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Green Economy in Eastern Partner Countries



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Improving water infrastructure in Azerbaijan using an expenditure support scheme

Designing and costing a green public investment programme

SUMMARY

Action implemented by:





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Project background

Public investments play an essential part in creating an enabling environment framework for the transition to a green model of economic growth. For more than ten years, the OECD has provided technical assistance and capacity development to the countries in the Eastern Europe, Caucasus and Central Asia (EECCA) region, to help **increase the competency** of government authorities in managing public environmental expenditure and assets.

The OECD work in **greening public expenditure** focuses on assisting partner governments to utilise public budgetary and human resources effectively and efficiently. This helps countries reach their national environmental and climate-related objectives and their international commitments, as well as increase the overall well-being of their citizens through socio-economic development.

Water-related objectives are among the key goals of Azerbaijan's environmental policy and its endeavours to ensure sustainable development. Despite several improvements at the regulatory and legislative level, its water policy framework largely remains fragmented. Management responsibilities in the water sector are overlapping and underfunded. At the same time, substantial investments are needed to improve the **deteriorating water infrastructure**, especially in rural areas.

In 2021-22, the “European Union for Environment” (EU4Environment) Action, in cooperation with the Ministry of Environment and Natural Resources of Azerbaijan (MENR), undertook the project “Designing Green Public Investment Programme and Conducting Training in Azerbaijan”. It was designed to support the partner country in improving water demand management and the efficient use of water resources, by creating pipelines of smaller-scale **priority investment projects**.

The project also aimed to **facilitate knowledge transfer** and encourage experience-sharing between the EU and its Eastern Partnership (EaP) countries on best practices and lessons learnt in:

- preparation and implementation of large-scale (national) public support programmes
- approaches to water supply and wastewater treatment in rural and remote areas.

The project has also supported complementary activities and requirements for launching the green public investment programme (GPI) in the water sector.

A satellite-style map of Azerbaijan and the surrounding Caspian Sea basin. The Caspian Sea is the central feature, colored in shades of green and blue. The land is shown in various shades of brown, tan, and green, indicating different terrain types and vegetation. The title 'Sector challenges' is overlaid in white text on the upper part of the map.

Sector challenges

There are more than 8 350 rivers and about 450 lakes in Azerbaijan. The Caspian Sea is the largest inland body of water in the world. The Caspian Sea basin – into which all the rivers in Azerbaijan flow – is one of the largest non-flowing basins in the world. The water balance of the Caspian Sea is mainly influenced by the approximately 130 rivers flowing into it, but it has been subject to significant fluctuations.

All the major rivers in Azerbaijan except the Tartar are transboundary rivers. With 22 in total, the basin of the Kura River – the main body of water in the Caucasus – covers 80% of the territory of Azerbaijan and more than 70% of the drinking water supply in the country. The Aras River is the main tributary of the Kura River and one of the longest rivers in the Caucasus.

The Kura-Aras river system¹ is the principal source of water for:

- industry
- agriculture
- residential use
- energy.

Rainfall and the internal flow of the rivers are an important source of recharge of Azerbaijan's aquifers, but surface waters and groundwater flowing from neighbouring countries (either external inflow or inflow from countries upstream) are also an essential part of Azerbaijan's renewable water resources.

Although Azerbaijan is the largest of the three South Caucasus countries, it has relatively fewer water resources than the neighbouring riparian states. Its inland water resources make up 15% of the water resources of the South Caucasus at present. Water shortages are rife in many regions of the country, and in some rural areas, residents do not have a reliable water supply, given the lack of infrastructure.

Overall, Azerbaijan has been **prone to water scarcity** in the past two decades.

Two main issues affect the availability of its water resources:

1. Azerbaijan's geophysical landscape is mainly shaped by mountains² and lowlands, and **diversified climate conditions** – varying from subtropical and dry in the central and eastern parts of the country to subtropical and humid in the southeast – affect precipitation levels.
2. Within the EaP region, Azerbaijan is the country most heavily **dependent on the inflow** of surface water and groundwater from neighbouring countries. Its average dependency ratio for upstream water is greater than 70% of its total renewable water resources. In addition, downstream countries in the South Caucasus are affected by diminishing hydrological flows.

1. The basin covers almost all of Armenia, a significant part of Azerbaijan, and the populated and urbanised parts of Georgia in the eastern part of the country. The basin also spreads over the northwestern part of Iran and the territory of northeast Turkey.

2. The three mountain systems – of the Greater Caucasus, the Lesser Caucasus and the Talysh Mountains – cover about 40% of Azerbaijan, and 27% of its area is situated more than 1 000 m above sea level.

Sector challenges

The pressure on Azerbaijan's renewable water resources is likely to be exacerbated by several factors:

- **Climate change:** Even if the annual precipitation rate remains unchanged, as has been the case in Azerbaijan recently, higher temperatures will increase the evaporation rate and reduce river flows in the Azeri part of the basin. A decline in the internal flow and inflow of water from other countries is also expected.
- **Water infrastructure:** Improved water supply infrastructure would allow for more water withdrawals from surface and groundwater bodies.
- **Water treatment:** The level of treatment of wastewater, which can be used as industrial water for industrial, irrigation and other purposes, is low.
- **Public awareness:** Azerbaijan's dynamic rate of population growth, and the low awareness on the part of the population and water users of how to use water efficiently, is likely to stress its water resources even further.

“*Water shortages are rife in many regions of the country, and in some rural areas, residents do not have a reliable water supply, given the lack of infrastructure.*”

Initial assumptions

Given the major constraints on Azerbaijan's water resources, which are expected only to increase in the future, a national programme to **increase the reliability and resiliency** of the water supply is needed.

Initial assumptions

The investment programme will be carried out at the national level. Initially, it will not cover the entire country but will **have a regional focus**. In its pilot phase, the programme will focus on a few priority regions and then expand to other areas.

This programme is to be based on the following factors and considerations:

- All Azerbaijan is vulnerable to climate change. The sustainability of its water supply on the Caspian seashore, in particular, is in question. Transboundary waters are of higher priority, with some exceptions.
- The programme requires compliance and logical coherence with water sector strategies, in particular, the National Strategy on Rational Use of Water Resources (Water Strategy).
- The programme builds on current and planned capital investments, based on priority investment lists:
 - contained in the National Strategy on Rational Use of Water Resources
 - priority investment lists of the main stakeholders (in particular, Azersu OJSC and the Azerbaijan Amelioration and Water Farm OJSC).
- The following regions were not considered for the programme:
 - Baku – there has generally been interest and investment in the capital city.
 - Karabakh – projects in that location cannot currently be financed through multi-lateral instruments, and it is expected that some financing for this programme will come from multi-lateral sources.
 - The Nakhchivan region – because it is not contiguous with the rest of the country.



