GREEN AGENDA ARMENIA

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National Comprehensive Green Transition Assessment Report for Armenia

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Executive summary

This National Assessment for Armenia evaluates the country's readiness for a green transition. It examines key, related issues in the context of the objectives and targets of the European Green Deal and the Eighth European Environmental Action Programme (EAP) – the legally agreed, common agenda of the European Union (EU) for environment policy that is embedded in the EU acquis.

The assessment examines trends and the status of progress in sectors critical to Armenia's green transition. It highlights achievements, identifies gaps that must be filled, and outlines strategic pathways to advance progress in and across multiple sectors that are essential for facilitating such a transition.

The assessment provides a comprehensive analysis on the following themes: climate change; resource efficiency and the circular economy with a focus on waste management; environmental pollution; biodiversity and ecosystems; energy; buildings and renovation; sustainable food systems; and transport and smart mobility. It also examines key cross-cutting topics: just transition, digitalization, research and innovation, and sustainable finance.

In each area, the assessment focuses on the following aspects:

- **Policy and legislative readiness** as assessed by a review of the existing policy and legislative framework, including the EU and international obligations.
- **Institutional readiness** as indicated by a review of public capacity.
- **Non-institutional and private-sector readiness** as determined by analysing the capacity of businesses, NGOs, academia and other non-institutional actors.
- **Overall green transition readiness** of the country as determined by reviewing all sectors and cross-cutting issues.

Background

In recent years, Armenia has experienced significant socio-political and economic changes and shocks: the 2018 Velvet Revolution, the 2020 global Covid-19 pandemic, the military conflict with Azerbaijan in 2020, and the influx of more than 100,000 ethnic Armenians fleeing Nagorno-Karabakh and seeking refuge within Armenian borders in 2023.

Against this backdrop, Armenia faces challenges as it seeks to enhance its economic competitiveness, ensure the welfare of its people, and address the issues that facilitate a green transition and sustainable development. Challenges include low investment rates (including low levels of foreign direct investment); limited investments in human capital; low levels of connectivity, both within the country and with other countries; a lack of diversity in export commodities and markets; and the growing impacts of climate change.

To achieve inclusive and sustainable growth and make a green transition, Armenia must address these myriad challenges. In this pursuit, Armenia has an ambitious agenda to pursue low-carbon development. It reports regularly to the UN Framework Convention on Climate Change (UNFCCC), and it has cooperation agreements and frameworks with the EU to foster collaboration, particularly in sustainable development and environmental initiatives. High-ranking public officials, including the Prime Minister, have publicly expressed support for the EU Green Agenda and have stated that Armenia is an integral part of implementing it.[1] Armenia's commitments to developing a green economy are reflected in the Eastern Partnership Summit Declarations and the Comprehensive and Enhanced Partnership Agreement between the EU and the Republic of Armenia (CEPA), which governs the EU-Armenia economic and political relationship, including the alignment with EU acquis.

In 2024, key officials launched dialogues involving visa liberalization and other aspects of the EU Partnership agenda, and in January 2025, Armenia's government officially endorsed a draft bill, initiating its process to join the EU. In late March 2025, Armenia's Parliament adopted the bill into law.[2]

Though Armenia has received support through the various EU-funded projects and assistance from other donors (such as the UN, development banks and EU Member States), EU alignment has nonetheless proved to be quite challenging. Thus, this assessment aims to help outline an agenda to address challenges and move forward.

Key findings on green transition trends, challenges, readiness and ways forward

This assessment concludes that Armenia is at an early stage of developing its readiness for a green transition. Both strengths and weaknesses are evident, with levels of readiness varying from sector to sector.

Armenia faces challenges that have hindered progress. Challenges include insufficient policy frameworks, limited access to green technologies and solutions, a lack of coordination between sectors, limited awareness and education on green issues, and resistance to change from legacy industries.

Challenges on its transition pathways involve many dimensions. Armenia's competitiveness is constrained by insufficient regulatory frameworks and institutions. It lags in the implementation of its Public Administration Reform Strategy.[3] Corporate governance practices are weak, and levels

[1] According to a September survey carried out by the US-funded International Republican Institute, 58% of respondents expressed support for Armenia joining the EU in a potential referendum, while only 13% opposed it.

[2] https://armenpress.am/en/article/1215464

[3] https://www.arlis.am/DocumentView.aspx?docID=162791

of transparency are low. Armenia's transportation routes are burdened by bottlenecks that stem from its landlocked geography and geopolitical issues. Its integration into global value chains is limited. Small- and medium-sized enterprises have limited access to finance, and a significant amount of banks' funding in foreign currency involves very high interest rates. Human capital is also a key area of concern, with the economy struggling to absorb the labour supply, leading to high emigration rates. Even though the labour force participation of women is high, gender inequalities remain.

Addressing these barriers is crucial to ensuring that the transition to a sustainable, greener economy is achievable for Armenia and equitable for all stakeholders.

Table 1 provides an overview of Armenia's readiness progress across different themes of the European Green Deal. The subsequent sections will look at each theme more closely.

Table 1. Overview of Armenia's readiness progress across different themes

Thematic area	Overall readiness score
Climate change	**Some progress**
Resource efficiency and the circular economy with a focus on waste management	**Little progress**
Environmental pollution	**Little progress**
Biodiversity and ecosystems	**Some progress**
Energy	**Some progress**
Buildings and renovation	**Little progress**
Sustainable food systems	**Little progress**
Transport and smart mobility	**Some progress**

Little Progress

"Little progress" indicates that while foundational steps for a green transition have been initiated, related policies or practices remain largely misaligned with relevant EU or international policies. There may be isolated pilot projects or scattered legal provisions, but no cohesive strategy or widespread implementation is evident. Institutional capacities, budget allocations, and stakeholder engagement in this area are notably low, limiting the sector's readiness to transition effectively.

Some Progress

"Some progress" suggests that foundational measures have been introduced, and certain institutional structures, policies, or regulatory frameworks are beginning to align with green transition goals. Though reforms have taken hold in selected regions or sub-sectors, gaps still exist in full-scale enforcement, financial incentives, and cross-sector coordination. In this category, progress is evident, but implementation is uneven, and the impacts are not yet broad or transformative.

Significant Progress

"Significant progress" demonstrates that advanced alignment has emerged with the European Green Deal and related global commitments. Robust legal frameworks, clear targets, and strong institutional capacities are in place. Stakeholders (in government, the private sector and civil society) actively collaborate. Tangible results – such as measurable emissions reductions or increased biodiversity protection – are visible. Although there may still be room for refinement or scale-up, the foundational elements for a successful green transition are largely well established in this category.

Climate change	**Some Progress**

Trends and challenges

Armenia's Nationally Determined Contribution (NDC) target proposes a 40% reduction of greenhouse gas emissions by 2030 from 1990 levels. The target, although achievable with current policies, falls short of the EU's 55% target. Additional mitigation measures are needed to reach climate neutrality as set out in the 2050 Low Emissions Development Strategy (LEDS).

A significant portion of Armenia's past emissions reductions resulted from the post-Soviet economic downturn of the 1990s, not from sustainable climate policies.

Readiness status

Armenia has made some progress but faces significant challenges. While the nation has established a policy and legal framework, including its NDC and long-term strategies, these efforts are insufficient to meet the European Green Deal goals.

There are critical gaps in policy implementation, institutional and non-institutional capacity, and financial readiness. The country relies heavily on donor funding, and a lack of technical expertise hinders effective climate action. Most financing is focused on climate change mitigation,

while adaptation efforts lag. Research and innovation in climate-related fields and planning for a just transition are underdeveloped.

Progress has been made in setting the policy framework on sustainable finance with plans on introducing green taxonomy, and climate budget tagging in 2025. Still, substantial reforms are required to strengthen legislation, enhance institutional capacity, secure adequate funding, and improve technical expertise to achieve full readiness.

Ways forward

Adopt the Climate Change Law to establish a robust regulatory framework, including fiscal tools and quantitative targets for the reduction of greenhouse gas emissions. The law should mitigate cross-border adjustment mechanism (CBAM) impacts through carbon tax schemes, and it should incentivise private-sector climate action with ESG disclosures. Mainstreaming and sectoral policy coordination must improve.

Strengthen the Climate Change Coordination Council. Broader stakeholder involvement is crucial for effective cross-sectoral communication. Ministries require enhanced capacity, resources, and technical expertise, alongside competitive salaries to retain skilled staff.

Secure sustainable transitional funding. Armenia's NDC long-term financial strategy needs to be adopted, and public funding options explored. Assess carbon tax impacts and foster private-public partnerships.

Invest in enhancing the role of NGOs, civil society, and media in the green transition. Sustainable funding, capacity building, education and advocacy are needed.

Resource efficiency and the circular economy with a focus on waste management	**Little progress**

Trends and challenges

The collapse of the Soviet Union drastically changed Armenia's manufacturing industry, which relied on mining and the production of chemicals, machinery and equipment, textiles, and food and beverages. Currently, the leading sectors are food and beverage production, tobacco, cement (and other non-metallic mineral products), and metal mining.

Armenia's manufacturing industry generates 11.3% of GDP and 11.5% of its greenhouse gas emissions. The metal mining sector, which accounts for only 3% of GDP, dominates Armenia's goods exports. A country rich in natural resources, particularly copper, molybdenum, gold and dimensional stones, Armenia has 27 metal mines.

The intensity of energy use in Armenia's economy is growing. Energy intensity of Armenia's GDP has increased by 14.5% in recent years, the carbon footprint of Armenian GDP increased by 3%, and consumption of primary energy per capita increased by 13.2%, indicating low efficiency of resource use.

Readiness status

Armenia's legal framework does not align with the EU acquis on the circular economy, waste management, clean production, or resource efficiency (including the use of acquis definitions and quantitative, enforceable targets). The data-collection system for waste generation, landfilling, recycling and other types of waste treatment is very poor and inefficient. Legislation does not ensure full cost recovery through the "polluter pays" principle. Tax policies (environmental, landfill, solid waste treatment taxes and fees) provide no incentives for landfill diversion, reducing the use of primary raw materials, or increasing the use of secondary raw materials. Enforcement of the existing regulation is weak. There is institutional fragmentation and weak ownership of key state agencies competent in the waste governance and circular economy sectors.

Armenia has a weak regulatory set up. Green Economy Transition Strategy has been pending adoption since September 2023. The circular economy transition roadmap developed in 2022 has not yet entered the implementation phase and is currently undergoing revision. Industrial energy consumers are still not subject to mandatory energy audits or resource efficiency regulations. There are no mechanisms to promote waste sorting and recovery. Reliable data regarding waste management and circularity are lacking, hindering target setting and monitoring. This gap will be partially addressed through a new digital platform for special waste data reporting that will ensure the upcoming introduction of Extended Producer Responsibility (EPR).

Ways forward

Revise and establish clear mandates and responsibilities among state agencies to improve inter-agency collaboration and streamline policy implementation. Giving ownership of the green transition agenda to a deputy prime minister is likely to help with interagency coordination. Training programs and capacity-building initiatives for both the public and private sectors can address knowledge gaps around modern waste management, resource-efficient production, and circular business models.

Introduce policy instruments for mandatory audits for resource-intensive enterprises and voluntary agreements between the public authorities and private enterprises for improved resource efficiency and reduced pollution.

Provide technical guidance, training, and financial resources to local authorities and municipalities to enable them to implement effective waste-management and circular-economy initiatives. A robust data-collection and reporting mechanism is essential to help track progress, identify bottlenecks, and inform evidence-based planning and policy decisions, create accurate baselines, and facilitate monitoring of progress towards green transition goals.

Modernise the sector. Improve enforcement and monitoring system, and upgrade waste management infrastructure and technologies to modernise the country's waste collection, sorting, and recovery, including biodegradable waste treatment, such as composting and anaerobic digestion (biogas production).

Develop financial mechanisms and policy instruments that make circular practices cost-effective. To this end, it should create tax incentives, grants, or low-interest loans that encourage both public and private stakeholders to invest in circular business models, technologies, and infrastructure. It should offer financial tools and risk-sharing mechanisms to attract capital and stimulate research and development in sustainable waste management solutions.

Environmental pollution	**Little progress**

Trends and challenges

Environmental pollution issues are emerging public concerns. Increased construction, road transportation, and landfill open burning in the capital city, Yerevan, has led to growing public discussions about air pollution.[4]

Water pollution is also a concern, as currently Armenia has no municipal wastewater treatment plants that provide biological treatment. The six plants operating perform only mechanical treatment to remove large solid objects. The water and sanitation agenda is also gaining momentum in the country, with a focus on water overuse and insufficient treatment of wastewater. Future freshwater resources per capita are expected to decline further due to population growth, climate change, and Türkiye's plans to build additional reservoirs on the upper reaches of the Araks River.[5]

Land degradation and desertification in Armenia are driven by both natural and anthropogenic factors. Human-induced causes include inefficient agricultural practices, such as lack of crop rotation, inefficient use of irrigation techniques, overgrazing of pastures, overuse of groundwater resources, soil contamination, and mining. Climate change is increasing risks and aggravating degradation processes.

Soil contamination is also a concern. Though chemical contamination has not increased recently (because of the collapse of the chemical industry in Armenia), pollution from minerals has grown due to the relatively low cost and incorrect application of chemical fertilisers, especially nitrates. Soil pollution from uncontrolled waste dumpsites is also significant. The increase in contaminated lands is evident in all rural areas of Armenia.

[4] Yerevan's Air Pollution Problem: City Authorities Contest Disturbing International Data (February 1, 2025), Hetq [https://hetq.am/en/article/172398]

[5] AUA Acopian Centre for the Environment. (2024). Water Sector Political Economy Analysis for USAID Armenia Improved Water Management Programme (USAID and Deloitte Consulting).

Readiness status

Although some progress has been made on air quality, emissions control, and environmental monitoring, overall progress in the sector remains quite low.

Armenia faces several structural constraints in its water sector. The country lacks a holistic, cross-sectoral water policy with clear efficiency and quality targets, leading to fragmented governance and weak coordination among responsible agencies. However, efforts are underway to develop a whole-of-government water strategy in the country.

Water distribution to farmers remains inefficient, with outdated irrigation systems and subsidies encouraging excessive consumption rather than conservation. Armenia's reliance on aging Soviet-era infrastructure results in significant water losses, with municipal drinking water losses reaching approximately 70%. Wastewater treatment remains highly inadequate, with only 1% of wastewater treated and limited biological filtration capacity in existing facilities.

Climate change poses a growing challenge to Armenia's water security. Lake Sevan, a critical freshwater resource, is at risk due to reduced inflows and nutrient pollution from untreated municipal wastewater and agricultural runoff. Industrial pollution, particularly from mining and metallurgy, further degrades water quality, while the absence of effective economic instruments to regulate water consumption hinders conservation efforts. Additionally, Armenia's transboundary water relationships, particularly with Azerbaijan, remain politically sensitive, complicating cooperative management of shared water resources.

Land degradation is exacerbated by industrial activities, including mining, agriculture, and construction. Soil contamination through tailings and fugitive dust of the mining sector poses health risks, especially for children. Inefficient agricultural practices – such as overgrazing, outdated irrigation methods, and soil salinization – have led to severe land degradation, particularly in the Ararat Valley. The continued expansion of unmanaged landfills on fertile agricultural land further reduces the country's productive land base. While laws regulate soil management and pollution, enforcement remains weak, and local communities often lack the resources to address environmental damage effectively.

Without sustained government action, increased funding for monitoring programmes, and a robust chemicals management framework, the risks posed by chemical contamination will persist. The absence of a comprehensive law on chemical substances, a weak institutional framework for pesticide and chemicals registration, and limited public awareness hinder progress. The contamination of sites like the Nubarashen obsolete pesticide burial site, where over 1,250 tons of hazardous pesticides remain, underscores the urgency of improving waste disposal and regulatory oversight. The Nairit chemicals plant also requires urgent attention.

Ways forward

Prioritise monitoring systems and registers for air quality, water management, soil and land degradation, and chemicals to improve transparency and public engagement. Strengthen the capacity of expert bodies involved in measuring and reporting to enhance the country's ability to take timely action against pollution.

Strengthen regulatory reforms and enforcement mechanisms to address pollution from industry so that businesses install emission-control technologies, undergo independent audits, and comply with stricter permit conditions.

Establish a functional emissions testing and enforcement system for vehicles. Promote the adoption of electric vehicles (EVs) through financial incentives, tax breaks, and improved charging infrastructure to significantly reduce urban air pollution. Develop and enforce stricter regulations on waste burning, landfill operations, and crop-residue management to prevent the release of hazardous pollutants.

Increase public awareness of environmental health risks and encourage related behavioural changes. Nationwide campaigns should educate citizens on the health risks of air, water, land and chemical pollution and the importance of sustainable choices. Encouraging businesses and individuals to adopt cleaner technologies, such as using energy-efficient heating systems and avoiding unnecessary vehicle use, will help reduce pollution. Noise pollution should also be addressed through stricter urban planning regulations, zoning laws, and improved enforcement of noise-related administrative fines, particularly in Yerevan and other urban centres.

Develop a comprehensive and cross-sectoral water strategy, aligned with the EU directives. Integrate clear targets for water use efficiency, quality management and conservation. Strengthen coordination between key institutions. Enhance transboundary water cooperation, particularly with Georgia and Iran, to secure shared water resources and improve water management.

Invest in infrastructure to reduce water losses and improve efficiency in both agricultural and municipal sectors. For agriculture, upgrade irrigation systems from energy-intensive pumping to more sustainable gravity-fed systems, and promote drip irrigation. Expand wastewater treatment capacity to reduce nutrient pollution and improve water quality.

Adopt strict regulatory measures to promote water conservation and efficiency. Introduce tiered water pricing, where higher consumption leads to increased rates. Establish regulatory requirements for industries to recycle and reuse waste. Provide financial incentives such as tax credits and grants to businesses and households that adopt water-saving technologies and practices.

Transition to sustainable agricultural practices to reduce pesticide dependency. Promote agroecological approaches, integrated pest management, and organic farming. Give farmers targeted subsidies, training programmes, and technical support to adopt ecosystem-based pest-

control methods. Strengthen partnerships with research institutions, NGOs, and international organizations to facilitate knowledge-sharing.

Biodiversity and ecosystems	Some Progress

Trends and challenges

Armenia is rich in biological diversity at the genetic, species and ecosystem levels. The country crosses the Caucasian and Irano-Anatolian Biodiversity Hotspots. Flora, fauna and habitats are exceptionally diverse and remarkable.

Major threats to biodiversity stem from illegal logging, poaching, wildfires, unsustainable harvesting, and the use and illegal trade of flora, fauna and fungi. Indirect threats are posed by environmental pollution; large-scale agricultural production; unregulated use of pesticides; habitat fragmentation, destruction and loss caused by mining and infrastructure development; and the expansion of invasive alien species that contribute to the decline of species, habitat diversity and quality. One of the major challenges for key habitats and migratory species is the long-lasting armed conflict between Armenia and Azerbaijan.

Readiness status

Armenia has made some progress overall. It has the potential to reach significant progress by more closely aligning with EU directives, building institutional and non-institutional capacities, strengthening enforcement and expanding dedicated biodiversity funding.

Armenia has made significant progress in preparing a comprehensive policy and legislative framework on biodiversity conservation. However, some key documents, such as the Strategy and State Programmes of Conservation and Use of Specially Protected Areas and the Red Book of Armenia require an update, while the National Biodiversity Strategy and Action Plan is under preparation.

Some progress has been made in policies and legislative implementation and in capacity building, and Armenia has established an EcoPatrol Service. However, there has been little progress in terms of alignment with the EU Bird and Habitat Directives.

Though Armenia has made significant progress on research and innovation funding, biodiversity inventory and monitoring has not been properly structured and harmonised in ways needed to underpin evidence-based decision-making.

Current levels of forest restoration and tree planting efforts are insufficient to meet set targets.

The crucial role of biodiversity and ecosystem services in human wellbeing, urban development,

and other sectors is undervalued, with limited financial resources available to address nature conservation and biodiversity.

Ways forward

Use Armenia's hosting of COP17 under the Convention on Biological Diversity in 2026 to provide additional impetus to accelerate progress in the sector.

Align Armenia's legislation and strategic documents with the EU Birds and Habitats Directives, the EU Biodiversity Strategy, and the Nature Restoration Regulation.

Increase extent of the specially protected nature areas and OECMs to meet the global target 30x30, improve ecological connectivity and enhance specially protected nature areas management effectiveness.

Strengthen institutional capacity, particularly for the newly established EcoPatrol Service and the management effectiveness of state sanctuaries and nature monuments within specially protected nature areas.

Enhance the effectiveness of the state non-commercial organization "Hayantar" SNCO in forest landscape restoration to meet the commitment to doubling forest cover by 2050.

Create a unified, national biodiversity monitoring and inventory system, and encourage innovation among scientific research institutes specializing in botany, mycology and zoology, and research NGOs conducting biodiversity studies.

Increase biodiversity budget allocations to address long-term conservation and restoration needs and reduce dependence on funding from international donors. To encourage non-state actors to contribute to the transition, provide ways for them to participate in decision-making processes.

Energy	**Some Progress**

Trends and challenges

In 2021, Armenia produced 7.7 TWh of electricity, generated from natural gas (44%) (3.4 TWh), hydro and other renewables (30%) (2.3 TWh), and nuclear (26%) (2.0 TWh).[6] Approximately 86% of natural gas is imported from Russia and the remainder from Iran. Russia also supplies nuclear fuel. Overall, Armenia imports 76% of all total primary sources, and 94%, including enriched uranium, to fuel the Armenian Nuclear Power Plant.

[6] IEA 2021 Energy Balance for Republic of Armenia

The recently approved Energy Sector Development Strategy (through 2040) is intended to guide Armenia's energy future, with a focus on increased renewables (solar and wind development and upgrading hydro); extending the life of the nuclear plant, and constructing a new nuclear power plant to replace it; boosting energy efficiency; increasing power transmission links with Georgia and Iran; and continuing liberalization of the electricity market (launched in 2022).

In energy efficiency of end-use, Armenia has not been able to initiate any alignment with EU Directives related to eco-labelling of energy-consuming devices and appliances, since pre-existing mandatory provisions of the Eurasian Economic Union have created a legal friction.

Weak governance and administrative inefficiencies pose risks that could delay the implementation of crucial energy policies, particularly those linked to renewable energy, energy efficiency, and achieving alignment with EU directives. Uncertainty surrounds the construction of a replacement nuclear reactor beyond 2036, posing significant risks: Armenia currently lacks viable alternative power generation options, and without strategic planning, it may struggle to maintain energy security while reducing its dependence on imported fossil fuels.

Armenia's integration into regional energy markets is limited, hampering the development of its renewable energy sector. Without strong interconnections, the country may face difficulties in balancing supply and demand, especially as solar and wind power generation increases. The lack of cross-border trade mechanisms for electricity could limit Armenia's ability to manage peak generation periods efficiently.

Financial and technical constraints present challenges. Most energy-related investments have focused on supply-side infrastructure rather than demand-side energy efficiency improvements, particularly in the building sector. Funding mechanisms for residential and public building energy retrofits remain underdeveloped. The absence of a long-term energy efficiency strategy, coupled with limited government funding for research and innovation, restricts progress. Gaps in technical expertise and the lack of skilled professionals in renewable energy and efficiency-related fields pose further hurdles. Indeed, the ongoing brain drain from engineering and energy professions to the IT sector, combined with a failure to cultivate new technical expertise, weakens Armenia's institutional and technical capacities, making long-term energy planning and policy implementation more difficult.

Readiness status

This sector shows some progress, as evidenced by the ambitious energy reforms after the collapse of the Soviet Union and a large uptake of renewables, reaching up to 300 MW in the last decade. The legislative and regulatory framework exhibits some level of alignment with the Comprehensive and Enhanced Partnership Agreement between the EU and Armenia.

Despite progress, Armenia faces substantial institutional and governance challenges. The merger of the Ministry of Energy with the Ministry of Territorial Administration and Infrastructure weakened the government's capacity to develop and oversee energy policy, particularly in

renewable energy and energy efficiency measures. The absence of a dedicated energy agency has slowed policy implementation. Staff turnover in key ministries has disrupted reform momentum towards alignment. The ambitious policies adopted in the renewable energy sector triggered substantial growth in solar energy capacities, however, this progress faced technical limitations of the domestic transmission and distribution network, as well as lack of opportunities for integration into regional electricity markets.

Ways forward

Enhance the ability of government agencies to implement and monitor energy policies, particularly in alignment with EU frameworks. To support the adoption of renewables, invest in transmission infrastructure and the development of energy storage solutions. To improve efficiency and reduce Armenia's dependence on external energy sources, integrate smart grid technologies and expand regional energy partnerships. To strengthen the national standards in design and quality assurance infrastructure for renewable energy and energy efficiency technologies.

Strengthen educational and vocational training programmes, particularly in renewable-energy system design and installation, to help bridge skills gaps and build a workforce capable of sustaining the green transition.

Use business incentives and tariff schemes to encourage private-sector investment and stimulate the development of emerging technologies that can drive sustainable energy development. Address institutional, technical, and financial barriers to help secure Armenia's energy future and, at the same time, advance towards a greener, more resilient economy.

Address gaps in institutional capacity, policy implementation, and infrastructure development to fully capitalise on international commitments, including the Paris Agreement and EU alignment efforts that offer opportunities for further integration into European energy markets and access to climate finance.

Buildings and renovation	**Little progress**

Trends and challenges

Buildings represent the largest energy-consuming sector in Armenia. Buildings account for nearly 40% of electricity demand and over 25% of gas demand. The residential subsector accounts for the lion's share of Armenia's total energy consumption.

Most of Armenia's buildings are residential dwellings (individual houses (52%), multi-apartment buildings (45%)). Nearly two-thirds of Armenia's population lives in urban areas. Apartment buildings dominate in cities such as the capital, Yerevan, where 37% of Armenians live. The

exterior wall materials of apartment buildings are stone (70%) or prefabricated panels (23%). Most apartment buildings were built 35 to 60 years ago, when energy-saving standards were not considered.

Natural gas predominates as a fuel source, accounting for 70% of residential fuel consumption (followed by biomass, 29%).

Readiness status

Despite Armenia's demonstrated commitment towards achieving energy efficiency in the building sector, progress remains slow.

Armenia is currently implementing its second National Energy Saving and Renewable Energy Programme (NESREP) for 2022-2030. Its first triennial Action Plan for 2022-2024 (to be viewed as the 3rd National Energy Efficiency Action Plan), and (as of May 2025), its second Triennial Action Plan was pending adoption. The country has adopted several beneficial legal measures, including mandatory technical provisions for energy efficiency in new residential building construction, and in capital renovation and reconstruction of buildings that use state budget funds, transposing some of the energy performance of buildings directive (EPBD) provisions.

Armenia lacks a national building renovation strategy and plan. Quantitative data are lacking on many aspects, including annual renovation and retrofit rates, energy-saving targets, and emission reductions.

Energy audits and standards in residential and public buildings are applied on a voluntary basis, are weakly enforced, and use myriad, sometimes conflicting standards. Indeed, aligning with EU building and renovation standards and energy performance certification system has the potential to stimulate market development and increase the demand for energy-efficient buildings by imposing a clear and reliable method for estimating energy savings.

Ways forward

Take steps to align with the requirements of the recast EU Energy Efficiency Directive and the EU Energy Performance of Buildings Directive. Undertake capacity building to address technical requirements. Clearly define a cost-optimal analysis procedure and quantitatively define standards for zero- and nearly-zero energy buildings and low-carbon buildings (LCB), energy performance certificates and mortgage portfolio standards.

Develop a national building renovation strategy and action plan – including quantitative targets for residential and non-residential buildings and allocation of responsibility for the implementation of the renovation programme. To establish a building digital registry, develop a building reference database, and define worst-performing buildings.

Provide financial support to Armenia's building renovation plan. Clearly define roles and

responsibilities, and allocate a mandate to government institutions to carry out, coordinate and financially support Armenia's renovation plan.

Harmonise legislation in key areas to fill gaps. Introduce consistent definitions and methodologies to harmonise approaches to building and renovation. As one example, define cost-optimality and energy poverty.

Incorporate key provisions into the Law on Renewable Energy and Energy Efficiency (now under development) to use it as a national policy instrument for buildings. Include references to the law on urban planning and minimum energy performance requirements for all types of buildings in Armenia, and outline criteria for obtaining permits for construction or reconstruction.

Develop new, mandatory minimum energy performance requirements for all types of buildings with specific definitions of standards for new buildings and for existing buildings undergoing retrofits.

Strengthen educational and vocational training in energy-efficient building design, energy auditing, and thermal renovation to bridge the skills gap and support a sustainable green transition in the building sector.

Provide government seed funding to move forward. For example, Armenia could introduce utilities' energy efficiency obligation schemes and/or soft "polluter pays" mechanisms and/or set up funds for targeted investment projects.

Sustainable food systems	**Little progress**

Trends and challenges

Primary agriculture is a cornerstone of Armenia's economy. It is the third-largest contributor to the country's GDP (9% of GDP) and provides livelihoods for approximately 30% of the workforce. Gross agricultural output (AMD 948 billion in 2023) includes plant production (47%) and livestock production (53%). More than two-thirds of Armenia's lands (68.7%) are designated for agriculture.

Self-sufficiency of food production of key food products (wheat, legumes, vegetable oil, poultry and sugar) is a concern.

The agri-food sector faces substantial obstacles. These include low productivity and inefficiency due to unsustainable management practices, fragmentation from early 1990s land privatization, climate-related losses, poor infrastructure, and limited technological advancements. Soil degradation, inadequate irrigation, pasture mismanagement, and groundwater overuse in fish farming are also concerns.

Many farmers lack the knowledge and skills needed to improve their farming practices. Despite efforts by universities and organizations to offer training and capacity building, knowledge gaps persist.

Climate change is increasingly playing a larger role, with weather events such as frosts, droughts, and hail damaging crops.

Readiness status

Though Armenia has made initial strides towards EU alignment. The policy and legal framework demonstrates moderate to good development, with notable progress in areas such as organic production, seed and planting materials, sustainable land and water management, and institutional capacity in matters such as climate-smart agriculture and agritech.

Nevertheless, alignment with EU standards remains at an early stage across most areas, with scores consistently low. Armenia needs a cohesive strategy addressing capacity-building, funding, and innovative practices to overcome limited and fragmented progress. Policy implementation faces significant challenges, particularly in matters such as sustainable diets and nutrition, and food loss and waste.

Private-sector capacity is underdeveloped. Research and innovation efforts are uneven. Financial readiness remains a pressing issue, with most sectors requiring substantial investment to bridge gaps.

Ways forward

Prioritise sustainable practices in agriculture and food processing, utilizing innovative technologies and resource-efficient approaches to help address water scarcity, land degradation and the impacts of climate change.

Adopt sustainable land and water management measures to address water scarcity and land degradation, and to stem the potential decline of crop yields. Effective management of pastures and meadows is also critical. Update outdated irrigation infrastructure to deliver water efficiently.

Leverage climate-smart agriculture practices that can integrate sustainability into farming practices, enhance resilience to climate change, and, at the same time, boost productivity. Such approaches can reduce greenhouse gas emissions by reducing methane and nitrous oxide emissions in the agri-food value chain; promoting carbon sequestration in soils; and enhancing energy efficiency in production, processing and distribution.

Pursue energy efficiency and use of renewable energy in food processing through modernizing food-processing facilities with energy-efficient and renewable energy solutions, such as solar and biogas systems, and energy-efficient equipment.

Minimise food loss and adopt waste valorisation measures to reduce waste, create additional revenue and support environmental goals. Such practices include composting, vermicomposting, and related waste-to-nutrient management; reducing food loss and waste through sustainable post-harvest and handling management; the use of integrated pest management; employing energy-efficiency measures; adopting an agrivoltaics strategy; and using drones for precision agriculture.

Promote nutrition, food security, and sustainable diets and consumption patterns by encouraging shifts towards more sustainable and plant-based diets. Promote related education, awareness, and collaboration by investing in research, innovation, and technology to support sustainable agriculture. Promote behavioural change and foster collaboration among stakeholders. Educate farmers, processors, and consumers about the advantages of sustainable practices to facilitate widespread adoption.

Align legal and policy frameworks with EU standards, and improve enforcement mechanisms by adopting best practices and standards.

Integrate digitization into related processes to enhance efficiency and transparency. Create centralised electronic platforms for legal documentation, compliance tracking and reporting. Use advanced digital tools to support real-time monitoring and enforcement, ensure consistent application of standards and reduce gaps in compliance, and promote accessibility and participation.

Transport and smart mobility	**Some Progress**

Trends and challenges

Transport is a critical sector for achieving greenhouse gas emission-reduction targets. Transportation accounted for around 21% of carbon emissions in 2022, with light-duty passenger vehicles the biggest source.

Road transport is the most important transportation mode in Armenia, with a road network of 7,792 kilometres. A strategic component of Armenia's road infrastructure is the 550-kilometre-long North-South Road Corridor being built, which, when completed, extends the trans-European transport network and connects the full length of Armenia, from Iran to Georgia.

Though Armenia is not now a transit country for international goods, the introduction of the North-South Road Corridor has the potential to change this, and to lead to a significant increase in the volume of road traffic, air pollution and greenhouse gas emissions in Armenia.

The number of vehicles per capita has rapidly grown, with the rise of the use of personal vehicles increasing traffic jams in rush hours in Yerevan and underscoring the inadequacies of its urban

transport infrastructure. The share of electric vehicles in personal transport is increasing steadily. An estimated 10% of all vehicles purchased in 2023 were electric vehicles (EVs), with tax waivers helping adoption.

Readiness status

Some progress has been achieved in the sector, and there is some level of alignment with the Comprehensive and Enhanced Partnership Agreement between the EU and Republic of Armenia.

Emission-reduction initiatives, regulations and policies have been put in place. For example, in Yerevan, there are plans to procure enough electricity-powered buses to constitute 20% to 30% of the total fleet of the city. Emissions standards and regulations have been established to promote the use of electric and compressed natural gas (CNG)-powered buses. Armenia has introduced policies and incentives to support renewable energy generation, with electric mobility becoming an integral part of this new system.

Ways forward

Involve stakeholders in creating and adopting a well-coordinated transportation strategy that ensures alignment between government policies, private-sector initiatives, and international commitments. Focus on developing a clear roadmap that integrates sustainable mobility solutions, strengthens institutional coordination, and enhances funding opportunities for green transport projects.

Core priorities include the following:

Install EV charging infrastructure to encourage the adoption of EVs by addressing concerns around range anxiety.

Develop and integrate sustainable mobility infrastructure. Optimising public transport can significantly reduce emissions and decrease urban congestion. Invests in active transport modes such as cycling and pedestrian infrastructure to promote healthier lifestyles and improve urban mobility. Enhance rail infrastructure to provide an efficient alternative to road travel, reduce dependence on personal vehicles and mitigate transport-related emissions. Provide financial support mechanisms, including subsidies for EVs and sustainable transport projects.

Boost technical and institutional capacity. Implement intelligent transport systems (ITS) and digital technologies to improve traffic management, optimise transport planning and enhance overall efficiency. Strengthen data collection and monitoring systems to ensure better decision-making and facilitate transparent reporting on emissions and transport performance. Undertake capacity-building initiatives to equip the workforce with the necessary skills in green transport technologies.

Provide education and increase public awareness to drive behavioural change, and secure community support for sustainable transport. Provide comprehensive education programmes to build expertise in green mobility. Undertake public campaigns to encourage the adoption of eco-friendly transportation habits. Adopt a just transition approach to ensure that workers in traditional transport sectors are not disproportionately affected; provide them with reskilling opportunities to participate in the evolving green economy.

Cross-cutting issues for a green transition

Just transition

The concept of just transition remains underdeveloped in Armenia. Barriers to achieving a just transition include fragmented institutional coordination, insufficient stakeholder engagement, weak labour rights protections, and inadequate data, especially regarding gender and child labour.

To move forward, social dialogue mechanisms such as the Republican Tripartite Commission must be empowered, and inclusive participation across civil society, academia, and affected communities must be ensured. It is critical to address systemic issues such as a lack of inclusive and modernised VET programmes, insufficient occupational safety and health standards, and limited climate-related social protections.

Embedding gender equity, policy coherence, and financing mechanisms into Armenia's transition plans is essential for fostering long-term resilience and equity across sectors. Capacity building, comprehensive data systems, and multi-level collaboration will serve as the foundation for Armenia's National Just Transition Plan.

The most immediate next steps for advancing a just transition in Armenia include:

- **Establish a coordinated just transition framework.** Form a cross-ministerial working group to design Armenia's National Just Transition Strategy with clear objectives, responsibilities, and sector-specific guidelines aligned with principles of the International Labour Organization and frameworks of the Comprehensive and Enhanced Partnership Agreement between the EU and the Republic of Armenia.
- **Invest in capacity building and inclusive participation.** Launch comprehensive training programmes for government bodies, civil society, and local communities on gender, labour rights, climate policy, and data systems; strengthen the role of the Republican Tripartite Commission and ensure systematic stakeholder engagement

Digitalisation

Digital technologies – artificial intelligence (AI), the internet of things, remote sensing, geographic information system (GIS) mapping, and blockchains – offer efficiency, transparency, and predictive capabilities to support sustainable development. While Armenia has made strides in digital governance and private-sector engagement, critical gaps persist, particularly in cybersecurity regulation, data interoperability, and sector-specific digital infrastructure.

Fragmented data systems, a lack of unified standards, outdated legal frameworks, and uneven public digital literacy are key challenges. Each sector addressed in this assessment shows

evidence of both progress and unmet potential stemming from inconsistent digital adoption, limited investment, and a lack of cohesive policies. Addressing these will require robust national strategies, legal and technical reforms, and strengthened public-private partnerships to ensure secure, efficient and inclusive digital transformation that supports environmental and climate goals.

Three key next steps include:

- **Adopt and implement a revised national digitalisation strategy with a cybersecurity focus.** Finalise and execute the updated national digitalisation strategy beyond 2025, including the adoption of Armenia's first cybersecurity law, sector-specific standards, and regulatory frameworks for critical infrastructure, ensuring alignment with EU and international standards.
- **Build an interoperable, standardised data ecosystem.** Develop a fully functional national data governance framework, including unified protocols for data sharing, monitoring, creating simulations, and forecasting across all green sectors. This includes expanding digital identification (eID) systems and integrating decentralised platforms for public- and private-sector collaboration.
- **Strengthen digital capacity and public engagement nationwide.** Launch inclusive digital literacy campaigns and training programmes on cybersecurity and environmental digital tools. Expand information and communication technology (ICT) infrastructure to rural areas. Enhance citizen engagement through accessible digital platforms and promote active involvement in environmental monitoring and climate action.

Research and innovation (R&D)

State funding of R&D has increased substantially, almost doubling since 2020. Armenia's ranking in the Global Innovation Index has been improving. Nevertheless, Armenia must overcome challenges in strategy, recruitment and retention of talent, and data on R&D.

Armenia lacks a comprehensive national research and innovation strategy. There is inadequate research infrastructure, weak coordination between academia and industry, and a lack of clear mandates for state institutions to commission and effectively utilise research.

Other key challenges include attracting and retaining research talent in Armenia. Perhaps linked to this (through limited absorptive capacity), Armenia's researchers underutilise funds available to them, such as the very sizable amounts available from international programmes (esp., EU Horizon Europe).

Key steps to advance the role of R&D in the green transition include:

- **Develop and implement a national research and innovation strategy that is aligned with green transition goals.** Formulate a comprehensive, cross-sectoral strategy that integrates

green transition priorities into research policy, includes clear mandates for institutions, supports private sector involvement, and aligns with EU standards.

- **Strengthen institutional capacity and funding mechanisms.** Increase R&D investments, especially for applied and green research. Enhance research administration. Improve data infrastructure, particularly for collecting and reporting of R&D data, as well as introducing approaches for tracking innovation. Create targeted incentives to attract and retain research talent. Foster collaboration across academia, government and industry.
- **Boost private-sector engagement and access to international opportunities.** Incentivise business-led R&D. Improve accounting for private research investments. Actively support Armenian institutions in accessing programmes like Horizon Europe by raising awareness, simplifying application processes, and offering technical support.

Finance for green transition

Armenia has made important strides in outlining its financial needs and potential sources for supporting a green transition, including through its nationally determined contribution (NDC), long-term low-emission development strategy (LT-LEDS) and other planning documents. Total green investment needs by 2050 are estimated to be around EUR 7.4 billion, most of this required for renewable energy, energy efficiency, sustainable agriculture and resilient infrastructure.

Financing is expected to come from a mix of public and private sources, with up to 75% expected to come from the private sector. While green loans, concessional financing, and early-stage green bond issuances are gaining momentum, Armenia still lacks key levers to move ahead. It would benefit from having a unified green financing strategy, sector-specific investment pipelines, and a strong enabling environment for private finance. Critical next steps are to finalise and adopt a green taxonomy and use its support mechanisms to facilitate Armenia's access to global green finance sources.

Key institutional and regulatory gaps remain in areas such as green taxonomy and environmental, social and governance (ESG) disclosure; green procurement; environmental taxation; and monitoring systems. Closing these gaps through coordinated policy, public-private collaboration, and strengthened institutional capacity is critical to unlock sustainable finance needed to reach Armenia's climate and development goals.

1. National Assessment Framework and Methodology

The National Assessment framework aims to provide a detailed overview of the methodological approach to the Green Transition National Assessment Report (NAR). It elaborates on the project background, goals and objective, as well as the methodology used in preparing the NAR, primarily based on the European Green Deal and other key EU policy frameworks. This Chapter will also discuss the process and structure of the Report.

1.1 Project Background, goals and objective

The National Assessment Report (NAR) has been developed under the project: **Green Agenda for Armenia, Georgia, Moldova and Ukraine (GA GUMA), funded by SIDA (Swedish International Development Agency) and implemented by SEI (Stockholm Environmental Institute).** The goal of the GUMA project is to assist Armenia, Georgia, Moldova and Ukraine in reaching climate neutrality goals through green transition. The project aims to achieve this goal by assessing the green transition readiness of participant countries in the light of alignment with European Green Deal (EGD) and other key EU climate and environmental policies, developing National Green Transition Roadmaps while providing technical assistance and awareness raising.

Ministries of Environment (MEnv), Territorial Administration and Infrastructure (MTAI), and Economy are direct project beneficiaries, while Ministries of High-Tech Industry (MHTI), Finance, Education, Science, Culture and Sport (MoESCS), as well as Labour and Social Affairs (MLSA) are also among the key stakeholders in the project.

1.2 Objectives and the scope of national assessment

The overall objective of **the National Assessment Report (NAR) is to evaluate Armenia's cross-sectoral readiness for Green Transition**.

The NAR focuses on a detailed analysis of eight thematic sectoral reports as per the EGD; climate action, circular economy and resource efficiency, environmental pollution and degradation, nature and biodiversity, energy, sustainable food systems, urban planning and development, buildings and mobility, consumer patterns and awareness, as well as four cross-cutting sectoral reports; just transition, digital transformation, research & innovation and sustainable finance.

The Report provides current status of environment and climate change and the major challenges the country is facing in that regard, indicating prevailing trends and closely examines:

- Policy and legislative readiness through a review of the existing policy and legislative framework, including the EU and international obligations
- Institutional readiness through the review of public capacity

- Non-institutional and private readiness by analysing the capacity of businesses, NGOs, academia and other non-institutional actors
- Overall country green transition readiness by looking at all sectors and cross-cutting issues and delivering a country green transition score to serve as guidance for developing the **National Green Transition Roadmaps and concrete project proposals** in the next phases of the Project.

1.3 Methodological Framework

The national assessment was being conducted through the lens of the **European Green Deal (EGD),** using this EU policy framework as a benchmark against the green transition objectives as set out in the agreements with the EU, policy dialogues or other international fora. The EGD sets out a comprehensive and ambitious strategy which proposes to transform the EU into a more sustainable, environmentally friendly, and climate-neutral economy and society by 2050, by assuring net-zero greenhouse gas (GHG) emissions, decoupling economic growth from resource use and leaving no person and no place behind in the green transition. In addition, this methodological framework uses the **EU 8th Environment Action Programme's (EAP**) objectives and targets that guide European environmental policy until 2030. The third EU reference policy framework used in this assessment is the **EU environmental and climate policy framework** and **EU acquis** and Chapter 27 in particular, as well as **the EU-Armenia Comprehensive and Enhanced Partnership Agreement (CEPA)**. The Report examines the overall EU alignment relevant for the EGD, but it does not provide a thorough assessment of Armenia's implementation of the Agreement. Consequently, the thematic scope is very much aligned with the priority themes, sectors, goals and objectives of EGD, 8th EAP, EU acquis and CEPA.

Below is Table 2 containing all the NAR assessment themes and sub-themes.

Table 2. National Assessment themes and sub-themes

Theme	Sector and Sub-themes
Climate Action	CC mitigation
	CC adaptation
Circular Economy and Resource Efficiency	Resources consumption
	Waste management/circular economy

Theme	Sector and Sub-themes
Environmental Pollution	Air (emissions, ambient air quality)
	Water resources management
	Noise
	Sustainable land resources management (pollution, contaminated sites, land use, pasture management)
	Chemicals management (Chemicals strategy, REACH)
Biodiversity and Ecosystems	Species, landscapes, protected areas, sustainable forest management (including non-timber resources)
Energy	Energy production and consumption, RE, energy efficiency, energy security
Sustainable Food Systems	Agriculture and fisheries (including aquaculture)
Urban Planning and Development, Buildings and Cities Mobility/ Transport	Spatial planning and urban development, buildings and smart mobility/transport
Consumer Patterns and Awareness	Ecolabing, consumer rights and advocacy, sustainable consumption and production related activities
Cross-Cutting Issues of the Green Transition	
Just Transition	All sectors
Digitalisation Supporting Green Transition	All sectors
Research and Innovation (R&I)	All sectors
Financing Green Transition	All sectors
Horizontal Measures	EIA, SEA, public participation in decision making, access to environmental information and justice, reporting requirements, environmental liability, environmental management (CSR, disclosures and certifications – iso, ecolabel, etc.)

Structure

Each **NAR** theme contains a detailed analysis, with following content and structure:

- **Status and Trends (Context) –** status and trends of the theme; main environmental problems related to the theme
- **Identifications of Main Enabling Conditions, Gaps and Needs**
- **EU Approximation –** how close is the country to EU's governance, policy and legislation
- **Main Priorities (from the gaps and needs identification)**
- **Readiness to Green Transition**
- **Conclusions/Pathways**

Indicators

The **NAR** uses EGD high-level strategic indicators and associated targets, as well as a selected set of the European Environment Agency (EEA) green transition indicators to assess the current status in Armenia. Datasets used to illustrate the existing trends cover the period between 2018-2022. Where available, some longer-term trends are also provided.

Definitions

For the purpose of this Report, terms and definitions of "Green Transition", "Readiness" and "EU Approximation" applied by the Finnish Ministry of Environment[7] and EU[8] have been used:

- **Green Transition** – a shift towards economically sustainable growth and an economy that is not based on fossil fuels and overconsumption of natural resources. A sustainable economy that relies on low-carbon solutions promoting circular economy and biodiversity
- **Readiness** – the complex interaction of parameters and conditionalities needed for an uptake of an issue – in the context of this report, a green transition. Readiness assessment in this report is the assessment of a list of themes and aspects ("parameters and conditionalities") on the progress towards green transition in the country
- **EU Approximation** – Process of harmonisation and compliance of strategies, policies and institutional framework to EU policies, targets and legislation

[7] https://ym.fi/en/what-is-the-green-transition#:~:text=The%20green%20transition%20means%20a,and%20overconsumption%20of%20natural%20resources

[8] https://reform-support.ec.europa.eu/what-we-do/green-transition_en

Research methods

In drafting of the Report, the national and international experts used:

- Desk study: compilation, analysis and synthesis of existing official statistics published by the Armenian Statistical Committee (Amstat), data provided by key focal point Ministries, EUROSTAT and UN datasets, and information contained in various thematic and strategic documents
- Comparative analysis of existing national and EU legislation and policies and identification of gaps
- Verification of data and assessments through consultations with focal point at the Ministries
- Process (country teams, SEI Team Leads, National Assessment teams)
- Use of data, sources, desk reviews, interviews with experts, stakeholder consultation, feedback incorporation
- Selection and use of indicators (core indicators, country-specific indicators or replacement indicators
- Assessment and expert judgement
- Green transition readiness tables

For Green transition readiness assessment, three gradient colour coded indicators were used, as shown in Table 3.

Table 3. Three gradient colour coded indicators

Readiness Assessment	Colour	Thematic assessment report scoring (for reference only, not to use!!)
Little progress/readiness	Hex code: #b5c8c9` (Light Blue)	0-1
Some progress/readiness	#6b9296 (Medium Blue)	2-3
Significant progress/ readiness	#205a5e` (Dark Blue)	3-5

2. Armenia's Green Transition Challenges

2.1 Geo-political context

Armenia is a landlocked country in the South Caucasus region, bordering Georgia in the North, Turkey in the West, Iran in the South, while Azerbaijan sits on its east and south-west borders. There is no direct border with the Russian Federation (Figure 1).

Figure 1. Map of the Republic of Armenia

Source: UN Geospatial https://www.un.org/geospatial/content/armenia

Armenia is a developing country and ranks 85th on the Human Development Index (2021).[10] Geopolitically aligned on many issues with Europe, the country is a member of Organisation for Security and Co-Operation in Europe, the Council of Europe, the Eastern Partnership, the Assembly of European Regions, and the European Bank for Reconstruction and Development. Armenia is also a member of certain regional groups throughout Eurasia, including the Asian Development Bank, the Collective Security Treaty Organisation, the Eurasian Economic Union, and the Eurasian Development Bank. Armenia supported the once *de facto* independent Republic of Artsakh (Nagorno-Karabakh), which was proclaimed in 1991 on territory internationally recognised as part of Azerbaijan, until the republic's dissolution in September 2023.

There have been several cooperation agreements and frameworks between the EU and Armenia, which foster collaboration in sustainable development and environmental initiatives.

Since 2009, Armenia has been a member of the Eastern Partnership (EaP), a joint initiative of the EU, its member states, and six Eastern European countries. While Armenia has expressed interest in closer cooperation with the Energy Community, it has not formally joined or adopted its acquis. In 2017, the EU and Armenia signed a Comprehensive and Enhanced Partnership Agreement (CEPA), which serves as the legal basis for political association and economic integration between the EU and Armenia. The country's high-ranking officials, including the Prime Minister have publicly expressed their support for the EU Green Agenda and have stated that Armenia is an integral part of implementing it[9]. Also, as a part of its cooperation with the European Union, Armenia has made commitments to a green economy. This is reflected in the Eastern Partnership Summit Declarations and the CEPA.

The latest EU-Armenia Partnership Committee meeting held on 11-12 June 2024 in Yerevan highlights the EU and Armenia's commitment to addressing environmental challenges and promoting sustainable energy solutions. Discussions focused on **Energy Security and Transition**, including projects like the Caucasus Transmission Network and the Black Sea Electric cable; **Environmental and Climate Action** and **Strategic Investments** with the Resilience and Growth Plan, supporting strategic investments, particularly in connectivity infrastructure in transport, digital, and energy sectors with a budget of EUR 270 million for 2024-2027.

The Green Deal and Green Recovery dimensions are high on the agenda of the new EU-Armenia Partnership Agenda currently being negotiated[10], which focuses on several key areas to strengthen and deepen their relations: **Political Dialogue and Reform, Economic and Trade Cooperation, Energy and Connectivity, Humanitarian Aid, Visa Liberalisation** and **Regional Stability.** These discussions highlight the EU and Armenia's commitment to a comprehensive partnership that addresses political, economic, and social challenges. In January 2025, Armenia's government officially endorsed a draft bill, initiating its process to join the EU.[11]

Armenia also experienced significant socio-political and economic shocks in recent years including the 2018 Revolution, the global COVID-19 pandemic in 2020, the military conflict with Azerbaijan, and the consequent influx of over 100,000 ethnic Armenians from **Nagorno-Karabakh** seeking refuge within Armenian borders in 2023. The immediate challenges, which require urgent actions are humanitarian needs of the displaced population, including providing shelter, food, healthcare, and psychological support.

The conclusions of the EU-Armenia Partnership Council meeting in February 2024 further stressed "the absolute necessity of **establishing durable peace and stability in the South Caucasus"**.

[9] According to a September survey carried out by the US-funded International Republican Institute, 58% of respondents expressed support for Armenia joining the EU in a potential referendum, while only 13% opposed it.

[10] https://eeas.europa.eu/eeas/eu-armenia-partnership-committee_en

[11] https://www.eeas.europa.eu/delegations/armenia/vice-president-schinas-yerevan-launch-dialogue-visa-liberalization-armenia_en?s=216

The EU reiterated its commitment to support the normalisation of relations between Armenia and Azerbaijan based on the principles of mutual recognition of territorial integrity and inviolability of internationally recognised borders based on the 1991 Almaty Declaration. The EU welcomed the policy direction of the Government of Armenia aimed at working towards peace and normalisation in the region, including the opening of regional transport links under the countries' sovereignties and national jurisdictions, as well as according to the principles of equality and reciprocity, which also underpin Armenia's "Crossroads of Peace" project.

The unpredictable geopolitical landscape results in low investment rates, including low foreign direct investment. Other challenges include limited human capital, connectivity limitations both within Armenia and with other countries, limited diversity in its export commodities and markets, and climate change impacts. Addressing these needs and challenges represent key constraints to achieve inclusive and sustainable growth. Positive progress on resolving Armenia's peace negotiations and reopening of borders with neighbours would expand Armenia's economic potential and potentially boost growth.[12]

Additionally, Armenia has historically maintained a strategic balance between its security partnership with Russia and its interest in deepening ties with the EU and the West. However, the Russian invasion of Ukraine has complicated this balance, creating new geopolitical tensions.[13]

In terms of regional cooperation, Armenia is part of the South Caucasus region, which includes Azerbaijan, Georgia, and Turkey. The region's geopolitical landscape is influenced by various external actors, including Russia, the EU, and the United States. Armenia's foreign policy aims to navigate these complex relationships while promoting regional cooperation. As for global cooperation, Armenia advocates for global cooperation and peacebuilding through initiatives like the Crossroads of Peace project. This project emphasises the importance of economic cooperation, democracy, and technological innovation in addressing global challenges.[14]

2.2 Socio-economic context

Armenia is a landlocked fast-growing transitional economy of 2.9 million people, located in the South Caucasus region. During the last three years, the economy demonstrated steady growth, reaching in 2023 the gross domestic product (GDP) of USD 19.5 billion (Figure 2) and GDP per capita of USD 6,572 (World Bank, 2023). The World Bank groups Armenia as an upper-middle-income country.

This growth was particularly high in 2022, at 12.6% compared to the previous year, making the country the fastest growing in Eastern Europe and Central Asia. In 2022 and 2023, this expansion

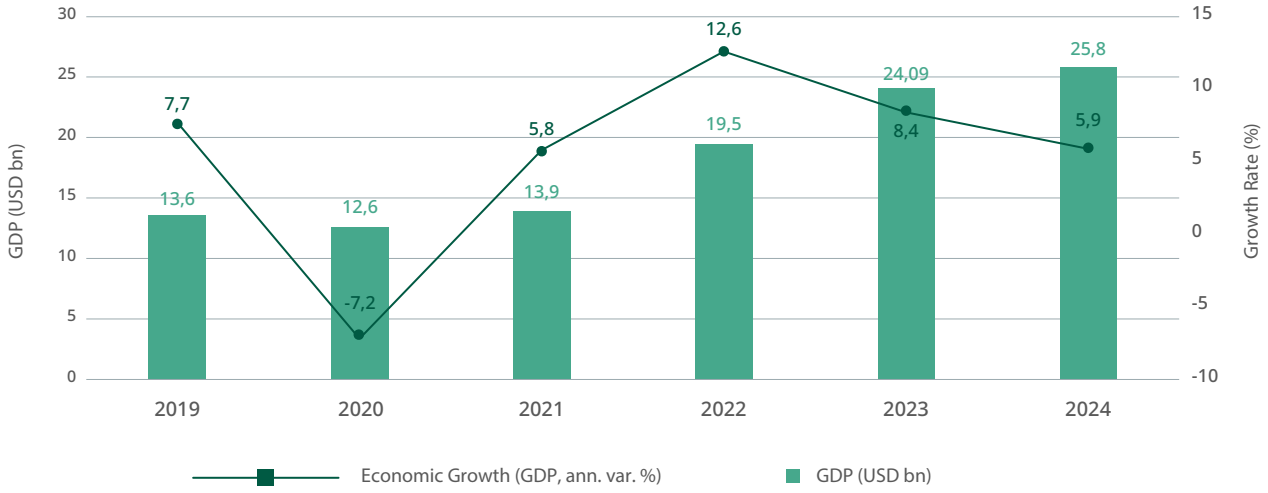
[12] World Bank, 2023

[13] See, for instance, www.cmi.no

[14] weforum.org

was fuelled by the influx of migrants, businesses, and increased capital following Russia's invasion of Ukraine. As of 2022, the services sector, particularly in IT, trade, and transportation, continues playing a significant role in driving this growth (World Bank, n.d.). Poverty rates measured by the national poverty line have declined steadily during the last twenty years and are projected to further decrease.

Figure 2. Republic of Armenia's GDP, total and per capita, 2019-2024 (USD current prices)



Source: Focus Economics[15]

While Armenia's economy shows signs of growth and resilience, it also faces several structural challenges that need to be addressed to ensure sustainable development (World Bank, 2023).

1. **Growth and Inflation**: The International Monetary Fund (IMF) forecasts inflation in Armenia to be 0.2% in 2024 and 3.1% in 2025. The economy has the potential for annual growth of up to 5.5% over the next five years, provided that structural reforms and opportunities for labour force integration are realised (IMF).
2. **Exports and Trade**: Armenian exports increased by 39% year-on-year in September 2024, driven by re-exports of precious and semi-precious stones and metals. The country's foreign trade turnover in January-October 2024 soared by 67.6% year-on-year to over $26.2 billion (IMF).
3. **Economic Challenges**: Despite significant development gains, Armenia faces challenges such as low investment, weak attraction of foreign direct investment, limited human capital, and connectivity constraints. The country is also vulnerable to climate change and geopolitical uncertainties (WB).
4. **Government Initiatives**: The government is pursuing ambitious plans to boost human capital through reforms in the education and health sectors. Progress in peace negotiations with neighbouring countries could expand Armenia's economic potential and boost growth (WB).

[15] https://www.focus-economics.com/country-indicator/armenia/gdp/

Nevertheless, Armenia has also experienced significant socio-political and economic shocks in recent years. These events have included the 2018 Revolution, the 2020 COVID-19 pandemic and the military conflict with Azerbaijan. Despite these shocks, the economy demonstrated its resilience that could be attributed to prudent macroeconomic policies, including active inflation targeting, adherence to fiscal responsibility, and effective oversight of the financial sector. The country has also been actively engaged in a wide range of reforms, including in the justice sector, healthcare, and social protection systems (World Bank, 2023). The annual medium-term growth is projected to be 4.3% in 2024-2025, helping to maintain an average inflation rate at 4% and reduce poverty further.

The outlook is subject to significant downside risks constraining inclusive and sustainable growth. These include recent developments related to the influx of 100,000 ethnic Armenians from Nagorno-Karabakh and the related humanitarian crisis, tensions at the Armenian border, the potential reversal of money transfer inflows, and a possible slowdown in trading partner economies (World Bank, 2023). Operating in a turbulent and uncertain geo-political context, the country struggles with low investment rates, weak attraction of foreign direct investment, limited human capital, connectivity constraints, both within Armenia and with other countries, and limited diversity in its export base and destinations. Armenia is also vulnerable to climate change.

Armenia exhibits medium transition performance in competitive, well-governed, resilient, and integrated qualities, as compared to other GUMA countries. The country nevertheless faces a number of challenges on its transition pathways in various dimensions. The country's competitiveness is constrained by insufficient regulatory framework and institutions. It lacks a unified and strategic approach to public administration reforms and has insufficient institutionalised actions against corruption, inefficient judiciary system, weak corporate governance practices, and low transparency. The country lags in such aspects as human capital and macroeconomic stability. The labour challenges are driven by the lack of adequate supply from the educational system as well as due to continuous emigration of the labour force. Gender inequality still exists. The country faces bottlenecks of transportation routes due to its landlocked geography and geopolitical issues; its integration into global value chains is limited; small and medium enterprises have low access to finance; and a significant amount of the banks' funding in foreign currency at very high interest rates. Addressing the environmental issues is required in multiple dimensions.

Armenia's manufacturing industry has drastically changed since the collapse of the Soviet Union. While during the Soviet period, the country was known for the production of chemicals and its heavy industries, machinery and equipment, textile, food and beverages production, currently, the current leading sectors are food and beverage production, tobacco, cement and concrete (and other non-metallic mineral products), and metals. Although de-industrialisation and a massive shut down of factories happened after the Soviet collapse, Armenia has started to prioritise the manufacturing industry during the last few years, and its potential has proved to be a success in reducing the poverty level, emigration and other major challenges faced by the country. Armenia's GDP largely depends on the manufacturing industry which contributes 11.3% of the country's GDP (ArmStat, 2022) equal to $2.28 billion (994.6 billion AMD), with some other major areas being agriculture, wholesale and retail, construction, mining and others.

The GDP structure of Armenia's industry and related sectors for the years 2017-2023 is presented below (Table 4), while the full list can be accessed following the reference link.

Table 4. Armenia's GDP structure, for select industries (2017-2023)

GDP Structure	Percent to GDP						
	2017	2018	2019	2020	2021	2022	2023
Agriculture, hunting, forestry and fishing	15.0	13.9	11.5	11.3	11.3	10.4	8.4
Mining and quarrying	3.3	2.8	3.3	3.9	5.5	3.8	2.9
Manufacturing	10.6	11.3	11.7	12.3	11.0	11.3	11.1
Electricity, gas, steam and air conditioning supply	4.1	3.5	3.1	3.3	2.9	3.0	2.6
Water supply, sewerage, waste management and remediation activities	0.5	0.5	0.5	0.4	0.4	0.4	0.4
Construction	7.3	6.6	6.3	6.9	6.5	6.8	6.9
Wholesale and retail trade; repair of motor vehicles, motorcycles	11.1	11.5	11.7	10.8	11.0	11.6	12.7
Transportation and warehouse economy	3.0	3.2	3.2	2.4	3.1	3.7	3.9
Other service activities	0.9	0.9	0.7	0.7	0.7	0.6	0.7

Source: ArmStat

Armenia's GDP largely depends on the manufacturing industry, which contributes 11.3% of the country's GDP (ArmStat, 2022), equal to $2.28 billion (994.6 billion AMD), with some other significant areas being agriculture, wholesale and retail, construction, mining and others. In 2023, the manufacturing industry was mainly dominated by light manufacturing, including food production at 33.5%, and had less input from heavy manufacturing. The mining industry has focused mainly on the mining of metal ores (94.4%). In 2023, Armenia has also increased the export level of different products, with the largest focus area being precious and semi-precious stones, precious metals, and articles (an overall 3.2 times increase in export amount compared to 2022).

The importance of the manufacturing industry has also been presented in the Armenian government's five-year plan (2021-2026), within which the government committed to provide at least $200mln to support those manufacturers that are able to produce high-quality, exportable

products, which can support the manufacturing sector to contribute 15% of the country's GDP. The government has identified the following five priority industries in the action plan: jewellery and diamonds; light industry, which will mainly focus on food and textile industries; heavy industry, which will mainly focus on metallurgical and chemical production; machinery; and pharmaceuticals.

Armenia has been active in the mining industry since the 1770s when it started copper extraction at the Alaverdi mine, later some other major mines were active such as the Kapan gold mine, the copper-molybdenum mine in Kajaran, etc. Currently, an estimated 800 mineral deposits exist in Armenia that have proven reserves. One of the priority areas for the Armenian government is the development of the mining industry. By 2026, the country is aiming at increasing the value of production to $1.7 billion, while the exports should reach US$1.5 billion.

According to the analysis of the Armenian Centre for Socio-Economic Studies, in 2021, 56% of the manufactured products were sold in the local market, while the rest was exported to different countries with 8.4% of products being exported to the Eurasian Economic Union countries.

2.3 Environment and climate change context and challenges

Armenia is particularly vulnerable to **climate change impacts** with the average temperature increases from 1929-2022 of 1.3 degrees Celsius. Between 1994 and 2014, Armenia lost well over USD 1.5 billion due to natural hazards like floods, landslides, drought, hail, spring frosts and mudflows.[16] Most affected sectors are natural ecosystems (aquatic and terrestrial, including forest ecosystems, biodiversity and land cover); human health; water resource management; agriculture, including fishery and forests; energy; human settlements and infrastructures; tourism.

Air pollution shows high incidents of high levels of pollution exceeding MACs (on SO2, NO2 and dust) when taking the daily or monthly averages. 619 such incidents have been recorded in 2023. The ambient air pollution comes from stationary sources (one-third from factories, plants, farms, landfills, etc.) and two-thirds from mobile sources (e.g. transport). For stationary sources, electricity production plants are the major source, with construction, agriculture, mining and quarrying and manufacturing covering the rest.

Armenia also experiences **severe water stress** due to excessive consumption, with nearly 40% of its available renewable water resources used each year, as indicated by the Water Exploitation Index.[17] Agriculture, including irrigation and aquaculture, is the primary water consumer,

[16] Armenia's 4th National Communication on Climate Change (https://unfccc.int/sites/default/files/resource/NC4_Armenia_.pdf)

[17] AUA Acopian Centre for the Environment. (2024). Water Sector Political Economy Analysis for USAID Armenia Improved Water Management Programme (USAID and Deloitte Consulting).

accounting for approximately 87% of total usage. Industrial sectors such as mining, metallurgy, energy, and food processing use about 7%, while municipal and domestic needs make up the remaining 6%. Future freshwater resources per capita are expected to decline further due to population growth and climate change.

Increasing **water insecurity** will impact food and energy security and economic growth. According to Armenia's Fourth National Communication on Climate Change (2020), river flow could decline by up to 39% by 2100, while inflows to Lake Sevan may drop by 12% by 2040 and 34% by 2100, affecting multiple sectors. Legacy of subsidised agriculture has contributed to inefficient water use and hindered conservation efforts.

Land degradation and desertification in Armenia are driven by both natural and anthropogenic factors. Human-induced causes include inefficient agricultural practices, such as lack of crop rotation, inefficient use of irrigation techniques, overgrazing of pastures, overuse of groundwater resources, soil contamination, mining, and more. In addition to the ongoing land degradation processes, climate change is increasing the risks and aggravating degradation processes.

Chemicals management in Armenia is fragmented and underdeveloped, despite the critical role chemicals play in key sectors like agriculture, mining, and pharmaceuticals. While the country is party to major international conventions and has taken steps to reduce highly hazardous pesticides, it lacks a functioning chemicals registry, clear legislation, and effective enforcement. Efforts to draft a comprehensive Law on Chemical Substances have repeatedly stalled due to institutional and regulatory gaps, unclear definitions, and limited capacities. To meet its CEPA obligations and align with EU and international standards, Armenia must urgently develop integrated legislation, improve interagency coordination, enhance oversight, and seek international support to build a sustainable and health-focused chemicals management regime.

Biodiversity loss in Armenia is predominantly caused by anthropogenic activities. In particular, the direct threats are illegal logging, poaching, wildfires, unsustainable harvesting, use and illegal trade of flora, fauna and fungi, etc. Additionally, indirect threats such as environmental pollution, large-scale agricultural productions, unregulated use of pesticides, habitat fragmentation, destruction and loss caused by mining and infrastructure development, expansion of invasive alien species are contributing to decline of species, habitat diversity and quality. One of the major challenges facing several protected areas, key habitats and migratory species is the long-lasting armed conflict between Armenia and Azerbaijan. Table 5 below shows the core indicators for environment and climate change with their values for Armenia and the EU.

Table 5. Selected key CC and environmental indicators, with relevant Armenian and EU values

Indicator	Armenian value	EU value	Information source
CC mitigation			
Total GHG emissions CO2 eq, Megatonnes per year (Mt/y)	- 6.3 (2022) - 20.6 (1990)	- 3 138 (2022) - 4 867 (1990)	EDGAR – Emissions Database for Global Atmospheric Research: https://edgar.jrc.ec.europa.eu/report_2023#data_download EEA viewer: https://www.eea.europa.eu/en/analysis/maps-and-charts/greenhouse-gases-viewer-data-viewers
Per capita GHG emissions, t CO2 eq	- 2.151 (2022) - 2.281 (2020) - 1.94 (2018)	- 7.009 (2022) – EU27; - 6.76 (2020) – global value	EDGAR – Emissions Database for Global Atmospheric Research: https://edgar.jrc.ec.europa.eu/report_2023#data_download EEA viewer: https://www.eea.europa.eu/en/analysis/maps-and-charts/greenhouse-gases-viewer-data-viewers
GHG removals (emissions from LULUCF), – Mt/y CO2 eq	-0,550 (2010) -0.523 (2005) -0.736 (1990)	- 37 (2022) - 324.54 (2015) - 217.47 (1990)	UN Framework Convention on Climate Change: Emissions Summary for Armenia https://di.unfccc.int/ghg_profiles/nonAnnexOne/ARM/ARM_ghg_profile.pdf EEA viewer: https://www.eea.europa.eu/en/analysis/indicators/greenhouse-gas-emissions-from-land/eu-emissions-and-removals?activeTab=570bee2d-1316-48cf-adde-4b640f92119b
Carbon intensity, kg CO2 eq per constant 2015 US$ of GDP	- 0.5 (2023) - 0.5 (2022) - 3.6 (1990)	- 0.2 (2022) - 0.3 (1990)	World Bank Group: https://data.worldbank.org/indicator/EN.GHG.CO2.RT.GDP.KD
CC adaptation			
Annual economic losses from all climate hazards, billion US$	- 0.557 (current trend) - 0.659 (moderate RCP 4.5) - 0.736 (worst-case RCP 8.5)	- 20 107 (2009-2023 moving average value)	Annual economic losses caused by weather and climate related extreme events in the EU Member States, EEA viewer: https://www.eea.europa.eu/en/analysis/indicators/economic-losses-from-climate-related/annual-economic-losses-caused
Drought impacts, total area affected, km2	- 2 512 (15% of agricultural land)	- 143 513 (2023) - 648 749 (2022) - 102 688 (2015)	World Bank Group: "Modernising Weather, Climate and Hydrological Services" https://documents1.worldbank.org/curated/en/684715483473713 95/pdf/134019-WP-P167315-Hydrometeorological-Report-Armenia-September2018-Final.pdf EEA viewer: https://www.eea.europa.eu/en/analysis/indicators/drought-impact-on-ecosystems-in-europe
Energy, buildings and transport			
Share of Renewable Energy Sources (RES), %	30.00 (2021)	21.89 (2021) 23.05 (2022)	IEA 2021 Energy Balance for Republic of Armenia. IEA, 2020; EEA viewer: https://www.eea.europa.eu/en/analysis/indicators/share-of-energy-consumption-from/progress-towards-renewable-energy

Indicator	Armenian value	EU value	Information source
Energy performance of buildings – average specific annual energy demand, kWh/m2	**Public sector buildings:** 300 kWh/m2 **Residential buildings:** 185 kWh/m2	**Public sector buildings:** 190 – 400 (depending on the climatic zone and functionality) R**esidential buildings:** 170 – 350 (depending on the climatic zone and occupancy)	Task 6 Report. Demand-Side Management Study. Danish Energy Management, p. 92.; EU Buildings Factsheets – European Commission)
Share of electric vehicles (EV), %	**1. Share of EV in current fleet of personal use vehicles:** - 2.5 (2023) **2. Share of newly registered EV:** - 10 (2023)	**Share of newly registered EVs** *-22.7 (2023)* *21.6 (2022)* *1.9 (2018)*	Statistic Committee of the RA; EEA: https://www.eea.europa.eu/en/analysis/indicators/new-registrations-of-electric-vehicles/new-registration-of-electric-cars-eu-27
GHG emissions from energy sector, Mt/y CO2 eq	7.1385 (2019)	926 (2022)	National Greenhouse Gas Inventory Report of Armenia 1990-2019 by Ministry of Environment; STATISTA: https://www.statista.com/statistics/1171183/ghg-emissions-sector-european-union-eu/
GHG emissions from transportation, Mt/y CO2 eq	2.1493 (2019)	803 (2022)	National Greenhouse Gas Inventory Report of Armenia 1990-2019 by Ministry of Environment; Greenhouse gas emissions from transport in Europe, EEA: https://www.eea.europa.eu/en/analysis/indicators/greenhouse-gas-emissions-from-transport/greenhouse-gas-emissions-from-transport?activeTab=570bee2d-1316-48cf-adde-4b640f92119b
GHG emissions change from energy use in buildings, 2005-2019, %	+51.25%, 2005-2019	-23%, 2005-2019	National Greenhouse Gas Inventory Report of Armenia 1990-2019 by Ministry of Environment; Greenhouse gas emissions from energy use in buildings in Europe, EEA: https://www.eea.europa.eu/data-and-maps/indicators/greenhouse-gas-emissions-from-energy/assessment
Resource efficiency and circular economy/waste management			
Waste generation per capita, kg/y	All of the below refer to year 2023 (mostly to Armstat report) 58,793.3 thousand tons/y (total waste) 58,360.0 thousand tons/y (industrial waste) 6,232.1 thousand tons/y (landfilled waste)	1. MSW: 513 (2022); 532 (2021) 2. Packaging: 188.7 (2022) 3. Food waste: 131, of which 70 kg is household food waste (2022)	National data: Armstat 2023; EU data: EUSTAT: https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20240208-2#:~:text=In%202022%2C%20the%20amount%20of,considerably%20among%20the%20EU%20members; UNEP food index for 2021 and 2024.

Indicator	Armenian value	EU value	Information source
	433,3 thousand tons/y (total MSW) 1. MSW: 146.2 kg per capita/y 2. Packaging waste: no data 3. Food waste: 67.3 kg per capita/y (46% of total MSW per 2020 study)		
Waste recycling/ recovery rate, %	MSW and packaging recycling: less than 5 (2023)	MSW: 48 (2022) Packaging: 64 (2022)	National data: GUMA expert's estimation EUROSTAT: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Municipal_waste_statistics#:~:text=48%20%25%20of%20municipal%20waste%20in,recycling%20and%20composting)%20in%202022
Municipal waste landfilling rate, %	95 (2023)	23.1 (2022)	GUMA expert's estimation; STATISTA: https://www.statista.com/statistics/1480844/european-union-municipal-waste-landfill-share/
Environmental pollution and degradation of natural resources			
<u>Air quality:</u> 1. PM2.5 concentrations, µg/m3 2. Health impacts of PM2.5: mortality per 100 000 inhabitants	**1. PM2.5 concentration** *- 26.4 or 5.3 times WHO value (2023);* *- 31.4 or 6.3 times WHO value (2022)* *- 33.9 or 6.8 times WHO value* (2021) **2. PM2.5 health impacts:** *- 105 (2019)*	**1. PM2.5 concentration** *- 88 (2022)* *-101 (2018)* **2. PM2.5 health impacts:** *- 78 (2022)* *- 76 (2019)* *- 97 (2018)*	AQ+: https://www.iqair.com/armenia UNEP note: https://www.unep.org/interactives/air-pollution-note/ https://openknowledge.worldbank.org/server/api/core/bitstreams/550b7a9b-4d1f-5d2f-a439-40692d4eedf3/content EEA viewer: https://www.eea.europa.eu/en/analysis/indicators/health-impacts-of-exposure-to/premature-deaths-attributable-to-exposure
<u>Water resources:</u> 1. Available freshwater resource per capita, m3 2. Water Exploitation Index (WEI), % 3. Water abstractions, M m3 4. Household water consumption per capita, m3 5. Population	**1. Available water resource per capita:** 3 100 **2. WEI** *- 46.7 (2023)* *- 77.3 (2022)* *- 65.7 (2021)* *- 49.5 (2020)* **3. Water abstractions:** *- 2897.2 (2022)* **4.Household water consumption, per capita**	**1.Available water resource per capita:** 4-5 000 **2. WEI+** *- 3.60 (2019)* *- 4.07 (2018)* **3. Water abstractions:** *- 196 604 (2022)* *- 203 879 (2010)* **4. Household water consumption, per capita:**	World Bank Group: Open Knowledge Repository, "Publication: Toward Integrated Water Resources Management in Armenia" https://openknowledge.worldbank.org/entities/publication/e9b38d1c-99c4-5ed0-8244-f6bbab693513 Ministry of Environment of the Republic of Armenia: Ecoportal https://ecoportal.am/en/page/indicators/#:~:text=Armenia%20is%20a%20country%20with,2023%20%2D%2046%2C7%25). UNSD https://unstats.un.org/unsd/envstats/Questionnaires/2022/Tables/Population%20connected%20to%20wastewater%20treatment.xlsx https://statbank.armstat.am/pxweb/en/ArmStatBank/ArmStatBank__8%20Environment__(C)%20Water%20resources/EE-c14.px/table/tableViewLayout2/?rxid=9ba7b0d1-2ff8-40fa-a309-fae01ea885bb

Indicator	Armenian value	EU value	Information source
connected to WWTP (secondary and tertiary), % **6. Groundwater monitoring stations with exceedances of 50 mgNO3/l limit value, %** **7. Nitrates in surface waters, mgN/l**	*- 44.8 (2022)* *- 48 (2000)* **5. WWTP connection rate** UNSD - 42.9 (2021) - 41.1 (2020) - 34.9 (2019) armstat - 79.8 (2023) - 80.8 (2022) - 81.2 (2021) - 77.9 (2020) - 74.7 (2019) ***6.* Groundwater monitoring stations with exceedances of 50 mg N/l limit value:** **7. Nitrates in surface waters:** - 1.1 *(2023)* - 1.25 *(2022)* - 2.01 *(2016)* - 1.6 *(2010)*	*- 45 (2022)* *- 47 (2021; 2020)* *-45 (2010)* **WWTP connection rate:** *-80.88 (2022)* *-78.81 (2015)* **5. Groundwater monitoring stations with exceedances of 50 mg N/l limit value:** 14.1% (2016-2019) **6. Nitrates in surface waters:** *1.7 (2021)* *1.8 (2018)*	Statistical Committee of the Republic of Armenia: Armstat https://armstat.am/en/ European Commission https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Water_statistics#Water_uses Water Statistics, EUROSTAT https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Water_statistics WEI+, EUSTAT https://ec.europa.eu/eurostat/databrowser/view/SDG_06_60/default/table?lang=en&category=sdg.sdg_06 Population connected to wastewater treatment at least at the secondary level in the EU-27, 2000–2022, EEA https://www.eea.europa.eu/en/european-zero-pollution-dashboards/indicators/population-connected-to-at-least-secondary-wastewater-treatment Nitrate in groundwater in Europe, EEA https://www.eea.europa.eu/en/analysis/indicators/nitrate-in-groundwater-8th-eap#:~:text=Despite%20legislation%20addressing%20nutrient%20pollution,l%2C%20has%20not%20been%20reduced
<u>Land resources</u> **1. Land structure/ cover, %** **2. Area of degraded lands, km2** **3. Area of land under stress, km2** **4. Soil carbon loss (SOC)** **5. Pesticide use, t/y (common with sustainable food systems)** **6. Reduction of soil degradation, %**	**1. Land structure/ cover:** total – 29 743 km2; agricultural area – 58.8% (16 748 km2); Grasslands – 15.3% (4 380 km2); Forest area – 11.5% (3 280 km2); Artificial area – 2.4% (692 km2) **2. Degraded lands:** 5 532 km2 or 19.44% of total land (2019) **3. Land area under stress:** 472 km2 or 1.6% of total land(2019) **4. SOC loss:** 99.3% of total land with stable SOC and 0.7% of total land with degraded SOC (2019) **5. Pesticide use:** *- 914 (2021)*	**1. Land structure/ cover:** total – 4 233 255 km2; agricultural area – 39% (1 730 000 km2); Croplands – 23% (1 060 000 km2); Artificial areas – 5% (222 592 km2); 'Natural' soils (i.e. without intensive management regimes): 52% **2.Degraded lands:** 60-70% of total soils (2020) 3.NA **4. SOC loss**: Area with low and declining carbon stocks – 23%. of which 0.6%	World Bank Group: Land Cover of Armenia https://data.worldbank.org/indicator/AG.LND.AGRI.ZS?locations=AM&view=chart%2Cchart%3Flocations%3DAM-AZ-GE UNCCD National Report 2022: Armenia https://data.unccd.int/country-overview?country=ARM&layer=LAND_DROUGHT_E5 2023 NEAP monitoring report; CBD 6th National Report, MEPA, 2019; Soil carbon, EEA: https://www.eea.europa.eu/publications/soil-carbon#:~:text=The%20cultivation%20and%20drainage%20of,removals%20of%2044Mt%20CO2 EUROSTAT: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Agri-environmental_indicator_-_consumption_of_pesticides#:~:text=In%202022%2C%20sales%20of%20pesticides,less%20than%20sales%20in%202011 Caring for soil is caring for life, Report of the Mission Board for Soil Health and food, Directorate-General for Research and Innovation 2020 Directorate-General for Agriculture and Rural Development, EC, file:///Users/lazi/Downloads/caring%20for%20soil%20is%20caring%20for%20life-KI0220673ENN.pdf

Indicator	Armenian value	EU value	Information source
		falls outside of agricultural areas (2020) **5. Pesticide use** *- 352 000 (2022)* *- ~354 200 (2021)* *-~360 640 (2011)*	
Chemicals **1. Number of substances restricted on their own, in mixtures or in articles** **2. Number of registered chemicals** **3. ODS reduction, ODP tonnes**	**1. Restricted chemicals:** - 180 (brand names of banned pesticide) (2013) **2. ODS consumption reduction:** - 2.32 (2023) - 6.3 (2018) - 24.9 (2009) - 174.4 (2003)		Tadevosyan A, Tadevosyan N, Kelly K, Gibbs SG, Rautiainen RH. Pesticide use practices in rural Armenia. J Agromedicine. 2013;18(4):326-33. https://doi.org/10.1080/1059924X.2013.826118 Country pharmaceutical situations. Fact book on WHO Level I indicators 2007. Geneva, World Health Organisation, 2007. UNEP Ozone Secretariat: https://ozone.unep.org/countries/profile/arm
Nature and biodiversity			
Number of endangered species **Percentage share of PAs, %** **3. Forest cover, %**	Number of endangered species: - 452 vascular plants, 40 fungal, 155 vertebrate and 153 invertebrate species listed in the Armenia's red list (2022)		Red book of Armenia; https://www.env.am/en/news/the-red-book-of-armenia-mobile-application-containing-information-on-the-species-registered-in-the-red-books-of-plants-and-animals-of-the-republic-of-armenia-has-been-run
Coverage by protected areas (PAs), %	- 13.1% of the territory of Armenia, including Lake Sevan (4.28% of the country's territory) (2022)		WWF, Development of the Protected Area System.: https://www.wwf.am/en/our_work/wildlife/development_of_the_protected_area_system/
1.Forest area, M ha **2. Degraded forests, %**	**1. Forest area:** -0.3341 million or 11.2% (2023) **2. Degraded forests:** 70 % (2005)	1. Forest area: 159.56 (2020) or around 39%	World Bank: https://documents1.worldbank.org/curated/en/099090523175040850/pdf/P17173815d072503018f461b8c8ded40056.pdf Hayantar. "National Forest Programme of the Republic of Armenia." RA Government Decision N123N. https://unece.org/fileadmin/DAM/timber/meetings/20170913/ National_Forest_Program_Armenia.pdf The European Union and forests: https://www.europarl.europa.eu/factsheets/en/sheet/105/the-european-union-and-forests

Indicator	Armenian value	EU value	Information source
Sustainable food systems			
Land Use,1000 ha:	**1. Agricultural lands excluding pastures**: 540 (2023), from which: Arable lands: 450 Orchards and vineyards: 75 Hayfields: 15	**1. Agriculture lands:** 2.04 mil ha or 38% (2020) 39.1% (2018)	Official report of the Statistical Committee of Republic of Armenia, 2023: Sown Areas of Agricultural Crops, Planting Area of Permanent Crops, Gross Harvest and Average Crop Capacity for 2023; Farms and Farmland in EU, EUROSTAT: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Farms_and_farmland_in_the_European_Union_-_statistics.
Organic agriculture area, 1000 ha	0,674 or 0.13% (2023)	16 900 or 10.5% (2022) 15 900 (2021) 14 700 or 9.1% (2020)	Based on expert opinions gathered through surveys; Area under organic farming, EUROSTAT: https://ec.europa.eu/eurostat/databrowser/view/SDG_02_40__custom_4876726/bookmark/table?lang=en&bookmarkId=812474f1-cef7-4b81-8027-cb675ede7645; Developments in organic farming, EUROSTAT: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Developments_in_organic_farming
Aquaculture production, t/y	25 000-26 000	1 084 408 (2022) 1 123 892 (2021) 1 142 374 (2017)	Official report of the Statistical Committee of Republic of Armenia, 2023: Socio-Economic Situation of RA, January-December 2023; Production form aquaculture except for hatcheries and nurseries, EUROSTAT: https://ec.europa.eu/eurostat/databrowser/view/fish_aq2a/default/table?lang=en

3. Thematic and Sector Analysis

The chapter 3 of this report analyses the country's performance across the key green transition themes and sectors, embedded in the EGD and 8th EAP priorities, considering the current status and trends, enabling policies and legislation, EU approximation, implementation capacities, including government and non-government capacities, transitional finances, integration of cross-cutting issues (just transition, research and innovation and digital transformation) in each theme, and particularly focusing on the existing gaps and needs. Finally, it discusses risks for not adopting green transition pathways and strategic options towards green transition.

3.1 Climate Change

This section explores the status, trends, gaps/constraints and needs both in climate change mitigation and adaptation, examines the level of EU approximation and drawing on these, and provides a qualitative evaluation of Armenia's green transition readiness in this area.

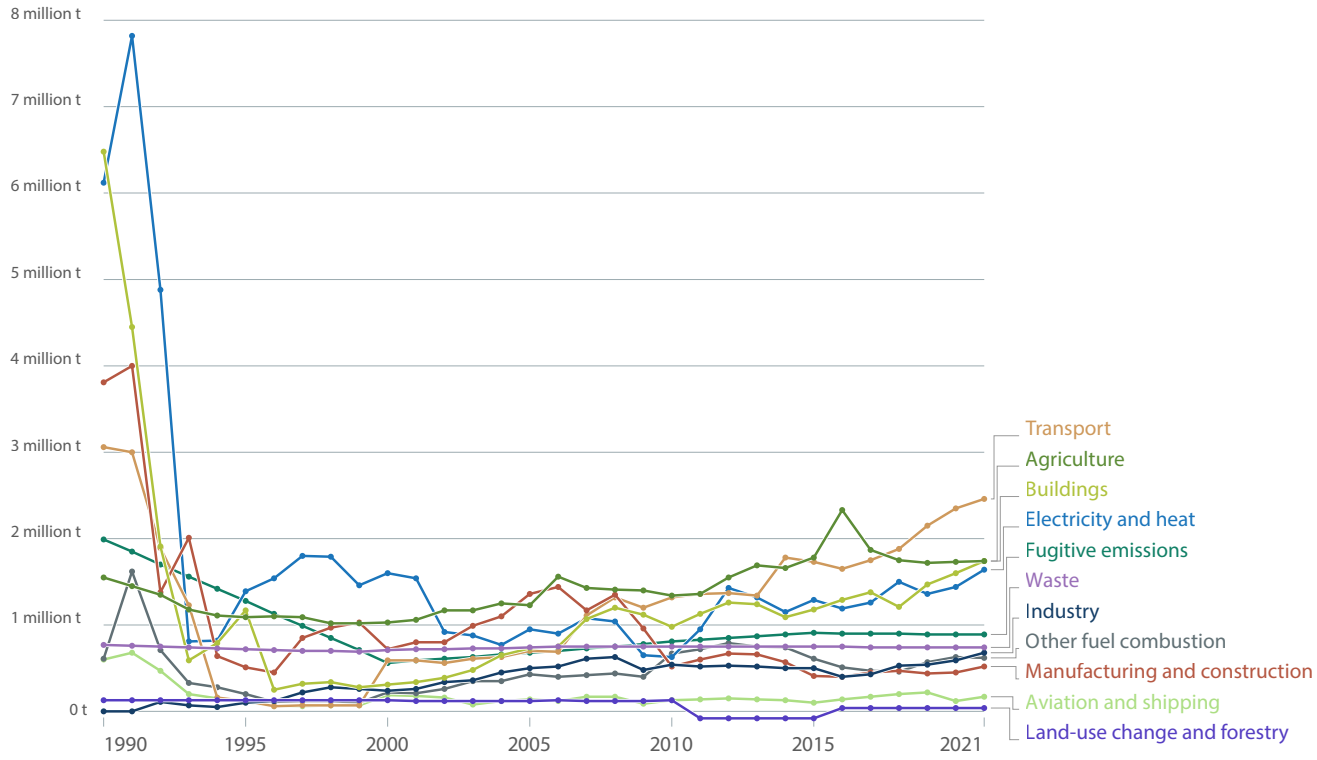
3.1.1 Status and Trends

The Republic of Armenia is a landlocked mountainous country vulnerable to the impacts of climate change. Due to its mountainous terrain, Armenia's climate zones range from dry subtropical to cold highland climate with hot summers (average temperature +25°C) and cold winters (average temperature -6°C). High intensity of solar radiation and abundance of sunny days are among other characteristics of Armenia's climate. Annual average value of sunshine hours is 2500 hours. Average annual flow of solar radiation on the horizontal surface is 1720 kWh/m2.

With a population of approximately 3 million as of 2020, Armenia's contribution to global greenhouse gas (GHG) emissions is 0.02%, placing it in the lower per capita footprint range at 3.45 t CO2 eq. The emission intensity per Gross Domestic Product (GDP) of 0.16 kg/USD[18] is the lowest among the Eastern Partnership countries. Since 2015, Armenia has published an official energy balance with details on energy consumption and methodology. According to the latest Energy balance from 2022, the 27.0% of Armenia's 4.0 million toe total primary energy supply was covered with domestic carbon neutral energy production: nuclear energy, hydro energy, as well as other renewable energy resources. As Armenia lacks indigenous fossil fuel resources, the country's fuel demand is met through imports.

[18] Carbon intensity: CO_2 emissions per dollar of GDP (ourworldindata.org), 2022.

Figure 3. CO_2 emissions by sector, Armenia



Source: Climate Watch (2023)

Based on the latest GHG inventory[19] Armenia had reduced its total GHG emissions (without LULUCF) by 56.8% in 2019 compared to 1990 levels and net GHG emissions (with LULUCF) by 57%. Most of these emissions were however reduced in the first half of the 1990s due to the deindustrialisation, emigration, and structural change of economy following the break-up of the Soviet Union. Since the beginning of 2000s the GHG emissions start to increase following the economic growth. However, they have remained relatively stable at around 10 Mt of CO2eq since 2012. The rise of emissions is mainly due to the energy sector, which comprises 64% of all emissions (it includes emissions from all use of fuels to generate energy, including fuel used in transport and fugitive emissions related to the transmission, storage, and distribution of natural gas). Figure 3 above shows rise in emissions by sectors, including the net removals from the LULUCF, with the rise of energy sector emissions is mainly conditioned by:

The rise of energy sector emissions is mainly conditioned by:

- Economic growth, increasing demand for energy. Rise in the volume of road transportation (number of automobiles). Within 2000-2019, road transport emissions showed a three-fold growth.
- Improved household living standards, the expansion of the natural gas supply network contributed to improvement of space heating as the former district heating system completely

[19] GHG Inventory 1990-2019 https://unfccc.int/sites/default/files/resource/NIR%202019_EN.pdf

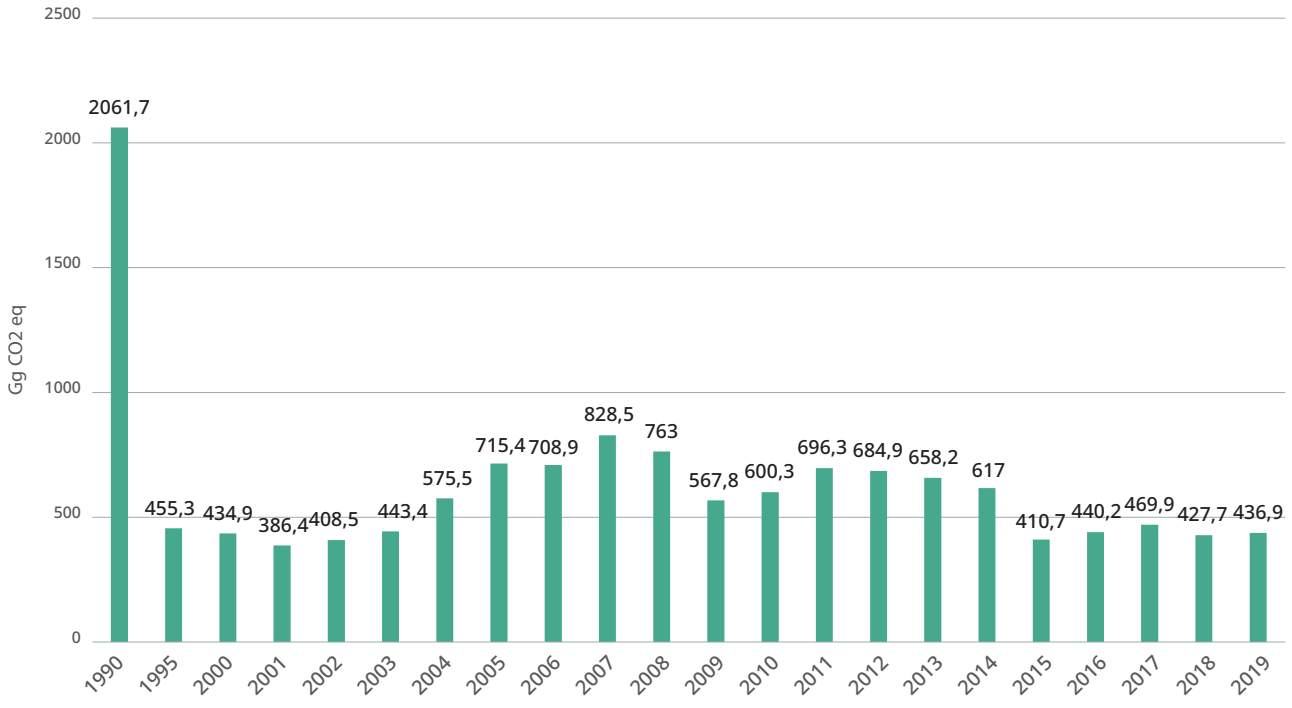
collapsed in 2002. The energy used by households demonstrated a six-fold surge within 2004-2019.

