The largest consumption of fuel and energy resources from non-renewable sources is coal – 338.7 million GJ (61% of total consumption), which is used in the energy sector to produce heat and electricity. The second place is occupied by gas – 123.6 million GJ (22%, of which 19% is natural gas – 104.8 million GJ), the consumption of liquid fuels was 34 million GJ (6%).

Energy consumption from renewable sources totalled 42,000 GJ, which is more than 2 times higher than the consumption from similar sources in 2023 (17,000 million GJ). This is the energy generated by RES.

GRI 302-1 **Fuel consumption from renewable sources, '000**

	2021	2022	2023	2024
Electricity (generation from RES), '000	26	46	17	42

GRI 302-3 **Energy intensity, '000 per unit of relevant products**

Indicator	Unit of measurement	2021	2022	2023	2024
Oil and gas exploration and production	GJ/t hydrocarbon feed	2.43	2.78	2.68	2.55
Oil and gas processing	GJ/ tonnes of refined oil (gas)	3.84	4.06	3.87	3.41
Oil transportation	GJ/t of oil	0.13	0.12	0.10	0.09
Gas transportation	GJ/million m³	1.65	1.11	0.87	0.90
Uranium exploration and production	'000/tonnes of uranium mined	0.25	0.25	0.26	0.24
Electricity generation	GJ/ '000 kWh	4.45	4.33	4.25	4.23
Heat production	GJ/Gcal	5.69	5.51	5.44	4.76
Railway transport	GJ/million tonnes Km gross	93.98	92.84	87.90	87.72
Production of chemical products	million GJ/tonnes of chemical products produced	0.46	0.40	0.17	0.30
Metallurgical projects	'000/t of refined gold	1.84	1.62	1.99	1.67

Water resources management

GRI 3-3
GRI 303-1

Climate change, population growth and anthropogenic pressures are having serious impacts on the world's water resources: water scarcity is worsening, precipitation patterns and the entire water cycle are being disrupted. This has a significant impact on ecosystems, economy, human health and communities. Kazakhstan is a 'water-dependent' country; only 2.8 per cent[37] of the territory is covered with water, while two thirds are arid zones. A significant part of water resources (over 40%) comes from neighbouring countries, making the use of transboundary rivers a vital issue for the republic. According to UN estimates, by 2040 Kazakhstan's water needs will be covered only by 50%. Realising the criticality of the issue for national security, the Government is taking serious measures: in 2023 the Ministry of Water Resources and Irrigation was established, and in 2024 the Concept of Development of the Water Resources Management System of the Republic of Kazakhstan for 2024–2030 was approved. It includes measures to conserve water. In particular, it is planned to increase water reuse in economic sectors from 17% to 28% by the end of 2030.

Water availability is a critical factor for the production activities of the Fund's companies. Our organisations in the energy (electricity and heat generation), mining (oil and gas extraction, uranium mining) and refining (oil and gas processing) sectors have the greatest impact on the country's water resources. We therefore work with stakeholders to jointly address water-related issues, including portfolio companies, local communities and Government agencies.

GRI 3-3 Our goal in the area of water consumption is to maximise the rational use of water resources in production processes. It is outlined in the Samruk-Kazyna JSC Energy and Resource Saving Programme 2027, as developed to implement the Low Carbon Development Concept.

The programme envisages a number of technical measures in the field of water resources management: reduction of production wastewater discharge and improvement of its quality; saving process water for make-up of recycling systems; installation of devices for determining the content of oil products in water; improvement of the temperature regime of recycling water supply, etc.

[37] www.news.un.org/ru/story/2022/06/1425862

TAZALYQ PROJECT

We are implementing one of the largest environmental protection projects – Tazalyq – at Atyrau Refinery since 2019. The project aims at improving the efficiency of wastewater treatment at ANPZ and improving the environmental situation in Atyrau. Tazalyq is implemented under a loan programme from the European Bank for Reconstruction and Development (EBRD). EBRD's participation was made possible due to the use of the best available technologies adopted by the European Union in the project solution, as well as compliance of the project with the requirements of the EBRD Environmental and Social Policy. Each stage of project implementation was accompanied by community engagement, feedback from public hearings as part of the EIA procedure, press tours and media coverage.

In 2024, the project is fully completed: two stages of reconstruction of the mechanical wastewater treatment plant have been put into operation, increasing the capacity to 1,000 cubic metres per hour; evaporation fields are being rehabilitated, and work has been completed on laying a pipeline to divert wastewater to municipal sewage facilities, eliminating the release of harmful substances into the environment.

WATER RESOURCES ACCOUNTING AND MANAGEMENT

GRI 3-3
GRI 303-1
GRI 303-2
GRI 303-5
SASB

Water consumption metering is included in the Fund's Resource Saving Programme as an organisational management measure. We are introducing a unified approach to collecting information on the impact of the Fund's portfolio companies on the country's water resources, which will improve the efficiency of fresh water use, reduce the dependence of organisations on water suppliers and more effectively manage risks associated with the availability of water to organisations. Since 2020, NC KazMunayGas JSC has been calculating its water footprint and annually discloses information on water use on the Carbon Disclosure Project (CDP) platform as part of the water security questionnaire.