OECD approach

Technical assistance provided by the EU4Environment project “Designing Green Public Investment Programme and Conducting Training in Azerbaijan” was intended to enhance the investment planning and management capacities of government officials and associated experts in Azerbaijan in **public environmental spending**. In particular, the EU4Environment project aimed to help equip government officials and experts with know-how and practical skills for designing a public environmental expenditure programme in one of the country’s priority sectors.

This project will increase the chances of obtaining adequate resources from the public budget and leveraging international co-financing. Economically sound and credible multi-year investment programmes are better positioned to **compete successfully for public support** – both from national and international sources – and to leverage the funds for greener, more sustainable development.

The OECD costing model helped national public authorities **calculate the public funds** needed to contribute to Azerbaijan’s environmental and climate-related targets. The funding serves to mobilise private investors, by providing them not only with direct financial support – especially before the new technologies reach market maturity – but also giving them guidance about investments that can achieve the desired environmental and socially beneficial outcomes.

Public support should not replace private financing, but it should encourage the private sector to take the lead in clean and socially important projects – i.e. to **tip the scales of decision making** towards more sustainable options, without making the investment too profitable for the private sector.

The programmes have been designed in line with international good practices and can **serve as a model** for other low-carbon public investment programmes in national medium-term expenditure frameworks (MTEFs). The enhanced investment planning and management capacity will help make local public spending more transparent and accountable and use budgetary and human resources more effectively and efficiently.

This project built on earlier OECD work in public environmental spending management, integrating the environmental sector into **medium-term budgetary processes** and climate change economics. The OECD has developed several policy tools to support governments’ efforts to design green public investment programmes – either at the national or the local level – both cost-effectively and in line with good international practices.

The activities, were both of **analytical as well as practice-oriented** and included two levels:

- programme design (main elements, methodology, costing model, etc.)
- training on medium-term environmental and climate-related investment planning and management (e.g. selection procedures, project cycle management).

BOX 1. HOW GREEN PUBLIC INVESTMENT PROGRAMMES ARE PREPARED

The methodology applies a programmatic approach to low-carbon public expenditure. It creates pipelines of priority environmental projects to be supported by public sector funds, mainly through subsidies in the form of grants. In the context of public finance, the programming process allows for decisions about which priority areas need public support, particularly where objectives would not be achieved without allocating funds.

OECD technical assistance projects apply four main pillars of the programmatic approach towards green public spending:

- **Pillar I:** Preparing an economic analysis exploring the supply and demand side of potential technologies and equipment in the agreed target sector, which could be included in the project pipelines.
- **Pillar II:** Developing costing methodology and an associated costing model that calculates the amount of finance – both on the supporters’ and the beneficiaries’ side – required to achieve the desired environmental (or other) outcomes.
- **Pillar III:** Proposing an institutional set-up that includes operating regulations (applying best practices of project cycle management) and policy and regulatory barriers that, conversely, need to be eliminated (if any).
- **Pillar IV:** Providing capacity development to allow the future implementer of the programme (i.e. the national public authorities) to launch it, after budgetary and personnel allocations have been decided on.

Besides the main pillars, further areas of support in the designing and costing phase of the project include an overview of possible financing sources (both national and international public sources), an overview of applicable (green) technologies for the target sector, description of project cycle management procedures, and an explanatory guide for using the adjusted OPTIC model.

Associated actions for the implementation phase of the programme were also outlined (setting the timeframe, allocating necessary human resources, adopting administrative procedures, etc.). The existing and potential domestic financing mechanisms (including public-private partnerships) were also surveyed, with a view to facilitating green investments.

BOX 2. ABOUT EU4ENVIRONMENT – GREEN ECONOMY

The “European Union for Environment” (EU4Environment – Green Economy) Action helps the six EU’s Eastern Partnership countries – Armenia, Azerbaijan, Belarus, Georgia, the Republic of Moldova and Ukraine – preserve their natural capital and increase people’s environmental well-being. The aim is to support environment-related action, demonstrate and unlock opportunities for greener growth, and set up mechanisms to manage environmental risks and impacts better.

The EU-funded Action supports countries in the EU’s Eastern Partnership (EaP) region, including Azerbaijan, to improve national governance and regulatory mechanisms that support the transition to a greener and more sustainable development path. Public expenditure is an essential part of efforts to create a level playing field for environmental and climate-related objectives. The work area on greening public expenditure (Activity 3.3.1) focuses on assisting partner governments use public resources – both budgetary and personnel – effectively and efficiently to achieve national environmental and climate-related objectives.

Under the overall direction of the European Commission, the implementing partners – the Organisation for Economic Co-operation and Development (OECD), the UN Environment Programme/UNEP, the UN Economic Commission for Europe (UNECE), the UN Industrial Development Organisation (UNIDO) and the World Bank – build on important achievements of earlier co-operation, for example, Greening Economies in the Eastern Neighbourhood (EaP GREEN), a large regional programme dating to 2013-2017.

Note: For more information, see <https://www.eu4environment.org>.

 *The EU-funded Action supports countries in the EU’s Eastern Partnership (EaP) region, including Azerbaijan, to improve national governance and regulatory mechanisms that support the transition to a greener and more sustainable development path.* 

The focus of the programme

The programme's goals – to ensure a safe domestic drinking water supply, secure irrigation water and reduce pollution from wastewater – will be achieved by supporting investments in the water sector.



The focus of the programme

The study conducted a market analysis that identified three groups of projects (“pipelines”):

WATER SUPPLY

The programme pipeline includes investments to increase **drinking water supply** coverage, mainly by construction of:

- water intake, wells and pumping stations
- water catchment and storage facilities
- water/wastewater treatment facilities
- the water distribution network and all supporting elements.

IRRIGATION

The programme pipeline includes investments in **irrigation and drainage networks** by construction or rehabilitation of the existing but deteriorated infrastructure, including:

- irrigation and transmission channels
- hydro-junctions, pumping stations and sub-artesian wells
- main water storage infrastructure and small reservoirs.

WASTEWATER

The programme pipeline includes investments in **sanitation infrastructure**:

- small-scale wastewater collection networks
- small-scale wastewater treatment plants.

The proposed investment pipelines should be combined with other measures, especially including public awareness-raising and the introduction of a proper tariff system that at least covers operating costs.

The following table presents the proposed project pipelines, the types of investments by sector (water supply, irrigation and wastewater), and sample investments within each category.

