

# Business review

## Market overview

Metals segment



### Global demand for aluminium<sup>1</sup>

**In 2024, the worldwide economic landscape faced persistent inflation challenges, increasing interest rates, ongoing trade wars, swift consumption growth in China's green industries, a slow rebound in European production, and rapid production growth in the US. In addition, in 2024 decarbonisation accelerated on the back of the adoption of stricter international standards for greenhouse gas emissions, rising consumer demand for sustainable products and the increasing importance of environmental, social and governance (ESG) criteria.**

**72.6** mt

Global aluminium consumption in 2024, +3.1% y-o-y

Thus, consumption rates in the global aluminium market saw further growth. In 2024, global aluminium consumption amounted to 72.6 mt, which is 3.1% higher year-on-year. China's consumption rose to 45.1 mt, a 5.0% increase from the previous year. The achievement was made possible by governmental support initiatives that aimed to speed up economic development, which in turn fostered an increase in aluminium demand. As for aluminium consumption in the rest of the world (outside China), there was a slight increase of 0.5% year-on-year to 27.5 mt in 2024. Demand growth intensified in the second half of 2024 and was recorded in all aluminium consumption areas, but stronger growth was seen in construction, packaging and electricity.

The automotive industry remains the main consumer of aluminium (25.6% of total aluminium consumption). Although the production of automobiles declined by 1.6% in 2024, aluminium consumption continued to grow, driven by the increasing adoption of electric vehicles. The electric vehicle market is expanding due to stricter emission standards, government incentives and advances in battery technology. In addition, the development of charging station infrastructure and increasing consumer demand for sustainable transport is accelerating this growth. This has been largely due to the production of electric vehicles. According to Rho Motion, a leading electric vehicle research company, global sales of electric vehicles in 2024 grew 25% from 2023. The Chinese automotive industry accounts for a significant portion of this growth, rising by 36% year-on-year. This was significantly influenced by plug-in hybrid electric vehicles (PHEVs), which surged by 81%, while the battery electric vehicle (BEV) segment only increased by 19%. Increasing demand for range-extended electric vehicles (REEVs) played a significant role in the growth of PHEVs in China, although this technology is yet to be widely adopted in Western markets.

The construction industry remains the second largest consumption sector, accounting for 19.9% of global aluminium consumption. Signs of a slowdown in China's construction sector first became evident in 2022, as the industry grappled with decreased investment levels, stalled construction projects, and a weakening real estate market leading to a long-term reduction in the demand for aluminium. By 2024, the risk of deflation in China intensified, which prompted the government to take measures to prevent a further decline in the construction sector. Despite the government's best efforts, aluminium consumption in China's construction sector again fell by 4.8%. Globally, aside from China, the outlook appeared more positive as the year concluded. The global construction industry showed the first signs of recovery in the second half of 2024, as interest rates

began to fall, which reduced the cost of borrowing and encouraged new investment. This shift helped stabilise aluminium demand in regions such as North America and Europe, where infrastructure modernisation and sustainable construction projects increased.

Aluminium consumption in the packaging sector in 2024 grew to 16.4% of global consumption resulting from the expansion of production facilities, the launch of new plants and high consumer demand. Furthermore, a growing consciousness about environmental issues among consumers, along with more stringent regulations in the EU, US, and various other nations targeting the reduction of plastic waste, led to a rise in the use of aluminium. High-end cosmetic and beverage brands are progressively adopting aluminium packaging to enhance their eco-friendliness and brand perception.

The electrical engineering sector also showed strong growth in 2024, accounting for 16.3% of global aluminium consumption. In its September 2024 analysis, Ember estimated that the total capacity of solar panels installed around the globe would amount to 593 GW by year-end. This marks a 29% rise compared to last year's installations, maintaining robust growth following an 87% surge in 2023. This growth is in line with global investment in energy infrastructure, which, according to the International Energy Agency (IEA), exceeded USD 2 trillion, with investment in green energy covering renewables, electric vehicle infrastructure and energy storage, for the first time ever reaching double the level of funding for fossil fuels. With an impressive investment of USD 675 billion, China topped the worldwide green energy funding competition, while Europe and the United States followed with USD 370 billion and USD 315 billion, respectively.

### Global aluminium supply

The worldwide supply of primary aluminium was up 2.5% year-on-year to 72.6 mt in 2024. Production in the rest of the world (excluding China) increased by 1.0% to 29.4 mt, driven by production restarts and capacity expansions in South America and India.

Aluminium production in China in 2024 rose by 3.8% year-on-year to 43.2 mt. With aluminium production capacity in China already peaking at 45 mt, further growth will be limited. By end-2024, the Chinese manufacturing sector posted net capacity additions of about 1.8 mt to 43.9 mt, taking into account new capacity additions totalling 0.43 mt and the restarts of production suspended earlier (1.87 mt). China's aluminium production capacity reached 45.4 mt by the end of 2024 (excluding illegal capacity).

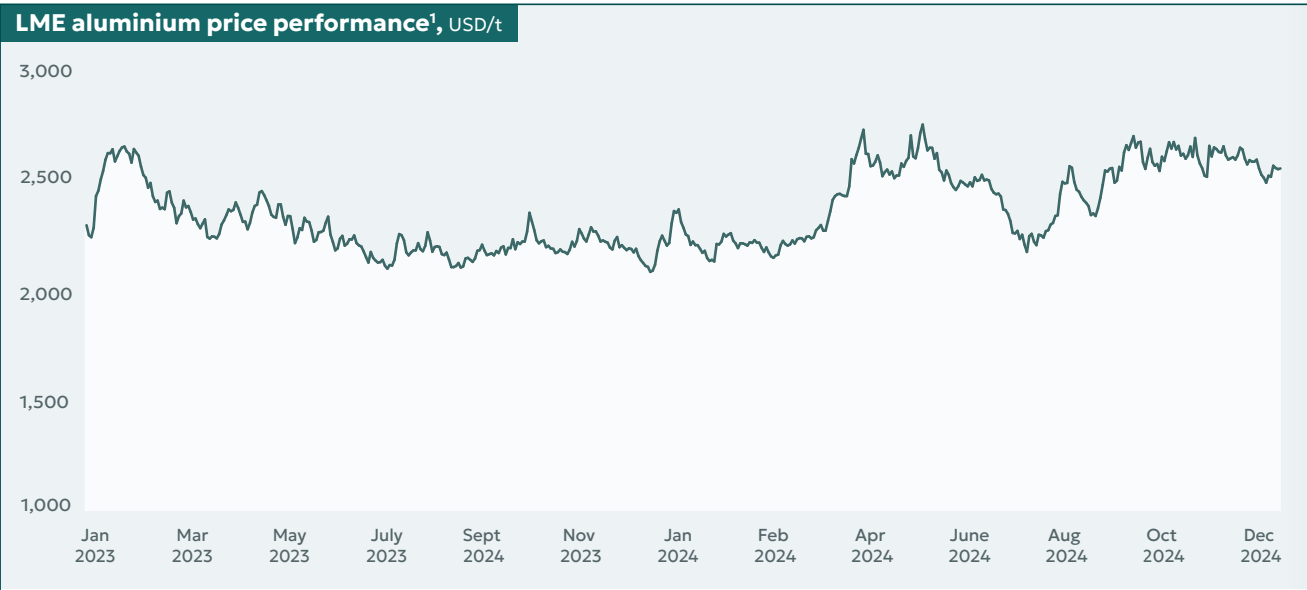
In 2024, China exported an unprecedented amount of unwrought aluminium and alloys, surpassing figures from the prior year, driven by robust export arbitrage beyond its borders to other countries. The year 2024 marked a 17.2% year-on-year increase in China's exports of unwrought aluminium, alloys, and semi-processed metals, amounting to 6.66 mt. However, the removal of VAT refunds on the majority of aluminium exports by the Chinese government, effective 1 December 2024, is likely to result in an exports decline in the future. The imports of unwrought aluminium and alloys by China in 2024 grew dramatically by 25.2% year-on-year, achieving a total of 3.4 mt. That being said, the cancellation of VAT refunds on Chinese aluminium products significantly increased the negative arbitrage on imports of unwrought aluminium by China. In the coming years, the growth in aluminium imports will depend on the growth in domestic consumption and aluminium prices on the Chinese domestic market.