- Increase in fuel consumption in the commercial/institutional and agriculture subcategories (mainly due to extension of natural gas distribution system).

In 2019 GDP energy intensity index decreased 4.7 times compared to 1990, and almost two-fold as compared to 2000. The contributing factors are structural changes in the economy, use of less carbon-intensive fuels (switch from coal and mazut to natural gas for energy production and in transport switch from diesel and gasoline to natural gas), increased share of renewable energy, mainly hydropower in power generation.

Figure 4 below shows the GHG emissions by sector, with the energy sector by far the biggest source of GHG emissions in the country – in 2019 its share of the total greenhouse gas emissions was 64%. Transport and households are leading sources of GHG emissions. Other significant emission sources in the energy sector are fugitive emissions of natural gas, the share of which in 2019 was slightly less 19% compared to 2017 when it comprised 23%.

Figure 4. Greenhouse gas emissions by sectors, (without Forestry and Other Land Use), Gg CO2 eq.



The second largest source of GHG emissions is agriculture sector with 18.8% share, (GHG Inventory 2019)[20]. The Forestry and Other Land Use sub-sector stays as net carbon sink, however the net removal of emissions reduced almost by half from 1990 volume of -736.89 Gg to -372.98 Gg in 2019, mainly due to the high level of harvested fuel wood and weak forest management. The

[20] https://unfccc.int/documents/630784

Industrial Processes and Product Use (IPPU) with 11.5% share is the third largest source, with the emissions from IPPU having an increasing trend mainly due to emissions of HFCs of 75,4% of the sector. The share of emissions from the Waste sector in the country's total emissions is relatively stable and made 5.6% in 2019.

The share of methane emissions made nearly 25% of the total emissions in 2019, attributed to 47% to fugitive emissions from the natural gas system and 35% share is from enteric fermentation attributed to the agriculture sector. The Waste sector holds the third place with nearly 20% of methane emissions. Since Armenia joined the Global Methane Pledge (GMP) at COP26 in Glasgow 2021 which calls to slash methane emissions by 30% by 2030, the actions on methane emissions reduction must be assessed and considered under NDC3.0.

The Government of Armenia updated its Nationally Determined Contribution (NDC) in 2021 stating an unconditional target to reduce GHG emissions by 40% by 2030 compared to the base year of 1990. The target set is unconditional and safeguarded by the national and sectoral strategies and their implementation programmes. Armenia plans to double the share of renewables in energy generation and develop adaptation actions by 2030 to reduce impacts of climate change. The main considerations taken by the government when updating the NDC were to maintain the growth of the national economy, ensure poverty reduction, environmental protection and achievement of sustainable development goals, while increasing national energy security and ensuring affordable and clean energy supply.

The latest developments in regulatory framework for RES promotion contributed to the RES share increase in the total energy generation up to 12.5%[21] due mainly to private investments in grid connected solar energy generation installations (>30 MW), as well as installations in rooftop PV systems in residential and commercial buildings (>150 kW). 1/3 of installed PV capacities during last year are for self-use.

Adaptation to Climate Change

While the NDC is the primary means to communicate national targets to reduce GHG emissions under the Paris Agreement to the international community, Armenia as most developing countries prioritised and underlined the essential need of adaptation for the country's sustainable development. Seven sectors most affected under climate change were identified, while focus on ecosystem approach in adaptation measures was given priority: (1) Natural ecosystems (aquatic and terrestrial, including forest ecosystems, biodiversity and land cover); (2) Human health; (3) Water resource management; (4) Agriculture, including fishery and forests; (5) Energy; (6) Human settlements and infrastructures; (7) Tourism. It is, in particular, projected that because of climate change main natural ecosystems will shift vertically over the end of the century, including shifting of mountain ecosystem types upwards by up to 300 metres.

[21] https://www.psrc.am/contents/fields/electric_energy/el_energy_reports

Regarding climate risks, Armenia is particularly vulnerable to climate change with the average temperature increases from 1929-2022 making 1,30C. Between 1994 and 2014, Armenia lost well over USD 1.5 billion due to natural hazards like floods, landslides, drought, hail, spring frosts and mudflows.[22] The climate projections indicate that temperatures across the country may rise by 4.70C by 2100, combined with an 8.3% decline in average annual precipitation and increase of frequency and intensity of other extreme hydrometeorological events.

Over 80% of the population is vulnerable to major disasters caused by natural hazards that have a 0.5% probability of occurring annually (equivalent to a 1-in-200-year event). Additionally, more than 30% of the population is exposed to lower-intensity natural hazards with a 5% annual probability (1-in-20-year events). A single 1-in-200-year event could result in direct physical damages estimated at around EUR 11 billion[23]. Vulnerability to floods, landslides, and hailstorms[24] is particularly significant. These hazards are expected to intensify due to climate change, and Table 6 provides some indication on the average losses incurred.

Table 6. Major natural hazards, exposure, and average losses in Armenia.

Hazard	Exposure	Average loss
Floods	Ca. 40,000 people are impacted annually, specifically in marzes Ararat and Shirak	EUR 85 million[25] per annum
Landslides	4.1% of Armenia's territory and 1/3 of its communities	n.a.
Hailstorms, drought, frost	80% of total weather-related damages. Climate change will make hail storms more common in the future.[26]	EUR 220.2 million (AMD 110 billion) over six years

[22] Armenia's 4th National Communication on Climate Change (https://unfccc.int/sites/default/files/resource/NC4_Armenia_.pdf)

[23] ADB. Country Partnership Strategy: Armenia. Available at: https://www.adb.org/sites/default/files/linked-documents/cps-arm-2014-2018-sd-02.pdf. It is worth noting that under various climate change scenarios the occurrence of different climate hazards may change. Under 1.5°C of warming, what is currently a 1-in-100-year event may return every 20 years, and under 2°C of warming such an event may recur every 10 years or less. https://www.adb.org/sites/default/files/publication/709836/climate-risk-country-profile-armenia.pdf

[24] As well as earthquakes, which are not related to climate change

[25] In 2024, severe flooding affected communities in Tavush and Lori regions, including areas along the Armenia-Georgia border, resulting in 3 casualties and significant infrastructure damage, further underscoring the growing climate related risks. Reuters (2024). Available at: https://www.reuters.com/world/asia-pacific/one-dead-villages-cut-off-after-flooding-armenia-georgia-border-2024-05-26/

[26] IFI and CB (2020). Climate Risk Insurance for the Agriculture Sector in Armenia. Available at: https://www.afi-global.org/wp-content/uploads/2020/12/AFI_IGF_armenia_CS_AW_digital.pdf

Climate change adaptation was prioritised, and needs were summarised in 4th National Communication Reports to the UNFCCC, as well as underlined in the statements of heads of Armenia's delegations to the Conference of Parties. The importance of adaptation is also stated in NDC for Armenia's achievement of its social and economic development goals.

The programme of the RA Government 2021-2026 emphasises the issue of increasing the country's resilience to climate change by contributing to implementation of the best adaptation practices.

On 13 May 2021, the Government of Armenia approved the National Adaptation Programme and List of Measures for 2021-2025. This strategic framework of adaptation is to facilitate the integration of adaptation options into sectoral and province development plans, focusing at this stage on **water resources, agriculture, energy, health, tourism, and settlements**. The climate change considerations are also incorporated in the Sevan National Park management plans, which approximately cost USD 7.9 million. See Table 7 below for EGD objectives/targets and current status/progress in the climate change thematic area.

Table 7. EGD objectives/targets and current status/progress in climate change thematic area

EGD Objectives and Targets (including 8th EAP targets and indicators)	Relevant EGD indicators and EU level reference (8th EAP)	Assessment indicators/level of achievement of Armenia
Greenhouse gas emissions: ■ Reduce net GHG emissions by at least 55% by 2030 from 1990 levels. ■ Net-zero GHG by 2050. ■ Increase net GHG removals by carbon sinks from the LULUCF sector to -310 million tons CO2-eq by 2030.	**Emissions:** ■ Net GHG emissions (source EEA) – EU average per capita in 2021: 7.3 t CO2eq (EEA indicator viewer) ■ Greenhouse gas emissions from land use, land use change and forestry in Europe (source EEA) – tons of CO2-eq)	**Emissions:** ■ Reduce GHG emissions by 40% by 2030 below 1990 level (NDC) ■ Reduce greenhouse gas emissions to 2.07 t CO2 equivalent per capita by 2050. Achieve climate neutrality by the second half of the century (LEDS). ■ Net GHG emissions per capita in 2019: 3.7 t CO2 eq ■ Forest coverage increase by 28% in 2050 relative to the level of 2021 (LEDS)
Adaptation: ■ Climate-related economic losses: reduce overall monetary losses from extreme weather and climate-related events	**Adaptation:** ■ Economic losses from weather- and climate-related extreme events (EEA) ■ Drought impact on ecosystems (EEA) – area affected in km2)	**Adaptation:** ■ Between 1994 and 2014, Armenia lost well over USD 1.5 billion due to natural hazards like floods, landslides, drought, hail, spring frosts and mudflows.

EGD Objectives and Targets (including 8th EAP targets and indicators)	Relevant EGD indicators and EU level reference (8th EAP)	Assessment indicators/level of achievement of Armenia
■ Drought impact on ecosystems: decrease the area impacted by drought and loss of vegetation productivity		■ Under an unmitigated emissions scenario, Armenia's average temperature could rise by around 5.6 degrees by 2100, and be accompanied by lower rainfall, a 40 percent drop in water flows and a sharp increase in climate related natural disasters such as droughts.[27] ■ Under a volatile climate scenario, modelling predicts that gross domestic product (GDP) per capita could decline by 18% relative to baseline by 2072. In the absence of any fiscal policy response, this could result in public debt levels increasing at an unsustainable pace to 140% of GDP.

3.1.2 The main enabling conditions, needs and gaps (constraints)

Climate Strategies and Legal Framework

The Republic of Armenia ratified **the United Nations Framework Convention on Climate Change (UNFCCC)** in May 1993, with status of non-annex I country. In December 2002, Armenia ratified the **Kyoto Protocol**, and in February 2017, it ratified the **Doha Amendment** to the Kyoto Protocol and the **Paris Agreement**. In May 2019, Armenia ratified **the Kigali Amendment** to the Montreal Protocol, undertaking a commitment to phase down HFCs.

The **Armenian Strategic Programme of Prospective Development 2014-2025** – the overarching development strategy of the country – mentions climate change as an issue that needs to be addressed to improve rates of economic growth. The Government Programme for 2021-2026 set priorities of the actions for climate change as part of environmental policy. The Programme also

[27] https://www.imf.org/en/Publications/CR/Issues/2022/10/25/Armenia-Technical-Assistance-Report-Quantifying-Fiscal-Risks-from-Climate-Change-525059

prioritises the development and implementation of a policy aimed at promoting the long-term goal for green economy and sustainable development.

The Strategic Programme for the Development of the Energy Sector of the Republic of Armenia (until 2040) (2020) embedded important targets for renewable energy development and energy efficiency, which were important for realistic assessment of 2030 commitments under the climate agenda.

In 2021 Armenia updated its **Nationally Determined Contribution (2021-2030)**[28] considering its commitments under the Paris Agreement. The updated document sets the ambition of the Government of Armenia towards reduction of greenhouse gas (GHG) emissions **by 40%** by 2030 compared to the base year 1990. By 2030, Armenia plans to double its share of renewables in energy generation and introduce adaptation measures in various sectors on the path to achieve climate neutrality in the second half of this century.

The **Programme on Energy Saving and Renewable Energy for 2022-2030** and its Action Plan for 2022-2024 were approved by the Government in 2022.

The National Strategy on Disaster Risk Management (DRM) (2017) and its Action plan (2023-2026), include several climate measures ensuring alignment of national DRM priorities with the Sendai Action Plan under the UNFCCC and the Paris Agreement.

As for Ozone-depleting substances (ODS) and fluorinated-gases (F-gases), Armenia has been Party to the Vienna Convention and the Montreal Protocol since October 1999. **The country ratified all five amendments to the Montreal Protocol, including the Kigali Amendment**, under which it has committed to achieve a reduction of hydrofluorocarbons by 80–85% until 2045. The **Law on ODS** was amended (Dec 7, 2023) to include requirements for restoring the ODS, monitoring, reporting and inventory of leakages, as well as on training and public awareness. National programme on phasing out the F-gases was launched, and the legislative act to regulate it is being developed.

In 2023 Government also approved **the Long-term low greenhouse gas emission strategy (2050)** and with that it reaffirms its ambition to reduce greenhouse gas emissions to 2.07 t CO2 equivalent per capita by 2050. This goal is in line with both provisions of the Government's programme and the international commitments undertaken by the Republic of Armenia.

The National Action Programme (NAP) of Adaptation and List of Measures for 2021-2025 (2021)[29] is focused on the most vulnerable sectors of the economy, such as water, agriculture, health, tourism, energy, and settlements. NAP must have a rolling plan based on a 5-year cycle. The plan mainly focuses on enhancing the institutional and technical capacity.

[28] NDC 2021-2030 of Armenia (https://unfccc.int/sites/default/files/NDC/2022-06/NDC%20of%20Republic%20of%20Armenia%20%202021-2030.pdf)

[29] NAP of Armenia (https://unfccc.int/sites/default/files/resource/NAP_Armenia.pdf)

Following the approval of the NAP, the **Water Sector Adaptation Plan (WSAP)** was approved by the Government in 2022.[30] According to a 2022 amendment to Water Code of the Republic of Armenia development of the Water Sector Adaptation Plan has become mandatory with five-year iteration.

Agriculture and health sector adaptation measures were respectively integrated into the action plans under sectoral strategies adopted in 2023. Integration of adaptation measures into energy and tourism strategies/action plans is expected. Four regional adaptation plans for Tavush, Shirak, Gegharkunik, and Syunik marzes (provinces) were developed in 2022-2023[31]. The mentioned adaptation plans are not designed to replace existing planning processes, rather to complement them. Currently, the adaptation plan for the transport sector is under development initiated with support of Asian Development Bank (ADB).

The country has a number of environmental laws adopted in early 90s' with further amendments which are related to the climate-related regulations: Atmosphere Air Protection; Water Code (2022); Land Code (2021); Forest Code (2005); Law on Energy Saving and Renewable Energy (2004); the Strategy of the Main Directions Ensuring Economic Development in Agricultural Sector 2020-2030 (2019).

The amendments to the **Atmosphere Air Protection Law** prescribe establishment of an integrated national system of GHG and other air pollutants' emissions monitoring and reporting. The new version of the **Law on Environmental Impact Assessment and Expertise** (2023) includes provisions on climate change mitigation and adaptation considerations in EIA procedure. The amendments in the **Water Code** includes consideration of climate change impact while giving water permits and need for 5-year cycle revision, as well as adoption of climate adaptation plans for the sector.

In 2015, Armenia joined the Sendai Framework for Disaster Risk Reduction 2015-2030, and accordingly, the **National Disaster Risk Management Strategy and Action Plan** were developed and adopted by the RA Government Decree of April 6, 2017, with the aim of protecting people, their health, property, livelihoods, as well as their production, cultural and environmental values from disaster risks, including ones related to climate.

Policy instruments for enhanced transparency for reporting

The **GHG inventory procedure and institutional responsibilities** are further regulated by the Governmental Decree adopted in 2023 in line with Paris Agreement transparency requirements. The "Hydrometeorology and Monitoring Centre" SNCO (HMC) was appointed as the responsible national agency for compilation of UNFCCC reporting and corresponding amendments are done in the agency charter. The HMC hosts several databases and fulfils reporting requirements at international and national levels (e.g., LRTAP, Basel Convention, etc.) thus enabling harmonised

[30] WSAP (https://drive.google.com/file/d/1LUNDBaZb75r1qwnjL9zOa8N4eu4trSQv/view)

[31] These adaptation plans were developed by UNDP support under the EU4Climate and Japan Budget Support projects.

reporting at both levels is secured by formalised mandate for GHG Inventory preparation and reporting contributing to the quality of reporting under LRTAP and UNFCCC.

The **GHG emissions Inventory quality assurance programme** and annual work plan are regulated according to the Order of the Environment Minister N 310-L from 01.08.2024.

The **National Inventory Improvement Plan** developed with support of a consultant engaged by the UNFCCC secretariat was considered for improvements undertaken in the 1990-2019 National Inventory Report and accordingly revised one will be used for **GHG inventory 1990-2022 currently under preparation in the framework of the "Development of the First Biennial Transparency Report[32] and the Combined Fifth National Communication and Second Biennial Transparency Report of Armenia to the UNFCCC"** UNDP-GEF project.

The GHG Inventory experts were involved in series of training for finalising sectoral templates (Energy, IPPU, AFOLU, Waste) according to the recent UNFCCC requirements for the GHG inventories and the need for additional activity data, along with the Guide on Archiving Information Used for GHG Inventory Preparation that was approved during that period.

The regulations related to GHG Inventory preparation, quality control and quality assurance, including institutional responsibilities fully comply with the requirements for GHG reporting under Paris Agreement transparency framework.

To ensure an appropriate system for tracking mitigation policies and actions in the country the draft Ministerial Order is developed pending approval which regulates **Measuring, Reporting and Verification of GHG emissions mitigation policies and measures, including, formats of reporting, formats for quality control and assurance**.

The Ministerial Order N 202-L from 04 July 2024 was approved for **Continuous collection and reporting of financial support received by Armenia for mitigation and adaptation actions under Paris Agreement, including the formats, methodology and classification by sectors.**

The "**Guidance on Consideration of Gender-related Requirements in the Armenia's Biennial Transparency Reports and National Communications under the UNFCCC**" is developed to support the team involved in the preparation of the country's Biennial Transparency Reports and National Communications on how to recognise, consider and address gender-related issues in order to ensure gender-responsiveness of information in the aforementioned national reports. Particularly, the methods (including key indicators, their statistical sources, the relevant international guidelines and toolkits) as well as the chapters of reports where gender analysis and gender mainstreaming should be inserted: (i) conducting sex-disaggregated socio-economic data

[32] The Article 4 of the Paris Agreement requires reporting policies and measures that support the implementation towards the NDCs, focus on those that have the most significant impact on GHG emissions or removals and those impacting key categories in the national GHG inventory. AS Armenia's NDC sets absolute reduction targets against the base year, the most suited indicator is GHG emissions (t CO2 e.q.) which will be applied in the Biennial Transparency Report (CTF Table 1).

analysis; (ii) presenting gender situation in the country; (iii) identifying national specifics of climate change-related gender issues, and (iv) presenting how gender mainstreaming is ensured in the reports' preparation process.

The official reports under the UNFCCC are uploaded on the website of the Ministry of Environment. The Ministry of Environment has an active Facebook page on which climate change news are widely presented.

The climate change reports, including National Communications, Biennial Update Reports and National GHG Inventory Reports, have been disseminated through the Climate Change Information Centre's website as well.

Governance

The **Ministry of Environment** (MoEnv) of the Republic of Armenia is designated National Focal Point for the UNFCCC, Operational and Political Focal Point for Global Environment Facility, Designated National Authority for Green Climate Fund and for Adaptation Fund.

The **Climate Policy Department** of the Ministry of Environment, which was established in 2020, is operational with 5 professionals. According to its Charter, the Department is responsible for ensuring the coordination and implementation of policies and activities required for the implementation of the provisions and obligations defined by the UNFCCC.

The Inter-Agency Coordination Council for the Implementation of the Requirements and Provisions of the UNFCCC was established in 2012. In 2021 the **Inter-Agency Climate Change Coordination Council** was reformed by the Prime Minister's Decree N 719 to ensure a higher extent of political leadership. The tasks of the Council are, among others, to coordinate the implementation of the commitments and provisions assumed by Armenia that arise from the Convention and the Paris Agreement, and to evaluate the respective performance and results, as well as coordinate the NDCs for the 2021-2030 period and implement SDG 13. The Council reform intends to enhance high level coordination between sectoral ministries, including the decision to establish technical working groups for having focal points in each ministry, which will ensure continuity of climate related knowledge- and expertise-building in sectoral ministries.

Climate finance and financial gaps

According to the OECD's *Assessment of Investment Needs for Climate Action in Armenia up to 2030* report, at least USD 4.9 billion in gross fixed assets might need to be invested for this purpose, while costing done in the draft Government Decree "On approving the action plan, financing strategy and investment plan for the implementation of NDC 2021-2030 of the RA" developed with support of UNDP/EU4Climate the needs are assessed at USD 2.8 billion, from which USD 1.5 billion already is available finance.

Armenia finances its climate agenda through state budget, multilateral and bilateral sources, specialised international climate funds, as well as private and alternative sources.

Within the Armenian environmental policy framework, the principal fiscal instruments employed to incentivise environmentally sound practices are the **i) environmental tax** and **ii) natural resources utilisation payment.**

Revenue generated from the environmental tax and nature use payments is also used for environmental protection measures, specifically targeting the mitigation of negative consequences arising from human activities. According to the legislation, the state budget expenses on environmental programmes for each year cannot be less than the sum of the environmental tax and nature use fees of the year preceding that year. However, there is no direct regulation that revenues generated and environmental expenditures from the state budget should match.

The Climate Public Expenditure and Institutional Review conducted for the period of 2017-2019 under EU4Climate-UNDP project[33] revealed that on average, around 3.2% of Armenia's budget was spent on climate-related activities between 2017 and 2019, although both the absolute and relative amount of climate expenditures has fallen over the three years reviewed. The number of measures related to climate change in the 2019 state budget was 182, which is 12.3% of the total number of state budget measures. As for climate change priorities of Armenia, **expenditure on adaptation-related measures (51%) has been higher than spending on mitigation (35%), with remaining expenditure on activities supporting both objectives.**

The main direction of expenditures in the sphere of transport was on urban transport infrastructure (electric transportation and subway), which accounted for more than 96% of the expenditures of the transportation sector in 2019. The other major policy direction was energy transmission and distribution, which accounted for about 66% of climate change mitigation expenditures in the energy sector. Energy efficiency and renewable energy accounted for 3% and 1% of mitigation expenditures in the energy sector, respectively.

In terms of adaptation, most expenditures in 2019, were carried out in two areas: human settlements, infrastructure and energy (33.7%), and water resources (27.9%). In terms of expenditures, transportation activities that reduced hazards and/or enhanced connectivity (especially of climate vulnerable groups) were the main policy directions in the sector of Human settlements, infrastructure and energy, accounting for 61% and 39% of the expenditures in the sector, respectively.

In the water sector, the main policy direction for expenditures was the irrigation systems, which accounted for about 88% of expenditures in this sector. In the sector of adaptation, another major policy direction, in terms of expenditures, the maintenance of Specially Protected Natural Areas, accounted for most expenditures in the field of natural ecosystems and biodiversity.

[33] https://eu4climate.eu/download/climate-public-expenditure-and-institutional-review-armenia/

Although Armenia uses funding from domestic sources and recognises the importance of sustainability and developing a green economy most of the funding for the climate is coming from outside donors. International organisations, IFIs, climate vertical funds, and bilateral partners serve as critical actors in propelling Armenia's climate and green agenda.

The Ministry of Economy is tasked with developing a **green taxonomy**[34] to guide private investment in climate action, and the Central Bank of Armenia (CBA) is undertaking an analysis of climate risks facing the banking sector. The CBA published its green finance roadmap in October 2023. A balanced government approach to risk-layering is recommended by the IMF to include risk retention, risk transfer, and risk reduction actions. Efforts should be made to direct public funds into adaptation investments while engaging the private sector and facilitating access to international financing.

Financial constraints present a significant barrier to adequately fund essential climate change mitigation and adaptation initiatives in Armenia. This ultimately hinders progress towards achieving sectoral objectives aligned with the EGD. While commendable efforts exist, such as government-backed financial support for specific sectors like transport, agriculture, community initiatives, these remain limited in scope. In current circumstances, support from donor organisations remains crucial.

However, there are opportunities for targeted use of environmental taxes, priority setting based on comprehensive cost-benefit analysis, establishing green procurement rules and climate targeted public and private partnership that has limited yet for number of energy sector examples. There are small positive steps in that direction as climate priority is included in the PIM decree[15] to guide prioritisation of the pipeline investments, consistent with the Medium-Term Expenditure Framework (MTEF).

Targeted economic instruments show high effectiveness in promoting certain technologies, e.g. due to import tax exemption the number of electric vehicles imported in Armenia skyrocketed from just 29 units in 2017 reaching 20,000 units in 2024. Similarly, state support for substituting interest rates for loans for energy efficiency renovation of houses and apartments increased private investments in building energy performance improvement.

3.1.3 EU Approximation – Governance and policy and legislation

The Comprehensive and Enhanced Partnership Agreement with EU sets certain alignment obligation with the climate change acquis for Armenia, namely aimed at the implementation of the Paris Agreement through both mitigation and adaptation measures, establishment of a national system for GHG monitoring and reporting and provisions related to the EU ETS Directive 2003/87/EC and the regulations EU 601/2012 on GHG monitoring and reporting for industrial

[34] Decree N 175 "on approving the procedure for revealing, developing, appraisal and determining priorities of public investment projects" of 9 February 2023.

installations and EU 602/2012 on verification and accreditation. The CEPA roadmap contains 12 measures that should enable full implementation of these. However, a feasibility assessment is needed for planning gradual steps for approximation of the certain selected provisions of the ETS Directive[35] in Armenia.

Compared to the EU targets with the ambition of reducing net GHG emissions by 55% by 2030 and achieving climate neutrality by 2050, Armenia's climate targets fall short. This is especially true for the 2030 target of – 40%, which has been formulated to limit the GHG emissions compared to business-as-usual scenarios and not to propose additional emission reductions. The climate neutrality goal is also more vaguely set for the second half of the century, rather than 2050, which is supposedly due to uncertainties with new nuclear energy plant funding, which will replace the current plant to be decommissioned in 2036 as well as limited opportunities for increasing GHG removals and enhancement of sinks. The latest WB report argues that current policies will enable Armenia to reach its 2030 target, but will not be sufficient to reach the 2050 climate neutrality goal. Additional mitigation measures are crucial towards that goal.[36]

While Armenia has enacted various climate-related legal acts, mainstreamed climate considerations in other sectors by integration in policies, a critical gap exists in the implementation of planned actions due to absence of corresponding fiscal framework and technical capacity constraints. Despite the fact that the regulatory framework for the GHG inventory data collection and preparation of reports, including the Biennial Transparency Reports and National Communications is there and is entrusted to the Hydrometeorological and Monitoring Centre, the process still relies on donor financing.

Although the legal and regulatory framework adopted in Armenia by 2024 created a good foundation, the focus must shift to building institutional capacity for a solid MRV system with transparent reporting and quality control and verification of mitigation actions to track NDC progress and allow for a gradual increase of ambitions in subsequent NDCs.

In drafting the Climate Law, Armenia requested a feasibility study on carbon pricing possibilities[37], which examined both carbon tax and emissions trading options, as well as the offset mechanisms and a result-based carbon finance. The initial assessment reveals that carbon tax is a simpler option, which does not require advanced institutional capacity for emissions verification, can begin operating in a shorter timeframe, is relatively easier to implement and provides immediate revenue to the government for financing climate-related regulations. Considering Armenia's circumstances, where the majority of emissions originate from combustion activities and not industry, and no appropriate conditions to fully align with the EU ETS Directive, this is a more logical option. Also, it can be based on a variety of sold or consumed products: fossil fuels, power, road trips, etc. However, it can face political challenges in cultures traditionally opposed to national taxes. In Armenia, this might prove to be a contentious issue, particularly concerning its

[35] EU4Climate: https://urlis.net/vkud574t

[36] World Bank Group, Armenia Country Climate and Development Report, Nov. 2024, Armenia CCDR Full Report pdf

[37] Carbon Pricing Possibilities in Armenia_eng.pdf, EU4Climate project.

social impact. In the absence of large carbon-intensive industries, the primary burden may fall on power generation, and fuel use for heating and transportation ultimately impacting consumers through increased energy-related bills.

Additionally, as there are no regulations for setting cap on emissions, additional instruments may be needed to reach the NDC targets. However, it still provides a good basis for alignment with future obligations arising from the EU Carbon Border Adjustment Mechanism (CBAM). The synergy and interlinkages between the legal instruments in the areas of climate change, air quality and industrial emissions can contribute to establishing an appropriate base for corresponding regulations.

The Climate Law draft was developed based on an agreed concept (2022) and as of October 2024 the draft Climate Law was circulated within the Government and published in the e-draft online system for public comment and its adoption is anticipated by 2025. The Law is intended for ensuring a comprehensive compulsory environment for the climate agenda and is foreseen to establish a framework for introducing enforcement and economic incentive instruments. The law is anticipated to result in 11 amended laws and 7 new government decisions.

Besides that, the draft government decree **"On approval of government strategic management system"**[38] initiated by the Government. The decree includes requirements for mainstreaming climate considerations in all strategic documents and provides detailed methodology in the Chapter 3 of the decree. The methodology proposed is in line with EU directive on strategic environmental assessment (SEA-D, 2001/42/EC) and 'Do No Significant Harm' principle based on EU taxonomy for sustainable activities. Among other principles of climate mainstreaming, all strategic documents "must be assessed to either not contribute to increasing GHG emissions or reducing GHG sinks".

While the legal framework is evolving, complementary regulatory and economic tools haven't been prioritised. These instruments would be crucial for managing emissions levels and reducing energy intensity of GDP. This gap highlights the need for a more systematic approach to tackling climate change, setting clear targets, policy objectives, measurable outcomes, indicators, timeframe and estimates of costs. The linkages of the implemented measures with climate sensitive sectoral development policies with the cost estimates, will not only help integrate climate change policies with the Ministry of Finance and fiscal frameworks, but also to further coordinate these processes and strengthen the role of the whole of economy approach.

Armenia's current legislation and sectoral strategies aren't strong enough to fully meet the EGD's goals for fighting climate change. Even though Armenia's overall objectives are similar to the EGD, the legislation needs to be better aligned with EU Acquis. To make sure all of Armenia's Government policies consider the environment and climate change, the country needs stronger enforcement instruments and stronger institutions.

[38] https://www.e-draft.am/projects/7524

Institutional capacity

Significant challenge lies within the broader civil service structure; the non-competitive salary limits the ability of ministries to attract and retain highly-qualified staff. This often results in a pattern of young graduates entering these institutions, gaining experience, and then departing due to limited salary growth and career advancement opportunities. This hinders the development of long-term expertise crucial for effective environmental policy implementation and reduces efficiency of capacity-building efforts by development partners.

Assessing the impact of the Inter-Agency Council one can state that it currently operates primarily in a formal capacity, rather than exercising decision-making authority. Notably, since its re-establishment in 2021, the Council has convened only three times. This limited meeting frequency raises concerns about the effectiveness of the Council in driving concrete action on climate change. Limited decision-making authority of the coordinating council, and staff turnover hinder the effectiveness of these mandates in achieving EGD goals. The absence of links with academia, industry associations and the civil sector reduce efficiency of the Council's work and hinder the implementation of the EGD goals in Armenia.

While the Ministry of Environment has a leading role in implementing environmental and coordination role for climate change-related policies, most areas of climate agenda are nested in other sectors' responsibility. Recent studies found that it has little or no mandate to engage in policy making, or to pursue the implementation of projects or achieving outcomes in other sectors which are covered by other Ministries.

The critical challenge lies in the execution of the strategic documents in sectors with critical impact on GHG reduction target: there appears to be a tendency to prioritise readily implementable actions within the upcoming action plans. This potentially postpones or even neglects the inclusion of more complex or challenging actions until later stages of implementation, which could jeopardise the overall success of the strategy.

The major gap for climate policy lies in weakness of systematic and comprehensive primary data and transparency. Majority of ministries collect sectoral data in accordance with its annual work plan and submit data to the Statistical Committee which after processing, publishes, ensuring its accessibility. The quality of this data varies significantly across sectors, as there is no well-established quality control and dedicated institutions for assessing the row data using up-to-date tools and technologies for corresponding decision making. As positive examples of definite and accurate reports can be mentioned the development of Energy balance since 2017 (applying guidance of IEA and publication by Statistical Committee) and transparency of energy information on Public Services Regulatory Commission however other climate related sector data suffers from inconsistencies and incompleteness as forest cover area, agriculture, land change, waste, loss and damage.

The local self-administration authorities are commonly conversed with the topics of RES, energy efficiency and climate adaptation through the EU Covenant of Mayors (CoM). Armenia has 28

Signatories of CoM, including the capital Yerevan, and committed to develop Sustainable Energy and Climate Action Plans (SECAPs), however by 2024 September only 12 have active status. The previous commitment was to reduce greenhouse gas emissions by 20%, but this figure was later increased to 30%. The CoM Signatories cover over 1.76 million residents which is over 60% of the country's population. Since 2019 the state subventions matching local government investments with state subsidies designated types of investments have triggered broader interest in financing SECAP measures, including street lighting retrofits, thermal modernisation of public and residential buildings, construction of solar powered systems.

Non-institutional sector capacity

The private sector role in climate is mainly in mitigation activities fuelled through green loans provided by commercial banks and funded by EBRD, EIB, ADB, AFD, kfW, Green for Growth Fund and other donors creating an enabling financial environment for the private sector. This has had a substantial impact on recent developments in renewable energy, which resulted in creation of job opportunities for SMEs and specialists in the solar energy field, around 30 companies are currently operating in the solar market. Although there is limited readiness of the industry and services for energy efficiency projects, the construction sector is interested in energy efficiency certification of buildings to be eligible for commercial banks special crediting products. This trend extends to demand for energy consulting, as the number of organisations and individuals applying for energy audit licences is growing.

However, the private sector in Armenia generally lacks a strong focus on climate adaptation actions and systemic involvement in climate related agenda, as well as implementation.

The higher and vocational education institutions introduced new courses relevant to climate change, however the efficiency of that on the labour market is not yet evident. National Polytechnic University of Armenia is developing a specialised course on energy audit to meet this growing demand. The Armenian National Agriculture University has revised curriculums for certain courses for considering climate change in relation to the adaptation issues.

There is limited engagement of the civil society organisations (CSOs) in the climate agenda implementation. The EU Delegation has engaged CSOs in the CEPA monitoring. Furthermore, the EU-funded Constructive Dialogue initiative enabled establishment of the "CSO Coalition on Sustainable and Transparent Energy Development".

3.1.4 Main priorities for green transition

Potential Green Transition benefits of achieving climate neutrality

The green transition provides Armenia with ample opportunity to improve not only its environment and health, but also to increase its competitiveness and energy security, ensuring economic and social prosperity as well as political stability.

Reducing emissions, particularly from transport and energy, two largest emitting sectors, will considerably improve air quality, especially in large cities. The increased share of renewables, and use of sustainable modes of transport would bolster energy independence, create green jobs and attract sustainable investments. Key infrastructure, extremely vulnerable to climate impacts, would benefit by strengthened resilience and reduced climate-related economic losses that are currently threatening to undermine Armenia's economic growth. Sectors such **as energy, agriculture, waste, construction and tourism** stand to profit the most from the green transition. The renewable energy sector has already experienced a huge surge in photovoltaics, but would benefit from improved regulatory framework and investments into the electricity grid, reducing the dependence on foreign imports and energy poverty. Exploring the use of biomass and sustainable hydrogen could also support this process. In agriculture, adopting sustainable practices and climate-resilient technologies can improve the sector productivity and food security. Conservation of biodiversity and ecosystems could bring new opportunities for sustainable tourism and green jobs, especially in protected areas. Construction, building and housing sectors could capitalise on unifying building standards and improved energy-efficiency resulting in reduced emissions and energy intensity. Green transition would also support local communities by reducing pollution, providing affordable energy and enabling them to adapt better to climate impacts. As CEPA already prioritises green connectivity, energy, environment, and climate change, offering opportunities for cooperation and alignment with stricter EU targets, so green transition pathways will bring Armenia closer to fulfilling its international obligations as well as enabling its geopolitical and economic stability.

Potential risks of not achieving climate neutrality

Armenia is already particularly vulnerable to climate change impacts which cause damage not only to critical infrastructure but also a loss of human life threatening to become an even bigger problem in the future. Key risks can be categorised as:

- Environmental risks

The climate impacts are increasing the chance of floods, landslides, drought, hail, spring frosts and mudflows and causing loss of well over USD 1.5 billion between 1994 and 2014. They are also causing biodiversity loss, water pollution and water scarcity.

- Economic risks

Armenia is already prioritising adaptation action in its policy documents due to significant economic losses from climate-induced disasters and escalating costs for disaster risk reduction (DRR) and climate change adaptation (CCA). Food security and livelihoods are also increasingly at risk, while hydropower generation is faltering due to changed precipitation patterns necessitating costly adjustments or investments in alternative energy sources. Tourism sector is affected due to more frequent and severe storms, flash floods leading to damage to infrastructure and reduced visitor appeal. Agriculture and especially the wine-producing sector are experiencing losses due to high temperature, hails and spring frosts contributing to a decline in competitiveness of local businesses and industries.

- Political risks

Armenia has been a reliable EU partner, committing to international climate agreements, crucial for maintaining positive relations with other countries and international organisations. Not meeting climate targets could lead to strained diplomatic relations and reduced support from international partners, including access to climate finance and donor support. This could hinder the country's ability to implement necessary climate mitigation and adaptation measures. Non-compliance with international climate commitments could result in trade restrictions or imposing of mechanisms such as CBAM.

- Social risks

Failure to address climate change can lead to increased environmental degradation, which may result in public dissatisfaction and social unrest. Citizens may demand stronger climate action and hold the government accountable for inaction. Loss of human life and decreased quality of life can also affect social cohesion, increase inequalities, especially of vulnerable communities, and particularly the internally displaced people, exacerbate existing socio-economic challenges and increase political instability.

Green Transition Priorities

Policy framework and EU alignment – Armenia should ensure adoption of the Climate Change Law as this would enable it to create conditions for introduction of appropriate regulatory framework, including fiscal instruments which will consider measures for reducing social pressure on vulnerable populations. This would also assist in enforcing legislation.

The Law would also support climate change mainstreaming and setting of emission reduction targets in sectoral mid-term and long-term programmes and establishing a sound system of monitoring, reporting and verification (MRV) and its implementation, including the formulation of SMART indicators for tracking progress, and verification of emission reductions related to mitigation projects of the private sector. Although sectoral policies are in place, there is a need for improved coordination and coherence between them for an increased efficiency.

The Climate Change Law would also mitigate the impact of CBAM due to timely introduction of carbon tax schemes, while the private sectors' climate action will be incentivised due to a predictable fiscal and regulatory framework. Introducing the ESG disclosure would also increase confidence in climate technology investments.

The synergies and interlinkages between different legal instruments in the sectors of climate change, air quality and industrial emissions should also be explored.

Institutional capacity – role of the Climate Change Coordination Council should be enhanced and strengthened to foster better communication between sectors and enable bold and ambitious green agenda reforms. Its composition should be extended to involve CSOs, academia and private sectors while the working groups should be extended to include the expert community.

The ministries' capacities should be strengthened and additional resources to implement existing plans and develop new ones should be explored. Additionally, technical expertise for implementing climate action strategies needs to be strengthened, particularly in improving data collection and analytical capacities across various sectors to improve the overall completeness and accuracy for improved planning. Uncompetitive salaries in the public sector hinder attracting and keeping qualified staff in public institutions. Increasing the attractiveness and competitiveness of work should ensure keeping them and ensuring institutional memory.

Financial framework – Adequate resources and targeted fiscal policy for implementation of existing plans and development of new ones including their costing and realistic mid and long-term implementation plans are missing. Additionally, most financial resources come from external donors, hindering sustainability. Developing the long-term climate change financial strategy and exploring the options to extend funding from public sources would assist in achieving ambitious climate goals. Assessment of social, economic and environmental impacts of introducing carbon tax to provide additional climate financing should also be explored.

Conditions should be created for enhancing private investments in adaptation and enhancing public private partnerships in climate-oriented projects. Also, capacities for climate risk financing and introduction of insurance should be developed.

NGO capacity/public capacity – NGO can support the process of green transition by providing education, increasing public awareness and promoting behavioural changes but are often reliant on donor funding as well as donor community priority setting. Exploring options for sustainable funding and building capacities to increase the involvement of NGOs in policy development and implementation, should assist in strengthening their role and mission and strengthening their collective impact on policy process. **Public understanding** and involvement in climate change policy development and implementation is weak though growing. While structures exist (such as the Public Council under the Ministry of Environment), the overall level of public involvement in policy development is low.

3.1.5 Readiness for transition

Armenia's NDC target proposes a 40% GHG emission reduction from 1990 levels by 2030, not aligning with the EU's 55% ambition. Climate neutrality should be reached in the second half of the century, reducing the greenhouse gas emissions to 2.07 t CO2 equivalent per capita by 2050, from the net GHG emissions per capita in 2019 at 3.7 t CO2 eq. However, the latest WB report shows that current policies are not sufficient to reach that target and that additional mitigation measures are crucial in that respect. In the same period forest coverage increase is set to increase by 28% in 2050 relative to the level of 2021 (LEDS). The latter target seems very ambitious given the fact that the net removal of emissions reduced almost by half from 1990 volume of -736.89 Gg to -372.98 Gg in 2019, mainly due to the high level of harvested fuel wood and weak forest management.

Based on the latest GHG inventory[39] Armenia had reduced its total GHG emissions (without LULUCF) by 56.8% in 2019 compared to 1990 levels and net GHG emissions (with LULUCF) by 57%. Most of these emissions were however reduced in the first half of the 1990s due to the deindustrialisation, emigration, and structural change of economy following the break-up of the Soviet Union. Since the beginning of 2000s the GHG emissions start to increase following the economic growth. However, they have remained relatively stable at around 10 Mt of CO2eq since 2012. The rise of emissions is mainly due to the Energy sector, which comprise 64% of all emissions.

Armenia is particularly vulnerable to climate change with the average temperature increases of 1,3 ^{0}C in the period of 1929- 2022. Between 1994 and 2014, Armenia lost well over USD 1.5 billion due to natural hazards like floods, landslides, drought, hail, spring frosts and mudflows.[40] The climate projections indicate a serious rise of temperatures by 4.7^{0}C by 2100, combined with an 8.3% decline in average annual precipitation and increase of frequency and intensity of other extreme hydrometeorological events. Populations' vulnerability to floods, landslides, and hailstorms[41] is particularly significant. These hazards are expected to intensify due to climate change, increasing in frequency and severity.

Armenia has a number of policies and plans in place to address climate change, including the National Determined Contribution (2021-2030) and the Long-term low greenhouse gas emission strategy, Energy Strategy, the Programme on Energy Saving and Renewable Energy, National Strategy on Disaster Risk Management, the National Action Programme of Adaptation to Climate Change and other documents. Armenia is also a party to international agreements like the UNFCCC, Paris Agreement and the Montreal Protocol and collaborates with organisations such as the Green Climate Fund, Adaptation Fund and various UN agencies.

Despite all of this, Armenia's current climate change legislation and sectoral strategies aren't comprehensive and ambitious enough to fully meet the EGD's goals for combating climate

[39] GHG Inventory 1990-2019 https://unfccc.int/sites/default/files/resource/NIR%202019_EN.pdf

[40] Armenia's 4th National Communication on Climate Change (https://unfccc.int/sites/default/files/resource/NC4_Armenia_.pdf)

[41] As well as earthquakes, which are not related to climate change/

change. Even though Armenia's overall objectives are similar to the EGD, the legislation needs to be better aligned with EU Acquis. To make sure all of Armenia's Government policies consider the environment and climate change, the country needs stronger enforcement instruments and stronger institutions.

Adequate resources and targeted fiscal policy for implementation of existing plans and development of new ones including their costing and realistic mid and long-term implementation plans are still missing, and climate change is often reliant on donor funding. The Climate Change law, currently in governmental procedure, aims to regulate the policy and legislative framework, including target setting, monitoring, reporting and verification of GHG emissions across the sectors and introducing carbon pricing. Technical expertise for implementing climate action strategies is missing.

Below is a table with qualitative assessment of Armenia's green transition readiness in the climate change sector, considering and key elements for readiness such as policy and legal frameworks, EU approximation, policy implementation instruments, institutional and non-institutional capacity, research and innovation, transitional finances and JT. Key actions for closing critical gaps have also been proposed.

Table 8. Transition readiness summary

Thematic area / Gap, needs enabling conditions area	Policy and legal framework	EU approximation	Policy implementation	Institutional Capacity	Non-institutional and private capacity	Research and Innovation	Financial	Just transition
Climate Change Mitigation	Some progress	Some progress	Little progress	Little progress	Some progress	Little progress	Some progress	Little progress
Climate Change Adaptation	Some progress	Some progress	Little progress	Little progress	Little progress	Little progress	Little progress	Little progress

The Climate Change readiness assessment shows that Armenia has partial coverage in policy and legal framework, EU approximation and financial capacity with limited institutional and non-institutional capacity and implementation. Financial capacity is showing some progress in climate change mitigation, but little progress in climate change adaptation. Research and innovation as well as just transition is showing little progress.

Thus, Armenia has reached some progress in transition readiness. Still, significant gaps remain in policy implementation, institutional capacity and non-institutional capacity as well as financial readiness, indicating a need for further reforms to improve towards the full readiness levels.

3.2 Resource efficiency and Circular Economy with focus on Waste Management

Sustainable industrial practices – The EU is encouraging sustainable industrial practices such as Eco-Management and Audit Scheme (EMAS) and eco-labelling. By examining the sustainability and environmental performance of supply chains, including the sourcing of raw materials, transportation, and logistics, to promote responsible and low-carbon practices both the business and public sector by procuring services and goods will encourage the market and suppliers to become more resource and energy efficient. Assessment should provide an overview of how environment management standards (ISO 14001, EMAS) and Green Public Procurement (GPP) requirements are incentivised and used in practice and what are the obstacles in applying sustainable industrial practices in the country.

Support initiatives in Armenia – International organisations such as UNIDO, UNEP, and the European Union, in cooperation with Armenian government agencies and local stakeholders, mainly supported and financed several Resource Efficient and Cleaner Production (RECP) initiatives in Armenia. One of the major projects on RECP in Armenia has been facilitated by UNIDO working closely with national institutions such as the Ministry of Economy and the Ministry of Environment. Local partners—industry associations, technical universities, and NGOs—play an important role in disseminating RECP methodologies, implementing on-site RECP audits, pilot projects, and training local experts.

The outcomes of the project have been significant. Numerous pilot companies reported considerable savings in energy and water usage, material costs, and waste generation, which in turn reduced their overall environmental impact. RECP clubs have been established to sustain the initiative's momentum beyond its initial term, providing a platform for local experts and companies to exchange best practices and foster continuous improvement. By demonstrating practical ways to incorporate green business practices, the RECP project has contributed to Armenia's broader economic and environmental objectives, strengthening export competitiveness and establishing a foundation for more sustainable industrial development.

Despite these achievements, access to finance for comprehensive technological upgrades remains a challenge. Not all small and medium enterprises have the resources to implement more capital-intensive efficiency measures. Continued efforts are also needed to raise awareness about RECP's financial and environmental benefits among businesses in rural or less industrialised regions. Finally, to ensure sustainable results over the long term, RECP principles must be further integrated into Armenian legislation, investment incentives, and national industrial development

programmes, building on the progress made so far and reinforcing Armenia's commitment to green growth and competitiveness.

Another notable initiative advancing sustainability goals in Armenia is "CirculUp," an EU funded 3-year programme run by Impact Hub Yerevan. CirculUp focuses on promoting circular economy principles, which aim to minimise waste and make the most of resources by creating closed-loop systems. Through mentorship, networking opportunities, and practical workshops, the programme helps entrepreneurs and innovators develop business models that reduce environmental impact and utilise materials more efficiently.

By supporting projects that repurpose or upcycle waste, introduce new zero-waste solutions, or otherwise foster responsible consumption and production patterns, CirculUp contributes to a broader shift toward sustainability in Armenia. It complements efforts such as the Resource Efficient and Cleaner Production (RECP) project by nurturing startups and small enterprises that integrate resource-efficient practices from the outset. In doing so, CirculUp not only helps participants navigate the complexities of circular economy concepts but also expands the community of Armenian ventures dedicated to building sustainable and resilient business ecosystems.

3.2.1 Status and Trends

The focus is on the manufacturing and mining industries (energy production, agriculture, and construction sectors are assessed in other thematic reports). In addition, an overview of the waste management sector as an integral part of moving towards a circular economy is provided.

3.2.1.1 Industry sector (manufacturing and mining)

During the Soviet era, Armenia's economy was heavily reliant on its manufacturing sector, which served as a cornerstone of industrial activity. However, following the dissolution of the Soviet Union, the country experienced significant de-industrialisation due to the widespread closure of factories and the disruption of established supply chains. This economic transition left a lasting impact on Armenia's industrial base. In recent years, Armenia has renewed its focus on revitalizing the manufacturing industry, recognizing its potential to address pressing socio-economic challenges such as poverty reduction, unemployment, and emigration.

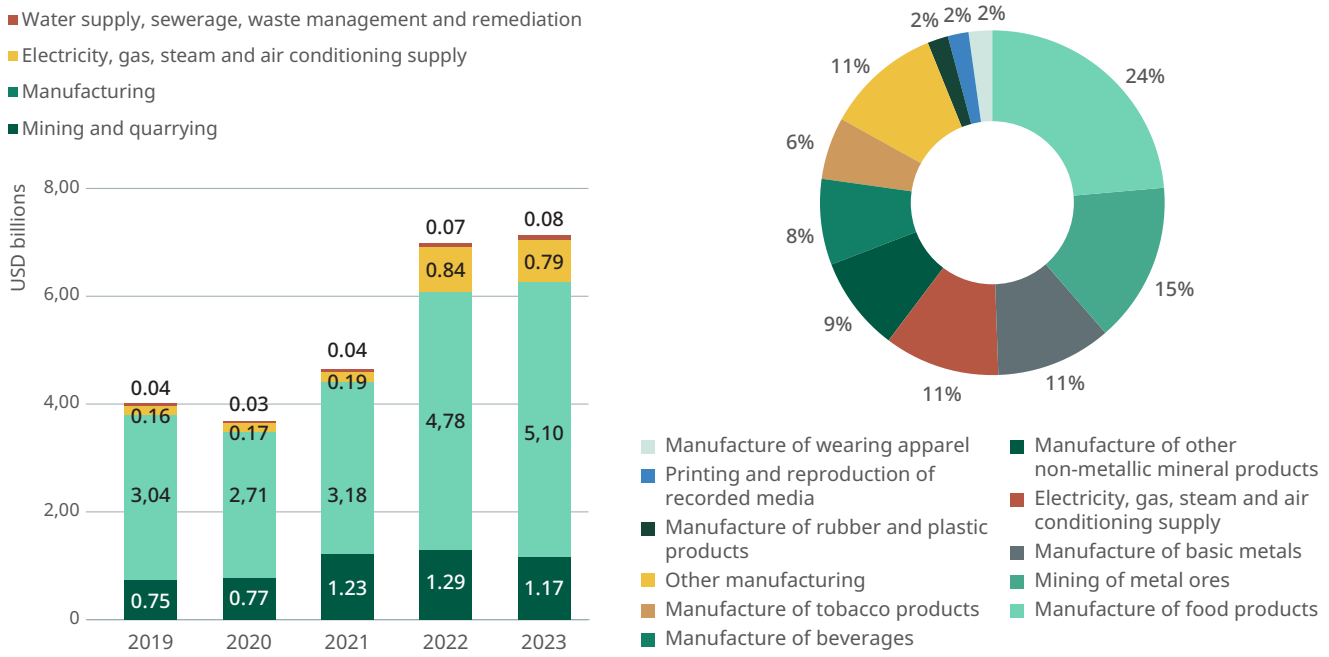
Armenia's GDP largely depends on the manufacturing industry which contributes 11.3% of the country's GDP (ArmStat, 2022) equal to $2.28 billion (994.6 billion AMD), with some other major areas being agriculture, wholesale and retail, construction, mining and others. The GDP structure of Armenia's industry and related sectors for the years 2017-2022 is presented below, while the full list can be accessed following the reference link. The industrial sector of Armenia holds 7.3% of total employment (2488 organisations).

In 2023, Armenia's manufacturing industry was predominantly driven by light manufacturing, with food production accounting for 33.5% of total manufacturing output. In contrast, heavy manufacturing contributed relatively less to the overall industrial output. Meanwhile, the mining sector remained focused on the extraction of metal ores, which constituted 94.4% of all mining activities.

Notably, Armenia achieved significant growth in exports during 2023, particularly in high-value categories such as precious and semi-precious stones, precious metals, and related articles. Exports in these categories surged by 3.2 times compared to 2022, reflecting the country's increasing integration into global value chains and its ability to leverage natural resource-based industries.

This resurgence in manufacturing and export growth underscores Armenia's ongoing efforts to diversify its economy and strengthen its industrial base as a pathway to sustainable development. The structure of industrial output from 2019 to 2023 and a breakdown by subsector for 2023 are illustrated in Figure 5.

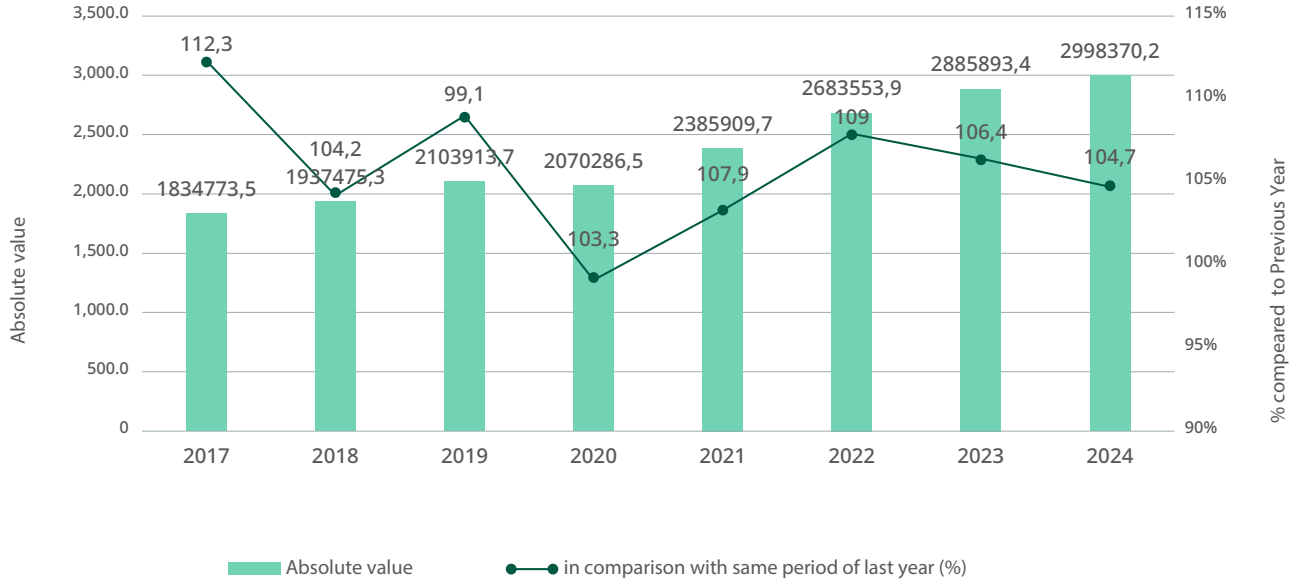
Figure 5. Structure of Industrial Output for 2019-2023 (left) and breakdown by subsector in 2023 (right)



Industrial output continuously grew after post-COVID recovery. The industry adds 28% of value to the economy (see Figure 6).[42]

[42] https://www.eu4environment.org/where-we-work/armenia/

Figure 6. Volume of Industrial Output, mln. Drams.



Source: ArmStat[43]

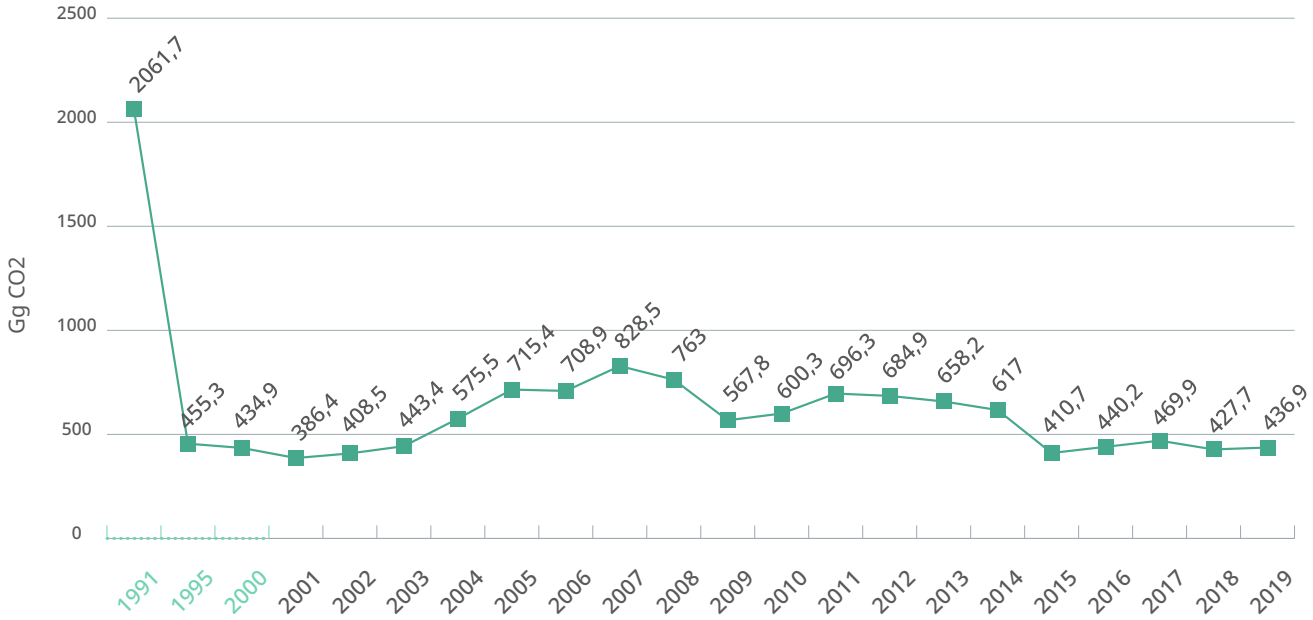
Environmental Impacts

According to the 2019 National GHG Inventory Report of Armenia, industrial sector emissions accounted for 11.5% of Armenia's total GHG emissions (11.9% of net emissions). Emissions from this sector include non-energy related carbon dioxide emissions from mineral industry – cement, lime and glass production, carbon dioxide emissions generated from lubricant and paraffin use, HFCs emissions from use of refrigerators, air conditioners and other appliances, as well as sulphur hexafluoride emissions from use of electrical equipment. Emissions from the sector include also sulphur dioxide emissions from metal industry, nonmethane volatile organic compounds emissions from solvent use, asphalt production, as well as food and beverage production. The most significant carbon dioxide emissions' source in this sector is cement production (258.95 Gg CO_2), which accounts for 82.2% of the CO_2 emissions from the sector and 2.4% of Armenia's total CO_2 emissions. Emissions from the use of HFCs, substitutes for ozone depleting substances in refrigeration and air conditioning systems made 969.5 Gg CO_2 eq, while SF6 emissions from the use of electrical equipment are negligible – only 3.3 Gg CO_2 eq.

According to the National Greenhouse Gas Inventory Report of Armenia 1990-2019, Manufacturing Industries and Construction is one of the major GHG emitters in the country. The data from 1990-2019 is presented below (Figure 7), followed by a breakdown per industry for 2019.

[43] https://armstat.am/en/?nid=12&id=02001

Figure 7. Time series of CO_2 emissions from the Manufacturing Industries and Construction (1A2) category in 1990-2019, Gg CO_2.



Source: National Greenhouse Gas Inventory Report of Armenia 1990-2019[44]

Natural gas consumption in industry and construction in 2019 was 194.1437 million m3, diesel fuel – 16,671.09 tons, LPG – 209.9 tons, energy – 7,497.58 TJ. The non-metallic minerals, food processing and beverages and tobacco sub-categories are the largest consumers of natural gas and total energy, mining and quarrying and non-ferrous metals are the largest consumers of diesel fuels. Mining and quarrying are the largest consumers of LPG. In 2018 and 2019 it was identified that no charcoal was used. In 2019, total fuel consumption within the industry and construction sector included:

- **Natural gas**: 194.1437 million m^3
- **Diesel fuel**: 16,671.09 tons
- **Liquefied petroleum gas (LPG)**: 209.9 tons
- **Energy consumption**: 7,497.58 terajoules (TJ)

The non-metallic minerals, food processing, beverages, and tobacco sub-sectors were identified as the highest consumers of natural gas and total energy (see Table 9 for energy efficiency and intensity of Armenia's GDP). In contrast, the mining, quarrying, and non-ferrous metals industries were the leading consumers of diesel fuel, while mining and quarrying were the dominant consumers of LPG.

[44] https://drive.google.com/file/d/1Ntz9N4niiKQ8g1S9xAdEvLtgA9U9IXH4/view

Table 9. Energy efficiency and intensity of Armenia's GDP

Indicator	Measurement Unit	2019	2024	2027	2030
Forecast					
GDP Energy Efficiency	AMD/GJ	1,437	1,352	1,519	1,730
GDP/ PPP 2017/ Energy Efficiency	USD/GJ	11.99	11.46	12.87	14.65
GDP PPP energy intensity	MJ/1000 $	0.083	0.087	0.078	0.068

Energy intensity of Armenia's economy has registered a growth trend since 2018 (GDP energy increased by 14.5 percent from 11g to 12.6gJ in 2018 to 12.6gJ in 2020. Meanwhile, total CO2 emissions have increased (2016-2020) and GDP carbon footprint increased by 3 percent (up from 40.8 t/TJ in 2018 to 42.0 t/TG). Consumption of primary energy per capita increased by 13.2 percent (from 44.8gJ to 50.7gJ).

3.2.1.2 Circular economy and waste management

In 2019, the share of emissions from the waste sector was 5.6%, while the industrial processes caused 11.5% of total emissions in the same year.

There are several challenges that hinder the monitoring and verification of the process of green transition in Armenia. The main problem in the area of circular economy and waste management is the lack of relevant data, the quality of existing data and data collection.

When it comes to GHG emissions from the waste management sector, the latest data available is from 2017, which has estimated that around 5.8% of the total GHG emissions are coming from the waste management sector, out of which 71% is from solid waste. The emissions from the waste sector have increased by approximately 16.6% between 2000-2016 (due to the growth in methane emissions from SW disposal). In 2017, waste management led to 620.7 Gg CO2 eq. emissions.

Relevant statistics on resource productivity and other circularity-related indicators are not available on a large scale. Based on official data, the total volume of waste generation in Armenia significantly exceeds the EU average level – 26.6 tons in Armenia versus 4.8 tons in the EU (see Table 10 for detailed statistics on waste generation in Armenia). This is mainly a consequence of the structure of the Armenian economy. The Armenian economy is primarily focused on resource-intensive sectors (e.g. mining activity), and the industry is largely not resource-efficient; therefore,

it can be assumed that resource productivity is low and waste generation is simultaneously high. At the same time, Armenia has a significantly lower volume of municipal waste generation per capita – 179 kg, compared to 513 kg in the EU. This is mainly a consequence of lower consumption levels in Armenia due to low household incomes. Another cause of this can be improper data collection methods and landfilling in unofficial landfills/dumpsites.

It is estimated that less than 5% of waste is recycled in Armenia; however, there is no official data supporting this information. Most of the municipal waste is landfilled (mostly in illegal landfills and dumping sites). Therefore, there is a significant need in Armenia to turn municipal waste management into a more circular pathway.

Armenia has started focusing on circular economy and proper waste management only recently, thus there is very little official data available about this area. During the development of this document, no reliable data has been found regarding the resource efficiency and circularity indicators since the roadmap for adopting circular approaches in Armenia was only recently presented by the Ministry of Economy. Nevertheless, several research, education and other institutions have conducted various studies to gather and/or introduce data on circular economy and waste management.

Table 10. Waste generation in Armenia

Indicator	2019	2020	2021	2022	2023
Industrial and mining waste generation, thousand ton	67,891	73,962	88,736	79,088	58,360
Industrial and mining waste generation per unit of GDP at purchasing power parity (PPP, 2017)*, ton/$1000	1.68	1.98	2.24	1.79	1.44
Industrial and mining waste generation, ton per capita	22.9	24.9	29.8	26.6	19.7
Municipal waste generation**, kg per capita	159.6	193.6	164.5	179.4	146.2

Several important indicators are not tracked by the national Statistical Committee. Those indicators include:

- Municipal waste recycling rate (share of municipal waste recycled, %)
- Waste treatment methods (breakdown of waste treated by recycling, incineration, landfilling, composting, %)
- Packaging waste recycling rate (% of packaging waste recycled by material type)
- Food waste per capita (amount of food waste generated per person per year)
- Circular material use rate (% of materials reintroduced into the economy as secondary raw materials).

Environmental impacts from waste management in Armenia primarily stem from littering, inadequate collection and transportation, uncontrolled open dumping, and unsafe recovery or disposal practices.

Littering is an issue in Armenia, largely due to low public awareness of waste's environmental impacts and a lack of sufficient waste management infrastructure, including timely collection. In many communities without basic waste collection services, residents resort to burying or disposing of waste in natural areas such as rivers, canyons, scenic spots, or random locations. Uncollected waste is often burned as a last resort. Additionally, many waste bins and containers lack lids or remain open, making it easy for animals and birds to scavenge in municipal waste, spreading litter and posing public health risks. Littering extends beyond household waste and includes construction debris, bulky items, and hazardous waste, such as packaging from agricultural chemicals.

Poor waste collection and transportation exacerbate these issues, with overflowing bins due to irregular pick-up and waste transported in open trucks leading to street littering, odour, and air contamination.

The most significant environmental impacts arise from **uncontrolled open dumping**. As of 2020, Armenia had around 300 active open dumpsites, although this number has reportedly decreased with recent municipal consolidations. Fires, both spontaneous and intentional, are common at larger dumpsites, particularly during summer temperatures above 35°C. In 2023 and 2024, the largest dump site in Nubarashen, Yerevan, burned for nearly 10 days. Several dumpsites in the country are constantly smoking or burning. Fires are often set to recover valuable materials or to reduce waste volume. Due to inadequate monitoring, low awareness, and a lack of infrastructure such as civic amenity sites, community sorting stations, and sanitary landfills, nearly all types of waste—municipal, construction, industrial, agricultural, and automotive—are dumped in an uncontrolled manner. This includes unsorted biodegradable materials, which release methane, a potent greenhouse gas, as they decompose, and untreated agricultural waste, which also contributes to methane emissions and resource loss.

Unsafe waste recovery activities further contribute to environmental degradation and public health risks. Sorting and baling recyclable fractions of municipal waste expose informal waste pickers to significant health and safety hazards, including fire risks. To recover metals, waste pickers frequently burn household appliances and cables at dumpsites, releasing toxic emissions and risking large-scale fires. Disposing of car tires, which often have no recycling demand, is a common problem, with tires frequently burned in bulk or used as fuel, resulting in poor indoor air quality and posing serious health risks. Similar practices occur with plastic waste, which is burned in household burners. Additionally, the recovery of hazardous materials, like lead-acid car batteries, often occurs informally and unsafely. Car batteries, for instance, are sometimes emptied by unlicensed collectors who discharge acid into the soil before delivering them to licensed facilities. This practice is estimated to release around 700 tons of battery acid into urban areas annually. Electronic waste, too, is frequently mishandled for metal recovery, and many recycling facilities operate with minimal regard for environmental compliance, often failing to report emissions

or meet regulatory standards. Recovery plants frequently lack adequate occupational safety standards, placing employees at significant risk. Workers often work bare-handed, face exposure to hazardous substances, unsafe machinery, and poorly maintained equipment, increasing the likelihood of accidents and long-term health issues.

Another significant issue in Armenia is the disposal of slaughterhouse waste. Farmers commonly bury or dump this waste in the same municipal dumps or random ad-hoc lagoons, often due to a lack of accessible and safe disposal options. This practice poses serious environmental and health risks, as decomposing animal remains contaminate soil and water, attract disease-carrying pests, and produce foul odours. Additionally, untreated waste releases methane and other greenhouse gases as it decomposes, further contributing to climate change.

Circularity in waste management sector

The waste management sector in Armenia still has a very linear nature. This sector currently comprises both public and private entities providing waste-related services that are primarily limited to waste collection, transport, and landfilling. The waste is mainly collected in the mixed fractions and delivered to the landfills. Although source separation and recycling, as well as the new circular economy, approaches, and services, are slowly gaining more attention, this sector is still in its initial stage of development.

On the other hand, Armenia has made very little progress in circular economy and material productivity. However, it is important to note that the government has started some activities to introduce regulatory and economic instruments (e.g. Extended Producer Responsibility, EPR) that can enhance circularity. Further development of waste recycling and recovery will also boost the development of the waste management sector.

The below sections present the current state and trends in waste management in terms of policy and governance, infrastructure and technology, and financial mechanisms.

Policy and Governance

Resource Efficiency. Clean Production and Decarbonisation: Armenia into an industrially developed country with the use of modern management models and competitive technologies, as well as through constant development of human capital. For the implementation of the above-mentioned objectives "**The Strategy of Export-Led Industrial Policy of RA**" has been developed by the Ministry which has been approved by RA Government on December 15, 2011, and still in force.[45] The document aims to set out and develop new areas of economic growth together with continuous development of existing exporting sectors and those with export potential. In order to mitigate the impact of the global financial crisis on the economy, to create favourable

[45] Source: https://www.mineconomy.am/en/page/97

conditions for the development of industrial sectors, to promote local production and to create new jobs, the RA Government applies complex tools of state support aimed to increase export and import substitution by creating favourable conditions for new investments. Law on Value Added Tax (VAT) enables 3-year deferred VAT payments on investments exceeding 300 bn AMD. The Customs Code created simplified taxation procedure for re-export (temporary import) and re-import (temporary export)[46]

To increase access to credit resources for the industry sector and to attract finance, the Ministry of Economy has developed the regulation of running registration of machine tools, equipment, and their component parts subject to inventory in RA. The regulation was approved by RA Government N 407-N Decree, on April 15, 2010.

5-Year State Development Program: This has also been presented in the Armenian government's five-year plan (2021-2026[47]), within which the government committed to provide at least $200mln to support those manufacturers that are able to produce high-quality, exportable products, which can support the manufacturing sector to contribute 15% of the country's GDP. The government has identified the following five priority areas in the action plan:

The taxation policy has a number of tax incentives for investments, including: (a) jewellery and diamond industry, (b) light industry, with a main focus on food and textile industries, (c) heavy industry, with a main focus on metallurgical and chemical production, (d) machinery industry, and (e) pharmaceutical industry

Armenia's strategic priorities mentioned in its 5-year action plan for the manufacturing industry are:

- to ensure the international development of Armenia's manufacturing industry for continuous growth of competitiveness,
- to increase the potential of creating exportable products,
- to establish 3 industrial zones,
- to take steps towards the industrialisation of Armenia and extend the production chain as much as possible, promoting the release of complex and high-value products.

State Targeted Programme on Promotion of Productivity: The Government had a programme for supporting all sectors of Industry by subsidizing/backing the interest rate on a loan/lease provided by financial organisations operating within the territory of the Republic of Armenia, the latest phase ended in December 2024. The programme supported Loans or Leasing for the following investments:

- Brand new (unused) machinery and their spare parts;
- Implementation of capital construction by a contractor paying the VAT during the installation and maintenance of the latter.

[46] RA Government N 1119-N Decree on August 4, 2011

[47] https://www.gov.am/files/docs/4586.pdf

- Digitalisation of business processes in each of the targeted sectors
- Involving business advisory and consultants in the targeted sectors

Strategic Development Programme for 2014-2025: Armenia has taken a big step in its green transition and started incorporating sustainable development activities into its **Strategic Development Programme for 2014-2025** upon joining EU4Environment Programme together with 5 other countries. It has developed 5 priority results and designed corresponding actions, such as:

- Support inter-ministerial policy dialogue platforms focused on green growth and including green economy targets in planning,
- Support the business in investment needs assessments,
- Support in the reforms of legislative frameworks, that will fully comply with international requirements building and developed implementation capacities for strategic environmental assessment (SEA) and transboundary environmental impact assessment (EIA),
- Awareness-raising on green economy, environmental action and sustainable lifestyles[48]

In partnership with UNIDO, Armenia has developed Resource Efficiency and Clean Production actions that support local organisations in up-taking circular economy approaches to ensure more resource-efficient business solutions and enhance productivity and innovation among SMEs.

SME Entrepreneurship Development Strategy for 2020-2024: August 27, 2020, the Government of Armenia approved the **Small and Medium-sized Entrepreneurship Development Strategy for 2020-2024** and its associated action plan for 2020-2022.

The goal of the strategy is to create a favourable environment for SMEs of the Republic of Armenia through development of entrepreneurial skills, implementation of ideas, increasing the competitiveness, which will allow SMEs with access to domestic and foreign markets.

Long-term Low GHG Development Strategy: The Long-term Low GHG Development Strategy of Armenia up to 2050 has set forward the following targets for the industry sector:

- Cleaner production: Introducing technologies and practices that reduce emissions from industrial processes.
- Waste management: Enhancing recycling and waste-to-energy initiatives.
- Innovation and research: Investing in research and development for green technologies.

The Strategy assumes that the Industrial Processes and Product Use (IPPU) sector will achieve reductions in GHG emissions through modernisation of equipment and upgrade of technological processes, primarily in cement production. For the “With Measures” (WM) scenario total reductions from 2030 to 2050 are 3,492 Gg CO2 eq. In the “With Additional Measures” (WAM) scenario a more

[48] https://mineconomy.am/en/page/2726

progressive measure would result in 9,323 Gg of CO2 eq GHG emissions reduction for the same period.

Green and Sustainable Economy Transition Strategy: Article 8.1 of the Programme of Activities for the Government of Armenia for 2021-2026 is designed to develop a strategy for green and sustainable economic development. This "green" agenda requires that the economy of any country is low carbon, resource efficient and socially inclusive, shifting the economy from the resource-intensive model to the knowledge/technology based one is the essential goal in transition to the green economy. Overall, in the context of a green economy all the three dimensions of sustainable development must be reflected equally.

According to Decision N 12 of the Supreme Eurasian Economic Council adopted on December 11, 2020, on **"Strategic Directions for Developing the Eurasian Economic Integration until 2025"**, in the context of the Combining efforts for the promotion of joint research activities (Direction 8), it is planned to develop a concept for introducing the "green" economy principles in the Union (8.3.7) for the development of the green technologies and environmental protection under the measure of economic cooperation (8.3). Additionally, the latter also includes a number of other activities related to the green economy, including financing by Eurasian Development Bank and the Eurasian Fund for Stabilisation and Development for the promotion of energy- and resource-saving technologies, distribution of "smart" energy efficient technologies, research, exchange of experiences, etc.

The Republic of Armenia has worked with donors and IFIs to define its vision for transition towards a green economy through "decoupling" of economic growth from resource consumption. To develop a proper vision in this direction, the Ministry of Economy has committed to development of a national policy framework through adoption of a Strategy for Transition to Green Economy as a means to *improve human well-being and social equity, while significantly reducing environmental risks and ecological scarcities*.[49]

The draft of the "Green and Sustainable Development" Strategy proposes to form a subsystem of sustainable economic development by introducing a sustainable economic development model from an inclusive and environmental point of view, where the economy and the environment will form a group of synergistic and mutually supporting systems, increase energy efficiency and resource saving, prevent the loss of biodiversity and ecosystem services by reducing carbon emissions and pollution. The purpose of the strategy is to promote economic benefits through the promotion of green industry, job creation, competitiveness, green energy development, sustainable agriculture and eco-tourism. The strategy also aims to contribute to economic development with a low carbon footprint by promoting the green economy. As of the time of writing this report, the draft Strategy was still pending adoption on the state legislative drafting website.[50]

[49] UNEP report, " Towards a Green Economy, Pathways to a Sustainable Development and Poverty Eradication", February 2011.

[50] https://www.e-draft.am/projects/6062/digest

The key priority areas, based on the existing national policies and strategic documents are prescribed in the draft Green Economy Transition Strategy, the Sustainable Finance Roadmap and the pending Green Taxonomy (the latter two are discussed in cross-cutting section). These include the following:

1. Resource efficiency and clean production (including reduction of environmental pollution and "green" packaging) in Industry and industrial value-chains and Responsible Mining;
2. Sustainable integrated planning, management, use and reuse of drinking and irrigation water resources (such as irrigation channels, drip irrigation, aquaculture, etc.);
3. Development of sustainable and efficient agriculture and forestry (sustainable seeding, pasture management, irrigation, refrigeration, development of organic/green certification, low-carbon/passive greenhouses, etc.);
4. Energy saving and improvement of energy efficiency in household heating and cooling, appliance use, lighting, as well as development of energy services;
5. Development of power sector and green transition to low-carbon energy development (renewable energy, hydrogen, storage/accumulation) with promotion of the local production of sustainable energy technologies and development of renewable energy capacities;
6. Waste management (Solid Waste and Wastewater) and extended producer responsibility (EPR) with focus on the principles of circular economy (including application of all "Rs" – refuse, reduce, reuse, redesign, repurpose, recover, recycle, rethink).
7. Transition to Smart and Green multi-modal Transportation (pedestrian mobility, development of electric mobility (trolleys/tams, e-vehicles, charging infrastructure, integration of renewable charging, development of local manufacturing opportunities of e-vehicle accessories, etc.)),
8. Sustainable, energy efficient urban development and green construction for development of urban settlements with reduced environmental footprint,
9. Service sector (agro-tourism, eco-tourism, education, information technology (IT), smart solutions, big data, data-storage, etc.).

However, the existing legislation of the Republic of Armenia does not fully provide for the transition to a green economy. Therefore, this objective requires development of a broad policy vision, legal basis and relevant amendments to the existing legislation in order to encourage transition to a green economy and efficient use of resources. Seen Annex I for a compilation of relevant policy documents in this sector.

Waste Management and Circularity: Waste reduction, recycling and circular economy are promoted only on a strategic level. MTAI Strategy on MSW removal highlights waste hierarchy and circular economy, Ministry of Economy's circular economy transition Roadmap outlines the high-level assessments and steps needed to develop a strategy. The Green Economy Development Strategy by the Ministry of Economy is pending finalisation as of November, 2024. However, there is yet no legislation to support waste reduction, recycling and circular economy. Clear incentives are missing. In terms of compliance with EU directives, the current legislation on waste needs drastic revisions, starting from the definition of waste. The role of different state agencies is often unclear when it comes to policy implementation and enforcement. There is an institutional fragmentation regarding various waste streams, which creates inefficiency in management. Poor implementation

of the "polluter pays" principle and lack of incentives and enforcement discourages private investment.

Infrastructure and Technology

Industrial Resource Efficiency and Decarbonisation: The industrial policy is based on the expansion of exportable sectors of the economy by contributing to the development of sectors with export potential, emphasizing the development of the processing industry. The Ministry of Economy is constantly carrying out activities towards the development and implementation of the policy of overall industry as well as of its separate sectors, which mainly aims to transform

Sustainable products and industrial practices

Armenia is currently in the process of developing roadmaps to promote eco-labelling, green procurement, and other strategic documents that may support the country's green transition. The narrative related to green economy, green products, sustainable businesses and alike have penetrated into many national policy documents and long-term strategic plans, however, there is no specific program, with the exception of the REC RECP initiative (mentioned at the start of the chapter), that directly targets the industry. The green credit lines offered to MSMEs such as the business development loans from EBRD, EIB, GGF, have pushed the investment pattern towards green and sustainable technologies through their technology filters. Nonetheless, there is no economy-wide tracking of the transformation that these investments have had.

During the last few years, Armenia has started showing some progress in eco-labelling, which is still mainly limited to the agricultural field. Currently, Armenia has no national ecolabel Type I. It is common to see self-made eco or green labels that the industry representatives put without permission on their products, and in the best-case scenario, eco-labels can be found on very few imported products. Currently, only one accredited body exists in Armenia that can certify agriculture and food products, which has enabled local organisations to obtain EU-equivalent organic certification for their agriproducts. It is important to note that in energy-efficient appliance labelling and building certification, a reformation process is taking place, and there are several accredited bodies. [51]

Through the support received from the EU4Environment programme, Armenia is working on developing its green procurement strategy, which also focuses on green certification, labels, standards, etc. They have identified the most common goods purchased by the state and included a list of possible alternative solutions and their reduced environmental impact. There are no national strategic documents that would directly be related to eco-labels and sustainable products; however, they are indirectly covered in some other major strategies. The 2021-2026 plan mentioned above includes components such as identification of gaps in the current procurement system,

[51] https://www.eu4environment.org/where-we-work/armenia/

developing a new modern e-procurement system that will support all customers by providing the possibility of automatic collection, generation, and analysis of all data, reach 20% increase in green and sustainable procurement in total government procurement value starting in 2024

3.2.2 Main Enabling Conditions, Needs and Gaps (constraints)

3.2.2.1 Key Institutional Capacities

The above analysis indicates, that the role-players requiring the training and capacity building include:

1. Key government institutions, particularly:
   a. Ministry of Economy – in charge of issues related to green economy transition, industry, agriculture and tourism, pending Green Taxonomy, Green Economy and Circular Economy strategies
   b. Ministry of Environment – in charge of climate change policy, circular economy and extended producer responsibility, overall environmental policy
   c. Ministry of Territorial Development and Infrastructure – in charge of green energy development, transport and broader infrastructure, local government support in local development finance, etc.
   d. National Statistical Service, in charge of generating statistics and reporting on "green" performance indicators for the overall economy and sectors in particular
   e. Urban Development, Technical Standards and Fire Safety Inspectorate
   f. Environmental Impact Expertise Centre" SNCO
   g. Committee of Forest of Ministry of Environment
   h. Environmental Protection and Mining Inspection Body of the Republic of Armenia
   i. National body for standards and metrology
   j. State Revenue Committee
   k. Statistical Committee of the Republic of Armenia
   l. Central Bank of RA
2. Financial Institutions
   a. Central Bank of Armenia – in charge of Sustainable Finance Roadmap implementation
   b. Commercial Banks – in charge of the local "green" lending
3. Private Sector
   a. Association of Entrepreneurs
   b. Employers Union
   c. Other industry associations
4. Environmental CSOs and academia
   a. Universities and research institutions
   b. CSOs that can support policy reform and advocacy on those measures
5. Educational System
   a. Universities that deliver professional training in environmental and natural resource economics, agriculture, energy and other related topics

b. School teachers and school-children for introducing the “green economy” concepts as part of the project-based learning

3.2.2.2 Gaps and Challenges of the Sector

This section gives an overview of the main gaps between the current environmental and climate/ environmental policy-related plans and actions in the industry thematic area and those proposed in the EGD, as well as provides an overview of what are the limitations in institutional and sectoral capacity.

The Armenian industry faces several challenges that lead to improper resource management, low productivity, pollution, etc. Some of the major challenges are:

- inadequate education and training, and shortage of experienced personnel,
- low productivity,
- gaps in legal frameworks and acts,
- poor branding,
- high export costs,
- limited local market opportunities,
- weak transport infrastructure and others.

On the other hand, when talking about the mining industry some of the most important issues are related to the old and improperly abandoned mines, as well as exploitation of open/active mines. Mining is one of those industries that receives a lot of media attention, as a result of which various active groups and NGOs protest against the creation of new mines and usage of existing ones by voicing its potential negative environmental effects. In addition, there are some issues associated with the legislation, monitoring systems, etc. The recent conflict between Armenia and Azerbaijan has also caused some conflicts in mining process and ownership of certain mines. Some other challenges are:

- Decrease in production capacity and access to natural resources due to the loss of lands
- Dependence on import of major products and materials
- Dependence on Russia in terms of exports
- Lack of international investments
- High percentages on loans and limited access to business-friendly financial mechanisms
- Shortage of high-skilled people due to continuous immigration

Furthermore, the industrial sector, including manufacturing, construction, mining and other activities, leave substantial environmental footprints on the nation’s ecosystems. Industry’s resource efficiency remains low, waste generation and resource intensity (energy intensity, water intensity) remain quite high. In the mining industry old and improperly abandoned mines are associated with immediate risks to the environment and human health, long-term environmental risks, as well as the feasibility of their further use.

3.2.2.3 Policy Gaps

Some of the current key gaps and bottlenecks in providing an adequate strategic framework for the manufacturing industry in reaching the international/ESG and country targets and objectives are:

- Armenia's Green Economy Transition Strategy and Circular Economy Strategy have not been adopted despite being in the Government action plan in 2023
- Armenia's SME development strategy for 2020-2024 did not accent the promotion of green practices and strategies among SMEs, it does not offer technical and financial support tools.
- The national documents have little to no enforceable monitoring and compliance mechanisms.
- There are no legally binding targets for decarbonisation and energy efficiency in the industry sector, there is also the absence of compliance monitoring and control mechanisms across the country
- There are no specific industrial strategies or national plans dedicated to promoting green technologies and international practices.
- Lack of Strong Environmental Regulations and weak enforcement of sustainability standards and environmental policies.
- Limited financial incentives such as tax breaks or subsidies for green technologies.
- Armenia lacks the financial means to take actions related to decarbonisation and energy efficiency on its own and largely depends on donor support from the EU and other partners whose support leads to national-level changes

Industrial Resource Efficiency and Clean Production

- There is no state policy promoting resource efficiency or clean production in the industrial sector
- There are no requirements for comprehensive mine closure planning to address environmental, social, and economic impacts once the mineral resource has been exhausted.
- There are no requirements or incentives for promoting responsible/local sourcing by ensuring that minerals are extracted and processed in an environmentally and socially responsible manner
- There are no objectives set on national policy level to promote industrial resource efficiency and clean production

Industrial decarbonisation

- There are very few national strategic documents related to energy efficiency, hardly any cover topics related to industry decarbonisation, with the exception of the Low greenhouse gas emission development strategy
- Armenia aims to reduce the dependency on fossil fuels by increasing the industry's share of renewable energy sources, simultaneously improving energy efficiency, primarily prescribed in the Energy Sector Development Strategy up to 2040, aiming at increasing the share of renewable energy in electricity production to 50%, the share of electric vehicles to 10%

- The country has started piloting motivational mechanisms to reduce the import of vehicles with higher emissions, giving additional benefits to those who prefer electric vehicles instead
- The renewable energy technologies advance in all sectors due to the market appeal and commercial viability, despite the lack of targeted industry programmes.

Sustainable products

- There are no approved frameworks focusing on sustainable products/eco-labelling yet. There are some practical actions/discussions undertaken with the funding of EU4Environment.
- Eco-labelling provisions also get delayed progress due to potential contradictions between the EU and Eurasian Customs Rules on product labelling and trade.

Circular economy/waste management

- A few draft strategies/frameworks have been submitted to the government on areas such EPR and hazardous waste management for feedback
- EU experts have been engaged in the development of new legislations and strategic documents
- EU funding has been allocated to some organisation to pilot small or medium-size projects in Armenia, including research projects
- Within CEPA agreement Armenia has to align some of its national and EGD goals based on the EU requirements/standards

Overall/Cross-cutting gaps

- There is little institutional capacity to design and implement proper policies.
- There is little to no monitoring and enforcement of the current strategic documents.
- There is little financial support available for meeting the strategic requirements.
- The targets are rather general and do not necessarily have specific numeric targets in all three areas.
- The objectives and targets that are set in strategic documents are somewhat in line, however, the timelines for achieving those are commonly changed.
- The data collection and monitoring of objectives and targets is implemented improperly, and thus, relying on the existing data to make some conclusions is an issue.
- Has the relevant EU legal framework been transposed in a suitable way relative to the EGD? What are the biggest issues?
- Very few relevant EU legal acts have been adopted in Armenia.
- Currently, several institutions are working on providing recommendations to the state on the adaptation of different EU legal frameworks.
- There are no proper legal acts and procedures promoting sustainable products and industrial practices (e.g. EMAS, eco-labelling (with some exceptions on agricultural products)).

3.2.2.4 Institutional Capacity Gaps

Industrial resource efficiency and clean production is a broad field of regulation, which overlaps with the policy and regulatory functions of other ministries/regulatory bodies. For example, areas related to green transition and efficiency of energy use are in the jurisdiction of MTAI, while areas related to water are under the Ministry of Environment and the Water Committee. In areas of such overlap, the Ministry of Economy, in charge of the industrial sector policy, has limited influence. In addition to the complexity of inter-agency coordination, the existing capacities of the respective ministries are insufficient to perform their regular functions, and embracing the green transition agenda would require substantial new capacities. The institutional capacities are insufficient in the following key areas:

- Policy and regulatory framework: development of most policy documents in the field of sustainability is heavily supported by donor initiatives, which often then face delay in adoption and enforcement due to insufficient capacities of ministries. The Strategies on Green Economy Transition, Circular Economy, E-Mobility are examples of seminal policy documents that have been pending adoption beyond their scheduled expected date.
- Research, innovation, and technical expertise: a lot of the sectoral policies require strong data basis and analysis, modelling, and forecasting. The statistical basis on the industrial sector is insufficient, undigitized, inconsistent, and rarely properly linked between production, financial and environmental indicators.
- Financial and economic instruments: the state budget support has been limited and main investments in this sector have been provided by the development banks through commercial loans. However, these loans are often unaffordable for MSMEs that have no collateral to offer.
- Institutional coordination and governance: with the exception of the Green Armenia Platform and the Inter-agency coordination committee on climate change, there is no coordination platform where effective solutions can be found for the cross-cutting issues.
- Information, awareness, and knowledge sharing: the episodic findings from industrial resource efficiency audits and implemented investment projects are not properly analysed, or conclusions drawn for sectoral policies.

3.2.2.5 Non-Institutional Capacities

Armenia's promotion of industrial resource efficiency is supported by various non-governmental organisations and initiatives that complement governmental efforts. Key contributors include:

Gyumri Green Technology Centre (GTC): Opened in 2014, the GTC offers training in engineering and green technology areas, the centre contributes to the development of a skilled workforce, indirectly promoting resource efficiency through technological innovation.

Vanadzor Technology Centre (VTC): Inaugurated in 2016, provides services such as business consultancy, mentoring, marketing, and technical innovation support, enhancing the competitiveness of companies and encouraging efficient resource utilisation.

The Regional Environmental Centre (REC) for the Caucasus, through its Armenian National Office, plays a pivotal role in advancing industrial resource efficiency and promoting cleaner production practices within Armenia. Its key contributions include implementation of Resource Efficient and Cleaner Production (RECP) Initiatives: REC Caucasus has been instrumental in executing RECP projects aimed at enhancing resource efficiency and environmental performance among Armenian businesses, particularly small and medium-sized enterprises (SMEs) in sectors such as agriculture, food processing, chemicals, and construction materials. These initiatives focus on reducing resource consumption, minimising waste, and improving overall sustainability.

Collectively, these non-governmental entities and initiatives play a significant role in advancing industrial resource efficiency in Armenia by fostering innovation, supporting technological development, and promoting sustainable practices.

3.2.3 EU Approximation – Governance and policy and legislation

3.2.3.1 Manufacturing industry

The EU Governance in promoting sustainability and resource efficiency within EU include the following:

- European Green Deal (EGD): The EU's flagship strategy to achieve climate neutrality by 2050, emphasizing sustainable industrial production and circular economy principles.
- Circular Economy Action Plan (CEAP): Aims to minimise waste, increase recycling, and ensure sustainable product design across industries.
- Industrial Emissions Directive (IED): Regulates emissions from industrial facilities, requiring them to adopt best available techniques (BAT) for reducing pollution and improving efficiency.
- EU Taxonomy for Sustainable Activities: Defines criteria for environmentally sustainable economic activities to guide investments in green industries.
- Eco-design Directive: Establishes minimum energy efficiency and environmental performance standards for industrial products.

The main laws regulating resource use and environmental impact of industrial enterprises and investments in Armenia through the following policies:

- The Strategy of Export-Led Industrial Policy of RA
- Law on Value Added Tax (VAT)
- The Customs Code
- The RA Law on Environmental Impact Assessment and Expert Examination (RA-110-N/21.06.2014)
- The RA Law on industrial policy (RA-184-N /19.11.2014)
- The mining code (RA-280-N/ 28.11.2011)
- The RA constitution (several clauses focusing on mining and industry)

The mining industry is also regulated by national laws such as the Land Code, Mining Code, Civil Code, Water Code, Administrative Code, Law on Waste, Law on Environmental Supervision, Law on Environmental and Natural Resource Use Fees, Law on Environmental Impact Assessment and Environmental Expertise. When it comes to international conventions, Armenia has ratified:

- International Labour Organisation (ILO C176) Convention on Safety and Health in Mines,
- C174 Convention13 on the Prevention of Industrial Accidents
- C81 Convention14 on Labour Inspection. The Republic of Armenia

One major convention that has not been ratified by Armenia is the C155 Convention on Occupational Safety and Health, nevertheless, the rights to healthy, safe and fair working conditions are stated by the UN International Covenant on Economic, Social and Cultural Rights (Article 716), as well as the Revised European Social Charter (Article 17).[52]

Key gaps:

- Armenia's SME development strategy for 2020-2024 did not accent the promotion of green practices and strategies among SMEs, it does not offer technical and financial support tools.
- The national documents have little to no enforceable monitoring and compliance mechanisms.
- There are no legally binding targets for decarbonisation and energy efficiency in the industry sector, there is also the absence of compliance monitoring and control mechanisms across the country
- There are no specific industrial strategies or national plans dedicated to promoting green technologies and international practices.
- Armenia lacks the financial means to take actions related to decarbonisation and energy efficiency on its own and largely depends on donor support from the EU and other partners whose support leads to national-level changes
- No policies accelerating Adoption of Clean Technologies or Best Available Technologies (BAT)
- No incentives or requirements for industries to shift to energy-efficient processes and low-waste production.
- No State policies that assign priority to clean production technologies
- No eco-design requirements establishing minimum energy efficiency and environmental performance standards for industrial products.
- No regulations or financial support for cleaner industries drive resource efficiency, waste reduction or water efficiency
- No provisions to incentivize or require companies to prioritise material recovery, reuse, and recycling, leading to better resource productivity.
- The government and private sector do not have investment programmes for developing or accelerating the uptake of green technology, leading to more efficient industrial processes.
- Increased research in eco-friendly materials, automation, and sustainable supply chains.

[52] https://crm.aua.am/files/2021/05/Disussion_Paper_Working_conditions_and_occupational_safety_EN.pdf

Strengthening of Green Jobs and Skills

- Workforce training programmes ensure industries adopt modern, efficient production techniques.
- Cross-sector knowledge sharing improves sustainable industrial practices.

