Caring for our planet

Environmental protection

Management approach

GRI 3-3

As one of the leaders in the energy industry, we attach high importance to environmental safety, guided by the legislation of the Republic of Kazakhstan, the international standard ISO 14001, and best practices of sustainable development. We recognize our responsibility for environmental control, actively implement energy efficiency projects, and are committed to regular publication of detailed environmental reports to confirm our transparency and maintain high standards of environmental safety.

The Company has approved a set of key documents that set the basic principles and norms of Samruk-Energy JSC's activities in the field of environmental protection:

- Policy of the corporate management system;
- Corporate Standard on Environmental Protection Management in the Group of companies of Samruk-Energy JSC;
- Guidelines on environmental emergencies and response to them.

Environmental safety management occupies a central place at all levels of the Company's activities. The Energy Efficiency, Innovative Development, and Environmental Safety Department of Samruk-Energy JSC assumes the role of a responsible person in managing environmental initiatives. Departments responsible for implementation of the environmental policy and strategy, as well as for maintaining compliance of partners' and contractors' actions with the Company's established environmental standards, have been formed in subsidiaries and affiliates.

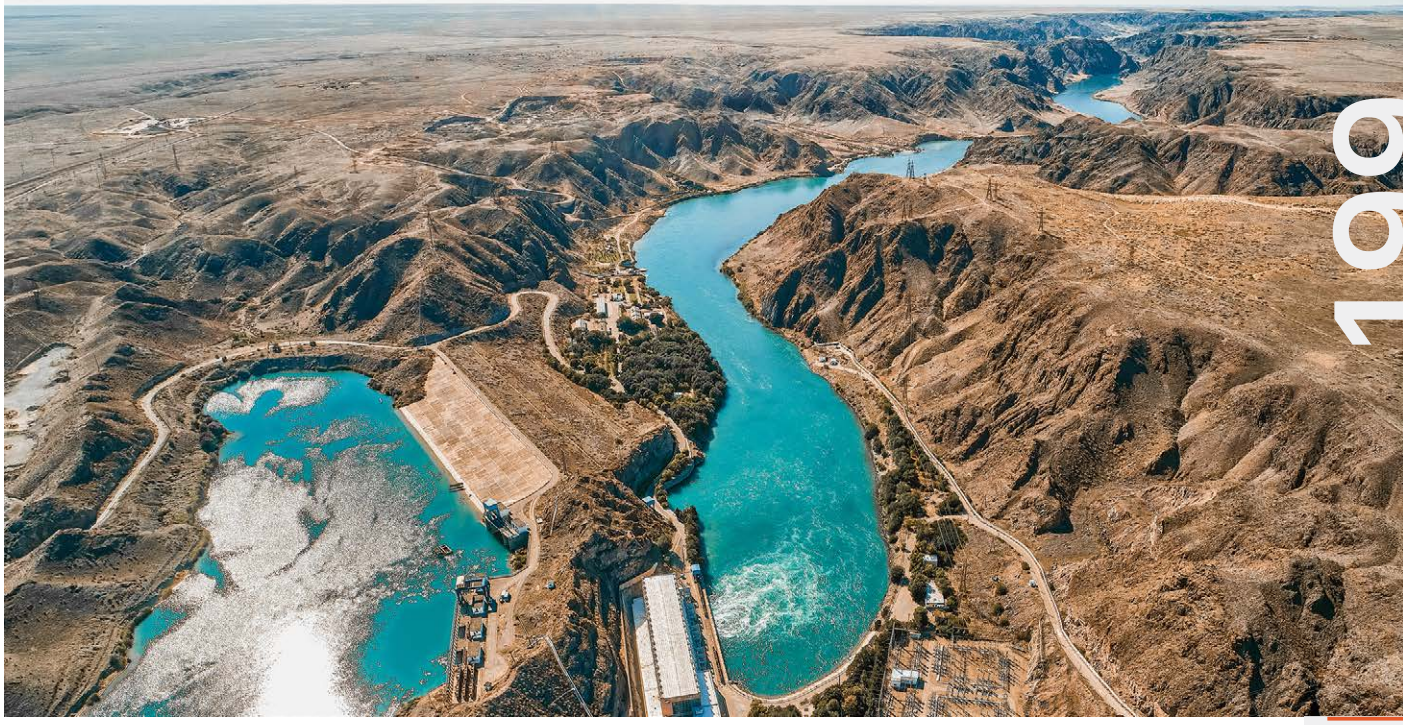
In order to maintain and confirm a high standard of environmental safety, we assume the obligation to systematically provide detailed reports related to environmental protection.

On a quarterly basis, the Energy Efficiency, Innovative Development, and Environmental Safety Department submits to the members of the Management Board, the Committee for Safety, Labor Protection and Environmental Protection, and annually to the Board of Directors of Samruk-Energy JSC a Report on the work in the field of environmental protection for the reporting period.

Samruk-Energy JSC's principles and rules in the field of environmental protection cover all activities and concern everyone in the Company, including employees, suppliers of goods and services, and contractors with whom we cooperate.

Every year, a Production Program is developed, which defines annual strategic goals. These include improving the quality management system, strengthening anti-corruption initiatives, raising environmental standards, improving working conditions and safety, and optimizing energy management. The objectives for each business unit are supported by specific, measurable metrics accompanied by clear plans or standards. Activities are focused on achieving these KPIs, and their fulfillment is regularly analyzed by the Corporate Management System Manager every quarter.

As part of our strategy to ensure comprehensive operational and environmental safety, we have developed an Environmental Management System (EMS). The EMS is regularly assessed for compliance with global standards by independent international experts and is continuously improved. As part of the EMS, we have developed an Environmental Emergency Response Manual that defines procedures, response measures, and the organization of on-site emergency response teams, which is updated after disasters and improved in line with current and effective practices.



In 2023, an internal audit was successfully implemented in accordance with the Corporate Management System Program, achieving the set objectives. The audit was conducted through interviews, document analysis and observation of management activities. The purpose of the audit was to verify the compliance of the corporate management system with the international standards ISO 9001, ISO 14001, ISO 45001, ISO 50001, and ISO 37001. It should be noted that these international standards apply to it should be noted that these international standards apply to Ekibastuz GRES-1 named after B. Nurzhanov LLP, Ekibastuz GRES-2 Station JSC, Almaty Power Plants JSC, Moynak HPP JSC, Samruk Green Energy LLP, Alatau Zharyk Company JSC, AlmatyEnergoSbyt LLP, Shardara HPP JSC, First Wind Power Plant LLP, and the corporate center of Samruk-Energy JSC ensuring uniform high standards of quality, environmental safety, health and energy efficiency throughout the organizational structure.

