



En+ Group

How to build a low-carbon future:
En+ Group on the way towards
carbon neutrality

En+ Group

12 countries
5 continents

No1
aluminium producer excluding
China

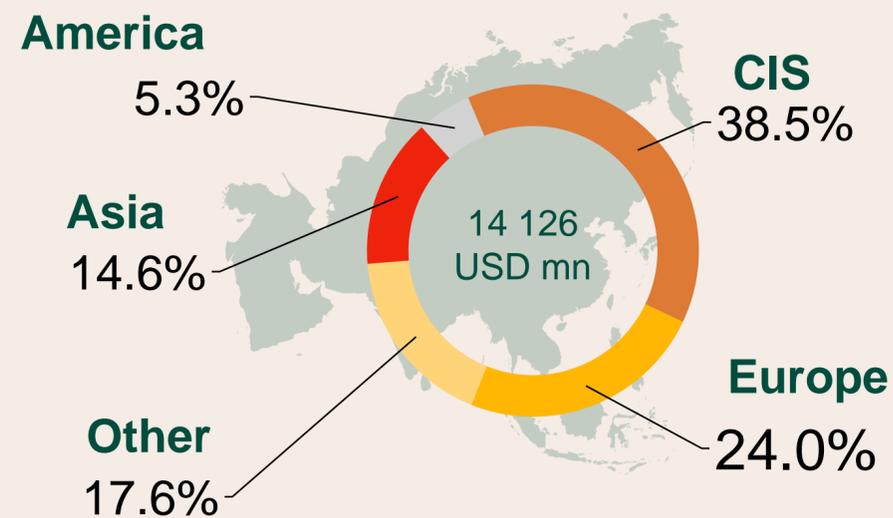
5.6%
of the world's aluminium
production

78.2 TWh¹
low-carbon hydropower generation

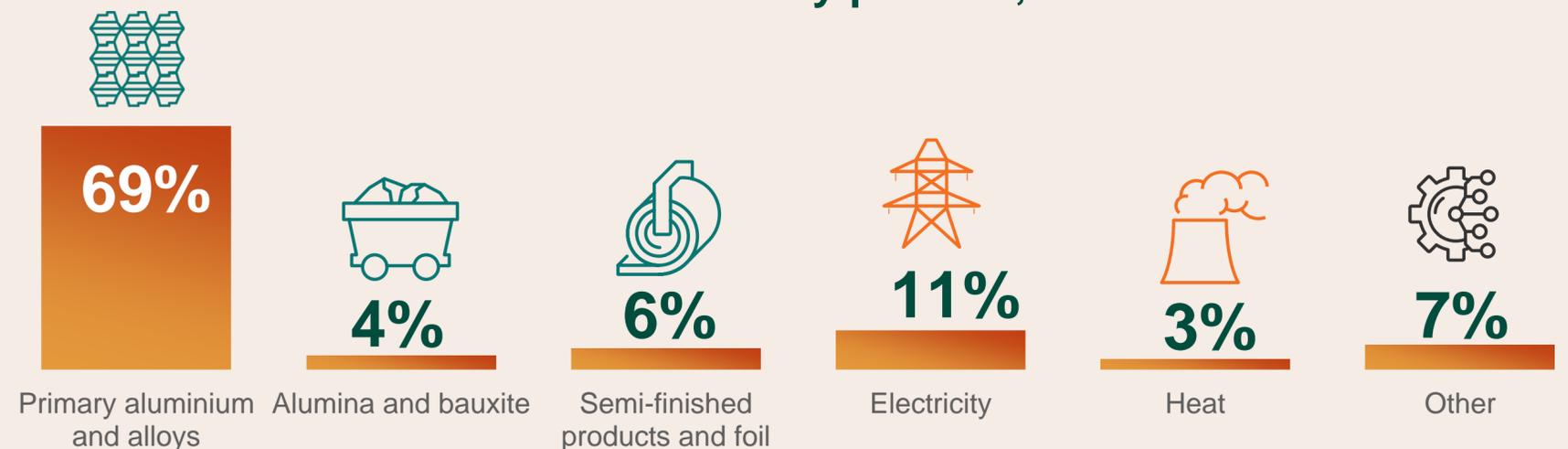
19.4 GW
total installed electricity capacity

	5 HPPs ¹	16 CHPs	SPP	11 ALUMINIUM SMELTERS ²	10 ALUMINA REFINERIES ³	7 BAUXITE PRODUCTION SITES
TOTAL CAPACITY	15.1 GW	4.3 GW	5.2 MW	4.2 mtpa	10.7 mtpa ⁴	20.6 mtpa
PRODUCTION LEVEL, 2021	78.2 ¹ TWh	12.7 TWh	6.1 GW	3.8 mt	8.3 mt	15 mt

Revenue by region, 2021⁵



Revenue by product, 2021⁵



(1) Including Onda HPP.
 (2) Ten aluminium smelters in operation (Alscon in Nigeria is mothballed).
 (3) Eight alumina refineries in operation (Eurallumina in Italy is mothballed) and QAL, located in Australia, in which RUSAL owns a 20% share.
 (4) RUSAL attributable capacity.
 (5) Ex. Boguchany Aluminium Smelter (BoAZ), a joint 50/50 project of RUSAL and RusHydro.