3.2.3.2 Industrial decarbonisation and energy efficiency (cross-cutting)

The main laws and regulations related to the industry, energy and mining (decarbonisation and energy efficiency) are listed below (in addition to the general strategic documents and plans listed above):

- The RA Energy Law (RA-148/07.03.2001)
- The RA Law on energy saving and renewable energy (RA-122-N/09.11.2004)
- The RA Law on Environmental Monitoring (RA-82-N/ 28.05.2005)
- The RA law on the construction of new nuclear power plant(s) in the RA (RA-192-N/27.10.2009)
- The RA Law on state technical control in the field of energy development and energy consumption (RA-237-N/23.06.2011)
- The RA Law on state technical control in the field of energy development and energy consumption (RA-36-N/14.12.2004)
- Long-Term Low GHG Emission Development Strategy

The significant carbon footprint in the industrial sector is also critical for the alignment with the EU climate acquis (covered in the respective chapter), including the EU ETS. Armenia has obligations about transposing the elements of the EU ETS stemming from the Comprehensive and Enhanced Partnership Agreement (CEPA), with introduction of the carbon border adjustment mechanism (CBAM) stepping in with reporting obligations from 2023, and pending the alignment with the EU ETS Directive (2003/87/EC). Armenia is working to establish a system for identifying relevant installations and identifying greenhouse gases (Annexes I and II to the ETSD), establishing monitoring, reporting, verification and enforcement systems, and public consultation procedures (Articles 14, 15, 16(1) and 17 of the ETSD). Armenia is also expected to set up a competent authority/authorities (CA/CAs) overseeing and implementing these provisions, adopting national legislation that would lead to the transposition of these provisions to Armenian law. In line with CEPA, the deadline for these actions has been set to 1 March 2029. The institutional readiness and the appropriate legal and regulatory measures in place could be a bonus to the companies exporting their products to the EU as Armenia could set up measures equivalent to the carbon border adjustment measures (CBAM) planned by the EU and demand an exemption from the CBAM for its companies, or the companies could use verified emissions reports to address the requirements of the CBAM. The approximation of Armenian laws to those of the EU may also bring in additional investment from the EU member states.

Key gaps:

Currently, there are several major gaps concerning the current legal framework in the industry/ mining sector in reaching the international/ESG and country decarbonisation targets and objectives:

Gaps in national policies and regulations promoting industrial resource efficiency and sustainable production

- Armenia does not have any policy and/or legislative acts that would set specific targets for mining and industry in decarbonisation efforts.
- Armenia does not have policies regulating emissions from industrial facilities, requiring them to adopt best available techniques (BAT) for reducing pollution and improving efficiency.
- Armenia has not adopted Green Taxonomy for Sustainable Activities to define criteria for environmentally sustainable economic activities to guide investments in green industries.
- There is a lack of proper regulation and procedure for conducting public hearings when it comes to making decisions related to the mining industry.
- The Armenian legislation does not cover any explicit requirements related to the implementation of cumulative impact assessment[53]
- Armenia does not have detailed mine waste management regulations and systems for operating and closed mines.
- There is a big gap in the mechanisms for inclusion and benefits for affected communities[54]
- Macro-economic exposure of industrial sectors affected by CBAM on the carbon-intensive industries creates risks on export volumes, foreign currency influx, employment, etc., particularly in the Iron and Steel sectors.

Gaps in financing industrial decarbonisation and energy efficiency

The main gaps to finance decarbonisation and energy efficiency projects are the following:

- The lack of specialised financial instruments (green loans, subsidies) and legal frameworks creates barriers to funding industrial decarbonisation and energy efficiency projects.
- Uncertainties in future regulatory or economic policy instruments, including the carbon pricing system, create risks for investors and donors.
- The payback period of investment in industrial decarbonisation and energy efficiency projects is often longer. It creates challenges for businesses and enterprises.

Thus, more funding should be allocated for developing corresponding instruments and supporting the industry with initial investments. No specific figure can be identified without detailed research.

[53] https://crm.aua.am/files/2019/05/Gap_Analysis_Eng.pdf

[54] https://documents1.worldbank.org/curated/en/289051468186845846/pdf/106237-WP-P155900-PUBLIC.pdf

Gaps in enhancing sustainable products and industrial practices

The Armenian government has no financial instruments for sustainable public procurement, eco-labelling and industrial practices and currently, is not interested in investing funds in this field. Some of the main gaps that should be improved and additional funds should be raised for are:

- The absence of economic instruments on sustainable products creates financial risks for businesses.
- The lack of a policy and legal framework on sustainable public procurement. In Armenia, the public procurement process primarily focuses on the price rather than the sustainability of the product and other green factors.
- The lack of awareness about the opportunities that the industry will get if it enhances sustainable production and follows green requirements set by the developed countries.

Investment needs

Estimating investment needs is crucial in meeting the country's climate targets on industrial decarbonisation, waste management, and industrial practices. However, comprehensive assessments of recent investment needs for climate actions are missing at the national level of Armenia (see Table 11 for EGD objectives/targets and current status/progress in the thematic area).

Table 11. EGD objectives/targets and current status/progress in the circular economy/waste management thematic area

EGD Objectives and Targets (including 8th EAP targets and indicators)	Relevant EGD indicators and EU level reference (8th EAP)	Assessment (relevant country indicators/level of achievement)
Circular economy/ Resource productivity: ■ Significantly decrease the EU's material footprint, by reducing the amount of raw material needed to produce the products consumed in the EU by reducing the amount of raw material needed to produce the products consumed in the Union ■ Sustainable industry: to double the use of recycled material, in terms of its share in the total amount of material used by the economy, between 2020 and 2030 in terms of its share in the total amount of material used by the economy, between 2020 and 2030	**Raw material consumption** (tonnes per capita) Source: Eurostat / EEA EU Average in 2022 is 14.8 tonnes per capita ■ **Circularity rate** – Circularity rate (%) EU in 2022 =11.5% Source: Eurostat Circular material use rate methodology ■ **Consumption footprint** (based on life cycle assessment) single indexed score (2010=100) Source EEA and Joint Research Centre	**No indicators are available** No indicators are available since Armenia has started its green transition very recently, and very little data has been collected.

EGD Objectives and Targets (including 8th EAP targets and indicators)	Relevant EGD indicators and EU level reference (8th EAP)	Assessment (relevant country indicators/level of achievement)
Waste management: Waste prevention: significantly reduce the total amount of waste generated by 2030	■ **Waste generation**: significantly reduce the total amount of waste generated by 2030. Waste generation per capita (kg/per capita): 4.8 tonnes of waste were generated per EU inhabitant in 2020, Eurostat. ■ Municipal waste generation (kg/per capita), EU average 513 kg per capita in 2022, Eurostat. ■ **Municipal waste recycling** (EU countries were set a recycling target of 50% by 2020 under the Waste Framework Directive); the EU average was 48% in 2022, Eurostat. ■ **Landfilling of municipal waste** (Landfill Directive introduces a landfilling ban for separately collected waste and limits the share of municipal waste landfilled to 10% by 2030) average municipal waste landfilling in the EU was 23% in 2022, Eurostat. ■ **Packaging waste generation and recycling:** ■ **Food waste generation:** food waste generation per capita, around 131 kg of total food waste per inhabitant were generated in the EU (2021), and household-based food waste generation was 70 kg per inhabitant (2021) ■ **Construction and demolition waste recovery** (EU countries were set a recovery target of 70% by 2020 under the Waste Framework Directive)	**Total waste generation per capita: 26.6 t** The overall waste generation is higher in Armenia than in the EU, which may be caused by the fact that Armenia generates a lot of mining waste. **Municipal waste generation per capita: 179.4kg** The overall waste generation is higher in Armenia than in the EU, which may be caused by the lower income level of Armenians and gaps in data collection methods. **Municipal waste recycling (%): no data** It is estimated that overall, 5% of recyclable waste is being recycled in Armenia. However, no official data is supporting this information. **Municipal waste landfilling (%): 36%** Since there is no official data on incineration, recycling and other activities, it is challenging to provide insights on 36%; however, there is a possibility that the amount is low as there is no proper tracking system, and a lot of waste ends up in illegal dumpsites. **Municipal waste incineration (%): 0%.** **No official data is collected.** No incineration facilities exist in the country, MSW is not incinerated. **Packaging waste generation per capita: no data** **Packaging waste recycling (%):** **No official data is collected.** It is estimated that less than 5% of waste is recycled in Armenia; however, there is no official data supporting this information. **Food waste generation per capita (%):** It is estimated that in urban areas, around 50% of municipal waste is food and organic waste. However, there is no official data supporting this information. **Construction and demolition waste recovery no data (%):** Construct and demolition waste

EGD Objectives and Targets (including 8th EAP targets and indicators)	Relevant EGD indicators and EU level reference (8th EAP)	Assessment (relevant country indicators/level of achievement)
		is commonly dumped in illegal dumpsites; sometimes, they are also taken to the landfills under another waste category (in some cases, using bribes).

3.2.3.3 EU Compliance on Waste and Circular Economy

Armenia has adopted several strategic documents that promote and provide a better strategic framework for the green transition.

- The signature of the "Comprehensive and Enhanced Partnership Agreement" (CEPA) in 2017
- The country has also included components on green transition within documents such as "Strategic Development Programme for 2014-2025", "Armenia's programme on energy saving and renewable energy for 2022-2030", "Roadmap on creating preconditions for extended usage of natural resources in the economic cycle (circular economy)" (the second version is currently being developed), "Waste Management Strategy" and more. Armenia has also managed to review some of its laws (e.g. the Law on Waste) and make them more specific and detailed as well as more in line with relevant EU directives. It is also working on developing regulations on Extended Producer Responsibility (EPR), as well as some actions being taken to improve the hazardous waste-related regulations.
- In 2022, the Ministry of Economy published a "Roadmap on creating preconditions for extended usage of natural resources in the economic cycle (circular economy)"
- The Waste Management Strategy (approved in 2021) of Armenia is based on the 5Rs (reduce, reuse, recycle, recover, residual)
- There is a general circular economy roadmap that was developed in 2022, which is currently being revised, but there are no nationally binding documents on the circular economy, no mechanisms to promote waste sorting and recycling, etc.

Therefore, one of the key gaps is that the current waste management-related strategic documents and legal framework are not aligned with relevant EU documents (EU CEAP and relevant EU acquis). There are no clear targets set in relevant policy documents, and many policy documents are still in the development stage.

Although municipal solid waste (MSW) collection data is published by the State Statistical Committee, information on recycling and its economic contribution is lacking. This data gap often creates the false perception that no recycling occurs in Armenia. However, as of 2023, over 40 companies in Armenia were engaged in recycling and waste treatment. Among them, 10 recycled paper, 5 recycled plastic, 4 recycled glass, and 5 recycled metals. Many small and medium-sized enterprises specialised in recycling polyethylene, and several manufacturers of polymer-based

construction materials, such as hatches and pipeline insulation, incorporated up to 15% recycled polyethylene from bags, packaging, and wrapping films into their raw materials.

The *Waste Governance in Armenia* report includes findings from surveys conducted in 2019 with 16 companies involved in material recovery. Of these, 12 companies reported a shortage of input materials, despite the availability of recyclables at landfills. Only 10 of the companies sourced materials from landfills, while 8 received recyclables from the informal sector, and 12 benefited from sorted collection initiatives. Nine companies operated their own collection trucks, and 3 exported materials in both processed and unprocessed forms.

Since 2020, Yerevan Municipality has initiated separate collection of plastic, glass, and paper, delivering these materials to recyclers. Nevertheless, as of 2024, consultations with recycling companies during Union of Recyclers of Armenia meetings continued to highlight the persistent issues of insufficient supply and low quality of input materials. These challenges underscore the need for large-scale, efficient, and high-quality source separation systems, coupled with enhanced secondary sorting capacity, to meet the growing demand for recyclables.

In addition to municipal solid waste (MSW), certain other waste streams in Armenia are partially managed with elements of circularity. For example, a portion of the waste car tires generated in the country undergoes pyrolysis, a thermal decomposition process, to produce carbon black and liquid fuel. The resulting fuel is repurposed for applications such as greenhouse heating, contributing to resource recovery and reuse. Similarly, used refrigerators and other household appliances are often repaired and reintroduced to the market as affordable options for consumers. These practices not only extend the lifecycle of products but also reduce waste generation and promote more sustainable resource use within the economy. Biodegradable waste represents one of the most mismanaged waste streams in Armenia. This category includes food waste within municipal solid waste, manure and crop residues from agricultural activities, waste from slaughterhouses, industrial food processing by-products, and green waste from yards and parks. Currently, these materials are largely underutilised, leading to a significant loss of potential value.

Financial Mechanisms

The World Bank 2024 report suggests the following financial framework in the MSW sector. In 2022, total municipal waste management (including waste cleaning, collection, or landfill disposal) expenditures reached 13.5 billion AMD, with 965 million AMD (7%) allocated for capital investments. This marks a 50% increase compared to the 8.8 billion AMD reported in 2015. Average monthly expenditures for waste management in 2022 were 380 AMD per capita, with approximately 250 AMD per capita attributed to waste collection, assuming two-thirds of the costs cover collection and one-third sanitary cleaning.

Based on an estimated 707,000 tonnes of municipal waste generated in 2022, the average collection cost was 12,610 AMD ($32) per tonne, varying between $14 and $66 per tonne across regions. These figures primarily reflect transportation costs to nearby dumpsites, excluding

equipment depreciation. If full depreciation and transportation to regional sanitary landfills or transfer stations were included, the unit cost would rise to align with international standards for upper-middle-income countries, ranging from $50 to $100 per tonne.

Current landfill disposal costs are minimal. In 2015, these costs totalled 170 million AMD (7% of total waste management expenditures), equating to 360 AMD ($0.90) per tonne for approximately 470,000 tonnes of waste. This is significantly lower than the open dumping costs in low-income countries.

The current household waste management fees in Armenia account for 10% to 45% of the minimum affordability threshold, which is defined as 0.75% of the median disposable household income. It is recommended to set the affordability threshold at 1% of household expenditures, adjusted by province to account for significant regional variations in income levels and, consequently, in household expenditures. This measure will allow for better cost recovery based on "polluter pays" and affordability principles.

The introduction of Extended Producer Responsibility (EPR) policy in 2025 will also contribute to full cost recovery for management of several selected waste post-consumer streams such as packaging, batteries and accumulators, waste electric and electronic equipment (WEEE), car tires, oils, and filters.

The EU waste management data reporting methodologies and standard indicators are defined by several key regulations and frameworks, primarily under Eurostat, the European Environment Agency (EEA), and the EU Waste Framework Directive (2008/98/EC). These methodologies ensure consistency, transparency, and comparability of waste data across EU member states. Key methodologies for waste data reporting in the EU include:

1. Waste Statistics Regulation (WSR) (Regulation (EC) No 2150/2002)
   - Defines reporting obligations for EU member states regarding waste generation, treatment, and disposal.
   - Requires data submission every two years to Eurostat.
   - Includes waste categorisation based on the European List of Waste (LoW).
2. Waste Framework Directive (WFD) (Directive 2008/98/EC, amended by Directive (EU) 2018/851)
   - Establishes definitions and waste hierarchy (prevention, reuse, recycling, recovery, disposal).
   - Mandates reporting of municipal waste generation and treatment, including recycling rates and landfilling rates.
   - Introduces the Early Warning Mechanism to monitor progress toward recycling targets.
3. Landfill Directive (Directive 1999/31/EC, amended by Directive (EU) 2018/850)
   - Requires countries to report annually on the amount of waste landfilled.
   - Sets reduction targets for biodegradable municipal waste (BMW) sent to landfills.
4. Packaging and Packaging Waste Directive (Directive 94/62/EC, amended by Directive (EU) 2018/852)
   - Requires reporting on the recycling and recovery rates of packaging waste materials (e.g., plastic, glass, metal, paper, wood).

5. E-PRTR (European Pollutant Release and Transfer Register)
   - Tracks industrial waste generation and hazardous waste transfers.
6. Material Flow Accounts (MFA) and Circular Economy Indicators
   - Assesses waste in relation to resource efficiency and circular economy goals.
   - Includes metrics such as recycling rates, waste generation per capita, and secondary raw material use.

The below Table 12 presents EU waste management reporting standard key performance indicators (KPIs) to track progress toward circular economy goals. The table also includes an indication of the status and quality of tracking those KPIs in Armenia.

Table 12. Standard key performance indicators (KPIs) to track progress toward circular economy goals

Indicator	Definition	Source	Status and quality of tracking in Armenia
Municipal waste generation per capita	Amount of municipal waste generated per person per year (kg/ person)	Eurostat	Tracked. Data is unreliable due to poor data collection methods.
Municipal waste recycling rate	Share of municipal waste recycled (%)	Eurostat, WFD	Not tracked.
Landfilling rate of municipal waste	Percentage of municipal waste sent to landfills (%)	Eurostat, Landfill Directive	Tracked. Data is unreliable due to poor data collection methods.
Waste treatment methods	Breakdown of waste treated by recycling, incineration, landfilling, composting (%)	Eurostat	Not tracked.
Hazardous waste generation	Amount of hazardous waste generated (tonnes)	Eurostat, E-PRTR	Tracked only for industrial waste. Organisations report quarterly.
Packaging waste recycling rate	% of packaging waste recycled (by material type)	Packaging and Packaging Waste Directive	Not tracked.
Food waste per capita	Amount of food waste generated per person per year	Eurostat, Farm to Fork Strategy	Not tracked.

Indicator	Definition	Source	Status and quality of tracking in Armenia
Circular material use rate	% of materials reintroduced into the economy as secondary raw materials	Circular Economy Monitoring Framework	Not tracked.

Armenia faces significant challenges in collecting and maintaining high-quality data on circularity, resource productivity, and waste management. Key issues include:

- **Legislative gaps**: A lack of comprehensive legal frameworks results in fragmented data collection and reporting systems that do not align with EU standards.
- **Institutional limitations**: Government agencies operate with constrained resources, limiting their capacity for accurate data collection and reporting.
- **Data management issues**: Existing data often suffers from inaccuracies, inconsistencies, and duplication due to inadequate reporting methodologies.

As a result, Armenia has little to no data available for several EU Environmental, Social, and Governance (ESG) indicators, particularly those related to the circular economy and waste management. The lack of a comprehensive waste tracking system exacerbates data gaps, particularly due to dumping at unregulated dumpsites lacking weighbridges. Additionally, in many rural areas, waste is dumped in rivers or burned on private property due to inadequate or unavailable waste collection services. Several research institutions and non-profit organisations attempt to fill data gaps, but their efforts are limited since data is gathered on a one-time basis, dependent on donor funding, while short-term studies do not contribute to a continuous national data system.

3.2.4 Main priorities for green transition

1. Clarify Institutional Roles and Strengthen Public Sector Capacity

Clearly define the responsibilities, structures, and functions of relevant ministries and agencies involved in waste management and circular economy. Clear division of responsibilities among ministries (Environment, Economy, Territorial Administration and Infrastructure, High-Tech Industry) and improved inter-agency collaboration will help streamline policy implementation. Training programmes and capacity-building initiatives—for both the public and private sectors—can address knowledge gaps around modern waste management, resource-efficient production, and circular business models.

2. Develop Policy and Regulatory Support for Green Industry

- Develop environmental standards for implementing stricter energy and emissions performance benchmarks for industrial production.

- Enforce accountability for product sustainability throughout the supply chain through EPR.
- Mandate sustainability criteria in government contracts to drive demand for green products through green public procurement.
- Promote best available technologies (BAT) and energy management systems to reduce energy intensity.
- Support industries in shifting from fossil fuels to clean electricity and green hydrogen, decarbonisation technologies in energy-intensive sectors
- Encourage resource-efficient manufacturing and substitution of high-impact materials with eco-friendly alternatives.
- Promote circular business models that minimise waste and increase material recovery.
- Mandate eco-design principles for longer product lifespans, reusability, and recyclability.

3. **Enhance Local Level Capabilities**: Provide technical guidance, training, and financial resources to local authorities and municipalities, enabling them to implement effective waste management and circular economy initiatives (e.g., introduce source separation of waste in their communities). Establish clear mandates and procedures at the municipal level to ensure accountability and consistent policy execution.

4. **Establish Robust Data Collection and Reporting Mechanisms:** Develop and implement a standardized, transparent system for gathering, analysing, and reporting data on resource use, pollution, circularity and waste management. This framework should cover all levels of government and industry, helping to track progress, identify bottlenecks, and inform evidence-based policy decisions. Reliable, comprehensive data on waste streams, resource productivity, and environmental indicators are essential for evidence-based policymaking. Strengthening the capacity of the Statistical Committee (ArmStat) and other relevant agencies, establishing clear reporting standards, and integrating digital technologies will help create accurate baselines and facilitate the monitoring of progress toward green transition goals. This will be partially addressed through the introduction of EPR policy that will require a digital platform for a higher quality waste data reporting.

5. **Improve Enforcement and Monitoring Infrastructure:** Strengthen oversight by creating or upgrading state laboratory testing facilities and control systems. Train and equip enforcement personnel to ensure compliance with waste management regulations and circular economy targets. Regular monitoring and auditing will ensure that measures are effective and properly enforced.

6. **Investment and Financial Incentives:** Expand funding for clean production technologies through grants, loans, and tax incentives. Strengthen carbon pricing mechanisms to drive investments in low-carbon production. Facilitate access to funding and technical assistance for micro, small and medium-sized enterprises (MSMEs).

7. **Foster Comprehensive Stakeholder Engagement**: Involve government agencies, local communities, the private sector, and civil society in designing and implementing policies. Encourage multi-stakeholder dialogues to identify common goals and synchronise efforts toward

meeting environmental objectives. Shared ownership of solutions will lead to higher efficiency and more sustainable outcomes.

8. **Upgrade Waste Management Infrastructure and Technologies**: Modernizing the country's waste collection, separation, and recycling infrastructure is crucial. This involves improving municipal waste collection services, introducing large-scale source separation systems, building sanitary landfills compliant with EU standards, and enhancing recovery processes (e.g., composting and anaerobic digestion) for organic waste. Strengthening hazardous waste treatment capacity and closing or rehabilitating illegal dumpsites would also reduce environmental harm and greenhouse gas emissions.

9. **Integrate Circular Economy Principles into Education and Public Awareness:** Embed clean production and circular economy concepts into educational curricula and conduct public information campaigns to cultivate a culture of resource efficiency. Encourage academic institutions, research centres, and vocational training programmes to collaborate with government and industry partners, ensuring a continuous pipeline of expertise and innovation.

10. **Promote Inclusive and Just Transition:** Ensuring that the shift to a green economy benefits all social groups involves mapping potential job gains and losses, integrating gender and social inclusion aspects in policy planning, and offering retraining or upskilling opportunities. A just transition approach will help minimise socioeconomic disruptions and garner broader public support for ambitious environmental reforms.

11. **Develop Incentive Frameworks and Financing Mechanisms:** Create tax incentives, grants, or low-interest loans that encourage both public and private stakeholders to invest in circular business models, technologies, and infrastructure. Offer financial tools and risk-sharing mechanisms to attract capital and stimulate research and development in innovative waste management solutions. Armenia must develop financial mechanisms and policy instruments that make circular practices cost-effective. Examples include increasing landfill fees, introducing tax breaks or subsidies for recyclers and secondary material users, and setting up Extended Producer Responsibility (EPR) schemes for key waste streams (packaging, batteries, electronic equipment, tires, oils, and filters). Properly pricing waste services—based on the polluter-pays principle—would encourage separate collection and recycling, while reducing the demand for open dumping and landfilling. One of the low-hanging fruits could be developing mechanisms necessary for enacting provisions under the Article 23 of the RA Law on Waste meant to provide incentives to circular business models, technologies, and infrastructure.

12. **Promote Digital Solutions and Technology Adoption:** Leverage AI, IoT, and automation to optimise resource use and reduce emissions. Leverage data analytics, digital platforms, and tracking technologies to optimise resource use and monitor material flows. Encourage the development and deployment of software tools that can streamline waste collection, recycling, and circular supply chains, helping businesses and authorities operate more efficiently. This will also be partially addressed through the introduction of EPR policy that will require a digital platform for a higher quality waste data reporting. Encouraging research institutions, universities,

and private enterprises to develop new technologies, products, and business models will help drive Armenia's green transition. Digital solutions—such as tracking systems for waste flows—can improve transparency and optimise resource use. Expanding grant programmes, incubators, and accelerators that support "green" startups can further stimulate innovation.

13. Foster Regional and International Collaboration: Align with global environmental standards to enhance market access for sustainable products, promote transparency and low-carbon sourcing across global supply chains. Foster international partnerships to scale clean industrial solutions. Engage in cross-border partnerships and knowledge exchange with neighbouring countries and international organisations. Sharing best practices, lessons learned, and technological advancements can accelerate Armenia's transition to a circular economy, aligning national efforts with global standards and trends. Regional level waste recycling and treatment cooperation shall be explored with Georgia and Iran among other neighbours.

3.2.5 Readiness for Transition

3.2.5.1 Policy and legal readiness

The government needs to develop a plan for setting long-term green growth strategies focusing on proper industrial resource efficiency, eco-labelling, waste management and a circular economy, which should be aligned with EU documents. Detailed action plans with measurable targets promoting efficient resource use, clean production, waste prevention and recycling should also be developed. The action plans should propose clear actions and measures that can be taken to reduce resource intensive production processes, landfilling, open burning, illegal dumping, and the establishment of EU-compliant landfills. Also, the "best available technologies", "eco-labelling", "polluter pays" principles and measures to create more beneficial conditions for sustainable and circular businesses, including those in the recycling industry, are needed.

Armenia needs to pay more attention to the timely implementation of its strategic and legal framework since the government is delaying and commonly requesting time extensions for completing the agreed activities set in different international agreements, including CEPA and others.

3.2.5.2 Readiness of Instruments for policy implementation

Several large-scale projects (funded by different international donor organisations) have been initiated that contribute to the development of relevant policy instruments (e.g. on EPR). Thanks to these projects, Armenia has started developing legal framework and policy instruments that help to achieve EGD goals. This includes prioritisation of topics such as the Extended Producers' Responsibility and "polluter pays" principle, the creation of waste hierarchy, the creation of sanitary landfills, the development of proper policies for managing and disposing of hazardous waste, the development of waste management plans, etc.

Nonetheless, the current set of regulatory and economic instruments (environmental tax – landfill tax, and solid waste tax/fee) is not sufficient to enhance the circular economy and sustainable waste management as well as provide the enabling conditions for reaching the relevant EU objectives and targets (incl. implementation of relevant policy instruments such as EPR) and funding the implementation of a higher hierarchy waste management system.

3.2.5.3 Financial capacity

Support from different international donor organisations (European Union, EBRD, ADB, World Bank, and others) has provided a good basis for making the first steps in the development of a more circular economic system in Armenia.

However, the government is not actively investing in waste management and the circular economy industry itself. There are no proper assessments of investment needed to transition from a linear economy to a circular economy, which may be the result of the absence of action plans such as Clean and Circular Economy Action Plans. The tax policies (e.g. environmental/landfill tax, see above) are not formulated in a way that makes circularity an interesting approach for the industry; no tax and other incentives are offered to make it financially feasible and attractive as well. Due to these unfavourable conditions and lack of data, Armenia also doesn't receive a lot of international (or even national) investments to boost the industry.

There are no stable funding sources or financing instruments (except for green loans) that support industry representatives of these fields in meeting EGD requirements. The Ministry of Finance of Armenia allocates collected environmental tax to governmental agencies to achieve its targets; however, the government of Armenia collects environmental taxes for other purposes rather than to mitigate environmental risks in the fields of waste management and circularity.

3.2.5.4 Public/institutional capacity

In all areas related to waste management and circularity, more than one decision-maker is involved, making the situation more complex to manage. In waste management, three line-ministries are responsible for different activities: e.g. the Ministry of Territorial Administration and Infrastructure is responsible for municipal waste, the Ministry of Environment is responsible for hazardous waste, and the Ministry of Economy is responsible for overall circularity. Decisions made by two or three different ministries sometimes contradict the priorities of another ministry (such as the law on the ban on the bags has created some challenges for the Ministry of Economy since there was a big drawback from the producers engaged in the production of single-use plastic bags).

3.2.5.5 Non-governmental capacity

In Armenia, the non-public sector engaged in circular economy and waste management has been gradually evolving and is represented by a broad spectrum of stakeholders varying from manufacturing and extractive industries to waste collectors, recyclers and landfill operators, environmental NGOs, consultancies, private testing laboratories and academic institutions. Regardless of some capacity presence, there are multiple capacity gaps in the non-public sector.

3.2.5.6 Cross-cutting issues

Under cross-cutting issues, key aspects (key gaps and needs) of just transition, research and innovation and digital transformation related to industry and circular economy/waste management are summarised.

Just transition

Armenia lacks a comprehensive baseline study on just transition, which is considered a relatively new and unexplored field. Armenia has no reliable data regarding gender equality, the future job market, or other aspects related to the green transition. Even if some national-level documents mention the plan to create new jobs along the green transition, there is no specific data on job loss and new job creation, etc. This applies also to the waste management sector.

Therefore, incorporating gender and social inclusion aspects in national and local policies and planning is weak, with zero consideration of such aspects in national waste management strategy and action plans as well as in municipal waste management plans.

Digitalisation

The digitisation policy of Armenia, coordinated by the Ministry of High-Tech Industry of the Republic of Armenia, aims to ensure the digital transformation of the Government, Economy and Society. It has focused on several areas and aspects:

- Efficient, fast, transparent and data-driven public administration.
- Upgrade and increase the capacity of the private sector through smart solutions.
- Improve digital skills of the labour force and the general public.

In addition, the introduction of Extended Producer Responsibility (EPR) legislation is set to establish new data reporting requirements for specific waste streams. These include packaging materials, batteries and accumulators, waste electrical and electronic equipment (WEEE), automotive tires, oils, and other related waste categories. The implementation of these requirements is expected to

strengthen accountability among producers, improve waste diversion from landfills, and promote recycling and sustainable resource management practices.

These initiatives reflect a broader commitment to modernizing waste management frameworks and fostering greater transparency and compliance within the sector.

Innovation and research

There are several active entities in research and innovation that focus their efforts on waste management, circular economy and related areas. Some of the examples are the American University of Armenia (AUA), Armenian National Agrarian University (ANAU), "ISSD" Innovative Solutions for Sustainable Development of Communities", Urban Foundation, Impact Hub Yerevan, REC Caucasus, Armenian Women for Health and Healthy Environment NGO, Foundation for the Preservation of Wildlife and Cultural Assets, Yerevan State University, National Polytechnic University of Armenia and others and others. There are several other organisations that have been involved in research and innovation in the corresponding field after obtaining short-term grants and conducting activities only within the duration of their grants.

In Armenia, some organisations also run short-term start-up incubator programmes and acceleration programmes that might include opportunities for those who are interested in green innovation (e.g. Fellowship by Impact Hub Yerevan and Green Armenia). There is no large-scale focus on promoting research and innovation (mainly) in this field.

However, there is a need for re-focusing the government and donor assistance towards innovation in the industrial sector, adoption of net-zero technologies, sustainable utilisation of critical material, as well as waste management and prevention technologies/approaches for waste reuse, recycling and recovery activities direction as well as for building knowledge of business operators in innovative technologies and processes.

Table 13. Readiness for Green Transition in Industrial Resource Efficiency, Decarbonisation and Circularity

Thematic area / Gap, needs enabling conditions area	Policy and legal framework	EU approxi-mation	Policy implement-tation	Institu-tional Capacity	Non-institutional and private capacity	Research and Innovation	Financial	Just transition
Industrial Resource Efficiency and Clean Production	**Little progress**	**Little progress**	**Little progress**	**Little progress**	**Little progress**	**Little progress**	**Little progress**	**Little progress**

Thematic area / Gap, needs enabling conditions area	Policy and legal framework	EU approxi-mation	Policy implement-tation	Institu-tional Capacity	Non-institutional and private capacity	Research and Innovation	Financial	Just transition
Decarbonisa-tion of Industry	Some progress	Some progress	Some progress	Some progress	Some progress	Some progress	Significant progress	Little progress
Sustainable Products	Little progress	Little progress	Little progress	Little progress	Little progress	Little progress	Little progress	Little progress
Circular Economy	Some progress	Little progress	Little progress	Little progress	Some progress	Some progress	Some progress	Little progress

Assessment readiness for resource efficiency and circular economy provides insight into **weak regulatory set up** with no nationally binding documents on the circular economy. Armenia has developed a general **circular economy roadmap** in 2022, which is currently being revised, but there are no mechanisms to promote waste sorting and recycling. Reliable data regarding waste management and circularity is still lacking, **hindering target setting and monitoring**.

The waste-related legal framework is not fully aligned with the EU Waste Framework Directive when it comes to the definitions and quantitative enforceable targets, as well as ensuring the full cost recovery through the **"polluter pays"** principle. There are no incentives for reducing the use of primary raw materials or increasing the use of the secondary raw materials. The **enforcement** of the existing regulations is weak. The sector is characterised by institutional fragmentation and weak ownership of key state agencies competent in the waste governance and circular economy sectors.

Several large-scale projects have contributed to **development of relevant policy instruments**, such as Extended Producers' Responsibility (EPR) and introduction of the "polluter pay" principle. However, these are all donor-funded.

The **tax policies** – environmental tax/landfill tax and solid waste tax/fee are not designed to incentivise a circularity approach for the industry. No other taxes and other economic incentives are offered to make it financially feasible and attractive. Due to this Armenia doesn't receive a lot of international (or even national) investments to boost the industry, calling for a **redesign of environmental tax allocation**.

The conclusion here is that Armenia has achieved **"little progress**" on industrial decarbonisation and circularity, as significant efforts are needed to align closer with the EU policies on data collection and reporting systems to make the industry more appealing to the investors, improve green financing tools, engagement of additional funds from donor organisations, create of better financial management mechanisms for the players of the field and better allocation of taxes.

3.3 Environmental Pollution

Like many post-Soviet and post-industrial countries, Armenia has its share of legacy environmental pollution challenges to address. Also, with increased stock of fossil-fuel based mobility solutions, a city like Yerevan is facing the need to address air pollution. Moreover, there is increased focus on water pollution, including municipal wastewater treatment as well as agricultural and industrial water emissions. Managing soil quality and preventing land degradation are also issues, esp. as it relates to agricultural lands and landslides.

3.3.1 Air Pollution and Noise

3.3.1.1 Status and trends

Monitoring Infrastructure

With increased construction, road transportation, and landfill open burning in the capital city, Yerevan, the public is highly sensitised and focused on ambient (or atmospheric) air pollution.[55] Monitoring of ambient air quality (in contrast to indoor air quality) in the Republic of Armenia is carried out by the Hydrometeorology and Monitoring Centre (Armhydromet), which is a State-Owned, Non-Commercial Organisation (SNCO) operating under the Ministry of Environment.[56]

As of February 2025, Armhydromet reports monitoring air quality in ten cities, including Yerevan, Gyumri, Vanadzor, Alaverdi, Hrazdan, Ararat, Tsaghkadzor, Charentsavan, Kapan and Kajaran. In these cities, there are 15 stationary active sampling observation stations and 214 mobile passive sampling observation stations.[57]

Moreover, since 2008, a regional monitoring station for cross-border atmospheric air pollution has been set up at Amberd station. Daily observations of atmospheric air quality and the composition of atmospheric precipitation are conducted. The annual data is sent to international partners who prepare the transboundary air pollution modelling and the annual report on transboundary air pollution for Armenia.[58]

[55] Yerevan's Air Pollution Problem: City Authorities Contest Disturbing International Data(February 1, 2025), Hetq [https://hetq.am/en/article/172398]

[56] The Armhydromet was established by the N 81-N decree (January 30, 2020) of the Government of the Republic of Armenia. Armhydromet merges the former "Environmental Monitoring and Information Centre", "Forest Monitoring Centre" and "Hydrometeorology and Atmospheric Impact Services" organisations. Armhydromet is the legal successor of these centres.

[57] The assessment of air quality is performed in comparison with the maximum allowable concentrations (MAC) of pollutants approved by the RA Government Decision N 160-Ն of February 2, 2006.

[58] The Executive Secretary of the Ozone Secretariat visited the "Hydrometeorology and Monitoring Centre" at Amberd High Mountain Meteorological Station of SNCO (September 15, 2023) https://www.env.am/en/news/ozone-secretariat-visited, accessed Feb 27, 2025.

The list of measured pollutants for the city air quality includes total dust (TSP), sulphur dioxide (SO_2), nitrogen oxides (NO_x), ground-level ozone (O_3), and metals in dust. The metals measured include cadmium, cobalt, copper, iron, lead, molybdenum, nickel, and zinc.

They are monitored by automated, as well as manually controlled stations. In addition, sulphur dioxide (SO_2) and nitrogen oxides (NO_2) are measured using a passive sampling method. Note that the existing system does not measure Particulate Matter (PM) 10 or PM2.5. As such no reliable data exists on these important pollutants.

Monitoring results

According to Armhydromet, in 2023, the latest year for which published data is available, the **average annual concentrations** of dust, SO_2, and NO_2 did not exceed their maximum allowable concentrations (MACs).[59] However, for dust, Yerevan, Gyumri, and Ararat came close to the MAC of 0.15 µg/m^3 even if not exceeding it. This contrasts to the 2022 average annual estimates where Gyumri and Vanadzor exceeded, while Yerevan came very close to the MAC.

On heavy metals in airborne dust, Armhydromet reports that in 2023 the average annual concentrations of nickel, molybdenum, and cobalt in the cities of Yerevan, Gyumri, Vanadzor, Alaverdi, Hrazdan, Ararat, and Tsaghkadzor did not exceed the corresponding MACs. For the other metals, i.e., lead, copper, iron, zinc, and cadmium, according to Armhydromet, MACs are not determined by Armenia's legislation.

While the annual averages may not show that the cities monitored exceed the MACs, there are occurrences of high levels of pollution exceeding MACs when taking the **daily or monthly averages.**[60] Almost all of the cities for which dust is measured (specifically, Yerevan, Gyumri, Vanadzor, Alaverdi, Ararat, Hrazdan, and Tsaghkadzor) had months and days with dust concentrations higher than the MAC. To illustrate, Table 14 shows that when looking at daily readings, there were 619 incidents (in 2023 across the 5 air-quality monitoring stations) where dust concentrations exceeded the Daily MAC of 0.15 µg/m^3. In 15 cases, they exceeded the MAC by 5 times or more (and as can be seen there was one case where the maximum recorded was 0.988, which is about 6.5 times higher than the MAC).[61]

[59] 2023 Summary on the Status of Atmospheric Pollution within the Territory of the Republic of Armenia, (RA Ministry of Environment's Hydrometeorological and Monitoring Centre), accessed at https://armmonitoring.am/page/69 on February 27, 2025.

[60] Armenia's current monitoring system does not allow for continuous or near-continuous monitoring. Samples are collected daily and analysed for that day. These will be changed in the coming year or so with new equipment being procured by the Armhydromet.

[61] The Umweltbundesamt (Environmental Agency of Austria) Concept for Improving Air Quality Monitoring in Armenia (2023) suggests that some of the monitoring stations (2 specifically in Yerevan) may be placed too close to the pollution source (moving traffic). On p. 16, the report says "The locations of the stations itself look very reasonable for an urban back-ground station (station no 1, 2) and urban traffic station (no 7, 8, 18), even though station no 7 and 18 might be too close to major junctions. Hence, these stations might be moved down the road according to the European AAQD

Table 14. Summary of concentrations of select air pollutants in Yerevan for 2023 and daily MACs set by RA legislation*

Pollutant	Maximum concentrations observed (µg/m³)**	Number of incidents where daily concentration at or above MAC***	Number of incidents where daily concentration exceeding MAC by 5 times or more***	Average annual Concentration (µg/m³)	Daily MAC (µg/m³)**
Sulphur dioxide (SO_2)	0.063	13	0	0.016	0.05
Nitrogen dioxide (NO_2)	0.110	334	0	0.028	0.04
Dust	0.988	619	15	0.145	0.15
Ground-level ozone (O_3)	0.027	0	0	0.007	0.03

Notes:
(*) Maximum Allowable Concentration (MAC) is expressed as a daily measure. These MACs are defined and set by RA Government Decision N 160-Ն of February 2, 2006.
(**) Maximum concentrations observed represent a single observation from one of the 5 air-quality monitoring stations in Yerevan.
(**) Each incident is based on the readings from a monitoring station. In Yerevan, there are 5 air-quality monitoring stations. Cumulatively they can produce 1825 observations per year (5 stations x 365 days in a year).

Source: 2023 Summary on the Status of Atmospheric Air Pollution within the Territory of the Republic of Armenia, (RA Ministry of Environment's Hydrometeorological and Monitoring Centre), accessed at https://armmonitoring.am/page/69 on February 27, 2025.

ArmStat estimates that, nationwide, about a third (⅓) of the ambient air pollution comes from stationary sources (e.g., factories, plants, farms, landfills, etc.) and two-thirds (⅔) from mobile sources (Figure 8). Within the stationary sources, about three-fourths (¾) is reported to be coming from electricity production plants, 6% from mining and quarrying, 6% from manufacturing, and 14% from a sundry of economic activities, e.g., construction, agriculture, etc.) (Figure 9).

mi-cro-scale siting criteria. However, the buildings and the infrastructure (inlets, electricity, air conditioning) themselves are worn down and should be replaced."

Figure 8. Quantity of populace emitted into the atmosphere, 2019-2023 (thousand tonnes)

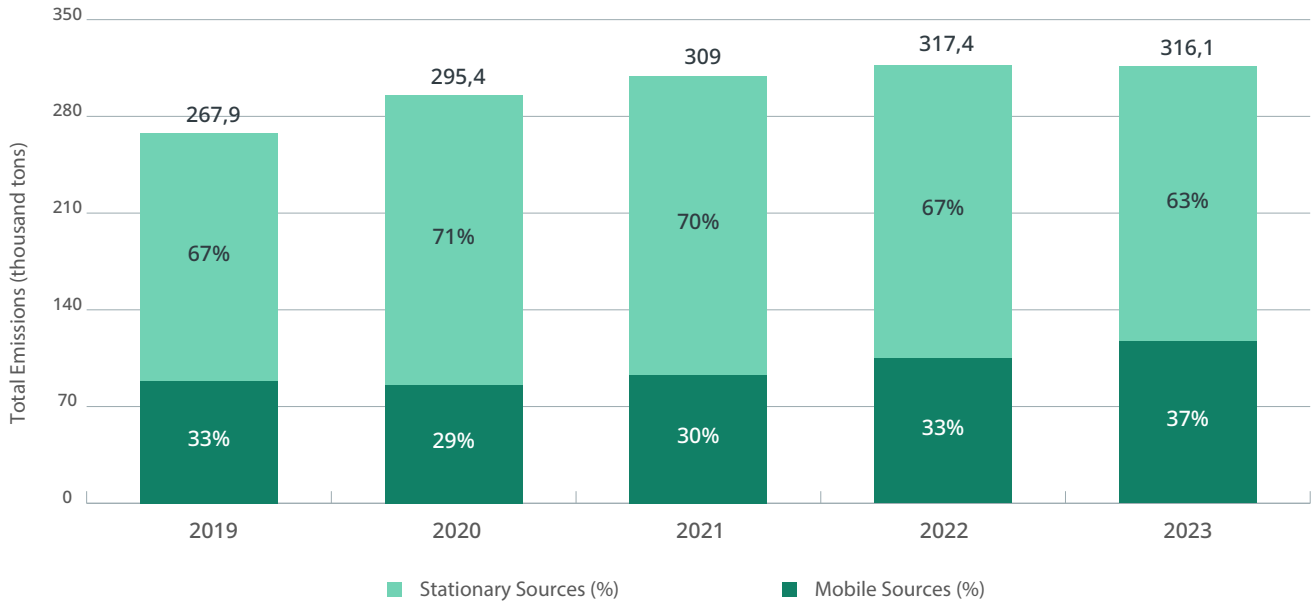
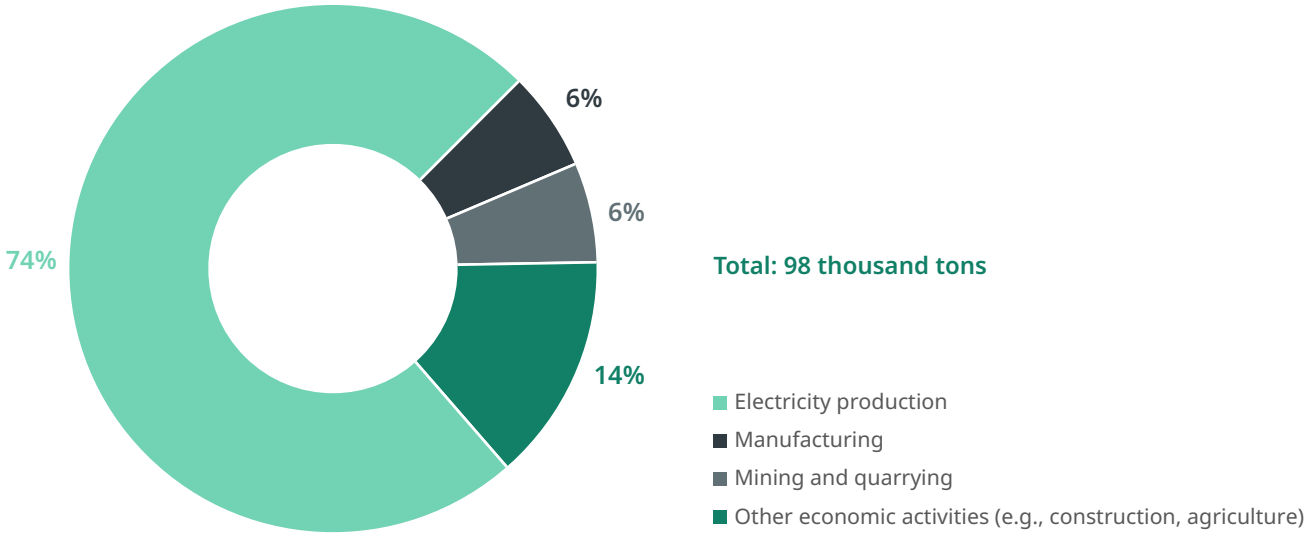


Figure 9. Air pollutant emissions from stationary source by type of economic activity, 5-year average for 2019-2023



Armenia's legacy monitoring system does not allow for continuous or near-continuous monitoring of air quality. Samples are collected daily and analysed for that day. This is expected to change in the coming year with new equipment being procured by the Armhydromet. The first two are being procured from the state budget and are expected to be installed in the first quarter of 2025. Two more are expected to be purchased related to CEPA alignment, and 3 more will be purchased with Japanese government support. This will bring the total of the new stations to 7 over the next year or two. In addition, using the RA state budget, nine (9) automatic

meteorological stations have been acquired and installed in Kotayk, Tavush, Gegharkunik and Ararat regions in 2024.[62]

The new air-quality monitoring stations will be also valuable for establishing baselines to calibrate other decentralised data collection being currently done by citizens or municipalities (see section on "Non-State Monitoring of Air Quality" below).[63]

Reporting Air-Quality Monitoring Results

Given the technology Armhydromet uses to collect air-quality data, it cannot offer real-time or near real-time information to interested experts or the public. It publishes this data on a monthly and annual basis for the cities it monitors. The information is released primarily through its online portal either as web-based charts or compiled in an annual report called "Summary on the Status of Atmospheric Pollution within the Territory of the Republic of Armenia," available on its website. This report also offers results of monitoring of transboundary air pollution.

In addition, ArmStat, produces an annual report called "Environment and Natural Resources in the Republic of Armenia," which has a chapter dedicated to air pollution. The report offers information on total volume of pollutant emissions (in tons), per capita and per square meter estimates, as well as the sources and economic activities generating the pollution. Much of the data used for the analysis is also available for download at the ArmStatBank database's Environment category where there is ambient air pollution data.

Non-State Monitoring of Air Quality

In recent years, residents of Yerevan in particular and the municipality of Yerevan have installed their monitoring stations. According to the Ministry of Environment, the municipality has installed their stations close to construction sites. Also, some of the devices used by citizens can have a margin of error of up to ∓40%.[64]

The Yerevan Municipality's network of sensors is significant. At the end of February 2025, the municipality's system had 166 sensors, each one collecting continuous data and reporting hourly

[62] This information is based on two sources: a) Telephone interview with Deputy Director of the ArmHydromet, Dr. Gayane Shahnazaryan and b) press release "Minister of Environment Hakob Simidyan addressed public concerns about the air quality in the Republic of Armenia" (January 13, 2025), accessed on February 28, 2025 at https://armmonitoring.am/post/1821.

[63] In addition, the MoEnv reports that using funds from the state budget, Armhydromet has enhanced the existing 23 automatic meteorological stations with snow cover height, soil temperature and humidity sensors at 4 depths, as well as 6 water surface evaporation sensors, 3 of which were installed in the Lake Sevan basin. All automatic meteorological stations and sensors have been connected to a unified system for online data acquisition and visualisation.

[64] *Ibid.*

averages for each sensor for PM1, PM2.5, PM10, and air temperature and humidity.[65] The system also calculates an air-quality index based on PM2.5 and reports it for each sensor and for the city as a whole based on hourly and on daily averages.

According to Armhydromet, the new high-quality monitoring stations to be installed can help many of the citizens as well as municipality's sensors be calibrated and benchmarked, possibly enabling them to be considered in the larger monitoring infrastructure of the country.

Ambient Air Pollution Governance and Management

Ambient air pollution has been governed in Armenia by the Law on Atmospheric Air Protection (first adopted in 1994). In 2022, it went through its latest revision, adding requirements for measurement, reporting, and verification under UNFCCC and promoting best available techniques (BAT).[66] The development of sub-legislative acts under the new law has begun. Under the new Law, two government decisions were adopted to support the implementation of the EU Ambient Air Quality Directive (AAQD), an obligation under CEPA:

- Decision No. 23-N (2024): Approves the procedure for summarising, analysing, and archiving information on state accounting and emissions of air pollutants
- Decision No. 32 (2024): Establishes the procedure for developing draft norms for maximum permissible emissions, as well as granting, rejecting, or revoking emission permits for entities engaged in entrepreneurial activities

Decision No. 32 cites two existing governmental decisions to regulate maximum allowable concentrations, one in human settlements and the other for premises of enterprises. For settlements, it refers to maximum allowable concentrations (MACs) for 389 atmospheric pollutants set by the RA Government decision, N 160, 2006. For premises of enterprises, it cites RA Ministry of Health's Order N 27-N issued on December 6, 2010.

For mobile sources, emissions estimates are based on imported fuels for these mobile units (e.g., cars). For stationary sources of pollution, according to Decision No. 32 and the 2022 Law, economic entities that have 200 million to 2 billion cubic meters required air use (RAU) have to present an emission accounting annually. Entities having more than 2 billion cubic meters of required air use (RAU) per year (or 2 thousand cubic meters per second or more of RAU) are required to obtain an emission permit. The application for the permit shall demonstrate that the if as result of dispersion, emissions of pollutants in the ground layer, in residential areas closest to the territory of the emitting economic entities, cause concentrations that, together with the background concentrations of pollution in the given area, do not exceed the total (միանվագ) MACs, then the permit is issued. If the background pollution for some substances present in the

[65] The Yerevan Municipality's information is available at https://gis.yerevan.am/portal/apps/dashboards/364e942224b544418ae7ef148fbc9bf1

[66] UNECE, Environmental Performance Review: Armenia (2024)

emissions of the economic entity exceeds the average daily MAC, then a temporary permit is issued for a period of 5 years. Permit application is rejected if they exceed the emissions along with background concentrations in the closest residential area exceed the MACs.[67]

If an emission permit holder violates the MAC as stipulated in their operation/permit plan, they will be required by the state to take mitigating measures to reduce emissions. The permissible limit values of the pollutant emissions are calculated on the basis of the annual production. If, as a result of the calculations, the company's emissions considering the background pollution of the given location do not exceed the maximum allowable concentration of pollutant, no plan of measures to reduce the emissions is planned. In the case any pollutant's MAC is exceeded, then a plan of measures to reduce the emissions is developed.

The key institution for ambient air quality protection is the RA Ministry of Environment, which houses two relevant offices: a) the Atmospheric Policy Department, developing policy and legislation and b) the Water and Atmospheric Emissions Management Department, issuing permits. Compliance oversight with requirements of legislation, including compliance with the limits of the permit issued, is carried out by the Environmental Protection and Mining Inspection Body (EPMIC). The inspections are based on a checklist approved by law and do not include measurements of actual emissions.[68]

There is a patchwork of regulation governing air quality management in operations such as landfills and the like.

Transboundary Air Pollution

Armenia is a Party to the Convention on Long-Range Transboundary Air Pollution (CLRTAP) since 1997 and its Protocol on Long-term Financing of Cooperative Programme for Monitoring and Evaluation of the Long-Range Transmission of Air Pollutants in Europe (EMEP) since 2014. Of the remaining seven protocols of the CLRTAP, Armenia has signed the Protocol on Persistent Organic Pollutants in 1998 and the Protocol to Abate Acidification, Eutrophication, and Ground-level Ozone in 1999, but has not yet ratified them. It has not signed the remaining five protocols of the Convention.

It should be noted that Armenia's four neighbouring countries are all parties to the Convention with the exception of Iran. Georgia is also a party to the EMEP. However, none of the other neighbouring countries are signatories or parties to any of the protocols of the Convention.[69]

Starting in 2015, Armenia started intensive cooperation with UNECE to prepare air emission inventories for its territory stipulated under the Convention. The country submitted its forest

[67] They can be rejected for technical reasons as well, e.g., incomplete documentation, etc.

[68] p. 171, UNECE, Environmental Performance Review: Armenia (2024)

[69] Based on information available at the United Nations Treaty Collection available https://treaties.un.org/, accessed March 2, 2025.

inventory Report in 2018, enabling discussion and review of emission inventories.[70] The observations and reporting to the Protocol secretariat continues. The results of the observations are also published in the annual summary report. For instance, in 2023, 55 tests were conducted at the Amberd regional station (set up as part of EMEP implementation), selecting 32 measures and indicators were determined, and calculating the average monthly and average annual concentrations. Results are available on Armehydromet's annual summary report. The data collected is also shared with the Norwegian Meteorological Institute, the responsible body for collection, analysis, and modelling of EMEP data.

Noise Regulation

Noise pollution is becoming a concern for residents of larger cities, esp., Yerevan. In most parts of Armenia, however, it is not a major concern. The law governing the noise issue in Armenia is the RoA Code of Administrative Offences – article 180, chapter 13 of the code addresses night-time noise with the following acts: "Administrative offenses against public order", "Breaking of silence in public places: breaking of silence at night (from 10:00 pm to 6 am)" as well as other acts alike in and out of residential areas are subject to notice or fine of 20-30 times of minimum wage in case of citizens and fine of 30-50 times in case of officials. Jurisdiction to deal with cases related to administrative offenses falls within the area governing and local self-governing bodies. There are various normative documents that can also be in place.[71]

3.3.1.2 EU Approximation – Governance, policy and legislation

Under CEPA roadmap, Armenia is to align with several key EU directives, including:

- Directive 2008/50/EC of the European Parliament, on ambient air quality and cleaner air for Europe (referred to as the Ambient Air Quality Directive (AAQD)). Note that to date, Armenia's obligation under CEPA is with regard to the 2008 Directive. In 2024, the EU adopted a revised version of the Directive, aligning itself better with WHO standards for air quality.
- 2004/107/EC of the European Parliament, relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air
- Directive 1999/32/EC on reducing the sulphur content of certain liquid fuels
- Directive 1994/63/EC on controlling volatile organic compound (VOC) emissions from petrol storage and distribution (Stage I petrol vapor recovery) and Directive 2009/126/EC on Stage II petrol vapor recovery during vehicle refuelling at service stations

[70] UNECE, Environmental Performance Review: Armenia (2024)

[71] These include: GOST 20444-2014 "Noise", "Traffic flows", "Methods of noise characteristic determination"; GOST ISO 362-2006 "Noise", "Measurement of noise emitted by accelerating road vehicles", "Engineering method"; GOST 32203-2013 "Railway rolling stock", "Acoustics", "Measurement of outward noise"; GOST 32957-2014 "Automobile roads of general use", "Acoustical barriers", "Technical requirements"; GOST 32958-2014 "Automobile roads of general use", "Acoustical barriers", "Methods of testing"; and GOST 33325-2015 "Noise", "Calculation methods for external noise emitted by railway transport"

- Directive 2004/42/EC on limiting VOC emissions from the use of organic solvents in certain paints, varnishes, and vehicle refinishing products
- Directive 2010/75/EC on Industrial Emissions (IED)

According to the CEPA, the approximation of two key EU air quality directives is scheduled as follows:

For Directive 2008/50/EC on ambient air quality and cleaner air for Europe, the target dates are:

- Adoption of national legislation and designation of competent authorities – 2025 (completed)
- Establishment and classification of zones and agglomerations (Articles 4 and 5) – 2028
- Establishment of upper and lower assessment thresholds and limit values (Articles 5 and 13) – 2028
- Establishment of a system for assessing ambient air quality for air pollutants (Articles 5, 6, and 9) – 2029
- Development of air quality plans for zones and agglomerations where pollutant levels exceed limit or target values (Article 23) – 2029
- Development of short-term action plans for zones and agglomerations at risk of exceeding alert thresholds (Article 24) – 2029
- Establishment of a system to provide information to the public (Article 26) – 2027

For Directive 2004/107/EC on arsenic, cadmium, mercury, nickel, and polycyclic aromatic hydrocarbons in ambient air, the target dates are:

- Adoption of national legislation and designation of competent authorities – 2026
- Establishment of upper and lower assessment thresholds (Article 4(6)) and target values (Article 3) – 2027
- Establishment and classification of zones and agglomerations (Articles 3 and 4(6)) – 2027
- Establishment of a system for assessing ambient air quality for air pollutants (Article 4) – 2029
- Implementation of measures to maintain or improve air quality for relevant pollutants (Article 3) – 2029.

Armenia is committed to improving air quality monitoring in line with the requirements of international protocols, EU legislation, and its corresponding commitments. Key areas of focus include:

- Introduction and implementation of air quality standards for ozone (O_3), particulate matter (PM), ammonia (NH_3), and critical loads of acidity and nutrient nitrogen
- Monitoring ambient concentrations and depositions of sulphur and nitrogen compounds, as well as O_3, volatile organic compounds (VOCs), and PM
- Estimation of exposure to O_3 and PM to assess public health impacts

Under the Eurasian Economic Union's Technical Regulation TR CU 013/2011, the sulphur content limits in gasoil (used for mobile machinery) are based on ecological classes K4 (50 mg/kg) (in force since 31 December 2015) and K5 (10 mg/kg) (no implementation deadline).

According to the CEPA roadmap, the legislative framework for adopting Directive 93/32/EEC (repealed by Directive (EU) 2016/802) on sulphur content in liquid fuels was planned for 2020–2023. Key actions include:

- Adoption of national legislation and designation of competent authorities
- Definition of an effective fuel sampling system and analytical methods for sulphur content determination (Article 6)
- Prohibition of fuel oil and petroleum distillate (gasoil) use if sulphur content exceeds specified limits during soil application (Article 3(1)), unless exceptions under Articles 3(2) and 4(1) apply

Petroleum products account for around 50% of transport energy consumption in Armenia. Currently, there are no regulations limiting VOC emissions from petrol distribution. In 2017, there were over 480 filling stations selling petrol and/or diesel.

Under CEPA, Armenia has established a programme to adopt VOC limit values for petrol storage and distribution, based on Directive 1994/63/EC (Stage I petrol vapor recovery), as outlined in Table 1 of Annex VI of the Amended Gothenburg Protocol of the Convention on Long-range Transboundary Air Pollution. However, there is no programme yet to adopt VOC limit values for car refuelling at service stations (Stage II petrol vapor recovery, based on Directive 2009/126/EC).

The roadmap for implementing Directive 94/63/EC on VOC emissions from petrol storage and distribution is scheduled for 2026–2029. This will enable Armenia to implement the limit values specified in Table 1 of Annex VI of the Amended Gothenburg Protocol. The competent authority for this implementation has already been designated.

In March 2025, discussions were held between the Armenian authorities and the representatives of the newly launched EU Green Recovery East program[72] about air quality monitoring about EU support for approximation with EU air quality regulations and building of analytical capabilities in Armenia.

[72] https://www.eu4environment.org/news/launch-of-a-new-eu4green-recovery-east-programme/

3.3.1.3 Main enabling conditions, needs and gaps

Enabling Conditions

Key enabling conditions for ambient air quality protection are Armenia's time-bound obligations under CEPA and growing public discontent with poor air quality, esp., in the capital city Yerevan, placing political pressure on local and national government. As outlined above, the national and Yerevan authorities have been taking steps to address this dual pressure. New ambient air quality monitoring equipment is being procured with more on the way. New legislation is being developed and adopted. Media attention has been on the issue for the past several months (esp., starting from late 2024). EU4Green Recovery East, a newly launched initiative, also offers critically needed resources to make substantive progress on the clear air agenda. This is an opportune time to accelerate improvements in this domain. Table 15 summarizes the key gaps and needs of the country.

Table 15. Key gaps and needs for air quality protection in Armenia

Key gaps	***Needs***
■ Armenia's air-quality monitoring infrastructure is outdated, not providing needed information to protect human and environmental health. For instance, there is no measurement of PM2.5 and PM10. Carbon monoxide (CO) measurements are not consistently or reliability measured. ■ In the past, investments in new monitoring infrastructure have been donor funded with inadequate state support to ensure the long-term maintenance and sustainability of the investments. ■ Key industrial cities are not being monitored for dust or PM. These cities include Agarak, Akhtala, Charentsavan, Kajaran, and Kapan. ■ Protocols for integrating citizen or decentralised collection of air-quality data are missing. ■ Estimates of air pollutant emissions are self reported by industry, with poor laboratory infrastructure to test industrial emissions (UNECE 2024). ■ Health impact of air pollution in Armenia is not regularly assessed (UNECE 2024). ■ Air quality management and compliance tools and mechanisms are missing, weak, or non-function. Air quality monitoring has to be viewed within the larger context of effective air quality protection.	■ The CEPA commitments and time-bound obligations outlined in the Roadmap need substantial government and expert capacity to implement. Armenia should consider mechanisms, e.g., EU Twinning, to help advance on the air-quality agenda and meet the deadlines. ■ Armenia needs to commit additional state budgetary funds to upgrade and build out a modern air quality monitoring system in the country, the capital, other big cities, and industrial centres in the country. The upgraded system needs to track PM2.5 and PM10. ■ Ensure that new investments in air quality monitoring have long-term commitment to building a well-functioning and sustainable air quality monitoring system. ■ Build an air quality management systems that is not only preoccupied with air quality monitoring but also informing and affecting the behavior residents and enterprises. This implies having a strong warning and information delivery system in place. ■ Accelerating electric vehicle (EV) imports and adoption, esp., in Yerevan, could contribute to cleaner air, esp. when the annual technical vehicle inspections required by law are not (and perhaps could not) function effectively to identify excessively polluting gas or petrol cars and remove them from use.

■ Availability of real-time information to citizens, affected communities, and public administrators for taking protective measures. There are no warning or information dissemination systems in place.	■ Armenia needs to more rigorously study the health impacts of air pollution and use the findings to promote behavioural change with respect to fuel use, treatment of crop residues, landfill management, transport choice, and more. ■ Develop methods and protocols for integration of decentralised, non-state sources of air quality data. ■ Develop or adapt cross-sectoral assessment tools and accrediting the reference laboratory ■ Connect local data to global networks and portals

3.3.1.4 Readiness for green transition

Table 16. Transition readiness summary

Thematic area / Gap, needs enabling conditions area	Policy and legal framework	EU approximation	Policy implementation	Institutional Capacity	Non-institutional and private capacity	Research and Innovation	Financial	Just transition
Ambient Air Quality Protection	**Some progress**	**Little progress**	**LIttle progress**	**Little progress**	**Some progress**	**Some progress**	**Some progress**	**Little progress**

3.3.2 Water Pollution and Water Use

3.3.2.1 Status and trends

Armenia's renewable water resources average around 2,600 cubic meters per person annually, surpassing the Falkenmark Indicator threshold of 1,700 cubic meters, which defines water scarcity. However, the country experiences severe water stress due to excessive consumption, with nearly 40% of its available renewable water resources used each year, as indicated by the Water Exploitation Index.[73]

Agriculture, including irrigation and aquaculture, is the primary water consumer, accounting for approximately 87% of total usage. Industrial sectors such as mining, metallurgy, energy, and food processing use about 7%, while municipal and domestic needs make up the remaining 6%.

[73] AUA Acopian Centre for the Environment. (2024). Water Sector Political Economy Analysis for USAID Armenia Improved Water Management Programme (USAID and Deloitte Consulting).

Over the past decade, data indicate a reduction in renewable water availability, potentially caused by prolonged dry periods or climate change. Future freshwater resources per capita are expected to decline further due to population growth, climate change, and Türkiye's plans to build additional reservoirs on the upper reaches of the Araks River.

Armenia's water resources are highly vulnerable to climate change. By 2050, temperatures are expected to rise by 2°C, with more erratic precipitation, longer dry spells, stronger storms, and drier summers. Increasing water insecurity will impact food and energy security and economic growth. According to Armenia's Fourth National Communication on Climate Change (2020), river flow could decline by up to 39% by 2100, while inflows to Lake Sevan may drop by 12% by 2040 and 34% by 2100, affecting multiple sectors.

Armenia's irrigation infrastructure, a remnant of the Soviet era, was designed for collective farming and a different agricultural economy. It is now aging and deteriorating, relying heavily on energy-intensive pumping, which incurs high electricity costs. Legacy of subsidised agriculture has contributed to inefficient water use and hindered conservation efforts. In addition, the infrastructure is old

Similar issues affect municipal and industrial water supply and sanitation, where outdated infrastructure and subsidised water tariffs promote inefficiency and significant water losses. According to Veolia Jur, the private operator, drinking water distribution losses reach approximately 70%, largely due to aging infrastructure, leaks, illegal connections, unbilled users, and unpaid bills.

Armenia has only six municipal wastewater treatment facilities, all of which perform only mechanical filtration to remove large debris. These plants lack biological treatment capabilities and do not remove nutrients like nitrogen and phosphorus. As a result, nutrient overload in major water bodies, such as Lake Sevan, has led to harmful algal blooms and accelerated eutrophication. Industrial wastewater treatment, largely absent during the Soviet era, remains insufficient today, while untreated agricultural runoff continues to introduce nutrients and pesticides into natural water sources.

The UNECE 2024 Environmental Performance Review for Armenia (Second Review), cites some statistics on water and sanitation availability in Armenia. In 2022, 82.41% of the population had access to safely managed drinking water. This was lower than the 82.69% in 2020. According to 2023 data of the WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation, and Hygiene, in 2022, 10.8% of the population had access to a safely managed sanitation system and only 1% of wastewater was treated.

Water sector reforms in Armenia have occurred in three phases. The first phase, in the early 2000s, was initiated by the World Bank with strong support from USAID. It led to the creation of Armenia's Water Code, national water policies, and the introduction of Integrated Water Resource Management (IWRM) and River Basin Management concepts, alongside pricing mechanisms for water use. The second phase, in the late 2000s, developed a more detailed framework for

decentralised water management. The third and ongoing phase began with Armenia's signing of the EU-Armenia Comprehensive and Enhanced Partnership Agreement (CEPA) in 2017. Under CEPA, Armenia must align its water legislation with EU standards by 2026, including the Water Framework Directive (WFD), which mandates a river basin management approach.

On transboundary water, Armenia has water-sharing and monitoring agreements with Türkiye and Iran, both of which originated during the Soviet period but remain in effect today. However, agreements with Azerbaijan and Georgia, which existed between the Soviet republics, collapsed with the dissolution of the USSR. The most complex transboundary relationship is with Azerbaijan, which, as the lowest downstream country in the Kura-Araks basin, is affected by upstream activities in Türkiye, Georgia, Iran, and Armenia. While Azerbaijan has pursued negotiations with other neighbouring countries, its transboundary water relations with Armenia remain a source of political tension and conflict.

Water resource management in Armenia is primarily overseen by the Ministry of Environment (MoEnv), which develops policies and strategies, issues water use permits, monitors water quality and availability, and manages the country's six River Basin Management Areas through a decentralised framework.

The Water Committee, under the Ministry of Territorial Administration and Infrastructure (MTAI), oversees state-owned water infrastructure for drinking water, sanitation, and irrigation. Drinking water supply in major cities and some rural settlements and wastewater removal where there is infrastructure is managed through a lease agreement with Veolia Jur CJSC, a private company. However, 579 settlements remain unserved due to a lack of distribution infrastructure. For irrigation, the MTAI contracts Jrar CJSC, a state-owned enterprise responsible for maintaining irrigation distribution networks and delivering water to farmers through Water Users Associations (WUAs), which are independent farmer cooperatives.

3.3.2.2 EU Approximation – Governance, policy and legislation

Under CEPA, Armenia has commitments to approximate five EU water-related directives:

- Directive 2000/60/EC establishing a framework for Community action in the field of water policy (Water Framework Directive);
- Directive 91/271/CEE concerning urban wastewater treatment (Urban Wastewater Directive);
- Directive 98/83/EC on the quality of water intended for human consumption (Drinking Water Directive);
- Directive 91/676/CEE concerning the protection of waters against pollution by nitrates from agricultural sources (Nitrates Directive);
- Directive 2007/60/EC on the assessment and management of flood risks (Floods Directive).

The status of the approximation with these directives are summarised in the Table 17 below.

Table 17. CEPA progress status on water directives

Directive and CEPA provisions	Deadline	Progress status
Water Framework Directive		
Adoption of national legislation and the designation of competent authorities	01.03.2026	Water Code revisions to comply with WFD prepared and officially adopted in 2022, competent authorities are designated and functioning
Identification of river basin districts and the establishment of administrative arrangements for international rivers lakes and coastal waters (Article 3(1) to 3(7)	01.03.2026	Implemented
Analysis of the characteristics of river basin districts (Article 5)	01.03.2026	Completed for all 6 RBDs
Establishment of programmes for monitoring water quality (Article 8)	01.03.2026	In the process. WFD compliant monitoring programmes proposed for 5 RBDs, but not fully implemented yet
Preparation of river basin management plans, consultations with the public and publication of these plans (Articles 13 and 14)	01.03.2026	5 RBMPs officially adopted (with second cycles of plans to be developed in 2022-2023), 1 RBMP in the process of development
Urban Waste Water Directive		
Adopt national legislation and designate the competent authorities	01.03.2026	Competent authority designated, legislation not adopted yet
Assess the status of urban wastewater collection and treatment	01.03.2026	Not implemented yet
Identify sensitive areas and agglomerations (Article 5, Annex II)	01.03.2026	Partially envisaged in the Road Map for Implementation of CEPA in the area water quality and resources management
Prepare a technical and investment programme for urban wastewater collection and treatment	01.03.2027	Not implemented yet
Drinking Water Directive		
Adopt national legislation and designate the competent authorities	01.03.2025	Implemented
Establish standards for drinking water (Article 4 and 5)	01.03.2025	Draft road map prepared, but implementation not started yet
Establish a monitoring system (Article 6 and 7)	01.03.2025	Draft road map prepared, but implementation not started yet
Establish a mechanism to provide information to consumers (Article 13)	01.03.2025	Draft road map prepared, but implementation not started yet

Directive and CEPA provisions	Deadline	Progress status
Nitrates Directive		
Adopt relevant national legislation and designate the competent authorities	01.03.2025	Water Code revisions adopted to harmonise with the Directive, but competent authorities not designated yet
Establish monitoring programmes (Article 6)	01.03.2025	Not implemented yet
Identify polluted and at-risk waters, and designate nitrate vulnerable zones (Article 3)	01.03.2025	Not implemented yet
Establish action plans and codes of good agricultural practices for nitrate vulnerable zones (Articles 4 and 5)	01.03.2029	Not implemented yet
Floods Directive		
Adopt relevant national legislation and designate the competent authorities	01.03.2026	Water Code revisions adopted to harmonise with the Directive, but competent authorities not designated yet
Undertaking preliminary flood assessment (Articles 4 and 5)	01.03.2026	Implemented in Aghstev River basin, but nothing implemented in other parts of the country
Preparation of flood hazard maps and flood risk maps (Article 6)	01.03.2026	Implemented in Aghstev River basin, but nothing implemented in other parts of the country
Establishment of flood risk management plans (Article 7)	01.03.2026	Road map developed for establishment of the plans

Source: Vahagn Tonoyan, water expert, in unpublished USAID report on CEPA progress

3.3.2.3 Main enabling conditions, gaps, and needs

Enabling Conditions

Armenia's CEPA commitments and the government's concerted interest in SDG 6 (Water and Sanitation) and the UNECE Protocol on Water and Health present opportunities to accelerate reforms on water use and quality management. In addition, there is greater recognition of the negative impact on Armenia's freshwater resources resulting from climate change and construction of reservoirs upstream Türkiye. Also, conducive are the recent efforts by the government to initiate a national water strategy development process and the availability of EU programmatic support to help with the reforms and investments. For a detailed breakdown of gaps and needs, see Table 18.

Table 18. Key gaps and needs of water sector in Armenia

Key gaps	***Needs***
■ Lack of holistic, cross-sectoral water policy and strategy with clear targets on water use efficiency and water quality ■ Fragmented governance of water ■ Current system of water distribution to farmers is inefficient and in many ways ineffective. ■ Ineffective use of economic instruments to alter user behaviour toward efficiency ■ Current investments in water infrastructure and wastewater treatment are insufficient to cover needs of systemic improvements (UNECE 2024) ■ Slow progress on water quality and sanitation agenda ■ Fragmented water-related data and inadequate analytics capabilities ■ Inadequate public awareness, education, and transparency. This is particularly important as there is a lingering cultural legacy about water being a boundless natural resource accompanied with the expectation that it should be a free good.	■ The country needs a holistic, cross-sectoral water strategy with clear targets on water use and water quality. ■ Water quality agenda needs to be pursued more aggressively ■ Investment plans need to be developed to ensure ■ Building on the experience of fish farm water recycling legislation, begin requiring water use recycling in other industries. ■ Mobilise awareness raising campaign on water use, loss, and quality.

3.3.2.4 Readiness for green transition

Table 19. Transition readiness in the water sector in Armenia

Thematic area / Gap, needs enabling conditions area	Policy and legal framework	EU approximation	Policy implementation	Institutional Capacity	Non-institutional and private capacity	Research and Innovation	Financial	Just transition
Water quality	**Little progress**	**Some progress**	**Little progress**	**Little progress**	**Little progress**	**Little progress**	**Little progress**	**Little progress**
Water use	**Some progress**	**Some progress**	**Little progress**	**Little progress**	**Little progress**	**Little progress**	**Little progress**	**Little progress**

3.3.3 Soil and Land Degradation

Land degradation and desertification in Armenia are driven by both natural and anthropogenic factors. Human-induced causes include inefficient agricultural practices, such as lack of crop rotation, inefficient use of irrigation techniques, overgrazing of pastures, overuse of groundwater resources, soil contamination, mining, and more. In addition to the ongoing land degradation processes, climate change is increasing the risks and aggravating degradation processes.

3.3.3.1 Status and trends

There are several sectors in Armenia that contribute to land degradation, agriculture, mining, construction, and waste management. Large-scale forest logging and intensive use of high-mountain meadows and pastureland also contribute to soil erosion. Forests and meadows, however, are discussed in the Biodiversity and Ecosystem section of this report. Though Armenia regulates movement and transport of top soil, much of the land impacted by agricultural, industrial, and municipal use can be better managed.

In agriculture, soil salinization has especially intensified in recent years. The secondary salinization occurs in Ararat Valley. Poor irrigation has contributed to secondary salinization, reaching 27,000 ha.

In addition, Improper use of agricultural machinery combined with outdated irrigation methods has led to extensive soil compactions. Currently, almost half of all agricultural land is in various stages of compaction.

The mining industry is also an active user of land. The industry impacts land and soil quality through its tailings, waste rock storage, and its mining operations. Land and soil are also impacted through the fugitive dust from mining and mineral process activities. Health of those exposed to such polluted soil, esp. children can also be significant. In 2018-19, the RA MoEnv inventoried 44 closed mining and mineral tailing sites in need for rehabilitation. With Swedish funding, the World Bank has initiated the Resiland program, seeking to restore some of the mining sites including reforestation.

Landfills, which are in some cases managed dumps and most unmanaged dumps, often are placed on top of high-grade agricultural land. With continued deposit of undifferentiated waste (which could include household and agricultural waste with toxic elements), these soils render useless for many economic activities.

Several urban areas also have legacy industrial sites with expected pollution from the Soviet era. The largest of these in Armenia is the synthetic rubber factory, Nairit, in Yerevan. There are also the pesticide factories in Vanadzor. No thorough assessment and evaluation of such “brownfield” sites have been made. Nairit has recently garnered greater attention as the Ministry of Finance has given the go ahead to evaluate the clean-up of the site. The World Bank is currently leading the assessment.

3.3.3.2 EU Approximation – Governance, policy and legislation

CEPA does not address soil management. Only in Provision 106 of the Annex, it refers to land-use planning. It states that the Parties will cooperate to consolidate the institutional and operational capacities of institutions of the Republic of Armenia in the fields of regional development and land-use planning by, among other things:

(a) improving inter institutional coordination, in particular the mechanism of vertical and horizontal interaction of central and local administration in the process of development and implementation of regional policies;

(b) developing the capacity of regional and local authorities to promote cross-border cooperation, taking into account regulations and practice of the European Union; and

(c) sharing knowledge, information and best practices on regional development policies to promote economic well-being for local communities and uniform development of the regions.

3.3.3.3 Main enabling conditions, needs and gaps

Enabling Conditions

Armenia has much of the legislation needed for soil and land-use management. It has also developed the National Strategy and Action Plan to Combat Desertification, the last one developed for the 2015-2020 period. Soil management remains one of the more neglected aspects of environmental governance in Armenia. The UNECE Environmental Performance Review for Armenia (Second Review) states that despite relevant legislation being in place, soil fertility continues to decline, carbon stocks are reduced, and erosion is observed throughout the country. For a detailed breakdown of gaps and needs, see Table 20.

Table 20. Key gaps and needs in Armenia

Key gaps	***Needs***
■ Weak implementation mechanisms are impeding application of soil conservation practices that could contribute to sustainable land use management, carbon sequestration, and erosion control. (UNECE 2024) ■ There are no economic incentives for farmers and land users to engage in soil conservation practices. ■ There is a lack of trained professionals to assist local stakeholders in implementing soil management practices.	■ Improving soil monitoring approach and institutions ■ Further develop legislation, esp. to regulate chemical fertilisers and pesticides, protection of soil biodiversity, and more. ■ Introduce soil protection and humus-enhancing management. ■ Align soil conservation and management policies with international practices. ■ Improve data collection and analytics on soil.

■ Internationally recognised best management practices for soil are not introduced at a significant scale.	■ Substantially increase public awareness raising on the value of good soil management.

3.3.3.4 Readiness for green transition

Table 21. Transition readiness for the soil and land reforms in Armenia

Thematic area / Gap, needs enabling conditions area	Policy and legal framework	EU approximation	Policy implementation	Institutional Capacity	Non-institutional and private capacity	Research and Innovation	Financial	Just transition
Soil Management	**Little progress**	**N/A**	**Little progress**	**Little progress**	**Little progress**	**Little progress**	**Little progress**	**Little progress**
Land-Use Planning	**Some progress**	**Some progress**	**Little progress**	**Little progress**	**Little progress**	**Little progress**	**Little progress**	**Little progress**

3.3.4 Chemicals Management

A chemical management regime in a country supports sustainable economic growth by ensuring that progress is made while protecting the health and safety of people as well as the integrity of the natural environment. Chemicals are essential in many industries, agriculture (pesticides, fertilisers, veterinary care medications, etc.), pharmaceuticals (raw input and lab supplies), mining (reagents, explosives, etc.), textile and leather manufacturing, electrical and electrical equipment production, and more. All these need to have a clear regulatory framework in which they are managed (handled, used, transported, and disposed).

3.3.4.1 Status and trends

During the Soviet era, in most, if not all, Soviet republics, there was widespread use of chemical fertilisers and pesticides. Agricultural progress relied on intensive use of pesticides and fertilizers. In Armenia today, pesticides and fertilisers are still applied annually though it has dramatically decreased since the Soviet era. All pesticides that are used in Armenia are imported as there are no pesticide manufacturing facilities in the country.

A study conducted by Armenian Women for Health and Healthy Environment (AWHHE) showed that in 2019 more than 60% of pesticides allowed by Armenian legislation belong to the category

of highly hazardous pesticides (HHPs).[74] While the official list may not have been amended, **in the past year or two the Food Safety Inspection Body in Armenia has started more stringent oversight over the imports of HHPs** significantly reducing availability in the market.

While these are positive trends, **knowledge about proper use, handling, and storage of pesticides is still lagging** and needs to be rapidly enhanced in order to prevent harm. There is also a need to promote use of the ecosystem-based approach and traditional knowledge in agriculture.

Registering and monitoring of chemicals in Armenia is stalled. The RA Ministry of Environment is designated as the authorized body to establish and manage a chemicals registry. Establishing such a registry is mandated by Eurasian Economic Union to which Armenia is a member.[75] The Ministry, however, sorely lacks the capacity and resources to establish and manage such a registry.

The **Ministry of Health is the main regulatory body responsible for pharmaceutical registration**. The Scientific Centre of Drug and Medical Technology Expertise conducts the examination of registration materials. The registration of medicinal products in Armenia is governed by several key laws and decrees:

- Law of the Republic of Armenia "On Medicinal Products": This law regulates the circulation of medicines, substances, herbal substances and preparations, and investigational medicinal products
- Decree No. 347 of April 25, 2001: "On adopting the Rule of Registration of Medicinal products and Assessment Fees for Registration of Medicinal products in the Republic of Armenia". This decree, along with subsequent amendments, covers essential aspects of the assessment process, sample quantities, final assessment report templates, registration certificate formats, and a list of variations exempt from new registration

Armenia is party to several key chemical management conventions. It has ratified the Basel (1999), Rotterdam (2003), Stockholm (2003), and Minamata (2017) Conventions. Being party to these conventions creates both obligations and also opportunities for capacity building and global engagement on these important issues. Adequate staffing of the focal points for these conventions is essential for optimal utilisation of the opportunities they offer for building capacity in the country.

There are **some unresolved conceptual and regulatory issues on chemical substances** and their management. For instance, What substances should fall under the chemical management regime, specifically, the law on chemical substances to be developed as part of obligations under CEPA?

[74] Armenian Women on Health and Healthy Environment, Report on the Situation of Highly Hazardous Pesticides (HHPs) and Alternatives in Armenia, 2020

[75] Government Decision 550-A, 2021.

One approach could include all chemicals regardless of their expiration date. This would mean that there is little differentiation between chemical substances used as input into a production process and hazardous chemical waste (including expired chemicals such as the ones found in the Nairit Plant). This may result in blurred boundaries between hazardous waste (e.g., stocks of stored POPs from the Soviet era), harmful fugitive chemical pollutants (in air, water, and soil); and chemical inputs into production. All may be deemed as an appropriate subject of the law on chemicals substances, leading to an unwieldy regulatory domain.

Another approach may be to include a narrower definition of chemicals. The law could focus only on chemicals that are used as raw input into production. These could include chemical fertilizers, pesticides, chemicals used in the production of pharmaceuticals and cosmetics (though not the final pharmaceutical or cosmetic products), chemicals used in producing household items (though not the household cleaners sold in the market), (chemicals used for scientific research (though not the post-experiment waste), chemicals used in mining (though not the residues in tailings), and so on. Such a narrower scope of chemicals, regulation may be more manageable but the question of proper governance of impact of chemicals on humans and the environment remains unresolved.

To better understand how to define the scope of chemicals and the responsibilities of who will be responsible for managing the various functions need research of international legislation and practice. Such analysis should also address aligning the EU, Eurasian Economic Union, and other international obligations.

3.3.4.2 EU Approximation – Governance, policy and legislation

Since 2010, the drafting of law “On Chemical Substances” has been included as an obligation in the list of all the government measures. Several attempts have been made to develop the draft, with no success to push it forward.

In 2011-2012, the Ministry of Environmental Protection developed and circulated a draft law “On Chemical Substances”, whereby the amount of the proposed state duty for the registration of chemical substances was considered by the Ministry of Economy as an additional burden for economic entities. The draft did not proceed further.

The second attempt was made in 2022, when the Law of the Republic of Moldova “On Chemical Substances” was localised, but the draft lacked a registration system, there were contradictions with respect to the Conventions, the draft lacked also the powers of the stakeholder bodies.

International support on addressing the chemical management regime in Armenia is currently being explored by the Government, especially through the RA Ministry of Environment. They are in discussions with the EU4Green Recovery East, a newly launched initiative, to further develop the hazardous waste requirements of CEPA and other international obligations. For the Law on Chemical Substances, they are exploring possibilities of receiving support from the Sweden-funded Green Agenda Armenia initiative led by the Stockholm Environment Institute.

Per CEPA, Armenia has 10 obligations on creating a chemicals management regime. These arise from provisions on the export and import of hazardous chemicals as well as those on classification, labelling and packaging of substances and mixtures. Table 22a summarizes these obligations. As can be seen, Armenia needs to urgently address them as planned deadlines have been missed.

Table 22a. Chemicals management action agenda for Armenia under CEPA

	CEPA provision	Action item for Armenia	Planned deadline
1	Implementation of the export notification procedure (ARTICLE 8)	Drafting the Law of the Republic of Armenia "On chemicals" and secondary regulatory legal acts to ensure the implementation of the export notification procedure	Q1 2023
2	Implementation of procedures for handling of export notifications received from other countries (ARTICLE 9)	Establishing export notification procedure in accordance with EU standards	Q1 2023
3	Setting up of procedures for drafting and submission of notifications of final regulatory action (ARTICLE 11)	Setting up of procedures for drafting and submission of import decisions	Q1 2023
4	Setting up of procedures for drafting and submission of import decisions (ARTICLE 13)	Setting up of procedures for drafting and submission of import decisions	Q1 2023
5	Implementation of the PIC procedure for the export of certain chemicals, in particular those listed in Annex III to the Rotterdam Convention (ARTICLE 14)	Implementation of the PIC procedure for the export of certain chemicals, in particular those listed in Annex III to the Rotterdam Convention	Q1 2023
6	Implementation of the labelling and packaging requirements for exported chemicals (ARTICLE 17)	Setting implementation requirement for labelling and packaging of exported chemicals	Q1 2023
7	Designation of national authorities that control the import and export of chemicals (ARTICLE 18)	Establishing national authority who will control the import and export of the chemicals	Q1 2023
8	Designation of competent authorities	Designation of competent authorities	Q1 2022
9	Implementation of classification, labelling and packaging of substances	Setting legislative provisions for the implementation of classification, labelling and packaging of substances	Q1 2022

	CEPA provision	Action item for Armenia	Planned deadline
10	Implementation of classification, labelling and packaging of mixtures	Setting legislative provisions for the Implementation of classification, labelling and packaging of mixtures	Q1 2025

Source: CEPA Implementation Strategy provided to author by the RA Ministry of Environment

3.3.4.3 Main enabling conditions, needs and gaps

Enabling Conditions

The RA Ministry of Environment is keen to develop a law on chemical substances and regulating hazardous waste in Armenia, particularly in the context of Armenia's EU approximation commitments. For a detailed breakdown of gaps and needs, see Table 22b.

Table 22b. Key gaps and needs in Armenia

Key gaps	*Needs*
■ The current chemicals related legislation is fragmented and does not fully regulate chemicals management in the country. The obligations of several international agreements related to chemicals have not been fully reflected and implemented in national legislation. ■ Armenia has not conducted an analysis of international experience with regulating and implementing chemicals and hazardous-waste management regimes ■ Insufficient stakeholder consultations has been conducted for developing effective legislation, particularly the business and scientific stakeholders who trade or handle chemicals and hazardous waste.	■ Conduct an analysis of global practice on chemicals substances regulation and management (including hazardous waste), esp. In the context of aligning with requirements of EU, Eurasian Economic Union, and international chemicals conventions. ■ Conduct policy and legislation development consultation with key stakeholders to ensure draft law garners adequate buy-in; this should include businesses, scientific laboratories, as well as civil society active in this domain. ■ Develop and adopt a Law on Chemical Substances. ■ Develop and adopt all regulatory and governance gaps on hazardous waste ■ Ensure a "whole" chemicals management system through workable interagency cooperation and continuous quality assurance and needs assessment. This system needs to ensure that key chemical management issues impacting public health and the environment are not missed as a result of governance fragmentation.

3.3.4.4 Readiness for green transition

Table 23. Transition readiness summary

Thematic area / Gap, needs enabling conditions area	Policy and legal framework	EU approximation	Policy implementation	Institutional Capacity	Non-institutional and private capacity	Research and Innovation	Financial	Just transition
Chemicals Management	**Little progress**	**Little progress**	**Little progress**	**Little progress**	**Little progress**	**Little progress**	**Little progress**	**Little progress**

3.4 Biodiversity and Ecosystems

3.4.1 Status and Trends

3.4.1.1 Country's biodiversity profile

Armenia has a rich biological diversity at the genetic, species and ecosystem levels supported by diverse landscape-climatic zones. The country crosses two global biodiversity hotspots – the Caucasian and the Irano-Anatolian. Flora of Armenia consists of 3800 vascular plant species, including 144 country endemics. The funga of Armenia includes about 4200 species of fungi and 619 species of lichens. The diversity of algae and mosses is represented by 428 and 399 species, respectively. The unique genetic stock of wild fruits, such as wild pears (32 species), crop wild relatives, along with species of economic value (more than 200 edible plants, 290 species of edible mushrooms, etc.) provide valuable goods and ecosystem services. The fauna is also exceptionally rich, with around 17500 species, including 495 endemic species.[76] The Red Book of the RA comprises 452 vascular plants, 40 fungal, 155 vertebrate and 153 invertebrate species. Armenia's habitats are diverse and remarkable, ranging from deserts and semi-deserts to steppes and meadow steppes, forests, subalpine and alpine meadows, and wetlands. According to the publications by Fayvush & Aleksanyan in 2016, about 750 habitats of different levels are classified in the country. The major threats and challenges that biodiversity faces in Armenia are predominantly caused by anthropogenic activities. In particular, the direct threats are illegal logging, poaching, wildfires, unsustainable harvesting, use and illegal trade of flora, fauna and fungi, etc. Additionally, indirect threats such as environmental pollution, large-scale agricultural productions, unregulated use of pesticides, habitat fragmentation, destruction and loss caused by mining and infrastructure development, expansion of invasive alien species are contributing to decline of species, habitat

[76] Ministry of Nature Protection RA, 1998. First National Report to the Convention on Biological Diversity. Available at: https://www.cbd.int/doc/world/am/am-nr-01-en.pdf

diversity and quality.[77] One of the major challenges facing several protected areas, key habitats and migratory species is the long-lasting armed conflict between Armenia and Azerbaijan. After the 2020 Nagorno-Karabakh war, Azerbaijani military forces moved into the "Shikahogh" State Reserve and Sev Lich State Sanctuary[78] under Armenian jurisdiction, logging dozens of thousands trees and developing military infrastructure in primaeval forest.

3.4.1.2 Area-Based and Species Conservation

The significant portion of the biodiversity is conserved through the state-managed network of nature specially protected areas (SPNAs that are internationally referred to as PAs). According to the "The RA Specially Protected Nature Areas Strategy, State Programme of Nature Conservation and Use", 36.7% of the plants, 82.5% of the fungi, 93.5% invertebrates and 62.7% vertebrate species are reported from the SPNAs. Currently, 13.1% (386 487 ha) of the territory of Armenia including Lake Sevan (4.28% of the country's territory) is designated as the SPNAs, including 3 state reserves, 4 national parks, 27 sanctuaries and 233 natural monuments with different protection regimes.[79] A new category – protected landscape is planned to be introduced in the revised Law on Specially Protected Nature Areas. During the previous 10 years, the total area covered by the SPNAs in Armenia has increased by 85 530 ha.[80] There are three state reserves (Khosrov, Shikahogh, and Erebuni) with a strict level of protection covering 1.2 % of the country, matching the IUCN category Ia for the strict reserves.[81] In 2013, the European Diploma for Protected Areas was awarded to the Khosrov Forest Reserve from the Council of Europe[82]. Four National Parks (IUCN Category II), Arevik, Dilijan, Lake Arpi, and Sevan, cover 7.9 % of Armenia's territory. Two new National Parks, "Jermuk" and "Tatev", covering areas of high biodiversity value are planned. There is also an ongoing project by the Succow Foundation aiming to build local capacities and to establish Armenia's first UNESCO Biosphere Reserve based on the Dilijan National Park. The prevailing part of the state sanctuaries (IUCN IV category) and natural monuments (IUCN III category) are lacking management plans, defined boundaries, and other attributes of the designated protected areas. In addition to the state-owned network, there are also private and community-based protected areas in Armenia (Ararat and Vayots Dzor provinces). Other effective area-based conservation measures (OECMs) have also significantly developed in Armenia over the last decade. By the efforts of the WWF and the MoEnv a long-term project entitled "Promotion of Eco-Corridors" was launched in 2015 to ensure ecological connectivity and safe migration of target species over the South Eastern Lesser Caucasus Eco-Corridor. The WWF-Armenia signed 14 conservation agreements with target communities and respective local community-based organisations (CBOs)

[77] Ministry of Nature Protection of the RA, 2014. Fifth National Report to the Convention on Biological Diversity: Armenia. Ministry of Nature Protection, Yerevan.

[78] Orbeli, 2021. Lake Sev is Not a Disputed Territory. Orbeli Analytical Centre. Available at: orbeli.am.

[79] Government of the RA, 2019. The 6th National Report of the RA on the Implementation of the Convention on Biological Diversity. s.l.: Government of the Republic of Armenia.

[80] WWF, 2022. Development of the Protected Area System. Available at: https://www.wwf.am/en/our_work/wildlife/development_of_the_protected_area_system/

[81] Dudley N (Editor), 2008. Guidelines for applying protected area management categories. Gland, IUCN.