In addition, we performed an external audit based on international standards, legislative requirements of the Republic of Kazakhstan, internal documentation of the organization and certification procedures of MS Certification Pvt. Ltd. Ltd. During the audit, measures for compliance with mandatory legislative requirements were identified (e.g., Report on execution of the action plan on key risk management for the second quarter of 2023 dated 26.09.2023), environmental aspects, potential hazardous factors and risks of the Group of companies of Samruk-Energy JSC were documented.

A significant achievement was the test launch of the automated emission monitoring system (AMS) at the site of EGRES-2 JSC on March 17, 2023, carried out in accordance with the environmental regulations of the Republic of Kazakhstan.

In 2023, all planned environmental protection measures were carried out, including measures to protect air, water and land resources, flora and fauna, as well as measures to conserve biodiversity.

In addition, low-emission vortex pulverized coal burners were successfully introduced at GRES-1, which made it possible to optimize the combustion process and reduce emissions. This achievement was strengthened by obtaining a positive opinion on the developed design and estimate documentation.

In 2023, projects were launched to construct new combined cycle gas turbine units at CHPP-2 and CHPP-3 in Almaty to replace outdated pulverized coal equipment with modern, environmentally friendly combined cycle gas turbine units. The project “Modernization of Almaty CHPP-2 with minimization of environmental impact” provides for the mothballing of current capacities of CHPP-2 after commissioning of a new gas-fired plant. The project “Reconstruction of Almaty CHPP-3 (with construction of SGP with a capacity of at least 450 MW)” provides for the replacement of existing equipment with modern combined cycle power units, thus ensuring full depreciation of the fleet of obsolete equipment and minimizing environmental impact.

Environmental protection costs

We, recognizing our responsibility to protect the environment for current and future generations, are actively targeting significant investments in environmental initiatives to minimize the impact of our operations and subsidiaries.

In 2023, we significantly increased our current spending on environmental protection measures by investing KZT 24.4 billion, a 244% increase over the previous year's investment level. This jump emphasizes the company's increased focus on environmental issues and its commitment to improving the environmental safety of its operations.

Actual investments of Samruk-Energy JSC in environmental protection measures, KZT billion

Indicator	2021	2022	2023	Δ 2023/2022, %
Current expenditures on environmental protection measures	9.1	7.1	**24.4**	244%

Compliance with environmental legislation and environmental reporting

The Environmental Code of the Republic of Kazakhstan classifies the main production activities of Samruk-Energy JSC subsidiaries and affiliates as special use of natural resources subject to strict environmental standards and regulations. Each subsidiary and affiliates of Samruk-Energy JSC is responsible for its impact on the environment, acting in accordance with issued environmental permits and requirements of special nature use.

We strive to meet all established environmental standards and expectations of stakeholders' interests. To this end, we systematically conduct an environmental impact assessment (EIA) before we start implementing new projects and commissioning facilities. As part of this process, an information campaign is organized to disclose information on proposed activities and their potential impact on the natural environment, which helps to gather and incorporate the views of all stakeholders.

We were among the initiators of the amendments to the Environmental Code of the Republic of Kazakhstan, expecting that these changes will contribute to the improvement of both environmental conditions and financial and economic indicators.

During the implementation of preventive inspections on environmental legislation in 2023, the authorized body for environmental protection identified a number of violations:

- The fact of dusting of ash beaches of the ash dump on the area of 1 hectare at Ekibastuz GRES-1 LLP was established, when the volume of inorganic dust emissions with the content of SiO2 (silicon dioxide) 70-20% was 0.655 tons;
- Violation of the project documentation of the permit for technological operations on extraction of microsphere from ash and slag waste in 2022 at Ekibastuz GRES-1 LLP, in addition, extraction of microsphere was carried out without assessment of possible environmental impacts.

Emissions of pollutants

Management approach

GRI 3-3, GRI 12: Coal Sector: 12.1.1

We are committed to reducing atmospheric emissions and systematically implement a number of measures aimed at actively reducing the level of pollutants.

Our main focus is on reducing the level of atmospheric pollution in the area of environmental protection, given that the activities of enterprises such as EGRES-1 LLP, EGRES-2 JSC, fossil fuel-based APP JSC and mining company Bogatyr-Komir LLP result in significant emissions into the atmosphere.

We continuously monitor compliance with the maximum permitted emissions standards, with mandatory periodic reporting to regulatory authorities. Air quality monitoring is conducted on a regular basis to ensure compliance with all established environmental standards, as part of a specially developed Industrial Environmental Control Program for each enterprise.

In addition, real technical and environmental performance is thoroughly analyzed on a quarterly basis against established standards and data for similar periods in previous years. Information on cases when environmental risks are realized is provided to the heads of energy facilities and senior management.

Emissions into the atmospheric air are strictly regulated by the environmental legislation of the Republic of Kazakhstan. Emissions of pollutants are produced in volumes determined by production processes and in accordance with developed projects and standards agreed with authorized state bodies and regulated in special permit documents.

Monitoring of emissions to the environment includes observation of emissions at the source to track production losses, quantity and quality of emissions, and their changes. Based on monitoring data, emissions of key pollutants are analyzed in accordance with approved calculation procedures within the framework of national environmental standards:

- Methodology for determining air pollutant emissions from thermal power plants and boiler houses;
- Methodology for calculating air pollutant emissions from cement production facilities;
- Methodology for calculating air pollutant emissions from Category 4 facilities;
- Methodology for calculation of emission standards from non-organized sources and other national methodologies

EGRES-1 LLP, EGRES-2 JSC, APP JSC and Bogatyr-Komir LLP measure emission levels of harmful substances in flue gases, including nitrogen oxides, sulphur dioxide, carbon oxide and dust particles. These measurements are performed in accordance with the approved Production Monitoring Schedule and are carried out by specialized accredited laboratories. Specialized software is used to calculate the volume of emissions coming from the main equipment and entering the atmosphere through flue gases. Based on these data, the "Report on air protection" (Form No 2-TP (air)) is formed, the frequency of submission of which is regulated by the relevant order of the RK Agency for Statistics.