All water-related activities of our portfolio companies are carried out in accordance with water resources protection permits and are regulated by the Water Code and the Environmental Code, as well as sanitary regulations of the Republic of Kazakhstan. We continuously monitor water intake, use and discharge. Wastewater quality control is carried out by specialised accredited laboratories. To assess the impact on water resources, the quality of both groundwater and surface water bodies in areas where our assets may have an impact is monitored on a quarterly basis. Based on this data, action plans are developed to optimise water management and minimise environmental impacts. The results of monitoring the impact on sensitive water bodies are submitted to authorised bodies on a quarterly basis. Water regulation issues in portfolio companies are coordinated by environmental departments. When conducting environmental impact assessments, public hearings are held to consider the impact on water bodies, among other things, and the opinions of all stakeholders are taken into account.

GRI 3-3
GRI 303-2

Wastewater after mechanical and biological treatment at specialised treatment facilities is partly discharged into receivers (storage ponds) and partly returned to the plants for further use. This water is primarily used to feed the water circulation systems in the plants, as well as for fire-fighting systems, irrigation of green areas and other needs.

GRI 3-3

Based on the Concept for the Development of the Water Resources Management System of the Republic of Kazakhstan for 2024–2030 and the aforementioned Programme until 2027, the portfolio companies have developed internal policies and programmes for water resources management, are implementing projects to modernise water infrastructure, introduce advanced water-saving technologies, digitalise water accounting and develop a culture of water saving among the population and employees of organisations.

We believe that the overall efforts of portfolio companies to implement the technical measures of the Programme, as well as the introduction of measures to track the Fund's water footprint, will allow us to reduce consumption and use available water resources more efficiently, which in turn will strengthen the Government's actions to prevent the development of a water crisis in Kazakhstan.

WATER BALANCE OF THE FUND, 2024

million m³

WATER DISCHARGE 95.1[39]

WATER CONSUMTION 324.8[40]

WATER WITHDRAWAL 324.8[38]

Surface water 1.7

Artificial surface facilities 15.8

Ash dump 75.1

Transferred to third parties for treatment 2.4

Oil and gas sector 59.0

Electroenergy sector 96.8

Other sectors 10.4

For production purposes:

Water reused 23.9

Sea water 13.9

Surface water 208.0

Ground water 43.8

Municipal and external water supply systems 55.7

Water for domestic needs 9.9

Other 6.8

Transferred without using 142.0

[38] Excluding the HPP water intake.
[39] Excluding water disposal from the hydropower plants.
[40] Excluding hydroelectric power plants.

WATER INTAKE

GRI 303-1
GRI 303-3
GRI 303-5
SASB

The greatest impact of the Fund's portfolio companies' production activities has on water bodies of the western region of Kazakhstan, such as the Ural River, Kigach River, Kokzhide Sands, Pyatimar Reservoir, as well as the Sharyn River and Bestyubinsk Reservoir (Moynak Hydroelectric Power Plant), Syrdarya River and Shardara Reservoir, Satpayev Canal, Shidertinskiy Canal (Big Almaty Lake and the basin of the Bolshaya Almatinka River – Cascade of Hydroelectric Power Plants), Kapshagai Reservoir (Kapshagai Hydroelectric Power Plant), and the Shu-Sarysuskỳ basin.

Water withdrawal is carried out in the volumes established by the relevant permit documentation in strict compliance with design and regulatory requirements.

Total water withdrawal was 80,431.7 million m³ of water in 2024, of which 99% or 79,966 million m³ is accounted for water used by HPPs for power generation. Water intake and discharges from Ust-Kamenogorsk HPP, Bukhtarma HPP and Shulbinsk HPP increased due to an accident – dam breach on the border of Kazakhstan and China, which led to an increase in water intake by 25.9% and an increase in HPP power generation in 2024. Thus, the volume of electricity generation by HPPs in 2024 (7.075 billion kWh) increased by 27.2% compared to 2023 (5.561 billion kWh), which led to a significant change in the volume of water intake for HPPs, which is almost completely returned to surface water.

This water is not used in technological processes, therefore, to make a more objective assessment of our water balance, we further analyse the dynamics of water withdrawal without taking into account the water involved in power generation at the HPP.

In 2024, the water consumption for production needs was 162.2 million m³. Of these, the largest amount of water for own needs was consumed by the energy sector – 96.8 million m³ (58% of total water consumption), oil and gas 59.0 million m³ (36%) and mining and metallurgical sector 7.6 million m³ (4.6%). The water consumption by other sectors totalled 2.8 million m³ (1.8%). In 2024, the total volume of produced associated formation water was 140.5 million m³, of which about 98% was re-injected. This demonstrates a high level of associated formation water utilisation and minimisation of impact on surface and groundwater resources.

[41] According to WRI Aqueduct: high category – total water load 40–80%, extremely high category> 80%.