[82] https://search.coe.int/cm?i=09000016808b7ca6

to manage the community conserved areas (total coverage is 87,501 ha). Moreover, other globally recognised areas of conservation significance have been identified in Armenia including 3 Ramsar Sites, 28 Key Biodiversity Areas, 32 Important Plant Areas, 18 Important Bird Areas, 32 Prime Butterfly Areas. Totally, 23 candidate Emerald Sites have been proposed, covering 34.7% of the country's territory. The Candidate sites of the Emerald Network have been neither approved by the Bern Convention nor adopted by the Government yet.[83]

The several species-level conservation projects are implemented by several national and international organisations. Since 2013, WWF Armenia, in partnership with the Ministry of Environment, has implemented Reintroduction of the Caspian Red Deer (*Cervus elaphus maral*) in Armenia. Thereafter, 13 animals born at the Breeding Centre were released into natural habitats in the Dilijan National Park. The flagship of the species conservation in Armenia is Caucasian or Persian Leopard (*Panthera pardus tulliana*). The WWF Armenia's Leopard Conservation Programme started in early 2000. Due to significant conservation efforts in southern Armenia, the number of leopard individuals increased from 1-2 to 8 individuals (Ecoregional Conservation Plan, 2020). The Leopard conservation is also among the priorities of the Foundation for the Preservation of Wildlife and Cultural Assets (FPWC). The organisation monitors and protects the animal within the private protected area – Caucasus Wildlife Refuge. The branch of Naturschutzbund Deutschland (NABU) in Armenia implements the project targeting birds of prey research and conservation. The RA Government founded the Foundation of "Restoration of Sevan trout stocks and development of aquaculture" on December 19, 2013. The foundation implements restoration of the threatened Sevan trout (*Salmo ischchan*).

3.4.1.3 Biodiversity Monitoring

Currently, the country lacks systematic biodiversity monitoring. However, there are positive steps being taken towards enhancing capacities and establishing the national biodiversity monitoring framework. Particularly, the Caucasus Nature Fund (CNF) and the Ministry of Environment jointly developed the project for the establishment of the monitoring framework in RA and, specifically 10-year biodiversity monitoring plan of Armenia. In the frame of the plan, the CNF finances several programmes for biodiversity monitoring in the SPNAs, including plant diversity monitoring with the Institute of Botany and wildlife monitoring with the Scientific Centre of Zoology and Hydroecology. In addition, the Armenian Association of Mammologists and BirdLinks Armenia NGOs signed the agreements with the CNF for rodent and bird monitoring in the SPNAs respectively. There is also a biodiversity monitoring group of "Forests and Biodiversity Monitoring Service" at the Hydrometeorology and Monitoring Centre of the Ministry of Environment, which also monitors biodiversity in the forestry and SPNAs. Since 2002, WWF-Armenia has been monitoring large mammals in the country. As part of their projects, the NABU's branch in Armenia focuses on monitoring birds of prey, while BirdLinks NGO conducts monitoring of birds and butterflies.

[83] Government of the RA, 2019. The 6th National Report of the RA on the Implementation of the Convention on Biological Diversity. s.l.: Government of the Republic of Armenia.

3.4.1.4 Restoration

Governmental and non-governmental actors are involved in the large-scale nature restoration. Both are primarily focused on forest landscape restoration. Armenia's NDC by 2030 is 12.9% of the country's area forested (Government of the RA, 2021). In 2023, the major state actor – "Hayantar" State Non-Commercial Organisation – planted 314 ha of forests, while in 2024, reforestation and afforestation efforts covered a total area of 337.4 hectares[84]. There was a large-scale planting initiative by the RA Government to plant 10 million trees in Armenia, which was unsuccessful because of the Covid-19 pandemics and the war in Nagorno-Karabakh. International donor organisations are also supporting governmental efforts to increase forest cover. The UN FAO, WB, SDC, UNDP have launched a number of large-scale forest restoration projects aiming to increase forest cover, improve forest management and conservation and resilience to climate change. The NGOs are also actively involved in forest restoration and afforestation activities. My Forest Armenia NGO, ATP, the FPWC and Shen NGO, all together, planted more than 1 million trees and initiated forest restoration of more than 1000 hectares in 2023. In 2022, the Armenia Tree Project, My Forest Armenia and Shen NGO announced the establishment of the Forest Alliance of Armenia uniting above-mentioned organisations and others to advocate for the protection and restoration of forest ecosystems. Additionally, the Resilient Landscapes Project for Armenia also intends to restore other important ecosystems, such as wetlands and abandoned mining sites. In the meantime, the Government emphasises freshwater ecosystem recovery of a key regional ecosystem – Lake Sevan. The eutrophication and deterioration of water quality caused by anthropogenic factors results in ecological degradation. The long-term national vision and 2024-2030 Strategy for Restoration of Lake Sevan Ecosystem were developed within the "Environmental Protection of Lake Sevan" (EU4Sevan) project.

3.4.1.5 Biodiversity Policy and Legal Framework

Nature and biodiversity governance in Armenia are regulated by Codes, Laws, Government Decrees, International Conventions, Bilateral and Multilateral Agreements. In addition, the country has adhered to over 20 International treaties (CBD, CITES, etc.), that are a constituent part of the legal system of the Republic. However, the main comprehensive and long-term planning document in the field of biodiversity, the Biodiversity National Strategy and Action Plan is outdated. The revision of the document has recently been initiated. The following Laws, Government Decrees and Codes are backbone of the biodiversity policy framework of Armenia: the Law "on Flora" (1999), the Red Books of Plants and Animals (2010), the "Forestry Code" (2005), the Law "On Environmental Control" (2005), the Law "On Environmental Impact Assessment" (2014), the Law "On Specially Protected Nature Areas" (2006), the Law "On hunting and hunting economy" (2007), the "Law on Tariffs for Compensation for Damage Caused to Fauna and Flora" (2005), the "Law on Genetically Modified Organisms" (2023), the Law "On Biosafety and Biosecurity".

[84] https://civic.am/news/86026

3.4.1.6 Biodiversity Financing

Three-year allocations from the state budget to two main state programmes – Management and conservation of natural resources and SPNAs and Forest management are EUR million 6.4, 10.8 and 13.7 (Table 24), respectively, show that the allocation to the sector has almost doubled during the period from 2022 to 2024 (Government of RA, 2024).

Table 24. Environmental targeted allocations in the 2024 State Budget

Name of the program/activity	Budget AMD	Budget EUR
State policy development, coordination of programmes and monitoring in the field of environment	1,313.5 million	2.96 million
Management and conservation of natural resources and SPNAs	2,030.11 million	4.57 million
Forest management	3,812.68 million	8.58 million
Environmental impact assessment and monitoring	2,270.68 million	5.11 million
Crop promotion and plant protection	125.38 million	282,273
Environmental subsidies to communities for the Implementation of environmental programmes thereto.	322.63 million	726,345
Conservation and exhibition of natural specimens	42.50 million	95,682
Inspection control program	7,146.85 million	16.09 million

1 EUR= 444.18 AMD

Source: Law of the Republic of Armenia "On the State Budget of the Republic of Armenia for 2024", Appendix No. 1, Table No. 1

Financial support to the sector from external sources is significant. The major problems would be extremely difficult to solve by the allocations only from the state budget without the investments by international partners. The GEF, CNF, FAO, WB, Federal Ministry of Economic Cooperation and Development of Germany through the KfW Development Bank are the main donors of biodiversity conservation. However, comprehensive data on donor funding for biodiversity and restoration is not available. However, complete data on donor funding for biodiversity and restoration is not available, including details on funding structure and total amounts allocated.

3.4.2 The main enabling conditions, needs and gaps (constraints)

3.4.2.1 The Enabling conditions, Gaps and Needs

Enabling conditions:

Armenia is a party to the Environmental Conventions related to the biodiversity thematic area, including the CBD, CITES, etc. At the same time, there is a relevant national legislative framework and the CEPA agreement creates necessary prerequisites for an approximation of the Armenian legislation with EU Directives.

Major gaps and needs:

In general, the **national legislation for biodiversity conservation and sustainable use** is in place. However, several Laws and Strategies are outdated and require significant revision. In particular, the Law on Specially Protected Nature Areas and the Law on Flora need major revisions, and several regulatory frameworks remain incomplete. Key documents such as the Strategy and State Programme of Conservation and Use of Specially Protected Areas, the Red Book of Armenia and National Biodiversity Strategy and Action Plan (NBSAP) also require updates to align with current challenges and priorities. Furthermore, there is no legal or regulatory framework for the control and management of invasive species. Armenia has committed to approximating its national legislation with the EU Bird and Habitat Directives, but this alignment has not yet been achieved. The CEPA Roadmap, adopted by the Government of Armenia (Decree No. 666-L, June 1, 2019), and subsequent legislative reforms proposed within the "Twinning Project: Strengthened Protection and Sustainable Use of Biodiversity in Armenia in line with European Standards", highlight these commitments. Meanwhile, the legal status of the Emerald Network in Armenia remains unclear, requiring further clarification and legal establishment. Issues directly related to biodiversity are only partially addressed in existing legislation. For instance, biodiversity information is not subject to formal verification during Environmental Impact Assessments or Strategic Environmental Assessments, and large-scale agricultural projects, which can pose significant threats to biodiversity, are currently exempt from EIA procedure.

Recent reforms in the system of the **specially protected nature areas (SPNAs)** and forestry protection have led to the establishment of the EcoPatrol Service, ensuring protection within SPNAs and forested lands. However, this newly established service currently faces significant challenges, including insufficient financial, human, and technical resources to enhance law enforcement capabilities. Substantial investments are required to strengthen the EcoPatrol Service and ensure its effectiveness. With the removal of protection responsibilities from SPNA administrations, the future development and management of the protected areas system remain unclear. One potential solution is to consolidate all SPNAs under a single agency. Such an agency could take on responsibilities such as administration, ecotourism, scientific research, and biodiversity monitoring, ensuring a more integrated and efficient approach to SPNA management. The management effectiveness of Armenia's protected areas also requires significant improvement. There is an urgent need to adopt officially a standardised management effectiveness tracking and

reporting system, such as the Management Effectiveness Tracking Tool (METT). Many protected areas, particularly state sanctuaries under the Hayanar SNCO, as well as most nature monuments and some other SPNAs, lack clearly defined boundaries, management plans, and other essential attributes expected of well-managed protected areas worldwide. As a member of the High Ambition Coalition for Nature and People, Armenia has committed to the global goal of protecting at least 30% of the planet's land and ocean by 2030. In respect of this commitment and to improve the effectiveness of SPNA management, comprehensive reforms in the SPNA system should be prioritised by the Government.

Another significant gap is the lack of comprehensive **communication between various governmental and non-governmental actors**. In particular, inter-ministerial coordination on biodiversity issues require urgent attention. While a governmental commission on implementing the country's commitments under the CBD was established by decree of the Prime Minister (Decree No. 710-A, 04 August 2016), it is currently inactive and requires revitalisation. Adopting a whole-of-society approach to biodiversity mainstreaming at the national level is essential to ensure effective collaboration and integration of biodiversity concerns across all sectors. The approach has also been highlighted and promoted by the Kunming-Montreal GBF.

Biodiversity inventory and monitoring is crucial for evidence-based decision-making and effective conservation management. However, a structured and unified monitoring system is currently lacking. Considering the importance of reporting on global and national indicators of the Kunming-Montreal Global Biodiversity Framework, the development of a comprehensive national monitoring system and biodiversity inventory framework is one of the key challenges for the country.

Ecosystem restoration, particularly forest landscape restoration, considering the state commitment under the Paris Agreement to restore 12.9% of the country's territory (approximately 50,000 hectares) is an ambitious goal. However, the current level of forest restoration and tree planting efforts remains insufficient to meet these targets. There is an urgent need to enhance the capacities of "Hayantar" SNCO and other non-state actors involved in tree planting initiatives. Additionally, mechanisms must be established to effectively engage local communities, which are often in conflict due to issues such as grazing in forest lands, boundary disputes, and competing land-use priorities. In the case of Lake Sevan's restoration, a long-term national vision and the 2024-2030 Strategy for the Restoration of the Lake Sevan Ecosystem have not yet been officially approved.

3.4.2.2 Institutional/Governance capacity

The Ministry of Environment is responsible for the national-level biodiversity policy development and execution body with its subsidiaries, such as:

a) Newly established "EcoPatrol Service", enforcing the law in the SPNAs and forests.
b) "Hydrometeorological and Monitoring Centre", monitoring the environment, including biodiversity and forests.

c) Environmental Projects Implementation Unit State Agency is ensuring the effective implementation of the state programmes in the field of environment.
d) As well as 6 SNCOs responsible for the management of protected areas: Zangezur Biosphere Reserve (merges "Shikahogh" State Reserve", "Arevik" National Park" and "Khustup" State Sanctuary"), "Khosrov Forest" State Reserve", "Reserve Park Complex", as well as "Dilijan", "Sevan" and "Lake Arpi" National Parks.

The Ministry of Territorial Administration and Infrastructure with its regional bodies (regional state Administrations (10) and Yerevan Municipality) develops and implements the government's policy in the field of territorial administration and infrastructure. **The Ministry of Economy** develops and implements the Agrarian Policy, such as agro-processing, animal breeding, veterinary medicine, horticulture, fisheries, food security and organic farming. There are several specialised organisations under the Ministry, such as Agriculture Scientific Centre; Rural Areas Economic Development Programmes Implementation Unit; "Centre for Agricultural Services" SNCO; Scientific Centre of Vegetable, Melon and Industrial Crops and "Scientific Centre for risks assessment and analysis in food safety area" CJCS. The ministry is also responsible for policy development in the tourism sector. **The Ministry of Finance** is an important stakeholder responsible for the public finance management, including environment. **The Standing Committee on Agriculture and Environment of the National Assembly** is one of the main bodies of the Parliament, which is responsible for developing policies, legislative initiatives, and monitoring actions in the fields of agriculture and environmental protection. **The Cadastre Committee** maintains a state registry of real estate and geospatial information systems, promotes development and implementation of land policy, and develops basic cartographic materials. **The Environmental Protection and Mining Inspection Body** exercises supervision and/or other functions prescribed by law, may apply sanctions in the field of environmental protection, as well as regarding the use and reproduction of subsoil and mineral resources.

Academia – dominated by the National Academy of Sciences (NAS) and linked to leading institutions for biodiversity studies and management, e.g. Institute of Botany after A. Takhtajyan, Scientific Centre of Zoology and Hydroecology and Centre for Ecological-Noosphere Studies. There are also 8 state universities (e.g. Yerevan State University, Khachatur Abovyan Armenian State Pedagogical University, American University of Armenia) with their branches, which study and teach biodiversity-and relevant topics.

Although the authorised body and its organisations have sufficient power under national legislation, the crucial role of biodiversity and ecosystem services in human wellbeing, urban development, and other sectors remains undervalued. Even though the importance of biodiversity conservation is maintained in related strategies. However, implementation progress is slow, due to limited financial and human resources. The long-term strategic planning documents are updated every 5-10 years. The Government Action Plan[85], including environmental commitments, is for 5 years (2021-2026). The National Biodiversity Strategy and Action Plan is currently in the process of being updated. SPNAs' management plans are generally developed for 5 years, only a few of them were/

[85] https://www.gov.am/files/docs/4902.pdf

are for 10 years (e.g. Dilijan National Park). Management plans are currently being developed for several SPNAs, including Zangezur Biosphere Complex and Sevan National Park. Several SPNA's management plans would benefit for an update, which could be done in the context of a wider sectoral strategy.

Insufficient funding for the Ministry of Environment, including low staff salaries, is an obstacle for the recruitment of high-level professionals necessary for effective biodiversity policy implementation. According to the State budget, limited financial resources are available to address nature conservation and biodiversity. At the same time progress is noticeable. For the first time, 60.0 million AMD were allocated by the 2024 state budget for water quality monitoring in Lake Sevan.

Data collection and monitoring are primarily the responsibility of the "Hydrometeorology and Monitoring Centre" SNCO. The Centre publishes data on atmospheric air pollution, quantity and quality of water and Lake Sevan on a quarterly and annual basis. However, forest monitoring is carried out in a fragmented manner. The monitoring of biodiversity was entrusted to the Centre only recently.

Public participation in environmental decision-making is regulated by the Law on EIA and by-laws. There is a unified platform for publishing draft legal acts – E Draft that provides electronic tools to stakeholders as an opportunity to get acquainted with the draft laws and policies developed by state bodies, follow the process of development and, in case of registration on the website, post comments, get acquainted with the summaries, the approved recommendations or the justifications for disapproval of those recommendations. Armenia is a Party to the Aarhus Convention. Until 2017 15 Aarhus Centre operated in Armenia, which provided wide access to information to the public. Currently, only one the Aarhus Centre in Yerevan operates under the MoE.

3.4.2.3 Non-governmental actor capacity

Non-Governmental Organisations – comprise various organisations from local to national levels. The leading NGOs in the field of nature and biodiversity are FPWC, My Forest Armenia NGO, Armenia Tree Project, Shen NGO, "Blejan" Environmental, Social and Business Support NGO, Armenian Society of Biologists NGO, Ecolur NGO, BirdLinks NGO, etc.

There are a number of non-governmental organisations working in the field of biodiversity conservation. NGOs, private companies and some of the scientific institutions traditionally and continuously provide consultancy and support to the field of biodiversity conservation. Some of them are aware of Green Transition certainly and have sufficient capacities to promote sustainable and environmentally friendly practice. However different organisations have different levels of awareness, the ideas on the issue and actions are not similar and appropriate. The situation in Armenia in recent years, caused by the conflict with Azerbaijan, the large number of refugees displaced from Artsakh, led many NGOs to prioritise social issues. The environmental problems,

as well as more innovative, long-term plans have become secondary. Even the huge part of allocations for environmental protection were transformed to cover the needs of refugees and vulnerable groups.

International organisations – led by the EU Delegation to Armenia, Council of Europe, WWF Armenia, Caucasus Nature Fund, UNDP, GIZ, World Bank, Asian Development Bank, Swiss Agency for Development and Cooperation in Armenia, the branches of Naturschutzbund Deutschland (NABU), and Friedrich-Ebert-Stiftung fund in Armenia.

Private sector – includes both supporters and green transition preventers.

Independent experts and civic initiatives, **as well as the Aarhus Centres** – facilitates public participation and can have an important input during consultations. Among them are the national and regional agro-industrial enterprises, advisor companies, etc.

Mining sector – has a significant role in Armenia's Economy. Armenia has joined the Extractive Industries Transparency Initiative (EITI).

3.4.3 Overview of Crosscutting Issues

3.4.3.1 Green transition finances

The measures, which are planned for the biodiversity field, do not currently get enough funding. The SPNAs management and conservation of specially protected areas is significantly dependent on external sources of finance. For instance, the Caucasus Nature Fund is one of the main donors for the SPNAs providing long-term and sustainable funding for operations support, improving management effectiveness and human and technical capacities. It applies the "50 percent principle", the organisation matches but doesn't exceed state budgets. Actually, it can double the operating funds of the selected SPNAs. 1,920,000 EUR was provided by the organisation between 2021-2023 years for the SPNAs in Armenia. In addition, the UNDP has recently initiated the Biodiversity Finance Initiative (BIOFIN) in Armenia, which will support the development of the national biodiversity finance plan.

3.4.3.2 Just transition

One of the most critical components of biodiversity conservation is the active engagement of local communities, NGOs, as well as youth and women, and other stakeholders in the decision-making process. Unfortunately, these stakeholders, particularly those in remote areas, often remain passive during the establishment of new specially protected nature areas or decisions on nature resource management and development. Meanwhile, they have no significant influence on the management of existing SPNAs. SPNAs typically have management councils that could serve as effective platforms for stakeholder involvement. However, these councils are often limited

to representatives of scientific institutions, excluding representatives of local communities and other key groups. Expanding the representation on these councils to include diverse stakeholders would enhance inclusivity and reduce conflicts. There is also an advisory board under the Minister of Environment; however, it remains inactive and lacks specific mechanisms to influence decision-making at the highest level.

3.4.3.3 Digitalisation

Collecting data through various digital tools such as sensors, drones, satellites, cameras, and audio recordings has become a fundamental enabler for environmental monitoring. AI-enabled solutions enhance data processing and management, significantly contributing to biodiversity conservation efforts. The Government of the RA digitalises some processes, e.g. the issuance of hunting permits and licences for the usage of biological resources. Platforms such as the ArmStat Database and EcoPortal.am provide some data on environmental and biodiversity indicators. Increasingly GIS and remote sensing technologies are being used in Armenia to support habitat mapping, biodiversity assessments, and monitoring. Armenia has made significant strides in digitising climate and biodiversity-related data collection and monitoring but major gaps still exist in data integration, management, and technical capabilities. For instance, there is no data collection and management system for biodiversity monitoring (e.g. SMART, unified databases). New edition of the Red Book should have an official online platform.

3.4.3.4 Research, development and innovation (R&I)

In recent years, the Government has drastically increased funding of scientific research, including biodiversity. Currently, the draft of the Law on Higher Education and Science, regulating research and guiding reforms in the field of science, passes through the public hearings. The draft Law on Higher Education and Science considers merging the universities into clusters together with research institutes and later on relocating them to the Academic City.

Meantime, there is no specific state research agenda for biodiversity conservation and restoration. The majority of calls for proposals announced by the Higher Education and Science Committee of Armenia do not address the specific needs of policymaking institutions, and scientists apply for state funding with their own project ideas and proposals. The only targeted grants, which constitute a minor part of state-provided funding, require a letter of support from a state agency interested in the project's results. Therefore, there is a need for an independent evaluation of the biodiversity research agenda and the development of funding calls aimed at solving specific issues. Additionally, an organisation similar to the European Commission's Joint Research Centre could play a crucial role in providing guidance and scientific support for evidence-based policymaking.

3.4.4 EU Approximation – Governance and policy and legislation

3.4.4.1 Overview of EU Biodiversity Strategy for 2030 and Nature Restoration Law

The EU's biodiversity legislative backbones are two Directives and a Regulation. The Birds Directive was the first adopted in the 1979. The directive provides comprehensive protection to all wild bird species. The Habitats Directive was adopted in 1992 and dedicated to conserve biodiversity. More than 1000 species and 200 habitats included in the annexes of the directives are legally protected through the Natura 2000 network (more than 27,000 nature sites). In May 2020, the new EU Biodiversity Strategy 2030 was introduced contributing to the post-2020 global biodiversity agenda and promoting green recovery after Covid-19 pandemic.

The strategic pillars of the document are:

- Legally protect a minimum of 30% of the EU's land area and 30% of the EU's sea area and integrate ecological corridors, as part of a true Trans-European Nature Network,
- Restore significant areas of degraded and carbon-rich ecosystems,
- Unlock at least EUR 20 billion per year for nature
- Lead an ambitious global biodiversity framework under the Convention on Biological Diversity

One of the key components deriving from the Strategy is the EU Nature Restoration Regulation, which intends to restore degraded ecosystems and enhance carbon sequestration. This regulation aims to cover restoration of at least 20% of the EU's land and 20% sea areas by 2030, and all ecosystems by 2050.

3.4.4.2 CEPA and approximation of Armenian biodiversity legislation

The country signed the Comprehensive and Enhanced Partnership Agreement (CEPA)[86] with the European Union that covers environmental issues and is stimulating legislative reform. By signing CEPA, the RA agreed to undertake measures geared towards improved protection and sustainable use of biodiversity. Those, in particular, envisage review and alignment of the national legislation with the EU standards. The alignment of the national legislation directly related to the field of biodiversity with only two EU directives is envisaged due to CEPA: Birds and Habitat Directives. In the field of biodiversity conservation and SPNAs actions were carried out in accordance with the goals and objectives defined by the Biodiversity Strategy and Action Plan during the previous years (2014-2020). New 2030 Strategy concept, guidelines, proposals for legislative reforms and other relevant documents have been drafted within the Twinning project entitled "Strengthened protection and sustainable use of biodiversity in Armenia in line with the European standards". Currently, the Institute of Botany after A. Takhtajyan of the NAS RA with financial support by the EPIU of the MoE revises and aligns the NBSAP with the Kunming-Montreal Global Biodiversity

[86] https://www.mfa.am/filemanager/eu/CEPA_ENG_1.pdf

Framework[87]. The document will comprise of national targets, actions and monitoring indicators in accordance with GBF.

The CEPA emphasises the inclusion in the Appendices to CITES of species which meet the CITES criteria agreed for such inclusion and implementation of effective measures against illegal trade in wildlife products. The requirements of the legislation regarding the CITES convention were analysed by the Secretariat in August 2023 and RA moved from the 3rd to the 2nd category due to legislation reforms, the last update was made in November 2023 (CITES, 2023). There is already a preliminary agreement on the next step: in case all planned legislation improvement activities take place, the transition to the 1st category will be discussed. However, there are no enforcement measures and significant improvements in capacities to tackle illegal wildlife trade.

Further efforts, beyond the scope of CEPA, will be needed to align the country's ecosystem restoration initiatives with the recently adopted EU Nature Restoration Regulation, as well as with Armenia's National Biodiversity Strategy and Action Plan, in line with the 2030 EU Biodiversity Strategy.

3.4.5 What are the main priorities for green transition? (from needs identification)

The priorities for green transition are proposed and inline with EU Biodiversity Strategy, CEPA and the countries commitments to the UN Convention on Biological Diversity in the Table 25.

Table 25. The proposed national priorities for green transition in the field of biodiversity corresponding to the respective EU Biodiversity strategy 2030, the CEPA and Kunming-Montreal GBF goals and targets.

Priorities	Targets of the EU Biodiversity Strategy 2030 and Nature Restoration Regulation	CEPA	Kunming-Montreal GBF goals and targets
Increase the extent of the specially protected nature areas and OECMs (including establishment of the Emerald Network in Armenia) to meet the global target 30x30,	Legally protect a minimum of 30% of the EU's land area and 30% of the EU's sea area and integrate ecological corridors, as part of a true Trans-European Nature Network. Strictly protect at least a third of the EU's protected areas, including all remaining EU	The conservation and sustainable use of biological diversity in natural or agricultural ecosystems, including endangered species, their habitat, specially protected natural areas and genetic diversity.	Goal A, Target 3

[87] https://www.cbd.int/gbf

Priorities	Targets of the EU Biodiversity Strategy 2030 and Nature Restoration Regulation	CEPA	Kunming-Montreal GBF goals and targets
improve ecological connectivity and enhance SPNAs management effectiveness.	primary and old-growth forests.		
Align biodiversity legislation in accordance with the CEPA and enhance law enforcement in specially protected nature areas and forestries.	Effectively manage all protected areas, defining clear conservation objectives and measures, and monitoring them appropriately.	Adopt measures to promote the conservation of forest cover and combat illegal logging and related trade, including with respect to third countries, as appropriate. Take effective measures to monitor and control fishing activities.	Goal A, Target 3
In line with the Armenian NDC to Paris Agreement, restore forest landscapes to 12.9% of the country's territory by 2030.	Legally binding EU Nature Restoration Regulation's target is to restore 20% of the EU's degraded ecosystems by 2030 and all by 2050. Planting at least 3 billion trees across the EU, in line with ecological principles.	The restoration of ecosystems and the elimination or reduction of negative environmental impacts resulting from the use of living and non-living natural resources or of ecosystems.	Goal A, Goal B, Targets 2, 5, 8
Reduce the pollution of Lake Sevan and its inflowing rivers.	Legally binding EU Nature Restoration Law's target is to restore 20% of the EU's degraded ecosystems by 2030 and all by 2050. Reduction of use of fertilisers by at least 20%. The risk and use of chemical pesticides is reduced by 50% and the use of more hazardous pesticides is reduced by 50%. At least 25% of agricultural land is under organic farming management, and the uptake of agro-ecological practices is significantly increased.	Cooperation shall aim at preserving, protecting, improving and rehabilitating the quality of the environment, protecting human health, utilising natural resources in a sustainable manner and promoting measures at international level to address regional or global environmental problems, including in the areas of: water quality and resource management, including flood-risk management, water scarcity and droughts.	Goal A, Target 2, 7,10

Priorities	Targets of the EU Biodiversity Strategy 2030 and Nature Restoration Regulation	CEPA	Kunming-Montreal GBF goals and targets
Improve conservation status of nationally and globally threatened species. Develop and implement special conservation measures for migratory birds.	Habitats and species show no deterioration in conservation trends and status; and at least 30% reach favourable conservation status or at least show a positive trend.	The conservation and sustainable use of biological diversity in natural or agricultural ecosystems, including endangered species, their habitat, specially protected natural areas and genetic diversity.	Goal A, Target 4
Restore free-flowing rivers.	At least 25,000 km of rivers will be restored into free-flowing rivers.	The restoration of ecosystems and the elimination or reduction of negative environmental impacts resulting from the use of living and non-living natural resources or of ecosystems.	Goal A, Goal B, Target 2
Develop the regulatory framework and strengthen law enforcement capacities for the sustainable use, harvesting, and trade of wild plants, fungi and animals.	Habitats and species show no deterioration in conservation trends and status; and at least 30% reach favourable conservation status or at least show a positive trend.	Promote the sustainable use of natural resources and contribute to the conservation of biodiversity when undertaking trade activities. Promote the inclusion in the Appendices to CITES of species which meet the CITES criteria agreed for such inclusion. Adopt and implement effective measures against illegal trade in wildlife products, including CITES protected species, and cooperate in the fight against that illegal trade	Goal A, Goal B, Target 5
Develop national legal and institutional frameworks for the management and control of invasive or potentially invasive species.	There is a 50% reduction in the number of Red List species threatened by invasive alien species.	The conservation and sustainable use of biological diversity in natural or agricultural ecosystems, including endangered species, their habitat, specially protected natural areas and genetic diversity.	Goal A, Target 6

Priorities	Targets of the EU Biodiversity Strategy 2030 and Nature Restoration Regulation	CEPA	Kunming-Montreal GBF goals and targets
Implement the biodiversity inventory and strengthen the biodiversity and ecosystems monitoring framework.	Habitats and species show no deterioration in conservation trends and status; and at least 30% reach favourable conservation status or at least show a positive trend.	The conservation and sustainable use of biological diversity in natural or agricultural ecosystems, including endangered species, their habitat, specially protected natural areas and genetic diversity.	Goal A, Goal B, Goal C, Goal D, Target 20

3.4.6 Readiness for transition

Armenia has made **significant progress** in preparing a comprehensive policy and legislative framework on biodiversity conservation, such as the Strategy and State Programme of Conservation and Use of Specially Protected Areas, the Red Book of Armenia and National Biodiversity Strategy and Action Plan (NBSAP).

Although there is **some progress** in the implementation of policies and legislation, as well as institutional and non-institutional capacity, in terms of alignment with the EU Bird and Habitat Directives, there has been **little progress**. The country has established an Eco-patrol service.

Armenia has made **significant progress on research and innovation in this sector, but biodiversity inventory and monitoring,** crucial for evidence-based decision-making and effective conservation management, is still not properly structured and harmonised.

Ecosystem restoration, and particularly forest landscape restoration, considering the commitment under the Paris Agreement to restore 12.9% of the country's territory (approximately 50,000 hectares) is an ambitious goal. However, the current level of forest restoration and tree planting efforts remains insufficient to meet these targets. The GHG inventory has also shown that the LULUCF sector's ability to act as a net carbon sink has been largely reduced making this target even more ambitious.

Although the authorized body and its organisations have sufficient power under national legislation, the crucial role of biodiversity and ecosystem services in human wellbeing, urban development, and other sectors remains undervalued. According to the State budget, **limited financial resources** are available to address nature conservation and biodiversity contributing to **noticeable progress**.

Assessment of this sector shows that there is **some progress overall**, but with a potential to reach significant progress in closer alignment with the EU Directives and further strengthening

of institutional and non-institutional capacities, stronger enforcement and dedicated biodiversity funding. Armenia's hosting of COP17 under the Convention on Biological Diversity in 2025 has potential to provide additional impetus to accelerate progress in the sector.

Table 26. Transition readiness summary

Thematic area / Gap, needs enabling conditions area	Policy and legal framework	EU approximation	Policy implementation	Institutional Capacity	Non-institutional and private capacity	Research and Innovation	Financial	Just transition
Biodiversity	**Significant progress**	**Little progress**	**Some progress**	**Some progress**	**Some progress**	**Significant progress**	**Some progress**	**Little progress**

3.5 Energy

3.5.1 Status and Trends

In 2021, Armenia produced 7.7 TWh of electricity, of which natural gas covered 44% (3.4 TWh), hydro and other renewables 30% (2.3 TWh) and nuclear 26% (2.0 TWh).[88] Approximately 86% of natural gas is imported from Russia and the remainder from Iran. Russia also supplies nuclear fuel. Overall, Armenia is importing 76% of all total primary sources, and 94% including enriched uranium to fuel the Armenian Nuclear Power Plant, however Armenia views nuclear power as semi-indigenous.[89] To guide Armenia's energy future, the recently approved Energy Sector Development Strategy (through 2040) focuses on increased renewables (solar and wind development and upgrading hydro) while also extending the life of the nuclear plant and constructing a new one to replace it, energy efficiency, increasing power transmission links with Georgia and Iran, and continued liberalisation of the electricity market (launched in 2022).

Armenia's electricity and natural gas systems power the nation's industry, public services (e.g., hospitals, schools), transportation and homes. Inefficient, expensive and disrupted services, as well as the absence of service, are a major constraint to national growth and resilience. Both electric and natural gas systems are vulnerable to natural shocks; earthquakes damage electricity and gas infrastructure; flooding can breach dams at hydroelectric plants; increased temperatures can cause demand to exceed supply and lead to power shortages during peak times. Full dependence on fossil fuel imports and externally-held control of critical infrastructure cause technical, economic and political vulnerabilities and are anticipated to increase. Serious cyber attacks have also been reported by Azeri and Russian hackers. Furthermore, the energy system

[88] IEA 2021 Energy Balance for Republic of Armenia

[89] Source: IEAI. Available at https://www-pub.iaea.org/MTCD/Publications/PDF/te_1404_web.pdf

also poses risks to Armenian natural resources (e.g., small hydroelectric dams reduce water availability for irrigation and harm river ecosystems and fish populations), the general population (e.g., nuclear power plant radioactive waste or water discharge) and contributes 66.7% of national greenhouse gas emissions which contribute to climate change. Making the energy system more efficient, import-independent and climate smart will entail making it more efficient and resilient to shocks while also reducing its carbon footprint and making it more environmentally friendly. Energy system developments also have the potential to increase energy security and reduce dependence on malign actors.

The above poses certain challenges:

Geopolitical challenges: The long-standing conflict over Nagorno-Karabakh has led to closed borders between Armenia and Azerbaijan, as well as with Turkey (which supports Azerbaijan). Geographic isolation and exclusion from major energy pipelines limits Armenia's access to diversified energy imports and export routes, thereby reducing energy security. Armenia relies on a few trade routes via Georgia and Iran, making its energy sector vulnerable to geopolitical disruptions and supply chain issues. The volatility of the region and proximity to the conflict zone also creates implied risks to foreign direct investments, limiting access to capital.

Energy security challenges: With the exception of a small barter of electricity with natural gas with the Islamic Republic of Iran, all of the natural gas comes through one pipe via Georgia from Russia. Nuclear fuel is also a supplier with Russia. Any disruption in these supply chains could lead to energy shortages. In addition, many of the energy sector assets (thermal power plant, hydro-power cascade, electric networks, gas utility, etc.) are owned by Russian-backed capital.

Environmental hazards (climate change): in addition to the well-known seismic risks, especially around the Metsamor nuclear power plant, climate hazards expose energy assets to reduced precipitation (hydro), increased temperatures (infrastructure), mudflows and landslides.

Low efficiency of end use: Private and public buildings represent the largest energy-consuming sector with nearly 40% of total electricity demand and over 25% of its gas demand; the residential sub-sector, alongside transport, consistently holds the lion's share of Armenia's total final energy consumption (TFC).

3.5.2 The main enabling conditions, needs and gaps (constraints)

Main Enabling Conditions

Armenia is one of the few post-Soviet countries that has successfully overcome the energy crisis triggered by the collapse of the Soviet Union and the energy blockade in the 1990s, and emerged to have a stronger, more viable power system. The subsidies were predominantly eliminated, tariff-setting regulations transitioned to cost-recovery, market-principles, and assets opened to private sector participation. While this opened the door to Russian ownership in previously public energy

assets, it also enabled energy entities to operate on a commercial basis, attracted foreign direct investment, enabling investment in critical energy infrastructure. This has improved Armenia's preparation for shocks and stressors.

Armenia is abundantly endowed with renewable energy resources with over 1750 kW/m2.year of annual horizontal solar insolation, as well as proven wind and geothermal resources. The licensing and net metering schemes for independent solar producers led to nearly 300 MW of distributed solar PV systems in less than 10 years.

The country inherited massive large hydro-power capacity from the Soviet era, supplying nearly 1/3 of electricity, while also succeeding to promote nearly 200 small hydro power plant (HPP) construction purely through elaborating a favourable regulatory framework. The operation of hydro-power plants has been with grave environmental consequences (limited enforcement of environmental flow, fish passes) as well as lack of proper maintenance of existing HPP equipment installed over the past 20 years, leading to inefficient utilisation of the occupied hydro potential.

These existing renewable resources provide nearly 30% for electricity production, which allowed at least a few hours of electricity supply during the energy blockade of the 90s.

Considering the uncertain prospects of nuclear energy beyond 2036, supply security concerns for natural gas, limited electricity export prospects, while the solar and wind potential still have substantial development potential, the Armenian energy sector is in urgent need for developing storage potential, including both battery and green hydrogen for energy storage.

The Armenian Government actors have historically been quite receptive to reform and constructive dialogue with external actors, donors, private actors, civil society organisations. The privatisation, tariff reform, transposition of international best practices in many niches of energy sector policy allowed significant progress in building a level playing field for market actors and creating incentives for private investments. This reform agenda, largely supported by USAID, has enabled Armenia to make rapid strides towards improving electricity sector infrastructure and thus increasing preparedness for shocks and stressors.

Armenia's status as a signatory of the Paris Agreement on Climate Change, submitted and updated Nationally Determined Contributions (NDC) and recently adopted Low Emission Development Strategy (LEDS) enable access to climate finance.

Armenia imported over 12,000 electric vehicles in the past 5-6 years which can also offer electricity storage capacity, with continued tax waivers contributing to further import of EVs. This increases availability of power during shocks and stressors.

Electric market liberalisation allows to minimise the burden of long-term power purchase agreements on the state, creating more market-based motivation for new power capacity developers, which lead to unexpected new trade deals between Armenian and Georgian businesses, expanding the electricity exports to unprecedented levels in 2023.

Public Institutional Capacity Gaps for Enabling Readiness

Armenia's energy sector is supported by the Ministry of Territorial Administration and Infrastructure (MTAI), with the separate Ministry of Energy having ceased after merger with MTAI, leaving the key responsible government agency significantly understaffed for properly addressing the policy needs of the sector. Regulatory functions are performed by the Public Services Regulatory Commission (PSRC), which has succeeded in creating a framework of licensing regulations and feed-in tariffs, leading to massive development of small (under 30MW) hydro-power plants (HPP) and independent power producers up to 150kW. The MTAI substantially relies on the Renewable Resources and Energy Efficiency (R2E2) Fund, which was established with Government participation and, despite non-profit foundation status, actively performs energy agency functions, and serves as the one-stop-shop for many donor- and IFI-funded programmes in energy efficiency (EE) and renewable energy (RE) projects. The Scientific Research Institute of Energy (SRIE) is MTAI's closed joint stock company that, while quite underfunded, supports the ministry with technical R&D tasks. However, other organisations are funded by donors to conduct research.

Armenia's government is actively working on the robust implementation of recently adopted laws in the buildings sector[90]. MTAI oversees Armenia's adherence to the EPBD under the EU-Armenia CEPA agreement. MTAI collaborates with the State Urban Development Committee on the directive's transposition, building codes, and housing policy. Other ministries, including Environment, Economy, and Finance, offer necessary support for building efficiency implementation or policy. Additionally, the Statistical Committee of the Republic of Armenia (ArmStat) serves as a vital source for energy statistics and activity data required for assessing greenhouse gas emissions in Armenia's UNFCCC reporting.

The administrative reform of 2019, including the merger of the Ministry of Energy into the Ministry of Territorial Administration and Infrastructure (MTAI), has, however, raised concerns about reduced administrative capacity to support energy efficiency, renewable energy policies and measures, along with nuclear energy and electricity market development agenda. The downgrade of the Ministry of Urban Development to State Committee status, responsible for key energy efficiency measures in existing buildings and technical standardisation, adds another layer to these capacity challenges. High velocity of change of staff in the ministries continuously resets any built momentum on the reform agenda, which may hamper the CEPA transposition and approximation agenda.

Armenia does not have a dedicated energy agency to coordinate energy efficiency policy development and implementation across ministries and departments. Compounding capacity challenges are energy end-use data quality and availability issues that impact policy formulation, implementation and monitoring. The Government has relied on donor agencies' technical assistance substantially to promote energy policy reform and CEPA transposition agenda. One of the largest supporters was the U.S. Agency for International Development (AID), which, through its various programmes has supported the electric market reform, which is still in early stages

[90] In-Depth Review of the Energy Efficiency Policy of Armenia, Energy Charter, 2017

of market opening, drafting of the new Laws on Electricity, and Renewable Energy and Energy Efficiency, development of the 4th National Energy Efficiency Action Plan, and other elements of the legal-regulatory reform aimed at supporting transposition of the EU energy acquis, in support of the MTAI.

Furthermore, the local government amalgamation with rural communities being merged with the neighbouring larger towns has created substantial institutional disruptions among the municipal government, loss of archives and continuity of institutional memory.

This is further complicated by the lack of digitalisation of energy-related data on the end-use level in all sectors, which limits the possibilities for sectoral analysis, modelling, and forecasting of energy demand, hence optimisation of supply options.

Non-Institutional Capacity Gaps: Technical and Infrastructure Capacities, Green Skills and Stakeholder Capacities

- The Government of Armenia lacks the institutional capacity, including sufficient government personnel of respective qualifications related to development and enforcement of national policies and strategies, laws and bylaws regulating the most urgent areas of energy sector security, low-carbon development and resilience, such as renewable energy, energy efficiency, storage, electric market, international trade, etc.
- Within the public government as well as in the private and civil society sectors there is a pronounced lack of green skills development and awareness relevant to sustainable energy. Efforts to finalise regulatory frameworks for renewable energy and energy efficiency, coupled with educational initiatives by institutions like the National Polytechnic University, underscore the growing demand for specialised professionals. However, challenges, such as a shortage of skilled workers in the labour market, particularly in the policy development, legal framework, design and installation of renewable energy systems, point to the evolving nature of the energy market and the urgent need for workforce development.

Cross-Cutting: Financing Mechanisms for Energy Efficiency

Energy efficiency financing mechanisms are different for different sectors and groups. More specifically:

- Energy efficiency financing based on grants and loans from IFI is not targeting the buildings sector, despite the fact that the buildings sector is the second biggest emitter of GHG.
- Funding for energy efficiency improvements primarily relies on grants and loans from International Financial Institutions (IFIs) and international organisations. Although energy is an important priority for the government, there is limited state funding for research, development, and innovation in the energy sector.

- Public buildings use state budget direct financing in terms of capital expenditure, financing through the grant or loan provided by donors or IFIs under the sovereign guarantee. In some cases, their own funds are sufficient for low-cost measures.
- Municipalities also use their budget, grants from donors and charity foundations or special purpose funding from the GoA. The decades of energy efficiency market development efforts by donors and IFIs have led to initial opening of the energy performance contracting and commercial financing of energy efficiency, which was later distorted by three years of state subventions assigned without comprehensive eligibility screening or evaluation. As a result, the energy saving agreements by R2E2 or lending by NEFCO have been jeopardised.
- The residential EE financing is limited to the commercial banks' consumer lending for domestic appliances, solar energy solutions, as well as for EE renovation of apartments. There are no specific credit lines designed for EE measures in multi-apartment buildings as a whole.
- Private sector, especially large companies having a sound credit history normally use commercial credits to finance their investments. Actually, almost all investments in technology may result in EE improvement due to the upgrade of technology.
- SMEs are more vulnerable in terms of creditworthiness, and therefore special facilities are provided by IFIs to improve SMEs' energy performance. More than 8 banks are currently involved in the lending activities for EE in SMEs. The Renewable Resources and Energy Efficiency Fund (R2E2) is supporting those banks by technical review of applications and identification of savings in the proposed measures.

Financing of energy efficiency activities in Armenia is in the portfolio of almost all IFIs and development partners, through initiatives comprising both investments support as well as technical assistance to create an enabling environment covering legal-regulatory, institutional, capacity building, resource assessment, technical-technological aspects, etc.

It is expected that in order to comply with provisions of CEPA, particularly the transposition of the EU directives and other regulatory framework into national legislation, there will be a need for broader support from the donor community to support the smooth process of transposition. In its turn, the EU regulations will stimulate demand for energy efficiency investments and need for more funding sources, including IFI facilities.

Overall initiatives totalling over 2 billion EUR covering demand as well as supply side have been mapped – including both ongoing activities and also initiatives that are in advanced stages of design – allocated into the following categories (see Table 27).[91]

[91] Note, for the ease of comparison, all donor and IFI funds are presented in rounded up Euro equivalents, calculated at $1.13 = EUR 1 based on oanda.com

Table 27. Key target groups and actions for energy efficiency and renewable energy investments

Sector	Key target groups/actions
Energy efficiency retrofits in public buildings	kindergartens, polyclinics, administrative buildings, other public buildings with or without capital repair and seismic reinforcement of buildings
Residential buildings	Residential multi-apartment buildings and individual houses
Integration of RES in energy efficiency projects	including rooftop PV, solar water heating, heat pumps, etc. both in public and private sectors
Retrofitting of street-lighting systems	with or without integration of safety upgrades, replacement of polls and luminaries, underground wiring
Energy efficiency retrofits of SME industrial facilities	including heating system upgrades, insulation of walls and roofs, lighting retrofits, process upgrades (refrigeration, compressed air), company vehicle upgrades
Investments in Energy Infrastructure	Including development/Improvements in existing power plants, digitalisation support, ability to integrate in regional markets.

Nearly 80 % of all lending continues to target energy infrastructure, in most cases with associated loss reduction and efficiency improvements on the supply side. The remaining funds target demand-side improvements in the public buildings, individual households, SMEs and industry, mixed credit lines for EE in households and SMEs. Multi-apartment buildings, being responsible for 30% of the total energy end use but hold untapped energy savings potential of nearly 50% of the total, are assigned less than 1% of the overall funds in this market.

3.5.3 EU Approximation – Governance and policy and legislation

Comprehensive and Enhanced Partnership Assessment

Armenia actively participates in joint efforts to create a climate neutral European continent aligned with the objectives of the Paris Agreement, UN Sustainable Development Goals 2030, and the EU-Armenia Comprehensive and Enhanced Partnership Agreement (CEPA).

Under the CEPA, Armenia is committed to ensuring, among other measures, environmental protection, transboundary cooperation, and the implementation of multilateral international agreements. This commitment extends to various strategies and action plans emphasising a green economy and ecosystem-based approaches to mitigation and adaptation.

Armenia also developed the National Framework Strategy on Adaptation to Climate Change Impacts for 2021-2030 (National Adaptation Plan, NAP) and the action plan for 2021-2025. The priority directions for adaptation are natural ecosystems, human health, water, agriculture, energy, tourism, and human settlements and infrastructure.

In the context of the Comprehensive and Enlarged Partnership Agreement (CEPA) between the European Union (EU) and Armenia, the policy elements that streamline with climate change mitigation are focusing on the energy sector, particularly on renewable energy, energy security, and nuclear energy as outlined in Articles 42, 44, and 58. These articles set out goals for enhancing the sustainability, safety, and security of Armenia's energy systems. It is noteworthy, that with the emerging climate risks, Armenia gradually places a stronger emphasis on adaptation in addition to mitigation, since green and sustainable economic transition is impossible without the security and resilience of the energy sector, which embraces broader concepts of energy infrastructures, regional energy markets, securities of external supply and trade.

As per CEPA, Chapter 2 Article 42 emphasises cooperation in energy efficiency and the development of renewable energy, with the aim of reducing Armenia's reliance on imported fossil fuels. Article 44 discusses improving energy security through diversification, better grid management, and energy efficiency measures. Article 58, related to nuclear safety, outlines Armenia's obligations in managing its nuclear power responsibly, especially regarding the aging Metsamor Nuclear Power Plant, a central yet controversial element in the nation's energy mix, which however offers transitional alternatives on the pathway to decarbonisation.

The EU is closely monitoring how effectively these energy policies are being implemented, with specific attention to the transition to renewable energy sources, energy security, and nuclear safety. These aspects are critical not only for meeting Armenia's energy needs but also for aligning its energy policies with EU standards, thereby fostering greater cooperation and integration with European energy markets. Unfortunately, the CEPA Implementation Roadmap does not adequately address the energy sector transposition needs. Furthermore, the Government counterparts also focus predominantly on transposition, however, little to no attention is being given to approximation. For example, in transposition of the energy acquis the concept of "energy poverty", which is central to the latest Energy Efficiency Directive (EED) and Energy Performance in Buildings Directive (EPBD) recasts, is still not formulated in the national policy, neither it is planned to be included in the pending package of legal amendments, which have the sole purpose of executing CEPA obligations. Hence, in the indicators for tracking (below), I will not only include those, related to the versions of the directives specified in the CEPA, but also the latest recasts of the EED, EPBD and Renewable Energy Directive (RED).

Renewable Energy Development: Armenia has significant potential for energy efficiency as well as solar energy, given its geographical location and abundant sunshine. However, progress has been slow, and there are challenges in terms of infrastructure and investment. Monitoring the effectiveness of policies promoting renewables is essential, as outlined in Article 42 and Annex 2 of CEPA.

Energy Efficiency: While the government has made strides in promoting energy efficiency and renewable energy, significant challenges remain, including limited financing, underdeveloped infrastructure, and regulatory hurdles. The shift toward renewables is essential for reducing dependence on imported gas, but progress has been slower than anticipated, primarily due to insufficient incentives and investments. The achievements since 2021 will be documented,

including opening of the electricity market, development of provisions for energy communities, optimisation of net metering regulations, etc. The new draft Law on Electricity provides a number of new regulations on grid-interconnections, ownership transfers, settlement and compensation schemes to further progress electricity market liberalisation and energy trade. The amendments pending to the Law on Energy Saving and Renewable Energy, which essentially represent a new Law on Renewable Energy and Energy Efficiency also bring in elements of transposition with EED and EPBD. The report examines the progress of implementation under the 3rd NEEAP (2022-2024) and proposals for the 4th NEEAP (2025-2027), as stipulated by EED, as well as efforts in building renovation, as stipulated by EPBD. Some regulatory provisions covered will include the Technical regulation on Energy Efficiency in Buildings, norms setting minimum requirements for building energy performance, lighting efficiencies, etc.

The MTAI, in cooperation with the USAID Energy Secure Armenia, was working on draft RA Law on "Renewable energy and energy efficiency" which is intended to amend the acting Law on Energy Saving and Renewable Energy, enabling the implementation of the regulations defined by the EU Renewable Energy Directive 2009/28/EC (RED I), Renewable Energy Directive (EU) 2018/2001 (RED II) and Energy Efficiency Directive 2012/27/EU (EE Directive), This will enable the approximation of the Armenian RES and EE-related legislation to the specified EU directives, considering that legislative approximation to the EU directives implies reflection of the stipulated provisions in the primary national legislative instrument regulating the relevant sphere.

- Considering that the RA Law on "Energy Saving and Renewable Energy" adopted in 2004 and currently in force (hereinafter referred to as the current law) does not reflect the current EU RES and EE developments and the requirements established by the said EU directives, it is planned to repeal the current law, following the adoption of the Draft law. Some of the new provisions introduced by this new law include:
- Establishing the mandate for development and implementation of national RES and EE policies, and designated key responsible authority and EE/RE Agency
- Introduction of an EE obligation scheme and a market for the provision of energy services
- Promoting the implementation of RES and EE measures in buildings and structures
- RES and EE implementation in heating, cooling and transport sectors
- Implementation of market-based RES support schemes
- Improving the energy audit process
- Facilitation of the process of obtaining RES-related consents, permits and documents
- Regulatory framework for energy storage
- Reforms in autonomous energy production
- Implementation of the guarantee of origin system
- Establishing RES and EE Fund
- Setting requirement for introduction of a long-term Energy and Climate Program
- Implementation of the mechanism for RES share calculation
- Implementation of a RES and EE National Information System
- Implementation of clear accountability mechanisms

The finalisation of the draft Law is pending in September 2025. The transposition does not address development of a Long-Term Building Energy Renovation Strategy. It is important to note that the stopping of USAID operations by the US Government from January 2025 will have a significant impact on the above process. The USAID technical assistance was instrumental to the MTAI policy reform efforts, and was critical for supplementing the institutional capacity needs of the Ministry.

Energy Security and Grid Modernisation: Armenia is diversifying its energy sources and improving the resilience of its energy grid. With a heavy reliance on imported natural gas from Russia and an aging nuclear plant, Armenia faces significant energy security challenges. Article 44 calls for better energy efficiency and diversified energy sources, making this a crucial focus. Armenia's reliance on Russian gas and the vulnerability of its single pipeline route through Georgia pose significant risks. Efforts to diversify energy sources, including potential partnerships with Iran and further development of renewables, are critical but face political and economic barriers. The government's Grid Modernisation Roadmap (Electricity System Transmission Network Ten-Year Development Plan. 2023–2032), Least Cost Energy Development Plan: 2020-2036, Energy Sector Development Strategy up to 2040 and other documents. aimed to enhance resilience, but implementation is hampered by outdated infrastructure and limited technical expertise.

Nuclear Energy and Safety: Nuclear energy is a transitional low-carbon, green energy for Armenia. Metsamor Nuclear Power Plant, while supplying a significant portion of Armenia's electricity, poses safety risks due to its outdated infrastructure and location in a seismic zone. Article 58 of CEPA underlines the need for enhanced safety standards and international cooperation in nuclear energy. The EU has urged Armenia to close the plant due to safety concerns, but Armenia continues to rely on it for a significant portion of its electricity. Although modernisation efforts have improved safety measures, the long-term viability of the plant remains in question. The challenge is balancing the need for reliable energy with international safety standards. The Armenian government has held bilateral discussions with various countries on potential utilisation of Small and micro reactors (SMR) after the 2036 decommissioning of the Metsamor Nuclear Power Plant, however no formal decision or commitment has been made to any technology vendor, particularly given the limited maturity of the technology, lack of successful on-land, civilian applications, absence of Margate-licensed technology as well as viable nuclear fuel supply alternatives.

3.5.4 Priorities for green transition

The key risks of not achieving green transition are related to the key policies, investments and capacities critical to implementation of adopted and pending plans, including the following:

- Continued deterioration of institutional capacities in public government leading to lingering delays in adoption and enforcement of energy sector policies, including those related to renewable energy, energy efficiency, regional energy markets, and other elements related to CEPA
- Potential risks related to the construction of the replacement nuclear reactor, which currently has no comparable power generation capacity alternatives, beyond 2036-2040, which is the indicated decommissioning timeline.

- Failure to integrate in regional energy markets, which is instrumental for the development of renewable energy potential and technical possibilities for evacuating peak power generated by growing solar power systems, as well as any envisioned wind capacities.
- With the pronounced brain drain from the energy and engineering professions to the IT sector, and the failure on behalf of the academic community to generate additional cadre, will gradually aggravate the gaps in technical and institutional capacities in the energy sector for policy, research, administration, etc.

Identification of the priorities for Energy

The priority needs according to the expert assessment.

- Enhance the institutional capacities and awareness raising efforts to enhance the enforcement of adopted regulatory framework as well as continue legal and institutional reforms to guarantee the efficient implementation and enforcement of recently introduced regulations. This includes ongoing efforts to transpose relevant EU legal frameworks into Armenia's national legislation, primarily under the framework of the CEPA and more broadly under the EGD. Moreover, institutional reforms are essential to strengthen the capacity of regulatory bodies and government agencies tasked with overseeing the energy sector.
- To ensure proper implementation of the concluded and pending reform, there is need for not only transposition but also approximation and alignment with the key principles on both primary and secondary legislation level, ensuring the efficient implementation and enforcement of legislation promoting investment in power transmission infrastructure to enhance energy transmission efficiency and reliability and to support the spread of renewable energy. This may include upgrading current transmission lines, establishing new transmission corridors and integration into regional energy markets, developing energy storage systems, and implementing smart grid technologies to improve grid management and mitigate transmission losses.
- Strategic planning of investments based on cost-effectiveness, particularly in projects aimed at demand-side energy management, such as energy conservation and energy efficiency. While donor support plays a significant role in energy-related research, the absence of a dependable baseline of government funding remains a challenge.
- Investing in capacity building efforts is essential to compensate the reduction in staff and expertise caused by the merger and downgrading of ministries, ensuring that adequate resources, authority, and support are provided to these entities to effectively fulfil their responsibilities in promoting sustainable energy practices. Additionally, establishing mechanisms for inter-ministerial coordination is critical to facilitate collaboration and consistency in energy efficiency and renewable energy policies.
- Capacity Building and analytic support for integrating energy efficiency and renewable energy considerations into the mandates and activities of relevant government agencies cross-cutting with the energy sector, including economy, environment, urban development. This includes incorporating energy efficiency measures into urban planning and development policies, infrastructure projects, and building codes, despite the absence of a dedicated energy agency.

- Enhanced strategic focus on untapped sectors with significant potential for enhanced energy security, including biofuels, hydrogen and battery storage, through development of business schemes, tariff incentives and piloting to create incentives for private sector investments.
- Implementation of plans outlined in the Energy Sector Development Strategy 2040 for capacity expansion in transmission lines, particularly focusing on the Armenia-Iran connection, involves upgrading existing transmission infrastructure and constructing new lines to facilitate the integration of renewable energy sources like solar energy into the grid. Addressing the need for energy storage battery systems requires investment in the development of solutions such as battery storage systems, pumped hydro storage, or emerging technologies like hydrogen storage to mitigate intermittency issues associated with solar energy and enhance grid stability.
- Collaboration with educational institutions, including the National Polytechnic University, is necessary to enhance curricula by incorporating courses tailored to renewable energy technologies, including solar energy system design and installation. Furthermore, developing vocational training programmes targeting green skills for individuals interested in practical skills development for jobs in the renewable energy and energy efficiency sector is essential, offering hands-on training and certification opportunities through technical schools or vocational training.

3.5.5 Readiness for transition

Table 28. Transition readiness summary

Thematic area / Gap, needs enabling conditions area	Policy and legal framework	EU approximation	Policy implementation	Institutional Capacity	Non-institutional and private capacity	Research and Innovation	Financial	Just transition
Energy Infrastructure	Significant progress	Some progress	Some progress	Little progress	Little progress	Some progress	Some progress	Little progress
Energy Efficiency	Significant progress	Some progress	Some progress	Little progress	Little progress	Little progress	Some progress	Little progress
Renewable Energy	Significant progress	Some progress	Significant progress	Little progress	Some progress	Little progress	Significant progress	Little progress
Energy Security	Some progress	Little progress	Little progress	Little progress	Little progress	Little progress	Little progress	Little progress
Internal Markets	Significant progress	Significant progress	Some progress	Some progress	Little progress	Little progress	Little progress	Little progress

3.6 Buildings and Renovation

In Europe buildings are the single largest energy consumer, using about 40% of total energy consumed and creating 36% of European greenhouse gas emissions (GHG). This is a result of the fact that most buildings in Europe (and the GUMA countries) are not energy efficient and are still mostly supplied by fossil fuels. At the same time, due to the labour-intensive nature of the construction sector, the buildings sector can be an economic driver – employing the domestic workforce by implementing energy efficiency and renewable energy measures on the energy supply (generation and distribution of thermal heat and cooling) and energy demand side (lowering the required energy demand of a building to meet the living and/or working comfort and standards) of buildings.

Thus, renovating both public and private buildings is an essential action and has been singled out in the European Green Deal (EGD) as a key initiative to drive energy efficiency in the sector and deliver on its key objective – *renovating the building stock will improve energy efficiency while driving the clean energy transition (decarbonise the building stock by 2050)*.

The European Union's (EU's) recent recast Energy Efficiency Directive (EED) (EU/2023/1791) and the Energy Performance of Buildings Directive (EPBD) (EU/2024/1275) are central to the EU's strategy for reducing greenhouse gas (GHG) emissions, improving energy efficiency (EE), and promoting sustainable growth across member states. The buildings sector is the cornerstone of the EED and EPBD—both are part of the EU's broader 'Fit for 55' and Green Deal initiatives aimed at achieving climate neutrality by 2050. The EED recast in 2023 (due for transposition by October 2025) sets a legally binding target for the EU to reduce final energy consumption by 11.7 percent by 2030 compared to 2020 levels with stronger measures to promote energy savings in buildings, while it mandates the public sector to reduce energy consumption by 1.9 percent annually, establishing the EE1st principle. The EPBD recast in 2024 (due for transposition by May 2026) focuses on achieving a decarbonised and ZEB stock by 2050 through National Building Renovation Plans, introduces minimum energy performance standards for buildings and digitalisation of building energy performance certificates and building renovation passports, mandates that all new buildings must be zero emission by 2030, and promotes the renovation of the worst-performing buildings and mitigation of energy poverty.

These directives set ambitious targets and policies aimed at enhancing the energy performance of buildings, supporting vulnerable households, and transforming energy markets. For instance, the effective implementation of the 'Energy Efficiency First' (EE1st) principle and the increased EE target by 2030 are likely to significantly enhance the energy performance of buildings across these countries, leading to broad and lasting improvements in energy consumption patterns. Furthermore, the combined effect of innovative financial instruments, energy-saving obligations, and enhanced access to financing is expected to drive the rate of building renovations, ensuring that a larger portion of the building stock undergoes EE upgrades.

With the new recast directive, the Long-term Renovation Strategies will be properly updated into the National Building Renovation Plan, introducing a template and roadmap with nationally established targets and measurable progress indicators. The plan will focus and prioritise worst-performing buildings used for residential purposes, aiming to reduce the average primary energy use of residential buildings by 16 percent by 2030 and 20–22 percent by 2035

Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU (recast) defines energy poverty within the context of ensuring fair access to essential energy services. It requires member states to address the needs of vulnerable customers and those affected by energy poverty, ensuring that all households can afford necessary energy services such as heating, cooling, lighting, and powering appliances, which are critical for maintaining a decent standard of living and health.

Directive (EU) 2019, /944 requires defining the concept of vulnerable customers in national context and including energy poverty within this definition, assess the extent of energy poverty, establish policies and measures to reduce it, and integrate these efforts into their National Energy and Climate Plans (NECPs). This includes setting an indicative national target for reducing energy poverty where a significant number of households are affected. Directive (EU) 2023/1791 on energy efficiency (EED) and amending Regulation (EU) 2023/955 (recast) identifies energy poverty as a condition where households are unable to access essential energy services required for a decent standard of living and health, such as adequate warmth, cooling, lighting, and energy to power appliances. The provisions in this directive emphasise prioritising energy efficiency and building renovation measures for energy-poor groups and other vulnerable populations.

The Commission Recommendation (EU) 2020/1563 provides further guidance on identifying and addressing energy poverty. It introduces 13 indicators that member states can use to recognise energy poverty in their context, such as the inability to keep homes adequately warm, and encourages the use of alternative data sets to reflect local realities. The updated EED mandates that member states prioritise energy efficiency measures for people affected by energy poverty, vulnerable customers, low-income households, and those living in social housing (see more on energy poverty in Box 1 below).

Box 1. Tackling energy poverty in the context of EU energy policies

Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU (recast) defines energy poverty within the context of ensuring fair access to essential energy services. It requires member states to address the needs of vulnerable customers and those affected by energy poverty, ensuring that all households can afford necessary energy services such as heating, cooling, lighting, and powering appliances, which are critical for maintaining a decent standard of living and health. Article 28 requires defining the concept of vulnerable customers in their national context and may include energy poverty within this definition, as well as assess

the extent of energy poverty, establish policies and measures to reduce it, and integrate these efforts into their National Energy and Climate Plans (NECPs). This includes setting an indicative national target for reducing energy poverty where a significant number of households are affected.
Directive (EU) 2023/1791 of the European Parliament and of the Council of 13 September 2023 on energy efficiency (EED) and amending Regulation (EU) 2023/955 (recast) identifies energy poverty as a condition where *households are unable to access essential energy services required for a decent standard of living and health, such as adequate warmth, cooling, lighting, and energy to power appliances.* The provisions in this directive emphasise prioritising energy efficiency and building renovation measures for energy-poor groups and other vulnerable populations.
The Commission Recommendation (EU) 2020/1563 provides further guidance on identifying and addressing energy poverty. It introduces 13 indicators that member states can use to recognise energy poverty in their context, such as the inability to keep homes adequately warm, and encourages the use of alternative data sets to reflect local realities.
The updated EED mandates that member states prioritise energy efficiency measures for people affected by energy poverty, vulnerable customers, low-income households, and those living in social housing.

Although the building sector might be seen as least complex to apply tangible measures and actions, from a policy perspective it is one of the most complex to decarbonise as it is right at the intersection of energy, climate, environmental, financial, and social (poor households, energy poverty and a just transition) policies. Therefore, given the significance of the buildings sector in Armenia (the residential sector contributing to 36% of the total final energy consumption), the key objective of the *Building & Renovation* thematic area within the GUMA project is to define the right sector's pathway towards its overall climate neutrality by 2050; resulting in:

- nearly zero energy demand of buildings (i.e. very low energy performance/characteristics indicator of buildings – "kWh/m^2 annually"),
- increased country's security of energy supply by lowering the overall energy demand of buildings (and increased resilience towards increased energy prices) including the Exemplary role of public buildings and developing digital building registry,
- the creation of green-jobs/employment opportunities which a systematic renovation of buildings is enabling within a country.
- Tariff reform to encourage demand-side management
- ESCO framework

Therefore, an assessment of the current green transition status of Armenia's Buildings & Renovation sector that are hindering the country from better alignment with the EU Green Deal framework will be analysed taking into account building stock and current building's energy characteristics, construction and retrofitting standards and policy frameworks, renovation and Retrofitting plans and targets, financial incentives and support, promotion of electromobility, energy poverty and living standards, key stakeholders / contributors to building and renovation sector and workforce development (market's absorption capacity to implement technologies leading towards nearly zero energy buildings).

The adoption of the EE1st principle as a legally binding requirement underscores its importance in all energy-related decisions and investments. Member states must now integrate this principle into national policies and planning processes. While this is a step forward in prioritising energy efficiency, the readiness to enforce this principle uniformly across all sectors remains inconsistent.

This obligation is coupled with requirements for EU countries to develop and ensure the application of cost-benefit assessment methodologies that include proper assessment of the wider benefits of EE solutions from a societal perspective, identify an entity responsible for monitoring the application of the principle, and report to the European Commission (EC) on how the principle is applied. Armenia's 2nd NEEAP aimed at 1% energy saving per year compared to the baseline total energy supply, but the following NEEAPs did not adequately quantify the commitment.

The EE directive sets an ambitious target of an additional 11.7 percent collective reduction in final energy consumption by 2030. Under the updated rules, EU countries have agreed to help achieve the EU target by setting indicative national contributions[92] using a combination of objective criteria which reflect national circumstances (energy intensity, gross domestic product [GDP] per capita, energy-saving potential, and earlier efforts for energy efficiency by EU countries). The directive also includes an enhanced 'gap-filling mechanism' that will be triggered if countries fall behind in delivering their national contributions.

This target necessitates substantial policy measures and investment from member states, as for Armenia the CEPA transposition requirements do not detail the EE1st principle in application.

Furthermore, the 2024 recast EPBD introduces a new definition of 'zero emissions building'. This is to be understood as a building with high energy performance in line with the EE1st principle, where the low amount of energy required is fully covered by energy from the building itself or from locally produced renewables. The plan also must include a requirement for all new buildings to be 'ZEB' by January 1, 2028, for publicly owned ones and by January 1, 2030, for other new buildings.

The EPBD recast also specifies that financial institutions should be mobilised to incentivise building renovations.

EC's forthcoming comprehensive portfolio framework, designed for voluntary adoption by financial institutions, will enhance lending volumes for building renovation. It also aims to streamline and regulate financial institutions' access to energy performance certificate (EPC) data, thereby facilitating smoother funding of renovations through private financial channels.

Member states will need to create conducive regulatory environments and market conditions to encourage the adoption of these instruments. Collaboration with private sector stakeholders and financial institutions will be essential to scale up these innovative financing solutions.

[92] https://energy.ec.europa.eu/document/download/1be582f1-5029-40c4-b9ca-04ca546b99ae_en?filename=2024_03_13_Detailed_calculations_for_EED_Article%204.pdf

Promoting ESCOs and EnPC is highlighted as a means to finance EE improvements. Under the EED recast, member states are obligated to promote and ensure, where technically and economically feasible, the use of EnPC for renovations of large buildings that are owned by public bodies. For renovations of large non-residential buildings with a total useful floor area above 750 m2, member states shall ensure that public bodies assess the feasibility of using EnPC and other performance-based energy services.

The Sector Assessment Report on *Building & Renovation* has direct linkages to the analysis of energy supply systems (primarily thermal energy to cover heat demand) for buildings which are further analysed by the *Energy* sector assessment report. Moreover, a reflection on the share of renewable energy in heating and cooling is provided in the *Building & Renovation* study but is more deeply analysed within the country's *Energy* thematic area due to the overall country energy mix.

3.6.1 Status and trends

The current state of the green transition in Armenia is tied to the challenges posed by its largest energy-consuming sector – buildings. Accounting for nearly 40% of the country's total electricity demand and over 25% of its gas demand, the residential subsector, alongside transport, consistently holds the lion's share of Armenia's total final energy consumption (TFEC).

Most of Armenia's buildings are residential dwellings, whereby 52% are individual houses and 45% are MABs. Nearly two-thirds of Armenia's population of nearly 3 million live in urban areas. MABs dominate in cities such as the capital, Yerevan, where 37% of Armenians live.[93] The exterior wall materials of apartment buildings in their majority – about 70%, are made of stone. The share of prefabricated panel-covered buildings is about 23%. The age of apartment buildings in the housing stock of Armenia is 35-60 years, and during their construction, in fact, energy saving standards were not under consideration. The following types of fuel are consumed in the residential sector: natural gas, liquid petroleum gas (LPG), fuelwood, and manure (consumption of kerosene and coal is negligible). The natural gas predominates in the total fuel consumption – accounting for 70 %, followed by biomass – 29%, manure and fuelwood (1%).

Despite varying statistics, energy audits conducted by R2E2 Fund[94], AE Consulting, Energy Saving Foundation, as well as those carried out by international stakeholders such as World Bank, UNDP[95], Habitat for Humanity Armenia Foundation and similar entities, average specific residential energy consumption is 185 kWh/m^2 per year[96] and varies between 171 kWh/m^2 per year[97] and 218 kWh/

[93] Source: Iea.org

[94] https://r2e2.am/en/projects/energy-efficiency-projects/

[95] http://www.nature-ic.am/hy/projects/Improving-Energy-Efficiency-in-Buildings/2

[96] Task 6 Report. Demand-Side Management Study. Danish Energy Management, p. 92.

[97] http://www.undp.org/content/dam/undp/documents/projects/ARM/MTE-Report_Buildings_Armenia_FINAL.pdf, p. 34.

m^2 per year for stand-alone buildings[98]. This figure contrasts sharply with estimates based on statistical data, where Integrated Fuel and Energy Balance (IFEB)[99] indicates an unrealistically low consumption of about 83 kWh/m2 per year. UNDP-GEF pilot projects revealed an average heating energy demand of 185 kWh/m2 per year in typical multi-apartment residential buildings. With cost-effective energy efficiency improvements, this can be reduced by 38-40%, reaching 111 kWh/m^2 per year[100]. Notably, 70% of Armenian apartment buildings, mainly constructed in the 40s-60s with stone materials, lack thermal insulation, leading to heat energy consumption of 150 to 180 kWh/m2 per year. Problems extend to windows and transparent constructions, contributing to high infiltration rates and poor thermal resistance, resulting in energy demand ranging from 140 to 210 kWh/m2 per year.

Despite varying statistics, energy audits conducted by R2E2 Fund[101], AE Consulting, Energy Saving Foundation, as well as those carried out by international stakeholders such as World Bank, UNDP[102], Habitat for Humanity Armenia Foundation and similar entities, average specific residential energy consumption is 185 kWh/m^2 per year[103] and varies between 171 kWh/m^2 per year[104] and 218 kWh/m^2 per year for stand-alone buildings[105]. This figure contrasts sharply with estimates based on statistical data, where Integrated Fuel and Energy Balance (IFEB)[106] indicates an unrealistically low consumption of about 83 kWh/m2 per year. UNDP-GEF pilot projects revealed an average heating energy demand of 185 kWh/m2 per year in typical multi-apartment residential buildings. With cost-effective energy efficiency improvements, this can be reduced by 38-40%, reaching 111 kWh/m^2 per year[107]. Notably, 70% of Armenian apartment buildings, mainly constructed in the 40s-60s with stone materials, lack thermal insulation, leading to heat energy consumption of 150 to 180 kWh/m2 per year. Problems extend to windows and transparent constructions, contributing to high infiltration rates and poor thermal resistance, resulting in energy demand ranging from 140 to 210 kWh/m2 per year.

Armenia's government is actively working on the robust implementation of recently adopted laws in the buildings sector[108]. The Ministry of Territorial Administration and Infrastructure (MTAI) oversees Armenia's adherence to the EPBD under the EU-Armenia CEPA agreement. MTAI collaborates with the State Urban Development Committee on the directive's transposition, building codes, and housing policy. Other ministries, including Environment, Economy, and

98 http://www.unece.org/fileadmin/DAM/energy/se/pp/gee21/Int._Training_Course_Istanbul/ArmeniaVahram Jalalyan.pdf

99 http://www.cenef.ru/file/Final%20Report_C2E2_CENEf_June2_2015.pdf

100 https://erc.undp.org/evaluation/evaluations/detail/6782

101 https://r2e2.am/en/projects/energy-efficiency-projects/

102 http://www.nature-ic.am/hy/projects/Improving-Energy-Efficiency-in-Buildings/2

103 Task 6 Report. Demand-Side Management Study. Danish Energy Management, p. 92.

104 http://www.undp.org/content/dam/undp/documents/projects/ARM/MTE-Report_Buildings_Armenia_FINAL.pdf, p. 34.

105 http://www.unece.org/fileadmin/DAM/energy/se/pp/gee21/Int._Training_Course_Istanbul/ArmeniaVahramJalalyan.pdf

106 http://www.cenef.ru/file/Final%20Report_C2E2_CENEf_June2_2015.pdf

107 https://erc.undp.org/evaluation/evaluations/detail/6782

108 In-Depth Review of the Energy Efficiency Policy of Armenia, Energy Charter, 2017

Finance, have mandates to provide necessary support for building efficiency implementation or policy. Additionally, the Statistical Committee of the Republic of Armenia (ArmStat) has a defined but limited scope of generating formal energy statistics and activity data required for assessing greenhouse gas emissions in Armenia's UNFCCC reporting.

Data on total final energy consumption shows that there was a constant increase between 2018 and 2021 – from 29,842 to 40,260 TJ, which is an increase of almost 35% within four years. The official energy statistics focus reports approximately 40,260 TJ total in 2021. Due to the absence of a comprehensive building stock inventory in Armenia, there is no structured database with engineering-technical information on the building stock. This gap obstructs the assessment of the country's progress towards European Green Deal (EGD) targets like renovation rate, deep renovation, and nearly Zero-Energy Building (nZEB) goals.

Moreover, Armenia's households are the largest consumers of energy, accounting for 35.6% of final energy consumption in 2017. The natural gas predominates in the structure of final energy consumption by households with the share of about 68% in 2017, the share of electricity – about 21% and biomass – about 11%[109]. In 2020, the proportion of natural gas in the energy mix decreased to 59.6%, accompanied by notable diversifications in the energy composition.

Addressing heating is a key focus in Armenia's building EE path. Given the extended heating season and harsh winter conditions, especially in specific rural areas, heating (space heating and hot water) constitutes the predominant share of energy consumption in Armenian buildings. In the period of the Soviet era, when 90% of residential and public buildings relied on district heating, the disintegration of centralised systems led to a significant shift. Individual installations, particularly gas-fired boilers and heaters replaced the former district heating systems, especially in apartment buildings.

The absence of data on the renewable energy systems' share in the heating sector poses a challenge in assessing their contribution. Notably, many public buildings currently experience insufficient heating, providing only 40–50% of the desired thermal comfort level. Since the collapse of district heating infrastructure during the 90's energy blockade, the recovery of district heating and co-generation installations faces multiple barriers, including high up-front capital investment needs, competition with fast-spreading, already dominant decentralised heating alternatives, lack of regulatory limitations to disconnections, combined with insufficient incentives to commercialise new district heating operators (only available in one small district with 36 buildings as an annex to a small scale cogeneration plant) and a lack of capacity among market participants, especially in MAB management associations.

Decision-makers currently lack strong incentives to transition to environmentally friendly heat-supply solutions, leading to the persistence of individual heating solutions even in new urban areas with high heat density. In the private sector, heating predominantly relies on individual gas

[109] https://unfccc.int/sites/default/files/resource/BUR3_Armenia.pdf

boilers (combi boilers) and, in some cases of newly built housing building-level central heating systems, often utilising rooftop boilers.

Building thermal renovation is one of the components emphasised by the 2022 National Energy Saving and Renewable Energy Programme (NESREP) and its 1st triennial (2022-2024) implementation plan (3rd NEEAP), approved by Government Decree No.38-L of September 28, 2022.[110] Only a fraction of the adopted and intended measures was implemented and completed in full and delivered the intended outcome. Some of the measures have enrolled donor or IFI technical assistance, which helped conduct various research or analytic tasks, however, these only could create background for the main legal-regulatory assignments, which the Government of Armenia should implement. However, the instrumental regulatory activities were not implemented. Activities 2.3 and 2.7 related to energy efficiency in residential and public buildings revealed an issue related to inter-agency coordination and donor/IFI cooperation.

It is unequivocal that the NESREP and NEEAPs need to rely on the buildings sector considering the substantial potential for energy saving. However, most of the building EE and event EE-integrated RE projects are implemented within projects and programmes outside the scope and jurisdiction of the MTAI. In the NEEAP update reporting it was recommended to exclude the measure from the program, which is unacceptable. The NESREP and NEEAPs are Armenia's key document for not only promoting but also reporting on saved energy and promoted renewables energy. Since there is no National Energy and Climate Plan, NEEAP monitoring and reporting is also the key reporting framework for mitigated greenhouse gas emissions. Under CEPA Armenia has obligations to transpose the EED and EPBD which are also closely related to the buildings sector. It is absolutely instrumental to include the interventions in the buildings sector in the NEEAP implementation and reporting platform and have been completely omitted from the 3rd NEEAP creating a vacuum of both information as well as any substantial measurable progress in reducing total primary energy sources used.

- Activity 2.3: Design of thermal insulation project for common area/spaces in 198 multi-apartment buildings was mainly implemented by a $20 mln UNDP/GCF grant with support from state and municipal co-financing ($8.4 mln).
- Activity 2.6: Development of draft energy saving and energy efficiency improvement Programme (until 2030) for public schools of the RA was initiated through a data collection effort, however due to significant data gaps as well as hundreds of schools with registered underheating below sanitary norms, which lead to postponing the development of School EE Program, which will require also increasing thermal energy consumption and bringing modern heating devices to many of the schools.
- Activity 2.7: Energy efficiency and energy-saving improvement projects in public facilities: R2E2 has been allocating 1.3 bn AMD in revolving funds through on-lending by financial institutions. Yerevan Municipality with loan from the European Investment Bank (EIB), an E5P grant and UNDP Technical assistance have a two-phase programme aiming at comprehensive thermal rehabilitation of 47 kindergartens and 6 polyclinics, and 47 kindergartens receiving horizontal

[110] https://www.e-gov.am/gov-decrees/item/37978/

interventions of heating and lighting EE, and solar PV and water heaters (total loan: EUR 32 mln, grant: EUR 15 mln, municipal co-financing: EUR 6 mln).

The 4th NEEAP (2025-2027) is pending adoption as of December 2024[111].

The relevant legal framework regulating building renovation includes the following main documents:

- Law on Energy Saving and Renewable Energy #HO-122-N dated 4.12.2004, amended on 12.05.2016 and 21.12.2017
- Government Decision N225-N, dated March 14, 2013, on the provisions for energy efficiency and energy-saving regulation in the construction sector.
- Government Decree N1504-N, dated 25 December,2014, "On the application of measures directed towards increasing energy saving and energy efficiency in objects constructed (reconstructed, renovated) by state means".
- Technical Regulation on Energy Efficiency in newly constructed residential buildings as well as state-funded construction (referred to as the Technical Regulation on Building EE (subject of the present analysis).
- RACN II-7.02-95 "Building thermal physics of building envelopes: design standards"
- Government Decision N120-N on the approval of "Thermal Protection of Buildings" 24-01-2016 RACN (Republic of Armenia Construction Norms, registered by the Ministry of Justice on 24.06.2016).
- "Urban development: Planning and Construction of Urban and Rural Areas" (RACN 30-01-2014)
- "Construction Climatology", RACN II-7.01-2011 Construction norms.
- RA standard Energy Efficiency. Building energy passport AST 362-2013.
- RA standard Energy Audit methodology, AST 371-2016.
- RACN 24-02-2022 on "Ensuring Energy Efficiency of Buildings: Energy efficiency Assessment Indicators"
- RACN 22-01-2024 on "Construction Climatology"
- 26 National standards, 17 EU and ISO energy efficiency standards

A number of secondary legislation items related to the norms and standards on building lighting, ventilation, technical structures, have also been adopted and refer to broader sectors, including street lighting.

EU4Energy in 2019 has developed and provided the MTAI with a Roadmap for NZEB Transition, which the Government of Armenia has never formally adopted or published, levelling this item on the policy agenda fully untapped.

While a foundational legal framework is in place, achieving significant progress in the green transition for Building and Renovation (B&R) necessitates the creation and implementation of

[111] https://www.e-draft.am/projects/7666/justification

essential secondary legislation to facilitate long-term planning, i.e. the Building Renovation Plan and it's 10-year implementation programme/strategy, the National Plan for increasing the number of Nearly Zero-Energy Buildings, as well as the regulations, methodologies and systems for the deployment of the certification of buildings' energy performance.

The European Green Deal (EGD) objectives and the current status/progress related to energy performance in buildings are summarized in the following categories (see Table 29).

Table 29. EGD objectives/targets and current status/progress

EGD Objectives and Targets	Relevant EGD indicators and EU level reference	Assessment (relevant country indicators/level of achievement)
Key EGD document – **Renovation Wave initiative:** ■ at least **double the annual energy renovation rate** (currently estimated at 1%) of residential and non-residential buildings by 2030 ■ initiate energy renovations that could **reduce building energy consumption by at least 60%** ■ nZEB (nearly/net zero energy buildings) to zero-emission buildings (ZEB)	**Greenhouse gas emissions from energy use in buildings in EU-27:** percentual change 2005 – 2019, -23% (Source EEA) ■ **Energy performance of buildings – average specific annual energy demand:** ■ public sector buildings: 250 kWh/m² a ■ residential buildings: 180 kWh/m² a (Source: EU Buildings Factsheets – European Commission**)**	**National Long-Term Building's Renovation Strategy (LTRS)** ■ **LTRS**: non existing ■ **Building Renovation Plan:** not existing ■ **Building reference database:** not existing ■ **Annual renovation rate**: not existing ■ **Defined nZEB buildings (and % RES share)**: not existing ■ **Renovations that are reducing building's energy consumption by at least 60% (deep renovation) initiated**: package of measures (resulting in deep renovation) not defined on country level. **Greenhouse gas emissions from energy use in buildings in Armenia:** Aggregated GHG emissions – 1.0 MtCO2 in 2020[112] **Energy performance of buildings – average specific annual energy demand[113]:** ■ Public sector buildings: 300 kWh/m2 a (Yerevan Municipality – 2017) ■ residential buildings: 185 kWh/m²a

[112] Grid emission factor 0.39 tCO2/MWh, 0.205 tCO2 per MWh natural gas, 0.267 tCO2 per MWh diesel fuel, and 0.403 tCO2 per MWh of non-sustainable burning of firewood

[113] Note: A comprehensive inventory of buildings has never been carried out in Armenia. There is no aggregated, structured database in place with engineering-technical information about the building stock. Thus, the information provided is based on the data compiled from the reports issued by various research projects and by the government where official information is available on the building stock and its energy consumption. Most of the information is obtained from the various studies, draft reports and the figures presented refer solely to final thermal energy demand.

In comparison with the most important indicators of the EGD and EU benchmarks with Armenia's present status and advancements toward the building and renovation targets, it is evident that Armenia possesses substantial untapped potential for improving the energy efficiency of its buildings. However, addressing various barriers and challenges is essential for significant progress in the decades ahead. Despite a rise in total final energy consumption and some progress in decarbonising the building sector in recent years (as per key statistics), the actual decarbonisation process has not yet started.

3.6.2 Enabling Condition, Gaps, and Needs

EU Strategic framework and Acquis (policy and legal readiness)

Enabling Conditions: During the last years, the Armenian Government demonstrated its engagement towards energy efficiency in the building sector through a series of changes in the regulatory framework. Furthermore, based on the Comprehensive and Enhanced Partnership Agreement (CEPA), Armenia committed to transpose the EU policies in the energy sector. As part of CEPA, energy efficiency standards and norms are being aligned with the EU acquis, such as the Energy Performance of Buildings Directive (EPBD).

Armenian's Government adopted the 1st National Energy Saving and Renewable Energy Programme (NESREP) for 2010-2020. 1st National Energy Efficiency Action Plan (NEEAP) was adopted in 2010 for 2012-2016, 2nd NEEAP – in 2016 for 2017-2018, and then the 2nd NESREP was adopted for 2022-2030 and its 1st triennial Action Plan for 2022-2024 (to be viewed as NEEAP 3 in conjunction with the 2nd NESREP) in early 2022. As of November 2024, the 2nd Triennial Action Plan was pending adoption (4th NEEAP). The NESREP is essentially an extended program, which is then supplemented with triennial action plans with timelines and roles assigned. The country adopted several amendments to the Law on Energy Saving and Renewable Energy from 2016 – 2021, introducing, among others – mandatory technical provisions for energy efficiency in new residential building construction, as well as in new construction, capital renovation or reconstruction of buildings which use state budget funds. 2nd NESREP forecasts cumulative energy savings in the household sector until 2030 (amounting to 91.9 ktoe), Scaling up Renewable Energy Programme NREAP.

Energy Sector Development Strategy up to 2040 and its implementation action plan specify targets for renewables, electric market liberalisation, regional energy network integration and nuclear energy development. These strategies, laws and action plans/programmes can be the basis for Armenia's Government and authorities to enable EGD goals for the buildings sector – reaching energy/emission neutrality by 2050 within its building stock. With support from EU4Energy programme in 2019 the Energy Charter Secretariat developed an NZEB Roadmap for Armenia, which was formally delivered to the Ministry of Energy (currently MTAI). The Roadmap was never formally adopted,

Key Gaps: One of the key gaps in Armenia is the non-existence of a National building renovation strategy and its ten year operational programme which would provide an action plan and allocation of responsibilities to invest into renovation of existing buildings (and would provide quantitative data on annual renovation rate (%), annual number and type of building (public, MABs and individual housing) to be retrofitted, renovation rate's annual energy saving targets (GWh) and expected emission reduction (t C02) for 2030, 2040 and 2050, numerical targets for the deployment of solar energy in buildings, as well as the required investments and allocation of domestic and international funding sources). Moreover, given the fact that definitions of critical technical terms such as "building primary energy use", "cost-optimality", "Light/Opaque structures", "Building unit", "Major renovation", "air-conditioning system", "district heating", "district cooling", "a nZEB" , "energy poverty", or many other critical terms of EPBD and related European Norms (Ens) for Armenia do not exist, nor a deep renovation package of measures on national and/or regional level (taking into account climate zones), utilisation of renewable energy technologies (required minimum share of renewables, including promotion of electromobility of new residential and public buildings) also has not been assessed on building level in Armenia within a cost-optimal analysis of the building stock.

The methodology for performing energy audits in residential and public buildings and its standards are applied on a voluntary basis and, generally are weakly enforced in the mainstream construction practice, have a broader scope and not all are specifically addressed to EPBD calculation methodology. The currently existing practice in Armenia is a mixture of EU, ISO, GOST (Russian), MSN (Eurasian Economic Union (EEU)) and national standards, and there is no clear guidance how and when the standards, or part of them, should be applied, particularly when there is a discrepancy between EU and standards. This offers a serious challenge both – national authorities in view of the need for regulatory changes and to energy professionals who need to adopt and implement this approach in practice. At the same time, the proposed interventions to align with EU buildings and renovation legislation have the potential to stimulate market development and increase the demand for energy efficient buildings by imposing a clear and reliable method for estimating energy savings.

Another gap is the fact that EPBD related by-laws and regulations are outdated from EU directives perspective, given the fact that an EED recast has been adopted in 2023, as well as an EPBD recast that has been adopted in 2024. However, recently adopted and to be adopted national by-laws in Armenia can serve as a good basis for additional changes and updates, but they need to be developed and updated within a short period of time if Armenia wants to meet EGD targets in the buildings sector by 2050.

Furthermore, the reform agenda under CEPA was predominantly supported by the USAID bilateral technical assistance to MTAI, including developing the new Law on Renewable Energy and Energy Efficiency, as well as the 4th National Energy Efficiency Action Plan, albeit the latter is now developed in compliance with EU templates, with the exception of the 2nd NEEAP.

Key Needs:

Adequate integration of building energy efficiency and renovation agenda in the national policy framework and market development initiatives, the following efforts are needed:

- National Climate and Energy Plan, which was not developed despite Commission recommendation to develop a combined national plan for both energy and climate.
- Cost-optimal analysis, and National building renovation plan – Armenia's authorities responsible for EED and EPBD need to quantify building renovation targets and allocate responsibility of the implementation of the renovation programme; i.e. Armenia needs to develop a National building renovation plan and, based on the Plan, a ten-year implementation programme with clear quantitative targets for public buildings, individual buildings, MABs, etc. In order to develop an as accurate as possible Building's Renovation Plan, Armenia should also develop their cost-optimal analysis for a set of different EE/RE measures for different types of residential and non-residential buildings (reference buildings). The Plan must also ensure that the provisions of the directive are integrated with the following elements:
  - Annual energy-saving obligations
  - Exemplary role of public buildings
  - Building renovation requirements for the residential sector

The above will require development of Reference Building Database on at least inception of Digital Building Registry Development conceptualisation and launch. These would require developing the missing definitions, mentioned in this table, as well as particular minimum energy performance requirements for renovated buildings (new, renovated, major repaired) as well as individual building elements, as well as exemptions from these requirements for particular building types (e.g. historical, temporary, military, etc).

Defining nZEB – A cost-optimal analysis for residential and non-residential buildings (for various reference buildings reflecting Armenia's existing building stock) with the aim to define nearly zero energy buildings in Armenia (taking into account different climate zones) needs to be undertaken; moreover, once done it needs to be embedded into a rule or the Law by stating/defining nearly zero energy requirements for planners, designers and managers of renovations programmes (for example – maximum allowance for energy demand, minimum share of renewable energy and/or average specific annual primary energy output for different building typologies). In conjunction with nZEB,

Laws and by-laws – The needs for a renovation Plan and defining nZEB would also mean that the currently existing laws and by-laws defining minimum technical/energy performance requirements of buildings need to move from different standards to one clearly defined standard; and furthermore move from required energy demand to final and primary energy as the required norm for designing new buildings, undertaking reconstruction of existing buildings, and auditing building with the aim to produce energy efficiency certificates. i.e. moving from heat demand (constructional measures) to primarily energy (including mechanical engineering/ heat production measures, renewable energy, energy required for lighting and cooling, hot

water supply, appliances and the country's energy mix). Therefore, updates of existing laws, regulations and norms need to be undertaken to reflect EED and EPBD recasts (including primary energy as the new required norm when assessing the energy performance of different building typologies).

Instruments for policy implementation (implementation readiness)

Enabling Conditions: Armenia has already a basis of existing policies and norms, which could further enable the country to enforce its building stock decarbonisation. The Law on urban planning prescribes the criteria for obtaining permits for construction or reconstruction which is used as a policy instrument in the country. Moreover, according to the Law on EE and RE, an obligation for energy performance certification of buildings is mandatory for new residential buildings and buildings under reconstruction at the expense of state funds. A construction norm on "Thermal protection of buildings", which defines minimum technical standards for all buildings, including the requirements regarding minimum energy performance of building, exists in Armenia as well.

Armenia has developed two National Standards which give a starting point for EGD goals enforcement in the building sector – "Energy conservation. Building energy passport. Basic rules. Standard form" and "Methodology for performing energy audit in residential and public buildings".

According to the Law on certification, an energy passport can be compiled and issued by individuals certified by the certification bodies accredited in accordance to the Law; thus providing a systematic approach to evaluation of energy performances of buildings.

The element of vulnerable households is reflected in the regulatory framework through a safety net of socially oriented tariffs for electricity and natural gas which are targeted at a) categorised low-income households (social status), and b) based on the minimal consumption thresholds. The Government also has a state programme of subsidised loans for low-income household energy efficiency investments.

Key Gaps: Several instruments for EPBD enforcement within Armenia's existing building stock are missing; namely, both building sub-sectors – existing residential and non-residential buildings, should have EPBD required Minimum Energy Performance Requirements which are mandatory to be met while renovating buildings. Furthermore, Armenia needs to set a clear date from which new residential and non-residential buildings need to meet its nearly zero energy definition.

Armenia is missing one (or several) dedicated and by Government-approved energy performance certification software serving as the tool for assessing buildings and the issuance of energy performance certificates for new buildings (to obtain construction permit) and for renovation of existing buildings (to conduct ex-ante energy audits with the aim to proof that the conducted implementation of EE/RE measures is in line with minimum performance requirements).

Furthermore, Armenia has not introduced a scheme for renovation passports, nor the proper building renovation codes or digital registry for the building passports (energy performance and renovation).

In order to ensure full alignment with EGD goals (climate neutral building stock in 2050) and EPBD requirements, the currently existing mix of several contradicting norms should be replaced by one technical standard or decision which would aim to include final and primary energy calculations and energy classes categorisation (on primary energy level), i.e. nZEB definition with cost-optimal measures and its technical requirements for various types of Armenia's building stock. A predefined minimal energy class (on demand and primary energy level) required to be met when renovating existing and/or constructing new buildings is available ("C" EE class), however, not fully applied and should be further enforced and harmonised aiming to be aligned to final energy.

There are currently no requirements for new buildings which would oblige the uptake of e-mobility by equipping buildings with certain minimum numbers of recharging points and ducting infrastructure (i.e. for existing non-residential and new residential and non-residential buildings).