In addition, in order to minimize atmospheric emissions, we regularly check the efficiency of equipment operation and, if necessary, take appropriate measures and introduce new technological solutions. At the enterprises of EGRES-1 LLP, EGRES-2 JSC, APP JSC and Bogatyr-Komir LLP, as part of production control, constant supervision of technical and technological characteristics of equipment affecting the level of emissions, effluents and waste is carried out.

In planning new stations, we aim to take into account key factors that help to reduce our impact on the atmosphere. When selecting a site for the nationally significant Ekibastuz stations, particular attention has been paid to locating them close to fuel sources, thereby reducing the environmental risks associated with coal transportation. Also, a certain height of chimneys contributes to a more efficient distribution of emissions, taking into account local topography, wind direction and distance to settlements.

Indicators for 2023

GRI 305-7, GRI 12: Coal Sector: 12.4.2

The list of 50 largest facilities of the I category in terms of total atmospheric emissions includes EGRES-1 LLP, EGRES-2 JSC and APP JSC (CHPP-2 and CHPP-3).

The main sources of pollutant emissions in the Company are boiler units, oil and fuel oil farms, ash dumps, as well as other sources of pollutant emissions located on the territory of fuel stations and boiler houses (EGRES-1 LLP, EGRES-2 JSC, APP JSC, and Bogatyr-Komir LLP), the main pollutants characteristic for EGRES-1 LLP, EGRES-2 JSC, APP JSC, Bogatyr-Komir LLP, which are formed during fuel combustion, are nitrogen oxides, sulphur dioxide, fuel oil ash, ash/dust, carbon oxide, and volatile organic compounds.

In 2023, air emissions of the Group of companies of Samruk-Energy JSC did not exceed the established maximum permissible values and amounted to

354,922.3

tons

In accordance with the requirements for the use of natural resources established in the environmental emission permits, EGRES-1 LLP, EGRES-2 JSC, APP JSC, Bogatyr Komir LLP, Shardara HPP JSC and Moynak HPP JSC have developed and approved with environmental regulators a nature protection action plan (hereinafter referred to as the Plan), the implementation of which is strictly mandatory.

The Plan's budget for 2023 was set at KZT 11.398 billion, but KZT 24.434 billion was utilized during the year. Of these funds, KZT 1.6 billion was spent on the repair and modernization of dust and gas cleaning systems aimed at reducing pollutant emissions.

The following activities were carried out under the core initiatives:

- Overhaul of burners of boiler units;
- Overhaul of burners of boiler units;
- Rehabilitation of fuel supply aspiration systems;
- Electric filters were repaired to improve air cleaning quality;
- Renovation of hydraulic ash removal system;
- Repair works on dust and gas cleaning units;
- Introduction of an advanced automatic emission control system;
- Efficient waste utilization;
- Maintenance and adjustment of equipment to meet established operating standards;
- Optimization of overburden management, including its placement in temporary internal dumps, which reduced volumes in external dumps by 54,455,719 tons;
- Inventory of greenhouse gas emissions for accurate accounting and control was conducted.

Dynamics of specific air emissions per unit of production, g/kWh

2021	2022	2023	Δ 2023/2022, %
9.7	9.5	9.5	0.6

In 2023, the KPI for the Company, an indicator of environmental friendliness of electricity generation measured by the volume of CO/Sox/Nox/solids emissions per kilowatt-hour, was set with a target value of 10.1 g/kWh. As a result, the specific emission of pollutants throughout the Group of companies of Samruk-Energy JSC amounted to 9.537 g/kWh for 2023, which shows a slight increase of 0.63% compared to the previous year.

Status of implementation of plans for 2023:

Several measures are envisaged to reduce environmental impact:

- Ensuring a high degree of flue gas purification from ash (SiO2 content 70-20%) by repairing electrostatic precipitators;
- Development of design and estimate documentation for reconstruction of burner devices aimed at reducing nitrogen oxide emissions;
- Repair of aspiration units used for fuel supply;
- Repair of dust collection systems on drilling rigs.

Plans for 2024 and the medium term

As part of our commitment to comply with the RK environmental legislation and transition to BAT, we are actively studying advanced flue gas cleaning methods at EGRES-1 LLP, EGRES-2 JSC, APP JSC, especially with regard to ash, dust, nitrogen oxides (Nox) and sulphur oxides (Sox) removal. Final costs of BAT implementation will be determined after a comprehensive analysis of available technological solutions.

In order to supervise processes and minimize accidental emissions, we are implementing stage-by-stage deployment of automated environmental monitoring systems at EGRES-1 (Units 7 and 8), SEGRES-2, as well as at APP (CHPP-1, CHPP-2, WEC), which ensures the redirection of collected data to the information system of the body responsible for environmental control.

In parallel, together with the Kazakhstan Electricity Association ALE, the work was done to initiate changes in the country's environmental legislation, proposing to postpone the timing of BAT implementation from 2025 to 2031 for energy companies. This will allow for a more thorough and qualitative selection of technologies.

There is also a proposal to modify the mechanism for financing measures to eliminate environmental impact, which will make it possible to allocate resources more effectively to modernize production to minimize its impact on nature.

At the moment, the relevant state body is working on the introduction of these changes to the legislation, with the purpose being to postpone the implementation of BAT.

Responsible water use

Management approach

GRI 303-1, 3-3, GRI 12: Coal Sector: 12.7.1, 12.7.2, 12.7.6

We strictly adhere to the norms of the Water Code of the Republic of Kazakhstan by abstracting water on the basis of permit documentation. This emphasizes our commitment to legal compliance and demonstrates our responsible use of water resources, including our obligation to reduce, reuse or recycle wastewater and fresh water. These practices ensure sustainable and efficient water management that serves the environment and society.

Although our subsidiaries, including EGRES-1 LLP, EGRES-2 JSC, APP JSC, Bogatyr-Komir LLP, Moynak HPP JSC, Shardara HPP JSC and Alatau Zharyk Company JSC, do not exploit water resources in water scarce regions, we focus on sustainable water use management. Our approach includes assessing the risks associated with water use and implementing strategies to minimize the consumption of clean water, as well as providing effective treatment of wastewater and fresh water to ensure its safe return to the natural environment.

Water resources management in the Company complies with the provisions of the Water Code of the Republic of Kazakhstan and is based on water use permits, guaranteeing careful protection of water resources.