TABLE 1. Proposed programme pipelines by type of investment

Programme pipeline	Type of investment	Sample investment
Water supply	Construction of shallow/deep wells	Shallow/deep wells, pumping stations, necessary pipes, supply of electricity, automatic control, disinfection system, protection of wells
	Construction of small water-treatment facilities for water wells that require more than disinfection systems	Filtration systems to reduce turbidity, aeration systems to reduce iron levels
	Construction of new water storage facilities	Cisterns, water towers for existing or new water wells
	Construction of new surface water catchments from small water bodies	
	Construction of new ground water storage facilities	e.g. ponds
	Construction of small water-treatment facilities for surface water catchments	Disinfection, filtration, aeration
	Construction of small, decentralized wastewater treatment facilities	
Irrigation	Construction of water distribution network	Polyethylene or high-density polyethylene pipelines, pumping stations, automatic pressure stations
	Rehabilitation of canals	Main, off-farm, in-farm and on-field canals
	Construction of new canals	Main, off-farm, in-farm and on-field canals
	Rehabilitation of transmission and irrigation channels	
	Rehabilitation of hydro-junctions, pumping stations and sub-artesian wells	
	Rehabilitation of existing small reservoirs	
Wastewater	Construction or rehabilitation of water storage infrastructure	
	Investment in small-scale wastewater collection networks	
	Investment in small-scale wastewater treatment plants	

Source: Authors.

The focus of the programme

In addition to the main investments, other investments to **increase the system's effectiveness** could include:

- construction of long-range supply mains to increase the diversity and security of the supply
- construction of storage and supply capacity for bulk water supply areas, with sufficient and reliable water supply to add additional customers.

All the investments listed above will require **proper maintenance and operation** (including the electricity supply), which the population should pay through tariffs. The local utility or Azersu would manage the resulting infrastructure.

Other non-investment measures to increase effectiveness could include:

- an inventory of surface and groundwater sources, detailing the capacity and the quality of the source
- awareness-raising campaigns on the cost of providing a stable, clean water supply and water savings on the demand side, for example.

 *The proposed investment pipelines should be combined with other measures, especially including public awareness-raising and the introduction of a proper tariff system that at least covers operating costs.* 

Stepwise implementation

The programme is designed to be implemented in two (or three) phases. It will be launched on a limited scale, both in terms of geographic area, number of beneficiaries and also required finances. The priority regions were identified given the importance of transboundary water, the relatively lower level of water supply connection rates, and the relative under-investment in the area.

Stepwise implementation

- **The first (pilot) phase** will focus on districts and settlements in the priority regions that have a low water supply and wastewater connection rate: the Astara and Lerik districts in the Lankaran-Astara economic region, and Dashkasan district in the Ganja-Dashkasan economic region. The focus of the pilot phase will be on rural areas in these districts, which have a combined rural population of 173 000. The irrigation pipeline will focus on the Lankaran-Astara economic region.
- **The second (scaling-up) phase** will extend the pilot phase and focus on other districts and settlements in the two priority regions (Lankaran-Astara and Ganja-Dashkasan). It is assumed that water supply connection rates in the cities are high and that water supply connection rates in rural areas are lower. The infrastructure investments during the scaling-up phase will cover a rural area with a population of 1 223 000. The focus of the irrigation phase will cover the Gazakh-Tovuz and Ganja-Dashkasan economic regions.
- **A possible future third phase** will further scale up the use of the potential described in the project's market analysis and can be implemented after 2030.

The outcomes of the two phases will be as follows:

PHASE 1 – PILOT PHASE:

- In Phase 1, 83 000 inhabitants of rural areas will be connected to the drinking water supply, and the connection rate will increase from 50% to 98% in the three priority districts in the Lankaran-Astara and Ganja-Dashkasan economic regions.
- In Phase 1, 34 000 hectares of agricultural land will be irrigated by rehabilitated irrigation systems in selected regions – 30% of the existing 115 000 hectares of irrigated area in Lankaran-Astara economic region.
- In Phase 1, 10 000 inhabitants in rural areas in the three priority districts in Lankaran-Astara and Ganja-Dashkasan economic regions will be connected to wastewater facilities.

PHASE 2 – SCALING-UP PHASE:

- In Phase 2, 465 000 of the population in rural areas will be linked to the drinking water supply, and the connection rate will increase from 60% to 98% in other districts in the Lankaran-Astara and Ganja-Dashkasan economic regions.
- In Phase 2, 59 000 hectares of agricultural land will be irrigated by rehabilitated irrigation systems in selected regions – 30% from the existing irrigated area in the Gazakh-Tovuz economic region (118 000 hectares in total) and Ganja-Dashkasan economic region (78 000 hectares in total) will benefit from

infrastructure rehabilitation. This will involve rehabilitation of the irrigation facilities responsible for irrigating 35 000 hectares in the Gazakh-Tovuz economic region and 23 000 hectares in Ganja-Dashkasan economic region.

- As before, 10 000 of the rural population in the three priority districts in Lankaran-Astara and Ganja-Dashkasan economic regions will be connected to the wastewater facilities (unchanged from the pilot phase).

BOTH PHASES:

- The target by 2030 is to connect 548 000 of the population in rural areas to the drinking water supply after Phase 2, and for the connection rate to increase from 50%-60% to 98% in selected districts in the Lankaran-Astara and Ganja-Dashkasan economic regions.
- The target by 2030 is a rehabilitation of 93 000 hectares of irrigation infrastructure in selected regions – Lankaran-Astara, Gazakh-Tovuz and Ganja-Dashkasan economic regions.
- The target by 2030 is to link 10 000 of the population in rural areas in the three priority districts in the Lankaran-Astara and Ganja-Dashkasan economic regions to wastewater facilities.

TABLE 2. **Key outcomes of the programme's implementation phases**

	Unit	Phase 1	Phase 2	Phase 1&2
Total population connected to drinking water supply	pers	83 136	464 136	547 876
Total population connected to wastewater facilities	pers	10 000	0	10 000
Total irrigated agricultural area with rehabilitated irrigation systems	ha	34 387	58 963	93 350

Note: The estimation is based on the current connection rate, setting the connection target and estimating the unit cost of connecting a person (pers).

Source: OECD calculations, OPTIC Model

Given the high costs of wastewater services, it is assumed that 10 000 of the rural population will be connected during the pilot phase (Phase 1). No estimate was made for the scaling-up phase (Phase 2). The wastewater pipeline for Phase 2 may be updated after evaluating the results of the pilot phase.