<sup>1</sup> Unless otherwise stated, data sources for this section include Bloomberg, CRU, CNIA, IAI and Antaika.

In the second half of 2024, following a rise amid high trading volatility in the first half of the year, aluminium inventories at the London Metal Exchange trended downwards until mid-December, but then jumped by 560 kt to 1.128 mt towards the end of May 2024 gradually returning to the level of 635 kt by the end of 2024. The volume of metal stored outside of LME-approved warehouses (reported off-warrant stocks) fluctuated throughout 2024 and by the end of November dropped by 111 kt to 325 kt.

Overall, regional aluminium premiums mostly increased by the end of 2024 on the back of a recovery in consumption growth outside China in the second half of 2024, the threat of import duties from the US and the removal of China's export tax credit. As a result, Chinese exports of semi-finished products saw a decrease in December, which may cause a drop in the delivery of aluminium semi-finished items to Asian regions shortly.

In December 2024, the US Midwest aluminium premiums rose by about 2.2 cents per pound to 23.4 cents per pound and continue to grow in Europe amid wide contango, potential sanctions against Russia-sourced aluminium and risks of US import duties. By end-2024, the European P1020 duty unpaid premium in-warehouse Rotterdam was USD 307 per tonne. Asian premiums rose sharply in the second half of 2024. The Japanese premium reached USD 220 at year end against the backdrop of growing regional premiums and a potential short-term supply deficit in the Asian region.



<sup>1</sup> According to the London Metal Exchange.

## Operational performance

Metals segment



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### Aluminium

RUSAL owns eleven<sup>2</sup> aluminium smelters located in three countries: Russia (nine plants), Sweden (one plant), and Nigeria (one plant). The Company's core operating assets are located in Siberia, Russia, accounting for approximately 94% of the Company's total aluminium output in 2024. Among those, BrAZ and KrAZ collectively represent over half of the Metals segment's aluminium production. The Company also holds an 85% stake in a Nigeria-based smelter.

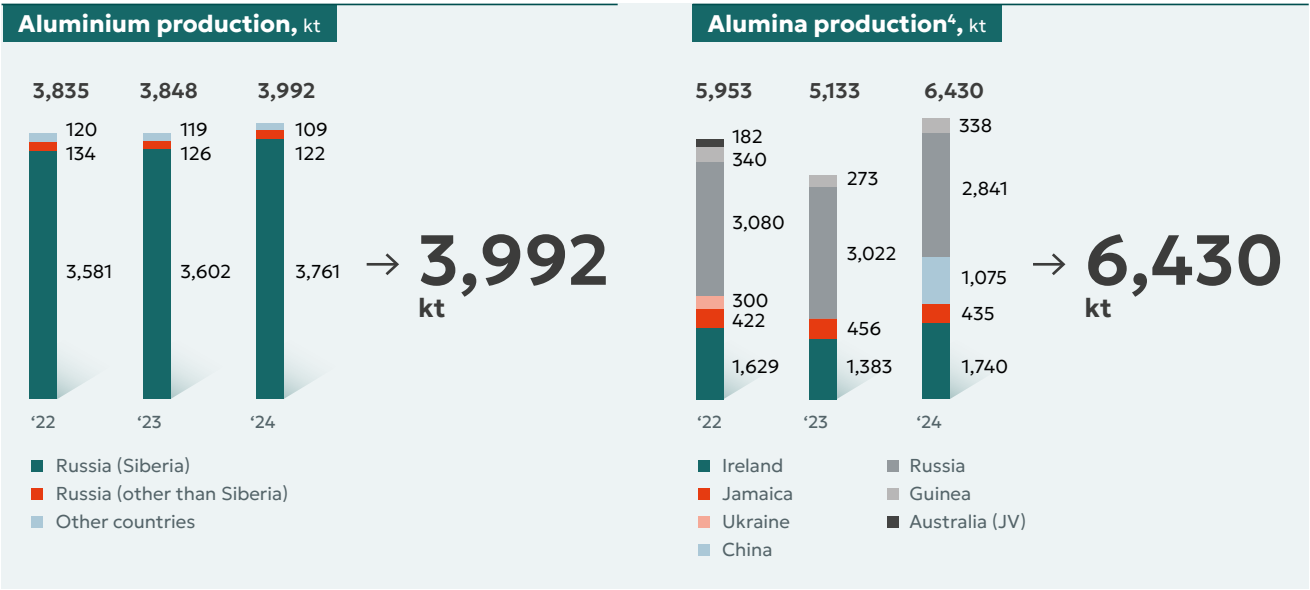
Throughout 2024, the Metals segment continued to implement a comprehensive programme to control costs and streamline operating processes, reinforcing the Company's position as one of the world's most cost-efficient aluminium producers.

The Group's primary aluminium production for the year ended 31 December 2024 increased to 3,992 kt compared with 3,848 kt in 2023. The output growth by 3.7% was due to the commissioning of all electrolyzers of the first start-up complex at Taishet Aluminium Smelter. In 2024, VAP sales were 1,422 kt out of total sales of 3,859 kt.

