Improving the efficiency of heat and water supply

To advance its strategic objectives, improve energy efficiency, and mitigate environmental impact, the Company carries out annual upgrades of its heat and water supply infrastructure.

2023 highlights:

- two advanced gas-fired boiler houses were constructed at the Agryz and Balezino stations, replacing the previous fuel oil-fired units, and a mobile cogeneration unit using old wooden sleepers as fuel was introduced at the Kanash station;
- two boiler houses at the Bryansk-Lgovsky and Sukhinichi-Glavnye stations were converted from fuel oil to gas;
- automated state-of-the-art coal-fired boiler houses were commissioned at the Uzhur and Karasuk stations;
- small modular coal-fired boiler houses designed for remote unmanned operation were successfully introduced across the Sverdlovskaya, West-Siberian, Krasnoyarskaya, Far Eastern, and Trans-Baikal railways.

As part of its Heat and Water Supply Digitalisation Programme, the Company implemented the following initiatives in 2023:

- advancing the Automated Accounting and Billing System for Housing and Utility Services, which reduced the volume of manual data entry;
- developing the Unified Automated Infrastructure Management System by introducing a Unified Database of Heat and Water Supply Facilities;
- launching a data visualisation and real-time monitoring service for the Russian Railways heat and water supply facility operations.

Air protection

GRI 3-3

In its operations, Russian Railways seeks to minimise air pollutant emissions from stationary and mobile sources. The Company conducts regular internal checks of mainline and shunting diesel locomotives and track maintenance equipment for compliance with technical standards for air pollutant emissions through the use of environmental monitoring points furnished with diagnostics facilities. Emissions are also measured following diesel locomotive rheostat testing.

Emissions by category, kt

GRI 305-7

Parameter	2019	2020	2021	2022	2023
Stationary sources					
Solids	11.8	10	9.3	8.2	7.7
Carbon monoxide (CO)	20.8	18.5	17.4	16.9	16.7
Sulphur dioxide (SO$_2$)	11.9	10.5	9.5	8.8	8.1
Nitrogen oxides (N$_n$O$_m$)	6.8	5.7	4.9	4.5	4.0
Hydrocarbons (C$_n$H$_m$)	0.1	0.1	0.1	0.1	0.1
Volatile organic compounds	2.2	1.9	1.5	1.3	1.1
Other gases and liquids	0.1	0.1	0.1	0.1	0.1
Mobile sources (diesel locomotives)					
Carbon monoxide (CO)	30.7	28.7	29.4	25.6	30.1
Hydrocarbons (C$_n$H$_m$)	15.7	14.6	15.1	15.5	14.3
Nitrogen oxides (N$_n$O$_m$)	113.5	105.5	108.8	103.2	110.7
Soot	6.9	6.4	6.6	6.0	6.7

Stationary sources

Emissions from stationary sources make up around 18.9% of all emissions by Russian Railways.

As part of the corporate Environmental Strategy, the Company cut its pollutant emissions from stationary sources in 2023 by 5.6% y-o-y, exceeding the target of 3.2%. This overachievement can be attributed to the additional conversion of small-capacity boiler houses from coal to electrothermal power, a reduction in bulk cargo handling, and modifications to the procedure for assessing stationary emission sources and air pollutant emissions[1], which led to recalculated emission figures. Also, the Company secured further savings in fuel and energy resources.

We are also increasing the share of alternative energy used in hot water and heat supply systems (solar collectors and heat pumps). We replaced small coal and diesel boilers with 43 boilers running on pellet fuel. The Company is also reconstructing and installing new dust collection and gas purification facilities.
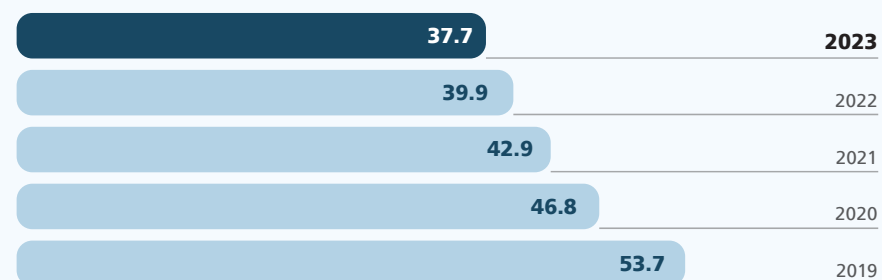
At present, gas boilers produce as much as