A photograph of a construction site. In the foreground, two large, dark grey pipes are laid out in a long, narrow trench. The trench is lined with concrete. The background shows a multi-story building under construction with blue and white facades. A red excavator is visible on the right side of the site. The ground is uneven and covered with dirt and construction materials.

Costs and benefits

APPROACH

The OECD applies a programme costing methodology focused on environmental and climate-related investment programmes. Using a modified OECD (Excel-based) model – the Optimising Public Transport Investment Costs (OPTIC) – the project **estimated programme costs and benefits** for the first (pilot) phase and the second (scaling-up) phase of the GPI Programme.

In particular, the following project pipelines were costed:

- water supply coverage
- irrigation and drainage network
- wastewater collection network

The results contain basic information on the number of new installations, total investment costs, the level of subsidy, the net costs to beneficiaries and overall impact. The model provides the implementer – the government of Azerbaijan – an **opportunity either to optimise** the targets given a specified programme budget, or vice versa, adjusting the programme budget to achieve the set targets.

In addition, the implementer may define one of the following programme targets:

- investment costs (programme financial envelope)
- subsidy budget (amount of funding available for subsidies).

Essentially, the model is an analytical tool that can **better inform** the decision-making process and make it more transparent. The accompanying analytical report puts these calculations into a practical frame. It outlines additional conditions and actions needed for a public investment programme (timeframe planned, human resources, adoption of administrative procedures, etc.).

BOX 3. THE OPTIC MODEL

The spreadsheet-based Optimising Public Transport Investment Costs (OPTIC) model is a simple, easy-to-use decision support tool. It was developed to calculate and optimise total programme costs, as well as potential reductions of emissions of carbon dioxide and other pollutants from urban public transport (carbon monoxide, nitrogen oxides, particulate matter, sulphur dioxide), from the proposed project pipelines. The model also enables potential beneficiaries to calculate the optimal level of subsidy available to them.

Optimisation of costs and benefits implies achieving given targets at the lowest possible cost to the public financier. Both targets and subsidy levels can be recalculated (or optimised) and adjusted accordingly if underlying economic conditions change over the programme period. For example, tariffs could be increased, interest rates on commercial loans lowered or available public financing reduced or augmented.

The model consists of seven modules: 1) assumptions; 2) emission factors; 3) determination of the subsidy level; 4) cost calculation; 5) calculation of emission reductions; 6) programme costing and 7) results.

Although the model was designed for public transport (and tested in Kazakhstan), it was adjusted for use of the green public investment programme (i.e. biodegradable waste, water supply and sanitation).

Other similar models on the market focus on estimating greenhouse gas (GHG) emission reductions for a country or for groups of countries. These models mainly focus on GHG emissions from industry and consider different scenarios for the country's economic development. Such models, however, are not suitable for this investment programme, which focuses on reducing emissions only from particular pipelines.

OUTCOMES

Analysis suggests that the total costs of the GPI Programme will be substantial. The investment cost of the pilot phase is estimated at **AZN 154 million** over two years. The cost of the scaling-up phase is estimated at **AZN 544 million**, covering year three to year eight of the programme. The cost of both phases is estimated at **AZN 698 million**. From the total investment costs, public support in the amount of **AZN 483 million** will be needed. Additional preparation and implementation finances of almost **AZN 2 million** will be needed for both phases.

The calculation of the subsidy level should be **based on economic principles**: if the project is not profitable for the beneficiary but is socially significant, the subsidy should make it just profitable.³ This will enable the government to avoid over-investing, providing an investment incentive for potential beneficiaries without making it too profitable for them as investors.

The subsidy level should not replace private spending. It should provide just the necessary leverage to encourage participation in the support programme without aiming to make a profit based on the subsidy. The level of the subsidy should thus be **kept at an absolute minimum**, especially given the scarcity of public resources. This optimal minimum can be defined as the rate of financial assistance that makes environmentally and economically important projects financially viable.

TABLE 3. Key input and output parameters of the assessed GPI Programme
(AZN million)

	Phase 1	Phase 2	Phase 1 & Phase 2
Total costs of installations	153.72	544.28	697.99
Co-financed by the programme*	100.38	382.62	483.00
Co-financed by private/municipal entities	53.34	143.65	196.99
Additional preparation and implementation costs	0.4	0.8	1.2

Source: OECD calculations, OPTIC Model.

Of the total estimated costs for both phases, AZN 698 million, AZN 483 million will be needed in public support. The bulk of the subsidies will go to the water supply pipeline – AZN 391 million (81% of public finance for the programme). Despite this support, the net costs for the beneficiaries will also be substantial for the water supply facilities, given the overall investment needed for the first pipeline.

3. The economic significance of the calculation is that the subsidy will encourage potential beneficiaries to participate in the programme, without encouraging them to profit from the subsidy. The determination of the subsidy level applies this principle by making a simple financial analysis of the cash inflows and outflows in each year of the analysis.

TABLE 4. Relationship between programme costs and outcomes

(AZN million)

Project pipeline	Investment costs	Subsidy	Net costs for the beneficiary
Water supply facilities	521.03	390.77	130.26
Irrigation facilities	161.96	80.98	80.98
Wastewater facilities	15.00	11.25	3.75
Total	697.99	483.00	214.99

Source: OECD, OPTIC model.

Determining the subsidy level takes into account **both investment costs and savings** that beneficiaries realise by introducing new technology (for example, the new irrigation system will entail less water loss, thanks to reduced water leakage). The investments are complex and not replicable, and the investment costs depend on the individual technical design. Thus, the **average unit cost method** of estimating the investment costs was used. As for operating and future investment costs, it is assumed these will be covered by tariffs.

TABLE 5. Relationship between programme costs and outcomes

Project pipeline	Unit cost	Investments
Water supply facilities	AZN 951 per person	Construction of water intakes and wells, pumping stations, a water distribution network with all supporting elements
Irrigation facilities	AZN 14.79 per hectare	Rehabilitation of the existing but deteriorated irrigation and drainage networks
Wastewater facilities	1 500 per person	Investments in small-scale wastewater collection networks and wastewater treatment plants.
Accompanying investments	Provided by municipalities	Necessary accompanying investments to ensure a project's success, including purchase of land and arranging access to land.

Note: *Percentage values denote the level of public support in the purchase costs.

Source: OECD, OPTIC model.

The calculations for the irrigation pipeline do not apply to the water supply and wastewater pipeline. Construction of the new infrastructure will not generate savings in operating costs, since the reference situation involves a completely different standard. It was assumed that a maximum of 75% in public support is required.