### Alumina

As of the end of 2024, the Group owned eight<sup>3</sup> alumina refineries. They are located in five countries: Ireland (one plant), Jamaica (two plants, one legal entity), Italy (one plant), Russia (four plants), and Guinea (one plant). In addition, RUSAL holds a 20% stake in Queensland Alumina Ltd. (QAL), an Australia-based alumina refinery, and a 30% stake in Wenfeng, a China-based alumina refinery.

In 2024, total alumina production by the Metals segment increased by 25.3% year-on-year to 6,430 kt compared with 5,133 kt in 2023. This production increase was due to the acquisition of a 30% stake in Hebei Wenfeng New Material Co., Ltd. in China.



<sup>2</sup> Ten aluminium smelters are in operation now (Alscon in Nigeria has been mothballed).  
<sup>3</sup> Seven alumina refineries are in operation now (Eurallumina in Italy has been mothballed).  
<sup>4</sup> Pro-rata share of production attributable to the Group.

## Metals segment



## Bauxites and nephelines

Bauxites and nephelines are essential raw materials for alumina production. In 2024, the Group was 88%<sup>1</sup> self-sufficient in bauxites and nephelines.

## Bauxites

The Group operates seven bauxite mines. The Metals segment's bauxite mines are located in four countries: Russia (two mines), Jamaica (one mine), Guyana (one mine), and Guinea (three mines). The Company's robust raw material base helps it secure sufficient supply for prospective expansion of its alumina production capacity. In addition, the Group sells bauxites to third parties.

The Group's total attributable bauxite output<sup>2</sup> was 15,885 kt in 2024 (against 13,376 kt in 2023). An 18.8% increase in the output for 2024 was driven primarily by capacity expansion projects at Compagnie des Bauxites de Kindia (CBK) and Dian-Dian facilities.

## Nephelines

The Metals segment's total nepheline syenite production was 3,650 kt in 2024 as compared with 4,519 kt in 2023. The 19.2% decrease in output was driven by the need to meet the nepheline ore demand of the consumer plant.

## Downstream projects

## Foil and packaging

In 2024, the Group's foil production volume was 97.9 kt, a decrease of 12.7 kt, or 11.5%, against 2023.

The output at RUSAL SAYANAL declined by 9.31 kt, or 21.1%, against 2023 due to increased production at the new construction tape line and the converting (coated foil) shop. The production at RUSAL Armenal decreased by 3.72 kt (or 13.94% against 2023) due to a lower share of exports and substitution with foil produced domestically in Russia.

## Wheel business

In 2024, the aluminium wheels market continued its recovery after the 2022 crisis and showed a 37% growth. The main driver was the original equipment manufacturer (OEM) market that experienced a 61% growth, while supplies to the aftermarket (AM) segment increased by 24%.

Wheel output surged by 31.3% in 2024 to 3,080 thousand wheels, propelled by the recovery of the aluminium wheels market after the 2022 crisis.

In 2024, SKAD continued its 2023 efforts to increase its share of the primary sales channels, boosting its sales through the OEM channel by 58% year-on-year and through the AM channel by 9% year-on-year.

## Other businesses

## Secondary alloys

The amount of dross and aluminium-containing waste recycled into secondary aluminium increased by 4 kt, or 58%, in 2024 compared to the previous year.

## Silicon production

Silicon output in 2024 rose by 4.1% to 53.0 kt compared to 2023.

## Other mining assets

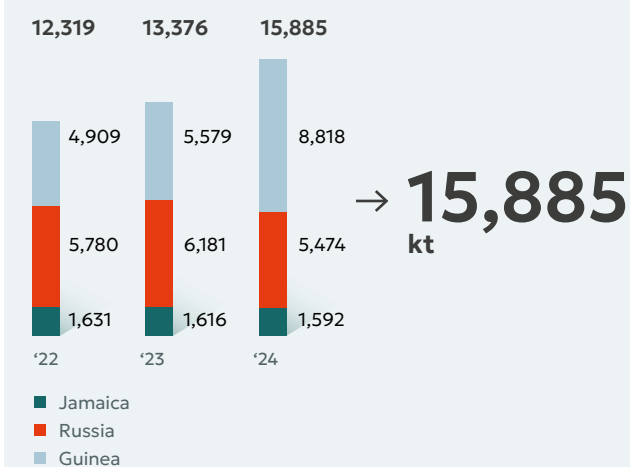
The mining portfolio of the Metals segment encompasses 15 mines and mining complexes, including bauxite operations, two quartzite mines, one fluorite mine, two coal mines, one nepheline syenite mine, and two limestone mines.

The Company's long position in alumina capacity is supported by its bauxite and nepheline syenite resource base.

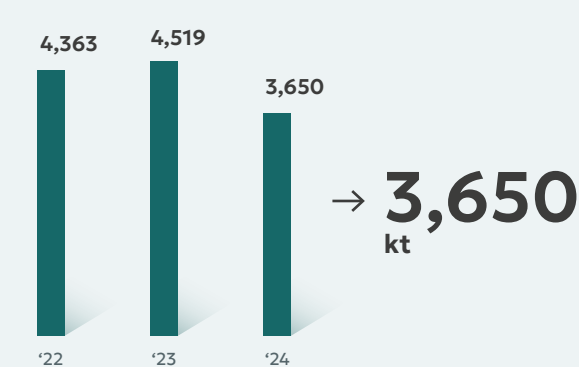
The Company jointly owns two coal mines with Samruk-Energy, the energy division of Samruk-Kazyna from Kazakhstan, through a 50/50 joint venture, Bogatyr Coal LLP.

## Bogatyr Coal LLP

Bogatyr Coal LLP, located in Kazakhstan. In 2024, the company produced approximately 42.7 mt of coal. As of 31 December 2024, Bogatyr Coal LLP held coal reserves across layers 1, 2, and 3 totalling 1,929 mt. Bogatyr Coal LLP recorded sales of approximately USD 287 million in 2023 and USD 294 million in 2024. Russian and Kazakh customers account for approximately 22% and 78% of coal sales, respectively.

Bauxite production<sup>3</sup>, kt

## Nepheline mines (Achinsk), kt, wet

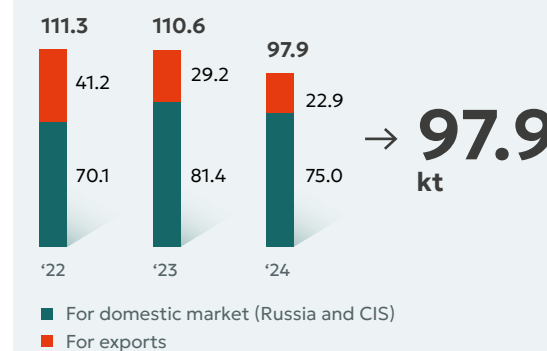


<sup>1</sup> Taking into account the shutdown of alumina production at Nikolaev Alumina Refinery and the Australian Government's ban on exporting alumina and aluminium ores to Russia. Taking into account the acquisition of a 30% interest in an alumina plant Hebei Wenfeng New Material Co., Ltd., located in China.