Within the framework of the Corporate Management System Policy and the Corporate Environmental Standard, we have adopted commitments and principles of water management, emphasizing the following aspects:

- Responsible water use and maintaining a sustainable water balance;
- Careful assessment and consideration of all source points of water intake, irrespective of direct water intake or its purchase through intermediaries;
- Continuous improvement and adaptation of company strategies and actions to optimize the use of water resources;
- Prioritizing the minimum use of potable water for production purposes;
- Annual audits of water and wastewater metering devices, verifying their availability, functionality, and timely calibration and sealing by regulatory authorities;
- Exclusion of the company's operations in water-stressed regions, emphasizing environmental responsibility.

Structure and management tools

We actively cooperate with local communities and authorities to ensure access to quality drinking water. Our openness to dialog allows us to carefully consider citizens' requests related to the impact of our operations on local water resources.

The main sources of water resources for the Company are the Bestiubinskoye Reservoir (Moynak HPP), the Shardara Reservoir (Shardara HPP), the K. K. Kovalev Canal, and the K. K. Kovalev Canal. K. Satpayev Canal (Bulat Nurzhanov EGRES-1 LLP, EGRES-2 JSC), Shidertinsky Canal (EGRES-2 JSC), Big Almaty Lake and the basin of the Bolshaya Almatinka River (Cascade HPP), Kapshagay Reservoir (Kapshagay HPP).

EGRES-1 LLP, EGRES-2 JSC, APP JSC, Bogatyr-Komir LLP, Moynak HPP JSC, Shardara HPP JSC and Alatau Zharyk Company JSC abstract water in the volumes required for their production processes, while strictly complying with design and regulatory requirements approved by the regulatory authorities. These units are also actively working to develop Sustainable Water Management Plans, which include measures to reduce freshwater consumption, effectively treat and discharge wastewater, minimize water losses during transportation, and improve wastewater reuse systems.

During 2023, we effectively reduced the volume of ash and slag waste, resulting in a 2% reduction in water consumption for its transportation and a corresponding reduction in wastewater. As part of our water conservation strategy, we actively utilized closed-loop water supply systems, including storage reservoir coolers and straight-through ash removal systems at the Ekibastuz power stations. The Almaty power plants also utilized cooling tower systems and the reuse of water from ash dumps to improve water efficiency and protect the environment.

Share and total volume of reusable and recycled water, megaliters

Indicator	2021	2022	2023	Δ 2023/2022, %
Volume of reusable or recycled and recycled water	3,552,379	3,534,516	**3,499,210**	-1.0
Share of reusable and recycled water	17.8%	15.7%	**14.8%**	-5.7

In 2023, the volume of water withdrawal per unit of output amounted to 0.667 m³/kWh, which is 6.7% more than in the previous year. This indicates the increased water intensity of the enterprise's production processes in the reporting period.

Water efficiency of production, m³/kWh

Indicators	2021	2022	2023	Δ 2023/2022, %
Volume of water withdrawal per unit of output product	0.259	0.625	**0.667**	6.7%

At EGRES-1 LLP, EGRES-2 JSC, APP JSC, Bogatyr-Komir LLP, Moynak HPP JSC, Shardara HPP JSC and Alatau Zharyk Company JSC, the quality of surface and ground water, as well as water supply and wastewater sources, is regularly monitored. In the context of environmental surveillance, accredited specialized laboratories perform detailed analyses to detect the presence of pollutants in wastewater and water resources, thus maintaining a high standard of environmental safety and sustainability. From the analytical data obtained from these studies, a vast pool of information is generated that provides an in-depth understanding of the impact of our activities on aquatic ecosystems in terms of volume, nature and extent. Based on this information, a comprehensive corrective action plan is built to optimize water resource management aimed at minimizing the environmental footprint of our operations.

GRI 303-2, GRI 12: Coal Sector: 12.7.3

We strictly adhere to high standards of wastewater management that aim to minimize negative impacts on water areas. We also strive not to exceed effluent limits and comply with regulations governing impacts on aquatic systems, thus ensuring that our presence does not harm the biodiversity of aquatic ecosystems and their natural habitats.

In 2023, we carried out thorough water quality control using certified specialized laboratories, following the Production Environmental Monitoring Program. The analysis included assessment of the chemical composition and quality of surface, underground and wastewater. During the reporting period, no violations of the established limits on the content of pollutants in wastewater were detected at the facilities of EGRES-1 LLP, EGRES-2 JSC, APP JSC, Bogatyr-Komir LLP, Moynak HPP JSC, Shardara HPP JSC and Alatau Zharyk Company JSC.

Water discharge to river systems and accumulation ponds is from rainwater collected on industrial territories, as well as from domestic and clean technical waters that are not used in production processes. Discharge of industrial wastewater used for ash and slag materials transportation is directed exclusively to specialized ash dumps, excluding their discharge into natural water bodies.

All wastewaters, except for those used for hydraulic transportation of ash and slag materials, are thoroughly treated until they reach the norms established by sanitary and hygienic standards, in accordance with the procedures defined in the Methodology for determining the norms of emissions into the environment. Legislatively regulated pollutant concentration limits and wastewater volume are based on design data on maximum permitted discharges and results of sanitary-epidemiological and environmental assessment.

GRI 303-4, GRI 12: Coal Sector: 12.7.5

In the process of production and economic activities of EGRES-1 LLP, EGRES-2 JSC, APP JSC, Bogatyr-Komir LLP, Moynak HPP JSC, Shardara HPP JSC, Alatau Zharyk Company JSC, two categories of wastewater are formed:

- The main part (over 99% of the total volume of wastewater), represented by wastewater from the ash removal system and treated water, which is used for cooling of hydroelectric units, transformers and during operation of hydroelectric generators at the HPP;
- A small volume (less than 1% of the total volume) is domestic wastewater collected from administrative buildings, canteens and other offices.

Wastewater treatment is carried out using modern physical, chemical and biological technologies. Development of standards for maximum permitted discharges is based on the methodology approved by the Order of the Minister of Ecology, Geology and Natural Resources of the Republic of Kazakhstan No 63 dated March 10, 2021. The quality of treated wastewater is reliably supervised by a certified laboratory, guaranteeing a high level of treatment and compliance with environmental standards.

Domestic wastewater is thoroughly treated at the biological treatment plant "Stok", which has two parallel treatment lines — main and backup, each with a design capacity of 15 m^3 per day. The treatment system includes a biological treatment unit, a device for additional filtration of wastewater and a unit for its disinfection, ensuring a high level of purification before returning the water to natural water bodies.