Costs and benefits

The programme is expected to entail total investments (Phases 1 and 2) of almost AZN 87 million, disbursed annually from both public and private sources over eight years (two years for the pilot phase and six years for the second phase), for a total of AZN 698 million.

The calculated amounts appear to be **within Azerbaijan's financing capacity**. At the same time, given investment needs in other sectors – and the massive investment required in irrigation and drainage infrastructure – the government of Azerbaijan should seek support from diverse funding sources, including international financial institutions (IFIs) and donors. It is also important not to neglect financing from user charges (tariffs), as they are incrementally increased to cost-recovery levels.

“ Given investment needs in other sectors
– and the massive investment required
in irrigation and drainage infrastructure – the
government of Azerbaijan should seek support from
diverse funding sources... ”

Co-financing options

NEEDS

The economic analysis shows that in current conditions, the level of public support must be relatively high – between 50% and 75% – to secure the interest of the potential beneficiaries (municipalities and the private sector). The calculation of the subsidy level should be **based on economic principles**. For the beneficiaries, the investments should generate at least a minimum return. For the public financier, on the other hand, the subsidy should not make the implemented projects very profitable.



Co-financing options

The subsidy rates were calculated using the OPTIC model, based on the net present value (NPV) of selected types of investment. They represent the **optimal subsidy level** per project pipeline, and the given estimates suggest that the level of public funds should not exceed the respective level. This optimal minimum can be defined as the rate of assistance that makes environmentally and economically important projects financially viable.

TABLE 6. **Summary of public support for the GPI Programme**

Programme pipeline	Investment	Estimated public co-financing
Water supply	Increase of the drinking water supply coverage by construction of water intakes and wells, pumping stations and a water distribution network with all supporting elements	75%
Irrigation	Irrigation and drainage networks by rehabilitation of existing, deteriorated infrastructure	50%
Wastewater	Small-scale wastewater collection network and wastewater treatment plants	75%
Accompanying investments	This includes any necessary accompanying investments to ensure the project's success, including purchase of land and arranging access to land.	Provided by municipalities

Note: Percentage values denote the level of public support in the purchase costs.

Source: OECD calculations, OPTIC Model.

At the same time, the module for determining the subsidy level takes into account both **investment costs and savings** that beneficiaries may achieve by implementing new technologies. For example, rehabilitation of the irrigation system reduces water loss through leakage. As for other pipelines, no similar calculations were made, since construction of the new infrastructure will not generate savings in operating costs, as the reference situation involves a completely different standard. The level of public support should thus be higher.

Experience shows that this tool has been the main driver in many countries for motivating private and public beneficiaries to allocate their **own financial resources** to purchase new – and more environment- and climate-friendly – equipment or installations. These generally require a higher initial investment (in terms of purchase cost) but involve several additional benefits (protection of water resources and security of water supply).

It is essential to **monitor market developments** regularly (e.g. changes in equipment and water prices, development of the market for new technologies, and availability of other financing sources) and how they interact with the GPI Programme design. Such market changes need to be reflected in the programme, and the state subsidy level adjusted accordingly.

In terms of total investments (Phases 1 and 2), about EUR 16 million will be disbursed annually from both public and private sources – calculated as EUR 130.55 million divided by eight years (two years for the pilot phase and six years for the second phase).

TABLE 7. **Summary of GPI Programme costs, Phases 1 and 2**

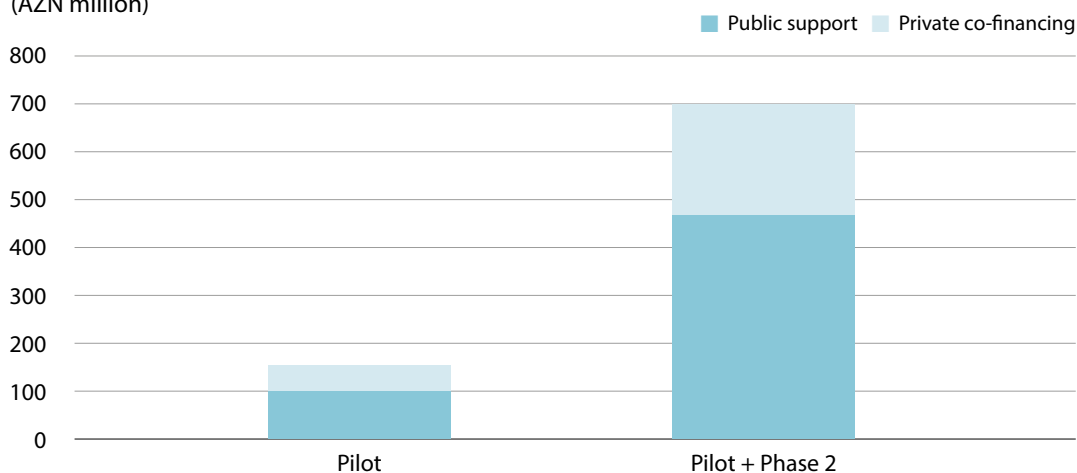
Overall costs	Public co-financing									
	Total	Year								8
		1	2	3	4	5	6	7		
AZN million										
Preparation costs (including fundraising)	0.4	0.4	0.2	0.2						
Pilot phase	153.7	100.4	50.2	50.2						
Implementation unit (operating costs)	1.2	1.2			0.2	0.2	0.2	0.2	0.2	0.2
Second phase	544.3	382.6			31.9	47.8	75.7	75.7	75.7	75.7
Total	699.6	484.6	50.4	50.4	32.1	48.0	75.9	75.9	75.9	75.9

Source: OECD calculations, OPTIC Model.

If the reviewed domestic financing sources are accepted, the state budget will be the main source of co-financing and ensure Azerbaijan’s commitment to the programme.

FIGURE 1. Overview of GPI Programme's total investment costs

(AZN million)



Source: OECD calculations, OPTIC Model.

SOURCES

Large-scale investment programmes in Azerbaijan have been financed by public funds, IFIs, donors, and private investment. The main source of investment activities is the government budget, as well as loans from international financial institutions (including the German KfW, the World Bank, the Asian Development Bank and others).

Co-financing from the **state budget is typical of state environmental programmes** (mainly through subsidies in the form of grants). However, considering the budget constraints in Azerbaijan and the substantial total costs of the programme, it will be challenging for the Azerbaijani public financier (mainly national governments) to cover all these costs by itself. To address this challenge, **additional financial support will be needed from international donors**.