The key purpose of energy performance certificates of buildings is to communicate and inform residents and building users about the energy efficiency class, and thus the expected energy consumption and associated energy costs. In this regard, and following the EPBD requirements, Armenia is still missing the adoption of a mandatory requirement stating that for selling, renting, and advertising purposes of buildings, a valid energy certificate needs to be accompanied (issued). Moreover, according to the directive, all public buildings need to have an energy certificate placed on a visible place. There is a discrepancy between the Energy Saving and Renewable Energy Law and the Government decision regarding energy audits implementation body. Based on the on Law the audit should be implemented by

Accredited conformity assessment body, while based on the Governmental Decision No 1399-N energy audit should be implemented by an energy auditor certified by an Accredited conformity assessment body. There is no clear mechanism to control and verify the auditing process that leads to a limited application of this regulation.

Armenia should make the steps towards ensuring that national authorities and/or institutions (for example technical universities or faculties, companies, etc.) are conducting the training programme for energy auditors for simple and complex buildings, building inspectors, etc.

Armenia is missing a fully functional general planning, implementation and monitoring mechanisms within which national energy savings and GHG emission reduction targets for the buildings sector (public buildings) would be planned, communicated (to lower level governments – for example municipal level), monitored and reported to a central place (for example the Ministry or a newly established dedicated agency, which needs to perform national functions – these functions can also be handed over to R2E2 as an alternative option). Another gap is the fact that the country doesn't possess a requirement for public buildings to nominate energy managers on building level in order to execute EE plans.

Professional maintenance companies (building maintenance companies) and Homeowner Associations are not yet recognised by the government as parties which can and should contribute to fulfilment of Armenia's EE targets in the multi-apartment buildings sector.

There is no qualification system existing in Armenia for housing stock managers. The majority of HOAs lack the necessary technical, financial, and managerial skills for the proper implementation of their function.

The energy poverty/vulnerable households' issue is not regulated in accordance with the definition of "inability to maintain thermal comfort", and limited efforts of national building renovation planning also lead to lack of proper prioritisation of empowering and protecting vulnerable customers and alleviating energy poverty. New Law on Renewable Energy and Energy Efficiency – Since a new Law on RE and EE is currently being developed, that will replace the Law on Energy Saving and Renewable Energy. The draft Law is pending adoption in September 2026, has provisions requiring development of the Building Renovation Strategy, but not implementation plan (2024 recast requirement). The draft law has many provisions on renewable energy development related to amendments in Energy Law and pending Electricity Law, including RE integration in heating and cooling. The draft law also has introductory articles on energy efficiency obligation schemes, energy performance contracting and energy service companies (ESCOs), energy storage and regulation of Energy Fund/Agency creation and operations (potentially to refer to the existing R2E2 Fund.), and energy auditing.

The developers must reflect the key elements of the recast directives, including:

- The legally binding 'EE1st' principle
- Increased EE target
- Annual energy-saving obligations
- Exemplary role of public buildings
- Building renovation requirements for the residential sector
- Definitions of "energy poverty" and mitigation of energy poverty.
- Access to financing, including through public funds, incentives, grants, and loans with favourable terms
- Innovative financial instruments
- Energy service companies (ESCOs) and energy performance contracting (EnPC)

The developers should link it with the Law on urban planning with minimum EPB requirements for all types of buildings in Armenia to be met in order to ensure different permits (construction, usage permit for example); the Law should also include minimum share of renewable energy and a nZEB definition and application. The Law should also prescribe the criteria (or give the basis to define criteria in a secondary legislations) for obtaining permits for construction or reconstruction which is used as a policy instrument in the country.

Mandatory Minimum Energy Performance Requirements – Armenia needs to develop new mandatory minimum energy performance requirements for all types of buildings (country's

reference buildings), linking them with nZEB definition, a definition of 'zero emissions building', as well as the updated EPBD recap requirements. A predefined minimal energy class (on demand and primary energy level) needs to be defined for existing buildings undergoing retrofits and new buildings, along with the necessary terms of "deep/major renovation", "cost-optimality", etc.

Also, according to the EPBD recast from 2024, Armenia shall establish minimum energy performance standards for non-residential buildings and establish specific timelines for non-residential buildings to comply with lower maximum energy performance thresholds by 2040 and 2050, in line with the pathway for transforming the national building stock into zero-emission buildings.

Ensure update of Energy Performance Certificates (an energy auditor market) – Armenia needs to ensure the right instruments to enable a proper enforcement of EPBD requirements, for example the country would need to adopt a rule/decision on a mandatory requirement to accompany energy performance certificates of buildings within the selling, renting, and advertising process. In addition, energy performance certificates should be mandatory for each retrofitted building (ex-ante certification) supported/financed by public funds. In parallel, ensuring the enforcement of minimum energy performance requirements for buildings would need to be accompanied via an independent controlling system (inspection). Armenia needs also to set a date until which all public buildings need to have an energy certificate placed on a visible place.

Introducing a scheme for renovation passports – Armenia shall introduce a scheme for building renovation passports. It may be allowed for the renovation passport to be drawn up and issued jointly with the energy performance certificate.

Energy auditing – the Law must specify the types/groups of "large" energy users and introduce mandatory requirements for conducting energy audits and introducing energy management based on ISO 50001 and ISO 50002.

Training programmes for energy auditors and inspectors – Armenia needs to develop and adopt a secondary legislation which would enable national authorities and/or institutions to conduct training programmes for energy auditors for simple and complex buildings, building's system inspections, etc. The education should also give practical work on a software tool for conducting energy auditing and issuing energy certificates.

Monitoring of public sector building's targets / energy management system – Armenia should introduce a general planning, implementation and monitoring mechanisms enabling authorities/ the Government to track national energy saving and GHG emission reduction targets within the buildings sector. An institution (department within a Ministry or a newly established dedicated agency, which needs to perform national monitoring functions – these functions can also be handed over to R2E2 as an alternative option) would need to be responsible for these activities. Moreover, in order to be able to implement and monitor EE measures within public buildings, the country needs to adopt a requirement for public buildings to nominate energy managers on building level in order to execute national EE plans/targets within the public buildings sector. A

digital/IT based energy management tool for public sector buildings could be one optional way forward (for example introducing EMIS as a country-wide tracking tool for energy consumption and savings).

E-mobility support – In addition, for new buildings and existing public buildings undergoing renovation, a rule/decision on certain minimum numbers of recharging points and ducting infrastructure needs to be adopted and enforced; aiming to support e-mobility in Armenia.

Enabling MABs to implement EE/RE measures – Armenia needs to create sustainable models (legal, policy and financial instruments) which would enable professional maintenance companies (building maintenance companies) and/or Homeowner Associations to invest into EE/RE measures on multi-apartment building level and thus contribute to Armenia's EE targets.

Energy Management – the Law must introduce requirements for energy management, particularly mandatory municipal energy management (creating staff, institutional capacities, methodology, tools and training), as well as energy management for large energy consumers.

Financial capacity (implementation/financial readiness) The country experienced during the last years an uptake of investments into EE measures of public sector and residential buildings. Most of the investments' financial sources are IFI and/or donor funding (vertical funds), financing implementation of EE/RE measures mostly via grants and concessional loans, often blended with state and municipal co-financing.

The number of projects in Armenia during the last five years shows that the absorption and implementation capacities to implement renovation projects exist, however quite limited due to limited technical and institutional capacities for procuring agencies, design institutions, construction and site supervision companies. Moreover, since the vast amount of funding sources originates from IFIs and donors (vertical funds), which successfully implemented their projects/ programmes in the country, the basis to scale up financial capacities (sources and mechanisms) to support the decarbonisation of Armenia's building stock exists, however will require strengthening and expanding the absorption capacity of the key public and market players.

As one of the first in the region, Armenia established an institution responsible for facilitating investments in energy efficiency and renewable energy and providing an array of comprehensive assistance to project developers, investors, banks, researchers and other stakeholders – the Renewable Resources and Energy Efficiency Fund (R2E2). The Fund built its capacities and showed successful implementation capabilities within the WB financed projects disbursing almost USD 10 million for EE/RE measures in municipalities for the public. The R2E2 created for this project Energy Performance Contracts and Energy Saving Agreements, and thus set a starting basis for potential ESCO projects in the country.

Armenia has a subsidy programme in place which supports projects resulting in utilisation of renewable energy (including photovoltaic systems), gasification of settlements and renovation of shared property in MABs (including implementation of EE measures). To total co-financing

amounts from 35 – 70%, depending on programme and type and location of buildings. Moreover, subsidies for energy poverty/social groups and for EE renovation loans also exist.

Given the number of existing public and residential buildings in Armenia, it can be stated that there is a gap between the currently existing funding volume and funding needs for buildings and renovation in regards to EGD decarbonisation objectives. The Government is co-funding energy modernisation projects in buildings through subsidy programmes, however, most of the funding comes from external development partners/donors. Due to the relative high investment costs and relatively low energy tariffs, citizens (residential sector) have a preferred focus on grant financing for EE/RE measure; however, only limited amount of government grants are available for end users as Armenia has a lack of domestic financial abilities/sources to increase financial volume and financial instruments which would support a large-scale renovation programme and thus the fulfilment of EGD goals within the building sector.

The barriers in the multi-apartment residential buildings are not only related to availability of finance, but also the legal gaps in common-space investing, un-collateralised lending to HOAs, as well as willingness and institutional capacities of HOAs to host such investments and repay in feasible timeframes, which also leads to the need in tailor-made financing instruments which account for low bankability of such investments, since most buildings require both EE, as well as general repair, seismic reinforcement, and handicapped accessibility upgrades.

Currently there is no national polluter pays mechanism which would create state seed funding to support EE/RE investments in public and residential buildings.

Although some national financial incentives and financial mechanisms exist (targeted grants, soft loans subsidies, introduced EPC and ESCO principles), the biggest gap is missing a continuous replicability and further development of these mechanisms (strengthen the policy environment to enable market maturity). Namely, for example, the energy efficiency legislation in force does not introduce the ESCO mechanism. The Armenian ESCO market is not yet developed, particularly with regard to legislation, market demand, practices, state support, and affordable financial resources. The Law on Procurement does not include a provision for performance-based contracts, which may create a barrier to ESCO market development. There is a need to further develop energy service-supporting mechanisms such as subsidies, government guarantee programmes, and tax incentives. Moreover, the ability for public companies and institutions to have multi-year budgeting is missing.

The energy performance contracting and ESCO working principles are initiated but are in very early stages of maturity. No taxes and/or customs fees reduction are available for EE/RES technologies. Given the current status of funding, Armenia doesn't yet have the financial readiness and capacity to meet the 2050 carbon neutrality goal of its buildings sector.

ESCO / EPC in the public sector will also conflict with the public debt regulations, since under Eurostat ESCO contracts are viewed as public debt. And under Eurasian Economic Union regulations

Armenia views municipal debt as part of country debt. This limits the ability of public entities to use EPC as a financing instrument.

It is also noteworthy, that while green finance is amply available, many of these products are sovereign loans, and the fiscal space limitation of the Government of Armenia is an emerging risk that will soon limit the opportunities for additional borrowing. Given the limited bankability of building thermal retrofitting investments, and limited fiscal space, it is reasonable to assume that the building renovation investments will need to extensively rely on grant financing (full or partial), as the experience from EU Renovation Wave and the Resilience and Recovery Fund indicates.

National financial mechanisms and seed funding to support EE/RE investments in the buildings sector – Armenia needs to develop further strengthen its existing financial mechanisms which best suits different end-user groups (i.e. aligned to the legal and administrative abilities and financial needs of three key stakeholders' groups/end-users of such mechanisms – public sector buildings, individual housing and MABs, and funding mechanisms for social/vulnerable groups). In order to ensure seed funding, a polluter-pays mechanism should be introduced on a national level which would serve as the basis to generate funds for supporting EE programmes (fulfilment of the buildings' Renovation Plan, which yet needs to be developed). Moreover, there is a need to legally, institutionally, administratively and financially enable individuals, HOA and building maintenance companies to absorb funding via public calls or open-ended funds (first come first serve basis) with targeted eligibility criteria and end-user groups (residential – individual housing, MABs and social vulnerable groups), and blended grant financing.

Given the existing institutions and mechanism in Armenia, budget capturing (to support an EE revolving fund or guarantee fund, as an alternative), multi-year budgeting and including a provision within the Law on procurement which would enable performance-based contracts and ESCO market development should be one way forward for the public buildings. There is a need to also further develop energy service-supporting mechanisms such as subsidies, government guarantee programmes, and tax incentives. Moreover, the ability for public companies and institutions to have multi-year budgeting is missing.

Ensure seed funding from own resources – Armenia needs to ensure to continue providing seed funding from its own resources in order to be in a position to better plan the execution of EE/RE renovation programmes. This could be done by introducing soft polluter-pays mechanisms and or by introducing budget capturing or revolving funds for EE investment projects. The State subventions have covered 70% in 2020, and 30% in 2021-2023 of all investments co-financing UNDP/GCF thermal retrofitting of 198 MABs.

Leveraging funds with IFI and donor funding – Once the country has generated its own funds (to, for example the R2E2 Fund), these need to be linked with IFI/donor activities, thus creating co-financing and leveraging. This should result in higher absorption of IFI/donor funding as well, and thus increased investments and number of renovated buildings (taking into account minimum energy performance and deep renovation targets).

National Investment Framework for Public Buildings – Armenia needs to clearly define which type of financing (for example % share of targeted grants, loans, loss guarantees, etc.) should apply to which building project/programme, if supported from budget and/or loan financing (if the country is the loan taker). Therefore, Armenia is advised to develop in parallel with the development of financial mechanisms a National Investment Framework for Public Buildings defining eligibility requirements for individual investments projects/programmes (technical, financial, socio-economic and environmental requirements) and an investment framework based on existing and planned financing options in the country (taking into account types of financing and sources of financing).

Allocation of responsibility to carry out/financially support Armenia's building renovation plan – The Armenian Government needs to clearly define roles and responsibilities and allocate a mandate to its institutions to carry out, coordinate and financially support Armenia's building renovation plan.

Public capacity (institutional capacity – effectiveness and efficiency – implementation readiness)

The Ministry of Territorial Administration and Infrastructure (MTAI) is leading Armenia's transposition, adoption and enforcement of EPBD and has the overall responsibility for energy and energy efficiency policies, regulations and strategic directions. The Ministry receives assistance in the transposition of EPBD and other building policy matters from the State Urban Development Committee, which is actively engaged in setting building codes for new constructions and shaping housing policy, including defining minimum EE standards and building codes which have been developed and adopted.

The Ministry of Economy (via the Institute for Standardisation) has the mandate for certification and technical regulations and national standards, as well as verification and adoption of mechanisms for energy performance indicators in buildings.

Armenia's Renewable Resources and Energy Efficiency Fund plays a facilitating role in channelling investments towards energy efficiency and renewable energy projects, extending a range of comprehensive services to project developers, investors, financial institutions, condominiums, researchers, and other involved stakeholders. The fund offers professional expertise to the government, advising on matters concerning the development of green energy strategies and legislation. The Fund has a successful track record of managing energy efficiency projects with international organisations and introducing innovative financial mechanisms in Armenia supporting the implementation of EE measures in the buildings sector.

These mandates of the key government stakeholders in Armenia give a good ground for planning and execution of the Building Renovation Plan, once developed. As noted in the "Energy" chapter, the merger of the Energy Ministry into MTAI in 2019 has limited the ministry's capacity to fully

maintain the policy agenda on a number of topics, which among others, includes building energy efficiency.

Furthermore, the downgrading of the Ministry of Urban Development to the status of State Committee on Urban development has reduced their policy-making functions.

The Ministry of Economy, in charge of related standards and certification of technical professionals also lacks resources in adequately implementing the provisions required by the existing provisions on building EE, energy auditing, certification, etc.

It should be noted that due to the recent changes in EPBD and EED requirements and the complexity of introducing nearly zero energy buildings/net emission buildings/low-carbon buildings and embedding primary energy into performances of buildings, there is to a certain extend lack of capacities to understand and ability to reflect these requirements into Armenia's energy performance of buildings policies and technical norms. In addition, given the existing legal, policy and financial gaps, it can be stated that key ministries currently lack the human resources to simultaneously be able to i) develop/update its legislation in accordance with the new EPBD and EED requirements and ensure its enforcement, ii) develop and execute sustainable and continues financial mechanisms for various building and renovation stakeholder groups – public buildings, MABs and individual buildings, and to iii) ensure funding and deliver a large scale country-wide building renovation programme.

In general, from a perspective to decarbonise Armenia's buildings sector by 2050, the country's authorities relevant for the building and renovation thematic area are understaffed. Although defined mandates exist among different ministries and government institutions, the government of Armenia has no effective institutional focal point for energy efficiency implementation support for buildings, though this is critical for the wider diffusion of the successful energy efficiency delivery mechanisms. As a result, international donors largely set and implement Armenia's energy efficiency agenda.

Thus, it can be stated that clear roles and responsibilities among different institutions aiming for a transparent and sufficient data collection, monitoring and reporting systems of activities and its achievements (energy savings, monetary savings, GHG emission reduction, % of renovated buildings per annum per building type, etc.), is at its early stage of development and MRV roles among key authorities are not fully defined yet. Namely, according to the current legislation of Armenia, the functions of data collection and publication are carried out by the Statistical Committee of Armenia at monthly, quarterly or annual intervals. However, the data collection, monitoring and transparency systems in Armenia need modernisation or introduction of new systems. The Municipal Energy Management System (MEMS) and Energy Management Information System (EMIS) have been voluntarily pioneered in three communities of Armenia to some extent, but there is still a need for systematic Measurement, Verification and Reporting (MRV) scheme adoption by the government.

Key Needs: Lack of human resources and capacities could also negatively affect Armenia's ability to absorb and manage large amounts of funding from several different financing sources.

The country has a country-wide awareness raising and communication strategy, developed with support from the USAID Energy Secure Armenia Project which is intended to streamline the MTAI efforts in communicating to the general public on energy efficiency and renewable energy. However, there is no targeted strategy or plan for a more topical campaign for publicising the benefits, financing options and goals of decarbonise Armenia's building sector towards zero emission in 2050. The donor-funded projects usually fill this gap. The majority of awareness efforts including the MTAI communication strategy was developed with USAID support for 2024-2026, however, with stop order on USAID operations since January 2025 the implementation of the awareness campaign will be limited.

Many of the building renovation programmes faced data limitation barriers. The lack of digitalisation in building energy data as well as absence of reference building databases limits the potential for proper data-driven policy-making, programming and planning in this sector.

Given the current status of public capacities, Armenia has a good basis but needs further technical assistance and capacity building of public authorities to be able to meet the EGD goals.

Increase the ability to understand and reflect new EED and EPBD requirements in Armenia's laws and by-laws – Armenia's Government and its institutions relevant for the buildings and renovation sector need to increase their ability to understand and reflect new EED and EPBD requirements in national laws and by-laws – this should be done by requiring targeted technical assistance from IFI and donor funding projects, as well as educational/capacity building support to increase the expertise of existing staff members.

Internal assessment of required human and institutional resources and capacities to plan, manage and execute EPBD/EGD/a large-scale buildings renovation programme (Armenia's building renovation plan) – The Ministry of Territorial Administration and Infrastructure, in cooperation with the Ministry of Economy, the State Urban Development Committee and the R2E2 Fund, should execute an internal assessment of required human resources and capacities to plan, manage and execute a large-scale buildings renovation programme (Implementation readiness assessment for EPBD in Armenia). This would clearly define the institutional and capacity needs of relevant authorities, their roles and responsibilities in transposition and enforcement of EPBD.

Strengthening (or enlarging the mandates) of existing institutions – Armenia needs to Strengthen its R2E2 Fund with domestic funding sources – either seeds funding allocated via the state budget and multiplied/re-used with an EE revolving fund, and/or introducing polluter-pays based principles for generating revenue/funds.

Moreover, in order to ensure a smooth coordination and monitoring of renovation programmes, an EE/Environmental Agency should be established or could be integrated into one of the existing institutions (by extensions of mandate of the R2E2 Fund). Such an institution should/could have

the obligation to enforce a systematic Measurement, Verification and Reporting (MRV) scheme aimed to track building decarbonisation effects.

Development and execution of a country-wide awareness raising and communication strategy on building renovation – A country wide awareness raising and communication strategy with the aim to inform the general public on benefits of EE/RE measures in the buildings sector – energy savings and reallocation of savings into other infrastructure projects, job creation, economic growth, increased security of energy supply, leave no one behind (taking into account a just transition process and focus on social groups), and possibilities to co-finance EE/RE measures for citizens and public administration, should be executed in parallel to the implementation of a large scale renovation program. Relevant authorities need to timely plan their resources for such communication activities. Moreover, the public sector needs to give clear market-based signals to the labour market, universities and private sector on the expected job creations, needed skills, etc. for decarbonise the buildings sector.

Reference building database and Digital building registry and building – Armenia needs to develop a reference building database with inputs from all past implemented building energy audits developed by public and international institutions to construct a reference building database, which can be used for developing Long-Term Renovation Strategy and 10-year implementation plan.

Armenia must develop the scope and terms for digitalising building sector data, gradually opening it for integration of building energy passports, technical data, as well as, in the long run, ensure the interoperability with other digital platforms (e.g. Cadastre, GIS, fire safety evaluations, seismic assessments, urban master-plans, etc.)

Non-governmental capacity (implementation readiness)

Enabling Conditions: With the successful implementation of EE projects in the past years, Armenia's non-governmental sector (its designers, engineers, workforce and equipment supplier) have the decent knowledge and skills to plan and apply EE measures in accordance with the currently required national norms and technical standards.

There are EE/RE technologies available on the market in Armenia. Most of the technology, materials, and supplies are imported. Locally verified attests are only provided for construction materials by existing laboratories. Demand on the technologies is constantly increasing for solar photovoltaic systems due to Armenia's net-metering scheme and relevant favourable conditions. Moreover, around 30 domestic solar systems companies have emerged during the recent years. These systems are used in single family households, residential and public buildings and are considered to be a financially viable investment. The net-metering policy can serve as an example for other technologies to increase the demand driven end-consumer attractive policies and its resulting market development and accessibility for end-users (private companies supply of technology/ equipment).

Per agreement with EU coordinating partner, American University of Armenia (AUA) has reformed the Master's in Industrial Engineering and Systems Management (IESM) program. Through this educational programme, three universities in Armenia offer Master Degree in Innovative Technologies in Energy Efficient Buildings for Russian & Armenian Universities.

There are a few CSOs/NGOs with capacities and knowledge to provide qualified TA and share knowledge related to EGD in the buildings sector. These have a track record of implementing projects or programmes related to energy efficiency, sustainable buildings, and environmental conservation. This experience allows them to offer valuable insights, lessons learned, and best practices to stakeholders in the buildings sector.

Key Gaps: The country has a number of existing distributors and vendors of EE/RE technologies, however, since the demand is usually created by stricter rules for energy performances of buildings, the demand to apply a set of measures (enabling high energy efficiency of buildings, i.e. reduced energy consumption towards nearly zero/net zero buildings) resulting in nearly zero energy performance doesn't exist. Deep renovations of residential buildings are minimal which is a result of high upfront EE/RE investment costs and relatively low energy prices, i.e. missing motivation to invest into EE measures in the residential sector.

While the Government underscores the importance of constructing buildings with nearly zero energy consumption and implementing incentive programmes within existing legislation, the prevalence of such structures in the economy is non-existent. The limited demand for these buildings primarily stems from a scarcity of technological and professional expertise, coupled with the high construction costs prevailing in the current market environment.

Currently, there are no equipped and licensed laboratories for EE/RE technologies in the country except for construction materials, or local producers (mainly solar PV suppliers) do test efficiency of the modules/performance standards of their equipment with in-house capacities – which is a gap as it needs to be done by third parties.

For energy professionals in Armenia, government policies serve as crucial guidance, shaping their skill set needs and obligations towards minimum technical standards. However, with the European Green Deal only beginning to gain traction in the public discourse, there appears to be a significant lack of awareness among professionals regarding its implications and potential opportunities for development – the non-government sector is missing knowledge and skills on nZEB technologies (ability to design and apply). Given the fact of non-existence of a nZEB definition, nZEB requirements for building performance standards, and no nZEB implemented projects, it can be stated that there is a gap of skilled professionals on the labour market capable to deliver (plan, design, apply and install, and commission and maintain) nZEB technologies in the country.

Although international partners continue their high-level policy dialogue aimed at supporting Armenia's sustainable green recovery and growth that can deliver jobs, no tangible results towards enhancing the skills and capacities for the workforce is yet recorded. As regards the vocational training and education sector, currently neither the technical schools nor the universities address

sufficiently the topic of energy efficiency in buildings. The current curriculum of technical universities/faculties and other educational institutions doesn't create market ready professionals capable of delivering a fully decarbonised buildings sector 2050. Namely, theoretical and practical education to create understanding, skills and practices of future engineers/energy practitioners on nZEBs are not yet existing.

In Armenia, the proficiency and expertise among designers, engineers, installers, and workers to implement new technologies aimed at achieving high-efficient buildings (all the way to nearly Zero Energy Buildings (nZEBs)) are limited both in quantity and quality. There is no training for designers, installers and energy auditors. There is a limited in-house technical capacity and skills for efficient management of energy use. Investment in the improvement of the human capital stock is low, limiting the creation of a more productive workforce.

Key Needs: Create demand for EE and nZEB/low-carbon building technologies – Armenia needs to create demand for nZEB technologies by adopting new policies (stricter energy performance norms) and implementation of a renovation programme. This will result in an increased demand for EE measures as well as market maturity of nZEBs technologies, and thus also higher level of understanding, skills and capacities of engineers and general workforce to design and apply a set of EE/RE measures resulting in deep renovation and/or nZEB. In the early stage post to adoption of nZEB policies and prior to the execution of a large-scale renovation programme.

Pilot nZEB projects & increase skill set of energy professionals – Armenia needs to pilot/demo nZEB projects in public and residential buildings and create short education/capacity building programmes for energy practitioners in the country. Based on findings and while delivering pilot projects, with the aim to improve the skills and capacities, it can also be recommended to establish training centres; develop/adapt training programmes/sessions for different stakeholders (designers, engineers, construction workers, auditors, investors, end-users, coming generation), as well as implement building energy efficiency topics in educational programmes in high-schools and universities.

Higher-education curriculum and required market signals – The current curriculum of technical universities/faculties needs to include different nZEB technologies in their regular education programmes for the country to be able to have a long-term pool of engineers and designers capable of understanding and delivering nZEB solutions.

Introduce national laboratories for verification and attesting of technologies – As the demands increases and more different EE/RE technologies and solutions are applied on Armenia's building stock, national laboratories would need to be established/equipped and returned in order to ensure reliable verification of EE/RE products (like boiler efficiencies, COPs, flue gases, etc). This especially becomes important as the demand for technology increases and domestic companies begin to produce and/or assemble EE/RE technologies in the country.

Establishment of one-stop shops for the energy performance of buildings – Armenia shall, in cooperation with competent authorities, and, where appropriate, private stakeholders, ensure

the establishment and the operation of technical assistance facilities, including through inclusive one-stop shops for the energy performance of buildings, targeting all actors involved in building renovations, inter alia, home owners and administrative, financial and economic actors, such as SMEs, including microenterprises.

Enhance market capacities – The capacities of external market players, such as practicing building energy assessors, energy auditors, designers, supervisors should also be enhanced to improve the volume and quality of project development, execution and supervision.

3.6.3 Green Transition Priorities

With the aim to be able to decarbonise its building sector by 2050, and thus meet the EGD objectives, Armenia would need to undertake the following immediate actions:

- **Increase the ability to understand and reflect new EED and EPBD requirements in Armenia's laws and by-laws** – Armenia's Government and its institutions relevant for the buildings and renovation sector need to increase their ability to understand and reflect new (recast) EED and EPBD requirements in national laws and by-laws – this should be done by requiring targeted technical assistance from IFI and donor funding projects, as well as educational/capacity building support to increase the expertise of existing staff members.
- **Develop a National building renovation Strategy and 10-year plan**– Armenia's authorities responsible for EED and EPBD need to quantify building renovation targets and allocate responsibility of the implementation of the renovation programme; i.e. Armenia needs to develop a National building renovation plan and, based on the Plan, a ten-year implementation programme with clear targets for residential and non-residential buildings. In order to develop an as accurate as possible Building's Renovation Plan, Armenia should also develop their cost-optimal analysis for a set of different EE/RE measures for different types of residential and non-residential buildings (reference buildings). This would require developing a ***building reference database*** and defining ***"worst performing buildings***", and also lead to development of a ***digital building registry.*** The Plan should also introduce mandatory annual targets for Public Building Renovation for the public sector to take lead.
- **Allocation of responsibility to carry out/financially support Armenia's building renovation plan** – The Armenian Government needs to clearly define roles and responsibilities and allocate a mandate to its institutions to carry out, coordinate and financially support Armenia's renovation plan.
- **Harmonise the legislation in key areas of gaps** – Introduce definitions of building structures, primary energy supply, district heating, district cooling, energy poverty, deep/major renovation, cost-optimality and other critical terms of EED and EPBD, as well as introduce the necessary provisions in laws and bylaws to ensure their application. For example, ***defining cost-optimality***, followed by methodology of its assessment, and legal requirements of compliance with cost-optimality as a threshold for technological ambition on building energy performance. Similarly, ***defining energy poverty,*** followed by methodology and regulatory provisions for

its assessment and generation of statistical basis for data-driven decision making, leading to development, adoption and implementation of policies to mitigate energy poverty.

- **Update of laws and by-laws & conduct a cost-optimal analysis & quantitively define nZEBs and low-carbon buildings (LCB)** – The needs for a renovation Plan and defining nZEB/LCB would also mean that the currently existing laws and by-laws defining minimum technical/energy performance requirements of buildings need to move from different standards to one clearly defined standard; and furthermore move from required energy demand to final and primary energy as the required norm for designing new buildings, undertaking reconstruction of existing buildings, and auditing building with the aim to produce energy efficiency certificates. i.e. moving from heat demand (constructional measures) to primarily energy (including mechanical engineering/heat production measures, renewable energy, energy required for lighting and cooling, hot water supply and the country's energy mix). Therefore, updates of existing laws, regulations and norms need to be undertaken to reflect EED and EPBD recasts (including primary energy as the new required norm when assessing the energy performance of different building typologies).

Since a new Law on EE and RE is currently being developed, the developers should link it with the Law on urban planning with minimum EPB requirements for all type of buildings in Armenia to be met to ensure different permits (construction, usage permit for example); the Law should also include minimum a quantitative nZEB definition. The Law should also prescribe the criteria (or give the basis to define criteria in a secondary legislations) for obtaining permits for construction or reconstruction which is used as a policy instrument in the country.

Quantitatively define nZEB and low-carbon buildings- A cost-optimal analysis for residential and non-residential buildings (for various reference buildings reflecting Armenia's existing building stock) with the aim to define nearly zero energy buildings in Armenia (taking into account different climate zones) needs to be undertaken; moreover, once done it needs to be embedded into a rule or the Law by stating/defining nearly zero energy requirements for planners, designers and managers of renovations programmes (for example – maximum allowance for energy demand, minimum share of renewable energy and/or average specific annual primary energy output for different building typologies).

Mandatory Minimum Energy Performance Requirements – Armenia needs to develop new mandatory minimum energy performance requirements for all types of buildings (country's reference buildings), linking them with nZEB definition as well as the updated EPBD recap requirements. A predefined minimal energy class (on demand and primary energy level) needs to be defined for existing buildings undergoing retrofits and new buildings.

- **Ensure seed funding from own resources** – Armenia needs to ensure seed funding from own resources in order to be in a position to better plan the execution of EE/RE renovation programmes. This could be done by introducing soft polluter-pays mechanisms and or by introducing budget capturing or additional uptake of revolving funds for EE investment projects.

National financial mechanisms and seed funding to support EE/RE investments in the buildings sector – Armenia needs to develop/strengthen its existing financial mechanisms which best suits different end-user groups (i.e. aligned to the legal and administrative abilities and financial needs of three key stakeholders' groups/end-users of such mechanisms – public sector buildings, individual housing and MABs, and funding mechanisms for social/vulnerable groups). In order to ensure seed funding, a polluter-pays mechanism could be introduced on national level which would serve as the basis to generate funds for supporting EE programmes (fulfilment of the buildings' Renovation Plan).

Once immediate steps are undertaken or are in the development/adoption process, following short and mid-term actions should be undertaken.

Short term:

- Ensure enforcement/uptake of Energy Performance Certificates as a regulatory instrument.
- Training programmes for energy auditors and inspectors executed by national authorities.
- Develop a monitoring system of public sector building's targets / energy management system.
- Develop building reference database and identify worst performing buildings
- Embed e-mobility support via the building sector regulations.
- Develop a National Investment Framework for Public Buildings.
- Leveraging funds with IFI and donor funding
- Define energy poverty and mitigation strategy
- Enable MABs to implement EE/RE measures.
- Conduct an internal assessment of required human and institutional resources and capacities to plan, manage and execute EPBD/EGD/a large-scale buildings renovation programme (Armenia's building renovation plan).

Mid-term:

- Strengthening (or enlarging the mandates) of existing institutions.
- Leveraging funds with IFI and donor funding, ensure funds are tailor-made to the economic and financial parameters of building renovation costs and borrowing capacities of the beneficiaries.
- Develop scope and design for Building Digital Registry
- Create demand for EE and nZEB technologies.
- Pilot nZEB projects & increase the skill set of energy professionals.
- Introduce national laboratories for verification and attesting of technologies.
- Align higher-education curriculum with decarbonisation objectives of the country and ensure a long-term pool of engineers and designers capable of understanding and delivering nZEB solutions.
- Development and execution of a country-wide awareness raising and communication strategy.
- Promote digitalisation of energy consumption data through energy management information systems (EMIS) for all public sector institutions to allow for comparative analysis and

benchmarking based on specific energy consumption (energy intensity) of individual public sector consumers and prioritisation of investment decisions
- Developing Building Energy Renovation Plan in transposition of the 2024 EPBD recast, ensuring increased annual EE targets and energy saving obligation for public sector renovation (Exemplary role of public buildings) and nZEB

Long-Term

- Design the Building Digital Registry, ensure interoperability with other digital platforms
- Energy service companies (ESCOs) and energy performance contracting (EnPC)

3.6.4 Transition Readiness Assessment

Despite Armenian demonstrated commitment towards **energy efficiency in the building sector** carried out through a series of changes in the regulatory framework and continued transposition of EU policies in the energy sector, including the energy efficiency standards and norms of the EU Energy Performance of Buildings Directive, **progress remains slow**.

Armenia is currently implementing its 2nd **National Energy Saving and Renewable Energy Programme** (NESREP) for 2022-2030, with the 1st triennial **Action Plan for 2022-2024** (to be viewed as National Energy Efficiency Action Plan). The Programme forecasts cumulative energy savings in the household sector until 2030 (amounting to 91.9 ktoe). As of November 2024, the 2nd Triennial Action Plan was pending adoption. The country adopted several amendments to the Law on Energy Savings and Renewable Energy from 2016 – 2021, introducing, among others – mandatory technical provisions for **energy efficiency in new residential building construction**, as well as in new construction, capital renovation or reconstruction of buildings which use state budget funds.

Although Armenia has an Energy Sector Development Strategy up to 2040 and its implementation action plan specifies targets for renewables, electric market liberalisation, regional energy network integration and nuclear energy development, **the National building renovation strategy** is missing. There are **no quantitative data** on annual renovation rate (%), annual number and type of building (public, MABs and individual housing) to be retrofitted, renovation rate's annual energy saving targets (GWh) and expected emission reduction (t C02) for 2030, 2040 and 2050, targets for the deployment of solar energy in buildings, as well as the required investments and allocation of domestic and international funding sources.

The **methodology for performing energy audits** in residential and public buildings and its standards are applied on **a voluntary basis** and, generally, are weakly enforced in the mainstream construction practice. The currently existing practice in Armenia is a mixture of EU, ISO, GOST (Russian), MSN (Eurasian Economic Union (EEU)) and national standards, and there is no clear guidance how and when the standards, or part of them, should be applied, particularly when there is a discrepancy between EU and standards. Despite challenges, the proposed interventions

to align with EU buildings and renovation legislation have the potential to stimulate market development and increase the demand for energy efficient buildings by imposing a clear and reliable method for estimating energy savings.

Table 30. Transition readiness summary

Thematic area / Gap, needs enabling conditions area	Policy and legal framework	EU approximation	Policy implementation	Institutional Capacity	Non-institutional and private capacity	Research and Innovation	Financial	Just transition
Building Renovation Planning/ Annual Energy Saving Obligation	Some progress	Some progress	Some progress	Some progress	Some progress	Little progress	Significant progress	Little progress
Regulatory Framework for EPB/ Renovation (bylaws, standards, key definitions)	Significant progress	Some progress	Some progress	Some progress	Some progress	Some progress	Some progress	Little progress
NZEB/LCBs	Little progress	Some progress	Little progress	Little progress	Little progress	Little progress	Little progress	Little progress
Exemplary role of the Public Sector/ binding EE1st Principle	Little progress	Little progress	Little progress	Some progress	Some progress	Little progress	Some progress	Little progress
Market Transformation/ ESCOs	Little progress	Little progress	Little progress	Some progress	Some progress	Little progress	Some progress	Little progress
Building Renovation Requirements for Residential Buildings	Little progress	Little progress	Little progress	Little progress	Little progress	Little progress	Some progress	Some progress
Vulnerable Households/ Energy Poverty Mitigation	Some progress	Little Progress	Some progress	Some progress	Little progress	Little progress	Some progress	Little progress
Access to Finance / Polluter Pays Scheme	Little progress	Little progress	Little progress	Little progress	Little progress	Little progress	Little progress	Little progress

3.7 Sustainable Food Systems – Agriculture and Fisheries

3.7.1 Status and Trends: main food systems problems, trends and challenges

Primary agriculture is a cornerstone of Armenia's economy, standing as the third-largest contributor to the country's Gross Domestic Product (GDP) with around 9% share, and providing livelihoods for approximately 30% of the workforce and covering 68.7% of Armenia's land area. Gross agricultural output comprised around 948 billion AMD in 2023, of which 47% from plant production and 53% from livestock production. In the first half of 2024, GDP increased by 4% compared to the same period in 2023. Self-sufficiency levels in 2023 indicate several gaps, with Armenia producing only 27.9% of its wheat needs, 8.3% of maize, 48% of pork, and 25.4 % of poultry domestically and while vegetable oil is fully imported. There is a high level of self-sufficiency in potatoes, vegetables, fruits, grapes, sheep and goat meat, eggs, and fish. Beef, pork, and milk also show above-average self-sufficiency. However, the low self-sufficiency in vital food products—such as wheat, legumes, vegetable oil, poultry, and sugar—remains a serious concern. To address this issue, it is crucial to boost the production of products with low self-sufficiency, where potential exists.[114]

In transitioning toward a market-oriented model, Armenia's agricultural sector prioritises efficiency, product competitiveness, and diversification. Nonetheless, the Armenian agri-food sector faces substantial obstacles, such as low productivity and inefficiency due to unsustainable management practices, fragmentation from early-1990s land privatisation, climate-related losses, poor infrastructure, and limited technological advancements. Additional issues include soil degradation, inadequate irrigation, pasture mismanagement, and groundwater overuse in fish farming. In addition, a major problem is that many farmers lack the knowledge and skills needed to improve their farming practices. Despite efforts by universities and organisations to offer training and capacity building, the knowledge gap still exists. Climate change also plays a big role, with weather events like frosts, droughts, and hail damaging crops. Another big issue is the lack of certified planting materials. Many farmers buy plants from uncertified sources, which often leads to viruses and pests spreading, making it harder to grow healthy crops. Irrigation is another challenge. Even though modern irrigation systems are available, farmers often do not know how to use them properly, leading to water being wasted and plants not getting the right amount. Poor land planning makes it even harder for farmers to manage their crops well. The lack of advisory services means that farmers don't know whom to approach for advice and technical support. Transportation and storage are also a problem. Poor roads and bad cold storage conditions cause crops to be damaged or spoiled before they can be sold.

[114] Statistical Committee of Republic of Armenia, 2024 "Sown Areas of Agricultural Crops, Planting Area of Permanent Crops, Gross Harvest and Average Crop Capacity for 2023"

Additionally, shortage of skilled labour, particularly during the harvest season, often results in delays and crop damage. Harvesting practices are frequently inefficient, leading to substantial food waste. Post-harvest, the situation is further complicated by insufficient storage and processing facilities, exacerbating losses. The uncontrolled use of pesticides and chemicals, combined with a lack of proper knowledge on Integrated Pest Management (IPM), poses additional barriers. Farmers generally have limited understanding of pesticide handling, sustainable management, and alternative pest control methods, such as IPM practices, biological control agents, mass trapping, and agronomic techniques. Another major challenge lies in the fragmented distribution networks. The agricultural distribution system in Armenia is highly disjointed, leading to inefficiencies and increased costs in getting products to market. The lack of coordination among stakeholders—farmers, distributors, and retailers—results in delays and substandard handling of produce. Furthermore, the absence of consistent quality standards is a notable obstacle. The lack of standardised criteria results in variable product quality, making it difficult for producers to compete in higher-value markets that demand uniform standards[115].

Collectively, these challenges weaken the competitiveness of Armenian agriculture and limit its potential for growth. Addressing these issues will be essential to strengthening the agricultural sector and enhancing its capacity to meet both local and international market demands.

Many food businesses are actively engaging in both local and international markets, investing in expanded production capacities. Key sectors within Armenia's food production industry include fruit and vegetable processing, dried fruits and spices, grape cultivation, dairy and meat processing, fish farming, bakery, confectionery and pasta manufacturing, as well as the production of mineral and drinking water, alcoholic and non-alcoholic beverages, beer, and coffee processing and packaging.

Meat production relies primarily on locally adapted cattle breeds (Caucasian Brown), which, while resilient to regional conditions, lack the productivity of high-yield meat and milk breeds. This reliance limits the efficiency and output of domestic meat production, posing challenges for meeting market demands and ensuring food security. Cattle breeding is the dominant sector of livestock farming in Armenia, accounting for 95% of the country's milk production. According to the Statistical Committee of the Republic of Armenia, as of January 1, 2024, there were 491,594 heads of cattle in the republic, of which 211,190 heads or 43 percent are cows[116]. During the last decade also with the help of Government support programmes and private initiatives, purebred high-yield animals were imported to Armenia. This helped improve the milk yield a little bit, but still the national average of milk production per cow is around 2800 kg. The portion of pure high-yield cattle is around 10-15% of the total, so more efforts are needed to establish dairy farms with such breeds[117].

[115] AMPERA, "Value Chain Analysis of Apricot, Peaches, Raspberry and Walnut", Final Report, 2024

[116] Statistical Committee of Republic of Armenia, 2024 "Sum Totals of Exhaustive Livestock Census as of 1st January, 2024"

[117] Ministry of Economy "Beef Cattle Breeding Development Programme in the Republic of Armenia for 2019-2024"

Nevertheless, production and economic indicators of cattle breeding[118] are still insufficient, one of the main reasons for which is that livestock breeding is mainly conducted in an extensive manner. The overwhelming majority of farms engaged in cattle and buffalo breeding are traditional subsistence farms. The number of the latter reaches about 111 thousand according to the 2014 Ag Census, 96% of which having up to 9 cows[119]. At the current stage of development, it is necessary to apply the modern technologies to establish modern dairy farms, which will allow increasing the milk yield of cows. The following three factors mainly affect the above indicators: feed, genetic potential of animals and behaviour[4].

The **seed and planting material system** in Armenia remains significantly underdeveloped, with major gaps across the seed breeding, production, and marketing. This lack of integration often results in a heavy reliance on imported seeds and plant materials, creating vulnerabilities in food security by increasing dependency on foreign sources for critical agricultural inputs. The primary country for cereal seed imports is the Russian Federation. The situation is even more concerning when it comes to plant materials. Although the Law on "Seed and Plant Material" was adopted in 2022, its implementation in the part of plant material certification remains stalled, leaving the country without a functional certification framework. As a result, there are no certified domestic plant materials, and only imported materials meet certification standards. This has left Armenia without certified nurseries, creating significant disadvantages for beneficiaries. In addition, during COVID period due to disrupted logistics and transportation delays, many planned intensive orchards were not established as plant materials didn't arrive on time. Many investors and farmers enlarging their orchard faced losses as the plant materials were spoiled and damaged in the containers due to the mentioned disruptions and very late deliveries. Therefore, it is important to strengthen the capacities of local nurseries and help them develop a solid base to produce certified plant materials locally. Moreover, the high cost of imported plant material creates a strong incentive to produce locally, opening opportunities for local growers to reduce expenses and support the local economy.

In 2023, Armenia's **organically certified cultivated land** covered 674 hectares, representing just 0.13% (agricultural lands excluding pastures, 540,000 hectares, out of which arable lands 450,000 hectares, orchards and vineyards 75,000 hectares and hayfields 15,000 hectare) of the nation's total agricultural area, with precise data not yet available. In contrast, land designated for ecological wild collection was more extensive, reaching 754 hectares. The certified organic farms in Armenia are solely focused on plant production, with no certified organic livestock farming currently in place, except for honey production.

The market for **pesticides and fertilisers** in Armenia faces notable constraints, creating challenges for farmers. Although a diverse range of pesticides is available locally, concerns persist regarding the quality of some products, which complicates effective pest and disease management. Data

[118] The majority of cattle breeding is concentrated in the regions of Gegharkunik (15%), Shirak (14%), and Lori (14%), driven by favourable climate and geographic conditions. In the lowlands, cattle are primarily raised using year-round manger feeding, while grazing is more common in the foothill and mountainous areas.

[119] Agricultural Census 2014, available at https://armstat.am/en/?nid=23

from the State Revenue Committee of Armenia shows that in 2023, there were 11 fertiliser producers and 4 pesticide manufacturers operating in the country—a figure that remained steady from 2022, but slightly decreased compared to 2021. Additionally, there were 168 pesticide and fertiliser retail stores, predominantly situated in the Ararat and Armavir provinces. These retailers are essential in supplying farmers with the necessary agricultural inputs. While specific details regarding the statistical data and the scale of these retailers are not readily available[120].

Armenia's agriculture is significantly dependent on imported mineral fertilisers. In 2023, the import of nitrogenous fertilisers amounted to 45,563 tonnes, representing a decrease of approximately 3,500 tonnes compared to 2020. The import of phosphorus fertilisers reached 51 tonnes in 2023, nearly three times the quantity imported in 2020. Potassium fertiliser imports totalled 946 tonnes in 2023, with minimal fluctuation since 2020. Similarly, the import of compound fertilisers remained relatively stable, amounting to 4,093 tonnes in 2023[121].

Opportunities for growth exist, especially in **greenhouse crop production and establishment of intensive orchards**. Both sectors have potential for export, particularly through the use of low-carbon technologies and organic ingredients. During the last five years about 1000 hectares of hi-tech greenhouses were established. State-subsidised greenhouses in Armenia are typically outfitted with the latest technologies and intensive cultivation methods. This initiative underscores the Armenian government's strong support for advancing modern and efficient agricultural systems, enhancing productivity and sustainability in the sector. In 2024, about 780 hectares of new intensive orchards were established in Armenia, with state compensation provided for 120 hectares. Over the past three years, approximately 3,000 hectares of orchards have been established, reflecting a significant commitment to modern agricultural practices with instalment of drip irrigation technologies, anti-hail nets, modern farm machinery and sometimes also digital weather stations.

The Ministry of Economy of the Republic of Armenia oversees policies related to livestock and aquaculture management, ensuring that **livestock and fish production** aligns with economic and agricultural goals. In contrast, the Ministry of Environment of the Republic of Armenia holds responsibility for water management and conservation within fish farms. This division of responsibilities allows water resource management in aquaculture to align closely with environmental regulations, safeguarding ecological sustainability while meeting the specific needs of the fish farming sector. Such a regulatory structure helps balance economic growth in animal agriculture with critical environmental protection efforts. In 2022, water abstraction comprised 3,071.7 mln cub. m (excluding HPSs), water use` 2,422.3 mln. cub. m (88.7% agriculture, fish breeding and forestry, 5.8%` industry, 5.5%-ը` drinking). Water losses during transit comprised 649.5 mln. cub. m 21.1% of water abstraction[122].

[120] State Revenue Committee of Armenia, 2024

[121] Tax Revenue Committee of Republic of Armenia, "Import Statistics of Products based on Product Codes", 2020, 2021 and 2023 available at: https://www.src.am/am/customStatisticsPage?id=128&selected_type=5&selected_date=Ընթացիկ

[122] Ministry of Environment, Water Resources, Retrieved from: http://env.am/en/environment/water-resurces

Fisheries

The climatic conditions in Armenia are highly favourable for industrial **fish farming**, particularly for the breeding and growth of salmonid and sturgeon species. The targeted use of groundwater resources further supports this potential, allowing for efficient commercial fish production throughout all seasons. This combination of optimal climate and reliable groundwater access provides a stable foundation for Armenia's aquaculture sector and contributes to its year-round productivity.

Armenia produces approximately 25,000 to 26,000 tons of commercial fish annually, predominantly rainbow trout, which is highly valued for its quality. This demand extends to the Russian Federation and other international markets, with around 30-40% of production exported each year. From aforementioned registered fish farms, approximately 80% of them are concentrated in the Armavir and Ararat regions. Currently, the country has 166 fish farming enterprises covering 2,886 hectares.

To implement **water-saving technologies in fisheries** there is an indirect instrument of state assistance, which is on "State assistance of leasing for financial lending of agri-food equipment in the Republic of Armenia". The main goal of the subsidy programme is the provision of business entities operating in the agri-food industry with machinery on affordable terms, in particular, using mechanisms of financial lending (leasing) of equipment. This will create preconditions for increasing production volumes of agricultural products and their processed goods, meeting the quality and safety requirements in compliance with international standards, enhancement of competitiveness, expansion of exportation volumes, as well as replacement of imported products with the locally produced.[123]

Additionally, the Law on Water prescribes that fish farms using groundwater from a borehole, need to install a closed circulation system to ensure that at least 40% of the outlet water is reused within the same basins after treatment[124].

The Ministry of Environment approved the User Guide by Ministerial Order No 262-d to regulate fish waste management and to boost recycled and bi-products from the fishery sector to contribute to a sound environment, as well as competitive and sustainable enterprises. In general, the waste from fish farms is processed and reused in slaughterhouses or as a feed[125].

[123] Government Decision No. 893-L, Adopted on July 19, 2018, Republic of Armenia. Under the programme, 50% of the down payment at 20% (which is 10% of the cost) of the leased fish farming equipment (equipment to be acquired for alternative use of water resources) can be compensated by the state. The total cost of equipment purchased within the framework of the programme should not exceed 2000.0 million AMD.

[124] Ministry of Environment, Water Resources, Retrieved from: http://env.am/en/environment/water-resurces, This is achieved by extracting no more than 60% of the total water volume permitted under the water use license, thereby saving at least 40% of the inlet water.

[125] Ministry of Environment, Water Resources, Retrieved from: http://env.am/en/environment/water-resurces

Regulation on water use by fish farms prescribes that they must be managed to prevent changes in groundwater levels, as well as issues like waterlogging or the drying out of surrounding areas. It also limits usage of water in production of fish species.[126]

Armenia's national legislation seeks to promote animal welfare; however, European Union directives on this subject have yet to be fully incorporated into Armenian law or reflected in the Comprehensive and Enhanced Partnership Agreement (CEPA). The Food Safety Inspectorate, as part of its 2024 Annual Activity Plan, has proposed several initiatives to **enhance animal health and welfare**. These measures include formulating a comprehensive strategy for the prevention and eradication of brucellosis and murrain disease, monitoring veterinary drug residues in food products, and strengthening state oversight in slaughterhouses to ensure the safety and quality of their products. In Armenia, preventive and diagnostic measures for animal diseases are carried out annually, guided by Article 18 of the RA Law 'On Veterinary Medicine.'

Armenia also has an annual programme on vaccination of agricultural animals aimed at ensuring a stable epidemiological situation within the country targeting brucellosis and tuberculosis in cattle and small ruminants, leukaemia, anthrax in cattle and horses, foot-and-mouth disease, lumpy skin disease, and small ruminant pox, among others. The programme is flexible and subject to modification annually, depending on cases recorded in neighbouring countries and individual regions within Armenia. These measures are in line with Decision of the Government of the Republic of Armenia[127] and are crucial in ensuring the integrity of the entire food security value chain.

With regards to **slaughterhouses**, Armenia's Transformation Strategy 2050, the Government Programme for 2021-2026, and other sectoral strategies align with the goal of ensuring food security and food safety. This decision stems from the expected outcome of measure 9.6, 'Ensuring Food Security in the Republic of Armenia,' outlined in the Ministry of Economy's Action Plan for 2021-2026, approved by Government Decision No. 1902-L[128]. The primary purposes of slaughterhouses in Armenia include ensuring human health by carrying out livestock slaughter in a prescribed manner, producing healthy meat, meat products, and by-products, protecting the environment from livestock waste, consolidating livestock products and raw materials for further processing or sale, and supplying target populations with livestock for laboratory experiments. Slaughterhouses are also vital for calculating turnover and production volumes, which are an essential component of food security. There are currently some 60 registered economic operators providing slaughterhouse services in Armenia, with guidelines and regulations available for their safe operation[129].

[126] Government Decision No. 703-N, Adopted on May 22, 2003, Republic of Armenia

[127] Government Decision No. 1544-L Adopted on October 6, 2022, Republic of Armenia

[128] Government Decision No. 1902-L on November 18, 2021

[129] Food Safety Inspectorate under the Government of the Republic of Armenia. Annual Reports: Annual Activity Plan for 2024. Food Safety Inspectorate under the Government of the Republic of Armenia. https://snund.am/en/page/annual-reports/146

As the state control carried out in 2022-2023 showed, there are still risks in the sector, among which we can highlight the lack of animal tagging except cattle[130]. A new regulation prescribes that legal authority has the right to suspend or terminate operations, as well as establish regulatory standards. These changes have also been introduced into the Law on Veterinary Medicine and the Code of Administrative Offenses[131].

Slaughterhouses currently face limited popularity among meat producers in Armenia, with many farmers avoiding them whenever possible. However, there is political will to change this trend. Starting next year, there are plans to **offer subsidies to farmers who send their livestock to licensed slaughterhouses**. This strategy mirrors the approach taken by Austria 25-30 years ago when a similar situation existed. By implementing subsidies, Austria successfully encouraged farmers to utilise slaughterhouses, resulting in positive outcomes for meat quality and safety.

Food insecurity remains high, with about 30% of households, particularly in rural areas, experiencing inadequate access to food. Health and nutrition concerns are also prevalent, as obesity rates exceed regional averages: 25.6% of adult women and 19.4% of adult men are affected. Diets generally lack diversity, with protein intake often above recommended levels and average meat consumption (27 kg/year) significantly exceeding the EAT-Lancet Commission suggested 15.6 kg per year. While there has been a steady rise in the consumption of vegetables, fruits, and pulses from 1992 to 2017—outpacing both EU and Central Asian averages—meat consumption has remained consistent[132].

Nutrition remains a significant challenge in Armenia, heavily influenced by the country's socio-economic difficulties and the low-income levels of many citizens. Additionally, cultural dietary habits and limited nutrition education contribute to widespread malnutrition. Addressing these issues demands a coordinated effort involving all relevant stakeholders, including national authorities and civil society organisations. Active participation in nutrition policy development and implementation is crucial, alongside the establishment of robust accountability and monitoring mechanisms to ensure effective outcomes. The typical Armenian diet remains high in fat, and there are currently no national policies to regulate industrially produced trans fats[133].

Sustained food security can be achieved through investments in food value chains that are nutritionally focused, socially responsible, and environmentally sustainable, while also being demand-driven and profitable. A true transformation of food systems requires a comprehensive

[130] Food Safety Inspectorate under the Government of the Republic of Armenia. Annual Reports: Annual Activity Plan for 2024. Food Safety Inspectorate under the Government of the Republic of Armenia. https://snund.am/en/page/annual-reports/146

[131] National Assembly of RA, Official News, 2024 available at http://www.parliament.am/news.php?cat_id=2&NewsID=20359&year=2024&month=04&day=02&lang=eng

[132] Government of the Republic of Armenia. Decision of the Government of the Republic of Armenia No. 1083-L "Strategy on the Development of the Food Security System in the Republic of Armenia". Available at https://www.e-gov.am/u_files/file/decrees/kar/GVC4-C2D2-66AC-4391/1083.1.pdf

[133] Global Nutrition Report, 2022 Available at: https://globalnutritionreport.org/resources/nutrition-profiles/asia/western-asia/armenia/?country-search=Armenia

approach, with both production capabilities and consumer demand playing key roles. Investing in these areas simultaneously creates the conditions for transformation.

WFP's initiatives in Armenia contribute to the government's efforts to build more resilient food systems, with various components of the Country Strategic Plan (CSP) working together toward this goal. Investment in value chains is one of these components, and the lessons learned show that the full potential of these investments is realised when activities are integrated across the CSP pillars. WFP Armenia plays a critical role in boosting national food security by developing strong food value chains that increase both the quantity and quality of nutritious products for local markets. One such example is the **wholegrain wheat value** chain project implemented by the WFP Armenia office.

Below, in Box 2, there is an example of good practice:

Box 2. Good practice

The project's goal was to strengthen food systems by increasing the availability of nutritious food in the market and improving the profitability of businesses across the value chain. These initiatives not only support national food production but also generate income opportunities, contributing to Armenia's economic growth. The project focuses on empowering bakeries through improved equipment and technical training, enabling them to meet growing demand for healthy food options, while also supporting local school feeding programmes. In addition, the project promotes sustainable production practices by providing bakeries with solar stations and energy-efficient equipment, reducing operational costs and carbon emissions. Community engagement activities will drive awareness and behaviour change regarding the benefits of wholegrain wheat products, contributing to better health outcomes for schoolchildren and local communities.
WFP helps local farmers produce whole grains using a full value chain approach, connecting them with market opportunities while also equipping bakeries with the skills and knowledge to produce nutritious, high-quality bread. To encourage farmer involvement, WFP provided 44,400 kg of seeds and fertilisers for the first year of the project to 106 smallholder farmers (11% female and 89% male) in two major communities. Training on crop rotation techniques was provided to reduce the use of chemical fertilisers, thereby minimise long-term soil degradation. Five bakeries (three male-owned and two female-owned) received support to improve food hygiene and transition to more energy-efficient cooking methods. As a result, 15,100 children (54% boys, 46% girls) across two of Armenia's ten provinces have benefited from the introduction of more nutritious wholegrain wheat, replacing white wheat in their school meal programmes.[134]

[134] Wholegrain value chain development project, WFP, https://www.wfp.org/news/one-bite-closer-improved-nutrition-armenia

The core goals of the Farm to Fork (F2F) strategy are broad and encompass several areas, one of which focuses on **reducing greenhouse gas emissions**, improving soil health, and protecting biodiversity within agricultural and food systems. This comprehensive approach aligns with the European Union's broader sustainability agenda.

Armenia has set ambitious climate goals, aiming for per capita net emissions of 2.07 tCO2eq by 2050 through economy-wide mitigation measures detailed in its 2021–2030 Nationally Determined Contribution (NDC). The NDC addresses emissions sources in agriculture, including methane from enteric fermentation and nitrous oxide from fertiliser use. Complementing this, the National Action Programme for Climate Change Adaptation (2021-2024) aligns sector policies with adaptation efforts, particularly for agriculture, as part of the National Adaptation Plan (NAP). Recent policy actions also reflect Armenia's commitment to sustainable food systems, such as signing the COP28 UAE Declarations on resilient food systems and climate action in December 2023.

Despite these prospects, Armenia's agricultural and food systems currently lack updated greenhouse gas (GHG) emissions data. The latest estimate from 2019 attributes 18.8% of GHG emissions to agriculture, largely from cattle-related methane emissions and nitrogen fertiliser practices, with nitrous oxide emissions predominantly linked to manage soil activities.[135]

Forestry

A crucial regulatory framework supporting the F2F strategy on reducing the environmental impact of food systems in the Republic of Armenia is the 'Forestry Code of the Republic of Armenia.' This code establishes the competencies of authorised state administration bodies in the field of **sustainable forest management and control**, and plays a key role in ensuring that forest practices contribute to environmental protection and climate goals. The Forestry Code, which states the responsibilities of authorised state administration bodies, includes 42 key points, two of which, No. 27 and No. 40, are specifically devoted to **agroforestry**. These points are essential in regulating and supporting various aspects of agroforestry, such as the restoration and afforestation of forests, the management of seed systems, and the promotion of sustainable forest practices. In addition, they focus on the establishment of forest plantations, the expansion of nurseries, and the organisation of activities aimed at forest improvement and agroforestry development. Agroforestry is a key practice in the agroecology system as it promotes biodiversity by integrating trees with crops, which helps maintain balanced ecosystems. This practice improves soil health and water retention, reducing reliance on chemical fertilisers and excessive irrigation. Furthermore, agroforestry enhances climate resilience by sequestering carbon, lowering greenhouse gas emissions, and offering protection against extreme weather events such as floods and droughts. By emphasising these components, the Forestry Code facilitates a more integrated

[135] National Greenhouse Gas Inventory Report of Armenia 1990-2019 Submission of the Ministry of Environment of the Republic of Armenia under United Nations Framework Convention on Climate Change, 2023, http://env.am/storage/files/nir-2019-eng.pdf

and sustainable approach to forest management, which is vital for enhancing biodiversity, soil health, and the overall resilience of Armenia's agricultural and forestry sectors[136].

The table below (see Table 31) provides an overview of the EGD objectives and targets related to sustainable food systems, along with the current status and progress made in Armenia.

Table 31. EGD objectives/targets and status/progress in name of the thematic area

EGD Objectives and Targets	Relevant EGD indicators and EU level reference	Assessment indicators/ level of achievement of Armenia
■ **Halving per capita food waste at retail and consumer levels**, and reducing food losses along production land supply chains, including poor-harvest losses, by 2030. ■ **Reduction targets for ammonia and nitrates** (National Emissions Ceilings Directive; The Nitrates directive) ■ By 2030, a **reduction by 50% of the sales of antimicrobials** for farmed animals and in aquaculture (indicative) ■ By 2030, reduce **losses of nutrients from fertilisers by 50%,** resulting in the reduction of the use of fertilisers by at least 20% (indicative) ■ **At least 25% of agricultural land is under organic farming** management, and the uptake of agro-ecological	**Area under organic farming** (% of utilised agricultural area in km2) Source: Eurostat EU 2021= 9.9% **Pesticides use** – Eurostat recently published EU-level data on the sales of plant protection products (here) with detailed indicators: ■ Pesticide sale (aei_fm_ salpest09) ■ Pesticide use in agriculture (aei_pest ■ Harmonised risk indicator 1 for pesticides by categorisation of active substances (aei_ hri) ■ Pesticide sales by categorisation of active substances (aei_pestsal) **Use of Fertilizers –** Consumption of inorganic fertilizers Source: Eurostat To consider Animal Welfare	**Food loss and waste**: Food loss has decreased from 600 to 200 thousand tonnes between 2015-2022. There is generally a lack of data on food loss although one 2014 study found that for commodities like fish and eggs around 20% loss occurs in the agricultural production stage due to animal mortality. In the case of potato and wheat, losses in the production stage are 19% and 15% respectively.[137] There is no indicator of the level of food waste. In Armenia, food losses and waste throughout the supply chain have been revealed during surveys and interviews with the main participants in each stage of the supply chain. This study was conducted in 2013, and no subsequent updates have been provided since its completion. According to the study, the food loss and waste across all stages of the studied agricultural supply chain was 288.7 thousand tonnes.[138] targets on food loss and waste have been identified. Food loss has increased from 200 to 233 thousand tonnes between 2022-2023.[139] **Reduction of ammonia and nitrates**: No indicators or targets have been found. The Ministry of Environment of the

[136] Forestry Code of Republic of Armenia No ՀՕ-365-Ն, Adopted on January 01, 2024, Republic of Armenia

[137] https://www.researchgate.net/publication/291821317_Food_Losses_and_Wastes_in_the_Armenian_Agri-food_Chains

[138] Food losses and waste in Armenia, 2013 Country Report, available at https://openknowledge.fao.org/server/api/core/bitstreams/660f6d92-d447-4976-94ed-ddaf70923f52/content

[139] Statistical Committee of Republic of Armenia, 2024, available at https://armstat.am/file/article/f_sec_1_2024_3.pdf

EGD Objectives and Targets	Relevant EGD indicators and EU level reference	Assessment indicators/ level of achievement of Armenia
practices is significantly increased (indicative) ■ **Reduce by 50%** the overall use of – and risk from – chemical **pesticides** (indicative)	indicators (not yet available at EU level)	Republic of Armenia has adopted a new decree on 18 June 2024. This decree is based on the requirements of the updated Water Code of Armenia, and aims to establish criteria for defining nitrate-vulnerable zones and the measures to be taken to reduce nitrate pollution. To reduce nitrate pollution from agricultural activities, the decree introduces restrictions on the use of nitrogen fertilisers and the storage of livestock manure, taking into account the type of soil and slope, climatic conditions, rainfall, irrigation and agricultural practices.[140] **Sales of antimicrobials:** No indicators or targets have been found. **Reduction of usage of fertiliser**: No targets and indicators on pesticide use were identified by the expert. However, Armenia imports almost all its chemical fertilisers. In 2022, the import of nitrogenous fertiliser was equal to 47,611 tonnes which is almost two times less than in 2018. Armenia's agriculture is significantly dependent on imported mineral fertilisers. In 2023, the import of nitrogenous fertilisers amounted to 45,563 tonnes, representing a decrease of approximately 3,500 tonnes compared to 2020. The import of phosphorus fertilisers reached 51 tonnes in 2023, nearly three times the quantity imported in 2020. Potassium fertiliser imports totalled 946 tonnes in 2023, with minimal fluctuation since 2020. Similarly, the import of compound fertilisers remained relatively stable, amounting to 4,093 tonnes in 2023. **Area of land under organic farming**: The area of land under organic production is less than 1 % according to the expert opinion. According to the Action Plan 2023-2026 for the implementation of the

[140] https://www.arlis.am/DocumentView.aspx?docid=194277

EGD Objectives and Targets	Relevant EGD indicators and EU level reference	Assessment indicators/ level of achievement of Armenia
		Strategy of the Main Directions Ensuring Economic Development in the Agricultural Sector of the Republic of Armenian expansion of area of land under organic production is envisaged but exact indicator is not mentioned. In 2023, Armenia's organically certified cultivated land covered 674 hectares, representing just 0.13% of the nation's total agricultural area. **Animal welfare**: The Food Safety Inspectorate in its 2024 Annual Activity Plan included measures, such as development of a comprehensive plan for the prevention and elimination of brucellosis and murrain disease; monitoring of residues of veterinary drugs in food products produced in Armenia and imported into Armenia; proper implementation of state control in slaughterhouses to ensure the sale of slaughterhouse products. Regarding the waste management in fisheries, the Minister of Environment of Republic of Armenia, approved the User Guide by Ministerial Order No 262-d to regulate fish waste management and to boost recycled and bi-products from the fishery sector. By new regulation during inspections of slaughterhouses, officials conducting state oversight will have the legal authority to suspend or terminate operations, as well as establish regulatory standards. Starting next year, there are plans to offer subsidies to farmers who send their livestock to licensed slaughterhouses to implement water-saving technologies in fisheries there is an indirect instrument of state assistance, which is on "State assistance of leasing for financial lending of agri-food equipment in the Republic of Armenia". Under the program, 50% of the down payment at 20% (which is 10% of the cost) of the leased fish farming equipment (equipment to be acquired for alternative use of water resources) can be compensated by the state. According

EGD Objectives and Targets	Relevant EGD indicators and EU level reference	Assessment indicators/ level of achievement of Armenia
		to Law of the Republic of Armenia on the Water Code in fish farms using groundwater from a borehole, a closed circulation system ensures that at least 40% of the outlet water is reused within the same basins after treatment. It achieves this by extracting no more than 60% of the total water volume permitted under the water use license, thereby saving at least 40% of the inlet water. **Reduction of the use of pesticide**: No targets or indicators on pesticide use were identified by the expert. However, Armenia imports almost all its pesticides. In 2022, the import was equal to 2,475 tonnes, and has not increased much from 2018. Only approximately 5-7% of farms implement IPM and the approximately the same percentage applying organic practices. In addition, there is a substantial gap in many other indicators for other areas covered by the F2F strategy: for example, agriculture and food systems related to GHG, quantity of fish sourced from sustainable fisheries sources (%), including imports, water quality indicator. The latest estimate from 2019 attributes 18.8% of GHG emissions to agriculture, largely from cattle-related methane emissions and nitrogen fertiliser practices, with nitrous oxide emissions predominantly linked to manage soil activities.

3.7.2 The main enabling conditions

The **2020-2030 strategic vision for Armenian agriculture** focuses on sustainable development, innovation, and high-value production that respects natural resources, supports biodiversity, and promotes eco-friendly farming. The aim is to create healthy, ecologically clean products while enhancing the well-being of rural communities. The government is committed to a coordinated approach that emphasises resource efficiency and partnerships to address key challenges in agriculture and rural areas. The primary goals are to increase agricultural productivity, strengthen food security, adopt modern technologies, and improve income for everyone involved in agriculture: especially smallholder farmers, producer groups, processors, and exporters.

The strategy also includes practices that boost biodiversity, soil health, and efficient use of resources, such as crop rotation and organic farming. As a result, new certification procedure introduced in 2024 now requires local certifying organisations to accept national certification standards, which will simplify organic certification and help Armenian products reach broader markets[141].

The **"GREEN Armenia" Policy Dialogue with the European Union**, initiated in 2022, highlights the importance of further discussions for technical and infrastructure development to facilitate a successful green transition. Advancing the agriculture sector necessitates additional investments in human capital across various segments and levels of the agricultural market. This involves a comprehensive reform of the educational and vocational training systems to actively involve youth, enhance farmer skills, and train the next generation of Armenian agronomists, agricultural technologists, and entrepreneurs. Additional efforts are required to attract qualified specialists. The primary objective of the GREEN Armenia platform is to consolidate and streamline policies and investment initiatives with the aim of facilitating Armenia's transition to a green economy (see Box 3 for an example of advancing climate-smart agriculture in Armenia).[142]

Box 3. Advancing climate-smart agriculture in Armenia: Sustainable practices and innovation

There are some **Climate-Smart Agriculture practices** implemented in Armenia, particularly in the framework of EU Green Agriculture Initiative in Armenia (EU GAIA) project implemented by Austrian Development Agency, the best "Green and Climate smart agriculture technologies" and "Good agricultural practices" were identified and implemented. There were selected and introduced particularly those technologies and practices that are best suited for the local context that conserve natural resources, reduce GHG emissions, and improve soil quality for healthy food production without depleting natural resources.[143]

The **green technologies and good agricultural practices** that demonstrate the best sustainable approaches in agriculture address the following main directions: Improved soil management (ISM), improved crop production (ICP), organic Agriculture and post-harvest processing. The establishment of demonstration sites and agribusiness support projects were the main approaches to promote the adoption of green technologies and good agricultural practices at the farm level. In total 16 demo sites were established at beneficiaries' farms. To strengthen the technical capacities of demo sites agricultural production machinery and small agricultural equipment, as well as some smart infrastructural inputs were provided to project beneficiaries.[144]

[141] Ministry of Economy of the Republic of Armenia. The Strategy of the Main Directions Ensuring Economic Development in Agricultural Sector of the Republic of Armenia for 2020-2030, available at: https://mineconomy.am/en/page/1467

[142] Government of Armenia, 2022 Official News: The first policy dialogue of "GREEN Armenia" joint platform took place Available at: https://www.gov.am/en/news/item/10142/

[143] Climate-Smart Agriculture (Food and Agriculture Organisation of the United Nations (fao.org))

[144] AMPERA, "Value Chain Analysis of Apricot, Peaches, Raspberry and Walnut", Final Report, 2024

The EU-GAIA project aims to promote inclusive and balanced growth in Armenia's Lori, Tavush, and Shirak regions by advancing green agriculture and increasing local value creation. Through this initiative, over 200 small and medium-sized farmers have received technical assistance and access to modern equipment, enabling a transition to sustainable and organic farming practices without depleting natural resources. The EU's support prioritises innovative, environmentally friendly, and resource-conscious agricultural methods, ensuring healthier and safer products for consumers. Additionally, approximately 20 agribusinesses involved in the herbs value chain, along with other farmers from neighbouring Shirak regions, now benefit from two newly established agricultural production hubs. These hubs adhere to "Green" standards and offer comprehensive services, including the production and supply of herb seedlings and seeds, soil pre-cultivation, high-efficiency seeding, seed cleaning and sorting, herb cleaning and grinding, high-value seedling production and sales, as well as agronomical consultancy. This integrated approach enhances sustainability and value within the agricultural sector. Another example is the piloted modelling project related to Green Agriculture on implementing precision agriculture services by using agri-drones in Lori province.[145]

Armenia's green transition also gained momentum with the country's **membership in the International Union for the Protection of New Varieties of Plants** in 2024. Armenia became the 79th member of the International Union for the Protection of New Varieties of Plants (UPOV), which offers a unique legal framework for plant variety protection. By introducing plant breeders' rights, Armenia opens up opportunities for sector growth and societal benefits, including enhanced breeding practices, access to improved plant varieties, foreign varieties and technologies, increased genetic diversity, and expanded seed and plant material exports. Additionally, this aligns with political commitments, including the CEPA agreement.

New modern **soil laboratories** have been established in the regional colleges/branches of ANAU in Vanadzor, Gyumri, Sisian and Yerevan, funded by the EU-GAIA initiative, and WFP. These laboratories are essential in enhancing agricultural standards, ensuring soil quality, and promoting sustainable farming practices in Armenia.

Seed certification in Armenia is governed by the "Seed and Plant Material" law and supporting regulations, including government and Ministry of Economy directives. The system was last updated in 2022. Seed certification procedures are partially aligned with the standards of the International Seed Testing Association and are based on Russian standards, which are officially recognised in Armenia. Seed certification in Armenia is done by the "Centre for Agricultural Research and Certification" state non-commercial organisation, under the Ministry of Economy of RA. The organisation has laboratories in Armavir, Gegharkunik, Shirak and Syunik regions of Armenia.

An additional, enabling condition is the **gradual adoption of drone technology** for fertiliser application, particularly crop dusting. In Armenia, organisations such as "Sky Agro" LLC provide

[145] Green Agricultural Initiative in Armenia, 2023 Retrieved from: https://gaiaarmenia.am/en/

these innovative services. Traditional spraying and fertilising methods present significant challenges for farmers and agronomists. These challenges include difficulties in navigating Armenia's complex terrain, especially in wet soil conditions, and the high costs associated with purchasing necessary materials. Furthermore, the effectiveness of traditional spraying methods is often limited due to uneven application and incorrect concentration of fertilisers or pesticides.

In **precision agriculture** there are numerous advantages by utilising technology to optimise farming practices. Usually it increases efficiency, yields, productivity and it provides environmental benefits and cost savings. Increasingly, farmers are drawn to this targeted approach, which allows precise application only where fertilisers are needed and in optimal amounts, called as: variable rate technology. For now, it is not possible to get this kind of service from suppliers in Armenia however in their plans are to provide it as well. This reduces over-application, minimises waste, and lowers overall fertiliser and plant protection chemicals consumption, helping prevent excess chemicals from seeping into groundwater and local waterways, thereby reducing pollution and protecting aquatic ecosystems.

The Ministry of High-Tech Industry of the Republic of Armenia actively supports the technological sector through various initiatives that positively affect the broader tech sector including the agritech and biotech. One key initiative is the "Neruzh" program, which aims to promote professional repatriation to Armenia. Over the years there were several agritech and biotech startups supported and promoted in the scope of Neruzh program[146].

3.7.3 The main gaps in green transition

The green transition, while essential for sustainable development, faces several gaps and constraints that hinder its progress. These barriers include insufficient policy frameworks, limited access to green technologies, which hinder the widespread adoption of sustainable practices. Additionally, a lack of coordination between different sectors, limited awareness and education on green issues, and resistance to change from traditional industries further exacerbate these challenges. Addressing these gaps is crucial to ensuring that the transition to a greener economy is both effective and equitable for all stakeholders.

Organic farming

The decline in the number of farmers applying for organic certification in Armenia can be attributed to the lack of direct government support for organic agriculture. Support has primarily come from international donors, but this funding does not lead to sustainability in the sector and has decreased in recent years. As a result, organic farming is not widely embraced by the majority of the Armenian population, which has impacted organic seed production as well. Seed producers are not prioritising organic seeds. On the other hand, there is a pressing need to digitalise seed

[146] Neruzh Diaspora Startup Program, Available at: https://hightech.gov.am/en/projects/annual/neruzh

certification procedures to improve services for beneficiaries and to streamline databases for implementing agencies. Key improvements should include a robust documentation system and the establishment of a digital platform for variety registration and laboratory testing.

Demand for organic products is growing in global markets, but supply remains limited. Increasing local organic production by small farmers will not only benefit their livelihoods but also the position of Armenia as a leading producer of high-quality goods. One of the key points in strategy is expanding organic production, establishing geographical indications, and strengthening quality control systems. Additionally, the country faces challenges with the absence of high-yield varieties, which negatively affects food security. The sector suffers from a lack of investment, insufficient scientific resources, and specialised laboratories, and there is a significant gap in seed production statistics. Research and science are not adapted to production of seed taking into consideration climate change, except that there are cases that seeds that are more drought resistant are being introduced into production. A comprehensive database for endemic and not endemic plant varieties should be created, with each variety being detailed for better tracking and management.

Fertilisers

Armenia's agriculture heavily relies on imported mineral fertilisers, particularly nitrogen-based ones, which creates several challenges. To support this, the Armenian government subsidised nitrogen, phosphorus, and potassium fertilisers, spending approximately 3.7 billion drams in 2022. Concerns over product quality, coupled with limited expertise and insufficient statistical data, complicate effective pest and disease management, leaving the sector more vulnerable to risks. This highlights the urgent need to improve access to high-quality pesticides and fertilisers, as well as to offer better training for retailers to ensure proper distribution of fertilisers. Farmers are generally uninterested in soil analysis and laboratory testing, and pesticide application is not adequately monitored. The use of pesticides is often excessive, with no reliable statistics on the matter. Additionally, there is no national system in place to track pesticide-related health incidents[147]. Integrated Pest Management (IPM) is not widely practiced, and according to the "Scientific Centre for Risk Assessment" CJSC, only approximately 5-7% of farms implement IPM and approximately the same percentage applying organic practices.

A potential strategy to reduce dependency on imports is to incorporate organic fertilisers alongside current practices. Analysis shows that organic fertilisers, derived from manure and bio-waste, can fully replace mineral options. These organic alternatives are more sustainable, environmentally friendly, enhance soil fertility, boost crop yields, and decrease pollution. However, despite these advantages, the production and use of organic fertilisers in Armenia are still in the early stages.

The agricultural sector struggles to transition to organic farming due to the scarcity of certified organic inputs and the absence of centralised support resources for farmers. Despite some use of

[147] AMPERA, "Value Chain Analysis of Apricot, Peaches, Raspberry and Walnut", Final Report, 2024

organic fertilisers, these practices have not significantly affected the habits of farmers. Encouraging the production of organic fertilisers in Armenia presents a cost-effective and environmentally sustainable alternative.[148]

The Food Safety Inspection Body (FSIB) under the Government of Armenia (GoA) is responsible for enforcing state control and legislative regulations related to food safety, veterinary services, and phytosanitary standards. The FSIB conducts oversight as mandated by Armenian legislation, applying disciplinary measures if any violations are detected.

The **lack of human resources is another significant constraint.** There is a significant shortage of professional advisors, such as agronomists and extension agents, to provide guidance to beneficiary farmers and businesses. Additionally, many farmers and other value chain participants lack the specialised knowledge and skills required for effective agricultural practices, including the latest technologies, techniques, and sustainable methods. This lack of awareness extends to new agricultural innovations, resulting in non-sustainable and improper land use, which reduces productivity, degrades soil quality, and causes other adverse effects. Farmers are often unaware of the regulatory framework, available state support programmes, disease management protocols, climate change mitigation strategies, and sustainable agricultural practices. Only a limited number of farmers have access to modern training and practical skills, leading to the misuse of inputs, inappropriate technology adoption, and reliance on manual labour instead of mechanisation—factors that reduce both productivity and efficiency.

The agricultural sector in Armenia also faces constraints due to the limited availability of **professional agronomists and plant protection specialists**. Collaboration and knowledge-sharing initiatives between farmers and experts from scientific and academic institutions, such as ANAU, are infrequent. This gap in expertise restricts farmers' access to sound advice on effective management and disease control, causing many to depend on outdated or unsuitable methods, which negatively impact crop health and yields. The lack of professional services further hampers the adoption of advanced agricultural technologies and innovations necessary for enhanced productivity and sustainability.

Absence of public extension service and lack of private extension services, which are vital for spreading knowledge and best practices among farmers, is a huge barrier for development. These services are underdeveloped and insufficient to address the agricultural sector's increasing demands. This deficiency creates a disconnect in the dissemination of modern farming techniques, climate-smart practices, and new innovations. As a result, farmers are frequently left without the essential support to optimise their operations, leading to stagnant productivity and limited progress in sustainability.

[148] Several local organisations, such as Vipeco LLC, Orwaco CJSC, Eco Plant LLC, Zulal Agro, and MAquaponics LLC, produce organic and eco-friendly products, which, if supported and promoted, could increase production volumes and foster wider adoption in Armenia. This could also open up future export opportunities. These companies use various methods, including bacterial processing of manure and fish waste, biotechnology (as seen with GreenFarm LLC or Vipeco LLC), and Californian worms for producing fertilisers and bio-humus (like Orwaco CJSC). Supporting these enterprises with resources and incentives could help them scale up production and access larger markets

Implementing the F2F strategy requires skilled professionals capable of navigating complex regulations and driving the necessary reforms in agriculture and food sectors. Armenia's capacity-building efforts have been insufficient, and there is a pressing need for targeted training and development to support the green transition. Additionally, there are no extension services, which are crucial for transferring knowledge about sustainable practices to farmers. Without these services, farmers may be reluctant or unable to adopt new practices that align with EU sustainability goals.

A key hindrance to transformation is also the **lack of financial and human resources at the institutional level.** The responsibilities for F2F initiatives are spread across multiple ministries, and while their mandates are clear, they may require further alignment to effectively meet EU goals. Institutional and human capacity is notably lacking at national, regional, and local levels in the area. Additionally, stakeholder engagement and communication within institutions are insufficient, and inter-sectoral collaboration is weak. In some cases, the enforcement of regulations is also inadequate.

3.7.4 The analysis of the crosscutting issues

Armenia is committed to the green transformation of its economy. In line with national policies and international treaty obligations, Armenia's efforts to transition to a green economy involve strategic investments and comprehensive reforms.

Finance

Building a robust market for sustainable F2F investments in Armenia necessitates the development of sufficient scale, liquidity, transparency, and diversification. These elements are crucial to attract both domestic and international investors, fostering the financing of a comprehensive range of private and public-sector initiatives aligned with the SDGs and Nationally Determined Contributions (NDCs)[149].

To date, sustainable financing in Armenia has predominantly relied on special programmes initiated by IFIs and donor organisations. The majority of adaptation funding in Armenia has been sourced from International Financial Institutions (IFIs) in the form of grants, while concessional loans, blended financing, and other instruments have predominantly supported mitigation efforts. Armenia has developed significant ties with the global sustainable finance network, collaborating with key entities such as IFIs, Multilateral Development Banks (MDBs), and organisations like the Sustainable Banking and Finance Network. Commercial investments (FIs) have heavily leaned on support from IFIs, facilitated through various programmes, often complemented by technical assistance. These facilities typically come as concessional support.[150]

[149] Central Bank of Armenia, 2023 National Sustainable Finance Roadmap of Armenia. Available at: https://www.cba.am/EN/pmessagesannouncements/National_Sustainable_Finance_Roadmap_06.10.2023.pdf

[150] Central Bank of Armenia, 2023 National Sustainable Finance Roadmap of Armenia. Available at: https://www.cba.am/EN/pmessagesannouncements/National_Sustainable_Finance_Roadmap_06.10.2023.pdf

Transitional finance in Armenia spans a diverse array of topics within the agri-food sector. This includes financing initiatives to facilitate the transition toward sustainable agricultural practices, such as startup funding for organic farming, IPM promotion, greenhouses, drip irrigation, intensive orchards, innovative and digital technologies. Additionally, support for SMEs in the agri-food sector is provided through various mechanisms, including loans, grants, and technical assistance. Furthermore, transitional finance extends to investments in post-harvest infrastructure and logistics, encompassing projects related to cold storages, equipment, transportation infrastructure, and more.

Now there are several state support programmes and state-subsidised loans provided by the government supporting the livestock sector, horticulture and farming, and leasing for agri-food equipment. However, since no sustainability criteria have been implemented within the loan and project designs, their attribution towards F2F-related activities and projects is challenging.

In Armenia, numerous financial institutions participate in government-developed and government-implemented subsidy projects. ACBA Bank and ACBA Leasing play a significant role among financial institutions, offering a variety of loans and initiatives directly or indirectly supporting sustainable agriculture.

VAT exemption on primary agricultural products, organic products and goods produced in Armenia can contribute to the growth and development of the agricultural sector, improve food security and support rural livelihoods. However, more policy actions are needed to increase effectiveness of the support and equitable distribution of benefits across the agricultural value chain. To sum up, although the elements of transitional finance are present within Armenian F2F-related sectors, the overall level of performance is low.

A review of the state budget laws from 2022 to 2024 indicates that the Government is starting to increase the funding of the agriculture and related sectors that are under the F2F thematic area. In general, within the agriculture sector, irrigation schemes and infrastructure get considerable funding from the state budget and donor resources, however it is not clear what share of those funds regard the climate adaptation activities. In general, finances do not cover the entire food chain of the F2F thematic area: food production, transport, distribution, marketing and consumption.

Digitalisation

To enhance the competitiveness of Armenian agriculture and to facilitate the green transformation towards digitalisation of various processes in the sector, it is essential to expand the use and effective implementation of modern technologies. This can be achieved through investments in digital agricultural infrastructure, such as creating a register of agricultural holdings, developing a system for numbering and tracking animals, and digitising the ministry's activities and advisory systems (non-existent at present, but under consideration for future implementation). In parallel, technological modernisation (non-digital) should focus on introducing innovative technologies

across various agricultural sectors, including modern hail protection and irrigation systems, advanced greenhouses, and post-harvest technologies.

One of the examples of so is the 'Numbering and Registration Programme for Cattle' project, which was launched in 2022[151], with the aim to establish a new and effective system for preventing and controlling infectious diseases that are common to both animals and humans. This programme will contribute to maintaining a stable animal epidemiological situation, ensuring traceability through a centralised database, controlling the movement of animals, and providing a foundation for targeted government initiatives. Ultimately, it will support the sustainable development of the livestock sector.

AI-powered predictive analytics is already making inroads into agribusinesses, enabling farmers to gather and process more data in less time. AI can also analyse market demand, forecast prices, and determine optimal times for sowing and harvesting, soil health, monitoring weather conditions, and recommending the application of fertilisers and pesticides. The implementation of AI in sustainable farming offers significant benefits, but there are challenges to address. While AI solutions prove cost-effective in the medium-to-long-term, the initial investment can be prohibitively expensive, posing a challenge for many financially struggling farms, particularly small-scale farmers and those in developing countries. The adoption of AI may be currently impractical for these farmers.

Despite the challenges faced by small-scale farmers in adopting modern technologies, innovative platforms like AgroTwin and iFarms are emerging as practical solutions to bridge the gap, providing farmers with accessible tools to optimise farm operations and improve decision-making.

Within a project implemented by ICARE Armenia with the support of USAID, a digital twin technology for agriculture – AgroTwin was developed as an innovative and comprehensive platform for effective in-season crop management and optimisation of farm operations. It will allow policy makers, farmers and agricultural researchers to model, simulate, plan, analyse for efficient decision making, optimal policy making, for improved food security and making farming more sustainable.[152]

The integration of digital technologies in agriculture is likely to create a range of new job opportunities centred around these advancements. Precision farming is expected to be pivotal in establishing and maintaining smart farms, introducing innovative automation techniques, and managing various technological processes. Although the use of drones is well-established internationally, their adoption in Armenia is yet considerably slow, although local farmers gradually understand their benefits.

[151] Government Resolution No. 954-L, dated June 11, 2020

[152] The project is implemented by Several data dashboards (e.g. Drone RGBI imagery and Vegetation Indices (such as NDVI, SAVI), Sentinel and Planet Scope imagery and vegetation indices, weather and soil data, cadaster maps, IoT sensors, etc.) are being developed within the AgroTwin platform These different dashboards will monitor the progress of the fieldwork, visualise live feeds from digital weather stations and summarise key indicators on the map.

These technologies help improve sustainability and efficiency in crop management. As smart agricultural machinery continues to evolve, even traditional equipment like tractors is expected to become more sophisticated, incorporating advanced technology to improve control and efficiency.

Currently, several incubation programmes are supporting the growth of AgriTech startups in Armenia, helping them secure a stable place in the market. One notable programme is the ANAU AgriTech Incubation Program[153]. Another key initiative is the ACBA Federation Fellowship program, run in partnership with Impact Hub Yerevan[154]. TUMO Labs offers a 12-week Technology Incubation Programme focused on AgriTech, while the AUA Entrepreneurship and Product Innovation Centre (EPIC) also supports AgriTech and life sciences startups by providing a collaborative ecosystem with facilities, programmes, and a network of mentors, advisors, and investors. Agritech sector also participates in major events, such as the Entrepreneurship World Cup (EWC) and the Sevan AgriTech Summit, held as part of the Sevan Startup Summit 2024, focused on AgriTech[155].

Gender Issues

The gender distribution within this sector shows that approximately 55% of the workforce (121,000 workers) were male, while around 45% (99,000 workers) were female. Economic empowerment of women is a key goal of the 2030 Agenda for Sustainable Development. The United Nations has highlighted that women lag behind men in business ownership, business size, and access to economic resources. Armenia's Women, Business and the Law Index score was 87.5 in 2023, indicating progress in legal reforms protecting women's rights. However, the Global Gender Gap Report 2023 shows that only 18.1% of firms in Armenia have majority women ownership, and women hold top management positions in only 19.1% of firms.

According to the Asian Development Bank's 2019 Country Gender Assessment of Armenia, women constitute 53% of the agricultural workforce, while men make up 47%[156]. (Asian Development Bank, Armenia: Country Gender Assessment, ADB, Manila, 2019)

In addition, the "Women Leading in Rural Entrepreneurship in Armenia" initiative, part of the USAID-funded RED-NEO Program, trained over 2,300 rural women in diverse areas including Integrated Pest Management (IPM), sustainable agriculture, aquaponics, and greenhouse management. The USAID RED-NEO programme survey indicated that about 28% of women in rural areas have engaged in agripreneurial activities in the past two years or plan to start a business soon.

[153] The initiative provides science and technology-backed solutions to address agricultural challenges both locally and globally. Established in May 2019, the programme has fostered innovation and ecosystem development in AgriTech, with its first batch launched in September 2019, followed by the second batch in May 2020. The third and fourth cycles, funded by the EU and co-funded by the Austrian Development Cooperation (ADC), had an overall prize fund of EUR 70,000, attracting over 350 applicants and 60+ participants

[154] https://acba-federation.am/hy/acba-federation-impact-hub-yerevan-fellowship-welcome

[155] Sevan Startup Summit, available at https://www.seasidestartupsummit.com/sevan2024/

[156] Asian Development Bank, Armenia: Country Gender Assessment, ADB, Manila, 2019, https://www.adb.org/ documents/armenia-country-gender-assessment-2019

The current gender structure is far from being equal, as women are more heavily represented in the professions, which provide lower income, which contributes to the wider gender pay gap[157].

The increasing involvement of women in business continuously grows, yet several obstacles still hinder their active participation in value chains. Female farmers often face significant difficulties in accessing essential resources such as land, credit, and agricultural inputs. These barriers restrict their productivity and economic empowerment, ultimately limiting their potential to contribute to the overall growth and competitiveness of the agricultural sector. Furthermore, women often lack access to vital support networks and associations that offer mentorship, advocacy, and peer collaboration. This lack of support limits their ability to obtain crucial information, resources, and opportunities, thereby hindering their growth and success.

Employment in the Sector

According to the Statistical Committee of the Republic of Armenia, 57% (220.1 thousand) of the total workforce (1 184.6 thousand, employed between the ages of 15 and 70) in 2023 was working in the agricultural sector (including forestry and fishing). Males comprised about 54% (120.4 thousand workers) of the workforce in the sector[158].

As society transitions toward healthier and more sustainable diets, farmers with arable land may benefit from emerging market opportunities driven by the growing demand for plant-based foods. This shift is also anticipated to stimulate job growth in sectors focused on plant-based products and innovative alternatives, particularly in research and development. The rising demand for plant-based foods, including meat substitutes, could foster new business opportunities for companies. Furthermore, the adoption of healthier and more sustainable lifestyles is likely to yield additional socio-economic advantages, such as reduced public healthcare expenditures.

As farmers transition from conventional to organic farming methods, they often need to hire additional labour for tasks such as manual weed control, crop rotation, composting, and pest management. Organic farming practices typically require more hands-on labour and attention to detail, which can create employment opportunities for farm workers.

Research and Innovation

In Armenia, there are no defined Research and Innovation priorities for agriculture, food and bioeconomy sectors of Armenia[159].

[157] Women Agripreneurship in Armenia, https://red-neo.am/wp-content/uploads/2024/04/Women-Agripreneurship.pdf

[158] Statistical Committee of Republic of Armenia, 2024, https://armstat.am/am/?nid=82&id=2706, Labour Market in Armenia, 2024

[159] For comparison, the European Commission is preparing an additional call for proposals for Green Deal priorities in 2020 for a total of around EUR 1 billion under Horizon 2020. Under Horizon Europe, it proposes to spend EUR 10 billion on research and innovation on food, bioeconomy, natural resources, agriculture, fisheries, aquaculture and the environment as well as the use of digital technologies and nature-based solutions for agri-food.