REDUCED WATER WITHDRAWAL AND WATER CONSUMPTION IN REGIONS WITH WATER SCARCITY

GRI 303-3
GRI 303-5

According to the water stress indicator WRI Aqueduct[41] the basins of the Caspian Sea, Aral Sea, Lake Balkhash, Syr Darya and Ural rivers are among the regions with increased water deficit. We carry out additional monitoring and analysis of water withdrawal and water consumption by organisations operating in these regions, and place increased emphasis on the implementation of measures to reduce freshwater consumption and increase water recycling.

GRI 303-4

Portfolio companies have installed meters and automated water metering systems to record water intake and discharge.

The volume of water withdrawal in water deficit regions decreased by 5.3% in 2024 compared to 2023, and in general for 4 years – by 13%. The share of fresh water from the total water withdrawal in regions with water scarcity is also decreasing: 11 million m³ of fresh water was withdrawn in 2024 (share – 41% of the total water withdrawal), which is 15% less compared to 2023 (14 million m³, which was 45% of the total 2023 withdrawal of 30.1 million m³). The positive trend in lower water consumption in deficit regions stands to mention. It is down to the implemented programmes, the total water consumption in water deficit regions has decreased by 13% over four years.

Water withdrawal and water consumption reduction in regions with water deficit, million m³

	2021	2022	2023	2024
Water intake in regions with water scarcity*	32.8	32.5	30.1	28.5
Incl. fresh water:	8.5	14.4	13.7	11.6
Total water consumption in regions with water deficit	29.9	29.5	26.8	25.2
Water discharge in regions with water scarcity	2,973	3,011	3,326	3,293

** According to the WRI Aqueduct water stress indicator*

INNOVATIVE WATER TREATMENT AND DESALINATION TECHNOLOGIES

We implemented the project of a produced water desalination plant at the Karazhanbas oil field in Mangistau region. In August 2024, the produced water desalination plant reached its full capacity. The project has a special social significance. Water extracted together with oil from the reservoirs, after desalination, is now used at the field for technical purposes to produce steam, which has significantly reduced water intake from the Volga River. If before the launch of the plant the level of consumption of Volga water by JSC Karazhanbasmunai averaged 21,000 m^3 per day, now this figure has decreased to 5,000 m^3. Thus, water consumption has been reduced almost 4 times. This, in turn, allowed releasing a significant volume of water supplied through the Astrakhan-Mangyshlak trunk pipeline for the needs of the region's population.

The second most important project was the reconstruction of the Astrakhan-Mangyshlak main water pipeline, which increased its capacity from 110,000 m^3/day to 170,000 m^3/day, thus providing water to the population, agricultural enterprises, industry and oil and gas production facilities in the Atyrau and Mangistau regions. The Astrakhan-Mangyshlak water pipeline plays a strategic role as the only centralised source of water supply for the residents of Kurmangazy, Isatay and Zhylyoi districts of Atyrau region, as well as Zhanaozen city, Beineu, Mangistau, Karakiyan and Tupkaragan districts of Mangistau region.

WATER CONSUMPTION

Energy sector (electricity and heat production) is the biggest water consumer, accounting for 99%.

GRI 303-5 SASB Total irrecoverable water consumption by the Fund in 2024 was 232.7 million m³, down by 3.5% compared to the last reporting period (240.8 million m³ in 2023).

To rationally use water resources in technological processes, we use closed-loop water supply systems and equipment recirculating cooling systems. The volume of recycled water in 2024 was 4,077.2 million m³, which is 4% higher compared to 2023.

We follow the progress and constantly invest in the improvement of technological processes of wastewater treatment for the purpose of its reuse. We operate wastewater treatment facilities where wastewater undergoes mechanical and physical-chemical treatment, biological treatment, and we pay attention to modernisation and maintenance of storm and melt water collection and treatment systems. As a result, the amount of reused water increases from year to year.

Recycled and reused water, million m³

	2021	2022	2023	2024
Reused water (after treatment)	18.1	18.3	22.3	23.9
Recycled water	3,935.1	3,978.5	3,928.4	4,077.2

WASTEWATER DISPOSAL

GRI 303-5 The total volume of water disposal for the reporting period amounted to 80,199 million m³, of which the discharge of the Fund's production companies, not related to electricity generation, amounted to about 95,1 million m³. Disposal of water used by HPPs in electricity generation amounted to 79,966 million m³ (99% of total water disposal). In the process of ash and slag waste disposal to ash dumps 74.7 million m³ was used, another 15.8 million m³ of water was discharged to artificial water bodies (evaporation ponds, storage ponds and filtration fields). In accordance with the Methodology for Determining Environmental Emission Standards, the main pollutants whose concentrations are measured in wastewater are: oil products, phosphates, suspended solids, nitrates, nitrites, etc. In the uranium mining and processing sector, water discharge totalled 3.85 million m³, of which 1.71 million m³ was discharged to surface water bodies. Water discharge to surface water bodies includes storm water from industrial areas and water not involved in the technological process. Treated water is discharged through storm water drainage systems. Wastewater must be treated in accordance with legal regulations before discharge to water bodies or the ground surface. Maximum permissible concentrations of pollutants and standards for permissible discharges are established on the basis of design data on maximum permissible discharges and the results of sanitary-epidemiological and environmental expertise.