Nevertheless, if the state covers only a part of programme costs, the national contribution will be important to demonstrate real commitment to international partners – i.e. potential co-financiers of the programme – and to obtain international co-financing. In any case, this has to be carefully planned in the budget process and included in the mid-term expenditure framework (MTEF).

Besides the state budget, this report reviews some of the potential financing sources for the programme, including:

- Azersu OJSC
- Azerbaijan Amelioration and Water Farm OJSC
- donors and IFIs.

AZERSU OJSC

- Fully owned by the government of Azerbaijan and in charge of implementing the state policy and strategy in the field of water treatment and supply (drinking water), wastewater collection and treatment, as well as transportation and sales of water;
- Responsible for the design, construction, operation and maintenance of intake structures, reservoirs, pumping stations, water pipelines and sewage collectors;
- Maintains a robust investment programme in water supply and wastewater infrastructure, and maintains co-operation with IFIs and donors;
- Administers 21 000 km of water pipes and 10 500 km of sewerage and stormwater pipes;
- Determines (partially⁴) and collects water supply and wastewater collection and treatment fees and also generates other revenues (sale of water meters, scientific research and design projects);
- Assesses water needs and develops forecasts and norms of water use, forecasts distribution of water between different sectors of the economy.

AZERBAIJAN AMELIORATION AND WATER FARM OJSC

- A state-owned enterprise responsible for managing, monitoring and distributing water to industries and the agricultural irrigation sector;
- Oversees the development (design and construction) and management of state-owned irrigation and drainage systems throughout Azerbaijan, and reconstruction of existing systems;⁵
- Ensures state control in water use and protection, among other things, by maintaining a register on water use and conservation or by preparing overall schemes for the integrated use of surface water and its protection (with other relevant state bodies);
- Determines water use fees, supervises activities of water users' associations and is a key organisation for issuing water use permits for surface water use;
- Promotes efficient use of water irrigation, information activities and studying approaches for water savings in irrigation, or strengthening scientific support and human resources in the field of amelioration and water management;

4. In co-operation with the Tariff Council of the Republic of Azerbaijan, the regulator of tariffs applied by natural and government monopolies in the country.



5. The priority areas include reconstruction, rehabilitation and maintenance of existing land reclamation and water facilities, such as irrigation canals and water supply facilities for irrigation (e.g. storage reservoirs, hydro-junctions, pumping stations, sub-artesian wells, winter pastures water supply systems and other hydro-technical facilities). It is important to note that none of the identified priority investments include an estimate of capital investment costs.

Co-financing options

- Arranges measures to combat flooding and flood water (e.g. improves the drainage of land and infrastructure or salinity problems on irrigated lands).

CO-OPERATION WITH DONORS AND IFIS

- Azerbaijan continues to obtain support for policy reforms and capital investments from various IFIs and donors.
- Carrying out the programme is likely to involve co-operation with IFIs and donors.
- Most IFIs prefer larger-scale projects, although a green investment programme aimed at climate change adaptation and resilience may be a part of a larger facility that could be interesting to IFIs.
- According to the World Bank, the combined efforts of the government of Azerbaijan and several major international partners from Europe and Asia covered the needs of about 80% of the urban population in rayons outside Baku. It was expected that the rest would be addressed soon.
- In the case of the Green Climate Fund (GCF), which provides a mix of grants and loans, all climate adaptation measures can be a part of co-financing, and the programme can be a part of a bigger application to the fund that includes other climate adaptation measures.

 *Considering the budget constraints in Azerbaijan and the substantial total costs of the programme, it will be challenging for the Azerbaijani public financier (mainly national governments) to cover all these costs by itself.* 



Support instruments

The investment programme foresees **subsidies and other instruments** as the most targeted support option. The financing sources are available and can be provided by several actors – national public authorities (grants), national commercial banks (commercial loans) or international/development financial institutions (preferential loans and grants).

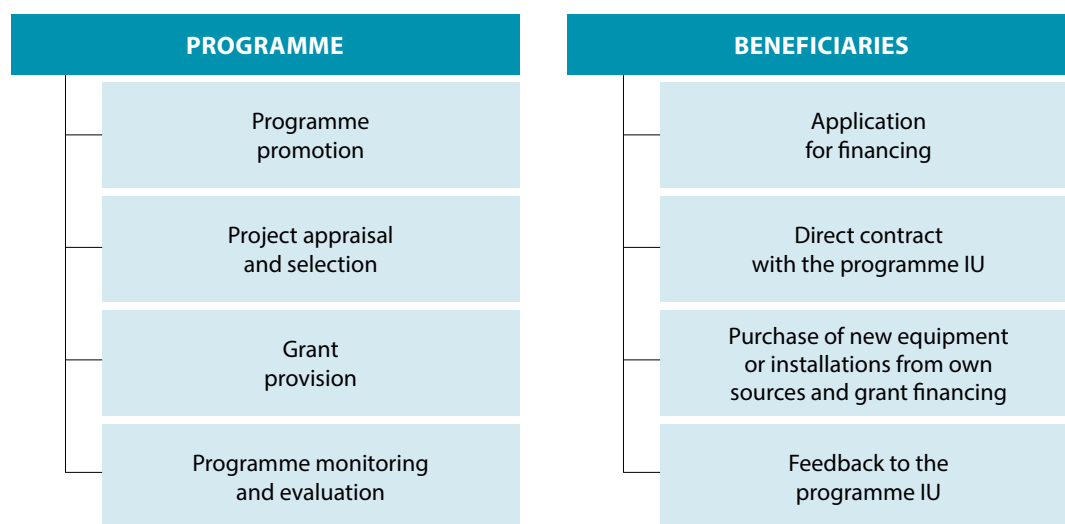
Support instruments

These public grants and associated loans aim to **motivate the beneficiaries** – in this case, other government actors (state-owned enterprises, municipal companies) – to allocate their own financial resources to purchase new equipment or installations. Such an approach generally requires a higher initial investment in purchase cost, but offers future benefits (protection of water resources and security of the water supply).

When calculating the optimal level of public support (subsidies in the form of grants), the programme analysis considers contributory factors such as **lower running costs**. For these reasons, the programme does not need to be completely grant-financed. It is designed to increase investments without making investments too profitable (or support purchases that would/could take place without public support).

In any case, a robust methodology to estimate investment costs, set the optimal level of subsidy and forecast the expected environmental benefits should be applied. This can make the programme more credible for both national and international public financiers.

FIGURE 2. **Financing from own sources and public grants**



The Implementation Unit (IU) pays beneficiaries in one of two ways:

- Public funds, according to the agreed disbursement schedule, are transferred to the beneficiary, who organises a tender to select a contractor. The beneficiary pays the contractor upon delivery of service and submission of invoice.
- Public funds, according to the agreed disbursement schedule, are assigned to the beneficiary, who organises a tender to select a contractor. The bank pays the contractor upon delivery of service and submission of invoice.