Some of the key research areas mentioned in the EU F2F Strategy are also important and relevant for the Armenian agrifood systems: developing urban food systems, increasing the availability and source of alternative proteins such as plant, microbial, insect-based proteins and meat substitutes, developing for restoring soil health and functions, developing agro-ecology living laboratories, reducing the use of pesticides, fertilisers and antimicrobials. However, in Armenia there are no defined research and development priorities as well as concrete assignments to specific scientific institutions for implementation of research in line with those state priorities. Financial support for research and development is limited, and there is no structured mechanism to ensure that research findings are effectively utilised for policy development or commercialised in the industry. As a result, research institutions and organisations operate largely based on their own understanding and self-defined priorities, with occasional minor guidance or instructions from the government. This lack of a coordinated national research agenda hinders the development of a cohesive and impactful innovation ecosystem in agriculture and food systems. Strengthening research governance, establishing structured funding mechanisms, and fostering collaboration between government, academia, and the private sector are critical steps toward enhancing Armenia's agricultural research and innovation capacity.

The Armenian National Agrarian University (ANAU) is the only higher educational institution in the agricultural sector of Armenia. ANAU has 3 scientific branches, 2 research institutes and 3 research centres conducting research and development projects aimed at contributing to the transition to sustainable and healthy food systems. Funding is coming mostly from the Higher Education and Science Committee of Armenia. Some of the ongoing research studies are the Impact of Climate Change in Armenia: A Comprehensive Approach to Plant Biodiversity, evaluating the efficiency of cultivating new grain crop varieties (barley, buckwheat, wheat) in green agriculture, assessing the vulnerability of natural forages in the arid and semi-arid regions of Armenia under climate change, and developing management strategies for their preservation[160]. Another example is the recent study conducted by the ANAU on sustainable agro-ecological practices, in particular agroforestry, with the support of the Swiss Development Agency. The study considers soil and climatic conditions, logistics, land availability, and the willingness and capacity of local communities to co-invest in innovative agroforestry and forest restoration efforts. This research project aims to provide knowledge that supports targeted policy reforms and their implementation at the local level. It will promote climate-smart forest and pastureland restoration and advance innovative agroforestry practices[161].

ANAU so far doesn't have access to Horizon 2020 or Horizon Europe funding. The capacity of state academic research and scientific centres are not strong enough to be considered for the international consortia applying for Horizon Europe calls. Although the mandates and activities of ANAU research agenda are within the EU F2F Strategy, there is not enough state funding and investments into the agricultural research laboratories and experimental facilities. There are no knowledge and technology transfer offices at the ANAU and or other scientific institutions.

[160] Armenian National Agrarian University, available at https://anau.am/

[161] Swiss Representation in Armenia, 2024 Retrieved from: https://www.eda.admin.ch/countries/armenia/en/home/aktuell/news.html/countries/armenia/en/meta/news/2023/december/switzerland-invests-10-mio-chf-for-10-year-forest-restoration-p.html

Strategic partnerships are needed for research and innovation governance engaging agrifood systems actors, public and private institutions to deliver innovative solutions for sustainable, inclusive and healthy food systems.

Overall, the progress of Armenia in the just transition within the F2F thematic area has been insufficient. There is a need to commit more to green transformation and enable sustainable financing, focus more on agriculture, technological integration and digitalisation, employment and gender dimensions, education and capacity building.

3.7.5 EU Approximation – Governance, policy and legislation

The Government of Armenia, particularly the Ministry of Economy and the Ministry of Environment, has made significant efforts to transpose the EU legal framework into national legislation. However, substantial work remains to ensure these changes are fully understood and effectively implemented by government agencies, farmers, food producers, and other stakeholders.

The Comprehensive and Enhanced Partnership Agreement (CEPA) between the European Union and Armenia, which entered into force in 2021, provides a solid foundation for aligning Armenia's legal and regulatory frameworks with the EU acquis[162]. Despite this, **the agricultural component of CEPA**, including the Farm to Fork (F2F) strategy, **is limited**. Furthermore, Armenia's membership in the Eurasian Economic Union (EAEU) presents challenges to closer cooperation with the EU, particularly in harmonising policies and standards.

Armenia's environmental and agricultural regulatory framework is generally comprehensive but still faces significant gaps. While efforts have been made in food safety, challenges persist in aligning the nutritional quality of food products with health standards to effectively address public health concerns. Efforts must extend beyond eliminating contaminants and pathogens to promoting balanced and nutritious diets that support disease prevention.

The Strategy of the Main Directions Ensuring Economic Development in the Agricultural Sector for 2020–2030 outlines Armenia's key agricultural priorities and challenges. The 2023–2026 Action Plan focuses on increasing **agricultural production, fostering rural development, and enhancing Armenia's competitiveness** in the global economy. It emphasises sustainable development, aiming to improve the economic efficiency of rural communities, increase revenues across the agricultural value chain, and strengthen food security. **Climate change adaptation, resilience, and environmental sustainability** are central principles of the strategy. In addition, **organic agriculture** plays an important role in the national strategy, supporting sustainable farming practices and environmental preservation[163].

[162] Comprehensive and Enhanced Partnership Agreement between the European Union and the European Atomic Energy Community and their Member States, of the one part, and the Republic of Armenia, of the other part. (2018), available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:22018A0126(01)

[163] Ministry of Economy of the Republic of Armenia. The Strategy of the Main Directions Ensuring Economic Development in the Agricultural Sector of the Republic of Armenia for 2020-2030, available at: https://mineconomy.am/en/page/1467.

The Government has identified several critical measures to enhance climate resilience and reduce risks in agriculture. These include establishing a national agricultural insurance system, developing and implementing effective anti-hail mechanisms, and promoting climate-resilient technologies such as drought-resistant crop varieties, modern agricultural practices, and localised smart technologies adapted to changing climatic conditions.

The current agricultural State Support Programmes (SSPs) in Armenia are designed to enhance the sector's competitiveness, sustainability, and export orientation. According to the Ministry of Economy, the primary objectives of state support for the agricultural sector include:

- **Food Security**: As a landlocked country with limited agricultural land, Armenia is particularly vulnerable to food shortages, especially during droughts or other natural disasters. State support plays a crucial role in ensuring a stable and reliable food supply.
- **Economic Development**: Agriculture is a significant contributor to Armenia's economy, accounting for approximately 9% of GDP and providing employment for about 30% of the workforce. By supporting the agricultural sector, the government aims to create new jobs, boost incomes in rural areas, and reduce poverty.
- **Climate-Smart Agriculture and Resilience to Climate Change**: Although climate-smart agriculture and resilience to climate change are reflected in Armenia's agricultural development strategy and some SSP descriptions, their emphasis within the programmes remains inconsistent. These elements appear sporadically and are not fully aligned with the country's current economic needs or the growing risks posed by climate change.
- **Environmental Protection**: Agriculture has a significant environmental impact. By promoting sustainable agricultural practices, the government seeks to protect natural resources and ensure the long-term viability of the sector.

To address these objectives comprehensively, SSPs need to be more cohesive and aligned with the pressing challenges of climate change, environmental sustainability, and economic resilience.

The following SSPs have been identified that could contribute to development of selected value chains:

1. **Loan interest rate subsidies** for the purchase of agricultural raw materials, increasing the level of access to credits by subsidising the interest rate of loans provided for the purchase of agricultural raw materials.
2. **Agricultural machinery leasing support program**, supplying the agricultural machinery through the use of leasing arrangements for the creation of favorable conditions for the effective use of agricultural land.
3. **Leasing support programme for the procurement of agri-food sector equipment**, supplying the agricultural machinery for agri-food subjects through the use of leasing arrangements. This will create prerequisites for increasing production volumes of primary and processed agricultural products, ensuring quality and safety requirements in accordance with international standards, increasing competitiveness, increasing export volumes, as well as replacing imported products with local production.

4. **State assistance** for the development of intensive horticulture, introduction of modern technologies (including irrigation) and promotion of the production of non-traditional high-value crops, promoting establishment of modern technology-based intensive orchards, vineyards and berry plantations, promotion of non-traditional high-value crop production, construction of water reservoirs, modern irrigation systems, and installation of hail-proof networks.
5. **Support Programme for Consolidation of Agricultural Lands**, promoting the increase of productivity and the reduction of cost, the creation of new jobs, the purposeful use and effective management of land, to contribute to the increase of the volume of investments in the agricultural sector and the increase of competitiveness by consolidating the small and fragmented agricultural lands.
6. **Project on insurance of agricultural crops**, policy aimed at risk management in the agricultural sector as a result of the introduction of a complete system.

There are several other state support programmes in Armenia aimed at modernising the manufacturing industry, involving high-skilled specialists, and supporting businesses in enhancing workers' skills. Although these programmes are not directly targeted at farmers, they are designed to improve the productivity and complexity of the manufacturing sector, which indirectly benefits value chain actors as well.

In 2024, Armenia achieved a significant milestone by becoming the 79th member of the Union for the Protection of New Varieties of Plants (UPOV). This also provides assurance to the European Union and other UPOV member states that Armenia is dedicated to fostering innovation in plant breeding and creating a supportive environment for breeders. This move is expected to encourage the introduction of new and improved plant varieties, benefiting both producers and consumers.

Armenia has also demonstrated its dedication to agricultural modernisation by establishing a strong legal framework for plant certification through the "Law on Seed and Plant Material." This law underpins the country's seed certification system, which plays a crucial role in ensuring the quality and reliability of seeds and plant materials used in agriculture. While the current seed certification system is partially harmonised with the rules and guidelines of the International Seed Testing Association (ISTA), efforts are ongoing to achieve further alignment with international best practices.

The adoption of the 2023-2028 Strategy on the Development of the Food Security System in the Republic of Armenia shows a commitment to addressing food security challenges and partially aligns with the objectives of the F2F approach.

Overall target of agricultural development interventions in Armenia is the improvement of agricultural production in terms of quantity and quality, promotion of higher value production and introduction of Armenian products in foreign markets. Meantime, each development and support intervention aim at specific objectives of improving the productivity and production volume, better technologies, higher value products, value chain development and many others.

Armenia adopted the Law "On organic agriculture" in 2008. The law is based on the principles of the Codex Alimentarius and regulates the production, storage, processing, transport and marketing of organic agricultural products and raw materials as well as the cultivation of wild plants. Organic farming is recognised as an important driver of export growth. The strategy sets an ambitious goal of achieving more than 5% eco-certified agricultural production by 2029. Increasing stakeholder awareness of global best practices and strengthening collaboration with the Ministry of Environment on conservation issues are essential to achieving these targets. By focusing on sustainable development, Armenia aims to enhance the resilience and competitiveness of its agricultural sector while advancing its green transition and aligning more closely with EU standards. As a consequence of the strategy action plan, a new certification procedure introduced in 2024 now requires local certifying organisations to accept national certification standards, which will simplify organic certification and help Armenian products reach broader markets.

Armenia has introduced legislative measures to reduce pollution from mineral fertilisers. As part of its commitments under the Comprehensive and Enhanced Partnership Agreement (CEPA), the country is aligning its laws with EU standards and international guidelines[164]. In terms of water quality and resource management, this includes adherence to five key EU directives: the Water Framework Directive, the Floods Directive, the Urban Waste Water Treatment Directive, the Drinking Water Directive, and the Nitrates Directive. According to Article 32 of the Armenian Water Code: "The Water Resources Management and Protection Authority is responsible for establishing criteria to identify nitrate-sensitive water resource areas and developing strategies to reduce and prevent nitrate pollution caused by agricultural activities."

To address nitrate pollution from agricultural activities, the Armenian government issued Prime Minister's Decision N 1099-A on September 27, 2022. This decision focuses on amendments to the Water Code and the National Water Programme of Armenia. The Ministry of Environment of the Republic of Armenia issued a new decree on June 18, 2024. This decree is aligned with the updated Water Code of Armenia and is designed to establish criteria for identifying nitrate-vulnerable zones, as well as the measures required to mitigate nitrate pollution. To address the impact of agricultural activities on nitrate pollution, the decree imposes restrictions on the use of nitrogen fertilisers and the storage of livestock manure, considering factors such as soil type, slope, climatic conditions, rainfall, irrigation practices, and agricultural activities. The goal is to strike a balance between the nitrogen requirements of crops and the amount of nitrogen that leaches into soil and water, thereby preventing pollution. The specific measures, tailored to the characteristics of each river basin, will be determined as part of the River Basin Management Plans[165].

The legislative package aimed at amending the Phytosanitary Law was presented by the Ministry of Economy in September 2024, with the aim to meet current requirements, such as simplifying

[164] Comprehensive and Enhanced Partnership Agreement between the European Union and the European Atomic Energy Community and their Member States, of the one part, and the Republic of Armenia, of the other part. (2018), available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:22018A0126(01)

[165] Government Decision No. N 219-Ն, Adopted on June 18, 2024, Republic of Armenia, https://www.arlis.am/DocumentView.aspx?docid=194277, The decree was developed under the EU4Environment Water Resources and Environmental Data Programme.

the registration process for pesticides and agrochemicals and separating and modernising related articles. The amendments also introduce new rules for pesticides and agrochemicals from the EU and other developed countries, as well as for pheromones of biological origin. Under the new draft, certain pesticides and agrochemicals registered in countries on a government-approved list can be imported to Armenia without expertise, ensuring timely supplies for farms and stable phytosanitary conditions[166].

Armenia has agreements with following organisations in the F2F area: WB (agriculture), FAO (animal health, plant protection, food safety, quality and security, nutrition security, and poverty alleviation), European Bank for Reconstruction and Development (EBRD) (water infrastructure), International Fund for Agricultural Development (IFAD) (agriculture), Codex Alimentarius Commission (food standards, health and fair trade), International Organisation of Vine and Wine (OIV) (grape and wine production), etc.

In 2022, the Armenian Government, in collaboration with the World Bank, the European Union, and the United Nations Development Program, initiated the "Growth and Recovery for the Strengthening, Upgrading, and Prosperity of Armenia" platform. This platform is designed to support Armenia's efforts towards sustainable development, green recovery, and overall economic growth.

In addition, there are number donor-funded projects, which could have an impact on green and sustainable agriculture in Armenia, addressing knowledge gap in agriculture, building capacity and raising awareness on circular economy, institutional support to Ministry of Economy on irrigated agriculture development, sustainable and inclusive growth in mountainous Armenia, economic resilience, innovative agriculture and similar.

In response to recent advancements in sustainable dietary practices, the government is initiating measures within the broader context of health system reforms. Initial steps include evaluating the implementation of taxes on sugary beverages and introducing regulations aimed at reducing salt content in certain foods.

In addition, a new update of "Hygienic requirements for the organisation of food for pupils in secondary educational institutions" of the Ministry of Health, on daily diet of pupils in educational institutions adheres to the core principles of balanced nutrition, ensuring an optimal ratio of key nutrients.[167]

This will be achieved through the full development of the wholegrain wheat value chain in Tavush, Gegharkunik and Lori provinces and pilot initiatives in Armavir and Kotayk provinces. The project

[166] National Assembly of RA, Official News, 2024 available at http://www.parliament.am/news.php?cat_id=2&NewsID=21093&year=2024&month=09&day=24&lang=eng

[167] "Hygienic Requirements for The Organisation of Nutrition for Students in Comprehensive Educational Institutions" N 2.3.1-02-2014 Approval of Sanitary Rules And Norms, Available at: https://www.arlis.am/DocumentView.aspx?DocID=188973

aligns with broader efforts to strengthen food systems and increase food security, nutrition, and the availability of nutritious wholegrain wheat products.

Armenia's comprehensive policies, strategies, legal frameworks, and activities are paving the way for a green transition in agriculture. Through targeted state support programmes, alignment with international standards, and collaboration with global organisations, Armenia aims to enhance sustainability, climate resilience, and innovation across its agricultural sector. These efforts are critical for achieving long-term environmental and economic goals while ensuring the sector's competitiveness in a rapidly evolving global landscape.

Key gaps

Although Armenia has made progress in aligning with the European Union (EU) standards in various sectors, significant gaps remain in the full approximation of EU agricultural and environmental policies, particularly in the context of the Farm to Fork (F2F) strategy. While the country has taken steps toward harmonising its trade agreements and legal frameworks with the EU, several key areas, such as the adoption of EU governance practices and legislation, still require substantial work. Armenia's commitment to the European Green Deal (EGD) and F2F strategy is evident, but the gap between EU targets and Armenia's status in terms of governance, policy, and legislation is noteworthy.

The 2020-2030 Strategy for Economic Development in the Agricultural Sector highlights a technology-driven modernisation approach, and the "GREEN Armenia" Policy Dialogue, initiated with the European Union in 2022, calls for further discussions on technical and infrastructure development to ensure the successful implementation of the green transition. However, financial constraints and limited technical capacity within the agri-food system present significant challenges to achieving an inclusive transition. State agencies responsible for the sector struggle to attract qualified specialists, mainly due to low salary levels.

One of the primary challenges lies in institutional capacity. Although Armenia has well-established public institutions with regulatory authority, many of these bodies lack the financial resources and human capacity necessary to implement complex monitoring and reporting systems effectively, in addition to those new initiatives.

These limitations hinder the efficient execution of EU approximation goals, especially in key areas like agricultural sustainability, food safety, and environmental protection. Furthermore, there is a noticeable fragmentation in responsibility, with the F2F initiative scattered across various ministries. This dispersion complicates the implementation of a coherent, unified strategy that aligns with EU objectives. Stronger inter-institutional collaboration is crucial to closing the gaps and ensuring alignment with EU standards.

In the agri-food sector, while roles and responsibilities are recognised, the clarity and precision needed to fully align with the F2F strategy are still lacking. Sustainable food production, processing,

and consumption, along with addressing food loss and waste, are integral aspects of the EU's F2F framework that have yet to be adequately addressed in Armenia's policies and strategies. Armenia's existing agricultural strategies primarily focus on food security and self-sufficiency, but they often overlook the broader goals of food accessibility and consumption. This narrow focus needs to be expanded to include sustainable dietary patterns, promoting healthy eating habits, and reducing food waste to safeguard public health and environmental sustainability.

One of the most significant gaps in Armenia's EU approximation efforts is the **lack of integration of agricultural and fisheries policies into the CEPA with the EU**. There is a basis for approximation in the context of fisheries, as the agreement outlines cooperation, mutual support, and actions to promote sustainable fisheries and maritime governance[168]. These provisions suggest a foundation for aligning practices, policies, and regulations in fisheries management between the parties. This limits the country's ability to fully align with the EU's agricultural and fisheries regulations. A comprehensive evaluation is needed to determine how closely Armenia's agricultural policies align with the core objectives of the F2F strategy and identify areas for improvement. For instance, the promotion of organic agriculture, reduction in pesticide use, and adoption of agroecological practices remain underdeveloped, despite being key components of the F2F framework. Without addressing these gaps, Armenia risks falling short of EU sustainability targets.

Furthermore, the absence of **regulatory and economic tools to promote sustainable practice**s presents another significant challenge. Armenia's current policies lack the economic incentives needed to support the transition to more sustainable agricultural practices, such as organic farming or the reduction of pesticide use. The state-subsidised loan programmes available in Armenia also fail to incorporate sustainability criteria, making it difficult for farmers to transition to greener practices. There are gaps in policies that support the shift toward healthy and sustainable diets, and a lack of incentives and support for stakeholders to adopt organic farming and integrate IPM. There is also a lack of provisions for eco-labelling, which would provide comprehensive information on the environmental impact of products and services throughout their lifecycle.

Similarly, Armenia lacks **tax incentives** to encourage sustainable consumption, a key component of the F2F strategy. For example, Armenia could consider implementing value-added tax (VAT) reductions or exemptions for environmentally friendly products, such as organic produce, or offering tax credits to incentivise green investments. Furthermore, businesses could benefit from tax breaks for adopting waste reduction practices, such as recycling, composting, or reusing materials. These measures would foster a more sustainable economy while encouraging both individuals and businesses to adopt environmentally responsible practices.

Financial capacity remains a critical barrier to Armenia's alignment with the F2F strategy. The country needs a comprehensive assessment to determine the funding required across different sectors of the F2F, including organic farming, agroecology, sustainable fisheries, and food waste

[168] Comprehensive and Enhanced Partnership Agreement between the European Union and the European Atomic Energy Community and their Member States, of the one part, and the Republic of Armenia, of the other part. (2018), available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:22018A0126(01)

reduction. Addressing these financial gaps is essential for achieving the objectives outlined in the F2F strategy. The existing national and international funding mechanisms within Armenia's agri-food sector are primarily focused on primary agriculture and food processing, with insufficient attention paid to the consumption side, such as dietary change and food labelling. This imbalance must be corrected to achieve a more sustainable food system.

Armenia's legislative framework also remains underdeveloped in several critical areas. While there are laws in place, such as the Law on Organic Farming, the lack of practical incentives for farmers to transition to organic methods limits their effectiveness. This illustrates the need for stronger incentives, both financial and policy-related, to encourage organic farming and other sustainable agricultural practices.

In summary, Armenia's progress in approximating EU agricultural and environmental policies is significant, but considerable work remains to be done. Key gaps include:

1. **Incomplete alignment with the EU F2F strategy**, particularly in areas like organic farming, food processing, and consumption.
2. **A lack of clear economic incentives**, such as tax breaks or sustainable financing mechanisms, to encourage the adoption of sustainable agricultural practices.
3. **A fragmented institutional framework** that hinders the effective implementation of sustainability measures.
4. **Insufficient funding for key initiatives**, particularly those that support the transition to organic farming, sustainable fisheries, food waste reduction, certification and plant breeders' rights system establishment.
5. **A lack of a robust monitoring and evaluation system** to track the progress of policies and their alignment with EU sustainability goals.
6. **A shortage of skilled professionals** and no public extension services to facilitate the transition to sustainable agricultural practices.

Addressing these challenges requires a more coordinated and strategic approach, stronger financial and human resources, and the development of a comprehensive legislative and policy framework that aligns with the EU's Farm to Fork strategy. There is still significant work required to transpose European legislation into the Armenian legal framework. This will be essential for Armenia to meet its EU approximation goals and to ensure a sustainable and resilient agricultural sector in the long term.

3.7.6 Main priorities for green transition

The agri-food sector faces serious challenges, including **water scarcity, land degradation, and the impacts of climate change**. The connection between climate change and agriculture is intricate: agriculture contributes to land degradation and greenhouse gas emissions, while climate change, in turn, undermines agricultural productivity, reducing yields. To mitigate these

risks and facilitate a green transition, Armenia must prioritise sustainable practices in agriculture and food processing, utilising innovative technologies and resource-efficient approaches.

Here are the primary priorities for advancing the green transition in Armenia's agri-food sector, tailored to its unique challenges and opportunities:

1. Sustainable Land and Water Management

Effective management of land and water resources is crucial for Armenia, which deals with pressing environmental issues like water scarcity and land degradation. The World Resources Institute forecasts that by 2040, Armenia will be the 22nd most water-stressed country, with a water stress rating of 4.6 out of 5. Without effective adaptation strategies, crop yields could decline by 8-14% by 2030. The country's irrigation infrastructure, largely constructed in the 20th century, is outdated and often fails to deliver water efficiently. Estimates from various years suggest that 40-50% of irrigation water is lost before it reaches its intended destination. The existing system is deteriorating, and in certain cases, drinking water may be used for irrigation, provided there are adequate technical capacities, financial and economic viability, proper permits, and no dedicated irrigation infrastructure.

2. Climate-Smart Agriculture (CSA)

Climate-Smart Agriculture integrates sustainability into farming practices, enhancing resilience to climate changes while boosting productivity.

Reducing Greenhouse Gas Emissions: Implementing measures to lower carbon emissions throughout the agri-food value chain. This includes reducing methane and nitrous oxide emissions from agriculture, promoting carbon sequestration in soils, and enhancing energy efficiency in production, processing, and distribution.

3. Energy Efficiency and Renewable Energy in Food Processing

Modernising food-processing facilities with energy-efficient and renewable energy solutions is crucial for reducing operational costs and carbon footprints. Solar panels, biogas systems, and energy-efficient equipment can increase Armenia's competitiveness in global markets.

4. Minimising Food Loss and Waste Valorisation

Reducing food loss along the supply chain and transforming unavoidable waste into valuable products are vital for sustainable food systems. These measures not only reduce waste but also create additional revenue and support environmental goals.

Adopting sustainable agro-ecological practices in production value chains that mitigate environmental impacts and foster sustainable production. These practices include soil preparation and health management, efficient water usage in the production of fruits, berries, and nuts, reducing food loss and waste through sustainable post-harvest and handling management, Integrated Pest Management (IPM), energy efficiency, the agrivoltaics strategy, and precision agriculture using drones.

Building Circular and Bio-based Economies: Integrating circular economy principles by recycling, reusing, and reducing agricultural waste. This includes utilising agricultural residues for compost, biogas production, or as raw materials for bio-based products.

5. Promoting Sustainable Diets and Consumption Patterns, Nutrition, Food Security

Encouraging shifts towards more sustainable and plant-based diets. This involves raising awareness about the environmental impacts of food choices, supporting local food systems, and promoting the consumption of seasonal and minimally processed foods. Ensuring a stable and sufficient food supply that is accessible, affordable, and nutritious, addressing both food quantity and quality

6. Promoting Education, Awareness, and Collaboration

Fostering Research, Innovation and Technology: Investing in research, innovation, and technology to support sustainable agriculture. This includes the development of new crop varieties, smart irrigation systems, digital tools for monitoring farm performance, and renewable energy solutions for farming operations.

Promoting behavioural change and fostering collaboration among stakeholders are critical to achieving a successful green transition. Educating farmers, processors, and consumers about the advantages of sustainable practices can facilitate widespread adoption. Collaborative platforms that unite government entities, private businesses, and international organisations can enhance knowledge exchange and improve access to funding. Initiatives supporting startups in the green agriculture and food sectors can drive innovation, while public awareness campaigns can encourage consumers to adopt sustainable consumption practices.

7. Approximation and Alignment of Legal and Policy Frameworks and Improvement of Enforcement Mechanisms

Achieving sustainable and effective governance in the agri-food sector requires the updating and harmonisation of national laws, policies, and regulations to align with best practices and standards, such as those set by the European Union or other international bodies. Integrating digitisation into this process can significantly enhance efficiency and transparency by creating centralised electronic platforms for legal documentation, compliance tracking, and reporting. Advanced digital tools can also support real-time monitoring and enforcement, ensuring consistent application of standards and reducing gaps in compliance. Furthermore, digitised systems promote accessibility, enabling stakeholders to easily access updated regulations and submit necessary documentation online, fostering greater accountability and participation.

Risks of not achieving green transition

The green transition within Armenia's agricultural and food-processing sectors is crucial for ensuring the country's long-term sustainability and resilience. The consequences of not achieving a green transition in Armenia's agricultural and food processing sectors are significant, posing risks to the environment, economy, and food security. Given Armenia's dependence on agriculture to meet food demands, any disruption in agricultural production threatens the country's food security.

Climate change worsens these vulnerabilities. Droughts, extreme weather events, and unpredictable rainfall patterns can severely affect crop yields, leading to food shortages and higher food prices, which in turn make nutrition less accessible to at-risk communities. Additionally, a decrease in agricultural output due to inefficient practices would drive up costs, further straining low-income populations.

Environmental risks are also significant. Current agricultural methods, if not updated, will continue to cause soil erosion, deforestation, and habitat loss. Neglecting nature-based solutions and sustainable land management practices risks the degradation of essential ecosystem services, such as pollination, water purification, and soil health. The ongoing reliance on fossil fuels in food processing, without a shift to renewable energy, contributes to climate change through increased greenhouse gas emissions. Inadequate waste management, overuse of chemical fertilisers, and reliance on pesticides further contaminate soil and water, harming ecosystems and public health.

The risks of failing to achieve a green transition in Armenia's agri-food systems include:

1. **Environmental Degradation**: Without adopting sustainable agricultural practices, there is a risk of soil depletion, water pollution, loss of biodiversity, and increased greenhouse gas emissions. This could lead to long-term damage to ecosystems and a decline in agricultural productivity.
2. **Reduced Food Security**: Climate change and unsustainable farming practices can disrupt food production, leading to reduced food availability, higher prices, and greater vulnerability to food shortages. This threatens national food security, particularly in rural areas dependent on agriculture.
3. **Economic Consequences**: The agricultural sector plays a significant role in Armenia's economy. Failure to transition to green practices could limit the growth of the sector, reduce its competitiveness, and result in missed opportunities for investment in sustainable agriculture, organic farming, and eco-friendly products.
4. **Loss of Export Opportunities**: As global demand for sustainably produced food increases, Armenia could miss out on export opportunities for eco-friendly and organic products, which may negatively affect trade and economic growth.
5. **Public Health Risks**: Continued reliance on harmful chemicals like pesticides and fertilisers could pose risks to public health, contributing to the spread of diseases and environmental contamination. Furthermore, inadequate attention to sustainable diets could lead to nutrition-related health issues.
6. **Reputation and Global Standing**: Failure to transition towards sustainable agriculture could damage Armenia's international reputation, especially in the context of global agreements and initiatives on climate change, biodiversity, and sustainable development.
7. **Increased Vulnerability to Climate Change**: Without a green transition, Armenia's agri-food systems may be ill-prepared for the impacts of climate change, such as droughts, floods, and changing weather patterns, which could further disrupt agricultural production and rural livelihoods.
8. **Social Inequality**: Unsustainable agricultural practices may exacerbate social inequalities, especially for marginalised communities in rural areas. Without targeted green policies,

these populations may suffer from reduced access to resources, low incomes, and poor living conditions. The social risks associated with the failure to achieve a green transition can also affect women farmers facing the greatest challenges. As the most vulnerable group within the agricultural sector, they not only lack adequate support to farm effectively, but are also more exposed to the adverse effects of the climate crisis.

Benefits of green transition in the country

The green transition offers substantial economic opportunities by fostering technological innovation and the development of sustainable business models. Armenia risks losing its competitiveness if it does not adopt precision agriculture technologies and sustainable practices, thus missing the economic benefits that accompany green modernisation.

The agricultural sector stands to gain significantly from the adoption of sustainable practices, which promote long-term soil health, enhance biodiversity, and increase resilience to climate change. These changes contribute to improved productivity and a more reliable food supply over time.

Additionally, the green transition holds great promise for future generations, offering a healthier, more sustainable world with reduced climate-related risks. It also generates employment opportunities in sustainable farming and eco-tourism, driving economic growth, enhancing resilience, and contributing to greater economic stability.

However, challenges persist for certain groups, particularly farmers relying on traditional methods and communities dependent on non-renewable resources. Some sectors may face economic disruption and will require retraining. A balanced approach, supported by effective policy, training, and investment in green sectors, is crucial to mitigate these challenges and ensure a just and smooth transition for all stakeholders.

Armenia has the potential to transform its agricultural and food processing sectors into a more sustainable, resilient, and economically viable system, securing a prosperous future for its environment, economy, and population.

3.7.7 Readiness for transition

As Armenia moves forward in its efforts toward EU approximation, assessing its readiness in key agricultural areas is worthwhile. The table below presents a comprehensive assessment of Armenia's readiness for EU approximation in the sectors of sustainable food system. It offers a structured view of key thematic areas, focusing on critical gaps and enabling conditions necessary for alignment with EU standards.

While some steps have been taken toward EU alignment, the table highlights that progress remains limited and fragmented. By examining dimensions such as policy frameworks, institutional capacity, and innovation, it serves as a diagnostic tool to guide strategic planning. It reveals areas where foundational work is required to address systemic challenges and foster a solid approach to achieving EU alignment. How much is Armenia ready for transition: the table below provides some insights.

Table 32. Transition readiness in the food systems sector in Armenia

Thematic area / Gap, needs enabling conditions area	Policy and legal framework	EU approximation	Policy implementation	Institutional Capacity	Non-institutional and private capacity	Research and Innovation	Financial	Just transition
Seed and Planting Material	Significant Progress	Some Progress	Significant Progress	Some Progress	Little Progress	Some Progress	Little Progress	Little Progress
Organic Production	Some Progress	Some Progress	Some Progress	Some Progress	Some Progress	Little Progress	Some Progress	Some Progress
Pesticides and Fertilisers	Some Progress	Some Progress	Little Progress	Some Progress	Some Progress	Little Progress	Some Progress	Some Progress
Aquaculture and Fisheries	Some Progress	Little Progress	Some Progress	Significant Progress	Some Progress	Little Progress	Some Progress	Some Progress
Animal health and welfare	Some Progress	Little Progress	Some Progress	Some Progress	Some Progress	Little Progress	Some Progress	Some Progress
Agroforestry	Some Progress	Some Progress	Some Progress	Some Progress	Significant Progress	Little Progress	Some Progress	Little Progress
Green Technologies and Precision Agriculture	Some Progress	Some Progress	Some Progress	Some Progress	Significant Progress	Some Progress	Some Progress	Some Progress
Sustainable Land and Water Management	Some Progress	Some Progress	Some Progress	Significant Progress	Some Progress	Some Progress	Significant Progress	Some Progress
Climate Smart Agriculture	Some Progress	Some Progress	Some Progress	Some Progress	Some Progress	Some Progress	Significant Progress	Significant Progress

Thematic area / Gap, needs enabling conditions area	Policy and legal framework	EU approximation	Policy implementation	Institutional Capacity	Non-institutional and private capacity	Research and Innovation	Financial	Just transition
Sustainable Diets and Nutrition	Little Progress	Little Progress	Little Progress	Little Progress	Some Progress	Little Progress	Some Progress	Little Progress
Food Loss and Waste	Little Progress	Little Progress	Little Progress	Little Progress	Little Progress	Little Progress	Little Progress	Little Progress

Stemming from all above, Armenia's readiness for EU approximation in the green transition exhibits varied levels of progress across thematic areas. The policy and legal framework demonstrate moderate to good development, with areas like Seed and Planting Material, Sustainable Land and Water Management, and Organic Production achieving notable progress. However, alignment with EU standards remains at an early stage across most fields, scoring consistently low. Policy implementation faces significant challenges, particularly in Sustainable Diets and Nutrition, and Food Loss and Waste, while Institutional Capacity shows better results in fields such as Climate Smart Agriculture and AgriTech.

Non-institutional and private capacity remains a critical gap, particularly in the foundational sector such as Seed and Planting Material. Research and innovation efforts are uneven, with high potential noted in AgriTech but limited advancement in key areas like Agroforestry and Sustainable Diets. Financial readiness remains a pressing issue, with most sectors requiring substantial investment to bridge gaps. While some areas, such as AgriTech and Sustainable Land and Water Management, demonstrate encouraging momentum, others lag behind in fostering a just transition. Overall, while Armenia has made initial strides, a cohesive strategy addressing capacity-building, funding, and innovative practices is essential for significant progress toward the EU's green transition goals.

3.8 Transport and Urban Development

3.8.1 Status and trends

Transport is a critical sector for achieving GHG emission reduction targets of Armenia. It accounted for around 21% of carbon emissions in 2022[169], which is below world average, however it is still significant. The transport related GHG emissions are driven by economic development, technological change, travel behaviour, transport policy, and energy efficiency improvements. In

[169] Statistic Committee of the RA

the transport sector, light-duty passenger vehicles are the major contributor to transport-related GHG emissions in Armenia.

Armenia relies on various transport modes, each holding significance in the country's overall mobility and connectivity. Road transport dominates the modal share, with a dense network of roads facilitating the movement of people and goods.

Road transport is the most important transport mode in Armenia. Armenia's Road network is 7,792 km long and comprises 1,735 km of interstate roads, 4,040 km of republican roads, and 2,017 km of local roads. Stretching over 550 kilometres, the North-South Road Corridor is one of Armenia's most strategic pieces of infrastructure. It will extend the trans-European transport network and connect the full length of Armenia, from Iran to Georgia and beyond. **Currently Armenia is not a transit country for international goods, however with North-South Road Corridor** introduction it may become, which will contribute to a significant increase of volume of road traffic, with a negative effect on greenhouse gas (GHG) emission patterns in Armenia.

The statistics of vehicle per capita shows rapid growth of personal vehicles: vehicles per capita rate in Armenia from 96/1000 ppl (in year 2007) up to 290/1000 ppl (in year 2022[170]). The growth accelerated in the past 5 years with reported 30% cumulative growth between 2018-2022. This has serious consequences in Yerevan, with increasing traffic jams in rush hours and inadequate urban infrastructure for that number of vehicles.

Fuel consumption structure in Armenia for road transport is 65% reliant on CNG fuels, and only 20% gasoline fuels[171]. At the same time, the share and popularity of battery electric vehicles is increasing.

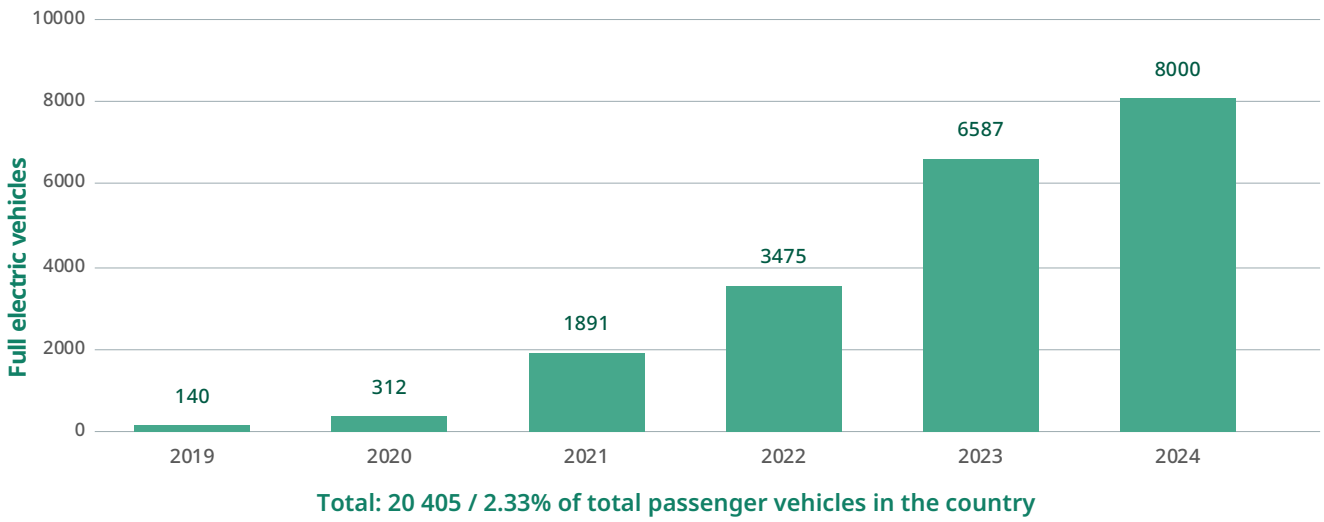
Total number of EV's imported in 2024 were at an all-time high of 8,000 vehicles (Figure 10). The share of EVs in personal use transport is increasing steadily (10% of all vehicles purchased were EV in 2023). In 2024 total quota under the tax waiver was used, and by February 2025 over 50% of quota for 2025 was already used[172]. The overall share of EVs in the personal use vehicles is estimated to be 2.5%.

[170] The Ministry of Internal Affairs, Consultant analysis

[171] Demirkhanyan, B. Emission Reduction Potential and Directions for Long Term Low Emission Development Framework of Armenia Transport Sector. Report. Yerevan, 2020. Available at: https://cc-armenia-production.s3.eu-central-1.amazonaws.com/Content/announcements/11682/Transport%20Armenia%20eng.pdf

[172] Revenue Committee of RA

Figure 10. EV import



Sources: Armenian Statistical Committee, Revenue Committee of RA

Given Armenia's reliance on imported fuels, the country is looking to its renewable energy potential, especially solar power, to support electric mobility. The country's energy generation mix includes thermal, hydropower, nuclear, and an increasing focus on solar PV capacity, aiming for up to 1,000 MW by 2030[173].

Railways are not playing a critical role in passenger traffic, while it is significant for freight. Railways provide only 0.3% (EU inland 8% share[174]) of total passenger traffic (pax-km), while rail freight traffic-based exports account for 18% of total freight tonnage and imports for 25% (total freight share in EU was 17% in EU, 2022[175]). Railways are 95 % electrified and it can have a more important role in green mobility and connectivity.

The railway infrastructure of Armenia is about 800 km (2022)[176]. The whole railway system is under a concession to South Caucasian Railways (a subsidiary of RZD)[177]. The concession agreement does not have any incentives for passenger service development.

Armenia primarily uses the broad-gauge railway track, specifically the 1,520 mm gauge, which is standard across countries in the former Soviet Union. This gauge is slightly wider than the standard gauge (1,435 mm) used in many EU countries.

[173] The International Energy Agency (IEA) has conducted in-depth peer reviews of the energy policies https://www.iea.org/reports/armenia-2022

[174] https://ec.europa.eu/eurostat/databrowser/view/tran_hv_psmod/default/bar?lang=en&category=tran.tran_hv_ms

[175] https://ec.europa.eu/eurostat/databrowser/view/tran_hv_frmod/default/bar?lang=en&category=tran.tran_hv_ms

[176] Statistic Committee of the RA

[177] The concession agreement is signed for the period 2008-2038 with the possibility to prolong the agreement until 2048.

The international railway connection is limited only to Georgia, which is not directly anymore connected by rail to Russia as the connection through Abkhazia was disrupted.

Georgia is connected to Azerbaijan and Turkey (through the Baku-Tbilisi-Kars (BTK) corridor but access for the Armenian freight rail wagons is banned for either crossing into Azeri territory at Boyuk Kesik or accessing any part of the BTK corridor which was built with Azeri money and was agreed with the Georgian Government and Georgian Railways not to allow Armenian cargo on it. While through Iran the former soviet rail connection through Julfa is going through the Nakhichevan Azerbaijani enclave is also not available for Armenia.

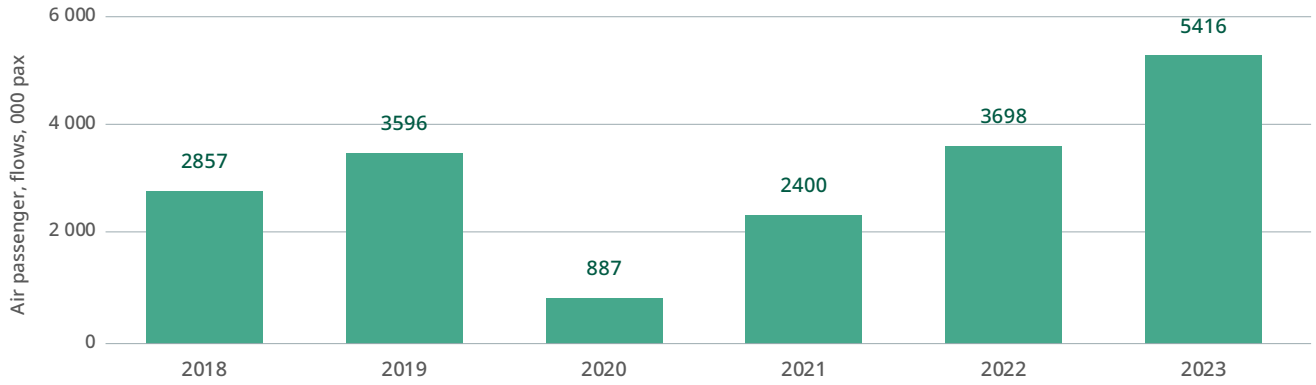
The average domestic haul is only 269km, though for international services to Poti/Batumi the distance is well above the competitive threshold of 500km that makes rail competitive to road transport. However, since most of the domestic traffic is related to bulk shipments that cannot easily switch to trucks (minerals, grains, petroleum products, chemicals and construction material) this is considered captive demand.

SCR (railway operator) provides local regular passenger service such as Yerevan – Gyumri-Yerevan and seasonal services, such as Yerevan – Shorzha – Yerevan. In the past 4 years with the introduction of faster service between Yerevan and Gyumri the demand for railways has slightly increased. There is infrastructure around Yerevan and a short distance service to Araks or Armavir that could potentially be utilised as a suburban service, but no effort has been made to develop such a service, the current service is very slow and does not attract much ridership. The international passenger services to Batumi and Tbilisi volume are small and increasing in summer season.

Air transport mode is an option that clearly is not affected by the landlocked state of the country and it has a special place for connectivity and international mobility.

Armenia has 3 main airports, including “Zvartnots”, “Shirak” and “Erebuni” airports. “Zvartnots” and “Shirak” are managed and maintained by Armenian International Airports (AIA) under concession agreement. AIA has upgraded the main international airport, “Zvartnots”, and currently the airport has an annual capacity of three million passengers in line with the current forecast in the Zvartnots Master Plan. However, it has reached its capacity limits and serviced over 4 million passengers in 2023 (see Figure 11). Currently an expansion investment plan is being negotiated between AIA and GoA.

Figure 11. Air passenger traffic



Sources: Armenian Statistical Committee

"Shirak" airport is underutilised though in 2023 it was also re-equipped. "Erebuni" airport has limited use for civilian needs.

There are about 58 flight routes to 37 countries operating from Zvartnots International Airport.[178] Regular daily flights are operated to different European, Russian, Middle Eastern and Central Asian cities, most of which have hub airports gathering multiple connectivity routes, connecting Armenia with several neighbouring countries and tourist destinations.

The Armenian Civil Aviation Organisation is still in the EU restricted list, blocking Armenian airlines from operating to Europe due to safety issues.

The market is mainly served by international airlines, however there are also Armenian carriers, the largest of which is Fly One.

Urban transport is one of the key areas where green transition can create challenges and large opportunities. In this respect Yerevan is the community with the most challenges and opportunities. Currently the municipality is in the final phase of implementation of its transport reform which includes new buses, routes, and there are plans to purchase Electric buses.

Transport safety in Armenia is a critical concern for road transport, while railways have a very good safety record. Annually there are over 1400 accidents and 200 (120 in Georgia, and 60 in EU, 2019[179],)fatalities per million population in Armenia.

Speed limits, seatbelt usage, and responsible driving play pivotal roles in safeguarding lives. The mountainous terrain poses additional challenges, requiring drivers to exercise caution on winding roads.

[178] Flightsfrom.com

[179] https://data.worldbank.org/indicator/SH.STA.TRAF.P5?locations=AM-GE&view=chart

Transport sector development and cooperation is an integral part of the Comprehensive and Enhanced Partnership Agreement between the European Union (CEPA).

CEPA sets out objectives as:

(a) expand and strengthen their transport cooperation in order to contribute to the development of sustainable transport systems.
(b) promote efficient, safe and secure transport operations as well as intramodality and interoperability of transport systems; and
(c) endeavour to enhance the main transport links between their territories[180].

CEPA sets out signing of Common Aviation Area Agreement between the European Union and the Republic of Armenia[181], which was signed in November 2021.

The main challenges

Armenia faces significant challenges in transitioning to green and sustainable mobility.

Inadequate policies towards active mobility and urban planning: The existing policies and legislation do not provide a comprehensive strategy for smart mobility aligned with the European Green Deal (EGD). While short-term action plans have been developed by different government bodies, these mainly focus on fleet renovation, new routes, and infrastructure improvements, without a clear long-term vision and rethinking of mobility. Active mobility is not targeted widely during the urban planning process. The urban planning process does not include detailed traffic impact assessment before new construction permits are issued.

Lack of coordination and cohesive policies towards e-mobility: Efforts are being made to reduce transport emissions through the promotion of electric vehicles (EVs) and favorable policies like tax waivers have been in place. These measures have led to a sharp increase in EV sales, although infrastructure, such as charging stations, remains underdeveloped. Moreover impact on individual charger installation, its safety and impact on the grid is not assessed.

Additionally, EVs are mainly imported not via official distributors and long-term maintenance of the vehicles can become an issue. In terms of charging infrastructure there is no single standard of charging stations (all standards GB/T, CCS1 and CCS2 are used).

Car ownership preference with inadequate public transport infrastructure: The motorisation rates have increased drastically which is impacting traffic, air quality, mobility (time to travel), noise and emission in the urban areas. GoA does not have a clear strategy of motorisation targets and personal car ownership versus public transport policies should be utilised. Yerevan Municipality

[180] CEPA, Article 36

[181] CEPA, Article 39

has a transport reform agenda, targeting development of public transport, currently the reform is underway.

Inefficient public transport in the urban areas: Urbanisation is concentrated in Yerevan, and main urban transport challenges are concentrated in Yerevan. Some issues and trends related to Yerevan:

- **Insufficient infrastructure planning capacity** is a hindering factor for smart mobility development,
- **Limited cycling infrastructure** is not incentivising,
- **Micro mobility is actively developing**, at the same time creating safety issues for users and pedestrians.
- Implementation of **intelligent transportation systems** is just at the initial discussion phase,
- **Digitalisation** reform of the ticketing system is at its final phase of implementation.
- **Lack of financial and fiscal capacity to invest.**

Inadequate regional transport system: There are limited public transport options between regions and the fleet used is old and inefficient in terms of fuel usage.

Underutilisation of railway for passenger transportation: railways are not utilised at its full potential for regional passenger traffic. The concession agreement of SCR does not incentivise the operator to develop passenger services, and unless GoA takes a more active role the situation will not be improved.

3.8.2 Main enabling conditions, needs and gaps

Armenia has demonstrated a solid commitment to sustainable development and environmental conservation, creating key enabling conditions for a green transition. These conditions include:

Emission Reduction Initiatives: Armenia has implemented several projects aimed at reducing carbon emissions. Key examples include:

- **Electric Buses in Yerevan**: The city has begun replacing old diesel buses with compressed natural gas (CNG) models, significantly reducing emissions and improving urban air quality. Moreover, there are plans to procure an EV bus fleet which can be about 20-30% of the total fleet of the city.
- **EV Charging Infrastructure**: Armenia has started building a network of electric vehicle (EV) charging stations, encouraging the adoption of EVs by addressing concerns around range anxiety.
- **Renewable Energy Development:** Policies supporting solar, wind, and hydroelectric energy sources are in place, fostering the transition toward cleaner energy generation and usage.

Regulatory Measures: Armenia has introduced emission standards and regulations to promote sustainability. For example:

- **CNG Buses and EV Promotion**: The introduction of cleaner public transport has already led to a measurable reduction in urban air pollution.
- **Increased Public Transport Usage**: Improved efficiency and comfort in public transport have led to higher usage rates, reducing the need for private vehicles.
- **EV importing tax waiver** helped to increase the share of EV total new cars purchased.
- **Economic Instruments**: Armenia has introduced subsidies and incentives to promote eco-friendly technologies, encouraging investment in green infrastructure and transportation.
- **International Alignment**: Armenia's policies align with both national and international objectives, including commitments under the Paris Agreement, CEPA agreement and the European Green Deal. The country's efforts to decarbonise transport and improve urban mobility support global climate goals and align with the United Nations Sustainable Development Goals (SDGs), particularly SDG 11 (Sustainable Cities) and SDG 13 (Climate Action).

Despite Armenia's progress, several gaps and constraints limit the effectiveness of its green transition:

- **Incomplete Strategy for Smart Mobility**: While short-term action plans exist, there is no comprehensive, long-term strategy for transitioning to fully sustainable mobility, especially as outlined in the European Green Deal (EGD).
- **Enforcement and Compliance Challenges**: Full compliance with environmental regulations across all sectors remains a challenge, hindering the consistent implementation of emission reduction initiatives.
- **Economic Instruments Gaps**: While economic incentives are in place, there is room for improvement. The current subsidies and incentives may need to be enhanced to ensure broader adoption of green technologies and infrastructure.
- **Technological and Infrastructure Barriers**: Limited charging infrastructure for electric vehicles. Additionally, the dominance of compressed natural gas (CNG) vehicles, while cleaner than diesel, still hampers a full transition to zero-emission transport.
- **Geographical and Cultural Barriers**: Armenia's mountainous terrain, combined with cultural preferences for private car use, poses significant obstacles to promoting alternative modes of transport like cycling and public transportation.
- **Road safety:** Armenia has one of the worst statistics in the world for accidents on the roads, and significant investments and enforcement efforts are needed to improve this situation.

By addressing these gaps through stronger enforcement, enhanced incentives, and continued alignment with international frameworks, Armenia can further advance its green transition and meet its sustainability goals.

Ownership of the task

Various ministries are responsible for green transport initiatives in Armenia, including the **Ministry of Territorial Administration and Infrastructure**, the **Ministry of Environment**, the **Ministry of Economy**, the **State Committee for Urban Development**, and **local municipalities**. However, there is no established mechanism for interagency coordination and collaboration, which limits the effective enforcement of policies.

Without a centralised framework for cooperation, these ministries and institutions often work in silos, leading to fragmented decision-making and inconsistent policy implementation. This lack of coordination hinders the development of comprehensive strategies for sustainable transport, delays infrastructure projects, and weakens the alignment of national policies with international sustainability goals. Establishing a formal system for interagency collaboration is crucial for streamlining efforts, maximising resource efficiency, and ensuring that green transport initiatives are effectively enforced across all levels of governance.

Other problems in the transport sector's institutional capacity for climate change adaptation in Armenia are as follows:

1) **Lack of Qualified Specialists:** There is a shortage of skilled professionals, and insufficient training is a key barrier to effective long-term planning and implementation of sustainable mobility policies.
2) **Weak Strategic Planning:** There is no comprehensive strategic base for sustainable and smart mobility, and transport planning is not integrated across governance levels and sectors.
3) **Limited Financial Resources:** Institutions responsible for sustainable mobility lack adequate financial and human resources, and current budget allocations are insufficient. External funding, such as from international climate funds, is necessary.
4) **Public procurement:** The existing procurement does not incentivise local governments to promote sustainable mobility, and there are no design guidelines or standards for sustainable infrastructure development.
5) **Lack of Data and Monitoring Tools:** Current data collection and monitoring systems are insufficient to track progress towards the European Green Deal (EGD) goals, and there is no unified system to measure and evaluate target achievements.
6) **Skill Gaps in Advanced Mobility Solutions:** Technical expertise and knowledge in implementing advanced smart mobility solutions are lacking, and there is no formal traffic engineering profession in the country.
7) **Insufficient Cooperation with Educational Institutions:** The public sector struggles to attract skilled professionals, and there is minimal collaboration with educational institutions to build necessary expertise.

These issues highlight the need for stronger institutional capacity, better interagency coordination, enhanced financial support, and targeted training to achieve sustainable transport goals in alignment with the EGD.

Transition to sustainable and smart mobility also involves a range of non-institutional stakeholders, each contributing through their unique capacities and resources. These actors play crucial roles in advancing environmentally friendly transportation solutions, though challenges remain in fully coordinating efforts across sectors.

1) **Private Sector (Transport Operators, Tech Companies):** Companies like Yandex Taxi and GG Taxi operate through mobile apps and can drive sustainable mobility by adopting electric or hybrid fleets and using advanced route planning. Their participation in public-private partnerships could enhance Armenia's mobility infrastructure.
2) **Academic and Research Institutions:** The National Academy of Sciences and universities like NAS RA and Yerevan State University contribute with research and innovation in areas like climate change and smart mobility. However, they require collaborations with the government and private sector to apply their findings in practice.
3) **Non-Governmental Organisations (NGOs):** ECOLUR Information NGO plays a role in raising awareness, advocating for sustainable mobility, and participating in policy discussions. Their capacity includes research, public engagement, and stakeholder coordination.
4) **International Collaboration:** Organisations like the UN, UNDP, ADB, and EBRD provide technical and financial support, helping Armenia implement eco-friendly transport systems, enhance infrastructure, and promote public transport aligned with global sustainability goals.

The cross-cutting issues in Armenia's green mobility transition can be summarised into the following key areas:

1) **Financial System Gaps** While investment grants, international funding provide some support, Armenia lacks sufficient local financing mechanisms for large-scale projects like electric vehicle (EV) infrastructure and intelligent transportation systems (ITS). Strengthening local funding strategies is crucial for long-term progress.
2) **Digitalisation and R&D Needs** Though initial digital technologies, like real-time tracking and electronic payments, are being introduced in public transport, further **digitalisation** is essential for smart mobility. Investment in research and development (R&D) for ITS and green technologies is limited, and more focus is needed on **local innovation**.
3) **Just Transition and Social Equity** A shift to green mobility may displace workers in traditional sectors. **Reskilling programmes** and educational initiatives for green technologies are essential. Additionally, rural and low-income areas risk being underserved, so infrastructure development must be inclusive to promote regional and social equity.
4) **Regulatory and Policy Gaps** Armenia lacks comprehensive **regulatory frameworks** that fully incentivise sustainable mobility. Policies need to better support EV infrastructure, adopt digital technology, and public awareness for eco-friendly transport solutions.

3.8.3 EU approximation, governance and policy

Armenia's approximation level to European Union (EU) standards and targets regarding green transition and sustainable development is a crucial aspect of its integration efforts. CEPA agreement is also sets out wide area of cooperation in the transport sector[182]. Here's an overview of how Armenia aligns with EU objectives and the gaps that exist:

1) **Governance Framework**: Armenia has made progress in aligning its governance structures with EU practices, particularly in environmental management and policymaking. However, the country still faces challenges in establishing comprehensive frameworks that ensure effective implementation and enforcement of environmental regulations, a key requirement under EU standards.
2) **Policy Alignment**: While Armenia has initiated various policies aimed at emission reduction and the promotion of renewable energy, these efforts often fall short of the ambitious targets set by the EU. For instance, the EU aims for a significant reduction in greenhouse gas emissions by 2030 and a shift towards renewable energy sources. Armenia's commitment by 2030 is not set very ambitious which is partly due to reference metrics of 1990 as set in NDC. At the same time the next planning cycle by 2040 will be very challenging for Armenia, and starting shaping strategies and policies can help to be better prepared in the future.
3) **Legislative Framework**: Armenia's legal framework for environmental protection and sustainable development is under development. Although some regulations exist, such as emission standards and incentives for electric vehicles, the depth and breadth of legislation are not yet comparable to the EU's comprehensive environmental laws. Significant gaps remain in areas such as waste management, biodiversity conservation, and climate change adaptation policies. Also, EV charging standards are not fully compatible with the EU.
4) **EU Target Comparison**: The EU aims for at least a 55% reduction in greenhouse gas emissions by 2030 and the transition to a circular economy. Armenia's current targets and efforts, while positive, indicate that it is not on track to meet similar ambitious goals. Current emissions from the transport sector still contribute over 21% of total CO2 emissions, highlighting the need for accelerated actions.

[182] CEPA, Article 37. Transport cooperation shall cover, the following areas: (a) the development of a sustainable national transport policy covering all modes of transport, in particular with a view to ensuring environmentally friendly, efficient, safe and secure transport systems and promoting the integration of transport-related considerations into other policy areas; (b) the development of sector-specific strategies in light of the national transport policy (including legal requirements for the upgrading of technical equipment and transport fleets to meet highest international standards) for road, rail, inland waterway, maritime, aviation and intermodality, including timetables and milestones for implementation, administrative responsibilities as well as financing plans; (c) the improvement of the infrastructure policy in order to better identify and evaluate infrastructure projects in the various modes of transport; (d) the development of funding strategies focusing on maintenance, capacity constraints and missing-link infrastructure as well as activating and promoting the participation of the private sector in transport projects; (e) accession to relevant international transport organisations and agreements, including procedures for ensuring strict implementation and effective enforcement of international transport agreements and conventions; (f) cooperation and the exchange of information for the development and improvement of technologies in transport, such as intelligent transport systems; and (g) the promotion of the use of intelligent transport systems and information technology in managing and operating all modes of transport as well as supporting intermodality and cooperation in the use of space systems and commercial applications facilitating transport.

5) **Funding and Resources**: Access to EU funding and programmes, such as Horizon Europe, offers potential support for Armenia's transition efforts. However, the country needs to enhance its capacity to effectively utilise these resources, aligning its project proposals with EU standards and priorities.
6) **Regional Cooperation and International Commitments**: Armenia's alignment with international commitments, including the Paris Agreement, reflects its intention to meet global standards. However, further regional cooperation and integration into broader European frameworks are essential for achieving sustainability objectives.

In summary, while Armenia has made strides toward aligning with EU governance, policy, and legislative frameworks, significant gaps remain in fully meeting EU targets for the green transition. Continued efforts in policy implementation, legislative development, and alignment with EU standards are necessary for Armenia to close the distance to EU objectives and effectively contribute to regional sustainability goals.

3.8.4 Main priorities

The risks of not achieving a green transition in Armenia's transport sector are substantial. Continued reliance on fossil fuels and inefficient transportation systems could lead to increased greenhouse gas emissions, worsening climate change impacts. Additionally, poor air quality from vehicular emissions can exacerbate respiratory and cardiovascular diseases, increasing healthcare costs and impacting public health. Economically, a lack of investment in sustainable transport solutions may hinder growth, particularly in sectors like tourism that rely on a clean environment. Socially, vulnerable communities might bear the brunt of pollution and lack of access to sustainable transport options, widening existing disparities. Furthermore, non-compliance with international environmental agreements could limit Armenia's access to funding and support for sustainable transport initiatives.

Conversely, transitioning to a greener transport sector offers numerous benefits for Armenia. Improved public health can result from reduced vehicular pollution, leading to decreased healthcare costs. Economic growth can be stimulated through investments in electric mobility and public transport, creating jobs and enhancing energy security. Social inclusion can be promoted by ensuring better mobility solutions for underserved communities, thus ensuring equitable access to economic opportunities. Additionally, compliance with international sustainability standards can enhance Armenia's global standing and access to funding for green initiatives.

To facilitate the green transition in the transport sector, the following priority needs should be addressed in the roadmap for Armenia:

1) **Strategy and coordination among stakeholders:** ensure the policies and strategies among different actors are coordinated and roles are clearly defined.
2) **Development and Integration of Sustainable Mobility Infrastructure**

- **Enhance Public Transport and EV Infrastructure**: By expanding EV charging stations and optimising public transport in urban areas, Armenia can significantly reduce CO2 emissions and reliance on private vehicles, leading to cleaner air and reduced traffic congestion
- **Invest in Active Transport Modes**: Developing infrastructure for cycling and walking promotes healthier lifestyles and decreases urban traffic, addressing mobility challenges and reducing emissions.

3) **Develop Rail Infrastructure for Passenger Transport**: Enhancing rail capacity for passenger transport reduces road congestion, lowers emissions, and provides a sustainable alternative for intercity travel.
4) **Financial Support Mechanisms**: Secure funding and investment for sustainable transport projects, including subsidies and incentives for electric vehicles. Enhance cooperation with international partners implementing joint projects.
5) **Boosting Technical and Institutional Capacity**
   - **Invest in Digital Technologies and ITS**: Utilising intelligent transport systems (ITS) optimises traffic management and transport planning, enhancing overall system efficiency and reducing operational costs
   - **Enhance Data Collection and Monitoring**: Developing transparent data systems enables better decision-making and policy implementation, ensuring effective monitoring and reporting
   - **Capacity Building and Training**: Provide training for the workforce in green transport technologies and sustainable practices.
6) **Educational and Awareness Programmes**
   - **Comprehensive Education programmes**: Building a skilled workforce through education programmes focused on sustainable mobility increases Armenia's capacity to implement green solutions and raises public awareness, fostering community support
   - **Public Awareness Campaigns**: Educate the public on the benefits of sustainable transport solutions and encourage behavioural changes.
7) **Just Transition Considerations**: Ensure that the shift to green transport does not disproportionately affect workers in traditional transport sectors, providing reskilling opportunities as needed.

By addressing these needs, Armenia can effectively navigate the challenges and opportunities in its transport sector.

3.8.5 Readiness for transition

Armenia solid commitment to sustainable development and environmental conservation has created key enabling conditions for a green transition in this sector demonstrating that **some progress** has been achieved.

These conditions include **emission reduction initiatives,** such as introducing **electric buses** in Yerevan, improving urban air quality. Moreover, there are plans to procure an EV bus fleet which can be about 20-30% of the total fleet of the city. Also installing the **EV charging infrastructure** to

encourage adoption of EVs by addressing concerns around range anxiety. Additionally, **renewable energy development**: policies supporting solar, wind, and hydroelectric energy sources are in place, fostering the transition toward cleaner energy generation and usage.

Regulatory measures are also in place as Armenia has introduced emission standards and regulations to promote sustainability. These include promotion of CNG buses and EV, with the increased public transport usage. Additionally, introduction of **EV importing tax waiver** has helped to increase the share of EV total new cars purchased.

Economic Instruments – Armenia has introduced subsidies and incentives to promote eco-friendly technologies, encouraging investment in green infrastructure and transportation.

There is **also some level of alignment** of Armenia's policies with commitments under the CEPA agreement.

Table 33. Transition readiness in the urban and transportation sector in Armenia

Thematic area / Gap, needs enabling conditions area	Policy and legal framework	EU approximation	Policy implementation	Institutional Capacity	Non-institutional and private capacity	Research and Innovation	Financial	Just transition
Transportation and Mobility	**Some progress**	**Little progress**	**Some progress**	**Little progress**	**Some progress**	**Little progress**	**Some progress**	**Little progress**

3.8.6 Note on Urban Planning and Development

By law, urban planning and development in Armenia are functions delegated to local governments. At the national level, the Urban Development Committee, under the Prime Minister's Office, is responsible for setting norms and standards and proposing legislation, including for construction. The MTAI, MoEnv, and MoEcon, also, have some role to play in the development of policies on spatial planning, land use, and urban development.[183] On final approvals of specific plans or projects, the Ministry of Internal Affairs' Rescue Services (disaster and emergency prevention and management body) also reviews plans and projects from a disaster resilience perspective.

The Law on Urban Development, first adopted in 1998, is the main regulatory document in this domain. It has gone through several revisions with the latest ones in 2024. The Law covers several

[183] Armenia's Transformative Urban Future: National Urban Assessment, Asian Development Bank (2019), http://dx.doi.org/10.22617/TCS190594-2

aspect of urban development including spatial planning, construction (including design),[184] and building maintenance.

The main planning documents for cities are the so-called "master plans." It sets out the main directions of spatial development, sets limits and requirements for urban development, offers short to long-term measures, and offers the permissible uses across the city for any given parcel. The master plan development process is regulated by construction norms[185] which focus on zoning, density of settlements, norms of green space, building height by zones, and the like. While the law expects public hearings, the process is primarily driven by experts and the municipality's political priorities.

Given their human and financial resource limitations, most communities require support to develop master plans. This often results in input from national authorities. In addition, to address local capacity limitations, there was a multi-year effort to administratively consolidate localities. By 2022, Armenia's 907 settlements were consolidated into 79 enlarged administrative units or communities.

While this has increased the administrative efficiency for many local government functions, it has also created its own challenges, esp., in the context of spatial planning given the mountainous nature of the country and accessibility issues.[186]

There are several layers of spatial planning that take place in Armenia. Two levels, the national (also called territorial) and local (master plan and zoning) are particularly relevant for spatial planning. The ambition of these plans is to prioritise:[187]

- Polycentric urban growth, to ensure a balanced spatial growth and distribution of people and opportunities;
- Inclusive governance of cities;
- Partnerships for balanced territorial development between urban and rural areas;
- Leveraging and promoting economic clusters in urban development;
- Disaster risk management including addressing the adverse impacts of climate change such as flooding; and
- Integrating ecological and cultural resources as part of new urban development strategies.

These are ambitious priorities and implementing them remains a constant challenge. They are aligned with many of Armenia's international obligations, including the Council of Europe

[184] Armenia is making advances on adopting the EU construction norms into its legislation. According to an article in Armenpress, the Urban Development Committee plans to localise and approximate in 2025 the EU norms and standards in construction (https://armenpress.am/en/article/1205442).

[185] Order #263 of Chairman of RA State Urban Development Committee on Urban Development: Design and Development of Urban and Rural Settlements, adopted 10 November, 2022

[186] Based on an interview with Urban Development Committee staff in March 2025.

[187] Urban resilience through integrated spatial planning: Armenia's key learnings for the region UN Economic and Social Commission for East Asia (28 February 2024)

Landscape Convention, which Armenia joined in July 2004. There are institutional and capacity challenges making it difficult to align these with each other.

EU-Armenia CEPA, however, does not stipulate any conditions for spatial planning. The only place in the document where the topic is touched upon is in Article 106 where it states that there shall be support and strengthening of local and regional-level authorities (including and especially cross border) to cooperate on regional policy, including through enabling legislation and capacity building measures. It then states: "The Parties will cooperate to consolidate the institutional and operational capacities of institutions of the Republic of Armenia in the fields of regional development and land-use planning …" This is the only occurrence of the term "land-use" in CEPA. There is no use of the terms "spatial planning" or "urban planning" in the context of obligations related to urban development.[188]

Over the years, there have been substantial EU contributions to Armenia's green urban development agenda, esp., through sustainable energy action plans (SEAPs), sustainable energy and climate action plans (SECAPs), and Green City Action Plans (GCAPs). SEAPs and SECAPs have been conducted within the Covenant of Mayors framework of activities. GCAPs were implemented as part of EBRD's mandate. These documents have been useful for many of the communities, though they were never systematically included in the master planning process. Overall, Armenia's regulation of master planning process does not integrate the types of sectoral tools (e.g., for energy, biodiversity, mobility, etc.) developed in the EU.

An EU urban planning tool that to date has not be used in Armenia are those offered by the New EU Urban Mobility Framework,[189] which strengthen the trans-European transport network (TEN-T) approach and utilisation of tools like the Sustainable Urban Mobility Plans (SUMPs). There is also the "bring nature back to cities," utilisation of nature-based solutions, addressing air-quality issues, and clean water and sanitation, all of which have strong urban development emphasis. The 2021 Joint Staff Working Document "Recovery, resilience and reform: post 2020 Eastern Partnership priotries" highlights these directions to develop and deepen between EU and EaP countries.

[188] The term urban planning is used frequently in the context of trade and business access to markets.

[189] EUR-Lex – 52021DC0811 – EN https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52021DC0811

3.9 Consumption patterns and awareness

There are no studies documenting the consumption patterns and awareness of citizens throughout Armenia or more specifically in Yerevan. Also, while some companies have started publishing sustainability reports periodically, the numbers of them doing so are small.

Sustainable products and industrial practices

Armenia is currently in the process of developing roadmaps to promote eco-labelling, green procurement, and other strategic documents that may support the country's green transition. Armenia has started showing some progress in eco-labelling, mainly in agriculture.

Currently, Armenia has no national ecolabel Type I.[190] It is common to see self-declared eco or green labels (Type II) that the industry representatives put on their products without any certification.

Currently, an accredited body exists in Armenia that can certify agriculture and food products, which has enabled local organisations to obtain EU-equivalent organic certification for their agriproducts. It is important to note that in energy-efficient appliance labelling and building certification, a reform process is taking place, and there are several accredited bodies.

In addition, a recent initiative is Green Key Armenia for the hospitality industry. The certification is managed by ISSD, an environmental NGO.[191] Green Key is a globally recognized eco-label that promotes sustainable practices in the tourism industry, ensuring that hotels and other accommodations adhere to high environmental standards. So far, according to the information on the Green Key website, only two hotels are certified.

Through the support received from the EU4Environment programme, Armenia is working on developing its green procurement strategy, which also focuses on green certification, labels, standards, etc. They have identified the most common goods purchased by the state and included a list of possible alternative solutions and their reduced environmental impact. There are no national strategic documents that would directly be related to eco-labels and sustainable

[190] There are three types of ecolabels. **Type I (ISO 14024)** is a voluntary multi-criteria ecolabel program assessed by an independent third party who considers the life cycle impacts of a product. Awarded certification authorizes the use of environmental labels on products and indicates overall environmental preferability of a product within a product category. The awarding body may be either a governmental organization or a private non-commercial entity. (e.g. EU Ecolabel, Nordic swan and German Blue Angel). **Type II (ISO 14021)** is a self-declared claim made by manufacturers or retailers without third-party auditing. Developed internally by companies claims can take the form of a declaration, a logo, or a commercial. **Type III (ISO/TR 14025)** an environmental product declaration consisting of quantified product information on the life cycle impacts. Instead of assessing or weighting the environmental performance of a product this type of label only shows the objective data, facilitating product comparison among buyers. (source: https://en.wikipedia.org/wiki/Ecolabel).

[191] https://greenkey.issdngo.com/en/

products; however, they are indirectly covered in some other major strategies, e.g., for agriculture or building energy efficiency.

The 2021-2026 Government Action Plan[192] includes several components on green procurement. These include:

- Identify the problems of the procurement system, including capacity development gaps, to support in the adaptation process of the role of the RA Ministry of Finance to the existing requirements, digitisation, standardisation and green procurement.
- Develop a new modern e-procurement system that will support all customers by providing the possibility of automatic collection, generation, and analysis of all data.
- A 20% average annual increase in green and sustainable procurement in total government procurement value starting in 2024.
- Increase the share of renewable energy in electricity production to 50%, the share of electric vehicles to 10%.

In mid-August 2022, the Concept of Development of the Procurement System and its Action Plan were approved by the Government of Armenia.[193] The main directions for development of the procurement system were specified as:

- Capacity development
- Ensuring increased access to information
- Adapting the role of the RA MoF to existing requirements
- Digitalization/development of a new e-procurement system
- Standardization and **green procurement**
- Continuous targeted system improvements

The draft of the "Green and Sustainable Development" Strategy proposes a sustainable economic development model where the economy and the environment form a group of synergistic and mutually supporting systems, increase energy efficiency and resource saving, prevent the loss of biodiversity and ecosystem services by reducing carbon emissions and pollution. The purpose of the strategy is to promote economic benefits through the promotion of green industry, job creation, competitiveness, green energy development, sustainable agriculture and eco-tourism. The strategy also aims to contribute to economic development with a low carbon footprint by promoting the green economy.

To support the development of the industry sector, the government of Armenia will:

- Support the local organisations to participate in international expos and other events

[192] https://www.arlis.am/Annexes/6/2021_N1902hav1.eng.pdf

[193] Decision of the Prime Minister No. 977 – L, August 25, 2022. For more on the procurement system performance, see Transparency International's Armenia Assessment of Public Procurement System 2024 (https://transparency.am/en/publication/pdf/370/11195).

- Encourage the organisations to obtain ISO certification

Key gaps:

Some of the major gaps in the area are:

- No national-level strategic documents focusing on sustainable products, eco-labelling, green procurement, etc.
- Lack of skills and expertise at the ministry/government level
- Low level of interest among the industry representatives
- Inadequate efforts for public awareness raising on sustainable consumption choices

4. Cross-Cutting Issues of the Green Transition

4.1 Just Transition

Rooted in social justice, equity, and human rights, Just Transition seeks to protect vulnerable or affected groups from disproportionate impacts of the green transition while fostering inclusive, gender-responsive economies through decent work and reduced inequalities.

Armenia's readiness for a fair and equitable transition, is key to ensure long-term sustainability of reforms underway or to be introduced. This chapter provides strategies and interventions to address social vulnerabilities, laying the groundwork for a socially just and sustainable shift to climate neutrality.

The International Labour Organisation (ILO) *Guidelines for a Just Transition towards Environmentally Sustainable Economies and Societies for All* (hereinafter, ILO Just Transition Guidelines)[194] set out seven core principles that should guide the transition to environmentally sustainable economies and societies and serve as the central reference for policy development in this area. The Paris Agreement further reinforces the importance of Just Transition as an integral part of climate action.[195]

According to the ILO, Just Transition involves greening the economy in a way that is fair and inclusive, creates decent work opportunities, and ensures that no one is left behind.[196]

This chapter focuses on identifying existing gaps and providing recommendations to align Armenia's initiatives with the principles of the ILO Just Transition Guidelines, facilitating the development of the country's National Just Transition Plan.[197]

4.1.1 Current State of Just Transition in Armenia

In Armenia, the concept of Just Transition is underdeveloped, with limited integration into national frameworks. Existing policies, such as the *National Strategy on Disaster Risk Management (2017)* and the *National Action Programme of Adaptation to Climate Change (2021)*, touch on transition topics but lack systematic coherence.

[194] See, Section IV. Guiding Principles at https://www.ilo.org/media/435091/download

[195] See, https://unfccc.int/sites/default/files/english_paris_agreement.pdf

[196] See, https://www.ilo.org/resource/other/climate-change-and-financing-just-transition#:~:text=A%20just%20transition%20means%20greening,and%20leaving%20no%20one%20behind

For ILO resources on Just Transition see https://www.ilo.org/topics-and-sectors/just-transition-towards-environmentally-sustainable-economies-and-societies

[197] Note that this research does not focus on measurement approaches for assessing Armenia's performance in achieving a just transition. For context, various measurement frameworks have been developed to monitor and evaluate just transition processes, see, e.g. the European Commission's "Just Transition Measurement Approaches" catalogue. Among them are *Just Transition Fund (JTF) Indicators, Leave-No-One-Behind (LNOB) Score, the Social Progress Index (SPI) and Just Transition Score (JTS)*, etc. While these measurement approaches offer valuable insights into monitoring just transition efforts, they are beyond the scope of this research.

Armenia's institutional framework provides a foundation for implementing Just Transition policies[198]. However, the absence of a unified agenda and insufficient capacity in institutional mechanisms impede policy effectiveness. Armenia lacks a central authority dedicated to Just Transition policy development and coordination[199].

Armenia faces considerable challenges in data collection, particularly in obtaining disaggregated labour statistics, assessing climate-related social impacts, and tracking sectoral employment trends.[200] These gaps in data and assessment hinder the development of evidence-based policies necessary for a successful Just Transition. Additionally, Armenia's social protection system is inadequate in addressing climate-related vulnerabilities. Systemic shortcomings in labour rights protection and vocational education and training (VET) pose considerable risks to achieving a socially equitable and sustainable green transition.[201] Without addressing data gaps and carrying out reforms in key sectors, Armenia's Just Transition efforts may be significantly impeded.

The EU-Armenia CEPA does not explicitly reference the term "Just Transition". However, CEPA includes provisions that align with the principles and objectives of a Just Transition, such as promoting sustainable development, environmental protection, social equity, and labour rights.[202] To this end, CEPA provides a framework for Armenia to incorporate Just Transition principles into its policies.

CEPA emphasises cooperation on climate change mitigation, renewable energy development, and energy efficiency, which are essential components of a green transition. Furthermore, the agreement highlights the importance of aligning labour rights and working conditions with international standards, which supports core principles of Just Transition outlined by ILO.

Overall, harmonisation with EU legal frameworks and best practices envisioned under CEPA offers an opportunity for Armenia to integrate Just Transition-related objectives into its national strategies.

4.1.2 Social Dialogue and Stakeholder Engagement

The ILO Just Transition Guidelines emphasise the fundamental role of social dialogue among tripartite partners—governments, employers, and workers—while underscoring the importance of broader stakeholder engagement, including communities and CSOs.

[198] Key state institutions and mechanisms in this regards are: Ministry of Labour and Social Affairs (MLSA), Ministry of Health, Ministry of Education, Science, Culture, and Sport, Ministry of Economy, Ministry of Territorial Administration and Infrastructure, State Statistical Committee, Trade Unions and Employer Organisations, Renewable Resources and Energy Efficiency Fund (R2E2).

[199] https://docs.google.com/document/d/1qqppetF3MVYG2SwW6SVHb45IdSc2v65s/edit

[200] https://docs.google.com/document/d/1qqppetF3MVYG2SwW6SVHb45IdSc2v65s/edit

[201] https://docs.google.com/document/d/1qqppetF3MVYG2SwW6SVHb45IdSc2v65s/edit

[202] https://neighbourhood-enlargement.ec.europa.eu/document/download/151aae61-d6b4-45cb-992b-38edce-55b33f_en

On October 5, 2020, a new National Tripartite Agreement was signed between the Government of Armenia, the Confederation of Trade Unions of Armenia, and the Republican Association of Employers of Armenia.[203] This agreement established the Republican Tripartite Commission, tasked with addressing key issues related to labour, social and economic rights and norms, including employee safety, health, wages, living standards, employment, etc.

For Armenia's Just Transition, the Republican Tripartite Commission should assume a central role in policy development across economic, environmental, social, education, and labour domains. Additionally, the Confederation of Trade Unions and the Republican Association of Employers can contribute significantly by raising awareness and fostering understanding of the green transition.

Despite growing public concern about climate change, research indicates low overall awareness among Armenian citizens. Targeted education and communication efforts are essential to bridge knowledge gaps and foster informed public engagement in climate-related decision-making.

In this regard, engagement of environmental groups and organisations, human rights organisations, women's organisations, and community groups, especially those that can be disproportionately impacted by the transition, is critical. Their active participation is essential for integrating cross-cutting issues such as employment, labour rights, decent work, and social equity into green transition policies while fostering social consensus around the country's green transition. Armenian NGOs often serve as key facilitators for community representation and participation in decision-making. However, direct government-led consultations with affected communities across all sectors of the green transition must also be ensured.

The 2024 World Bank Group's *"Armenia Country Climate and Development Report (CCDR)"* provides a comprehensive analysis of Armenia's climate-related challenges and opportunities, focusing on sustainable development, resilience, and inclusive economic growth[204]. The CCDR identifies Armenia as highly vulnerable to climate impacts, particularly in agriculture, energy, and water resources. These vulnerabilities disproportionately affect rural populations, women, and low-income communities, highlighting the need for equitable adaptation strategies, as well as inclusion of all groups that are likely to be disproportionately impacted or marginalised, in discussions on climate action.

Furthermore, academia and research institutions bring valuable expertise in aligning Armenia's policies with international standards and best practices. Their active involvement in policy making ensures these are effectively adapted to local contexts. A noteworthy example is the "EcoLur" NGO, a leading environmental CSO, which has conducted a detailed analysis on the "*Localisation of Climate and Energy Policies in Communities*"[205] examining the challenges and opportunities associated with implementing energy and climate policies in Armenia's enlarged communities.

[203] https://arhmiutyun.org/en/2020/10/08/national-tripartite-collective-agreement-is-signed/

[204] https://openknowledge.worldbank.org/server/api/core/bitstreams/41034941-5448-4df9-bfb8-6f93f32e7c4b/content

[205] https://www.ecolur.org/en/news/cities/15335/ Notably, the study reveals that approximately 72% of respondents from the surveyed communities demonstrate insufficient awareness of climate change and the energy sector, particularly regarding state policies in these areas.

4.1.3 Decent Work and Labour Rights Protection

A just transition requires strong alignment between climate action and the advancement of fundamental principles and rights at work (FPRW). Climate initiatives must actively promote labour rights while avoiding unintended negative consequences, and FPRW policies should, in turn, support the green transition by ensuring fair and equitable working conditions[206].

Armenia faces considerable challenges in data collection, particularly in tracking disaggregated labour statistics, assessing the climate-related social impacts, and monitoring sectoral employment trends.[207] This hinders the ability to create evidence-based policies that could contribute to a just transition across EDG sectors.

The 2024 International Trade Union Confederation (ITUC) *Global Rights Index*[208] ranks Armenia in "Rating 3: Regular Violations of Rights," highlighting systemic gaps in labour rights protections. If unaddressed, these shortcomings can hinder just transition efforts.

A significant concern in this context is child labour. The 2023 *ILO Issue Paper on Child Labour and Climate Change*, emphasises that climate action must align with efforts to eradicate child labour[209]. Public and private climate initiatives should be designed to maximise their positive impact on child labour reduction while preventing unintended consequences that could increase its prevalence.

Findings of the 2021 *DRL Report on the Worst Forms of Labour-Armenia*[210] reveal that children in Armenia remain vulnerable to commercial sexual exploitation, sometimes linked to human trafficking. Children, including those under 14, drop out of school to work in informal sectors such as agriculture and construction, with an increasing number involved in begging. Children from families engaged in seasonal labour on remote farms are particularly vulnerable, often missing out on education and facing risks of forced labour in agriculture. The government does not systematically collect or maintain official data on child labour. Furthermore, the minimum age for work falls short of international standards, as labour laws do not cover children employed in the informal sector.

Creating decent jobs, with protection from different forms of exploitation and abuse and ensuring adherence to occupational safety and health (OSH) standards are central to a just transition.[211] OSH risks can emerge not only from environmental changes but also from new work processes or hazardous materials introduced during the transition. Adequate gender-sensitive OSH assessments are equally critical.

206 https://www.ilo.org/media/544761/download

207 https://docs.google.com/document/d/1qqppetF3MVYG2SwW6SVHb45IdSc2v65s/edit

208 https://www.ituc-csi.org/global-rights-index

209 https://www.ilo.org/publications/issue-paper-child-labour-and-climate-change

210 https://www.dol.gov/agencies/ilab/resources/reports/child-labor/armenia; https://www.dol.gov/sites/dolgov/files/ILAB/child_labor_reports/tda2021/armenia.pdf

211 https://www.ilo.org/publications/occupational-safety-and-health-just-transition

A Just Transition in Armenia must include explicit steps to prevent child labour, prioritising measures that prevent its occurrence while fostering sustainable livelihoods for families.

The creation of decent jobs, free from exploitation and hazardous working conditions, is a cornerstone of a Just Transition. Occupational Safety and Health (OSH) risks may arise not only from environmental changes but also from new work processes and hazardous materials introduced during the transition.

Despite existing regulations in Armenia for safe working conditions, weak enforcement mechanisms and conflicting regulations on working conditions contribute to systemic non-compliance, leaving many occupational risks unaddressed. Additionally, Armenia's OSH framework lacks a gender-sensitive approach, failing to address the differing needs of male and female workers.[212] The absence of a comprehensive legal OSH framework covering all workers and sectors, the lack of a formal OSH policy and a detailed national program, creates a pressing need for comprehensive OSH reforms.[213] Strengthening OSH governance will ensure that green transition efforts uphold FPRW while also integrating gender equality into workplace safety measures.

Lastly, upholding decent work and labour rights protection should be paralleled with enhanced efforts in the domain of vocational education and training (VET). Robust VET systems need to be in place to equip workers—particularly those from traditional sectors—with the skills needed to participate in the green economy.

Despite ongoing VET reforms in Armenia, opportunities for retraining and upskilling remain limited, particularly for female workers and marginalised groups with low representation in EDG sectors, hindering workers' ability to transition to emerging green jobs[214]. Expanding access to accessible, inclusive and modernised VET programmes is essential to enable workers to transition successfully into emerging green jobs and ensure that Armenia's green transition is both socially and economically sustainable.

4.1.4 Gender Nexus

A just transition must prioritise the intersection of climate action, decent work, and gender equality. Gender is a core principle of the ILO Just Transition Guidelines, and the Paris Agreement similarly underscores the need for gender-responsive climate action.

The 2024 ILO Policy Guide on *Gender, Equality, and Inclusion for a Just Transition in Climate Action* offers a framework for integrating gender equality into green transition strategies, emphasising that "*each specific environmental challenge has its own specific equality dynamics – and these specific dynamics must be taken into account when tackling any environmental challenge.*" [215]

[212] https://www.rightsresearch.net/_files/ugd/f1a9eb_b0620c23b0a74199a07c635f6c710351.pdf?index=true

[213] https://armenia.un.org/en/274678-national-osh-profile

[214] https://docs.google.com/document/d/1qqppetF3MVYG2SwW6SVHb45IdSc2v65s/edit

[215] https://www.ilo.org/publications/gender-equality-and-inclusion-just-transition-climate-action

Climate change disproportionately impacts women by altering gender roles, limiting access to decent work, and exacerbating vulnerabilities to health risks, reproductive injustices, forced displacement, and gender-based violence.[216] These challenges underline the importance of ensuring that public and private sector financial investments in green transitions are gender-sensitive. Climate finance should prioritise initiatives that deliver co-benefits for vulnerable groups, particularly women, as poverty, inequality, and climate change are deeply interconnected.[217]

Given the deep interconnections between poverty, inequality, and climate change, climate finance should prioritise initiatives that deliver tangible benefits for vulnerable groups, particularly women. This requires comprehensive and disaggregated data—by sex, disability, ethnicity, and other characteristics—to assess the gendered impacts of climate change and inform policy responses accordingly.[218]

As a party to the Paris Agreement[219] Armenia commits to promoting and taking into account the principles of gender equality and intergenerational justice in the fight against climate change.

The 2024 World Bank *Armenia: Country Gender Assessment*[220] highlights women's underrepresentation in decision-making bodies addressing climate change, limiting their ability to shape solutions. This gap is compounded by Armenia's lack of intersectional data collection and analysis, which inhibits detailed recommendations for a gender-responsive transition.

To effectively integrate gender-responsive approaches into Armenia's Just Transition, coordinated state-level efforts are essential. National Gender Action Plans serve as a key tool for aligning Just Transition commitments with gender-responsive strategies, ensuring equal representation in climate policymaking and fostering inclusive outcomes.

The Draft Decision of the Government of Armenia, *"On the Approval of the 2024-2028 Gender Policy Implementation Strategy and Programme of Actions"* [221], highlights "Climate Change" as the sixth pillar of the strategy. This framework envisions the development of gender-sensitive and gender-responsive approaches to climate action, emphasising inclusivity and awareness-raising on the gendered impacts of environmental changes. Key actions include conducting studies on the gendered effects of climate change, defining gender-sensitive climate indicators, integrating training materials on the gender-social dimensions of climate change into public servant training programmes, and creating public awareness campaigns.

[216] https://www.unwomen.org/sites/default/files/Headquarters/Attachments/Sections/CSW/66/EGM/Expert%20Papers/Samantha%20SMITH_CSW66%20Expert%20Paper.pdf

[217] https://www.undp.org/sites/g/files/zskgke326/files/publications/UNDP%20Gender%20and%20Climate%20Finance%20Policy%20Brief%205-WEB.pdf

[218] https://www.ilo.org/publications/gender-equality-and-inclusion-just-transition-climate-action

[219] Ratified in 2017.

[220] https://documents1.worldbank.org/curated/en/099100824162527996/pdf/P179877190d0c006a1a6831a1a576083a16.pdf

[221] https://www.e-draft.am/projects/6821

By adopting this strategy and incorporating the Just Transition agenda within its Plan of Actions, Armenia has the potential to significantly advance gender equity in its green transition.

4.1.5 Policy Coordination, Financing and Capacity Building

The concept of Just Transition is relatively new in Armenia, leading to limited awareness and commitment from key stakeholders, including decision-makers, private sector actors, and local authorities. To address this gap, a comprehensive institutional framework must be established to coordinate climate and social policies across economic, labour, education, and environmental sectors.

The 2024 World Bank Group's *"Armenia Country Climate and Development Report (CCDR)"*[222] indicates that Armenia lacks streamlined institutional framework for the development, implementation, and evaluation of climate policies. While the Ministry of Environment is responsible for overseeing national climate change strategies, it has limited mandate for engaging in other ministries' climate-relevant programmes. This limitation hampers the integration of climate objectives into broader governmental programmes and policies, highlighting the need for stronger inter-ministerial collaboration and capacity-building efforts.

Additionally, the concept of a Just Transition to a green economy is relatively new in Armenia, leading to limited understanding and commitment from stakeholders, including decision-makers and the private sector.[223] A comprehensive institutional framework is needed to coordinate policies across sectors in alignment with Armenia's green transition needs under the EGD. Effective policymaking must involve key government entities such as the Ministry of Labour and Social Affairs, Ministry of Health, Ministry of Education, the Health and Labour Inspection Body (HLIB), and the Statistics Committee. These bodies are essential to ensuring coherence between economic, social, labour, and gender actions throughout the transition.

In this regard, building the capacity of governmental stakeholders is another priority. Human, organisational, and institutional capacities must be enhanced to address the intersections of social justice, equity, human rights, and climate change. Tailored capacity-building initiatives should focus on the gender and social equity dimensions of the transition to foster coordinated, effective solutions.

Apart from governmental entities, availability of targeted capacity-building programmes for CSOs, academia, private sector representatives, as well as provision of sufficient expertise for local communities is equally essential for shaping the country's Just Transition agenda.

The 2023 report of "EcoLur" NGO on the "*Localisation of Climate and Energy Policies in Communities,*"[224]

[222] https://openknowledge.worldbank.org/server/api/core/bitstreams/41034941-5448-4df9-bfb8-6f93f32e7c4b/content

[223] https://docs.google.com/document/d/1qqppetF3MVYG2SwW6SVHb45IdSc2v65s/edit

[224] https://www.ecolur.org/en/news/cities/15335/

indicates that targeted communities lack the necessary expertise to effectively address climate change, particularly in implementing mitigation, adaptation, and energy transition programmes.

Likewise, budgetary support and availability of financing schemes should be in place to fund Just Transition-related activities[225]. In this regard, the abovementioned report also reveals that municipal budgets are insufficient to fund transition initiatives[226]. None of the communities, within the study's scope, have incorporated climate or sustainable energy action plans into their five-year development strategies, highlighting a significant gap in local planning and resource allocation.

4.1.6 Summary and Overarching Recommendations

Gap assessment of Armenia's current state of Just Transition indicates limited awareness and lack of instructional framework that would ensure that the country's progress under EGD is in line with the principles of the ILO Just Transition Guidelines.

Establishing robust institutional and coordination frameworks is essential for successfully designing and implementing Armenia's National Just Transition Plan. Effective governance structures will ensure policy coherence, sectoral integration, and financial sustainability, all of which are crucial for a socially just and inclusive green transition.

Social dialogue and participatory governance are not adequately ensured in Armenia's green transition. Key stakeholders, including trade unions, CSOs, and community groups, are not meaningfully involved in decision-making processes. This limits the inclusivity and effectiveness of green transition efforts.

Armenia's social protection system does not adequately address climate-related vulnerabilities, and systemic shortcomings in labour rights protection and the VET sector create a considerable barrier to achieving a socially equitable and sustainable green transition.

The lack of comprehensive, disaggregated data on labour conditions, gender disparities, and the social impacts of climate change severely limits the capacity to design targeted interventions and monitor progress. Gender equality and social equity are insufficiently mainstreamed into Armenia's green transition policies.

Both human and financial resources are inadequate to support Just Transition initiatives. Limited technical expertise and training opportunities hinder the development of a skilled workforce for green sectors, while financial allocations for Just Transition remain unspecialised and insufficient.

[225] https://docs.google.com/document/d/1qqppetF3MVYG2SwW6SVHb45IdSc2v65s/edit

[226] https://www.ecolur.org/en/news/cities/15335/

The following overarching recommendations are proposed to ensure Armenia's green transition is inclusive and sustainable. These recommendations lay the foundation for a Just Transition Plan guided by the principles of the ILO Just Transition principles.

Fostering social dialogue and stakeholder engagement:

1. Enhance the role of the Republican Tripartite Commission to proactively identify challenges, facilitate social dialogue, and contribute to policymaking and problem resolution in real-time.
2. Ensure a shared agenda through comprehensive, multi-stakeholder awareness-raising efforts and meaningful participation of all stakeholders, including environmental groups and organisations, human rights organisations, and, especially, groups and communities, disproportionately impacted by the transition.

Upholding decent work and labour rights protection:

3. Climate policies should align with fundamental principles and rights at work (FPRW) to prevent unintended negative consequences for workers. All workers in sectors integral to the green transition should be covered by comprehensive FPRW safeguards. Targeted measures must safeguard children's rights, prevent exploitation, and establish a robust system for collecting and maintaining disaggregated data on child labour.
4. OSH risk assessments should be integral to all sectors affected by the green transition, addressing emerging hazards from new technologies and processes. Sector-specific guidelines must be developed to protect labour rights, with a strong focus on OSH standards to mitigate associated risks.