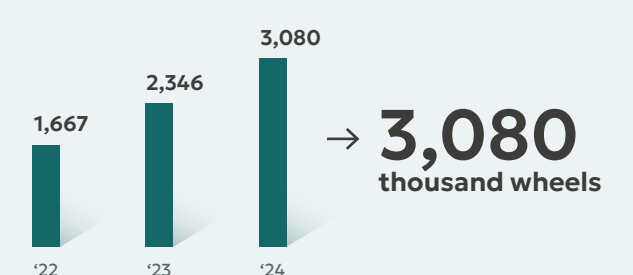
<sup>2</sup> The bauxite output data: 1) were calculated based on a pro-rata share of the Company's interest in the corresponding bauxite mines and mining complexes; 2) include the total production volume by the Company's fully consolidated subsidiary, Bauxite Company of Guyana Inc., notwithstanding that minority interests in all similar subsidiaries are held by third parties; 3) are reported as wet weight (including moisture).

<sup>3</sup> Pro-rata share of production attributable to the Group.

## Foil production, kt



## Wheel production, thousand wheels





## Investment in Norilsk Nickel

**Norilsk Nickel is the world's largest producer of palladium and high-grade nickel and one of the leading producers of platinum, copper, and cobalt. As of the most recent reporting date, RUSAL held a 26.39% shareholding in Norilsk Nickel.**

RUSAL's shareholding in Norilsk Nickel allows for significant earnings diversification through Norilsk Nickel's exposure to platinum group metals and non-ferrous metals (nickel, copper, and cobalt) and broadens RUSAL's strategic prospects.

### Norilsk Nickel's profile and financial performance<sup>1</sup>

As of 31 December 2024, Norilsk Nickel's resource base on the Taimyr Peninsula and Kola Peninsula consisted of 1,267 mt of proved and probable ore reserves and 1,869 mt of measured and indicated mineral resources. Its primary assets are situated in Russia (Norilsk Industrial District, Kola Peninsula, Trans-Baikal Territory) and in Finland.

In 2024, Norilsk Nickel produced 205 kt of nickel (a 2% decrease year-on-year), 433 kt of copper (a 2% increase year-on-year), 2,762 koz of palladium (a 3% increase year-on-year), and 667 koz of platinum (a 0.5% increase year-on-year).

According to the production report of PJSC MMC Norilsk Nickel for 2024, the following main factors that influenced the change in production can be outlined. The slight decrease in nickel production in 2024 was mainly due to the temporary shutdown of the flash smelting furnace (FSF-2) at Nadezhdinski Metallurgical Plant for scheduled capital repairs. As a result of the complete reconstruction of FSF-2, its productivity increased by 25%. The slight increase in other metals production was mainly due to the low base in 2023.

Norilsk Nickel maintains diversified metal sales across various regions. Meanwhile, in 2024, the proportion of sales to Asia and Russia rose compared to 2023, whereas sales to Europe, Middle East, Africa, North America, and South America saw a decline.

As of 31 December 2024, the market value of RUSAL's investment in Norilsk Nickel stood at USD 4,585 million, representing a decrease compared to the market value as of 31 December 2023 (USD 7,273 million). The decline in the value of Norilsk Nickel is driven by, firstly, continuing external pressure (high geopolitical tension, imposition of economic restrictions against Russia by several countries, lower prices for key metals) and, secondly, an increase in the key rate of the Bank of Russia (which has led, on the one hand, to higher interest expenses, and, on the other hand, to a revaluation of the entire stock market in Russia).

**26.39%**

RUSAL's shareholding in Norilsk Nickel

**USD 4,585 mn**

Market value of RUSAL's investment in Norilsk Nickel as of 31 December 2024

**205 kt of nickel**

Norilsk Nickel produced in 2024

## BEMO project

The Boguchany Energy and Metals Complex (BEMO) project involves the construction of the 3,000-MW Boguchany HPP (with a projected average annual electricity output of 17.6 billion kWh) and Boguchany Aluminium Smelter (BoAZ), capable of producing 600 kt of metal per annum, in the Krasnoyarsk Territory in Siberia.

BoAZ was constructed in two stages, each designed to produce 298 kt of aluminium annually. The initial segment of the first stage, producing 149 kt of aluminium annually with 168 electrolyzers, was launched in 2015. Subsequently, the second segment of the first stage came online in March 2019. In May 2019, the first stage of the smelter reached its design capacity. In 2024, production of aluminium and alloys reached 301.2 kt, marking an increase of 1.3 kt year-on-year.

The potential construction of the second stage of the BoAZ will be considered jointly with the strategic partner, contingent upon market conditions and project funding availability.

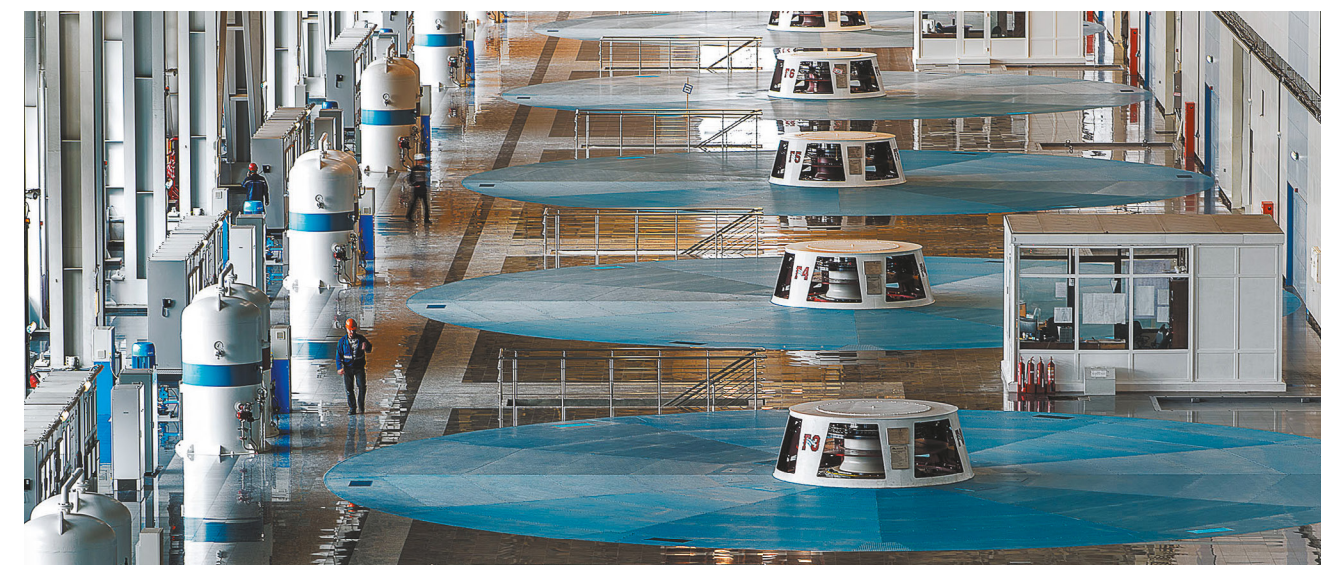
The project's composite gravity rock-fill dam was completed at the end of 2011, and nine 333-MW hydropower units of Boguchany HPP commenced operation between 2012 and 2014. The total installed capacity of all nine operating hydropower units amounts to 2,997 MW.