Proposed timeline

The experience of other countries with similar publicly supported investments suggests that programmes are best implemented over the medium to long term (namely, five to ten years) and linked to government targets.

- Given that the programme will be co-financed with public funds, a **preparation period** will be needed before the first phase. This will allow time to include the programme provisions in the state budget process, as well as to identify and apply for funding from additional financing sources (including donors).
- Once project financing is agreed upon, the rollout of the programme will be relatively rapid. The **pilot phase** could thus take up to two years. The results of the first phase will be evaluated to decide whether to continue with the second phase. If it goes ahead, the second phase will be carried out over six years and then reviewed in detail.
- **The second phase** will take about five to six years. In the second phase, Azerbaijan should evaluate the programme annually. After assessing whether the selected and implemented projects are helping to meet government objectives, the government should revise the programme, if necessary.
- A decision can then be made to extend the programme for a **third phase** or to end it, informed by possible new policy objectives and government goals or market developments. This phase could scale up to the full potential of the programme's market analysis and be implemented after 2030.

Proposed timeline

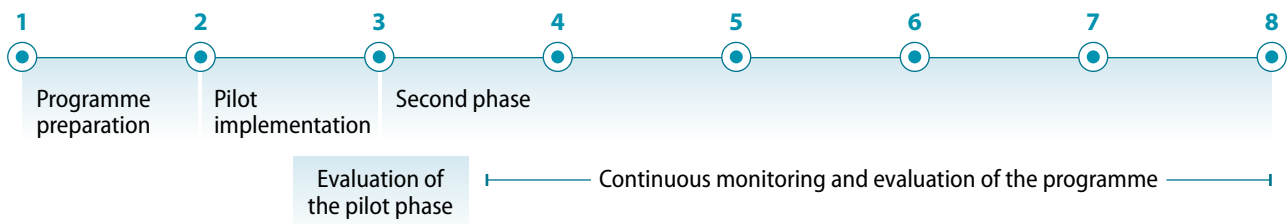
Annual evaluations of the programme should be conducted to see whether the selected and implemented projects are helping to meet government objectives, and to revise the programme, if necessary. The results of the first phase will be evaluated to decide whether to:

- continue with the second phase without any modification
- continue with the second phase with modifications
- bring the programme to a close
- prepare a new programme.

Since the programme is designed to be co-financed by the state budget, any update should be coordinated with the **multi-year budget and its requirements**. On this basis, the government should prepare annual financial plans for financing through the regular annual budget.

FIGURE 3. **Proposed timeline**

(in years)



“The experience of other countries with similar publicly supported investments suggests that programmes are best implemented over the medium to long term (namely, five to ten years) and linked to government targets.”

Institutional set-up

Not least, an optimal institutional set-up for the programme's implementation should be selected and mandated. This is the last step in programme preparation, and at this stage, all the elements of the programme will have been clarified and consensus on its priorities reached.

Institutional set-up

The programme implementation will require institutional arrangements that ensure transparent and cost-effective decision making. For larger-scale, targeted programmes – in particular, programmes that involve financing capital investments, such as this GPI Programme – **special institutional arrangements are recommended**. These special arrangements may take many institutional forms and involve various types of implementing units.

The report analyses several institutional options. In most instances, the institutional arrangement for large-scale (investment) programmes includes both a management (implementation) unit and a supervisory body. The institutional set-up proposed in this study includes three levels:

1. **programming entity (PE)** – adopts strategic documents, undertakes strategic decisions and oversees implementation capacity of the project cycle management;
2. **implementation unit (IU)** – manages the project cycle (project selection, implementation and monitoring) and may also be charged with drafting the programme's operating regulations;
3. **technical support unit (TSU)** – gives specialised assistance, advice and expertise (e.g. in developing programme implementation documents, such as the list of approved technologies and accompanying investments).

The analysis suggests the **Ministry of Ecology and Natural Resources (MENR)** is best suited to act as the programming entity (PE). As a supervisory body, it retains the final decision-making authority to:

- approve financing of the individual projects recommended by the implementation unit's technical staff, after the appraisal process
- approve internal operating procedures and rules (including eligibility and appraisal criteria to guide project selection).

Three institutions were preliminarily identified as suitable to manage the programme, i.e. to act as the implementation unit (IU) of the programme.

The role of IU could be fulfilled by:

1. the State Water Resources Agency – for all components (once the Agency is fully established and operational)
2. Azersu OJSC – for the water supply and wastewater components of the programme
3. Azerbaijan Amelioration and Water Farm OJSC – for the irrigation and drainage components of the programme.

The implementation unit (IU), among other things, is responsible for:

- conducting marketing activities for the programme;
- identifying beneficiaries and appraising beneficiaries' project proposals for eligibility;
- providing MENR with information on the planned number of beneficiaries and programme financial needs;
- reporting to MENR on programme expenditure, so that MENR can monitor the budget implementation for a given year (or programming cycle) and project type (project "baskets").

The technical support unit (TSU) would be charged with:

- providing specialised assistance, advice and expertise in the areas of water production, wastewater treatment, and irrigation and drainage.

As this task is quite wide, no one entity can play this role. Although TSUs may be defined as deemed necessary and prudent, the skills and knowledge of Azersu OJSC and Azerbaijan Amelioration and Water Farm OJSC in the areas of concern can be deemed adequate for programme implementation.

Because programming is a political process, it is important that the responsibilities for programming and project cycle management remain separate and distinct. This division of responsibilities provides a system of checks and balances and improves the accountability of the programme.

Independent of the institutional arrangement, the implementation unit should have:

- **a degree of independence** – this would ensure that decisions respect rules and criteria aligned with programme objectives, and are not subject to undue political influence;
- **capacity for programme implementation** – carrying a programme to completion requires capacity for project selection, implementation and monitoring. This means hiring skilled, trained personnel dedicated to the programme.

Regardless of the type of institutional set-up, programme management should involve an institutional structure and procedures that:

- promote environmental effectiveness;
- embody fiscal prudence;
- use financial and human resources efficiently.

Institutional set-up

The government of Azerbaijan should also aim to address other challenges that could hold back implementation of the GPI Programme.

