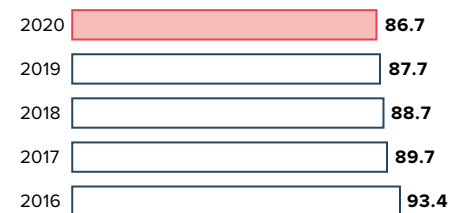


# Energy efficiency and conservation

Russian Railways maintains leadership in energy efficiency and environmental friendliness among global freight and passenger railway companies. Russia ranks first globally in terms of energy efficiency in rail freight transportation, outperforming European railways, as well as those in China, India, Japan and the USA. As regards energy efficiency in passenger transportation, Russia comes in fourth after India, China, and Japan.

Every year, the Company shapes and implements the Energy Savings and Energy Efficiency Programme as part of the Company's Energy Strategy through 2020 and potentially through 2030. In 2020, the Company set out to develop its new Energy Strategy through 2025 with an outlook through 2035, with a view to analysing the implementation of the current strategy and updating the priorities of the Russian Railways' energy management and the targets of the Company's energy efficiency.

## Energy intensity of the Russian Railways' operations, kJ / virtual tkm net



## Energy efficiency and energy intensity of the Russian Railways' operations

Target	Target for 2020	Actual for 2020
Reduction in the energy intensity of operations, %	-0.6	-1.0
Energy efficiency improvement, %	0.6	1.0



In the reporting year, the Energy Efficiency Programme helped to achieve fuel and energy savings of 6,566.4 TJ, or RUB 5.3 bn.

In 2020, initiatives implemented by the Company's divisions as part of the Energy Efficiency Programme saved:

- 814.7 m kWh of electricity for RUB 2,982 m;
- 44.2 kt of diesel fuel for RUB 1,897 m;
- 0.9 kt of petrol for RUB 40 m;
- 12.4 kt of fuel oil for RUB 140 m;
- 21.9 kt of coal for RUB 49 m;
- 13.6 mcm of natural gas for RUB 74 m;
- 69.6 k Gcal of heat energy for RUB 142 m.

The activities improving energy efficiency of the transportation process served to save 621.3 m kWh of electric power and 34.5 kt of diesel fuel, accounting for over RUB 3.7 bn. The bulk of savings (54.6%) was achieved by improving traffic management procedures, for example, using energy efficient firm-time slots, including installation of automatic locomotive operation and driver information systems, reduction in train downtime at intermediate stations and in the empty-run ratio.

The initiatives improving locomotive operation saved 117.7 m kWh of electricity and 16.0 kt of diesel fuel for the amount exceeding RUB 1.1 bn.

Russian Railways is carrying out innovative development to use liquefied natural gas as an alternative energy source for train traction, in line with the President's and the Government's instructions. The programme stipulates development, production and maintenance of new gas powered locomotives, as well as deploying liquefied natural gas supply infrastructure and drafting regulations. Liquefied natural gas for locomotive operation is supplied by Gazprom.

Energy efficiency improvement of the stationary power facilities saved more than RUB 1.7 bn. This included:

- 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 369.2 m;
- introduction of LED devices, energy-efficient lighting fixtures and control devices, optimisation of the lighting operation patterns at the station railyards, terminals, technical and administrative buildings, and warehouses, with the resulting economy of RUB 256.3 m;
- initiatives aimed to improve energy efficiency of the workflow and infrastructure, resulting in fuel and energy savings in the amount of RUB 448.9 m.

Despite a decline in the capacity for fuel and energy saving, the rate of Russian Railways' energy intensity reduction is quite stable against the benchmarks set by the UIC (kJ/tkm), largely due to Russian Railways' investments in energy saving.

In 2020, the investment project on introduction of resource-saving technologies in railway transport covered the launch of 1.2 k technical facilities to the amount of RUB 1.3 bn (98% of the target), including:

- 858 resource-efficient locomotive onboard systems;
- IoT-based energy-efficient lighting systems, including those at 4 station railyards and track maintenance stations;
- 164 high-mast lighting units using advanced lighting devices;
- 15 heat pumps at the domains of the Privolzhsk and North Caucasus Railways to replace the obsolete inefficient small boilers;
- 84 rolling stock jack stoppers;
- 5 scale test cars;
- 16 sets of reference equipment for metrology.

The 2020 savings from using the resource-efficient technologies deployed in 2019 amounted to RUB 313 m, or 132% of the target.