The hydropower plant started commercial electricity supply to the wholesale electricity and capacity market on 1 December 2012. In 2024, the plant produced and supplied 20,260 million kWh of electricity to the wholesale electricity and capacity market, marking a 1.7% increase of 336 million kWh compared to 2023.

### Acquisition of a stake in an alumina refinery

In April 2024, the Group completed the acquisition of a 30% stake in Hebei Wenfeng New Materials Co., Ltd., an alumina refinery located in China.

The transaction amounted to USD 316 million. The transaction strengthened the Company's raw material security, reducing risks in the area of critical raw material supply.



<sup>1</sup> Production and operational data in this section are derived from <https://nor nickel.com/>.



Assets overview

Metals segment



	Location	Installed capacity	2023 production	2024 production	Capacity utilisation rate (%)
Aluminium smelters					
Bratsk Aluminium Smelter	Russia (Irkutsk Region)	1,009 ktpa	1,005 kt	1,002 kt	99%
Krasnoyarsk Aluminium Smelter	Russia (Krasnoyarsk Territory)	1,019 ktpa	1,014 kt	1,015 kt	100%
Sayanogorsk Aluminium Smelter	Russia (Republic of Khakassia)	542 ktpa	538 kt	531 kt	98%
Novokuznetsk Aluminium Smelter	Russia (Kemerovo Region)	215 ktpa	204 kt	196 kt	91%
Khakas Aluminium Smelter	Russia (Republic of Khakassia)	297 ktpa	304 kt	307 kt	103%
Irkutsk Aluminium Smelter	Russia (Irkutsk Region)	422 ktpa	425 kt	423 kt	100%
Taishet Aluminium Smelter	Russia (Irkutsk Region)	428 ktpa	112 kt	288 kt	67%
Kandalaksha Aluminium Smelter	Russia (Murmansk Region)	76 ktpa	57 kt	54 kt	71%
Volgograd Aluminium Smelter	Russia (Volgograd Region)	69 ktpa	69 kt	68 kt	98%
KUBAL	Sweden	128 ktpa	119 kt	109 kt	85%
ALSCON <sup>1</sup>	Nigeria	–	–	–	0%
Boguchany Aluminium Smelter <sup>2</sup>	Russia (Krasnoyarsk Territory)	292 ktpa	300 kt	301 kt	100%

	Location	Installed capacity	2023 production	2024 production	Capacity utilisation rate (%)
Alumina refineries					
Achinsk Alumina Refinery	Russia (Krasnoyarsk Territory)	1,069 ktpa	872 kt	701 kt	66%
Bogoslovsk Alumina Refinery	Russia (Sverdlovsk Region)	1,030 ktpa	988 kt	977 kt	95%
Urals Alumina Refinery	Russia (Sverdlovsk Region)	900 ktpa	918 kt	920 kt	102%
PGLZ Alumina Refinery	Russia (Leningrad Region)	265 ktpa	244 kt	243 kt	92%
Friguia Alumina Refinery	Guinea	650 ktpa	273 kt	338 kt	52%
Queensland Alumina Ltd. <sup>3</sup>	Australia	3,950 ktpa	–	–	0%
Eurallumina <sup>1</sup>	Italy	1,085 ktpa	–	–	0%
Aughinish Alumina Refinery	Ireland	1,990 ktpa	1,383 kt	1,740 kt	87%
Winalco	Jamaica	1,210 ktpa	456 kt	435 kt	36%
Wenfeng	China	4,800 ktpa	–	1,075 kt	22%
Bauxite mines					
Timan Bauxite	Russia (Komi Republic)	3,500 ktpa	3,923 kt	3,456 kt	99%
North Urals Bauxite Mine	Russia (Sverdlovsk Region)	3,000 ktpa	2,258 kt	2,018 kt	75%
Compagnie des Bauxites de Kindia	Guinea	3,500 ktpa	2,670 kt	3,016 kt	109%
Friguia Bauxite and Alumina Complex <sup>1</sup>	Guinea	2,100 ktpa	837 kt	1,062 kt	56%
Bauxite Company of Guyana <sup>4</sup>	Guyana	1,700 ktpa	–	–	0%
Winalco	Jamaica	4,000 ktpa	1,616 kt	1,592 kt	40%
Bauxite company of Dian-Dian	Guinea	4,200 ktpa	2,072 kt	4,740 kt	155%

<sup>1</sup> Mothballed.

<sup>2</sup> A 50/50 joint venture between the Metals segment and RusHydro. The capacity and production volumes of the BEMO project are not included in the Company's consolidated operational data.

<sup>3</sup> Pro-rata share of capacity and production attributable to the Metals segment.

<sup>4</sup> Mothballed in February 2020.

## Market overview<sup>1</sup>

### Overview of the Russian power sector

**The Russian Federation's power sector is among the largest in the world; as of 1 January 2025, the total installed capacity of power plants within the United Energy System of Russia (UES of Russia) was 263.7 GW. In 2024, installed capacity increased by 0.62 GW due to the commissioning of 1.7 GW of new capacity, with the decommissioning of old facilities totalling 1.3 GW, and a rise of 0.3 GW due to other factors such as re-labelling and modernisation.**

The UES of Russia covers the most populated areas of the country. Grid interconnections between various energy systems are limited due to vast distances, so the Russian wholesale electricity and capacity market is divided into two pricing zones and four non-pricing zones.

The first pricing zone, the Europe-Urals zone<sup>2</sup>, encompasses the European region of Russia and includes integrated energy systems (IES) such as the North-West, Central, Middle Volga, Urals, and South.