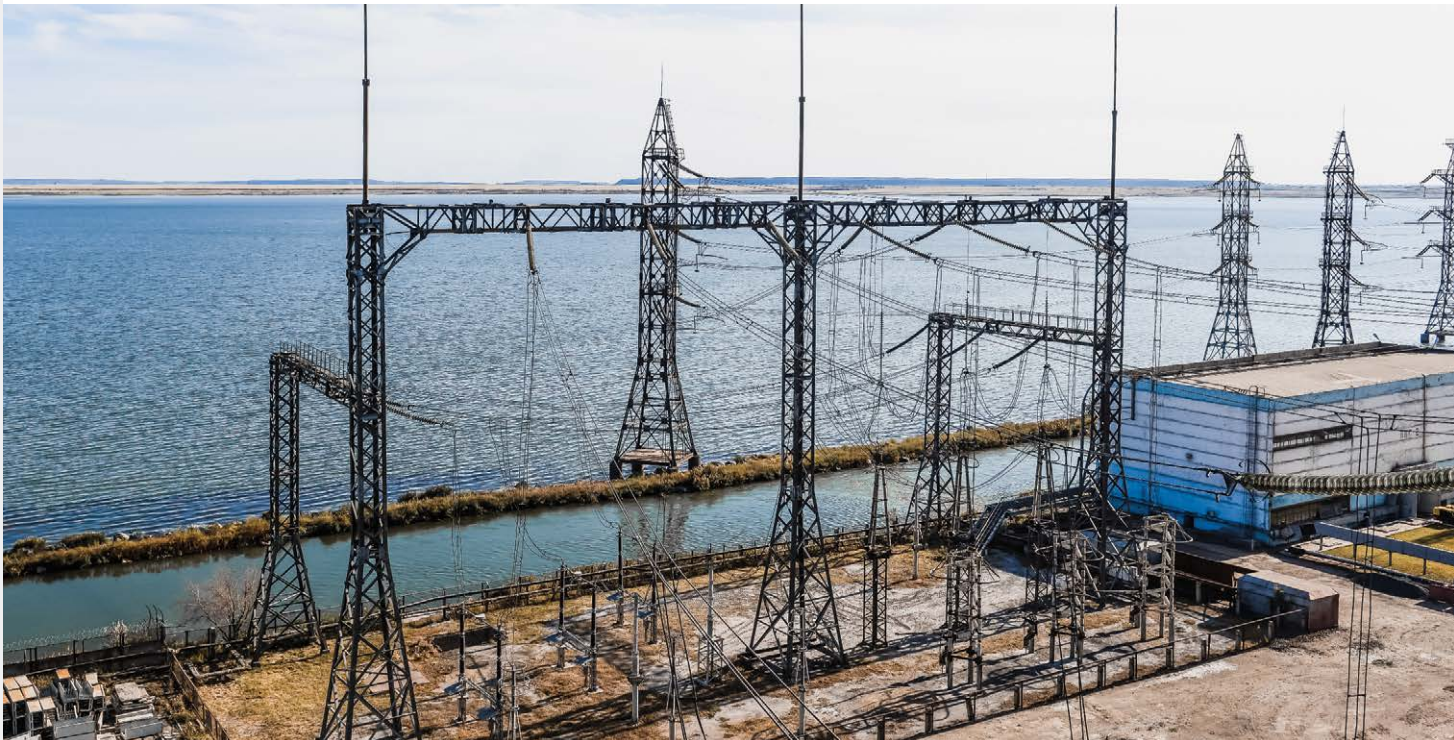
Surface water quality is assessed on the basis of two categories of indicators: general and specific. General indicators reflect the general condition of water, including salinity, pH, hardness, etc. Special indicators in turn include chemical oxygen demand (COD), biochemical oxygen demand (BOD), petroleum product content, ammonium salts, nitrates, nitrites, phosphates, surfactants, total iron, fluorides, suspended solids and copper.

In the reporting period, no cases of exceeding maximum permissible concentrations of pollutants in domestic wastewater discharges were recorded in EGRES-1 LLP, EGRES-2 JSC, APP JSC, Bogatyr-Komir LLP, Moynak HPP JSC, Shardara HPP JSC, and Alatau Zharyk Company JSC.

GRI 303-3, 303-5 GRI 12: Coal Sector: 12.7.4, 12.7.6

In 2023, 23,414,106 megaliters of wastewater were discharged to EGRES-1 LLP, EGRES-2 JSC, APP JSC, Bogatyr-Komir LLP, Moynak HPP JSC, Shardara HPP JSC and Alatau Zharyk Company JSC to meet production and drinking needs. At the same time, 99% of the water intake volume is used to power hydroelectric generators to produce electricity. We noted an increase in the volume of water withdrawal by 4.7%, reaching 23,568,982 megaliters.

In 2023, design and estimate documentation was developed for the construction of a clarified water return pumping station at EGRES-2. The main purpose of this measure is to ensure efficient reuse of treated water in technological processes and for equipment cooling.



The process of data collection for monitoring the Company's water consumption and withdrawal is carried out as follows:

Enterprise	Data collection process
Samruk-Energy JSC	Annually, according to the reporting form, as well as in case of need for information on water use, a request is made to SACs.
APP JSC	Daily data collection on water intake/consumption is carried out by requesting data by e-mail on the amount of transferred make-up water to Heat Networks LLP, water consumption from Almaty and Talgar water intakes for the needs of CHPP-1 and CHPP-2, as well as water releases in accordance with BABI instructions by faxogram for Kapshagay HPP and Cascade HPP. All data are displayed in the daily report — Daily report by stations of APP JSC. Monthly reporting data collection is carried out using e-mail with provision of water withdrawal/consumption/withdrawal balance from each MD.
EGRES-1 LLP and EGRES-2 JSC	Detailed accounting of water consumption is maintained through an automated system, which includes daily tracking of the volume of water withdrawn from the Kanysh Satpayev Canal for domestic and drinking needs, as well as water provided to secondary users, used in ash removal systems and for other auxiliary purposes, including for production and firefighting needs. Data are collected and analyzed by entering information into an Excel spreadsheet and keeping a log of primary water accounting, which ensures accuracy and transparency of water resources monitoring.
Moynak HPP JSC and Shardara HPP JSC	The use of water through the power plant turbines is subject to continuous monitoring and recording by the plant's operational staff on a 24-hour basis. Water consumption for domestic and potable purposes is monitored by the operator of the main pump intake.
Bogatyr-Komir LLP	On a monthly basis, in accordance with the approved energy facilities maintenance procedures, specialists responsible for water meters transmit data from these devices for verification and drawing up an official statement of readings in cooperation with the State Enterprise "Gorvodokanal". Archived data on wastewater discharges recorded by meters installed at key facilities are printed monthly in accordance with the terms of the contract with the service company. To monitor the turnover of water resources, including consumption, abstraction and discharge of drainage water, data from water meters are recorded every day and entered a special logbook according to the annex to the rules of primary registration of water use.

