

GHG emissions

GRI 305-1, 305-2, 305-4

Despite growth in transportation, Russian Railways reduced its total GHG emissions in 2023 to 36.9 mt of CO₂.

Indirect energy-related emissions make up more than half of the aggregate emissions in terms of mass. In 2023, their share reached 71.5%.

GHG emissions, both direct and indirect, are consolidated at the operational level. The boundaries are set based on financial and operational control, taking into account the territorial principle.

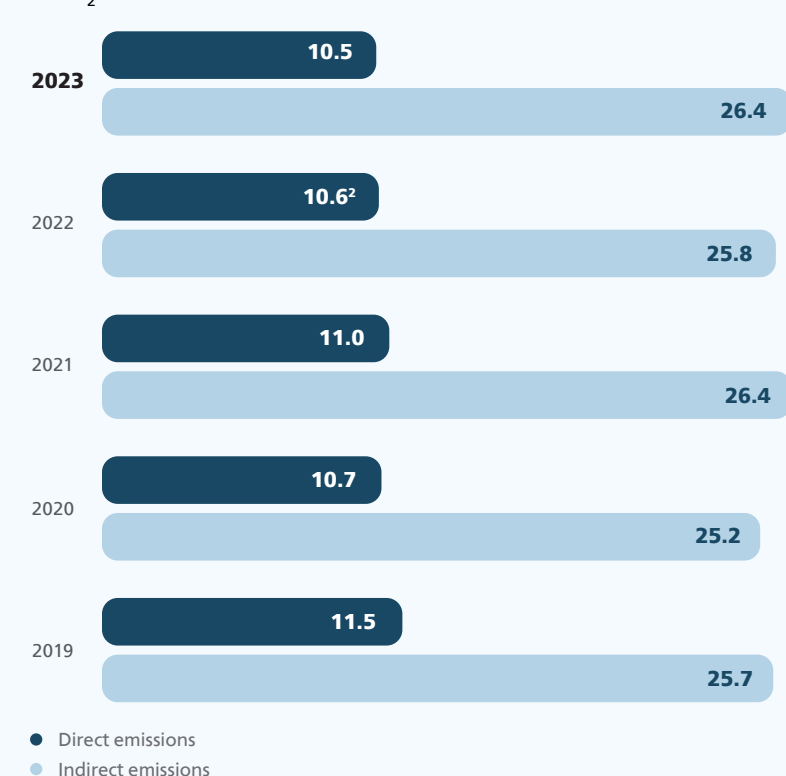
GRI 305-5

In 2023, the reduction in GHG emissions from the implementation of the Company's Environmental Strategy and Energy Strategy amounted to 485,085 t of CO₂, comprising:

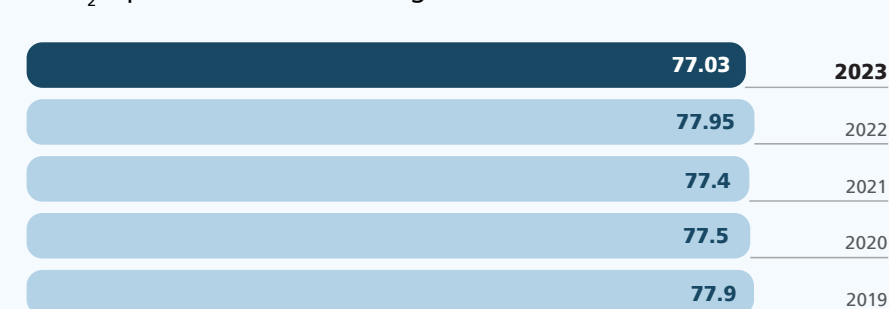
- direct emissions of 237,053 t;
- indirect emissions of 248,032 t.

The parameter of Russian Railways' carbon intensity is a specific indicator of total direct and indirect energy emissions of greenhouse gases per unit of work performed (gross tkm). This indicator most accurately reflects the Company's efforts related to low-carbon development, as it does not depend on the volume of services provided.

Direct and indirect energy-related emissions in 2019–2023, mt of CO₂¹



GHG emissions per transportation volumes in 2019–2023, kg of CO₂ equivalent / 10 thousand gross tkm



¹ In accordance with Order No. 371 of the Russian Ministry of Natural Resources and Environment dated 27 May 2022, and Decree No. 707 of the Russian Government dated 20 April 2022, GHG emissions are calculated only for CO₂.

² The 2022 Russian Railways Sustainable Development Report presented the emissions figure as 11.5 mt of CO₂. However, due to the requirement to prepare statutory reporting, in 2023 this indicator was recalculated in line with the national methodology (as per Order No. 371 of the Russian Ministry of Natural Resources and Environment dated 27 May 2022).

In 2023, Russian Railways' carbon intensity reached 77.03 kg of CO₂ equivalent / 10 thousand gross tkm. This was mostly driven by a high degree of electrification of Russian Railways' infrastructure, with more than 51% of the total operating length of railways electrified.

The Company is implementing an Energy Savings and Energy Efficiency Programme. The following two areas made the most significant contribution:

- improving the energy efficiency of transportation operations;
- enhancing the efficiency of resource utilisation in stationary power generation.

These focus areas encompass approximately 130 initiatives aimed at improving traffic management, the condition of track infrastructure, increasing energy efficiency of heat generation, and more.

Other important contributors were efforts to improve energy efficiency and the performance of locomotives, processes and infrastructure facilities; and higher level of energy recovery on electric traction. Electrification of railway infrastructure reduced the volume of diesel-powered operations on a number of railways.

By 2030, Russian Railways plans to electrify the Rtishchevo 1 – Kochetovka 1 section of the South-Eastern Railway with an operational length of 262 km, and Volochnaevka 2 – Komsomolsk-Sortirovochny – Vanino of the Far Eastern Railway with an operational length of 820 km.

