

Energy efficiency

GRI 302-1, 302-3, 302-4

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

Every year, the Company implements the Energy Savings and Energy Efficiency Programme as part of the Company's Energy Strategy through 2020 and potentially through 2030. In

2021, the Company set out to develop its new Energy Strategy through 2025 with an outlook through 2035, with a view to updating the priorities of the Russian Railways' energy management and the targets of the Company's energy efficiency.

Tools for the Company's efforts to save energy are its industry-specific programmes aimed at upgrading the Company's branches and its

investment project titled "Introduction of Resource-Saving Technologies in Railway Transport". In 2021, 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 Long-Term Development Programme.

Energy efficiency and energy intensity of Russian Railways' operations in 2021, %

Target	Target for 2021	Actual for 2021
Reduction in the energy intensity of operations	-0.6	-0.6
Energy efficiency improvement	0.6	0.6

In the reporting year, the Energy Efficiency Programme helped achieve fuel and energy savings of 4,221.6 TJ, or RUB 4.0 bn.

In 2021, initiatives implemented by the Company's divisions as part of the Energy Efficiency Programme saved:

- 460.0 m kWh of electricity;
- 32.2 kt of diesel fuel;
- 0.8 kt of petrol;
- 1.8 kt of fuel oil;
- 8.8 kt of coal;
- 8.6 mcm of natural gas;
- 63,900 Gcal of heat.

The activities improving energy efficiency of the transportation process served to save RUB 2.9 bn, including 347.0 million kWh of electricity and 27.4 kt of diesel

fuel. The bulk of savings was achieved by improving traffic management procedures (41.3%) and locomotive operation (40.4%). The improved performance of traction power supply saved 23.7 m kWh, or RUB 81.5 m.

Energy efficiency improvement at stationary power facilities saved RUB 1.1 bn, including:

- activities to boost energy efficiency of thermal generation and heating systems facilities, which served to save fuel and energy resources in the amount of RUB 337.6 m;
- initiatives aimed at improving energy efficiency of the workflow and infrastructure, resulting in fuel and energy savings in the amount of RUB 247.6 m;

- introduction of LED devices, energy-efficient lighting fixtures, optimisation of the lighting operation patterns at the station railyards, terminals, technical and administrative buildings, and warehouses, with the resulting economy of RUB 208.7 m.

Despite a decline in the capacity for fuel and energy saving, the rate of Russian Railways' energy intensity reduction is quite stable due to Russian Railways' investments in energy saving.

Russian Railways is carrying out innovative development to use liquefied natural gas as an alternative energy source for train traction, in line with the Russian President's and the Russian Government's instructions. The Company seeks to replace 25% of diesel fuel consumed by autonomous locomotives with natural gas by 2030.

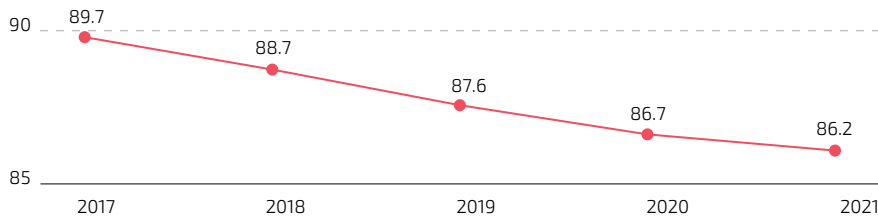
These efforts are part of the cooperation agreement with locomotive manufacturers that focuses on using natural gas as a motor fuel. The programme stipulates development,

production and maintenance of new gas powered locomotives, as well as deploying liquefied natural gas supply infrastructure and drafting regulations. Another work stream envisaged by the programme is the upgrade of mainline and shunting locomotives, which will enable them to run on natural gas. The 2021 savings from using the resource-efficient technologies deployed in 2020 amounted to RUB 176.4 m, or 130% of the target. In 2021, the Company:

- introduced 405 and supplied 122 resource-efficient onboard locomotive systems to save fuel and energy resources for train traction;
- implemented IoT-based energy-efficient lighting systems;
- replaced fuel oil and diesel fuel with alternative fuels in nine boiler houses, including three completed in 2021;

- introduced the innovative technology of remote acoustic sensing of long linear assets in interval train traffic control systems between Rzhev-Baltiysky and Velikiye Luki (three sections between Monchalovo and Olenino);
- put into operation 59 metering devices for fuel and energy resources;
- replaced an obsolete coal boiler with a heat pump at the Penza II railway station and supplied 13 pumps to the Privolzhskaya and North Caucasus railways;
- supplied five VPV-135K scale test cars;
- procured 32 units of reference equipment for different measurements for railways' metrology centres.

Energy intensity of Russian Railways' operations | kJ / virtual tkm net



Targets for reducing energy intensity of operations, kJ / virtual tkm net:

- to 84.5 by 2025
- to 82.7 by 2030
- to 81.5 by 2035