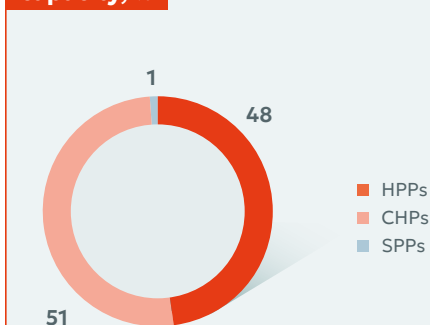
The second pricing zone, the Siberian IES, encompasses Siberia. The electricity prices of the two pricing zones are driven by the differences in capacity and fuel mix in the respective pricing zones. Network constraints play a significant role in the second pricing zone.

Non-pricing zones include the Kaliningrad Region, Arkhangelsk Region, Komi Republic, and Russian Far East regions. These regions operate under special electricity pricing rules rather than market conditions.

Most of the Group's energy assets are located in the second pricing zone, within the Siberian IES. The Siberian IES has an operational area of 4.9 million km<sup>2</sup>, with a population of more than 19 million. The Siberian IES comprises 126 power plants with a total installed capacity of 52.5 GW, including 25.4 GW of HPPs (48%), 26.5 GW of CHPs (51%), and 581 MW of solar power plants (1%). The backbone grid of the Siberian IES<sup>3</sup> consists of 110-kV, 220-kV, and 500-kV lines, with a total length of over 100,000 km.

A unique feature of the Siberian IES is the significant role of HPPs in both the installed electrical capacity mix and electricity output. Thermal power in the Siberian IES communities is generated mainly through coal-fired power plants, primarily located near coal-mining regions.

**Structure of the Siberian IES by installed capacity, %**



### Electricity generation

In 2024, electricity production in the UES of Russia increased by 4.1% year-on-year, reaching a total of 1,180.7 billion kWh compared to 1,134.0 billion kWh in 2023. The generation structure was as follows: CHPs – 57.3%, NPPs – 18.2%, HPPs – 17.3%, WPPs – 0.7%, SPPs – 0.3%, and industrial power stations – 6.1%.

Power generation in the Siberian IES amounted to 233.7 billion kWh (an increase of 3.5% year-on-year), with HPPs accounting for 51.7% of total electricity generation, CHPs for 44.2%, and RES for 4.1%. HPP output grew by 5.0% year-on-year to 120.8 billion kWh. At the same time, CHPs increased electricity production by 2.7% year-on-year to 103.3 billion kWh.

The main factor affecting the overall growth in energy generation in the Siberian IES in 2024 was an increase in demand from data processing centres and aluminium and mining companies.

### Electricity demand

Electricity consumption in the UES of Russia rose by 3.1% year-on-year to 1,174.1 billion kWh in 2024. The growth was primarily driven by increased consumption from the Central IES (an increase of 8.8 billion kWh), the IES of the South (an increase of 6.5 billion kWh), and the Siberian IES (an increase of 11.2 billion kWh).

The Europe-Urals pricing zone saw a 2.6% rise in electricity consumption, reaching 884.7 billion kWh. In the Siberian IES, electricity consumption went up by 4.9% to 241.1 billion kWh.

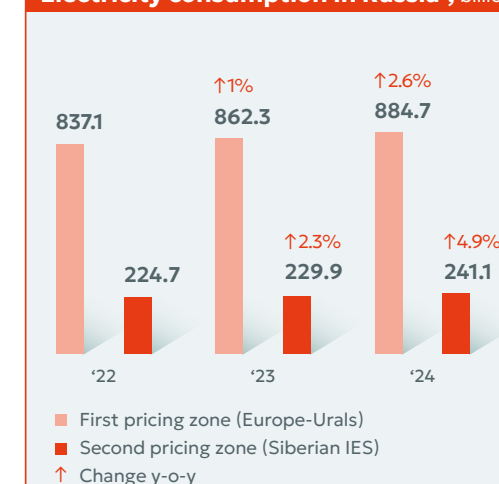
Changes in energy consumption in 2024 were driven by the temperature factor, industrial and household consumption growth.

### Electricity and capacity prices

Within the Siberian IES, electricity spot prices are dictated by the marginal costs of the least efficient coal-fired power plants among those in demand, with HPPs operating as price takers. Over the long term, electricity prices tend to move with thermal coal prices. A significant proportion of the power generated by Siberian CHPs is produced using locally sourced brown coal. Due to seasonality in demand and the fluctuating availability of hydropower, electricity prices can exhibit significant fluctuations throughout the year. One of the primary factors with significant medium-term influence is the inflow and water reserves in Siberian HPPs' reservoirs, driving the availability of low-cost hydropower in the wholesale market.

The capacity market operates somewhat differently from the electricity market, reflecting the long-term nature of decision-making. The primary method for selling capacity on the wholesale market is through competitive capacity auctions (CCAs), enabling the selection of the most suitable mix of generating capacities to meet projected demand and establishing a single capacity price within each pricing zone. Currently, CCA capacity prices are set through to 2028 and are then adjusted annually using the Consumer Price Index (CPI) from the previous year minus 0.1%, from 1 January of the CCA year until 1 January of the delivery year.

**Electricity consumption in Russia<sup>3</sup>, billion kWh**



<sup>1</sup> Unless otherwise stated, data sources in the section include TSA, NP Market Council Association, and System Operator of the United Energy System.

<sup>2</sup> Comprises the Central, Middle Volga, Urals, North-West, and South energy systems.

<sup>3</sup> According to the System Operator of the United Energy System of Russia ([www.so-ups.ru](http://www.so-ups.ru)).

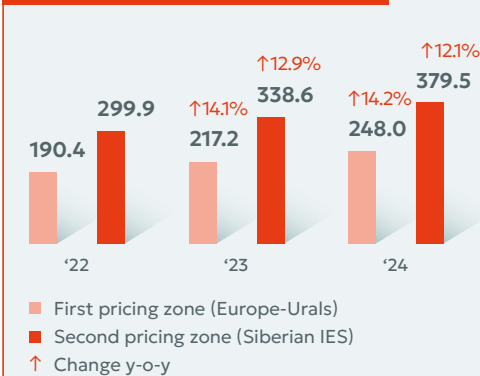


## Capacity prices

**Prices determined in capacity auctions for the second pricing zone (ex. CPI minus 0.1% adjustment),**  
RUB '000/MW/month

	2024	2025	2026	2027	2028
Second pricing zone	279	303	299	504	558

### Capacity prices (including CPI minus 0.1% adjustment), RUB '000/MW/month



In 2024, the CCA-resulting price for the first pricing zone increased by 14.2% year-on-year, including the CPI minus 0.1% adjustment, while the capacity price for the second pricing zone rose by 12.1% year-on-year.