Shifting to new types of rolling stock is essential for reducing GHG emissions. To this end, Russian Railways purchases modern Russian-made rolling stock with improved environmental performance.

Alongside enhancing its traction fleet with new locomotive models, the Company is also pursuing projects to develop and introduce eco-friendly traction rolling stock. These include initiatives to bring into service gas- and hydrogen-powered rolling stock between 2027 and 2028.

The Company is actively preparing the groundwork for its forthcoming climate projects. As part of these efforts, in 2023 it continued cooperation with Bauman Moscow State Technical University as part of the agreement to set up the Bauman GoGreen Consortium.

Energy efficiency

Russian Railways maintains leadership in energy efficiency and environmental friendliness among freight and passenger railway companies.

GRI 3-3, 302-3

To achieve our strategic targets in reducing carbon intensity, we take steps outlined in the Energy Strategy through 2030 with an outlook through 2035, annual Energy Savings and Energy Efficiency Programme, industry investment programmes of our branches, and programme of organisational and technical initiatives for 2020–2025¹.

Key areas in energy saving and efficiency:

- improving the energy efficiency of transportation operations;
- developing the power grid to reduce energy losses and make it more energy efficient;
- using stationary and non-traction energy more efficiently.

Russian Railways is advancing its energy-saving initiatives through investment programmes to upgrade fixed assets and the investment project to introduce resource saving technologies in railway transport.

In 2023, the Company went through with all of its essential energy saving activities covering both train traction and stationary units, which made it possible to achieve the targets for energy savings and energy efficiency improvement under the corporate Long-Term Development Programme². In 2023, the energy efficiency of Russian Railways' operations improved by 0.6% year-on-year.

¹ Approved by Russian Railways' Order No. 2651/r dated 27 November 2019.

² Order No. 466-r of the Russian Government dated 19 March 2019.

In the reporting year, the Energy Efficiency Programme helped achieve fuel and energy savings of 5,872.4 TJ, or RUB 6.463 bn.

The initiatives to improve energy efficiency of the transportation process served to save RUB 5.3 bn, including 548.3 m kWh of electricity and 50.8 kt of diesel fuel. The bulk of savings was achieved by improving locomotive operations (62.8%) and traffic management (28.8%).

The improved energy performance of traction power supply saved 16.9 m kWh, or RUB 70.6 m, while that of stationary power facilities saved RUB 1.2 bn, including:

- RUB 466.9 m in fuel and energy savings across thermal generation facilities and heating systems;
- RUB 208.6 m in fuel and energy savings across processes and infrastructure;
- RUB 189.3 m in savings from introducing LED systems, using energy-efficient lights, and optimising lighting operation.

Russian Railways utilised its Energy Efficiency automated information system to manage energy efficiency initiatives across its operations. This included the decomposition

of performance targets for the structural units of Russian Railways branches, the adjustment of their implementation programmes, and the quarterly monitoring of the efficiency of the technical solutions and technologies used. The system was leveraged by employees from more than 2,187 structural units of the Company's branches operating in 77 regions across the country.

Summary data on the achievement of fuel and energy savings targets by Russian Railways branches in 2023 are shown in Tables 1 and 2 of the [Annex to the Energy Efficiency section](#).



In 2023, the Company's investment project to introduce resource-saving technologies in railway transport covered the launch of 410 technical solutions worth RUB 0.8 bn, including:

- deployment of 270 resource-efficient onboard locomotive systems (81 wheel-slip protection solutions and 189 driver information systems);
- IoT-based upgrade to improve energy efficiency of lighting systems at the Gukovo station;
- supply of lighting equipment for the railyards of the Orenburg and Chelyabinsk stations, the Anisovka depot, and the Losta 113 track maintenance station;
- launch of a mobile cogeneration unit at the Kanash station using old, unusable wooden sleepers as solid fuel;
- commissioning of two new gas boiler houses at the Sukhinichi-Glavnye and Bryansk-Lgovsky stations;
- procurement of steam generators for the boiler house at the Moskovka station;

- procurement of 136 units of reference equipment for different measurements for railways' metrology centres.

In line with the national focus on transitioning to low-carbon and zero-carbon energy resources, the Company's Energy Strategy places a special emphasis on low-carbon development. The main initiatives in this area include:

- electrifying the most intensively used railway sections still operating with diesel traction;
- upgrading heat and power facilities by transitioning to natural gas and electricity instead of fuel oil and coal, as well as utilising renewable sources for heat and power generation;
- developing alternative traction technologies (using gas, electricity, energy storage systems, and hydrogen).

The implementation of the Company's sustainable low-carbon development initiatives is underway at various stages.

The 2023 savings from using the resource-efficient technologies deployed in 2022 amounted to RUB 203.2 m, or 112.7% of the target.

Renewable and low-carbon energy consumption in 2023 reached 18.6 bn kWh, accounting for 39.5% of total electricity supplied to Russian Railways over the year.

Russian Railways is carrying out innovative research to enable the use of liquefied natural gas as an alternative energy source for train traction, in line with the Russian President's and the Russian government's instructions.

Performance against energy saving and energy efficiency targets

Performance against targets	Target	Unit of measurement			
		2022		2023	
		Plan	Actual	Plan	Actual
Energy intensity of operations	kJ / virtual tkm net	85.7	85.7	85.1	85.1
Reduction in the energy intensity of operations	kJ / virtual tkm net	-0.5	-0.5	-0.6	-0.6
	%	-0.6	-0.6	-0.6	-0.6
Energy efficiency of operations	10,000 virtual tkm net / kJ	116.7	116.7	117.5	117.5
Energy efficiency improvement (ΔE)	10,000 virtual tkm net / kJ	0.7	0.7	0.8	0.8