Addressing the gender nexus:

5. The Just Transition agenda should be embedded within the 2024-2028 Gender Policy Implementation Strategy to address social and gender disparities and ensure equitable participation. All climate policies and transition strategies must incorporate gender considerations, supported by gender-responsive technical assistance and the establishment of gender focal points within relevant governmental entities to mainstream gender perspectives across all sectors.
6. Comprehensive research and collection of disaggregated data should inform policy decisions by identifying the impacts of the green transition on different social groups. Regular gender audits should assess funding allocations to ensure equitable benefits for women, while initiatives challenging discriminatory norms must be implemented to break stereotypes and enhance women's participation in climate-related sectors and leadership roles.

Ensuring policy coordination, financing and capacity building:

7. Develop a Just Transition Strategy that outlines clear definitions, objectives, and measurable outcomes, informed by international best practices and tailored to the country's socio-economic and environmental context. Institutional and coordination frameworks must be

reinforced through a government working group (e.g. Inter-Agency Just Transition Working Group) to identify overlaps, gaps, and opportunities for joint action across sectors.

8. The key government entities, such as the Ministry of Labour and Social Affairs, Ministry of Health, Ministry of Education, and the Statistics Committee, alongside the Health and Labour Inspection Body (HLIB), should be actively involved to ensure that the green transition addresses social, labour and gender disparities across sectors.
9. State budgetary processes should explicitly include Just Transition priorities, with dedicated funding for capacity building, programme implementation, and monitoring efforts.
10. The private sector should be encouraged to progressively integrate Just Transition principles into their operations, products, and strategies, with a strong emphasis on gender equality and social justice.
11. Government stakeholders at all levels should receive training and resources to enhance their ability to address the intersections of social justice, equity, human rights, and climate change. Gender equality training should also be provided to ensure that technical assistance is gender-responsive and that gender issues are considered at every stage of policy development.
12. Local communities and government officials must be consistently supported with the necessary capacities and resources to respond effectively to Just Transition needs.

4.2 Digitalisation to support Green Transition

With climate change and environmental degradation there is a need to tackle these challenges globally. The swift developments in digitalisation can contribute to achieving a more sustainable economy. Digitalisation can help achieve efficiency (e.g., energy or resource), transparency (e.g., monitoring, tracking pollution, waste, energy flows etc.), accuracy (e.g., data driven decision making, using digital twins) and accountability (e.g., digital processes and services, blockchain technology etc.) in different sectors so that changes leading to sustainability happen more quickly.

In the EU, the digital and green transition are viewed as closely interlinked, or the 'twin' transition, as digitalisation can greatly help with greening goals via functions like monitoring & tracking (emissions, energy or resource flows, etc.) for reporting (transparency, accountability, precision); simulation & forecasting (a product lifecycle , material flow, etc.) for efficiency; virtualisation (virtual experiences via digital services or virtual digital skills education) for saving resources and lowering emissions; systems management (in smart city, smart grid solutions) for more efficient management leading to lesser environmental strain. information and communication technology (ICT) infrastructure as a backbone providing connectivity for different digital systems and tools.

Several elements for effective digitalisation need to be sufficiently developed so that different sectors can fully benefit from digitalisation and so that digitalisation would be a means to further the green transition. The key elements of digitalisation are:

- **Governance** (regulations, responsible national bodies)
- **Connectivity** (broadband, mobile, 5G)
- **Cybersecurity** (standards, frameworks, responsible bodies)
- **Digital identification** (digital signatures, authentication)
- **Data management** (comprehensive standardised data registries, management, interoperability)
- **Digital skills** (digital literacy, data literacy and cyber security education)
- **Public-Private partnership in ICT sector** (start-ups, SMEs providing advanced digital solutions, digitalisation and cybersecurity services)

Armenia's digital transformation is multifaceted, encompassing governance, strategy, and the active participation of various stakeholders, with the participation of the private sector standing out. The digital governance, strategies and supporting legislation are mostly aligned with the EU standards and commitments such as the CEPA and EU4Digital and have major focus on data privacy and information security.

Despite significant progress in the engagement of the private sector in digital transformation, there are some fundamental gaps that need to be addressed both in the digital ecosystem development, esp. through innovative technologies, and cybersecurity regulations. The gaps can be characterised as follows:

- The **Digitisation Strategy of Armenia 2021-2025** needs to be updated because of the strategic changes that have happened in Armenia during the last few years and the end of 2025 deadline set by the Ministry of High-Tech Industry.
- Armenia's **first cybersecurity law** has been a working draft from the past 1.5 years.
- **National digitalisation and cybersecurity standards** are not yet developed and adopted.
- **Legal acts and protocols** are not yet developed and adopted to regulate the digitalisation of critical infrastructure, data governance, monitoring, cybersecurity, incident response mechanisms etc.
- The **roles and jurisdiction of governmental agencies** in cyberspace regulation are not approved yet.
- The **public awareness and digital literacy efforts** are not decentralised and do not cover all provinces of the country.

The sections below address the digitalisation advances and gaps for the focus areas of the green transition: Biodiversity, Industry & Waste Management, Climate, Energy, Farm-to-Fork/Agriculture, Buildings & Renovation, Smart Mobility, and Zero pollution.

Digitalisation solutions are already being used in most sectors through partnerships between private organisations, governmental agencies, and international organisations. While all sectors should continue their digitalisation process, there is a need to add more focus on the cybersecurity of their ecosystems and be ready to adopt the regulations that will be applied through the national cybersecurity framework.

In order to show the potential for use of innovative breakthrough technological solutions in different sectors in Armenia, we approach each of the eight green transition sectors through the lens of a digitalisation component, highlighting the current state, the gaps and major issues, and the enabling factors.

It is important to mention that the use of technology and cybersecurity measures are critical for all sectors and the summarised report for this is provided in Annex1.

As a result, we then provide policy recommendations aligned with international assessments conducted by the EU, UN, OECD, WB, USAID, ITU, and the like.

Biodiversity

Armenia has made significant strides in digitalising biodiversity-related data collection and monitoring but major gaps still exist in data integration, management, and technical capabilities. By addressing these challenges and leveraging digital enablers, Armenia can enhance its environmental conservation efforts and contribute to global climate resilience.

Collecting data through various digital tools such as **sensors, drones, satellites, cameras, and audio recordings** has become a fundamental enabler for environmental monitoring. **AI-enabled solutions** enhance data processing and management, significantly contributing to biodiversity conservation efforts.

Platforms such as the **ArmStat Database and EcoPortal.am** provide environmental and biodiversity indicators. Increasingly **GIS and remote sensing** technologies are being used in Armenia to support habitat mapping, biodiversity assessments, and monitoring. Despite these advancements, significant challenges remain. The lack of a comprehensive biodiversity monitoring system limits **data collection and analysis**, while fragmented data management and sharing hinder efficient reporting. Interoperability and standardisation are also critical issues, as aligning data with international standards remains a challenge.

The **Hydrometeorology and Monitoring Centre SNCO** oversees nature conservation data collection and monitoring, supported by the **Caucasus Nature Fund (CNF)** in forest and biodiversity monitoring. However, institutional efforts face barriers such as fragmented forest monitoring, newly entrusted biodiversity responsibilities requiring capacity-building measures, and limited environmental monitoring integration. Additionally, disparate datasets across various sectors reduce their effectiveness due to a **lack of interoperability and standardised data management frameworks**.

An overview of digitalisation technologies and cybersecurity issues affecting the biodiversity sector is presented in Table 34.

Table 34. Digitalisation technologies and cybersecurity issues in biodiversity sector

Sector	Digitalisation Technologies	Cybersecurity Issues
Biodiversity	■ Remote Sensing & Satellite Tech ■ AI & Machine Learning ■ IoT & Sensors ■ Blockchain for Data Security	■ Data breaches of sensitive ecological data ■ Unauthorised access to wildlife monitoring systems ■ IoT vulnerabilities (e.g., GPS collars) ■ Insecure Data Sharing

Industry & Waste management

Armenia is in the early stages of digitalising its waste management sector. Critical gaps remain in **data standardisation, digital tracking, and connectivity infrastructure**. While recent improvements in the waste management sector, such as partial source separation of waste or newly constructed sanitary landfill to be commissioned in the coming year have improved environmental safety, **comprehensive digital systems to monitor and manage** these processes remain absent. By addressing these challenges and leveraging digital enablers, Armenia can accelerate its transition toward a more sustainable and efficient waste management system.

Digital solutions in this sector focus on resource efficiency, sustainability, and production optimisation. Among the promising developments is the concept of an **Industrial Data Platform**, designed to aggregate and analyse industrial data for improved decision-making, as well as the planned new digital platform for special waste data reporting that will ensure the upcoming introduction of Extended Producer Responsibility (EPR). A critical missing component is a **Digital Tracking System** capable of monitoring material lifecycles to support circular economy goals, particularly as Armenia lacks a **policy framework** for managing electronic waste, including end-of-life solar panels and electric vehicle batteries.

These gaps highlight the need for real-time data systems powered by **IoT-enabled sensors**, **AI-based analytics, and blockchain for traceability**. An overview of digitalisation technologies and cybersecurity issues affecting the circular economy sector is presented in Table 35.

Table 35. Digitalisation technologies and cybersecurity issues in industry for clean and circular economy sector

Sector	Digitalisation Technologies	Cybersecurity Issues
Industry for Clean and Circular Economy	■ IoT in waste management & recycling ■ AI & Machine Learning for optimisation ■ Blockchain for resource tracking & sustainability ■ Robotics in Waste Sorting ■ EPR data infrastructure	■ Cyber-attacks on industrial control systems (ICS) ■ Data leakage in waste management and recycling systems ■ Intellectual property theft related to sustainable tech innovation

Climate

In Armenia, the climate sector is increasingly leveraging digital tools to address climate change challenges through more **effective data collection and informed decision-making**. The **National Climate Data Centre**, operated by the Ministry of Environment, serves as the cornerstone for collecting meteorological, hydrological, and environmental data, ranging from temperature and precipitation to air quality and water levels. Complementing this, the **Climate Change Information Management System (CCIMS)** gathers and processes critical information on greenhouse gas emissions, energy consumption, and renewable energy resources. These platforms not only support informed decision-making and the formulation of mitigation strategies but are also being aligned with EU and international standards to enhance interoperability and foster global collaboration. However, despite the availability of these platforms, the country still faces **significant gaps** in climate data analysis and a **lack of integration across platforms**, which hampers the ability to formulate comprehensive responses to climate-related issues.

Beyond data collection and analysis, there is a growing emphasis on leveraging digital services to enhance **climate awareness and citizen engagement**. The development of virtual platforms that can act as skills-enhancing tools, with digital identities serving as preconditions for accessing these services. Virtualisation would enable efficient information sharing, reducing the need for travel while increasing **access to up-to-date climate data**. An overview of digitalisation technologies and cybersecurity issues affecting the climate is presented in Table 36.

Table 36. Digitalisation technologies and cybersecurity issues in climate sector

Sector	Digitalisation Technologies	Cybersecurity Issues
Climate	■ Satellite Tech ■ Big Data & Cloud Computing for climate analysis ■ AI for climate prediction models ■ IoT and Sensors	■ Cyber-attacks on climate modelling data ■ Misuse of environmental data in policy making ■ Risk of data manipulation in climate research tools

Energy

In Armenia, digitalisation in the energy sector has primarily focused on **improving the effectiveness, efficiency, and security of energy distribution**. The evolution of energy-related information management is marked by the development of advanced energy data platforms that streamline data collection and analysis, enabling more **informed energy management and planning**. These platforms, coupled with the integration of **smart metering systems**, allow for real-time monitoring of energy consumption, ensuring more accurate billing and better demand forecasting. As a result, energy distribution strategies are becoming more **adaptive and responsive** to changing consumption patterns, which supports the overall goal of a more efficient energy system.

Despite these promising developments, there is an urgent need to address cyber security within Armenia's energy infrastructure. As digital systems become integral to energy management, the **security of sensitive data, including personal information and operational metrics**, must be rigorously safeguarded to prevent cyber threats and data breaches. Cyber security is not only critical for the energy sector but also for broader applications such as smart mobility and industrial operations. An overview of digitalisation technologies and cybersecurity issues affecting the energy sector is presented in Table 37.

Table 37. Digitalisation technologies and cybersecurity issues in climate sector

Sector	Digitalisation Technologies	Cybersecurity Issues
Energy	■ Smart Grids & IoT ■ Blockchain for energy transactions ■ AI & ML for energy demand forecasting & optimisation ■ Big Data and Analysis	■ Threats to critical infrastructure (e.g., smart grids, energy distribution) ■ Cyber threats to energy storage systems ■ Data privacy issues in consumer energy usage data – IoT Vulnerabilities

Agriculture (Farm to Fork)

Armenia is taking steps to modernise its agricultural sector, both through digital and non-digital technological advancements. Efforts like the 'Numbering and Registration Programme for Cattle' and its electronic information system are establishing centralised databases for animal tracking, veterinary measures, and movement monitoring. These initiatives aim to improve disease control, traceability, and sustainable livestock development. In addition, platforms like AgroTwin are emerging as innovative solutions for precision agriculture, enabling farmers and policymakers to make informed decisions through advanced tools such as satellite imagery, IoT sensors, and AI-powered forecasting models. Furthermore, AI applications in agriculture, such as predictive analytics for market demand and soil health monitoring, are gradually being introduced to optimise productivity and sustainability.

Despite these and other advancements like ArmStat Database, and the Agricultural Management Information System etc. several challenges remain in the Farm to Fork sector. The digital transformation of agriculture requires significant investments in infrastructure, such as creating a **comprehensive data registry and monitoring system** across all agricultural platforms. The high initial costs of AI and UAV solutions make them inaccessible to many small-scale farmers, who are already financially constrained. Additionally, there is a need to raise **cybersecurity awareness** and improve **digital literacy** among farmers in adopting modern technologies effectively. **Non-digital technological modernisation**, such as advanced irrigation systems and greenhouses, also needs broader implementation. Addressing these gaps will require **targeted investments, capacity-building initiatives, and strategic public-private partnerships** to ensure inclusive and sustainable agricultural development. An overview of digitalisation technologies and cybersecurity issues affecting the agricultural sector is presented in Table 38.

Table 38. Digitalisation technologies and cybersecurity issues in farm to form (food systems) sector

Sector	Digitalisation Technologies	Cybersecurity Issues
Farm to Fork	■ IoT & Sensors (smart farming) ■ AI for predictive analytics ■ Blockchain for food traceability ■ Cloud Computing & Big Data	■ Risk of data breaches in food traceability systems ■ Cyber-attacks on agricultural equipment (e.g., drones, robotics) ■ Insecure supply chain management systems – Poisoning or Sabotage via Digital Devices:

Buildings & Renovation

Armenia's building and renovation sector faces **critical regulatory gaps** that hinder progress toward energy efficiency and sustainability. Existing building codes and energy standards are neither comprehensive nor well-enforced, limiting the ability to systematically track and improve energy performance. Without updated regulations aligned with EU energy efficiency directives, **data collection remains fragmented**, making it difficult to plan large-scale retrofits or implement advanced solutions like **Building Information Modelling (BIM)**. A structured regulatory framework is essential for ensuring consistent data availability, which would support decision-making for energy-saving initiatives and **smart building strategies**.

Addressing the **gaps of standardisation** in Armenia's building sector requires an integrated approach that strengthens regulations while leveraging digital tools to unify and streamline data management. Enhancing the **national real estate cadastre** with improved energy performance tracking, implementing **GIS-based solutions**, and utilising digital building logbooks could support evidence-based renovation planning. By modernising regulations and establishing a more cohesive data ecosystem, Armenia can accelerate its transition toward nearly **zero-energy buildings**, improving both environmental sustainability and long-term economic resilience. An overview of digitalisation technologies and cybersecurity issues affecting the buildings and renovation area is presented in Table 39.

Table 39. Digitalisation technologies and cybersecurity issues in buildings sector

Sector	Digitalisation Technologies	Cybersecurity Issues
Buildings	■ Smart Building IoT (HVAC, security, lighting) ■ AI for energy management ■ Blockchain for building data security & transparency ■ Building Automation Systems (BAS)	■ Cyber-attacks on smart building systems (e.g., HVAC, lighting, security) ■ Privacy issues with smart home devices ■ Data breaches in energy usage & occupancy data

Smart Mobility

Public-private partnerships in the ICT sector are essential for the smart and efficient digitalisation of the Smart Mobility sector, as many services rely on private sector offerings and adoption. However, since transportation is a critical infrastructure, the public sector must play a key role in designing regulations and implementing supportive measures to enable the private sector to actively provide smart mobility solutions.

In Armenia, developments in smart mobility are still in their early stages. While there are already some widely used digital platforms, these are primarily concentrated in Yerevan. Other larger cities in the regions are gradually adopting them as well.

Some of the applications currently in use include Yandex, GG for smart transportation, TelCell, and IDram for online payments, public transportation tracking in Yerevan city, among others. However, there is a need for more private sector players to foster healthy competition and encourage greater citizen adoption of mobility applications.

This, in turn, creates a growing demand for robust **data management** and **connectivity** regulations, effective **cybersecurity** measures, as well as initiatives to raise **cybersecurity awareness** and improve **digital literacy** among citizens.

Armenia would greatly benefit from allocating more resources and placing greater emphasis on the implementation of intelligent transportation management and monitoring systems that seamlessly interconnect various modes of transportation, including ground, air, rail etc. An overview of digitalisation technologies and cybersecurity issues affecting smart mobility is presented in Table 40.

Table 40. Digitalisation technologies and cybersecurity issues in smart mobility sector

Sector	Digitalisation Technologies	Cybersecurity Issues
Smart Mobility	■ IoT for vehicle tracking & traffic management ■ AI & ML for traffic optimisation ■ Blockchain for secure mobility data ■ Autonomous Vehicles ■ Smartphones	■ Cyber-attacks on autonomous vehicles ■ Privacy risks in mobility data collection (location tracking, usage) ■ Vulnerabilities in connected transportation systems – Closed source applications – Risk of Data Leakage

Zero pollution

Armenia's efforts to tackle pollution face significant challenges, particularly in **data availability, interoperability, and monitoring infrastructure**. While the country has made strides with environmental monitoring stations and digital reporting mechanisms, gaps remain in the consistency and comprehensiveness of data collection. The existing **dust monitoring system in Yerevan** highlights compliance issues, and the broader lack of real-time tracking hinders effective pollution management. Addressing these gaps through enhanced **data-sharing frameworks and interoperable digital platforms** would improve transparency and decision-making across governmental and regulatory bodies. A unified system for monitoring and reporting pollution could ensure all stakeholders operate with the same data insights, strengthening policy enforcement.

In addition to data management, Armenia must advance its **research, development, and innovation (RDI)** capacity to support **cutting-edge pollution monitoring solutions**. The limited adoption of AI, IoT-based sensors, and other emerging technologies presents a missed opportunity for efficient environmental tracking and compliance monitoring. Encouraging investment in **smart technologies**, along with skills development programmes, would facilitate the integration of advanced solutions in pollution control. Furthermore, digital services can play a critical role in **raising public awareness** of pollution's impact. The key digitalisation technologies and cybersecurity issues within the pollution sector are summarized in Table 41.

Table 41. Digitalisation technologies and cybersecurity issues in pollution sector

Sector	Digitalisation Technologies	Cybersecurity Issues
Zero Pollution	■ IoT & Sensors for pollution tracking ■ Big Data for environmental monitoring ■ AI for predictive analytics in pollution control ■ Blockchain for Environmental Reporting	■ Cybersecurity risks in pollution monitoring systems ■ Data manipulation in environmental reporting ■ Privacy concerns related to smart pollution sensors

Policy Recommendations

Despite this fast-paced and consistent development, Armenia is currently focused on achieving the basics of harmonisation and integrated digital platforms to achieve sustainability. Interoperability and standardisation are critical issues, as aligning data across different national platforms and international standards remains a challenge in most sectors like climate, agriculture, energy, waste management, industry, zero pollution, smart mobility, and building monitoring, where digitalisation efforts are often isolated and lack common data management systems. The most critical areas that need focus are:

- Implementation of the new National Digitalisation Strategy that pays a significant attention to cybersecurity regulation for critical infrastructures.
- Implementation of cybersecurity legal regulations, policies and national standards.
- Data Governance and Data Residency policies standards.
- Fully functional interoperability platform to enable effective decentralised development for the public and private sector digital platforms.
- Comprehensive and interoperable data management and exchange systems for monitoring, tracking, simulation and forecasting in all sectors.
- Improve digital services provision by creating an overarching digital services framework, so the delivery and management of services can be improved across services.
- Implementation and adoption of eID across all critical sectors.
- Online campaigns, training programmes, and accessible information platforms to empower citizens to engage in environmental protection efforts, fostering a more informed and proactive society.

4.3 Research, Development, and Innovation

Research, Development, and innovation (RDI), as used by the EU Commission to capture both R&D and Innovation activities, is critical to a country's ability to meet its green transition ambitions. This section briefly evaluates the policy landscape, legal and institutional structures, research infrastructure, international partnerships, and human capacity development with respect to EGD priorities.

Most of the discussion and the statistics presented, however, will be about R&D, as it is a concept better integrated into national statistics and discussions. Innovation--a broader concept that includes R&D--is not sufficiently formalised for the purpose of data and research in Armenia. In this document, R&D and research and development (R&D) will be used interchangeably. Future discussions and developments should focus on developing and refining the relevant concepts in this domain.

Institutional Overview of RDI in Armenia

Academic Institutions and the Green Transition

Eight major academic institutions in Armenia are key actors in R&D:

1. National Academy of Sciences of the Republic of Armenia (NAS RA)
2. Yerevan State University (YSU)
3. National Polytechnic University of Armenia (NPUA or Polytechnic)
4. Agrarian National University of Armenia (ANUA)
5. Armenian State Pedagogical University (ASPU)
6. Yerevan State Medical University (YSMU)
7. National University of Architecture and Construction of Armenia (NUACA)
8. American University of Armenia (AUA)

Together they house close 35 institutes, faculties, and centres that work on various environmental and sustainability topics, with almost half of them being part of the National Academy of Sciences. Figure 12 provides a summary overview of this academic infrastructure. These institutions, however, vary considerably in their capacities and success in modernising themselves after Armenia's independence from the Soviet Union 30 years ago.

Figure 12. Key academic institutions in Armenia with at least partial focus on environmental and sustainability topics

NATIONAL ACADEMY OF SCIENCE OF THE REPUBLIC OF ARMENIA (NAS RA)

Division of Natural Sciences (excluding physiology and pharmaceutical directions)

- Institute of Botany
- Institute of Zoology and Hydroecology
- Institute of Biochemistry
- Institute of Hydroponics
- Institute of Molecular Biology
- Centre for Ecological-Noosphere Studies
- "Armbiotechnology" Scientific and Production Centre

Division of Chemistry and Earth Sciences (excluding some chemistry)

- Institute of General and Inorganic Chemistry
- Institute of Geological Sciences
- Institute of Geophysics and Engineering Seismology
- Institute of Chemical Physics

Other Organisations under NAS RA

- Expert Commission on Protection of Lake Sevan
- International Scientific Educational Centre
- National Bureau of Expertise, SNCO

YEREVAN STATE UNIVERSITY (YSU)

- Faculty of Biology
- Faculty of Chemistry
- Faculty of Geography and Geology
- Faculty of Law

NATIONAL POLYTECHNIC UNIVERSITY OF ARMENIA (NPUA)

- Institute of Energy and Electrical Engineering
- Institute of Mechanical Engineering and Transportation Systems Design
- Faculty of Mining and Metallurgy

ARMENIAN NATIONAL AGRARIAN UNIVERSITY (ANAU)

- Faculty of Agronomy
- Faculty of Agrarian Engineering
- Faculty of Veterinary Medicine and Animal Husbandry
- Science at ANAU

ARMENIAN STATE PEDAGOGICAL UNIVERSITY

- Faculty of Biology, Chemistry and Geography (which offers a Masters in Environmental Chemistry/ Natural Management)

YEREVAN STATE MEDICAL UNIVERSITY

- Public Health Faculty (which has MPH concentration on environmental health)

NATIONAL UNIVERSITY OF ARCHITECTURE AND CONSTRUCTION OF ARMENIA (NUACA)

NUACA has 5 faculties each with several chairs, which offer Bachelors and Masters degree programmes. The 5 faculties and their chairs are listed below. Environmental topics permeate many of the programmes listed below, as many are related to civil engineering. The University has a Science Department that coordinates all of its science-related activities. The list of laboratories and studios of the NUACA are available on its website only in Armenian.

- Faculty of Architecture
- Faculty of Design
- Faculty of Construction
- Faculty of Urban Economy and Ecology
- Faculty of Management and Technology

AMERICAN UNIVERSITY OF ARMENIA

- Acopian Centre for the Environment
- Turpanjian College of Health Sciences
- Akian College of Science and Engineering

Sources: AUA Acopian Centre for the Environment, compiled from websites of the institutions presented, all accessed March-May 2022.

Businesses, Foundations, and RDI

There is little information on private sector investments in RDI. A systematic tracking of business investments on RDI is needed to ensure the full potential of the country is assessed. Starting this year, state policies incentivise private sector RDI investments by making eligible spending tax deductible.[227] Eligibility of specific activities will be determined by an interagency committee on a case-by-case basis. This will enable to form a better picture of RDI activities by the private sector. The R&D eligibility guidelines used are the OECD Frascati Manual 2015.[228] Guidelines for innovation as laid out by the OECD Oslo Manual 2018 are not yet integrated and the new Government Decision does not address innovation.[229]

Anecdotally, it is known that the private sector, particularly the IT sector, has close ties with Armenian academic institutions. The relationships range from highly integrated strategic partnerships such as the one between Synopsis and NPUA. There are also intensive engagements such as between National Instruments and the NPUA. American University of Armenia also has partnerships with several IT firms, e.g., Mentor Graphics, Picsart, and others. Yerevan State University's Faculty of Biology students, for instance, have received funding from several private sources including ACBA Federation, the largest shareholder of ACBA Bank. The mining companies in Armenia also offer some research funding to academic and research institutes in the country.

In the last few years, the Philip Morris International Science (PMI Science) in partnership with the Enterprise Incubator Foundation (EIF) in Armenia has been working to develop an R&D ecosystem. They report providing research funding support to institutes and universities in Armenia in a number of fields including Applied Mathematics and Physics, Bioinformatics, Biotechnology, Biomedicine, Data Science, Artificial Intelligence, Machine learning, Industrial and Systems Engineering, Material Science, and more. Private foundations have also established science and innovation

[227] Government of Armenia Decision N195-N of February 13, 2025.

[228] See the OECD Frascati Manual 2015, which offers guidelines for collecting and reporting data on research and experimental development.

[229] OECD Oslo Manual 2015 offers guidelines for collecting and interpreting data data on innovation

funds supporting researchers in Armenia. The Afeyan Family Foundation has a multiyear research funding agreement with the American University of Armenia for research in Computer Science, AI, Robotics, Materials, Data-Driven Bioscience., and seed funding for international cooperation.

Science advocacy and civil society organisations

Gituzh, which translates to Knowledge Power or Science Power, is currently the most notable advocacy organisation created by a large number of entrepreneurs in the leading technology companies and trade groups in Armenia. They emphasise the urgency of developing a strong science basis for the country, which will support its security and rapid development. Their advocacy work is focused on both popularisation of science as well as lobbying the Government and the National Assembly to take immediate action to develop strong science and scientific institutions. As recently as November 2024, they had organised hearings in the National Assembly questioning public authorities in the paths to develop science and R&D policy in Armenia.[230] In February 2025, they organised a national conference on the topic. The focus on the advocacy, however, is general science and research and not any particular domain, e.g., green transition research.

Trends

Overall, a few general positive trends on RDI can be highlighted:

Armenia's innovation performance is notable. The 2024 Global Innovation Index (GII) places Armenia at the 66th position among 133 countries assessed. Armenia exhibits a consistent trend of generating more innovation output (55/133) compared to its inputs (79/133), with its ranking on these measures going up from year to year.

Armenia has an active innovation ecosystem particularly in the realm of IT, data science, and biotechnology. These include the Enterprise Incubation Foundation (EIF), Vanadzor and Gyumri Technology Parks, ImpactHub, UATE (Union of Advanced Technology Enterprises), AUA Entrepreneurship and Product Innovation Centre (EPIC), and several venture funds.

Armenia had some clear RDI targets based on the joint document between Eastern Partnership countries and the European Commission. The document called "Recovery, resilience and reform: post 2020 Eastern Partnership priorities,"[231] lays out RDI and green transition related RDI targets. These include increasing each partner country's global innovation index score by three points, by: (i) investing in Research and Innovation (R&I) policy reforms, (ii) increasing gross

[230] Article on parliamentary hearing on science policy in Armenia with strong Gituzh presence: https://tech.news.am/arm/news/4705/skzbic-orenq-heto-nor-razmavarutyun-inch-en-qnnarkel-azh-um-gitutyan-masin.html

[231] See https://www.eeas.europa.eu/sites/default/files/swd_2021_186_f1_joint_staff_working_paper_en_v2_p1_1356457_0.pdf

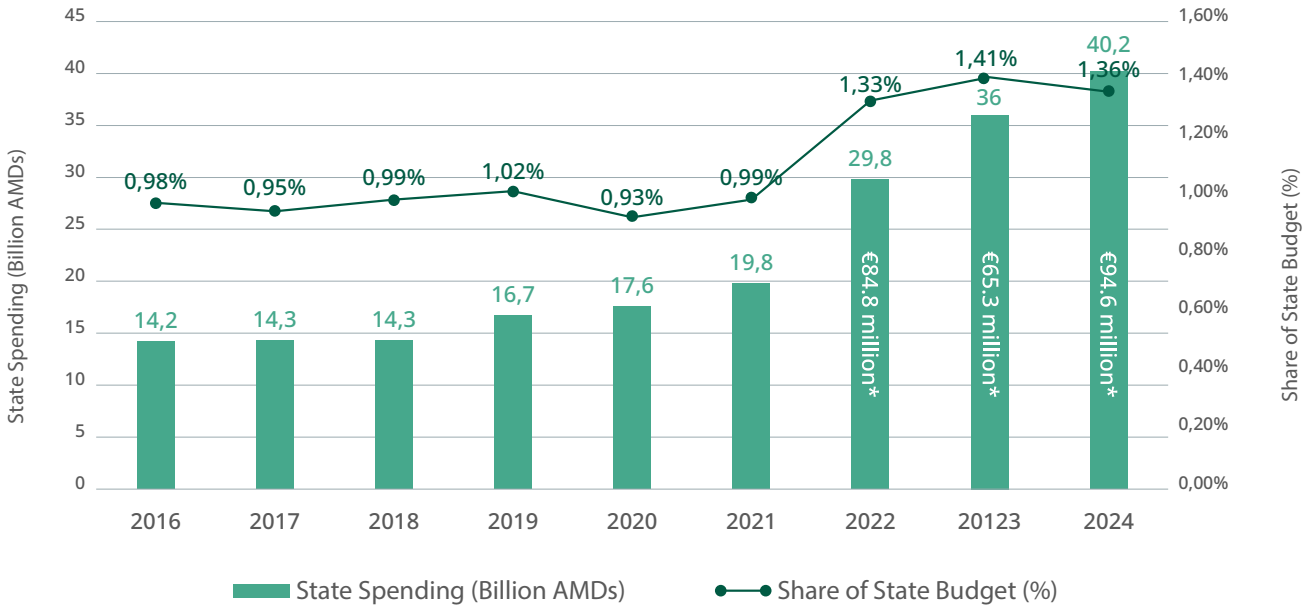
R&I expenditure in by at least 50% to ensure sustainable growth and (iii) supporting the green and digital transitions.

The document also emphasises solid citizen engagement in R&I actions, including in areas affecting the future of economies and societies. It also aims to strengthen excellence and the technological base by increasing to 700 the number of partner countries' participations in Horizon Europe and EU4Innovation. The EU has also agreed to support the implementation of smart specialisation strategies and the development of technology transfer roadmaps by interested EaP partners.

This working document on post-2020 priorities, offers strong guide and suggests programmatic support from the EU for advancing its stated objectives.

Armenia has made progress in state funding of R&D in recent years. According to the latest data, Armenia's yearly total government budget allocations for R&I more than doubled from about AMD 14 billion before 2020 to more than AMD 30 billion per year after 2022, reaching 40 billion in 2024 (Figure 13).[232]

Figure 13. Armenia's state budget allocation to science research and development in billion AMDs (current prices) and share of state budget for the given year, 2016-2024, with select allocations also converted to Euros



There is greater national discourse and activity on science policy and R&I investments. The government's medium-term expenditure framework plans to sustain R&I expenditure to about 33 billion AMD annually in the 2025-2027, with the aim of fostering a strengthened innovation

[232] These figures do not include state allocations on military R&D, which may not very relevant for the purposes of assessing R&D for green transition.

ecosystem. Advocacy group Gituzh is offering a critical overview of the country's public-sector investments in R&D, generating valuable discussions and debates.

Major research funding sources are available to Armenia's researchers immediately. Armenia's full association with Horizon Europe provides greater access to funding and global collaboration. The funding resources available to Armenia include:

EU Horizon Europe – With an enormous budget of €95.5 billion for the period 2021-2027, Horizon Europe offers opportunities for research, innovation, networking, and capacity building. A huge portion of this funding is available for green transition research and innovation.

EU Erasmus+ – With a budget of €28.4 billion for the 2021-2027 period, Erasmus+ funding is available to Armenia to upgrade its research and education capacities.

EU COST – With a 2021-2027 budget of €600 million, the European Cooperation on Science and Technology (COST) programme is a pan-European intergovernmental framework dedicated to interdisciplinary networking activities for researchers (EU and beyond, including Armenia).

EU Interreg NEXT Black Sea Basin – February 2025, Armenia government approved the draft law to join the EU's Interreg NEXT Black Sea Basin. At a total budget of €75 million, it is significantly smaller compared to the other programmes. But it has a regional focus on green transition and research capacity building.

Other bilateral – In addition, there is research and education cooperation between Armenia and other countries on a bilateral basis. These include Austria's Agency for Education and Internationalisation (OeAD), British Council, German Academic Exchange Service (DAAD), German Research Funding (e.g., BMBF), Swedish Institute, and others.

Some attempts to focus research funding on topics relevant to the European Green Deal: In 2023, the Ministry of Education, Science, Culture, and Sport (MoESCS) through its HESC launched a programme to solicit proposals on research areas with high socio-economic impact prospects.[233] These included research proposals AI and data science, quantum technologies, robotics, biotech, materials science, and the Green Deal. The Green Deal domains mentioned included:

- Clean and Secure Energy: Renewable energy (solar, wind, geothermal and biofuels), Hydrogen, Fusion (inertial confinement fusion, magnetic containment), Fission (molten salt, mini-reactors), Energy harvesting (wireless, bio-mechanical), Grid storage, Batteries (graphene, carbon nano-tubes, solid state, metal-air)
- Industry and agriculture decarbonisation and pollution abatement, smart agriculture
- Environmental intelligence and monitoring systems, ecosystems and biodiversity, climate change mitigation
- Agriculture, food security and soil usage

[233] https://escs.am/am/news/19341

- Sustainable, smart transportation (efficient, safe and environmentally friendly transport)
- Sustainable, safe and regenerative buildings

Such an approach is promising though it is unclear who the client is and how the research results will be put into policy or commercial use. The experience with these grant programmes should be reviewed for developing enhanced, new ones.

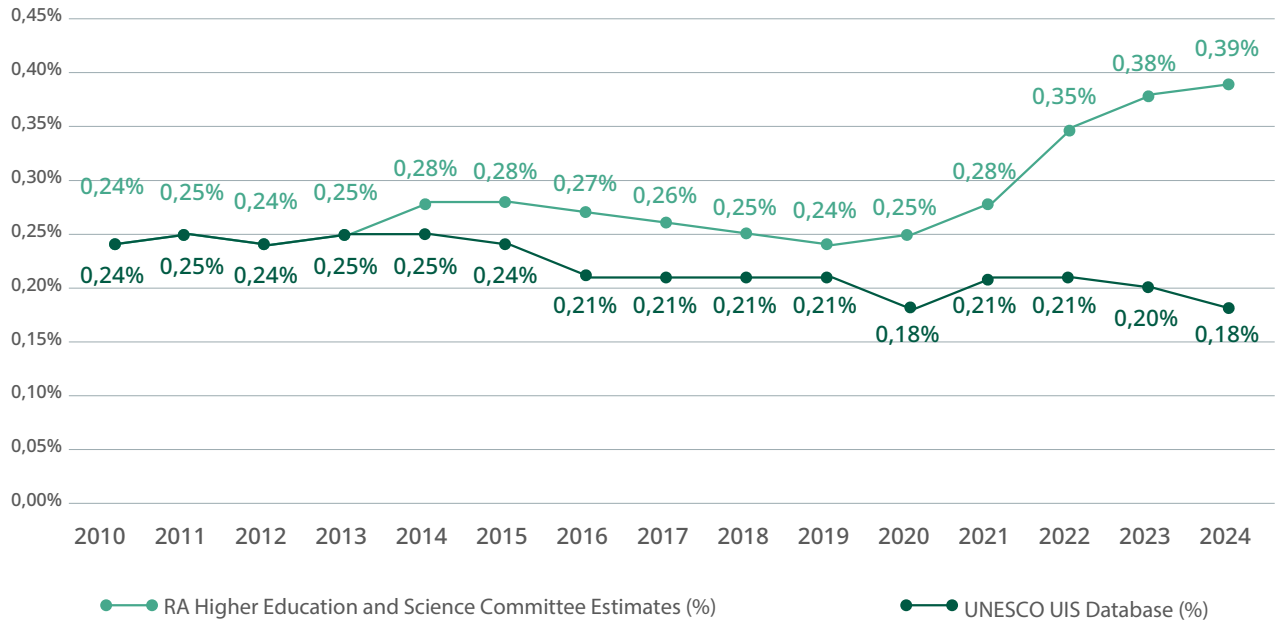
Armenia's Green Taxonomy is in the final stages of adoption. The Government of Armenia, through the efforts of the Ministry of Economy, is in the process of adopting a Green Taxonomy for identifying and validating green investments. The Taxonomy identifies three types of investment: green, transitional, and enabling. This should be helpful in guiding the validation process of an R&D investment as being relevant for green transition or not, though case-by-case considerations will remain important.

Challenges

These achievements are laudable, though they could be considered small steps in face of the challenge. Further progress is needed to accelerate RDI that supports the country's growth, including toward green transition. Several directions require public sector, academic, and business focus. These include:

1. **Fixing the discrepancies in gross expenditures on R&D (GERD) reported by various agencies.** There is wide discrepancy in the GERD amounts as reported by ArmStat and the RA Higher Education and Science Committee (HESC). It is the ArmStat estimates that are used internationally, especially in the UNESCO UIS Database, which is the main source of comparative international data on R&D investments. As Figure 14 shows there are divergent estimates. This should be resolved based on discussions and agreement on methodologies. UNESCO or HESC data should then be adjusted based on results.

Figure 14. Divergent estimates of GERD as a share of GDP reported by UNESCO (based on ArmStat data) and Armenia's Higher Education and Science Committee data (2010-2024)

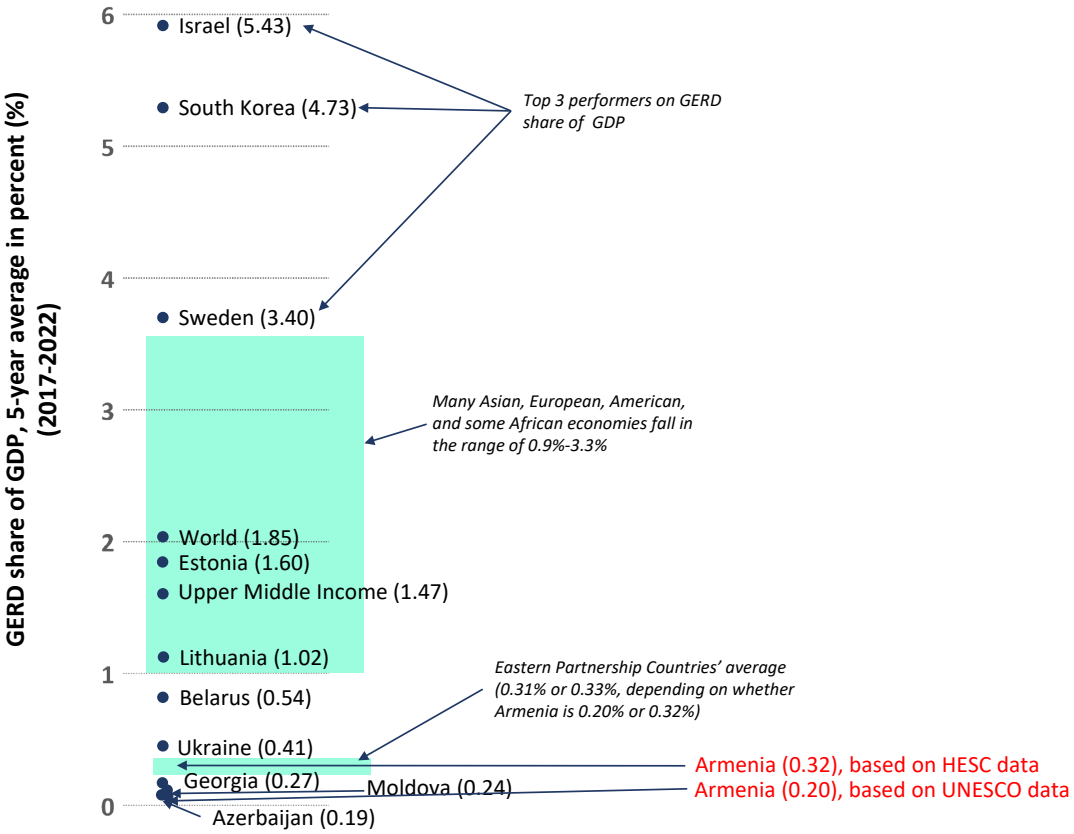


2. **Better accounting for the private for-profit sector in investments in R&D.** Neither of the sources that estimate the GERD account for business sector investments in R&D. The ArmStat and the HESC estimates both rely on state contribution to R&D. This can substantially underestimate the volume and significance of research and development taking place in the country like Armenia where there are global IT firms like PicsArt, Service Titan, Synopsis, National Instruments, and more.[234] The Government Decision adopted in February of 2025 to offer tax deduction to private entities for the R&D work is expected to help better capture the non-state funded R&D taking place in the country.

3. **Financing has increased but needs to continue to increase.** Despite notable increases in state funding and poor accounting for private R&D, Armenia still needs to work harder to attract and mobilise R&D resources. The 5-year average share of GERD in the GDP is 0.20% or 0.32%. The average for the Upper Middle Income countries, Armenia's economic cohort, is 1.47% of GDP (Figure 15). An example of a post-Soviet country with successful integration into the EU and with highly active R&D investments is Estonia, which has average gross expenditures of 1.6% of its GDP into R&D. The additional investments should not come only from the state budget but also from business, foundation, and international sources.

[234] As Eurostat explains, the R&D expenditures by private businesses in many advanced economies far exceeded state expenditures: "While R&D expenditure in the EU's Business enterprise sector was equivalent to 1.47% of GDP in 2023, this ratio reached 3.85% in South Korea (2022 data), 2.83% in the United States (2022 data), 2.70% in Japan (2022 data) and 2.26% in Switzerland (2021 data)."

Figure 15. Comparative Gross domestic expenditure on Research and Development (GERD) as a share of GDP, 5-year average, 2017-2022



Sources: AUA Acopian Center for the Environment analysis of UNESCO Institute for Statistics (UIS). UIS. Stat Bulk Data Download Service. Accessed Feb 15, 2025. https://apiportal.uis.unesco.org/bdds. The higher estimate of the GERD share of GDP for Armenia is based on information provided by the RA Higher Education and Science Committee (HESC).

4. **Modernising RDI system for research excellence:** Armenia's plans include modernising research infrastructure and increasing institutional funding. The Higher Education and Science Committee (HESC) has launched new grant schemes to foster experimental development projects and strengthen the link between academia and industry. However, the limited scale of funding and ongoing fragmentation in policy coordination hinder the full realisation of research excellence. A great deal of the focus required for upgrading the research capacity in Armenia is taken by the proposed Academic City, for which the government has tried to rally support. In the meantime, new facility and infrastructure projects are placed on a hold due to permitting uncertainties.

5. **Institutional Capacities:** Various aspects of institutional capacities are lacking. At the basic level, research management and administration capacities need to be enhanced. Large, collaborative research projects are administration intensive, requiring adequate staffing and financing. At a higher level, many institutions (including governmental) and enterprises have to enhance their capacities to effectively commission and absorb research and innovation.

6. **There is a lack of research and innovation policy and strategy aligned with green transition objectives.** While the Armenian Government prioritises a green economy and sustainability in its programmes, expenditures to accelerate the transition remain insufficient. The amounts made available, e.g., through the MoESCS's 2023-24 research proposal solicitation programme cited earlier, are small and insufficient to address the challenge. Importantly, a key challenge lies in the lack of a clear link between green policies and RDI. This disconnect limits the integration of innovative solutions into sustainability initiatives and undermines their effectiveness.

7. **Oversight of science policy and budget management** is crucial for Armenia's innovation landscape. The Higher Education and Science Committee (HESC) plays a key role in R&I financing and fostering international cooperation. However, it is important to assess HESC's capacity and approach to science financing. HESC will have an instrumental role in shaping the research and innovation domain in Armenia. An assessment of support to HESC to fulfil this role is critical.

8. **Developing research talent.** There is a significant decline in the number of graduating PhD students. While this may mean that institutions are becoming more selective in accepting doctoral students, there is also a good chance that with greater economic opportunities many do not find a research career appealing. Addressing this challenge requires innovative solutions to the human resource shortage, such as fostering internationalisation and creating incentives for pursuing research careers. There has to be a concerted effort to make research and development more appealing to the new generations.

9. **Armenia's researchers and research institutions have been slow in tapping into Horizon Europe opportunities.** While Armenia's full association with Horizon Europe provides greater access to funding, Armenian researchers and institutions are not sufficiently accessing the sizable grant amounts available from calls for proposals on green initiatives in the Horizon Europe program. A key question is why participation has proven to be so low. One or two institutions in Armenia are actively participating in the green transition related calls, while a vast potential remains untapped. As of February 2025, Armenia has received a mere €15.79 million from Horizon Europe and its predecessors (Table 42). This places Armenia in the fourth position out of the five Eastern Partnership countries, though on a per capita basis it occupies the third place. Sixty-five percent of the total funding in Armenia is secured by six institutions, with the American University of Armenia in first place (Table 43).

Table 42. Net EU contribution to Research and Innovation through the Horizon framework programmes to the Eastern Partnership and Baltic States (as of February 2025)

	Net EU Contribution (Million Euros)	Per capita (Euros)
Eastern Partnership Countries		
Armenia	15.79	5.28
Azerbaijan	2.73	0.27
Georgia	21.25	5.72
Moldova	19.46	7.92
Ukraine	146.50	3.88
Baltic States		
Estonia	682.20	497.85
Latvia	297.10	158.25
Lithuania	343.40	119.59

Sources: Compiled by the AUA Acopian Centre for the Environment from a) EU Horizon Dashboard accessed on February 25, 2025 and b) World Bank, country population data for 2023, accessed February 25, 2025.

Table 43. Top six research and innovation grantees funded by the EU Horizon framework programmes (as of February 2025)

Grant Recipient Organisation in Armenia	Net EU Contribution (Euros)
American University of Armenia	€3,903,249
L. A. Orbeli Institute of Physiology	€2,415,000
Institute of Informatics and Automation Problems	€1,236,186
Yerevan State Medical University after Mkhitar Heratsi	€930,144
Institute for Physical Research	€928,838
National Academy of Science of the Republic of Armenia	€910,764

Source: EU Horizon Dashboard accessed on February 25, 2025

To build a robust and dynamic innovation ecosystem, addressing strategic, investment, capacity, and effective research and innovation practices gaps will prove critical for Armenia's greater integration into global R&I activities that will support a sustainable socio-economic growth of the country.

Key gaps and needs

Below are the two broad dimensions of advancing RDI for green transition in Armenia: policy/ legislative readiness and implementation readiness. Making marked progress on these would be important for improving the RDI ecosystem, and particularly on green transition, in Armenia.

Policy and Legislative Readiness

Enabling Conditions

The Armenian RDI landscape has experienced a significant shift due to the implementation of the EU-Armenia Comprehensive and Enhanced Partnership Agreement (CEPA). Enabling conditions include:

- Cooperation in advancing research, development, and dissemination of sustainable technologies (Articles 52, 53, 58, and 79 of CEPA).
- The 2021 Joint Working Document between EaP countries and the EU offers specific objectives and targets as well as a shared platform for advancing RDI in Armenia.
- The Armenian Government's strategic initiatives to integrate climate considerations into sector-specific policies.
- The increase in investments in research infrastructures, reviewing researchers' baseline salaries, and introducing new research-grant frameworks.
- Adoption of the OECD

Key gaps

- Absence of a national strategy on addressing RDI directions in the country.
- Fragmented R&I policies across various state agencies, with little policy coherence.
- Lack of clearer articulation of the RDI aspects of the green transition-related legislation and investments in Armenia (e.g., on farm-to-fork, climate mitigation and adaptation, zero pollution, biodiversity, energy transition, etc.)
- Lack of collaboration and coordination among government, industry, academia, and society.
- Inadequate and inconsistent accounting of state spending on RDI and lack of adequate accounting for non-state RDI investments.
- Lack of adequate guidelines for

Needs

- Development of a national strategy on RDI, with strong policy coordination across state agencies.
- Adequately scaled incorporation of RDI needs for green transition in the national strategy.
- Supporting and incentivising collaboration and coordination efforts among all government, industry, academic, and other societal stakeholders.
- Develop standardized collection and reporting of RDI data. This includes developing better definitions, norms and standards on RDI spending, adequately accounting for state and non-state investments.

Implementation Readiness

Enabling Conditions

Armenia's regulatory and economic instruments for policy implementation are evolving but still face significant challenges. Key enabling conditions include:

- Some business R&D support measures, esp. the nascent R&D tax incentives adopted in February 2025.
- The Government of Armenia, through the efforts of the Ministry of Economy, is in the process of adopting a Green Taxonomy for identifying and validating green investments. The Taxonomy identifies three types of investment: green, transitional, and enabling. This can be helpful in qualifying R&D investment as relevant for green transition.
- State research funding is planned, managed and delivered primarily through one state agency, the Higher Education and Science Committee (HESC). It offers to be a single contact point for most non-military state-funded research activities.
- There are recent initiatives (post 2020) such as the capacity modernisation programme and the attracting of highly qualified professionals programme to enhance innovation and attract top-tier talent.
- Through the nascent tax incentives for the private sector R&D investments (adopted in February 2025[235]), the OECD Frascati Manual 2015 for collecting and reporting data on research and experimental development.
- Universities, research institutions, businesses, and even local, regional and national governments in Armenia have access to large R&D funding made available from the EU Horizon Europe and EU4Innovation programmes.
- Armenia's non-governmental RDI capacity has seen substantial growth, particularly in the ICT sector, with significant contributions from private and donor-funded initiatives. Key players like the AUA Acopian Centre for the Environment and the Enterprise Incubator Foundation (EIF) have advanced various green agenda projects and innovation programmes. Notable initiatives

[235] Government of Armenia Decision N195-N of February 13, 2025.

include the Global Cleantech Innovation Programme, Climate Change Tech Accelerator, and EU Green Agriculture Initiative.

Key gaps

- Guidelines are missing for collecting and reporting of innovation activities. The OECD Oslo Manual of 2018 offers such guidance but has not been officially adopted.
- Low R&D expenditures, where GERD levels remain low compared to relevant cohorts, e.g., Upper Middle Income countries. Even under the best-case scenarios of current R&D spending, Armenia would need to quadruple or quintuple its R&D spending to reach parity with the Upper Middle Income countries average spending.
- Weak collaboration between research institutions, academia, and the private sector limits the socio-economic impact of R&D.
- Alarming underutilisation of EU Horizon Europe programme to advance RDI in Armenia.
- There are significant challenges in retaining skilled professionals and attracting top-tier talent, despite initiatives to incentivise highly qualified professionals.
- Inadequate system(s) in place to integrate research results and monitor impact.
- Unclear understanding of R&D needs and spending of local businesses, which in part hampers development of policies to increase non-state R&D investments.

Needs

- Adopt standards and guidelines for collecting and reporting data on innovation.
- Enhance financial incentives for R&D activities, including specific tax credits and customs exemptions tailored for R&D.
- Increase private sector engagement in R&D through targeted support and incentives for local businesses.
- Substantially raise GERD to align with international standards, focusing on applied research and practical innovation.
- Strengthen collaboration between research institutions, academia, and the private sector to facilitate knowledge exchange and commercialisation.
- Implement sustained efforts to address the skills gap and foster an environment conducive to talent retention.
- Encourage a culture of innovation and entrepreneurship to stimulate demand for R&D services among local businesses.
- Provide private and public institutions with clear mandates specifically focused on achieving EGD-related objectives.
- Enhance collaboration among businesses, educational institutions, and research organisations, and government through incentivising partnerships and knowledge exchange platforms. A clear platform for this could be participation in joint Armenian participation in Horizon Europe calls and their consortia.

4.4 Horizontal Measures

This sub-Chapter aims to provide an overview of the current legal framework on the Environmental Impact Assessment (EIA), Strategic Environmental Assessment (SEA), environmental liability, environmental management and public participation in public hearings in regard to alignment with the respective EU directives. The comparison with EU directives provides a benchmark for evaluating Armenia's progress toward harmonising its legislation with EU standards, ensuring effective environmental protection and sustainable development.

The CEPA agreement obliges Armenia to gradually align its legislation with EU law and international instruments within set timeframes. This includes harmonising environmental governance and integrating environmental considerations into other policy areas.

Specifically, RA must align its legal framework on:

a) **EIA**: assessing the environmental impact of public and private projects within two years of CEPA's entry into force (2021).
b) **SEA**: assessing the environmental impact of plans and programmes within three years.
c) **Public access to environmental information**: ensuring transparency within two years.
d) **Public participation and access to justice**: Strengthening public involvement in environmental decision-making within two years.
e) **Environmental liability**: adopting national legislation and designating competent authorities within two years; establishing polluter-pays rules to prevent and remedy environmental damage within eight years; introducing strict liability for hazardous activities within seven years.

Legal framework on EIA and SEA

The RA Law "On Environmental Impact Assessment and Expertise" (hereinafter "the Law") is considered the primary legislative act governing EIA and SEA processes in the RA. Although in effect since 9 August 2014, significant amendments have recently been introduced in relation to the requirements in the Annexe 3 of the CEPA, culminating in the adoption of a revised version of the Law, which entered into force in 2023.

The RA is also a Party to the Protocol on SEA since 2011, and thus it belongs to the first countries in the Eastern European and Caucasian region joining the Protocol on Strategic Environmental Assessment (Protocol on SEA) to the Convention on the Environmental Impact Assessment in the Transboundary Context (the Espoo Convention). This has been incorporated in the Law, which further regulates the transboundary EIA, state environmental expertise, public notification, the organisation of public hearings, expert conclusions, the rights and obligations of developers in the processes of impact assessment as well as the implementation of proposed activities.

The revised legal framework introduces substantial changes aimed at improving impact assessment and related expert procedures through refining definitions, streamlining processes, enhancing the mechanism for public participation and aligning national legislation with EU directives, the Espoo and Aarhus Conventions. Key updates include an expanded scope of "proposed activity," the clarification and expansion of key definitions, the introduction of Environmental Management Plan (EMP), revision of reporting requirements, and reclassification of activities subject to impact assessment, ensuring a more structured and transparent regulatory environment.

Despite these improvements, certain provisions raise concerns, particularly the automatic approval of EIA conclusions in cases of procedural delays. This deviation from EU standards presents significant risks to environmental protection, as the failure of the competent authority to conduct timely and thorough assessments results in inadequate evaluation of the environmental impacts of certain activities, projects, or plans. Such inaction undermines the effectiveness of the assessment process and compromises the implementation of appropriate mitigation measures, raising serious concerns regarding environmental protection and the effectiveness of the EIA process.

Alongside the main new regulations introduced in the Law on the procedures for conducting SEA, the Government's 2023 Decision No. 2294-N "On approval of the strategic environmental assessment order and the requirements submitted to the strategic environmental assessment report" sets forth the essential requirements for the phases of conducting SEA and preparing SEA reports. This decision aims to ensure alignment with the Espoo Convention and Directive 2001/42/EC on the assessment of the environmental effects of certain plans and programmes (SEA).

However, while the SEA provisions are now more comprehensive, the absence of explicitly defined SEA reporting requirements within the Law creates a regulatory gap, which may lead to inconsistencies in its implementation.

For EIA, the Environmental Management Plan and the Monitoring programme play a crucial role in ensuring that proposed activities are implemented with due consideration for environmental protection, impact mitigation, and compliance with regulatory requirements. The EMP outlines necessary mitigation measures, their implementation timelines, and associated costs, while the Monitoring Programme ensures ongoing oversight of environmental impacts, with an emphasis on preventive and corrective actions. Furthermore, impact assessment of each sector-specific proposed activity may necessitate the submission of additional plans and programmes alongside the EMP and also set specific monitoring and reporting obligations.

Despite these improvements, practical challenges remain. While the revised Law has updated key definitions in this regard, certain secondary legislative acts, particularly those governing sector-specific activities, have not been revised accordingly. This creates regulatory inconsistencies, as outdated provisions continue to govern critical aspects of environmental monitoring and impact assessment. The continued applicability of previous legal provisions until new ones are adopted raises concerns about the coherence and effectiveness of the regulatory framework.

Legal framework on LCA

Within the impact assessment framework LCA serves as a more comprehensive assessment of environmental impacts over the entire life cycle of a project, considering global and long-term effects, rather than focusing only on site-specific or direct impacts. Currently LCA, as a standalone requirement for the implementation of proposed activities, is not mandated within RA environmental legislation. The Law primarily focuses on assessing direct and immediate environmental impacts of proposed activities. Despite several recommendations and discussions on the necessity of LCA incorporation into RA legislation, there is no formal incorporation of LCA into RA legal and regulatory framework.

Legal framework on CBA

The Law focuses on assessing potential environmental impacts of proposed activities but does not specifically require a comprehensive economic evaluation through CBA. In practice, certain sectors have attempted to incorporate economic evaluations. For instance, in the mining industry, there have been proposals to include cost-benefit assessments in decision-making processes. However, these assessments have been criticized for being one-sided, focusing primarily on financial profitability without adequately accounting for environmental, social, or cultural losses. Adopting standardized CBA methodologies could strengthen the EIA process by ensuring that economic, environmental, social, and cultural factors are all considered in project evaluations.

Legal framework for public access to environmental information and access to justice

The engagement of the public in EIA and SEA processes serves a dual purpose: safeguarding their rights and interests while establishing by the national legislation effective tools for participation in decision-making within these frameworks.

The amendments aim to align the national legal framework with international obligations under the Espoo Convention and the Aarhus Convention. In particular, the Aarhus Convention requires that the public concerned should be notified about potential decisions or draft decisions resulting from EIA/SEA procedures. While the Law incorporates several public notification provisions, it does not explicitly regulate the direct provision of the expert conclusion. Instead, the Law mandates its publication on the competent authorities' official website.

Regarding compliance with the EU Directive on EIA, a comparative analysis reveals alignment with its key provisions. These include: 1) early public notification through electronic means, public notices, or other appropriate channels; 2) adherence to public engagement procedures; 3) compliance with development consent processes; 4) facilitating the submission of public comments, suggestions, and opinions; 5) ensuring access to relevant environmental information.

These legal reforms strengthen public participation, enhance transparency, and align national legislation with international environmental governance standards.

While these amendments align with the provisions of the EU Directive on EIA and the Aarhus Convention, challenges persist in their practical implementation. In particular, the technical complexity and extensive documentation prepared during the impact assessment and provided to the public concerned may not assist but hinder effective public engagement. As a result, public participation, especially among local communities, may not always occur early, meaningfully, or sufficiently inclusive, as required by international standards.

Aarhus Convention

The Republic of Armenia ratified the Aarhus convention in 2001. Armenia hosts a network of fifteen Aarhus Centres working on environmental issues throughout the country. The first Aarhus Centre was established in the city of Yerevan in 2002 with additional 14 centres around Armenia. Aarhus Centres work on all three pillars of the Aarhus Convention: (i) **access to environmental information**, (ii) **public participation in environmental decision-making** and (iii) **access to justice** as well as raising awareness of the public regarding environmental issues and their rights. They deal with various environmental hotspots, disaster risk reduction, environmental legislation and other issues.[236]

The expanded rights of NGOs to challenge environmental decisions in court reinforce compliance with the Aarhus Convention and EU EIA Directive, contributing to improved environmental oversight and accountability. However, practical barriers such as procedural complexities, resource constraints, and potential delays in judicial processes may still affect the effectiveness of access to justice.

Legal framework on environmental liability

The ELD aims at the prevention and remediation of damage to specific natural resources, i.e., protected species and natural habitats, water, and land. It centres on the obligation of the state, acting through the relevant competent authority (i.e., the domestic regulator responsible for enforcing the law(s) that implement the Directive), to require operators to undertake preventive and remedial measures or take the measures itself and recover the costs from the responsible operator.

The RA environmental liability framework is distributed across multiple laws, which can be categorised into two main types: direct and indirect liability laws[237]. Direct environmental liability pertains to the use of specific natural resources and establish offenses and corresponding

[236] https://aarhus.osce.org/armenia

[237] EU4Environment (2024), Environmental liability provisions in Armenia: Damage prevention and assessment.

liabilities (e.g., civil liabilities) for violations of these regulations, such as those outlined in the RA Code "On subsoil", RA Water Code, RA Forest Code, RA Law "On Fauna", RA Law "On Flora" and RA Law "On Atmospheric Air Protection". In contrast, indirect environmental liability, as established under the RA Code on Administrative Offenses, RA Criminal Code[238], RA Tax Code and other legal instruments, applies to legal responsibility for violations affecting impact assessment and environmental governance, including sector specific requirements. Overall, legal framework sets four types of environmental liabilities:

1) **use fees for natural resources** (e.g. Article 203 of RA Tax Code),
2) **compensation**, which refers to the payment of damages to the state, as outlined in various legal provisions, such as Article 167 of the RA Tax Code and the financial guarantee specified in point 28.2 of Part 2 of Article 3 of the RA Code "On subsoil",
3) **fines** (e.g. Article 94.1 of RA Code on Administrative Offenses),
4) **costs associated with performing preventive and/or remedial measures** (e.g. Article 69 of RA Code "On subsoil" referring to the environmental protection fund paid for the restoration of lands disturbed during subsoil use).

The approach used in the RA legal framework for damage assessment differs from that required under the ELD. The scientific assessment of the damage (or threat thereof) caused to the environment is a central feature of the ELD. The responsible party bears the financial costs of these obligations, as determined by the relevant regulatory authority. In contrast, RA legislation defines environmental liability primarily in terms of financial compensation paid to the state for the unlawful use of natural resources or environmental harm. Instead of relying on scientific evaluation, compensation is calculated indirectly using predefined formulas and tariffs as a proxy for actual environmental damage. Under the legal framework, an EIA report must include an assessment of potential economic and environmental damages, along with the form and timeframe for compensation. The compensation mechanism is regulated by Government Decision № 764-N adopted as of May 27, 2015 "On approval of the procedure for assessment and compensation of possible economic damage to the environment", which requires developers to calculate potential environmental damage in line with the decree's methodology. Compensation includes fees for impacted environmental components, expressed in monetary terms.

It should be highlighted that ELD emphasises the "polluter pays" principle, holding operators/ developers strictly liable for preventing and remedying environmental damage. It mandates undertaking necessary preventive actions and, in cases where damage occurs, implement remedial measures to restore the environment. In contrast, Armenia 's current legislation does not fully align with the ELD's preventive and remedial focus. The existing laws lack explicit requirements for operators to proactively prevent environmental damage and to carry out remediation. Additionally, the methodologies for assessing environmental damage are not well-defined, leading to challenges in quantifying harm and enforcing liability.

[238] This report does not analyse the Criminal Code, which prescribes imprisonment for offenders, as it is not classified as a form of environmental liability.

This distinction underscores a critical gap in Armenia's regulatory system, as the existing laws do not provide a comprehensive mechanism for the proactive prevention and restoration of environmental damage.

Looking forward, Armenia's efforts to align more closely with international standards will require further refinement of its legal framework, particularly in developing clearer methodologies for environmental damage assessment and ensuring effective implementation of preventive measures. As secondary legislation continues to evolve, it is essential to bridge these gaps through well-structured transitional measures to ensure both continuity and compatibility with updated regulations.

Overview of legal framework on environmental management

Currently, RA does not have mandatory sustainability reporting requirements akin to the EU Corporate Sustainability Reporting Directive. However, the country is actively advancing its sustainable development agenda through various initiatives. In October 2023, the Central Bank of Armenia published the National Sustainable Finance Roadmap, outlining expectations and planned actions to promote sustainability within the financial sector. This roadmap emphasises integrating environmental, social, and governance (ESG) considerations into corporate governance and decision-making processes. It also highlights the development of reporting templates and climate risk disclosure frameworks for financial market participants, including banks, credit institutions, insurance companies, and asset managers.

Additionally, Armenia has committed to the United Nations' 17 Sustainable Development Goals (SDGs) and has integrated sustainable practices into its policy framework. Notable initiatives include implementing climate change screening requirements for public investment projects, approving the 2022–2030 National Programme on Energy saving and renewable energy, and amending legislation to enhance monitoring of greenhouse gas emissions.

While these efforts demonstrate dedication to sustainable development, the establishment of mandatory sustainability reporting requirements under the national legislation similar to the EU Corporate Sustainability Reporting Directive has not yet been realised. The current focus remains on developing frameworks and guidelines to encourage voluntary adoption of sustainable practices and reporting among organisations.

Priorities and needs

The provisions on automatic approval in the EIA procedure raises serious concerns regarding environmental integrity and the effectiveness of the EIA process. The absence of explicitly defined SEA reporting requirements within the Law creates a regulatory gap, which may lead to inconsistencies in its implementation. Despite several recommendations and discussions on the necessity of Life-Cycle Assessment (LCA) incorporation into Armenian legislation, this is yet to be

formally included in the regulatory framework. Similarly, the Law does not require integration of Cost and Benefit Analysis (CBA) in the assessment, although a standardised methodology should strengthen the EIA process by ensuring that economic, environmental and social factors are all considered in the project evaluation.

Although the consolidated 2023 Law proposed comprehensive changes, the by-laws governing implementation still need to be amended. In order to fully align with the international environmental governance standards, efforts need to be made to enhance public awareness, simplify access to information, address procedural inefficiencies, and strengthen institutional capacity to ensure that environmental decision making processes are truly participatory and inclusive.

The requirements for sector-specific plans, such as mine closure plans and subsoil waste management or recycling plans, are also missing, highlighting the need for a more integrated and comprehensive approach to environmental governance.

The Environmental Liability Directive “polluter pays” principle hasn’t been incorporated in the Armenian law, mandating undertaking necessary preventive actions and, in cases where damage occurs, implementing remedial measures to restore the environment. The existing laws lack explicit requirements for operators to proactively prevent environmental damage and to carry out remediation. Additionally, the methodologies for assessing environmental damage are not well-defined, leading to challenges in quantifying harm and enforcing liability.

Furthermore, the establishment of mandatory sustainability reporting requirements under the national legislation similar to the EU Corporate Sustainability Reporting Directive has not yet been realised. The current focus remains on developing frameworks and guidelines to encourage voluntary adoption of sustainable practices and reporting among organisations.

5. Financing the Green Transition

5.1 Transition finance national context and relevant stakeholders

Sustainable finance follows specific environmental, social, and governance (ESG) objectives in public and private investment decisions. Conceptually, it embraces several other related finance concept that all together aim at environmental, economic, and social transformation: i.e., net-zero finance (reducing net GHG emissions), just transition finance (net-zero finance and a socially just transition), climate finance (climate mitigation and adaptation finance), and green finance (climate finance and other environmental aspects, such as the sustainable use and protection of water and maritime resources, transitioning to a circular economy, control and prevention of environment pollution, the protection and restoration of biodiversity and ecosystems).

Armenia is committed to reduce its GHG emissions[239] and build a more climate resilient economy through implementing the Paris Agreement and its Nationally Determined Contributions (NDCs). Armenia's green transition commitments prioritise the development of renewable energies, energy efficiency, and sustainable resource management[240]. Related policies and strategies are developed in response to the requirements of the United Nations Framework Convention on Climate Change (UNFCCC) and Armenia's commitments under the EU-Armenia's Comprehensive and Enhanced Partnership Agreement (CEPA). However, specifically action plans to structure and finance these necessary investments within and across sectors are still rare and an exception.

NDC. Both the NDC and EGD share the main goal of achieving sustainability. However, the priorities and focus areas are different. Armenia's NDCs focus on renewable energy resilience in sectors like agriculture and water resources, while the EGD targets a cross-sectoral approach with clear goals and a systematic change approach. Table 44 outlines Armenia's NDCs versus the EDG framework, to understand their approaches to climate change and green transition.

Table 44. Armenia's NDCs and the European Green Deal: Action Plan Focus

Aspect	EGD	Armenia's NDCs[241]
Primary goal	■ Achieve climate neutrality in the EU by 2050 through systemic transformations in energy, transport, and agriculture	■ Reduce national GHG emissions and enhance resilience to climate impacts.

[239] UNFCCC (2021). Armenia's Nationally Determined Contributions (NDC). Available at: www.unfccc.int/NDCREG

[240] Government of Armenia (2022). The first policy dialogue of the "Green Armenia" joint platform. Available at: www.gov.am

[241] UNFCCC (2021). Armenia's Nationally Determined Contributions (NDC). Available at: www.unfccc.int/NDCREG

Aspect	EGD	Armenia's NDCs[241]
Emission Reduction Target	■ Net-zero GHG emissions by 2050, with a 55% reduction by 2030 (base year: 1990).	■ Reduce GHG emissions by 40% by 2030 (base year: 1990).
Sectoral focus	■ Cross-sectoral, including energy, agriculture, transportation, industry, and biodiversity.	■ Energy, agriculture, forestry, and water resources.
Key Action Plans	■ Decarbonisation of energy. ■ Circular economy action plan. ■ Sustainable and smart mobility. ■ Biodiversity strategy.	■ Transition to renewable energy. ■ Improve energy efficiency. ■ Enhance climate resilience in agriculture and water sectors.

The draft National Action Plan 2023-2030 for the Implementation of Armenia's NDC, encompasses an investment plan and a financing strategy. However, this document was not adopted. The draft plan identifies investment needs for NDC of a total amount of **EUR 1.27 billion** (AMD 540 billion)[242] until 2030. Table 45 provides an overview on the sector finance needs, as far as the draft plans describe them.

Table 45. Financing Needs by Sector, according to Draft Financing Strategy of NDC's Action Plan[243]

Sector/theme	Subsector	Financing need indicated	Notes
Climate change Of that: disaster risk management	General Mitigation and Adaptation Flood and drought resilience	Total of all sectors EUR 190 million	Total financing for (2023–2030). Part of adaptation-focused projects across sectors, including infrastructure.
Circular economy / waste management	Waste-to-energy projects	N/A	-
Environment protection, including chemicals management	N/A	N/A	Focused on broader strategies but not explicitly itemised.

[242] Ministry of Environment of the Republic of Armenia, Draft Government Decision on Approving the National Action Plan for 2023-2030, Financing Strategy, and Investment Plan for the Implementation of the 2021-2030 Nationally Determined Contributions under the Paris Agreement, 2023. Available at: https://www.e-draft.am/index.php/projects/5672

[243] The NDC action plan focuses on mitigation and adaptation action; this document does not cover broader sustainability and green transition activities, such as R&D, Digitisation, Environmental Protection etc.

Sector/theme	Subsector	Financing need indicated	Notes
Nature and biodiversity	Forest restoration and conservation	N/A	Includes adaptation and mitigation multi-benefit projects.
Energy and buildings	Energy generation, energy efficiency	Solar: not indicated, however some large projects are pending such as Ayg1 and Ayg 2 Wind: EUR 285 million Hydro: EUR 320 million Energy efficiency in buildings: EUR 166 million Energy storage: EUR 131 million	Includes solar energy development projects, and specific allocation for hydroelectric projects.
Sustainable food systems	Climate hazard adaptation, irrigation	Agriculture climate hazard adaptation	No explicit allocations provided.
Urban planning and smart mobility	E-mobility	Charging network: EUR 23 million	Includes e-buses and electric mobility infrastructure.
Digitalisation	N/A	N/A	Digital solutions are indirectly referenced but no explicit allocation.
Research and Innovation	Innovation in clean technologies	N/A	Mentioned indirectly, not separately itemised.

LT-LEDS. Furthermore, Armenia has developed its Long-term Low Greenhouse Gas Emission Development Strategy of the Republic of Armenia Until 2050 (LT-LEDS)[244]. The strategy identifies a total investment and financing need of up to EUR 7 billion. About 60% of these investments are planned to be directed to the energy generation sector. Investments shall be financed deploying a broad spectrum of financing instruments from different sources: development finance institutions (DFIs), bilateral development assistance, trade guarantees and insurance, debt-for-climate swap mechanisms, blended finance approaches, thematic (green, transitional, sustainability-linked) bonds and green equity funds to catalyse private capital etc. In addition, the LT-LEDS considers the selective implementation of carbon pricing instruments (i.e., emissions trading system, carbon taxation, offsetting mechanisms, and results-based carbon financing). However, carbon pricing or

[244] Decree of the GoA, 28 December 2023 N 2318 – L on "Approval of long-term low GHG emission development strategy of the Republic of Armenia (until 2050)"

carbon trading instruments have not been introduced in Armenia as of the date of this report. Table 46 provides an overview about the main measures and investment needs under Armenia's LT-LEDS.

Table 46. Main measures and investment needs under Long-term low GHG emission development strategy of the Republic of Armenia (until 2050)

Sector/theme	Subsector	Financing need indicated
Climate change	General Mitigation and Adaptation	Is total of all sectors
Circular economy / waste management	Waste-to-energy projects	■ CH4 emission reduction through the capture and combustion of landfill gas – cost is not estimated ■ Introduction of organic waste processing facilities (aerobic stabilisation (composting) and/or anaerobic digestion with biogas and fertiliser production) and waste gasification plants (with energy and/or chemical production) – cost is not estimated ■ Biogas in all wastewater treatment plants – cost is not estimated
Environment protection, including chemicals management	Industrial Processes and Product Use	Cost is not estimated
Nature and biodiversity	Forest restoration and conservation	Sequestration of carbon dioxide (forestry): > EUR 215 million
Energy and buildings	Energy generation Energy saving and energy efficiency in buildings	■ Nuclear power: EUR 350 million – EUR 1,550 million ■ Solar power: > EUR 1,430 million ■ Wind power: > EUR 600 million ■ Hydro power: >EUR 600 million ■ Total energy: > 4,180 million ■ For energy efficiency actions cost is not estimated
Sustainable food systems	Animal husbandry	■ Reduction of methane emissions from the cattle's enteric fermentation: investment EUR 950 – EUR 1,450 million ■ Reduction of methane emissions from cattle manures management – cost not estimated ■ Reduction of energy consumption and improved irrigation conveyance efficiency in irrigation schemes – cost not estimated
Urban planning and smart mobility	E-mobility	Increasing the number of electric vehicles: EUR 1,100 million

Sector/theme	Subsector	Financing need indicated
Digitalisation	N/A	N/A
Research and Innovation	Innovation in clean technologies	N/A
Disaster risk management	Flood and drought resilience	N/A

The implementation of the NDC and LT-LEDS will be tracked towards quantitative targets. The GoA plans to establish a unified system of monitoring and evaluation of quantitative targets. Data collection is based on the international indicators used to track progress towards Sustainable Development Goal (SDG) 13 which evaluates the actions of countries in the fight against climate change. Data will be collected on an annual and biennial basis. Data collection will be carried out both for the main target values in the field of reducing GHG emissions, and for sectoral ones. The monitoring of key indicators is coordinated by the inter-agency coordinating council on climate change.[245] The GoA will disclose the results of monitoring and evaluation to the public.

[245] The following types of evaluation are planned: 1) evaluation on an annual basis and GHG emissions inventory on a biennial basis; 2) mid-term evaluation of the national programme or strategy; 3) evaluation at the end of the programme or strategy; 4) post factum evaluation.

5.2 Public and Private Financing Sources and Expenditure for Green Transition in Armenia

Table 47 sets out main sources of public and private revenue and expenditure flows related to green transition in Armenia.

Table 47. Green transition: public and private financing in Armenia

Sector/theme	Public/private	Funding source	Expenditure/investment
Climate change	Public sector	■ Taxes and fees[246] ■ ODAs ■ International grants (GCF, UNDP, EU) DRM: ■ Emergency funds ■ International aid	■ Climate adaptation and mitigation projects ■ Subsidies for renewable energy ■ Subsidies for agri sector adaptation ■ Investing in climate resilience infrastructure DRM: ■ Disaster relief grants to businesses ■ Disaster preparedness programmes
	PPP	Investment in combined projects related to various sectors and themes (i.e., energy generation, water supply etc.)	
	Private sector	■ Profits ■ Private equity and loans in green technologies DRM: ■ Public disaster relief funds (mainly small businesses) ■ Debt ■ Insurance products	■ Corporate spending on green investments ■ Technology updates for emission reduction ■ Private funding for renewable energy projects ■ Private investments for climate adaptive intensive horticulture DRM: ■ Insurance premiums ■ Disaster reduction technologies

[246] Taxes and fees include targeted and non-targeted taxes, customs duties and fees and resource use fees that are collected by the GoA.

Sector/theme	Public/private	Funding source	Expenditure/investment
			■ Corporate emergency planning ■ Climate adaptation measures
Circular economy / waste management	Public sector	■ Taxes and fees ■ ODAs ■ Subsidies for waste management	■ Budget allocation for waste management ■ Recycling programmes
	PPP	■ Projects with focus on development of recycling facilities and waste reduction tech	
	Private sector	■ Profits ■ Private financing of recycling and waste management technologies	■ Investment in waste processing and reduction innovative solutions
Environment protection, including chemicals management	Public sector	■ Pollution and emissions taxes, vehicle taxes ■ Environmental resource use fees ■ Fines ■ ODAs ■ International grants	■ Conservation projects ■ Pollution control ■ Ecosystem restoration
	PPP	■ Collaborations for managing natural resources and protecting biodiversity	
	Private sector	■ Private financing related projects	■ Corporate spending on environmental compliance and sustainable practices
Nature and biodiversity	Public sector	■ Taxes and fees ■ ODAs ■ International Grants (GEF, UN)	■ Conservation projects ■ National parks maintenance ■ Biodiversity research
	PPP	■ Collaboration for conservation efforts and sustainable resource management	
	Private sector	■ Profits ■ Corporate social responsibility initiatives	■ Sustainable forestry ■ Eco-tourism

Sector/theme	Public/private	Funding source	Expenditure/investment
Energy and buildings	Public sector	■ Taxes and fees ■ ODAs ■ International grants	■ Upgrading building energy efficiency ■ Renewable energy installations and subsidies ■ Subsidies for energy-efficient solutions
	PPP	■ Collaborations on energy performance contracting and green public buildings development	
	Private sector	■ Profits ■ Private financing of related projects ■ Debt ■ Subsidies for energy-efficient solutions and renewable energy investments	■ Development of energy-efficient commercial buildings and units
Sustainable food systems	Public sector	■ Taxes and fees ■ ODAs	■ Public funding for sustainable practices (subsidies for technology upgrade) ■ Subsidies for intensive horticulture development and climate adaptive measures ■ Innovation in agri-tech
	PPP	■ Possibly joint ventures in agri-tech innovations	
	Private sector	■ Profits ■ Subsidies from the government ■ Agribusiness ventures ■ Debt	■ Development of sustainable agricultural products and technologies
Urban planning and smart mobility	Public sector	■ Taxes and fees ■ ODAs ■ Grants ■ Tax waivers for EV import	■ Infrastructure development ■ Improvement of public transport system (including planned expansion the subway system and the purchase of new buses) ■ Smart city projects ■ Tax breaks and reduced import duties for green technologies and electric vehicles

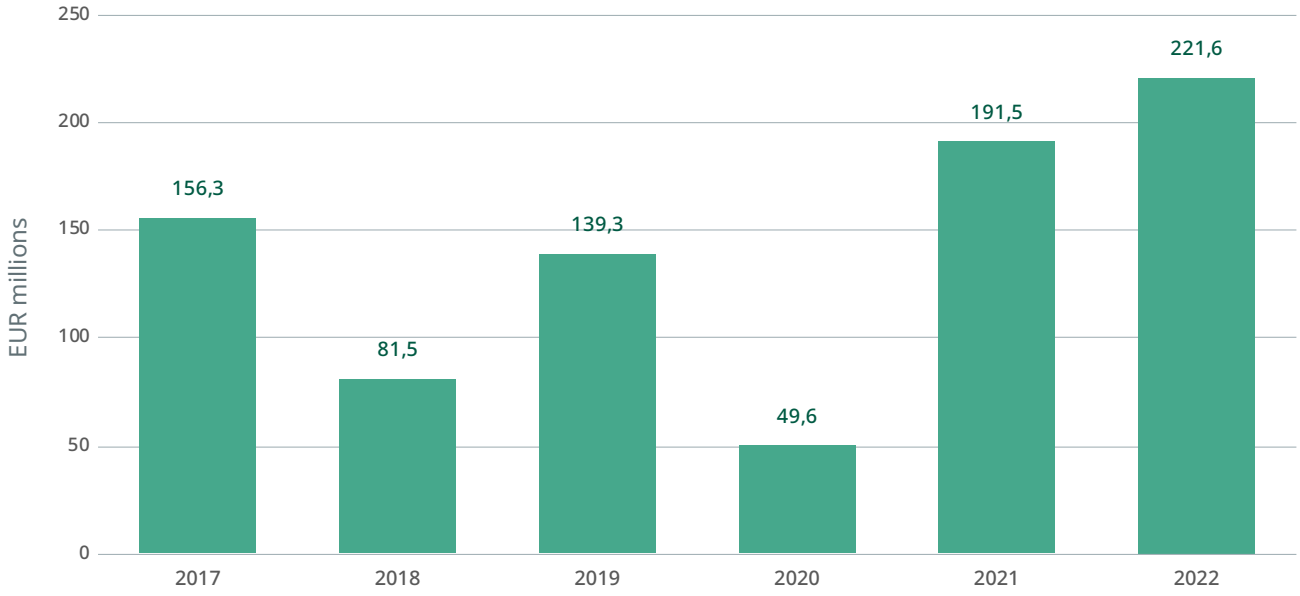
Sector/theme	Public/private	Funding source	Expenditure/investment
	PPP	■ Collaboration on urban generation and public transport initiatives	
	Private sector	■ Profits ■ Debt ■ Tax breaks and reduced import duties for green technologies and electric vehicles	■ Investment in related projects, including smart cities ■ Investments in EV charging infrastructure
Digitalisation	Public sector	■ Taxes and fees ■ ODAs ■ Grants	■ Digitalisation of government and its services ■ Development of infrastructure for public access to technology ■ Digital education programmes
	PPP	■ Collaboration on digital infrastructure projects	
	Private sector	■ Profits ■ Venture capital ■ Debt	■ Investment in digital processes and services ■ Infrastructure updates ■ Cybersecurity measures ■ Sponsoring startups (competitions)
Research and Innovation	Public sector	■ Taxes and fees ■ ODAs ■ Grants ■ Collaboration with international research institutes	■ Funding for universities and public research institutes ■ Grants for innovative projects
	PPP	■ Collaborative research projects and development of innovation ecosystems	
	Private sector and civil society	■ Profits ■ Private research grants	■ Corporate R&D investments ■ Sponsorship for academic research

5.3 Green Transition Finance Flows in Armenia

Reported Official Development Assistance (ODA)

Official Development Assistance (ODA) flows, including grant and concessional loans from international partners such as the World Bank, ADB, and the EU Green Agenda for Armenia contribute to the streams. Data about ODA has been retrieved from the OECD Data Explorer[247]. The OECD classifies financial flows according to Rio-Markers (adaptation, mitigation, dual benefit, and biodiversity). Data provided encompasses multilateral, bilateral, as well as private philanthropic financial flows. The amount of climate finance to Armenia from 2017 to 2022 totalled to around EUR 840 million (see Figure 16).[248] The largest providers of climate finance to Armenia were EBRD (26.5%), Germany (22.5%), ADB (15.6%), France (14.5%) and EU Institutions (9.5%).

Figure 16. ODA climate finance to armenia by multilateral and bilateral agencies



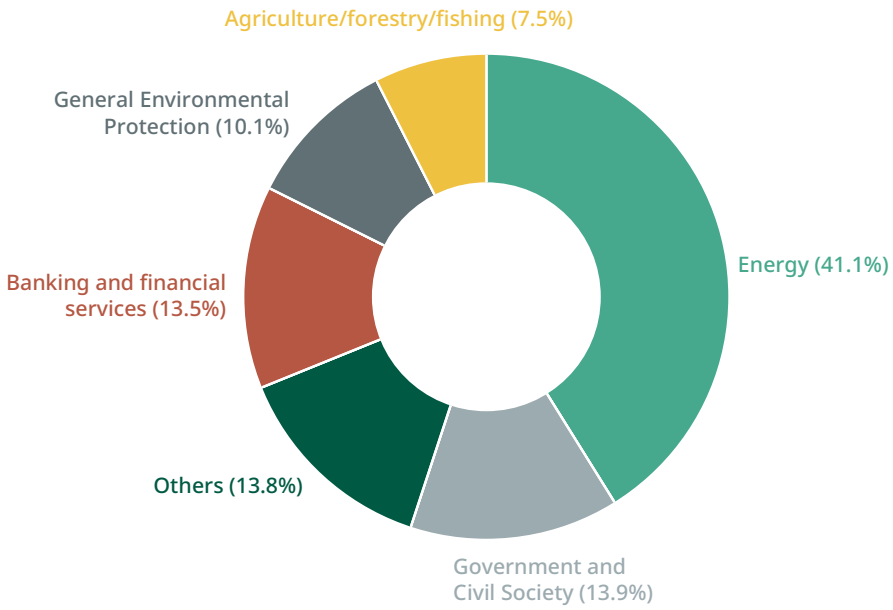
Source: OECD Data Explorer

Climate finance through ODA has been predominantly allocated to the following sectors: energy (41.1%), government and civil society (13.9%), banking and financial services (13.5%), general environmental protection (10.1%), and agriculture/forestry/fishing (7.5%) (see Figure 17).

[247] OECD. *OECD Data Explorer*. Available at: https://data.oecd.org/.

[248] All USD/EUR and AMD/EUR exchange rates hereinafter are based on the average rates for the respective reporting year. USD/EUR exchange rates are based on figures from: https://www.ofx.com/. AMD/EUR exchange rates are based on figures from: https://www.exchange-rates.org/. An alternative OECD source indicates a corresponding total of USD 955.5 million from 2017 till 2022. https://webfs.oecd.org/climate/RecipientPerspective/

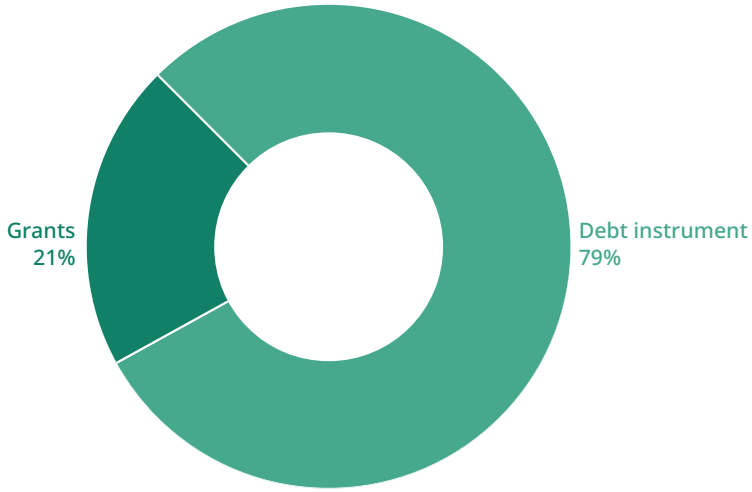
Figure 17. ODA to Armenia 2017-2022, share by sector



Source: OECD Data Explorer
Note: EUR amounts mentioned are converted based on the average exchange rates for the years 2017-2022.

Regarding the financial composition of ODA, 79% consisted of debt, while 21% was allocated as grants (see Figure 18). Additionally, a minimal portion (0.01%) originated from equity shares in collective investment vehicles. It is unsurprising that most of the debt was provided by multilateral development banks, whereas most grants were contributed by Development Assistance Committee (DAC) countries.

Figure 18. ODA by financial instruments



Source: OECD Data Explorer

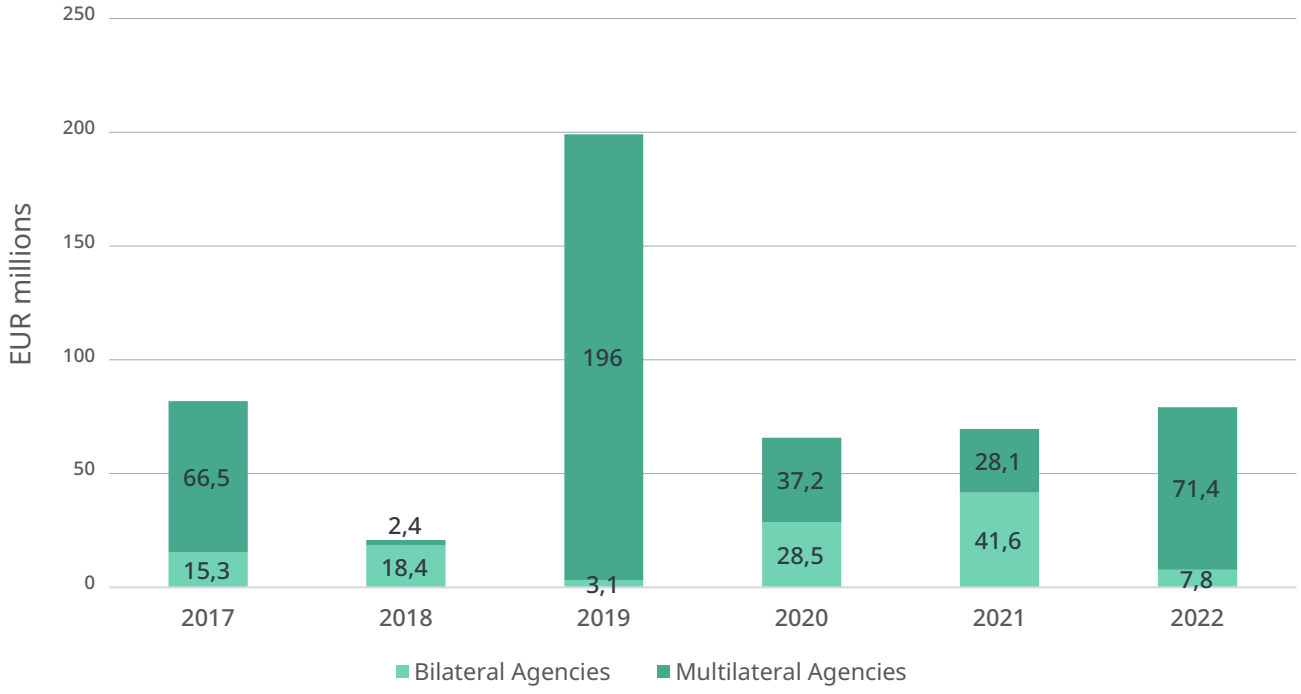
In addition to climate finance flows to Armenia, OECD recorded between 2017 and 2022 approximately EUR 123.7 million in bilateral ODA flows marked (principal and significant) for

biodiversity protection, as well as EUR 462.9 billion bilateral ODA flows for general environment protection (marked principal and significant).[249]

Reported Mobilised Private Climate Finance By ODA

The OECD report for mobilised private climate investment in Armenia during the years 2017 until 2022 amounted to approximately EUR 516 million.[250] Multilateral Development Banks and Multilateral Development Institutions are leveraging the largest share of private climate finance on average (see Figure 19).

Figure 19. Annually Mobilised Private Climate Finance in Armenia



Source: OECD Data Explorer

The spike seen in 2019 was likely driven by increased international climate finance flows and enhanced reporting practices[251], alongside intensified green finance initiatives by institutions like the EBRD[252]. Some important investments in renewable energy, energy efficiency, and climate

[249] OECD Data Explorer. RioMarkers: Aid activities targeting global environmental objectives. Data provided cannot be disaggregated by funding source or targeted sector.

[250] OECD. "Official Development Assistance (ODA) and Mobilised Private Climate Finance Data." Available at: https://data-explorer.oecd.org

[251] Climate Policy Initiative. "Global Landscape of Climate Finance 2019." Available at: https://www.climatepolicyinitiative.org/publication/global-landscape-of-climate-finance-2019/

[252] European Bank for Reconstruction and Development (EBRD). "EBRD Deepens Green Finance in Armenia." Available at: https://www.ebrd.com/news/2019/ebrd-deepens-green-finance-in-armenia.html

action projects were facilitated through collaborations with local financial institutions and targeted assessments of climate investment needs[253].

In Armenia, the following sectors mobilised the most private finance from 2017 to 2023: energy (EUR 199.3 million); banking & financial Services (EUR 147.9 million); industry, mining, and construction (EUR 88.8 million); and agriculture (EUR 51.0 million). Together, these four sectors constitute 95% of the total amount mobilised in the reported six years.

Private Sector Finances

Sources for private green investments (mostly renewable energy and energy-efficient construction) encompass mainly **retained profits and earnings, equity investments,** and **borrowed funds**. Private sector financing is channelled mainly via banks and credit organisations, capital market equity and securities, and private investment transactions. Currently, private sector investments encompass predominantly **solar energy infrastructure**, **EV charging stations**, photovoltaic energy systems for businesses and households. Those investments are supported by concessional loans and financing from IFIs/MDBs, such as the European Bank for Reconstruction and Development (EBRD)[254]. For the past four years, subsidisation of investments in mitigation measures in the energy and agricultural sector were very attractive for private investors. Companies such as Masrik Solar Farm, developed with private and concessional loans, showcase this trend[255].