- **Inter-ministerial co-operation** is vital for successful implementation. Such a programme can help increase the profile of the environment and climate on the energy policy agenda.
- **Promotion** is essential for the success of the programme. The costs of programme promotion should be included in the programme costs envelope and be the responsibility of the IU.
- Subsequently, the government needs to ensure that the **resources, qualified staff and instruments** are able to run the programme.⁶

The OECD Handbook for Appraisal of Environmental Projects Financed from Public Funds includes details of all the rules that need to be considered in defining procedures for the programme IU. It could be useful in further defining procedural rules for the programme – see (OECD, 2007).

Deciding which form is most appropriate will generally **depend on a variety of factors**, including, but not limited to:

- sources of finance
- types of disbursements envisaged
- the legal and political culture of governance.

Programme implementation should strictly apply project sustainability criteria, i.e. when public support is provided, the assets must be used for the assigned purpose for at least five years. This can be imposed on public bodies (municipalities), but a guarantee might also be required from the private entity that will be realised after five years.

6. Environmental programmes of EUR 50 million annually and about 200 contracts per year implemented in Central and Eastern Europe generally need a staff of more than 20 people.

A high-speed photograph of water being poured into a pool, creating a large splash with many bubbles and a clear surface reflection. The water is a vibrant blue color.

Policy recommendations

Various regulatory barriers may complicate the implementation of even a well-designed investment programme. It is important that before a programme is developed and financed, the government of Azerbaijan reviews the relevant regulatory basis and eliminates any barriers to the extent possible. A reflection on other countries' experiences could provide an indicative checklist of measures and approaches to anticipate and tackle these problems.

One of the biggest obstacles for an investment programme that results in sustainable changes in water supply, wastewater treatment, and irrigation and drainage is the lack of cost recovery tariffs for those services. Combining such regulatory improvements with financial support from the state is more likely to lead to a sustainable water supply and irrigation and drainage systems.

WATER SECTOR ANALYSIS

- **Conduct sector-wide economic analysis** – The aim of this analysis would be to identify potential benefits of improved co-ordination and co-operation and a strong demand for further external support for improving co-operative management (which will help allocate the economic benefits of the Kura-Aras basin equitably).
- **Establish a regulatory framework for full-cost recovery tariffs** – Subject to household affordability, water and wastewater tariffs should reflect the full costs of providing services. If the full-cost recovery tariffs are too high for most households, other modes of financing the operations and investment in the sector can be developed, for example targeted subsidies for lower-income users.
- **Conduct national awareness-raising campaigns** – National campaigns are necessary to encourage an understanding of the need for and the cost of providing a stable, clean water supply and water savings on the demand side.
- **Review and improve the division of responsibilities in the water sector** – A clear division of rights and responsibilities of the public bodies involved in the management of water resources in Azerbaijan is needed to prevent the wasteful use of water and to achieve efficient use and management of water resources. Recent changes – for example, establishment of Azerbaijan Investment Holding to manage state-owned companies and enterprises and to increase the transparency and economic efficiency of their investment programmes – should be carefully evaluated for their effectiveness. Water user associations should also play an important role in the planning and financing of the water supply and irrigation sectors.

WATER RESOURCES MANAGEMENT

- **Update water resource inventories** – Water resource inventories from the 1970s and 1980s require revision.
- **Develop a groundwater cadastre** – With Azerbaijan's many unregistered wells, groundwater use can only be roughly estimated, making it difficult to plan for the use of water resources.
- **Establish groundwater quality standards** – There is no classification of groundwater types, which also makes it difficult to plan the use of water resources.
- **Inventory surface water sources** – Surface water sources also require inventorying, including the capacity and quality of the source.
- **Establish basic and baseline water-consumption data** – No basic economic data on water use have been compiled that would, for instance, allow for

reliable, comprehensive cost and benefit estimates. In addition, detailed service connection rates for water supply and sewage are not available by region, district and settlement. These data, however, are essential for planning future use of water resources.

HIGH TECHNICAL WATER LOSSES

- **Develop a master plan/investment programme to address water losses** – Azerbaijan potentially faces future water deficits (the current estimated water exploitation index is 72%). Most of the threat of water deficits results from technical losses in the water systems (pipelines and canals), resulting in increased water withdrawals to meet demand.
- **Integrate the programme into national policy, strategic documents and respective action plans** – This programme, the Green Public Investment Programme (GPIP), should feed into the budgeting process.
- **Secure the finance for the investment programme** – In addition to making budget allocations in a medium-term budget framework, dialogue with donors and IFIs is required to accelerate investment in water supply security.

WATER POLLUTION

- **Establish policies and programmes to address soil erosion** – In the upper part of river catchment areas – in particular, in mountainous regions – erosion has led to poor soil protection, with damaging mudslides and turbid rivers.¹
- **Develop a master plan/investment programme for wastewater collection and treatment** – Azerbaijan suffers from a lack of functional wastewater treatment plants – especially in small towns and settlements – and the discharge of untreated municipal wastewater into rivers contaminates water in both rivers and reservoirs.

1. For example, the Aras River is said to be one of the most turbid in the world.

FURTHER READING

EU4Environment (2023), *Improving water infrastructure in Azerbaijan using an expenditure support scheme – Designing and costing a green public investment programme*, European Union for Environment, <https://www.eu4environment.org/improving-water-infrastructure-in-azerbaijan-using-an-expenditure-support-scheme/>.

OECD (2007), *Handbook for Appraisal of Environmental Projects Financed from Public Funds*, EAP Task Force, OECD Publishing, Paris, www.oecd.org/env/outreach/38786197.pdf.



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Green Economy in Eastern Partner Countries



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Federal Ministry
for Economic Affairs
and Climate Action

On the basis of a decision
by the German Bundestag

Improving water infrastructure in Azerbaijan using an expenditure support scheme

Azerbaijan has fewer renewable water resources than the other countries in the South Caucasus, and its surface and groundwater reserves are expected to decrease even further as a result of climate change. Its infrastructure, largely inherited from the Soviet era, is deteriorating and will not be able to supply its growing population with water of sufficient quantity or quality.

In 2021-2022, under the EUEnvironment Action programme, the OECD provided technical assistance to the Ministry of Ecology and Natural Resources of Azerbaijan in preparing a green public expenditure programme designed to help meet the demand for potable and utility water for Azerbaijan's population, agriculture and industry. It focuses on rural districts in selected regions that face significant challenges ensuring a safe domestic drinking water supply, securing water for irrigation and reducing pollution from wastewater. Despite its regional focus, the programme will be carried out at the national level to align with Azerbaijan's objectives for the water sector. It builds on current and planned capital investments set out in the policy documents and listed investment priorities of the major stakeholders.

For more information:



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<https://www.eu4environment.org>

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