Plans for 2024 and the medium term

As part of the Industrial Environmental Control Program for 2024, the Company's enterprises will conduct industrial control with the involvement of specialized laboratories that have licenses and accreditation certificates for certain types of work. The purpose of the control is to determine the overall impact of power plant operations on the condition of surface water in the area where production facilities are located.

The following types of observations are planned to monitor the condition of water resources in the area of the enterprise's influence:

- Control over water quality in the Satpayev Canal and Zhengeldy Reservoir;
- Control over quantitative and qualitative composition of water from the cooling system of turbine condensers and water for transportation of ash and slag waste to the ash dump;
- The schedule of monitoring of impact on water bodies presented in the program provides for observations once a month. Groundwater quality is monitored through a network of observation wells, which are located in the direction of groundwater flow. The wells are equipped with metal casing and have serial numbers.

Monitoring of water resources condition is carried out in accordance with the approved monitoring schedule developed by the Department of Environmental Protection.

Waste Management

Management approach

GRI 3-3, 306-1, 306-2, GRI 12: Coal Sector: 12.6.1, 12.6.2, 12.6.3

We strive to use resources efficiently by actively working to reduce waste generation and minimize its impact on the environment in all aspects of our operations, from power generation to facility operations. We systematically undertake analytical work to identify the causes of waste and develop strategies to effectively reduce it.

The waste management process, including waste generation, consumption, data collection and analysis, is organized in strict accordance with established standards and procedures. These covers:

- Corporate standard on environmental management;
- Waste management programs;
- Waste management action plan.

Waste management includes accurate accounting of its mass and turnover, which is tracked in special registration logs. Waste volumes are recorded in tons, ensuring strict control over their storage, timely disposal and recycling. We strictly adhere to all waste management legislation and procedures, ensuring that waste is disposed of and recycled safely and responsibly.

Facilities also closely supervise the actions of waste management contractors. Procurement procedures carefully check that candidates have the appropriate licenses to handle each type of waste and that their logistics are adequate for proper waste management. Contractors are required to sign contracts confirming their commitment to comply with environmental regulations and legislation of the Republic of Kazakhstan. Environmental services at the enterprises regularly inspect contractor activities to ensure compliance with waste management standards.

We maintain active interaction with stakeholders, giving everyone an opportunity to express their environmental concerns through specialized feedback channels of Samruk-Energy JSC. All incoming applications are formally recorded and subject to detailed consideration.

At the enterprises of EGRES-1 LLP, EGRES-2 JSC, APP JSC, Bogatyr-Komir LLP, all types of wastes were accurately identified and classified through a thorough inventory process of their sources. Specific accumulation methods have been developed for each type of waste, taking into account their hazard class, toxicity, physical state, solubility, volatility and other characteristics affecting the environment. In accordance with the classification established by the authorized body in the field of ecology, wastes at these enterprises are divided into hazardous and non-hazardous, thus ensuring their effective and safe management.

Hazardous waste such as batteries, mercury-containing lamps and waste oil require specialized disposal due to their harmful nature. Non-hazardous waste, including stationery and food waste, is separately collected and recycled.

Depending on the category of waste, separate collection and accumulation methods are organized. For this purpose, specialized collection points and temporary storage areas have been set up, equipped with containers and metal tanks with clear markings for identification. Criteria have been established for waste that should not be buried in landfills, and the types of materials suitable for reuse or recycling into secondary raw materials have been identified, with the possibility of their further transfer to legal entities and individuals.

Bogatyr Komir LLP is actively working to reduce its impact on the surrounding area by reducing the amount of overburden buried on external dumps. As part of this initiative, the Company is developing plans to adapt the mined-out areas of the Severny and Bogatyr open pits for use as internal dumps. In addition, to prevent oxidation and spontaneous combustion of carbon-containing rocks, they are being isolated with inert materials and the surface layer of the dumps is being compacted.

Development of HPPs and RES facilities in Samruk-Energy JSC contributes to the reduction of ash and slag waste per unit of output.

Indicators for 2023

The enterprises regularly organize collection of used batteries containing toxic substances such as lead, cadmium, mercury, nickel, zinc and alkalis, which can be harmful to human health and the environment. To prevent contamination of soil and water resources, used batteries are sent for specialized recycling, preventing them from ending up in municipal landfills with ordinary household waste. In the period from 2020 to 2023, 191 kg of used batteries were collected and transferred for recycling.

In the process of production activity of EGRES-1 LLP, EGRES-2 JSC, APP JSC, Bogatyr-Komir LLP, no radioactive waste is generated. Regular radiation monitoring is carried out on the territories of these enterprises and in the protective zones adjacent to them every quarter. Monitoring results show that radiation levels remain within the safe standard of 2.5 m^3 per hour, confirming the effectiveness of existing radiation safety measures.

GRI 306-3, GRI 12: Coal Sector: 12.6.4

In 2023, we generated 98,496,096 tons of production waste. These data correspond to the waste classification established by the authorized body in the field of environmental protection, where waste is divided into hazardous and non-hazardous categories.

The main types of waste characteristic of this production are overburden and ash and slag waste. Comparative analysis shows that in 2023 there was an increase in the volume of waste generation by 9.5% compared to the previous year. This growth is due to the increase in the volume of steam coal production and increase of waste rock content in the developed seam of Bogatyr-Komir LLP.

In particular, there is a significant increase in ash and slag waste generation, which amounted to 24.2%. This is due to the increase in specific consumption of fuel equivalent at thermal power plants GRES-1 and GRES-2. At the first station the consumption increased from 344.2 g/kWh to 347.1 g/kWh, and at the second station — from 366.3 g/kWh to 381.3 g/kWh. These changes reflect the growing challenges in waste management and emphasize the need to adopt more efficient technologies to reduce the environmental impact of production activities.