Green Loans and Credit Products

Green loans of commercial banks are the main source of sustainable financing for the private sector in Armenia. Several commercial banks and credit organisations now offer green loans, with **Ameriabank**[256], **Inecobank**[257], **ArmSwissBank**[258], **ACBA Bank**[259] and **AraratBank**[260] providing financing options for renewable energy, energy efficiency, eco-friendly transportation, and sustainable agriculture. These loans fund diverse projects, including building efficiency retrofits,

[253] EU4Environment. "Assessment of Investment Needs for Climate Action in Armenia up to 2030." Available at: https://www.eu4environment.org

[254] EBRD. Renewable Energy Projects in Armenia. Available at: www.ebrd.com

[255] IFC (2021). Masrik Solar Case Study. Available at: www.ifc.org

[256] Ameriabank: "Doing Business Responsibly." Available at: https://ameriabank.am/investors/ESG/Doing-business-responsibly

[257] Inecobank Green Financing Page. Available at: https://www.inecobank.am/en/Business/lendings/green-financing/documents

[258] ArmSwissBank: ArmSwissBank Expands Green Financing Opportunities. Available at: https://www.armswissbank.am/en/events/?ELEMENT_ID=2772

[259] Acba Bank Green Loan Page. Available at: https://www.acba.am/en/business/get-a-loan/1584513227

[260] AraratBank Green Economy Partnership News. Available at: https://www.araratbank.am/en/news/2024/12/12/ebrd-and-araratbank-join-forces-to-promote-green-economy-and-competitiveness-in-armenia/719

renewable energy installations, waste reduction initiatives, hybrid and electric vehicle purchases, and sustainable agriculture practices. Green loans in Armenia are largely refinanced by special programmes initiated by international financial intermediaries and donor institutions, such as EBRD and GCF. However, it is not yet common for domestic financial institutions to issue green loans financed entirely by their internal fundings. At present, CBA does not require reporting of green loan disbursements within the overall bank loan disbursement. There are few banks that report green loan disbursement amounts in their annual report, however this is not common practice as of 2024.

Capital Markets' equity and debt instruments

Armenia's sustainability and green bond market is still in its early stages, though there have been some recent developments that suggest increasing interest in sustainable finance and green bond issuance. In 2020, Ameriabank was the first to issue green bonds in Armenia. The Green Bond was structured in accordance with internationally recognised ICMA Green Bond Principles (GBP). The issue was done in close cooperation with FMO, the Dutch Entrepreneurial Development Bank, and Sustainalytics – a global leader in sustainability research & analysis, who provided the Second-Party Opinion[261]. The Electrical Networks of Armenia also issued their own green bonds in 2024[262]. On the other hand, Telecom Armenia issued a Sustainability-Linked Bond (SLB) in 2024. Telecom Armenia's SLB is tied to specific sustainability performance indicators (KPIs)[263]. The proceeds are designated for expanding mobile and fixed networks, developing electric vehicle charging infrastructure, and refinancing existing loans. Notably, international financial institutions, such as ADB and EBRD, have participated as anchor investors. Unibank also reported that they have provided Sustainalytics the second party opinion on their green bond framework. However, they have not issued any green bonds yet[264]. Table 48 provides a summary of the green and sustainability-linked bonds in Armenia.

[261] Ameriabank. "Ameriabank Successfully Placed Its First-Ever Green Bond." Available at: https://ameriabank.am/investors/news-media/ArticleID/6403/Ameriabank-Successfully-Placed-Its-First-Ever-Green-Bond

[262] Ameriabank. *Electric Networks of Armenia Issues USD 30 Million Green Bonds.* August 2024. Available at: https://ameriabank.am/en/media-room/articleid/8449

[263] Team Telecom Armenia. *Sustainability-Linked Bonds Presentation.* December 12, 2024. Available at: https://www.telecomarmenia.am/en/news/2024/12/12/team-telecom-armenia-presents-sustainability-linked-bonds-to-prospective-investors-at-an-official-event/1158/

[264] Unibank. *Sustainalytics Confirms the Compliance of Unibank's Green Bond Framework with International Standards.* Available at: https://corp.unibank.am/en/news/press-releases/sustainalytics/

Table 48. Summary of green and sustainability-linked bonds in Armenia.

Issuer of bond / security	Year of issue	Modality	Value of Issue million *EUR equivalent*	Maturity in years	Listing	Support / Certification
Ameriabank	2020	Green Bond	43.84.	Not specified	AMX	ICMA[265] Green Bond Principles; Second-Party Opinion by Sustainalytics
Ameriabank	2022	Green Bond	7.6.	2.25	AMX	ICMA Green Bond Principles; Second-Party Opinion by Sustainalytics
Electric Networks of Armenia (ENA)	2024	Green Bond	27.6.	5	AMX	Green bond programme prospectus registered by the CBA
Telecom Armenia OJSC	2024 (series 1)	Sustainability-Linked Bond	41.5.	5	AMX	Bonds linked to sustainability performance targets
Telecom Armenia OJSC	2024 (series 2)	Sustainability-Linked Bond	18.4.	4	AMX	Bonds linked to sustainability performance targets
Telecom Armenia OJSC	2024 (series 3)	Sustainability-Linked Bond	9.2.	5	AMX	Bonds linked to sustainability performance targets

Note: AMX – Armenian Stock Exchange

These recent developments in the market demonstrate the growing awareness and commitment to sustainable finance in Armenia.

[265] The International Capital Market Association

Public Finances

Public revenue streams for green transition financing in Armenia include:

- **Targeted taxes and fees:** environmental taxes such as pollution and emissions taxes; environmental resource use fees; vehicle taxes to reduce environmental impact[266]. Fiscal revenues from environmental taxes and resource usage fees[267] in 2023 totalled EUR 142.5 million (AMD 60.6 billion), significantly lower than the EUR 220.6 million (AMD 95.9 billion) collected in 2022.
- **Not targeted taxes and other fiscal revenues:** general taxes (VAT, profit tax, income tax etc.) and other fiscal revenues.

Public investments in green transition include following:

- **Direct public investments** from the governments in renewable energy projects, such as solar and hydropower,
- **Subsidies for energy-efficient solutions,** particularly in the housing and industrial sectors[268].
- **Subsidies for new energy and resource efficient machinery and equipment,** specifically interest rate subsidisation of new machinery and equipment that targets replacement of old machinery and equipment with new more energy and resource efficient ounces. GoA also announced that its programme of subsidisation investment in new more resource efficient machinery and equipment leveraged private investments of EUR 811 million (AMD 341 billion) for the period 2020-2024.
- **Subsidies for intensive horticulture development, including climate adaptive measures**, specifically interest rate subsidisation and cost reimbursement for hail-nets, drip irrigation and smart water systems. Intensive horticulture programme leveraged over EUR 300 million private investments with about EUR 65 million public financing in the form of loan subsidisation and cost reimbursement for the period 2019-2024.
- **VAT and customs waivers: t**he government also provides fiscal incentives such as tax breaks and reduced import duties for green technologies and electric vehicles[269].

[266] OECD (2021). Environmental Performance Review: Armenia. Available at: www.oecd.org

[267] Environmental taxes and resource use fees: Armenian Tax Code includes a Nature Protection tax. This tax is applied to the following types of environmental pollutions and the tax base is the tonnage of the released pollution into the environment: released harmful substances into the atmosphere; discharge of harmful substances and (or) compounds into the water resource; natural resources use, production and/or consumption waste; and import of environmentally harmful products into the territory of Armenia and related trade activities. Generated revenues from this tax are not directed into some specifically designed fund that could be used only for advancing climate and/or environment related policies. The effectiveness of this taxation system has not been assessed by the key stakeholder in terms of achieving its objectives. Armenia also has natural resources use payments for water use, non-metal solid mining resources use, ecosystem resource use and royalty payments for the metal mining industry.

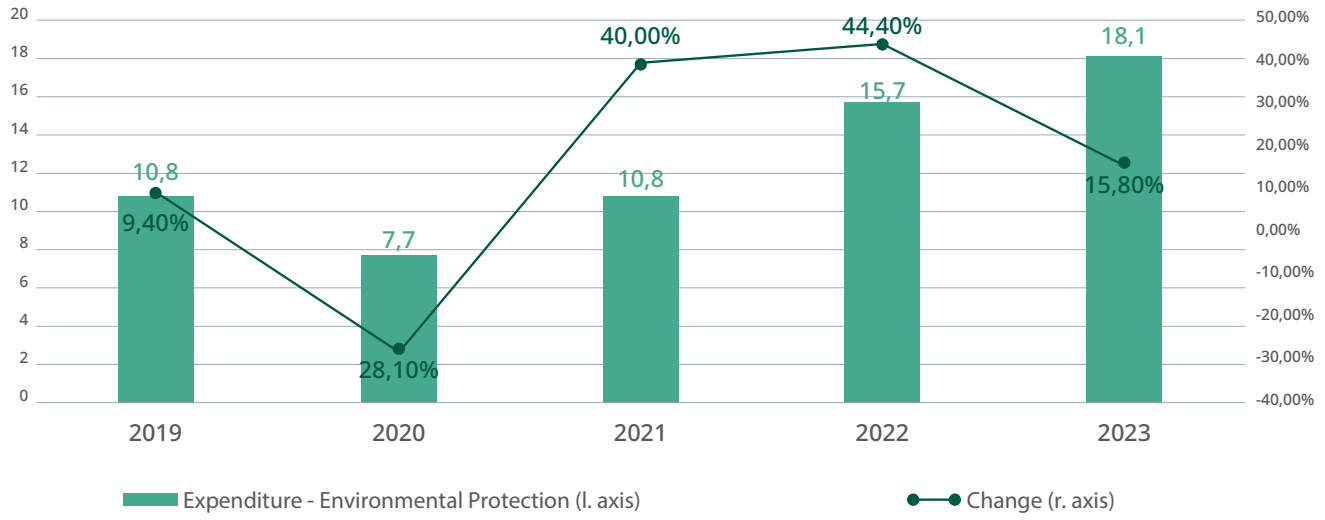
[268] UNDP (2023). Energy Efficiency and Renewable Energy Initiatives. Available at: www.undp.org/armenia

[269] Ministry of Economy, Armenia (2023). Incentives for Renewable Energy and Green Technologies. Available at: www.mineconomy.am

Climate-related expenditures. Armenia conducted a Climate Public Expenditure and Institutional Review (CPEIR) in 2020 which revealed that, while climate-related expenditures are increasingly funded from domestic sources, between 2017 and 2019, only around 3.2 % of the state budget was related to climate[270]. More than half of all climate expenditure during this period focused on adaptation, and just over a third on mitigation. The other investments support both adaptation and mitigation.

Green budget tagging. Currently Armenia does not have climate budget tagging implemented, and there is no official reporting and green and climate expenditures of the Government. The Ministry of Finance announced that it will implement a climate budget tagging mechanism starting from 2025 which will provide tools to monitor ongoing planning and budget execution in terms of environmental and climate expenditures (see Figure 20 for the expenditure budget details).

Figure 20. RA Government budget expenditure on environmental protection



Source: Armenian Statistical Committee

Armenia's state budget expenditures for 2023 totalled EUR 5.98 billion. (AMD 2.55 trillion), of which **0.3%** was allocated to **environmental protection**. This percentage is consistent with 2022 reported figures.

Anticipated Finance Needs for the Management of Natural Hazards

Armenia faces high risks from natural hazards, which have the potential for severe human and economic losses. Over 80% of the population is vulnerable to major disasters caused by natural hazards that have a 0.5% probability of occurring annually (equivalent to a 1-in-200-year event). Additionally, more than 30% of the population is exposed to lower-intensity natural hazards with

[270] EU4Climate, "Climate Public Expenditure and Institutional Review (CPEIR): Armenia Key Findings," 2020

a 5% annual probability (1-in-20-year events). A single 1-in-200-year event could result in direct physical damages estimated at around EUR 11 billion.[271] Vulnerability to floods, landslides, and hailstorms[272] is particularly significant (see Table 49). These hazards are expected to intensify due to climate change, which would increase the frequency and severity of natural hazardous events.

Table 49. Major natural hazards, exposure, and average losses in Armenia.

Hazard	Exposure	Average loss
Floods	Ca. 40,000 people are impacted annually, specifically in marzes Ararat and Shirak	EUR 85 million[273] per annum
Landslides	4.1% of Armenia's territory and 1/3 of its communities	n.a.
Hailstorms, drought, frost	80% of total weather-related damages. Climate change will make hail storms more common in the future. [274]	EUR 220.2 million (AMD 110 billion) over six years

A World Bank analysis of disaster finance funding gaps (recurrent disasters excluding earthquakes) between 2009 and 2015 identified annual funding gaps of EUR 18 million to EUR 135 million towards the total annual range of disaster finance needs between EUR 117 million and EUR 234 million and taking into account domestic disaster risk financing mechanisms.[275] The magnitude of the funding gaps estimated for recurrent events indicates that improved management of the budgetary mechanisms, such as contingent budgets, combined with contingent credit facilities could be used to manage the low-risk layer. The government liabilities potentially arising from the impact of more severe events would surpass the country's fiscal response capacity in most cases.

[271] ADB. Country Partnership Strategy: Armenia. Available at: https://www.adb.org/sites/default/files/linked-documents/cps-arm-2014-2018-sd-02.pdf. It is worth noting that under various climate change scenarios the occurrence of different climate hazards may change. Under 1.5°C of warming, what is currently a 1-in-100-year event may return every 20 years, and under 2°C of warming such an event may recur every 10 years or less. https://www.adb.org/sites/default/files/publication/709836/climate-risk-country-profile-armenia.pdf

[272] As well as earthquakes, which are not related to climate change/

[273] In 2024, severe flooding affected multiple regions, including areas along the Armenia-Georgia border, resulting in 3 casualties and significant infrastructure damage, further underscoring the growing climate related risks. Reuters (2024). Available at: https://www.reuters.com/world/asia-pacific/one-dead-villages-cut-off-after-flooding-armenia-georgia-border-2024-05-26/

[274] IFI and CB (2020). Climate Risk Insurance for the Agriculture Sector in Armenia. Available at: https://www.afi-global.org/wp-content/uploads/2020/12/AFI_IGF_armenia_CS_AW_digital.pdf

[275] World Bank / GFDRR (2017): Disaster Risk Finance Country Note: Armenia. The GoA maintains a Cabinet Contingency Fund of the Armenian State Budget, annually financed with USD 57.8 million to USD 113.0 million between 2010 and 2015.

Contingent credit could play an important role in disaster response by providing critical bridge financing until additional international resources can be mobilised.

The CBA has conducted a study on portfolio climate risk assessment and provided ESG portfolio scoring. According to the CBA's ESG risk Radar 2024', approximately 16.25% of the banking sector loan portfolio is allocated to ESG high risk sectors[276]. Given the increasing financial burden of climate-related natural hazards and assessing the exposure of Armenia's financial sector to these risks, it is essential for financial institutions to effectively manage risk and plan for resilience of investments.[277]

Anticipated Finance Needs for Green Transition

Armenia requires large investments to meet its green transition targets, as outlined by the RA Government, CBA[278], OECD[279], and the World Bank (WB)[280]. The purpose of these investments is to achieve national climate goals, including but not limited to carbon neutrality, enhanced energy efficiency, and long-term resilience against climate impacts. These documents do not cover all dimensions of the EGD, such as social, R&D and digitisation. Wider scope of EGD financing will necessarily demand more investments and financing.

According to the WB, Armenia requires around **EUR 7.4 billion** for transition to a low emission and climate resilient economy between 2025 and 2060. The distribution of the funding should be 25% public and 75% private sectors. This includes both mitigation and adaptation measures, with over 90% dedicated to decarbonising the economy. The primary focus areas are renewable energy (mostly solar), enhancing energy efficiency in buildings and industries, and electrifying heating and transport systems. These investments align with Armenia's goals under its NDC and the Strategy for Low Carbon Development, as outlined in Table 50.

[276] Central Bank of Armenia. (2024). *ESG Risk Radar for Armenia*. Available at: https://www.cba.am/EN/panalyticalmaterialsresearches/ESG_Risk_Radar_for_Armenia_ENG_22.11.2024.pdf

[277] The CBA has conducted a study on portfolio climate risk assessment and provided ESG portfolio scoring. According to the CBA, approximately 29% of the banking sector loan book is allocated to climate vulnerable sectors as of 2022. Based on the sectoral analysis of CBA's banking sector statistical data, the climate-related physical or transition risks are associated with agriculture, forestry and fishing (6%), mining and quarrying (2%), manufacturing (8%), electricity, gas, steam and AC (3.2%), construction (8.6% and transportation (1.4%) loan book exposures. The CBA published the "ESG Risk Radar for Armenia" in 2024, which provides an analytical framework for evaluating ESG risks across different economic sectors. Central Bank of Armenia. (2024). *ESG Risk Radar for Armenia*. Available at: https://www.cba.am/EN/panalyticalmaterialsresearches/ESG_Risk_Radar_for_Armenia_ENG_22.11.2024.pdf

[278] Central Bank of Armenia (CBA), National Sustainable Finance Roadmap (2023). This document outlines the financial frameworks, green taxonomy, ESG disclosure standards, and mechanisms for mobilising private capital to support Armenia's green transition.

[279] EU4Environment, *Assessment of Investment Needs for Climate Action in Armenia up to 2030*, OECD, 2021

[280] World Bank, Armenia Country Climate and Development Report (CCDR) (2024). This comprehensive report details sector-specific investment needs, financing mechanisms, and the challenges faced in achieving Armenia's green transition targets.

Table 50. Climate investment distribution by sector in Armenia (2024)

Sector	Investment Amount	Key Initiatives	Public-Private Share
Electricity Sector	EUR 2.8 billion (USD 3 billion)	Transition to solar-powered systems, upgrading grid infrastructure, and adding battery storage	93% private, 7% public
Residential and Building Sector	EUR 1.4 billion (USD 1.5 billion)	Energy efficiency improvements and sustainable heating programmes	70% private, 30% public
Transport Sector	EUR 184 million (USD 200 million)	Electrification of vehicles, public transit expansion, and charging infrastructure development	66% public, 34% private
Water and Irrigation	EUR 922 million (USD 1 billion)	Modernisation of irrigation systems, construction of water storage reservoirs, and improved efficiency of the systems	80% public, 20% private
Agriculture and Land Restoration	EUR 728 million (USD 790 million)	Climate-smart agriculture, reforestation, and soil restoration programmes	70% public, 30% private
Public Infrastructure	EUR 166 million (USD 180 million)	Strengthening resilience of roads, schools, and hospitals against climate risks	Public

Source: World Bank, Armenia Country Climate and Development Report (CCDR) (2024

The CBA estimates that Armenia requires around EUR 7.4 billion (USD 8 billion) investment for green transition from 2025-2060. The OECD provides a more focused assessment of Armenia's immediate investment needs for climate action. They estimated the gross costs for adaptation and mitigation investments from 2021 to 2030 to be around EUR 4.8 billion (USD 5.7 billion). This figure has significant emphasis on infrastructure investments, energy efficiency, and resilience-building. The Draft Action plan for NDC estimated EUR 1.27 billion investments need between

2023-2030[281], and the LT-LEDS anticipates over EUR 7 billion investments by 2050. Consensus cost estimates suggests that Armenia will need to invest in green transition EUR 250-500 million annually (in constant prices) or 1-2% of GDP (equivalent of 3.5-7% of Government annual expenditures budget) to reach its objectives[282]. Table 8 provides a comparison of all available estimates. It is worth noting that the LT-LEDS contains some actions without attributing cost estimates. Thus, the figures are assumed to be higher with additional research and studies. Table 51 provides a comparative overview of the investment needs according to different institutions.

Table 51. Comparison of green transition finance needs according to different institutions

Institution	Total Investment Need	Timeframe	Key Focus Areas	Objective of the document	Public vs. Private Split
WB	€7.4 billion	2025-2060	Decarbonisation, energy efficiency, water, transport	A resilient, low-carbon future,	25% public 75% private
CBA	€7.4 billion	2025-2060	Decarbonisation, ESG frameworks, renewables	A resilient, low-carbon future	25% public 75% private
OECD	€4.8 billion	2021-2030	Mitigation and adaptation, focusing on infrastructure, energy, and resilience	Focus on mitigation and adaptation investments	Not specified
RA Gov.	€1.27 billion	2023-2030	Renewable energy, energy efficiency, agriculture, water management	NDC action plan	Not specified
RA Gov.	€7 billion	Until 2050	Renewable energy, energy efficiency, agriculture, transport	Low carbon future	Not specified

[281] https://www.e-draft.am/index.php/projects/5672

[282] Expert estimation based on the available reports and studies

5.4 Institutional status and gap assessment for Green Transition Finance

Gap assessment

Based on above analysis the roadmap for implementing the green agenda in Armenia, with a focus on transition finance, needs to address following gaps:

Detailed financing plan for the LT-LEDS. The strategy provides cost estimates for priority actions, potential financing instruments and sources, as well as priorities of financial instruments for respective sector actions. The next step could be to develop a financing strategy for transition finance, outlining the Armenian government's vision for leveraging finance during the transition and a plan naming the roles of relevant stakeholders, the timeline, and deliverables, as well as potential financing options.

Building an investment pipeline based on the actions of the LT-LEDS. It is not clear how these investments will be channelled into Armenia's Medium-term Expenditure Framework and PIM framework[283]. Sector-based assessments for green transition activities are needed to be able to **effectively apply investment prioritisation by utilisation of the PIM framework**. These activities along with right policies to direct financial markets' resources into green projects are crucial for supporting sustainable economic growth and for reaching set green transition targets.

Green budgeting. A comprehensive green budgeting framework must encompass all environmental objectives, the entirety of budgetary elements (i.e., expenditure, revenue and tax expenditure) and all public sector entities. In this regard, key areas for enhancing budgetary and fiscal policy, applied across different governance levels (national and local) include:

- **Climate budget tagging:** Adoption, and implementation of the climate budget tagging and green budgeting framework. Separating environment/climate funds to incorporate both relevant revenues and expenditures would be an important leverage to fund green infrastructures (planned for 2025).
- Improvement, adoption, and implementation of **green procurement regulations**.
- **Environmental tax reform** to reflect the levels of actual environmental externalities.

[283] Decree N 472-L of the Prime Minister of the Republic of Armenia of 29 October 2021 on Approving the procedure for identifying, developing, evaluating public investment programmes, compiling and determining the list of priorities, approving the methodology for evaluating public investment programmes and the model form of developing and evaluating the draft public investment programmes in the Republic of Armenia has the objective of improving the management system of public investments, increasing the effectiveness and ensuring accountability of public investment programmes, as well as developing a bank of public investment programmes.The PIM decree adopts a multi-criteria assessment approach, and Impact on Climate Change (mitigation aspects) has been added as one of 6 criteria in recent revision of PIM framework in February 2022. Starting from 2023 all new capital projects must be assessed by the PIM framework and be approved by the Investment Committee headed by the Prime Minister.

- Strategically implementation of **carbon pricing instruments** (emissions trading system, carbon tax, carbon certificates, offsetting mechanisms and results-based carbon financing, ITMO[284]s, MRV[285]).

Enabling transition finance for private sector investments: There are the following efforts needed:

- Finalisation of green taxonomy and its implementation for the public and private green financing agenda, including taxonomy linked fiscal stimulus, CBA regulation incentives for financial sector etc.
- Implementation of an ESG framework and instrumentalization of it for attracting investment via Armenian Stock Exchange. This can be done also by adopting one of the international taxonomies such as Climate Bonds Initiatives.

5.5 Recommendations Addressing Institutional Gaps for Green Transition Finance

To successfully address the institutional gaps in green transition finance, it is important to proceed with a structured and forward-thinking approach. Table 52 outlines the main areas of concern, their associated gaps, and actions needed to create an effective framework.

Table 52. Gaps and needs for green transition finance

Gaps	Needs to examine in the roadmap
Lack of clear financing strategy and public investment pipeline, covering all aspects of a sustainable transition	■ Develop a comprehensive strategy, action, and investment plans outlining financing needs, roles, timelines, and deliverables. ■ Integrate this strategy with the Medium-Term Expenditure Framework (MTEF) and Public Investment Management (PIM) frameworks. ■ Conduct sector-based assessments to prioritise investments.
Lack of the efficient implementation framework	■ Identify the leading stakeholders who will provide guidance to line ministries and other parties involved on how to conduct budget tagging and PIM framework implementation. ■ Define the roles and responsibilities of different stakeholders. ■ Assign the required human and administrative resources.

[284] Internationally Transferred Mitigation Outcomes

[285] Measurement, Reporting, and Verification

Gaps	Needs to examine in the roadmap
Insufficient PFM for green transition goals	■ Implement a green / sustainable budget tagging system (accelerate). ■ Adopt a full-scale green / sustainable budgeting framework covering all public revenues and expenditures. ■ Improve the implementation of green procurement regulations. ■ Introduce incentives for entities that consistently adhere to green procurement criteria, fostering a positive shift toward sustainable practices ■ Implement a unified system of monitoring and evaluation of quantitative targets as defined by the LT-LEDS. ■ Ensure reporting on the environmental results (achieved energy savings and CO2 emissions reductions) of all public investment mechanisms and funds, reflecting the implementation of the EGD and the SDGs.
Limited engagement of the private sector	■ Finalise the green taxonomy and link it to incentives such as tax breaks and mandatory reserves for banks. ■ Enhance private sector participation by fostering Public-Private Partnerships (PPPs) ■ Improve access to green loans and bonds framework.
Absence of standardised ESG disclosures	■ Mandate ESG disclosure frameworks aligned with international standards ■ Develop tools to integrate ESG metrics into financial decision-making. ■ Support corporations in ESG integration.
Lack of effective monitoring and reporting	■ Develop a system for reporting green budgeting information in both annual budgetary plans and executed budgets. ■ Ensure the system of auditing and feedback. ■ Introduce carbon certificates, emissions trading systems, ITMO and MRV systems to ensure transparency and credibility.
Underdeveloped framework for green and sustainability bonds	■ Introduce the mechanism and the supporting infrastructure for green bonds. ■ Provide training for potential issuers and incentives for early adopters. ■ Promote international partnerships to enhance bond issuance.
Inefficient and weak environmental taxation mechanism	■ Review the scope of existing environmental taxes and consider expanding to cover a wider range of activities with significant ecological impacts. ■ Review tax models and rates to reflect actual environmental externalities. ■ Introduce carbon taxes or other green taxation instruments
Limited fiscal tools for incentivising low-carbon activities	■ Assess the effectiveness and feasibility of various fiscal tools (e.g., carbon tax, emissions trading, green subsidies) to ensure alignment with Armenia's climate goals under the NDCs and Paris Agreement ■ Develop a structured fiscal policy framework that integrates green taxation into existing tax structures while ensuring predictability for businesses and investors. ■ Establish transparent mechanisms for reinvesting revenues from environmental taxes into green projects, such as renewable energy, climate adaptation, and sustainability initiatives.

Gaps	Needs to examine in the roadmap
Insufficient capacity	■ Collaborate with international organisations to share best practices and receive technical assistance in developing and executing green budgeting strategies at national and local levels. ■ Plan sufficient training for public officials on green budgeting. ■ Ensure capacity building of potential bond issuers, such as regional and city authorities, as well as credit agencies (bundling the issuance for several jurisdictions). ■ Conduct awareness campaigns and training programmes for procurement officers, suppliers, and other key players on green procurement.

It is important to recognise that implementing these recommendations and addressing the gaps and needs require coordinated efforts from multiple stakeholders: government bodies, private entities, and international organisations. If the institutional gaps are addressed, Armenia can potentially have a strong foundation for a green finance framework that supports the country's long and short-term environmental goals and sustainable development agenda.

6. Country readiness to green transition

This chapter aims to provide a general assessment of the green transition readiness of the Republic of Armenia in view of objectives and targets set out the European Green Deal (EGD), the 8th Environment Action Programme and subsequently embedded in the EU acquis. The key findings of the Armenia National Assessment Report will be presented for each of the thematic sectors and outlined in a green transition readiness table. Drawing from these findings, the Chapter attempts to propose the immediate next steps as well as strategic pathways towards the green transition and climate neutrality by mid-century.

The findings highlight Armenia's enabling conditions and constraints, status of the green transition progress and actionable follow-up actions/strategic pathways. The chapter outlines the country's strengths and weaknesses in the main thematic areas:

- **climate action**
- **resource efficiency and circular economy, with focus on waste management**
- **environmental pollution and degradation: air, noise, water, soil/land, chemicals**
- **energy**
- **buildings and renovation**
- **biodiversity and ecosystems**
- **sustainable food systems, including agriculture and fisheries**
- **transport and smart mobility**

The focus is on policy and legal frameworks, policy instruments, and institutional and non-public sector capacities.

6.1 Country enabling conditions for green transition

Armenia has established **several policies to reach its targets on GHG emission reductions, energy efficiency, renewable energy sources and increase resilience to climate change impacts, including its NDC (2021-2030), Long-term Low Greenhouse Gas Emission Strategy, Energy Strategy, and National Strategies on Adaptation to Climate Change and Disaster Risk Management**. It is a signatory to international agreements such as the UNFCCC, Paris Agreement, and other relevant conventions and protocols on international cooperation, and works closely with various UN agencies. Armenia is also implementing the **Comprehensive and Enhanced Partnership Agreement with the EU (CEPA)**, which sets ambitious obligations for Armenia to align with the EU policies and legislation.

The Climate Change law, currently in governmental procedure, aims to regulate the policy and legislative framework, including target setting, monitoring, reporting and verification of GHG emissions across the sectors and introducing **carbon pricing**, to assist with EU Carbon Border Adjustment Mechanism Regulation compliance.

Armenia has taken steps toward green transition by introducing sustainable development activities into its **Strategic Development Programme for 2014-2025,** focusing on supporting inter-ministerial policy dialogue platforms focused on green growth and including green economy targets in planning, support the business in investment needs assessments, support in the reforms of legislative frameworks to fully comply with EIA and SEA, as well as awareness-raising on green economy, environmental action and sustainable lifestyles

Draft of the **Green and Sustainable Economy Transition Strategy** was developed as per Government Work Programme (2021-2026) to enable a low carbon, resource efficient and socially inclusive economy. The strategy aims to promote economic benefits through the promotion of green industry, job creation, competitiveness, green energy development, sustainable agriculture and eco-tourism. However, it is yet to be adopted.

A general **circular economy roadmap** was developed in 2022 and is currently being revised, but there are no nationally binding documents on the circular economy, no mechanisms to promote waste sorting and recycling, etc. There is also no reliable data regarding waste management and circularity, which hinders target setting and monitoring.

Several large-scale projects (funded by different international donor organisations) have been initiated that contribute to the **development of relevant policy instruments** (e.g. on EPR). Thanks to these projects, Armenia has started developing legal framework and policy instruments that help to achieve EGD goals. This includes prioritisation of topics such as the **Extended Producers' Responsibility** and "polluter pays" principle, the creation of waste hierarchy, the creation of sanitary landfills, the development of proper policies for managing and disposing of hazardous waste, the development of waste management plans and, in general, making the first steps in the development of a more circular economic system in Armenia.

The country's obligations under CEPA provide a structured framework for aligning with EU directives on **air quality, emissions control, and environmental monitoring**. Public concern over deteriorating air quality, especially in Yerevan, has placed political pressure on both national and local governments to act. This has resulted in increased investments in monitoring infrastructure, with new air-quality stations being procured through state funds, CEPA-related financing, and Japanese government support. Additionally, Armenia has taken legislative steps, including the 2022 revision of the Law on Atmospheric Air Protection, to enhance air quality monitoring and compliance mechanisms.

Armenia has initiated a national **water strategy development process**, supported by EU funding and technical assistance. There is also growing recognition of the impact of climate change and upstream water management in neighbouring Türkiye, which has spurred interest in more sustainable water resource planning. The presence of international agreements on transboundary water monitoring with Türkiye and Iran further presents opportunities for improved water governance.

Armenia has established legal frameworks such as the **Land Code and the Mining Code**, which outline land use regulations and post-mining restoration requirements. The adoption of environmental taxes for mining companies and mandates for community reinvestment further enhance the potential for environmental restoration.

Despite a decrease in Armenia's domestic **chemical industry**, the continued reliance on pesticide imports contributes to the persistent contamination of natural resources. Armenia has ratified key international agreements such as the Basel, Rotterdam, Stockholm, and Minamata Conventions and to assist with their implementation the government has initiated a three-year project with support from the United Nations Environment Programme (UNEP). This includes establishing a National Inter-Agency Coordination Mechanism (NCM) to oversee chemical safety and updating Armenia's National Chemicals Management Profile.

Armenia has taken also steps toward policy improvements, including tightening import controls on pesticides and agrochemicals. The law on phyto-sanitation prohibits the use of unregistered pesticides, and official labelling requirements aim to enhance transparency. Nonetheless, enforcement remains inconsistent, and local farmers continue to use banned substances, often unaware of the associated health risks. Civil society initiatives, such as "Armenian Women for Health and Healthy Environment," play a crucial role in raising awareness and advocating for safer agricultural practices.

Armenia has made significant strides in **energy sector reform** since the collapse of the Soviet Union and the subsequent energy crisis of the 1990s. The transition to a market-based energy system, elimination of subsidies, and privatisation of assets have improved resilience and attracted foreign direct investment. Renewable energy resources, including solar, wind, and hydro, have become central to Armenia's energy mix, with solar photovoltaic (PV) installations reaching nearly 300 MW within a decade. However, while large hydropower plants inherited from the Soviet era continue to supply about one-third of Armenia's electricity, environmental concerns and maintenance issues have hindered their full potential. The government recognises the need for energy storage solutions such as battery and green hydrogen technology to enhance energy security and sustain renewable energy expansion.

The Armenian Government demonstrated its commitment towards **energy efficiency** in the **building sector** through a series of changes in the regulatory framework. As part of CEPA, it continued to transpose the EU policies in the energy sector, including the energy efficiency standards and norms of the EU Energy Performance of Buildings Directive.

Armenia is currently implementing its 2nd **National Energy Saving and Renewable Energy Programme** (NESREP) for 2022-2030, with the 1st triennial **Action Plan for 2022-2024** (to be viewed as National Energy Efficiency Action Plan). The Programme forecasts cumulative energy savings in the household sector until 2030 (amounting to 91.9 ktoe). As of November 2024, the 2nd Triennial Action Plan was pending adoption. The country adopted several amendments to the Law on Energy Savings and Renewable Energy from 2016 – 2021, introducing, among others – mandatory technical provisions for **energy efficiency in new residential building construction**,

as well as in new construction, capital renovation or reconstruction of buildings which use state budget funds.

Armenia is a party to the Environmental Conventions related to the biodiversity thematic area, including the CBD, CITES, etc. At the same time, there is a relevant national legislative framework and the CEPA agreement creates necessary prerequisites for an approximation of the Armenian legislation with EU Directives. In general, the **national legislation for biodiversity conservation and sustainable use** is in place. Recent reforms in the system of the **specially protected nature areas (SPNAs)** and forestry protection have led to the establishment of the EcoPatrol Service, ensuring protection within SPNAs and forested lands. According to the State budget, limited financial resources are available to address nature conservation and biodiversity. At the same time progress is noticeable. For the first time, 60.0 million AMD were allocated by the 2024 state budget for water quality monitoring in Lake Sevan.

Armenia has 2020-2030 strategy which focuses on **sustainable development**, innovation, and high-value production that respects natural resources, supports biodiversity, and promotes eco-friendly farming. The primary goals are to increase **agricultural productivity**, strengthen food security, adopt modern technologies, and improve income for everyone involved in agriculture: especially smallholder farmers, producer groups, processors, and exporters. The strategy also includes practices that boost biodiversity, soil health, and efficient use of resources, such as crop rotation and organic farming.

The **“GREEN Armenia” Policy Dialogue with the European Union**, initiated in 2022, is used to consolidate and streamline policies and investment initiatives with the aim of facilitating Armenia’s transition to a green economy. It also promotes a comprehensive reform of the educational and vocational training systems to actively involve youth, enhance farmer skills, and train the next generation of Armenian agronomists, agricultural technologists, and entrepreneurs.

Introduction of green technologies and good agricultural practices, opening of new, modern soil laboratories, gradual adaptation of drone technology and precision agriculture, including agritech and biotech initiatives show the possible way forward in exploring a more sustainable agriculture pathway.

Armenia has made significant progress in transitioning toward **sustainable transportation**, with key enabling conditions including government initiatives, international partnerships, and growing consumer demand for green mobility. The introduction of tax waivers for electric vehicles (EVs) has accelerated their adoption, with over 10% of new vehicle purchases in 2023 being EVs. Additionally, Yerevan’s transport reform, which includes fleet modernisation and the planned integration of electric buses, demonstrates a commitment to reducing urban air pollution. Armenia’s renewable energy strategy, particularly the expansion of solar capacity, aligns well with these efforts, ensuring that the transition to e-mobility is powered by cleaner energy sources.

6.2 Country readiness assessment

Climate Action	Some progress

Armenia's readiness assessment for climate change reveals a **complex picture of some progress and significant challenges.** While the nation has established a policy and legal framework, including its Nationally Determined Contribution (NDC) and long-term strategies, these efforts are deemed insufficient to meet the ambitious goals of the European Green Deal (EGD). Armenia's NDC target, aiming for a 40% reduction in greenhouse gas (GHG) emissions by 2030 (from 1990 levels), falls short of the EU's 55% target.

A significant portion of Armenia's past emissions reductions resulted from the economic downturn of the 1990s, not from sustainable climate policies. Current emissions, though stabilised, are primarily driven by the energy sector. Furthermore, Armenia is highly vulnerable to climate change, experiencing rising temperatures and increased extreme weather events, leading to substantial economic losses.

The assessment identifies **critical gaps in policy implementation**, institutional and non-institutional capacity, and financial readiness. The country relies heavily on donor funding, and a lack of technical expertise hinders effective climate action. Research and innovation in climate-related fields are underdeveloped, as is the planning for a just transition.

Despite **some progress in policy frameworks on sustainable finance by introducing green taxonomy and climate budget tagging, planned for 2025,** climate funding is still mostly focused on climate change mitigation, while the adaptation efforts are lagging. The overall assessment concludes that Armenia's climate change readiness is "**some progress**" requiring substantial reforms to strengthen legislation, enhance institutional capacity, secure adequate funding, and improve technical expertise to achieve full readiness.

Resource efficiency and Circular economy with focus on Waste Management	Little progress

Assessment readiness for resource efficiency and circular economy provides insight into **weak regulatory set up** with no nationally binding documents on the circular economy. Armenia has developed a general **circular economy roadmap** in 2022, which is currently being revised, but there are no mechanisms to promote waste sorting and recycling. Reliable data regarding waste management and circularity is still lacking, **hindering target setting and monitoring**.

However, **detailed action plans** with measurable targets promoting waste prevention and recycling are yet to be developed. These should focus on reducing landfilling, open burning, illegal dumping, and the establishment of EU-compliant landfills.

The waste-related legal framework is not fully aligned with the EU Waste Framework Directive when it comes to the definitions and quantitative enforceable targets, as well as ensuring the full cost recovery through the **"polluter pays"** principle. There are no incentives for reducing the use of primary raw materials or increasing the use of the secondary raw materials. The **enforcement** of the existing regulations is weak. The sector is characterised by institutional fragmentation and weak ownership of key state agencies competent in the waste governance and circular economy sectors.

Several large-scale projects have contributed to **development of relevant policy instruments**, such as Extended Producers' Responsibility (EPR) and introduction of the "polluter pay" principle, the creation of waste hierarchy, the creation of sanitary landfills, the development of proper policies for managing and disposing of hazardous waste and the development of waste management plans. However, these are all donor-funded.

The **tax policies** – environmental tax/landfill tax and solid waste tax/fee are not designed to incentivise a circularity approach for the industry. No other taxes and other economic incentives are offered to make it financially feasible and attractive. Due to this Armenia doesn't receive a lot of international (or even national) investments to boost the industry.

Dedicated circular **economy and waste management stimulus policies and incentive mechanism**s ("polluter pays" principle, taxes and tariffs) that would provide the basis for waste collection and recycling as well as create demand for recycled products still need to be created. This includes a **redesign of environmental tax allocation**.

The conclusion here is that Armenia has achieved **"little progress**" on industrial decarbonisation and circularity, as significant efforts are needed to align closer with the EU policies on data collection and reporting systems to make the industry more appealing to the investors, improve green financing tools, engagement of additional funds from donor organisations, create of better financial management mechanisms for the players of the field and better allocation of taxes.

Environmental pollution	**Little progress**

Air and Noise

Despite some progress—such as legal amendments and new monitoring systems in Yerevan—overall advancement in air quality remains limited. Armenia's monitoring infrastructure is outdated, lacking critical data on pollutants like PM2.5 and PM10. Industrial cities often lack PM monitoring, and emissions data mostly rely on self-reporting, with weak lab verification. Noise

pollution is growing in urban areas but is regulated mainly through fines, with little enforcement or comprehensive mapping.

Vehicle emissions are poorly regulated, with outdated cars contributing heavily to urban air pollution. Open landfill burning and industrial pollution from energy and mining also worsen air quality. Local monitoring initiatives are disconnected from national systems, reducing their policy impact.

To address these issues, Armenia needs to modernize its monitoring infrastructure, enforce emissions rules, promote electric vehicles, and raise public awareness. Integrating local data into national systems would also improve transparency and governance.

Water

Water pollution is a concern, as currently Armenia has no municipal wastewater treatment plants that provide biological treatment. The six plants operating perform only mechanical treatment to remove large solid objects. The water and sanitation agenda is also gaining momentum in the country, with a focus on water overuse and insufficient treatment of wastewater. Future freshwater resources per capita are expected to decline further due to population growth, climate change, and Türkiye's plans to build additional reservoirs on the upper reaches of the Araks River.

Soil and Land

Land degradation in Armenia is driven by mining, agriculture, and unmanaged landfills. Mining contaminates soil with dust and tailings, posing health risks. Poor farming practices—like overgrazing and inefficient irrigation—have severely degraded land, especially in the Ararat Valley. Weak enforcement and limited community resources hinder effective response.

Solutions include stronger institutions, better regulation, and public awareness. Investments in reforestation, soil restoration, and wastewater treatment should be scaled up with international and private sector support.

Chemicals Management

Armenia's chemicals management system remains underdeveloped, despite the vital role chemicals play across key sectors like agriculture, mining, and pharmaceuticals. While the country is party to several international conventions and has made limited progress in restricting highly hazardous pesticides and improving oversight, significant challenges persist. These include outdated legislation, lack of a functioning chemicals registry, weak enforcement, and poor public awareness. Efforts to draft a comprehensive Law on Chemical Substances have stalled multiple times due to institutional disagreements, lack of capacity, and insufficient stakeholder engagement. To meet its obligations under CEPA and align with EU and international standards, Armenia must urgently develop a comprehensive chemicals management regime. This includes defining the scope of regulation, creating procedures for import/export notification, improving

labelling and classification systems, and ensuring interagency coordination. The Ministry of Environment is seeking international support to close these gaps, particularly through EU and Sweden-funded initiatives.

Biodiversity and Ecosystem	Some progress

Armenia has made **significant progress** in preparing a comprehensive policy and legislative framework on biodiversity conservation, such as the Strategy and State Programme of Conservation and Use of Specially Protected Areas, the Red Book of Armenia and National Biodiversity Strategy and Action Plan (NBSAP). However, these need to be updated to align with current challenges and priorities. Similarly, several Laws and Strategies are outdated and require significant revision. In particular, the Law on Specially Protected Nature Areas and the Law on Flora need major revisions, and several regulatory frameworks remain incomplete.

Although there is **some progress** in the implementation of policies and legislation, as well as institutional and non-institutional capacity, in terms of alignment with the EU Bird and Habitat Directives, there has been **little progress**.

The newly established Ecopatrol service currently faces significant challenges, including insufficient financial, human, and technical resources to enhance law enforcement capabilities.

Armenia has made **significant progress on research and innovation in this sector, but biodiversity inventory and monitoring,** crucial for evidence-based decision-making and effective conservation management, is still not properly structured and harmonised.

Ecosystem restoration, and particularly forest landscape restoration, considering the commitment under the Paris Agreement to restore 12.9% of the country's territory (approximately 50,000 hectares) is an ambitious goal. However, the current level of forest restoration and tree planting efforts remains insufficient to meet these targets. The GHG inventory[286] has also shown that the LULUCF sector's ability to act as a net carbon sink has been largely reduced making this target even more ambitious.

Although the authorized body and its organisations have sufficient power under national legislation, the crucial role of biodiversity and ecosystem services in human wellbeing, urban development, and other sectors remains undervalued. According to the State budget, **limited financial resources** are available to address nature conservation and biodiversity contributing to **noticeable progress**.

Assessment of this sector shows that there is **some progress overall**, but with a potential to reach significant progress in closer alignment with the EU Directives and further strengthening

[286] Insert footnote on GHG inventory.

of institutional and non-institutional capacities, stronger enforcement and dedicated biodiversity funding. Armenia's hosting of COP17 under the Convention on Biological Diversity in 2025 has potential to provide additional impetus to accelerate progress in the sector. **Armenia's hosting of COP17 under the Convention on Biological Diversity in 2025 has potential to provide additional impetus to accelerate progress in the sector**.

Energy	**Some Progress**

This sector has been evaluated as having **some progress** due to ambitious energy reforms after the collapse of the Soviet Union and a large uptake of renewables up to some 300 MWs in the last decade. The **legislative and regulatory framework**, and some level of alignment with CEPA is also in place.

Despite progress, Armenia faces **substantial institutional and governance challenges**. The merger of the Ministry of Energy with the Ministry of Territorial Administration and Infrastructure (MTAI) has weakened the government's capacity to oversee energy policy, particularly in renewable energy and efficiency measures. While regulatory functions are carried out by the Public Services Regulatory Commission (PSRC) and supported by the Renewable Resources and Energy Efficiency (R2E2) Fund, the absence of a dedicated energy agency has slowed policy implementation. Additionally, continuous staff turnover in key ministries has disrupted reform momentum, complicating efforts to align national energy policies with EU directives under the Comprehensive and Enhanced Partnership Agreement (CEPA).

Financial and technical constraints further challenge Armenia's green transition. Most energy-related investments have focused on supply-side infrastructure rather than demand-side energy efficiency improvements, particularly in the building sector. While international financial institutions (IFIs) provide support, funding mechanisms for residential and public building energy retrofits remain underdeveloped. The absence of a long-term energy efficiency strategy, coupled with limited government funding for research and innovation, restricts progress. Moreover, gaps in technical expertise and the lack of skilled professionals in renewable energy and efficiency-related fields pose further hurdles.

Armenia's participation in international climate agreements, including the Paris Agreement and CEPA, offers opportunities for further integration into European energy markets and access to climate finance. However, the country must address gaps in institutional capacity, policy implementation, and infrastructure development to fully capitalise on these commitments.

Buildings and Renovation	Little Progress

Despite Armenian demonstrated commitment towards **energy efficiency in the building sector** carried out through a series of changes in the regulatory framework and continued transposition of EU policies in the energy sector, including the energy efficiency standards and norms of the EU Energy Performance of Buildings Directive, **progress remains slow**.

Armenia is currently implementing its 2nd **National Energy Saving and Renewable Energy Programme** (NESREP) for 2022-2030, with the 1st triennial **Action Plan for 2022-2024** (to be viewed as National Energy Efficiency Action Plan). The Programme forecasts cumulative energy savings in the household sector until 2030 (amounting to 91.9 ktoe). As of November 2024, the 2nd Triennial Action Plan was pending adoption. The country adopted several amendments to the Law on Energy Savings and Renewable Energy from 2016 – 2021, introducing, among others – mandatory technical provisions for **energy efficiency in new residential building construction**, as well as in new construction, capital renovation or reconstruction of buildings which use state budget funds.

Although Armenia has an Energy Sector Development Strategy up to 2040 and its implementation action plan specifies targets for renewables, electric market liberalisation, regional energy network integration and nuclear energy development, **the National building renovation strategy** is missing. There are **no quantitative data** on annual renovation rate (%), annual number and type of building (public, MABs and individual housing) to be retrofitted, renovation rate's annual energy saving targets (GWh) and expected emission reduction (t C02) for 2030, 2040 and 2050, targets for the deployment of solar energy in buildings, as well as the required investments and allocation of domestic and international funding sources.

The **methodology for performing energy audits** in residential and public buildings and its standards are applied on **a voluntary basis** and, generally, are weakly enforced in the mainstream construction practice. The currently existing practice in Armenia is a mixture of EU, ISO, GOST (Russian), MSN (Eurasian Economic Union (EEU)) and national standards, and there is no clear guidance how and when the standards, or part of them, should be applied, particularly when there is a discrepancy between EU and standards. Despite challenges, the proposed interventions to align with EU buildings and renovation legislation have the potential to stimulate market development and increase the demand for energy efficient buildings by imposing a clear and reliable method for estimating energy savings.

Sustainable Food Systems	Little Progress

While some steps have been taken toward EU alignment, the assessment highlights that **progress remains limited and fragmented**. By examining dimensions such as policy frameworks, institutional capacity, and innovation, this sector shows varied levels of progress across thematic areas. The **policy and legal framework demonstrate moderate to good development**, with

areas like Seed and Planting Material, Sustainable Land and Water Management, and Organic Production achieving notable progress. However, **alignment with EU standards remains at an early stage across most fields,** scoring consistently low. **Policy implementation** faces significant challenges, particularly in Sustainable Diets and Nutrition, and Food Loss and Waste, while Institutional Capacity shows better results in fields such as Climate Smart Agriculture and AgriTech.

Non-institutional and private capacity remains a critical gap, while research and innovation efforts are uneven, with high potential noted in AgriTech but limited advancement in key areas like Agroforestry and Sustainable Diets. **Financial readiness remains a pressing issue**, with most sectors requiring substantial investment to bridge gaps. While some areas, such as AgriTech and Sustainable Land and Water Management, demonstrate encouraging momentum, others lag behind in fostering a just transition. Overall, while Armenia has made initial strides, **a cohesive strategy addressing capacity-building, funding, and innovative practices** is essential for significant progress toward the EU's green transition goals.

Transport and Smart Mobility	**Some Progress**

Despite these positive steps, several structural and policy-related constraints hinder Armenia's transport sector transformation. One of the biggest challenges is the absence of a comprehensive, long-term mobility strategy that aligns with the European Green Deal. While there are short-term measures such as fleet renewals and infrastructure upgrades, Armenia lacks a cohesive vision for sustainable urban planning, active mobility, and intermodal transport systems. Additionally, the car ownership rate has surged rapidly, contributing to worsening traffic congestion, pollution, and road safety concerns, particularly in Yerevan. The underdevelopment of intelligent transportation systems and limited cycling and pedestrian-friendly infrastructure further exacerbate mobility inefficiencies.

Infrastructure gaps and governance challenges further constrain Armenia's ability to shift toward a greener transport sector. While the railway system is largely electrified and could play a greater role in passenger and freight transport, its potential remains underutilised due to outdated concession agreements that do not incentivize passenger service development. Regional and intercity public transport options are also limited, with an aging and inefficient fleet contributing to fuel overconsumption and emissions. In terms of governance, the lack of interagency coordination and institutional capacity prevents a streamlined approach to transport policy and implementation. Without a centralised body to oversee green mobility initiatives, different ministries and municipalities operate in silos, leading to fragmented decision-making.

Financial and technological barriers also present key constraints to sustainable transport development. Armenia's EV charging infrastructure remains underdeveloped, with inconsistent charging standards, limited availability, and inadequate grid capacity assessments. Public investment in sustainable mobility is limited, and while international donors support transport

projects, long-term financial sustainability remains a concern. The dominance of compressed natural gas (CNG) vehicles, while cleaner than traditional gasoline or diesel, still delays the shift to zero-emission transport. Additionally, Armenia's exclusion from regional rail networks, due to geopolitical constraints, limits opportunities for more sustainable freight movement

6.3 Way forward for Green Transition in Armenia

6.3.1 Climate change

Policy framework and EU alignment – Armenia should ensure adoption of the Climate Change Law as this would enable it to create conditions for introduction of appropriate regulatory framework, including fiscal instruments which will consider measures for reducing social pressure on vulnerable populations. The proposed coordination and accountability mechanism would also assist in enforcing legislation.

The Law would also support climate change mainstreaming and setting of emission reduction targets in sectoral mid-term and long-term programmes and establishing a sound system of monitoring, reporting and verification (MRV) and its implementation, particularly verification of emission reductions related to mitigation projects of the private sector. Although sectoral policies are in place, there is a need for improved coordination and coherence between them for an increased efficiency.

The Climate Change Law would also mitigate the impact of CBAM due to timely introduction of carbon tax schemes, while the private sectors' climate action will be incentivized due to a predictable fiscal and regulatory framework. Introducing the ESG disclosure would also increase confidence in climate technology investments.

The synergies and interlinkages between different legal instruments in the sectors of climate change, air quality and industrial emissions should also be explored.

- **Adopt the Climate Change Law**

Establish a comprehensive regulatory framework to reduce GHG emissions and integrate climate change considerations into all sectors. Prioritise the adoption of the Climate Change Law to create conditions for appropriate regulatory measures, including fiscal instruments that consider social impacts on vulnerable populations. Ensure the enforcement of legislation.

- **Mainstream Climate Change**

Integrate climate change mitigation and adaptation measures across all sectoral policies. Embed emission reduction targets in mid-term and long-term sectoral programmes. Establish a robust system for monitoring, reporting, and verification (MRV) with SMART indicators to track progress and verify emission reductions.

- **Mitigate CBAM Impact**

Align with EU's Carbon Border Adjustment Mechanism (CBAM) requirements. Introduce carbon tax schemes timely to mitigate CBAM impact. Foster private sector climate action through a predictable fiscal and regulatory framework. Implement ESG disclosure to boost confidence in climate technology investments.

- **Enhance Legal Synergies**

Improve coordination and coherence between climate change, air quality, and industrial emissions policies. Explore synergies between legal instruments to enhance policy effectiveness and efficiency.

Institutional capacity – role of the Climate Change Coordination Council should be enhanced and strengthened to foster better communication between sectors and enable bold and ambitious green agenda reforms. Its composition should be extended to involve CSOs, academia and private sectors while the working groups should be extended to include the expert community.

The ministries' capacities should be strengthened and additional resources to implement existing plans and develop new ones should be explored. Additionally, technical expertise for implementing climate action strategies needs to be strengthened, particularly in improving data collection and analytical capacities across various sectors to improve the overall completeness and accuracy for improved planning. Uncompetitive salaries in the public sector hinder attracting and keeping qualified staff in public institutions. Increasing the attractiveness and competitiveness of work should ensure keeping them and ensuring institutional memory.

- **Strengthen the Climate Change Coordination Council**

Enhance cross-sectoral communication and enable ambitious climate reforms. Expand the Council's composition to include Civil Society Organisations (CSOs), academia, and the private sector. Involve expert communities in working groups to provide technical expertise.

- **Boost Ministries' Capacities**

Enhance the capacity of ministries to implement and develop climate policies. Strengthen ministries' capabilities and allocate additional resources for climate action. Improve data collection and analytical capacities across sectors to ensure accurate planning. Address uncompetitive public sector salaries to attract and retain qualified staff.

Financial framework – Adequate resources and targeted fiscal policy for implementation of existing plans and development of new ones including their costing and realistic mid and long-term implementation plans are missing. Additionally, most financial resources come from external donors, hindering sustainability. Developing the long-term climate change financial strategy and exploring the options to extend funding from public source would assist in achieving ambitious climate goals. Assessment of social, economic and environmental impacts of introducing carbon tax to provide additional climate financing should also be explored.

Conditions should be created for enhancing private investments in adaptation and enhancing public private partnerships in climate-oriented projects. Also, capacities for climate risk financing and introduction of insurance should be developed.

- **Secure Transitional Funding**

Ensure transitional financing for climate initiatives. Develop a long-term climate change financial strategy and explore public funding options. Assess the impact of carbon taxes to provide additional climate financing. Foster private investments in adaptation and public-private partnerships in climate-oriented projects. Develop capacities for climate risk financing and introduce insurance mechanisms to manage climate-related risks.

NGO capacity/public capacity – NGO can support the process of green transition by providing education, increasing public awareness and promoting behavioural changes but are often reliant on donor funding as well as donor community priority setting. Exploring options for sustainable funding and building capacities to increase the involvement of NGOs in policy development and implementation, which should assist in strengthening their role and mission and strengthening their collective impact on policy process. **Public understanding** and involvement in climate change policy development and implementation is weak though growing. While structures exist (such as the Public Council under the Ministry of Environment), the overall level of public involvement in policy development is low.

- **Support NGO Involvement**

Strengthen NGOs' role in the green transition. Provide sustainable funding options and build NGO capacities to increase their involvement in policy development and implementation. Enhance their impact on the policy process through education, public awareness, and promoting behavioural changes.

- **Increase Public Engagement**

Improve public involvement in climate policy development and implementation. Strengthen existing structures like the Public Council under the Ministry of Environment. Promote greater public involvement in policy development to enhance overall engagement and effectiveness.

6.3.2 Resource efficiency and Circular Economy with focus on Waste Management

Overall, currently, the waste-related legal framework is not fully aligned with the EU Waste Framework Directive when it comes to the definitions and quantitative enforceable targets. The data collection system for waste generation, landfilling, recycling and other types of treatment is very poor and inefficient, while the legislation does not ensure full cost recovery through the "polluter pays" principle. Additionally, there are no incentives for reducing the use of primary raw materials or increasing the use of the secondary raw materials. The enforcement of the existing regulation is weak. Also, institutional fragmentation and weak ownership of key state agencies

competent in the waste governance and circular economy sectors. Some proposed actions are below:

1. Clarify Institutional Roles and Strengthen Public Sector Capacity

Clearly define the responsibilities, structures, and functions of relevant ministries and agencies involved in waste management and circular economy. Clear division of responsibilities among ministries (Environment, Economy, Territorial Administration and Infrastructure, High-Tech Industry) and improved inter-agency collaboration will help streamline policy implementation. Training programmes and capacity-building initiatives—for both the public and private sectors—can address knowledge gaps around modern waste management, resource-efficient production, and circular business models.

2. Develop Policy and Regulatory Support for Green Industry

- Develop environmental standards for implementing stricter energy and emissions performance benchmarks for industrial production.
- Enforce accountability for product sustainability throughout the supply chain through EPR.
- Mandate sustainability criteria in government contracts to drive demand for green products through green public procurement.
- Promote best available technologies (BAT) and energy management systems to reduce energy intensity.
- Support industries in shifting from fossil fuels to clean electricity and green hydrogen, decarbonisation technologies in energy-intensive sectors
- Encourage resource-efficient manufacturing and substitution of high-impact materials with eco-friendly alternatives.
- Promote circular business models that minimise waste and increase material recovery.
- Mandate eco-design principles for longer product lifespans, reusability, and recyclability.

3. **Enhance Local Level Capabilities:** Provide technical guidance, training, and financial resources to local authorities and municipalities, enabling them to implement effective waste management and circular economy initiatives (e.g., introduce source separation of waste in their communities). Establish clear mandates and procedures at the municipal level to ensure accountability and consistent policy execution.

4. **Establish Robust Data Collection and Reporting Mechanisms:** Develop and implement a standardized, transparent system for gathering, analysing, and reporting data on resource use, pollution, circularity and waste management. This framework should cover all levels of government and industry, helping to track progress, identify bottlenecks, and inform evidence-based policy decisions. Reliable, comprehensive data on waste streams, resource productivity, and environmental indicators are essential for evidence-based policymaking. Strengthening the capacity of the Statistical Committee (ArmStat) and other relevant agencies, establishing clear reporting standards, and integrating digital technologies will help create accurate baselines and facilitate the monitoring of progress toward green transition goals. This will be partially addressed through the introduction of EPR policy that will require a digital platform for a higher quality waste data reporting.

5. **Improve Enforcement and Monitoring Infrastructure:** Strengthen oversight by creating or upgrading state laboratory testing facilities and control systems. Train and equip enforcement personnel to ensure compliance with waste management regulations and circular economy targets. Regular monitoring and auditing will ensure that measures are effective and properly enforced.

6. **Investment and Financial Incentives:** Expand funding for clean production technologies through grants, loans, and tax incentives. Strengthen carbon pricing mechanisms to drive investments in low-carbon production. Facilitate access to funding and technical assistance for micro, small and medium-sized enterprises (MSMEs).

7. **Foster Comprehensive Stakeholder Engagement:** Involve government agencies, local communities, the private sector, and civil society in designing and implementing policies. Encourage multi-stakeholder dialogues to identify common goals and synchronise efforts toward meeting environmental objectives. Shared ownership of solutions will lead to higher efficiency and more sustainable outcomes.

8. **Upgrade Waste Management Infrastructure and Technologies:** Modernizing the country's waste collection, separation, and recycling infrastructure is crucial. This involves improving municipal waste collection services, introducing large-scale source separation systems, building sanitary landfills compliant with EU standards, and enhancing recovery processes (e.g., composting and anaerobic digestion) for organic waste. Strengthening hazardous waste treatment capacity and closing or rehabilitating illegal dumpsites would also reduce environmental harm and greenhouse gas emissions.

9. **Integrate Circular Economy Principles into Education and Public Awareness:** Embed clean production and circular economy concepts into educational curricula and conduct public information campaigns to cultivate a culture of resource efficiency. Encourage academic institutions, research centres, and vocational training programmes to collaborate with government and industry partners, ensuring a continuous pipeline of expertise and innovation.

10. **Promote Inclusive and Just Transition:** Ensuring that the shift to a green economy benefits all social groups involves mapping potential job gains and losses, integrating gender and social inclusion aspects in policy planning, and offering retraining or upskilling opportunities. A just transition approach will help minimise socioeconomic disruptions and garner broader public support for ambitious environmental reforms.

11. **Develop Incentive Frameworks and Financing Mechanisms:** Create tax incentives, grants, or low-interest loans that encourage both public and private stakeholders to invest in circular business models, technologies, and infrastructure. Offer financial tools and risk-sharing mechanisms to attract capital and stimulate research and development in innovative waste management solutions. Armenia must develop financial mechanisms and policy instruments that make circular practices cost-effective. Examples include increasing landfill fees, introducing tax breaks or subsidies for recyclers and secondary material users, and setting up Extended

Producer Responsibility (EPR) schemes for key waste streams (packaging, batteries, electronic equipment, tires, oils, and filters). Properly pricing waste services—based on the polluter-pays principle—would encourage separate collection and recycling, while reducing the demand for open dumping and landfilling. One of the low-hanging fruits could be developing mechanisms necessary for enacting provisions under the Article 23 of the RA Law on Waste meant to provide incentives to circular business models, technologies, and infrastructure.

12. **Promote Digital Solutions and Technology Adoption:** Leverage AI, IoT, and automation to optimise resource use and reduce emissions. Leverage data analytics, digital platforms, and tracking technologies to optimise resource use and monitor material flows. Encourage the development and deployment of software tools that can streamline waste collection, recycling, and circular supply chains, helping businesses and authorities operate more efficiently. This will also be partially addressed through the introduction of EPR policy that will require a digital platform for a higher quality waste data reporting. Encouraging research institutions, universities, and private enterprises to develop new technologies, products, and business models will help drive Armenia's green transition. Digital solutions—such as tracking systems for waste flows—can improve transparency and optimise resource use. Expanding grant programmes, incubators, and accelerators that support "green" startups can further stimulate innovation.

13. **Foster Regional and International Collaboration:** Align with global environmental standards to enhance market access for sustainable products, promote transparency and low-carbon sourcing across global supply chains. Foster international partnerships to scale clean industrial solutions. Engage in cross-border partnerships and knowledge exchange with neighbouring countries and international organisations. Sharing best practices, lessons learned, and technological advancements can accelerate Armenia's transition to a circular economy, aligning national efforts with global standards and trends. Regional level waste recycling and treatment cooperation shall be explored with Georgia and Iran among other neighbours.

6.3.3 Pollution

Air and Noise

- Prioritize the modernisation of Armenia's air-quality monitoring system

Urgent investments are needed in state-of-the-art monitoring stations capable of measuring key pollutants such as PM2.5, PM10, and carbon monoxide (CO) and expanded across all major cities and industrial centres. Ensuring **real-time data availability and integrating decentralised air-quality monitoring networks**—such as those operated by Yerevan Municipality and citizen groups—into the national system will improve transparency and public engagement. Strengthening the capacity of the Hydrometeorology and Monitoring Centre (Armhydromet) to analyse and report air-quality trends in real-time will also enhance the country's ability to take timely action against pollution spikes.

- Strengthen regulatory reforms and enforcement mechanisms

This should enable limiting emissions from both stationary and mobile sources. Industrial polluters should be required to install emission control technologies, undergo independent air-quality audits, and comply with stricter permit conditions. Establishing a functional emissions testing and enforcement system for vehicles is essential, particularly as outdated and highly polluting cars continue to dominate Armenia's roads. **Promoting the adoption of electric vehicles** (EVs) through financial incentives, tax breaks, and improved charging infrastructure could significantly reduce urban air pollution. Additionally, Armenia should develop and enforce **stricter regulations on waste burning, landfill operations, and crop residue management** to prevent the release of hazardous pollutants.

- Increase public awareness and encourage behavioural change

Such initiatives are essential for long-term success. Nationwide campaigns should educate citizens on the health risks of air pollution and the importance of sustainable transportation choices. Encouraging businesses and individuals to **adopt cleaner technologies**, such as using energy-efficient heating systems and avoiding unnecessary vehicle use, will contribute to overall pollution reduction. Noise pollution should also be addressed through stricter urban planning regulations, zoning laws, and improved enforcement of noise-related administrative fines, particularly in Yerevan and other urban centres. Establishing **clear noise pollution thresholds** and requiring businesses, construction projects, and entertainment venues to comply with noise limits will help mitigate the growing problem.

Water

- **Develop a comprehensive and cross-sectoral water strategy**

To address Armenia's water challenges, a framework strategy integrating clear targets for water use efficiency, quality management, and conservation is essential. **Aligning this strategy with EU** directives under CEPA will ensure a structured and enforceable framework for sustainable water governance. **Strengthening the coordination** between key institutions, such as the Ministry of Environment, the Water Committee, and regional water management bodies, will be essential in streamlining policy implementation and enforcement. Additionally, **transboundary water cooperation**, particularly with Georgia and Iran, should be enhanced to secure shared water resources and improve regional water management strategies.

- **Investments in infrastructure modernisation are critical**

New investments are needed to reduce water losses and improve efficiency in both agricultural and municipal sectors. Upgrading irrigation systems from energy-intensive pumping to more **sustainable gravity-fed or drip irrigation** will significantly reduce water waste in agriculture, which accounts for 87% of total water use, and make it more resilient to climate change impacts. Similarly, municipal water supply systems need urgent rehabilitation to minimise distribution losses, currently estimated at 70%. **Expanding wastewater treatment capacity**, particularly with biological filtration systems, will reduce nutrient pollution in Armenia's water bodies, including Lake Sevan, and improve overall water quality.

- **Strengthening economic and regulatory measures**

Strict regulatory measures can promote water conservation and efficiency. Introducing tiered water pricing, where higher consumption leads to increased rates, **can discourage excessive use and incentivise conservation**. Establishing regulatory requirements for industries to recycle and reuse water—similar to existing legislation for fish farms—can reduce strain on freshwater resources. Additionally, **financial incentives such as tax credits and grants** should be provided for businesses and households that adopt water-saving technologies and practices.

- **Prioritising public awareness and education**

This would foster a culture of water conservation and responsible usage. Many inefficiencies stem from long-standing perceptions of water as an unlimited resource. Nationwide campaigns, school curricula updates, and farmer training programmes should emphasize the economic and **environmental importance of water efficiency**. Encouraging citizen participation in water monitoring and conservation initiatives can further strengthen accountability and promote long-term behavioural change.

Soil and Land

- **Adopt a holistic and cross-sectoral approach to effectively combat soil degradation**

Armenia must integrate sustainable land management practices, regulatory enforcement, and targeted investments. Developing and implementing a **national soil conservation strategy**, aligned with existing environmental commitments under CEPA and the SDGs, would provide a clear framework for action. **Strengthening policies on crop rotation, responsible irrigation practices, and controlled fertiliser use** can help mitigate soil salinisation and compaction, particularly in high-risk areas like the Ararat Valley. Additionally, **integrating sustainable land-use planning** into Armenia's broader environmental strategy would ensure that agricultural, mining, and construction activities do not contribute further to land degradation.

- **Invest in modern agricultural techniques and infrastructure**

Encouraging **precision irrigation methods**, such as drip and sprinkler systems, can significantly reduce water overuse and prevent secondary salinisation. Additionally, promoting **conservation tillage and organic farming practices** can help restore soil fertility and structure. The government should also incentivize farmers to adopt sustainable soil management techniques **through subsidies, tax breaks, or direct support programmes**. Expanding research initiatives in soil health, in collaboration with universities and research institutions, can further facilitate the development of localised solutions tailored to Armenia's specific soil conditions.

- **Ensure stronger regulation and enforcement mechanisms**

These are particularly needed to curb the **negative impacts of mining and industrial activities** on soil quality. While Armenia has introduced laws requiring post-mining land restoration, enforcement remains inconsistent. Establishing a **robust monitoring system** for industrial pollution, including **stricter penalties for non-compliance**, would help mitigate further soil contamination. Additionally, **reforming landfill management practices** by prohibiting waste

dumping on high-quality agricultural land and introducing waste sorting and recycling initiatives would prevent further soil degradation. Municipalities should also be equipped with the necessary resources to implement land rehabilitation programmes.

- **Prioritise public awareness and education**

Many land degradation issues stem from outdated practices and a lack of knowledge about sustainable alternatives. Nationwide awareness campaigns, farmer training programmes, and community-led initiatives can help shift mindsets and encourage responsible land use. Additionally, integrating soil health education into school curricula and vocational training programmes would ensure that future generations are equipped with the skills needed to maintain Armenia's agricultural productivity while protecting its natural resources.

Chemicals

- **Adopt a multi-pronged approach, focusing on regulatory reforms, enhanced monitoring, and sustainable alternatives**

To address the environmental and health risks posed by pesticides and other chemicals in Armenia, strengthening the legislative framework should be a priority, including the adoption of a **comprehensive law on chemical substances** and the establishment of a **centralised pesticide registration system.** Aligning national policies with international best practices and fully implementing commitments under the relevant international conventions and the CEPA will ensure stricter control over pesticide imports, use, and disposal. Additionally, updating and enforcing hazardous waste management strategies will help prevent further contamination from obsolete and expired pesticides stored across the country.

- **Improving monitoring and enforcement mechanisms**

Tracking pesticides and other chemicals use, contamination levels, and associated health impacts is essential. Restoring funding for suspended pesticide monitoring programmes will provide critical data on contamination in water, soil, and agricultural products. Expanding these programmes to include air and groundwater monitoring will further strengthen oversight. The government must also introduce stricter penalties for the illegal use of banned pesticides and increase inspections of agricultural inputs. **Establishing a publicly accessible database** on pesticide safety, approved chemicals, and contamination risks will enhance transparency and accountability.

- **Transitioning to sustainable agricultural practices**

This approach offers a long-term solution to reducing pesticide dependency. Promoting **agroecological approaches, integrated pest management (IPM), and organic farming** will minimise environmental and health risks while ensuring food security. Encouraging farmers to adopt ecosystem-based pest control methods through **targeted subsidies, training programmes, and technical support** will drive this shift. Strengthening partnerships with research institutions, NGOs, and international organisations can facilitate knowledge-sharing and the introduction of safer alternatives.

- **Raising public awareness and building community capacity**

Educational campaigns targeting farmers, policymakers, and consumers can inform them about the dangers of hazardous pesticides and the benefits of sustainable alternatives. Civil society initiatives should be supported to expand their outreach and advocacy efforts. Additionally, fostering greater private sector engagement in the development and distribution of bio-based pesticides and alternative pest control methods can drive innovation and sustainability in Armenia's agricultural sector.

6.3.4 Biodiversity

Although a **policy and legal framework** is in place, significant revisions are required in critical legislation, such as the Law "On Specially Protected Nature Areas", the Law "On Flora" and other strategic documents. Additionally, substantial efforts are needed to align Armenia's legislation and strategic documents with the **EU Birds and Habitats Directives, the EU Biodiversity Strategy, and the Nature Restoration Regulation**. **Institutional capacity** must also be strengthened, particularly for the newly established **EcoPatrol Service** and the management effectiveness of state sanctuaries and nature monuments within the system of Specially Protected Nature Areas (SPNAs). Furthermore, the main state actor, **"Hayantar" SNCO**, involved in forest landscape restoration needs to enhance its effectiveness to meet the country's ambitious commitment to doubling its forest cover. Meanwhile, the lack of a unified national **biodiversity monitoring and inventory systems** are significant obstacles to the transition in the field. Scientific research institutes specializing in botany and zoology, together with some research NGOs, conduct biodiversity studies. However, **the innovation** component remains significantly limited. **Biodiversity financing** remains significantly dependent on international donor funding. Despite recent increases, the budget allocations are still insufficient to address the country's long-term conservation and restoration needs. **Public interest and awareness** of biodiversity issues remain low in the post-conflict period. Non-state actors, such **as NGOs** and private entities, can contribute to the transition, while they need an increased role in decision-making processes.

Priority actions:

- Increase the extent of the specially protected nature areas and OECMs (including establishment of the Emerald Network in Armenia) to meet the global target 30x30, improve ecological connectivity and enhance SPNAs management effectiveness.
- Align biodiversity legislation in accordance with the CEPA and enhance law enforcement in specially protected nature areas and forestry.
- In line with the Armenian NDC to Paris Agreement, restore forest landscapes to 12.9% of the country's territory by 2030.
- Reduce the pollution of Lake Sevan and its inflowing rivers.
- Improve conservation status of nationally and globally threatened species.
- Develop and implement special conservation measures for migratory birds.
- Restore free-flowing rivers.

- Develop the regulatory framework and strengthen law enforcement capacities for the sustainable use, harvesting, and trade of wild plants, fungi and animals.
- Develop national legal and institutional frameworks for the management and control of invasive or potentially invasive species.
- Implement the biodiversity inventory and strengthen the biodiversity and ecosystems monitoring framework.

6.3.5 Energy

Failure to achieve a green transition in Armenia presents **critical risks**, primarily related to **institutional capacities, energy security, and regional integration**. Weak governance and administrative inefficiencies could delay the implementation of crucial energy policies, particularly those linked to renewable energy, energy efficiency, and compliance with the CEPA commitments. Additionally, uncertainty surrounding the construction of a replacement nuclear reactor beyond 2036-2040 poses a significant risk, as Armenia currently lacks viable alternative power generation options. Without strategic planning, the country may struggle to maintain energy security while reducing its dependence on imported fossil fuels.

Another major challenge is Armenia's **limited integration into regional energy markets**, which hampers the development of its **renewable energy sector**. Without strong interconnections, the country may face difficulties in balancing supply and demand, especially as solar and wind power generation increases. The lack of cross-border trade mechanisms for electricity could limit Armenia's ability to manage peak generation periods efficiently. Furthermore, **the ongoing brain drain from engineering and energy professions to the IT sector**, combined with a failure to cultivate new technical expertise, threatens to weaken Armenia's institutional and technical capacities, making long-term energy planning and policy implementation more difficult. To mitigate these risks, Armenia should:

- **Strengthen institutional capacity and regulatory enforcement**

Enhancing government agencies' ability to implement and monitor energy policies, particularly in alignment with EU frameworks, is crucial for maintaining policy momentum. **Investment in transmission infrastructure and the development of energy storage solutions**—such as batteries and green hydrogen—will be necessary to support the increased adoption of renewables. Additionally, **integrating smart grid technologies and expanding regional energy partnerships** will improve efficiency and reduce Armenia's dependence on external energy sources.

- **Investing in human capital and technical expertise**

This is equally critical. Strengthening educational and vocational training programmes, particularly in renewable energy system design and installation, will help bridge the skills gap and build a workforce capable of sustaining the green transition.

- **Encourage private sector investment**

Business incentives and tariff schemes should be introduced to encourage development of

emerging technologies like biofuels and hydrogen to further drive sustainable energy development. By addressing institutional, technical, and financial barriers, Armenia can secure its energy future while advancing toward a greener, more resilient economy.

6.3.6 Buildings and Renovation

The **building sector** is one of the most complex to decarbonise as it is right at the intersection of energy, climate, environmental, financial, and social (poor households, energy poverty and a just transition) policies. Therefore, given the significance of the buildings sector in Armenia (the residential sector contributing to **36% of the total final energy consumption),** the following immediate actions are needed:

- **Aligning with the new EU Energy Efficiency Directive and Energy Performance of Buildings Directives requirements,** including capacity building on technical requirements of transposing these directives in Armenia's laws and by-laws. These should also clearly define **a cost-optimal analysis & quantitively define nZEBs and low-carbon buildings (LCB),** to allow for rigorous implementation of renovation strategy.
- **Developing a National Building Renovation Strategy and Action plan** – including quantitative targets for residential and non-residential buildings and allocation of responsibility for the implementation of the renovation programme. Developing a ***building reference database*** and defining ***"worst performing buildings***", leading to development of a ***digital building registry,*** would greatly assist in this process***.***
- **Provide financial support to Armenia's building renovation plan** – The Armenian Government needs to clearly define roles and responsibilities and allocate a mandate to its institutions to carry out, coordinate and financially support Armenia's renovation plan.
- **Harmonise the legislation in key areas of gaps** – Introduce definitions and methodology to agree consistent and harmonised approach to building and renovation; for example, ***defining cost-optimality and energy poverty.***
- The new draft of the **Law on EE and RE,** currently being developed, should have a reference to the Law on urban planning with minimum EPB requirements for all type of buildings in Armenia and to allow prescribing criteria in secondary legislation for obtaining permits for construction or reconstruction which is used as a policy instrument in the country.
- Developing new mandatory **minimum energy performance requirements** for all types of buildings (country's reference buildings), linking them with nZEB definition as well as the updated EPBD recap requirements. A pre-defined minimal energy class (on demand and primary energy level) needs to be defined for existing buildings undergoing retrofits and new buildings.
- **Ensure seed funding from own resources** – Armenia needs to ensure seed funding from own resources in order to be in a position to better plan the execution of EE/RE renovation programmes. This could be done by introducing soft polluter-pays mechanisms and or by introducing budget capturing or additional uptake of revolving funds for EE investment projects.

National financial mechanisms and seed funding to support EE/RE investments in the buildings sector – Armenia needs to develop/strengthen its existing financial mechanisms which best suits different end-user groups (i.e. aligned to the legal and administrative abilities and financial needs of three key stakeholder groups/end-users of such mechanisms – public sector buildings, individual housing and MABs, and funding mechanisms for social/vulnerable groups). In order to ensure seed funding, a polluter-pays mechanism could be introduced on national level which would serve as the basis to generate funds for supporting EE programmes (fulfilment of the buildings' Renovation Plan).

Once immediate steps are undertaken or are in the development/adoption process, following short and mid-term actions should be undertaken. These are described in more detail in the dedicated Chapter.

6.3.7 Sustainable Food Systems

Armenia's agricultural sector faces a range of structural and systemic problems and challenges that hinder its sustainability and development. Low productivity and inefficiency are significant issues due to the widespread use of traditional farming methods and outdated practices. Many farmers have limited access to modern machinery, high-quality seeds, and fertilisers. The average plot size is small, around 1.48 hectares per household, which contributes to low yields and inefficient water management. Additionally, a significant portion of agricultural machinery, approximately 95%, is outdated, causing mechanical damage and generating substantial food losses during cultivation and harvesting. Financial constraints and difficulty in accessing credit prevent smallholder farmers from investing in new equipment, further limiting their productivity.

Inefficient use of land resources is another major challenge. In 2022, 48% of Armenia's arable land was either unused or mis-utilised. This leads to soil erosion, desertification, and declining fertility due to improper land management. Overgrazing, deforestation, and climate change exacerbate these issues, making sustainable land management even more critical.

Poor agricultural infrastructure also hinders development. Many of the irrigation systems in place are outdated and inefficient. Rural areas lack access to modern equipment and technologies, limiting farmers' ability to scale production and reduce post-harvest losses. The absence of reliable cold storage and logistics hubs results in significant food spoilage.

The food safety system in Armenia faces substantial regulatory and enforcement gaps. Inconsistent quality control poses public health risks, and the absence of a fully aligned food safety framework with EU standards limits market access for local producers. Many slaughterhouses and food processing facilities do not meet hygiene and safety requirements.

Digital agriculture adoption in Armenia remains minimal, limiting the sector's efficiency and competitiveness. The integration of digital technology-based equipment and machinery, such as drones for crop protection and automated management systems, is largely absent. Financial

constraints and limited digital literacy among farmers are significant barriers to the adoption of modern technologies.

Food security is a pressing concern in Armenia. With 27% of the population living below the poverty line, food insecurity is widespread, particularly in rural areas. The country heavily relies on imports for essential food items like wheat, vegetable oil, pork, and poultry. Economic instability, import dependence, and climate-related disruptions worsen vulnerabilities in food availability and affordability. The infrastructure and capacities for forecasting, preventing, and responding to potential food crises are inadequate. Nutrition deficiencies and unbalanced diets further compound the issue, leading to health concerns.

A critical shortage of **skilled agricultural professionals**, including agronomists, veterinarians, and food safety specialists, also hampers sectoral development. The absence of robust extension services limits knowledge transfer and innovation adoption among farmers. Many agricultural workers lack formal education in modern practices, restricting productivity improvements.

Priority 1: Agricultural Efficiency and Resource Management

- **Regulations**: Implement robust regulations for water and land protection.
- **Efficient Irrigation Systems**: Enhance water use efficiency.
- **Mulching and Cover Crops**: Improve soil health and moisture retention.
- **Utilise Degraded Lands**: Implement greenhouse farming on marginal lands.
- **Anti-Hail Systems**: Protect crops from hailstorms.
- **Harvesting Techniques**: Encourage improved methods.

Priority 2: Sustainable Agriculture and Organic Farming

- **Organic Farming**: Support eco-friendly production and biodiversity.
- **Rotational Grazing and Agroforestry**: Improve soil health and diversify outputs.
- **Regenerative Agriculture**: Enhance soil carbon storage and nutrient recycling.
- **Pesticide and Fertiliser Management**: Establish comprehensive registration and monitoring systems.
- **Tax Exemptions**: Incentivize organic inputs production and use.
- **CSA Practices**: Scale up climate-smart agriculture like organic farming and intensive orchards.
- **Awareness Campaigns**: Promote safe use of agrochemicals and sustainable practices.

Priority 3: Renewable Energy in Agriculture

- **Solar Panels and Biogas Systems**: Shift to renewable energy in food processing.
- **Energy-Efficient Machinery**: Adopt machinery that reduces energy use and waste.
- **Facility Modernisation**: Implement energy-efficient and renewable solutions in food processing facilities.

Priority 4: Food Waste Reduction and Management

- **Minimise Food Waste**: Improve storage, transportation, and labelling practices.
- **Food Donation**: Donate excess food to charities.
- **Waste Valorisation**: Convert food waste into valuable by-products.
- **Digital Platforms**: Use technology for food sharing and redistribution.
- **Advanced Packaging**: Employ biodegradable or recyclable materials.
- **Post-Harvest Infrastructure**: Enhance infrastructure and distribution centres.
- **RECP Practices**: Promote resource-efficient and cleaner production.

Priority 5: Healthy and Sustainable Diets

- **Nutritional Labelling**: Strengthen labelling requirements for consumer information.
- **Eco-Labelling**: Promote eco-friendly product information.
- **Policy Support**: Develop policies and guidelines for healthy and sustainable diets.
- **Grant Programmes**: Adjust programmes to include consumption-related factors.
- **Comprehensive Strategy**: Develop a strategy for sustainable food systems.

Priority 6: Capacity Building and Innovation

- **Educational Reform**: Invest in human capital and vocational training.
- **Advisory Services**: Enhance farmer advisory and peer learning opportunities.
- **Working Conditions**: Improve conditions for experts, especially in rural areas.
- **Training Tools**: Expand training and awareness for sustainable procurement.

Priority 7: Policy Alignment and Compliance

- **CEPA Agreement**: Incorporate EU acquis on agriculture and fisheries.
- **National Legislation**: Align food safety and animal welfare laws with international standards.
- **Farm to Fork Strategy**: Evaluate and integrate F2F principles into national policies.
- **Monitoring and Evaluation**: Establish systems to assess regulatory and economic instruments.
- **Access to Finance**: Enhance financial support for SMEs.
- **Coordination**: Improve coordination among responsible institutions and agencies.
- **Female Farmer Support**: Ensure equal access to resources for female farmers.

6.3.8 Transport

A successful green transition in Armenia's transport sector requires a well-coordinated strategy among stakeholders, ensuring alignment between government policies, private sector initiatives, and international commitments. Without a structured approach, continued reliance on fossil fuels and inefficient transportation could increase greenhouse gas emissions, worsen air quality, and lead to negative economic and social impacts. To mitigate these risks, Armenia must focus on developing a clear roadmap that integrates **sustainable mobility solutions, strengthens institutional coordination, and enhances funding opportunities** for green transport projects. Some of the core priorities are listed below:

- **Developing and integrating a sustainable mobility infrastructure**

Expanding electric vehicle (EV) charging stations and optimising public transport can significantly reduce emissions and decrease urban congestion. Investments in active transport modes such as cycling and pedestrian infrastructure will promote healthier lifestyles while improving urban mobility. Additionally, enhancing Armenia's **rail infrastructure** for passenger transport can provide an efficient alternative to road travel, reducing dependence on personal vehicles and mitigating transport-related emissions. **Financial support mechanisms, including subsidies for EVs and sustainable transport projects**, are crucial to accelerating the shift towards greener mobility.

- **Boosting technical and institutional capacity**

Implementing **intelligent transport systems (ITS) and digital technologies** will improve traffic management, optimise transport planning, and enhance overall efficiency. **Strengthening data collection and monitoring systems** will ensure better decision-making and facilitate transparent reporting on emissions and transport performance. Capacity-building initiatives should focus on equipping the workforce with the necessary skills in green transport technologies, ensuring Armenia's long-term readiness to adopt sustainable solutions.

- **Providing education and increasing public awareness**

These efforts are essential to driving behavioural change and securing community support for sustainable transport. Comprehensive education programmes can build expertise in green mobility, while public campaigns can encourage the adoption of eco-friendly transportation habits. A just transition approach should ensure that workers in traditional transport sectors are not disproportionately affected, providing them with reskilling opportunities to participate in the evolving green economy.

List of Abbreviations

AAQD	Ambient Air Quality Directive
ADB	Asian Development Bank
AF	Adaptation Fund
AMEX	Amortisation Expenditures
AP	Action Plan
AQ	Air Quality
Armhydromet	Republic of Armenia Ministry of Environment's Hydrometeorology and Monitoring Centre, State-Owned Non-Commercial Organisation
BAT	Best Available Techniques
BREF	European Union Best Available Techniques Reference Document
BTR	Biennial Transparency Report
CAFE	Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe
CAPEX	Capital Expenditures
CAREC	Central Asia Regional Economic Cooperation
CBAM	Carbon Border Adjustment Mechanism
CBD	Convention on Biological Diversity
CBT	Climate Budget Tagging
CBA	Central Bank of Armenia
CC	Climate Change
CCA	Climate Change Adaptation
CCC	Climate Change Council
CCD	Climate Change Department
CCM	Climate Change Mitigation
CCS	Carbon Capture and Storage
CE	Circular Economy
CEPA	Comprehensive and Enhanced Partnership Agreement between the EU and Republic of Armenia
CFC	Chlorofluorocarbons
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CLC	CORINE land cover
CLP	Classification, Labelling and Packaging Regulation (EU Regulation on chemicals)
CLRTAP	Convention on Long-Range Transboundary Pollution
CNF	Caucasus Nature Fund
CNG	Compressed Natural Gas

CO_2	Carbon Dioxide
CO_2-eq.	Carbon Dioxide Equivalent
COM	Covenant of Mayors
CORINE	Coordination of information on the environment
CR	Corporate Reporting
CSO	Civil Society Organisation
CSR	Corporate Social Responsibility
CSR	Corporate Sustainability Reporting
CSRD	European Union's Corporate Sustainability Reporting Directive
DAC	Development Assistance Committee the Organisation for Economic Co-operation and Development (OECD)
DP	Development Plan
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
EAP	European Environmental Action Programme
EBRD	European Bank for Reconstruction and Development
EC	European Commission
EEA	European Environment Agency
EEC	European Economic Community
EED	Energy Efficiency Directive
EF	Energy Efficiency
E5P	Eastern Europe Energy Efficiency and Environment Partnership
EGD	European Green Deal
EIA	Environmental Impact Assessment
EIB	European Investment Bank
ELV	End-of-Life Vehicles
EMAS	Eco-Management and Audit Scheme
EnC	Energy Community
EPBD	Energy Performance of Buildings Directive
EPR	Extended Producer Responsibility
ESCO	Electricity Market Commercial Operator
ESG	Environmental, Social, and Governance
ESR	EU Effects Sharing Regulation
ETF	Enhanced Transparency Framework
ETS	Emissions Trading System
EU	European Union
EUR – Euro	the official currency of the European Union

EUROSTAT	Statistical Office of the European Union
EVs	Electric Vehicles
FAO	Food and Agriculture Organisation
FAOSTAT	Food and Agriculture Organisation Corporate Statistical Database
FDI	Foreign Direct Investment
F-gas	Fluorinated gas
FEC	Final Energy Consumption
FSC	Forest Stewardship Council
GCF	Green Climate Fund
GDI	Global ICT Development Index
GDP	Gross Domestic Product
GEF	Global Environment Facility
GERD	Gross Domestic Expenditure on Research and Development
GG	Green Growth
GHG	Greenhouse Gas
GHS	Globally Harmonised System of Classification and Labelling of Chemicals
GII	Global Innovation Index
GIS	Geographic Information System
GiZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (German Society for International Cooperation)
GPP	Green Public Procurement
GUMA	Green Agenda for Armenia, Georgia, Moldova, and Ukraine
GW	Ground Water
GWP	Global Warming Potential
GWQ	Ground Water Quality
HC	Hazardous Chemicals
HCB	Hexachlorobenzene
HCFC	hydrochlorofluorocarbons
HDI	Human Development Index
HPPs	Hydropower Plants
HRA	Health Risk Assessment
HVAC	Heating Ventilation and Air Conditioning
HW	Hazardous Waste
JSC	Joint-Stock Company
IC	International Company
ICMA	International Capital Market Association
ICT	Information and Communication Technology

IEC	International Electrotechnical Commission
IFAD	International Fund for Agriculture Development
IFI	International Financial Institution
INSPIRE	Infrastructure for Spatial Information in Europe
IPPC	Integrated Pollution Prevention and Control
ISO	International Organisation for Standardisation
IT	Information Technology
IEA	International Energy Agency
ITMAO	Internationally Tradable Mitigation Outcomes
IUCN	International Union for Conservation of Nature
IUU Fishing	Illegal, Unreported and Unregulated Fishing
JT	Just Transition
KfW	Kreditanstalt für Wiederaufbau (German Development Bank)
LPG	Liquified Petroleum Gas
LT-LEDS	Long-Term Low Emission Development Strategy
LULUCF	Land Use, Land-Use Change, and Forestry
LV	Limit Values
MAB	Multi-apartment Building
MAC	Maximum allowable concentration
MAE	Maximum allowable emissions
MEA	Multi-Lateral Environmental Agreement
MEPR	Minimum Energy Efficiency Requirement
MBT	Mechanical-Biological Treatment
MoEnv	Ministry of Environment
MRV	Measurement, Reporting, and Verification
MoEcon	Ministry of Economy
MoESCS	Ministry of Education, Science, Culture and Sport
MoF	Ministry of Finance
MTAI	Ministry of Territorial Administration and Infrastructure
SMEs	Small and Medium-size Enterprises
MSW	Municipal Solid Waste
NA	National Assessment
NA	Not available
N/A	Not applicable
N/I	No information
NAP	National Adaptation Plan

NC	National Communications
NDC	Nationally Determined Contribution
NEAP	National Environmental Action Plan
NEEAP	National Energy Efficiency Action Plan
NGO	Non-Governmental Organisation
NIS2	European Union Directive on Security of Network and Information Systems (Second Version)
NMVOC	Non-Methane Volatile Organic Compounds
NPL	Non-performing Loan
NREAP	National Renewable Energy Action Plan
ODA	Official Development Assistance
ODP	Ozone Depletion Potential
ODS	Ozone-Depleting Substances
OECD	Organisation for Economic Co-operation and Development
OPEX	Operational Expenses
PA	Protected Area
PA	Paris Agreement
PDO	Protected Designation of Origin
PEC	Primary Energy Consumption
PES	Payment for Ecosystem Services
PGI	Protected Geographical Indication
PM	Particulate Matter
PFM	Public Finance Management
POPs	Persistent Organic Pollutants
PPP	Public Private Partnership
PPP	Power Purchase Parity
PRTR	Pollutant Release and Transfer Register
PV	Photovoltaics
RA	Republic of Armenia
R&D	Research and Development
R&I	Research and Innovation
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals (EU Regulation)
REAP	Renewable Energy Action Plan
RECC	Regional Environmental Centre for the Caucasus
RES	Renewable Energy Sources
RS	Remote Sensing
SDC	Swiss Agency for Development and Cooperation

SDG	Sustainable Development Goal
SEA	Strategic Environmental Assessment
SECAP	Sustainable Energy and Climate Action Plan
SEI	Stockholm Environment Institute
SEVESO	EU Seveso Directive, aimed at preventing and managing industrial accidents involving hazardous substances
SFM	Sustainable Forest Management
SIDA	Swedish International Development Cooperation Agency
SMART	Specific, Measurable, Achievable, Relevant and Time-bound
SOC	Soil Organic Carbon
SoE	State of the Environment Report
SOP	Standard operating procedures
SNCO	State-Owned Non-Commercial Organisation, a legal-entity type in the RA
SUP	Single-Use Plastics
SW	Surface Water
SWB	Surface Water Body
SWQ	Surface Water Quality
TA	Technical Assistance
TPP	Thermo-Power Plant
TS	Technical Support
UN	United Nations
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNDP	United Nations Development Programme
GCF	Green Climate Fund
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organisation
UNITAR	United Nations Institute for Training and Research
US	United States
USAID	United States Agency for International Development
USDA	US Department of Agriculture
VAT	Value-added Tax
VET	Vocational Education and Training
VOC	Volatile Organic Compounds

WaM	With additional Measure
WB	World Bank
WeM	With existing Measure
WFD	Water Framework Directive
WGI	Waste Generation Index
WHO	World Health Organisation
WTO	World Trade Organisation
WWTP	Wastewater Treatment Plant
WWF	Worldwide Fund for Nature

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