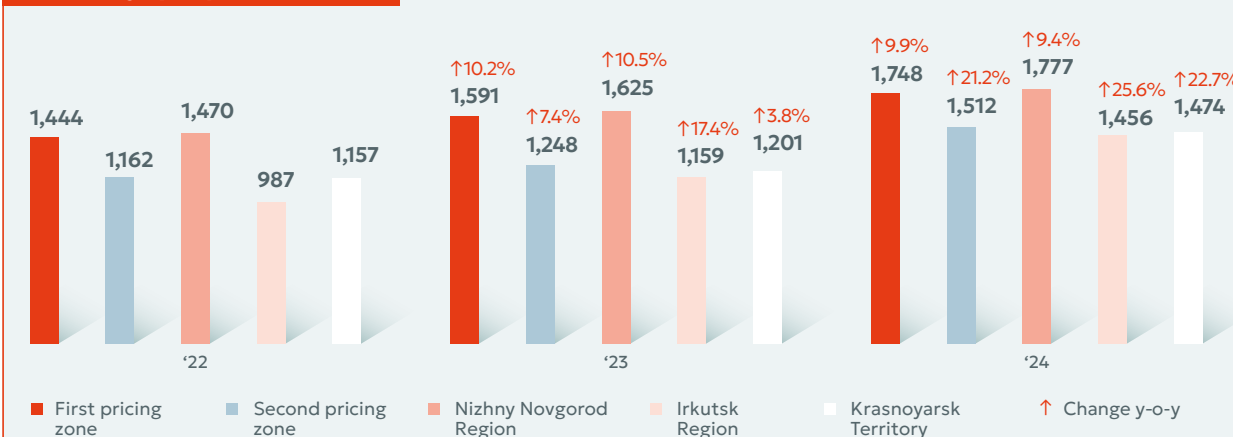
A key contributor to higher CCA prices in 2024 vs. 2023 was adjustment for actual 2023 inflation rate of 7.57%.

## Electricity prices

In 2024, the average spot price in the day-ahead market for the second pricing zone reached RUB 1,512 per MWh, a 21.2% increase from 2023. This upward trend was caused by lower HPP generation in the second half of 2024, higher CHP price bid levels, as well as grid limitations on transit between Eastern and Western Siberia, with an increase in the number of hours of flow reversal towards the Irkutsk Region.

The average spot prices in the Irkutsk Region and Krasnoyarsk Territory stood at RUB 1,456 per MWh and RUB 1,474 per MWh, respectively, marking a 25.6% and 22.7% year-on-year increase, respectively. This was due to lower generation from the Angara cascade HPPs in the second half of 2024, with an increase in the number of hours of flow reversal towards the Irkutsk Region amid increased consumption, as well as due to higher CHP price bid levels.

### Electricity spot prices, RUB/MWh



## Operational performance

Power segment



As of 31 December 2024, the Group's total installed electrical capacity stood at 19.5 GW<sup>1</sup>, while the aggregate installed heat capacity was 13.7 Gcal/h. As of 31 December 2024, HPPs represented 78% of the installed electrical capacity, while the remaining 22% was accounted for by predominantly coal-fired CHPs and one solar power plant.

In 2024, the Company generated 90.7 billion kWh<sup>2</sup> of electricity. The share of En+ in the total generation of electricity in the Siberian unified energy system was about 36%, while the Group's HPPs accounted for approximately 61% of the total hydropower generated in the Siberian unified energy system.

Water levels in the Bratsk reservoir reached 399.71 m (1.98 m above the long-term average) as of 1 July 2024, and 399.37 m (0.93 m above the long-term average) as of 1 December 2024.

Total generation from Krasnoyarsk HPP rose by 15.8% year-on-year in 2024, to 18.3 billion kWh. The increase was the result of more intensive state-regulated water discharges compared to 2023 as established by the Yenisei Basin Water Management Board, driven by increased hydro resources. The maximum level of the Krasnoyarsk reservoir reached 239.26 m in 2024, marking an increase of 3.2 m compared to the 2023 maximum level and remaining 0.4 m below the long-term average annual maximum.

## Hydropower generation

Hydropower generation is the main focus of the Group's Power segment. The Company operates five HPPs<sup>3</sup>, including three of the five largest HPPs in Russia and of the twenty largest HPPs globally, in each case in terms of installed electrical capacity. In 2024, the Power segment's HPPs produced 73.7 billion kWh of electricity, or 81.3% of the Group's total electricity production.

In 2024, the total output of the Group's Angara HPP cascade (Irkutsk, Bratsk, and Ust-Ilimsk HPPs) increased by 4.5% year-on-year, to 55.5 billion kWh. This increase can be attributed to the existing water reserves in Lake Baikal and the Bratsk reservoir at the beginning of 2024, high water levels in the reservoirs, and more intensive state-regulated water discharges compared to 2023 as established by the Yenisei Basin Water Management Board. For example, water levels in Lake Baikal reached 456.51 m (10 cm above the long-term average) as of 1 July 2024, and 456.63 m (4 cm above the long-term average) as of 1 December 2024.

## CHP electricity and heat generation

Electricity generation by the Group's CHPs rose by 3.0% year-on-year to 16.9 billion kWh in 2024. The increase was driven primarily by a 9.2% year-on-year surge in electricity consumption within the Irkutsk energy system, along with reduced generation from the Angara HPP cascade in the second half of 2024.

Heat generation totalled 26.3 million Gcal and experienced a 4.0% year-on-year decrease due to weather conditions: the average monthly temperature in 2024 was, on average, 1.0°C higher than in 2023.