Total waste volume of Samruk-Energy JSC enterprises, tons

Indicator	2021	2022	2023	Δ 2023/2022, %
Total waste generated, of which	**88,839,712.0**	**89,929,927**	**98,496,096**	**9.5**
Hazardous	5,586,889.2	647	**1,732**	169
Non-hazardous	83,252,822.0	89,928,281	**98,496,364**	9.5
Of these, for the main types of waste, characteristic of the specifics of production	**87,472,541.0**	**89,912,724.9**	**98,474,212.4**	**9.5**
ash and slag waste	7,226,582.0	7,129,158.2	**8,853,230.0**	24.2
Overburden	80,245,959.0	82,783,566.7	**89,620,982.3**	8.3

Plans for 2024 and the medium term

In 2024, we plan to prevent pollution of natural environment components. Accumulation and disposal of waste will be carried out in accordance with international standards and current regulations of the Republic of Kazakhstan, as well as the Company's internal standards. We will ensure that waste does not have a harmful impact on the environment and the health of employees.

As part of the implementation of the concept on transition of the Republic of Kazakhstan to 'Green Economy' we will transfer ash and slag wastes for road construction and use as construction material to individuals and legal entities in full volume.

We have devised the Action Plan for implementation of the waste management program for 2024. The main activities of the Plan include transfer of generated hazardous and non-hazardous waste to third-party organizations for further utilization and carrying out works on development of ash and slag materials with dust suppression at sections.

Biodiversity conservation

Management approach

GRI 3-3, 304-1, GRI 12: Coal Sector: 12.5.1, 12.5.2

We are deeply aware of our responsibility to conserve biodiversity and are committed to avoiding any activities in regions of high biodiversity value. We aim not only for 'zero net loss' but also to achieve 'positive net impact' on biodiversity in all our operations. This includes the construction of new facilities, the modernization and operation of existing facilities, and their subsequent dismantling.

We have implemented a Corporate Environmental Management Standard, which is the basis for our commitment to implementing measures to protect nature. This standard aims to prevent or minimize the impact of our operations on biodiversity and includes strategies to conserve nature, manage environmental risks and aspects affecting biodiversity.

As part of our conservation strategy, we have identified key areas of focus to maintain and protect biodiversity:

- Active introduction of advanced technologies that significantly reduce the environmental impact of production;
- Development and implementation of specialized programs aimed at protecting and preserving biodiversity on lands adjacent to production zones;
- Regular monitoring of the environment to promptly identify and eliminate potential threats to ecosystems.

Indicators for 2023

We are committed to avoiding activities in protected areas and do not own facilities in these areas. We do not own or lease work sites and adjacent territories located in protected areas or areas of high biodiversity outside protected areas. In addition, we strictly comply with all requirements of the environmental legislation of the Republic of Kazakhstan to ensure compliance with environmental regulations.

In all aspects of our operations, from power generation to decommissioning, we actively work to protect and enhance natural ecosystems.

In this context, wildlife conservation projects are implemented, cooperation is established with scientific and research institutes, as well as with governmental bodies. One example of subsidiaries and affiliates interaction with international environmental organizations is Moynak HPP JSC, which cooperates with UNDP experts in Kazakhstan on a project to preserve a relic ash grove located downstream of the Charyn River. In addition, we strictly comply with all established internal regulatory standards aimed at protecting and maintaining biodiversity both within and outside the Company's operations.

In accordance with the requirements of the environmental legislation of the Republic of Kazakhstan, when expanding or modernizing production activities, the Company analyzes the possible impact on the ecological system, as well as the biological diversity of the region where our production facilities are located. In order to ensure public participation in management decision-making, the Company organizes public hearings to provide access to project materials for all interested parties.

For example, in 2023, during the development of working design documentation for the construction of power units 3 and 4 of EGRES-2 JSC, public hearings were held, following the results of which a protocol was signed without public comments.

Based on the results of continuous environmental monitoring, it was established that no significant direct or indirect effects of subsidiaries and affiliates activities on vulnerable ecosystems and biodiversity were observed during the reporting period.

GRI 304-4, GRI 12: Coal Sector: 12.5.5

According to the Final Report of the zoological survey, dated 07.10.2013, at the site of the proposed construction of a 45 MW wind power plant near the town of Ereimentau (FWPP LLP), two bird species listed in the Red Book of Kazakhstan were recorded in the mountainous area of Ereimentau: Imperial Eagle and Steppe Eagle. Bird groups were recorded in valleys and plantations along roads and railroad tracks, at a distance from the planned wind turbines. The assessment showed that the risk of collision of these birds and other birds with wind turbines is negligible. No incidents of collisions of migratory birds with wind turbines have been recorded during the period of operation of the wind farm, as evidenced by entries in a specialized logbook.

Our key production facilities are located in the Pavlodar and Almaty regions, which are characterized by intensive industrial development and associated high levels of anthropogenic impact on the environment. These facilities are located in areas designated for industrial use, which are not inhabited by flora and fauna species listed in the Red Book or endangered species. The environmental footprint of our operations is minimized and continuously monitored to ensure minimal impact on the natural environment.

GRI 304-2, 304-3, GRI 12: Coal Sector: 12.5.3, 12.5.4

We actively care about the preservation of biodiversity, guaranteeing the protection of flora and fauna within the framework of our activities. The implementation of targeted programs and initiatives confirms our contribution to the UN Sustainable Development Goals 14 and 15. This reflects our commitment to harmony with nature and responsible business conduct, supported by concrete actions to protect the environment and maintain its biodiversity.

In 2023, the Company's subsidiaries and affiliates invested KZT 115 thousand for the improvement and landscaping of the sanitary protection zone, which is 98.3% higher than the previous year's investment.

Investments in biodiversity conservation, KZT million

2021	2022	2023	Δ 2023/2022, %
0.095	0.058	**0.115**	98.3

In an effort to reduce risks to fish populations, our Company's hydroelectric power plants are equipped with specialized fish protection systems on hydro turbines. In accordance with scientific recommendations from the Kazakh Research Institute of Fisheries, we take additional measures to protect spawning fish. One such initiative is the illumination of the water surface with spotlights at night at water intakes in front of turbine conduits, which effectively repels fish and minimizes their entry into turbine devices, contributing to the conservation of fish resources in the river ecosystem.

To reduce the risk of death to birds, which often use overhead power line poles as resting places, we are implementing a project to reconstruct these poles by equipping them with insulated wires. This reduces the likelihood of electrical contact injuries to birds, helping to maintain their populations and ensuring their safety in areas where power lines are installed.