45.5 %

of heat energy

43 boilers

running on pellet fuel

Air pollutant emissions from stationary sources, kt

37.7		**2023**
39.9		2022
42.9		2021
46.8		2020
53.7		2019

Mobile sources

Emissions from mobile sources make up around 81.1% of gross emissions of which approximately 87.8% come from mainline and shunting diesel locomotives. Initiatives to make transportation more energy efficient helped us reduce diesel driven transportation, cut downtime and time to cover delay for passenger trains, and decrease per unit diesel consumption in train traction. These factors enabled a reduction in per unit emissions of pollutants into the air from mobile sources, achieving a level of 33.6 mg/tkm against the target of 36.9 mg/tkm (down by 8.9%).

[1] Approved by Order No. 871 of the Russian Ministry of Natural Resources and Environment dated 19 November 2021.

Waste management

GRI 3-3, 306-2

Russian Railways views efficient waste management as a prerequisite for transitioning to the circular economy. In the long run, the Company seeks to minimise waste sent to landfills by increasing its processing.

Production and consumption waste

GRI 306-3, 306-4, 306-5

In 2023, Russian Railways generated 1.44 mt of production and consumption waste, of which 0.075 mt was disposed of or decontaminated by the Company's units. Given the waste generated by other business units in 2023, 1.55 mt of waste was transferred to third parties, including:
- 1.18 mt for subsequent disposal;
- 0.19 mt for decontamination;
- 0.18 mt for burial.

In 2023, the share of production and consumption waste sent to be buried amounted to 11.7%, which is 2 pp below 2022 (13.7%).

The Russian Railways Group's processes result in production and consumption waste of various hazard classes.

Structure of waste generation by hazard class in the reporting year

In 2023, Russian Railways generated 1.437 kt of production and consumption waste:
- Hazard class 1 – 124.42 t;
- Hazard class 2 – 126.98 t;
- Hazard class 3 – 134.56 t;
- Hazard class 4 – 189.21 t;
- Hazard class 5 – 1,113.40 t.

In 2023, the Company revised existing contracts and entered into new construction agreements with a focus on incorporating environmental safety requirements and traceability throughout the waste management cycle.

Over 85% of the waste generated by Russian Railways is decontaminated, reused or recycled. Most of it (ferrous and non-ferrous scrap metals and used petroleum products) is handled by waste processing professionals. In addition, waste is disposed of and decontaminated in accordance with the classes 1–4 waste management licence obtained by Russian Railways[1].

Waste generation and waste sent to landfills[2]

11.7	1,437	**2023**
13.7	1,412	2022
14.8	1,412	2021
16.4	1,406	2020
17.0	1,488	2019
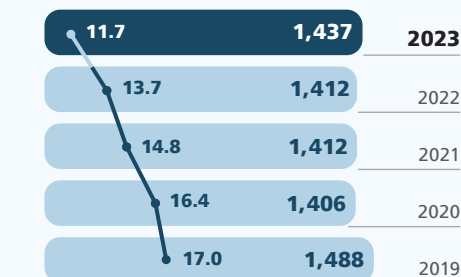
- Production and consumption waste, kt
- Share of waste sent to landfills, %

[1] Licence No. L020-00113-77/00114264 dated 21 December 2021.
[2] The share is calculated based on waste generated (taking into account waste accumulated as at the beginning of the period) and sent to be buried (including municipal solid waste transferred to a regional operator) in the reporting period in accordance with the 2-TP federal statistic form (waste) as regards reporting of industrial and consumer waste generated, processed, disposed of, decontaminated and sent to landfills.