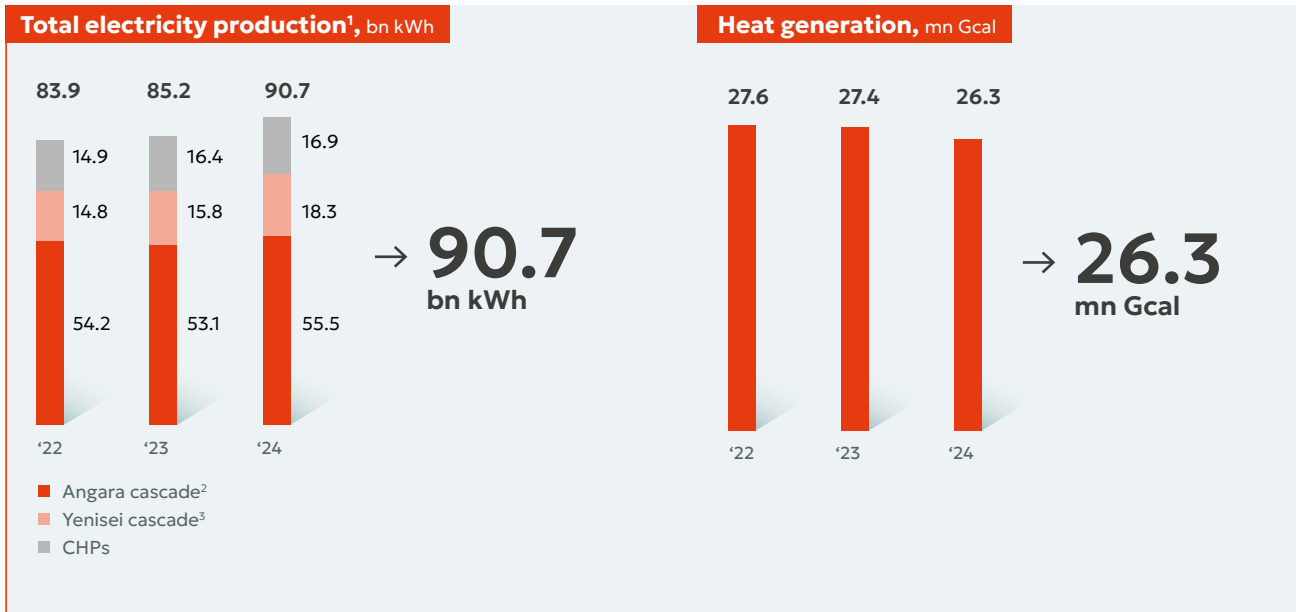
## SPP electricity generation

Abakan SPP generated 5.8 million kWh in 2024, marking a 3.3% year-on-year decrease attributed to fewer sunny days during the reporting period.

<sup>1</sup> Including Onda HPP, with an installed electrical capacity of 80 MW (located in the European part of Russia, leased to RUSAL); excluding Boguchany HPP, with an installed electrical capacity of 2,997 MW (a 50/50 JV between RUSAL and its strategic partner).

<sup>2</sup> Excluding Onda HPP, with an installed electrical capacity of 80 MW (located in the European part of Russia, leased to RUSAL), and Boguchany HPP (a 50/50 JV between RUSAL and its strategic partner).

<sup>3</sup> Including Onda HPP with an installed capacity of 80 MW (located in the European part of Russia, leased to RUSAL).



## Coal production

The Coal segment provides the Group's CHPs with a self-sufficient coal resource base and covers its internal coal demand. Part of the coal production (16% in 2024) is sold to third parties.

<sup>1</sup> Excluding Onda HPP, with an installed electrical capacity of 80 MW (located in the European part of Russia, leased to RUSAL) and Boguchany HPP, with an installed electrical capacity of 2,997 MW (a 50/50 JV between RUSAL and its strategic partner).

<sup>2</sup> Includes Irkutsk, Bratsk, and Ust-Ilimsk HPPs.

<sup>3</sup> Krasnoyarsk HPP.

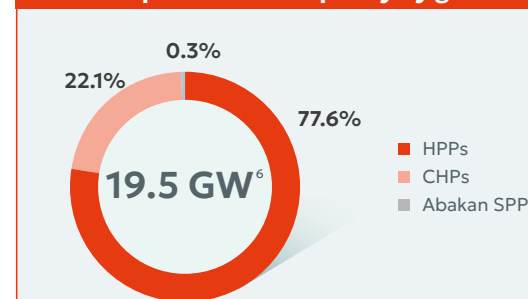
## Assets overview

Power segment



		Location	Installed capacity	2023 production	2024 production
<b>Hydropower plants</b>					
Irkutsk HPP		Russia (Irkutsk Region)	753.0 MW	4.6 bn kWh	4.5 bn kWh
Bratsk HPP		Russia (Irkutsk Region)	4,500 MW	25.1 bn kWh	26.9 bn kWh
Ust-Ilimsk HPP		Russia (Irkutsk Region)	3,840 MW	23.4 bn kWh	24.1 bn kWh
Krasnoyarsk HPP		Russia (Krasnoyarsk Territory)	6,000 MW	15.8 bn kWh	18.3 bn kWh
<b>Combined heat and power plants</b>					
CHP-10	Electricity Heat	Russia (Irkutsk Region)	1,110 MW 574.0 Gcal/h	4.9 bn kWh 0.3 mn Gcal	5.4 bn kWh 0.5 mn Gcal
CHP-9	Electricity Heat	Russia (Irkutsk Region)	540.0 MW 2,143.0 Gcal/h	2.5 bn kWh 6.0 mn Gcal	2.0 bn kWh 5.7 mn Gcal
Novo-Irkutsk CHP	Electricity Heat	Russia (Irkutsk Region)	726 MW 1,959.2 Gcal/h	3.3 bn kWh 5.9 mn Gcal	3.4 bn kWh 5.8 mn Gcal
Ust-Ilimsk CHP	Electricity Heat	Russia (Irkutsk Region)	515 MW 1,015.0 Gcal/h	0.9 bn kWh 2.1 mn Gcal	1.2 bn kWh 2.0 mn Gcal
CHP-11	Electricity Heat	Russia (Irkutsk Region)	320.3 MW 1,056.9 Gcal/h	0.7 bn kWh 1.0 mn Gcal	0.9 bn kWh 1.0 mn Gcal
CHP-6	Electricity Heat	Russia (Irkutsk Region)	287.0 MW 1,769.1 Gcal/h	0.9 bn kWh 3.3 mn Gcal	1.0 bn kWh 3.3 mn Gcal
Novo-Ziminsk CHP	Electricity Heat	Russia (Irkutsk Region)	260 MW 773.0 Gcal/h	1.3 bn kWh 1.5 mn Gcal	1.3 bn kWh 1.5 mn Gcal
Avtozavodsk CHP	Electricity Heat	Russia (Nizhny Novgorod Region)	480 MW 2,172.0 Gcal/h	1.6 bn kWh 3.1 mn Gcal	1.7 bn kWh 3.1 mn Gcal
<b>Solar power plants</b>					
Abakan SPP		Russia (Republic of Khakassia)	5.2 MW	6.0 mn kWh	5.8 mn kWh
<b>Other assets<sup>4</sup></b>					
Electricity Heat			118.4 MW 2,228.7 Gcal/h	0.6 bn kWh 4.1 mn Gcal	0.6 bn kWh 3.5 mn Gcal

## En+ Group's installed capacity by generation type<sup>5</sup>



<sup>4</sup> Other assets include Onda HPP and small-scale generating and heat-producing facilities.

<sup>5</sup> As at 31.12.2024.

<sup>6</sup> Including Onda HPP with an installed capacity of 0.08 GW (located in the European part of Russia, leased to RUSAL).