To minimize the impact on aquatic and terrestrial ecosystems, the operating regimes of hydropower plants are coordinated with the Ministry of Water Resources, local authorities, and the management of specially protected natural areas, especially in the context of the Moynak HPP. Also, the regulation of water flows for agriculture (irrigation) and water supply is carried out in close cooperation with the relevant authorized bodies, balancing the interests of all parties and protecting natural ecosystems.

At the pre-project and project preparation stages of wind turbines, special attention is paid to reducing their impact on the natural environment. In particular, in order to reduce light pollution, which may disturb the natural biorhythms of flora and fauna, as well as to maintain and restore biodiversity, lighting on wind turbines is limited to a minimum, being used only in the form of necessary parking lights.

Land conservation

We are committed to a strong commitment to land reclamation that significantly reduces negative environmental impacts while maximizing environmental and social benefits. In order to ensure the sustainability of closure and rehabilitation of waste pits, we are committed to allocating significant resources to cover all costs associated with these processes.

A key aspect of post-closure reclamation of waste pits is community engagement, which not only increases the transparency of our actions, but also takes into account the interests and expectations of local communities. This collaboration fosters a deeper understanding of community needs and provides the basis for developing effective ecosystem restoration plans.

We pay particular attention to the development and implementation of measures aimed at reducing the impact of our activities on the natural environment. In this context, special attention is paid not only to restoring the ecological value of reclaimed areas, but also to supporting biodiversity and protecting unique ecosystems.

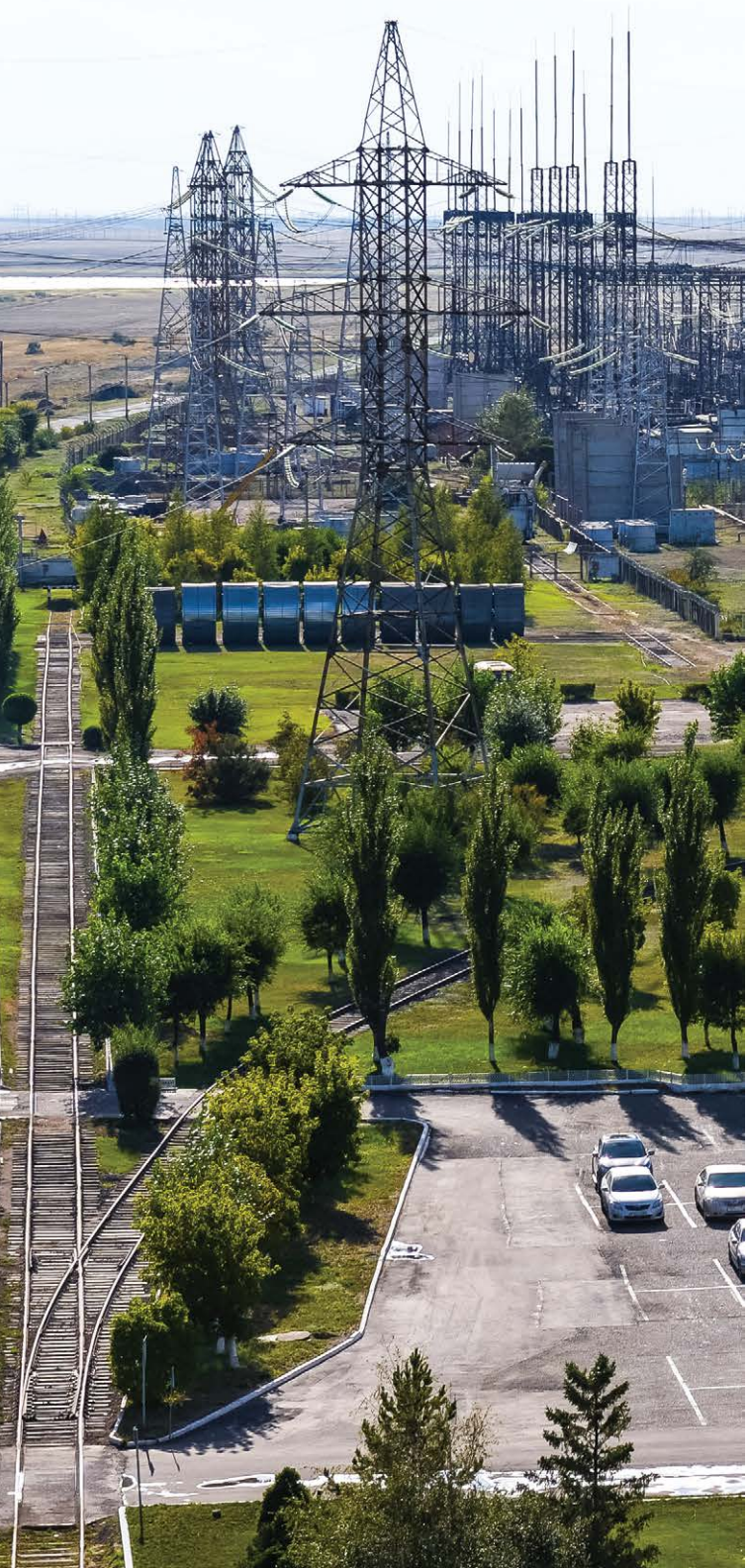
Elimination of ash dumps

In accordance with the Environmental Code, we have a legal obligation to eliminate ash dumps, which are specialized areas for disposal of waste generated in the course of our operations.

In 2023, the estimated value of the fund for ash dumps liquidation amounted to KZT 3,143.4 million, which is 26.6% higher than in the previous year. This increase is due to the higher cost of works and materials for reclamation.

Carrying amount of reserve for ash dumps liquidation, KZT million

2022	2023	Δ 2023/2022, %
2,482.0	3,143.4	26.6



The assessment of the current provision for ash disposal site remediation on our part is based on an interpretation of current environmental legislation of the Republic of Kazakhstan, which is supported by technical and economic arguments and engineering studies based on current standards and methodologies for reclamation and remediation works. This assessment assumes the possibility of adjustment in response to the results of future environmental studies and updates to current reclamation and remediation programs.

Plans for 2024 and the medium term

We are actively engaged in developing and implementing strategies aimed at improving the environmental situation and maintaining sustainable development. In this context, the following key actions are planned:

- Greening of the territory, increase of green areas;
- As part of industrial environmental control, regular laboratory tests are planned to monitor and assess the environmental impact of the Company's operations;
- Recultivation of spent areas of ash dumps is being designed, which includes their restoration and transformation into environmentally safe and functional zones.