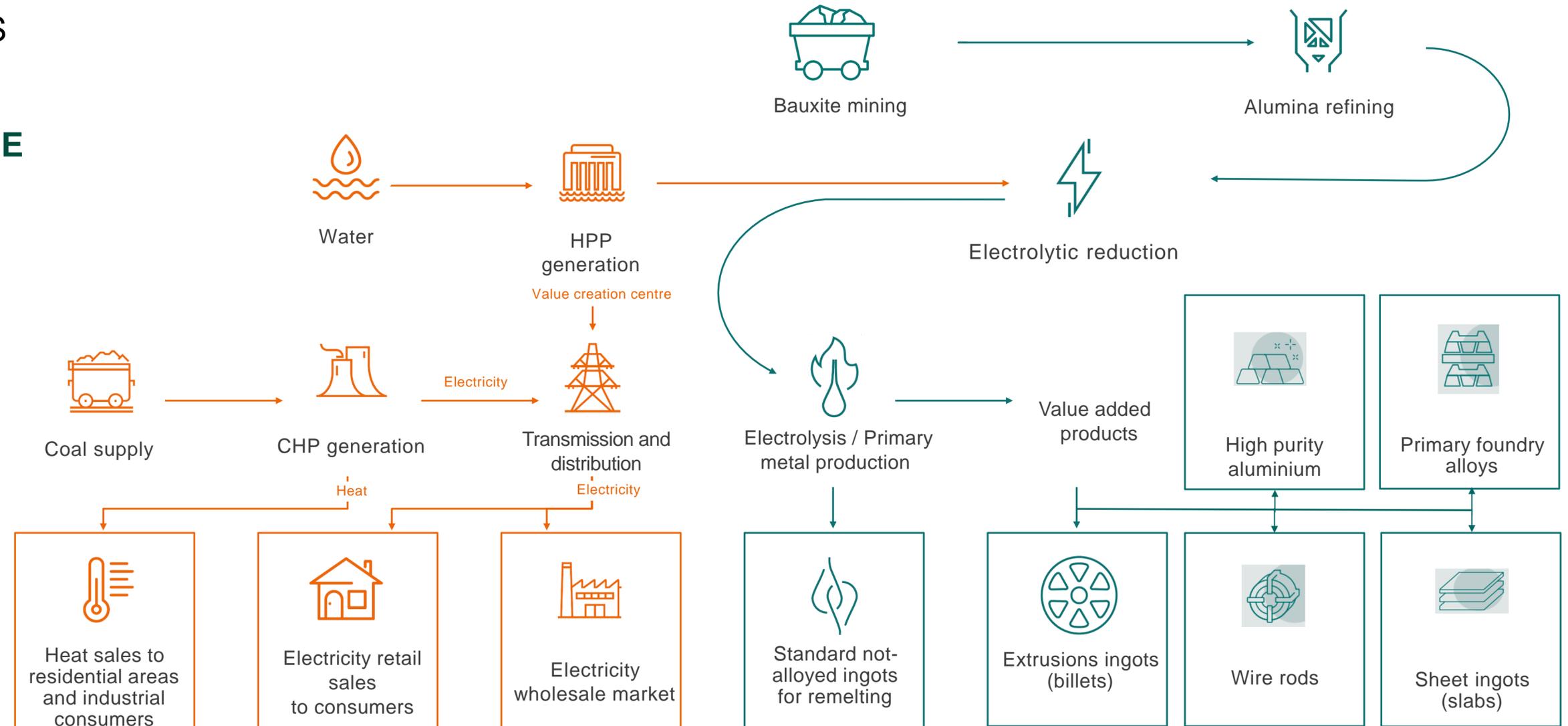
UNIQUE BUSINESS MODEL AND DECARBONISATION OPPORTUNITIES

>98%

of aluminum is produced
using hydropower

OUR TECHNOLOGIES ALLOW:

- SAVE RAW RESOURCES
- REDUCE COSTS
- **REDUCE IMPACT ON THE ENVIRONMENT**



En+ Group

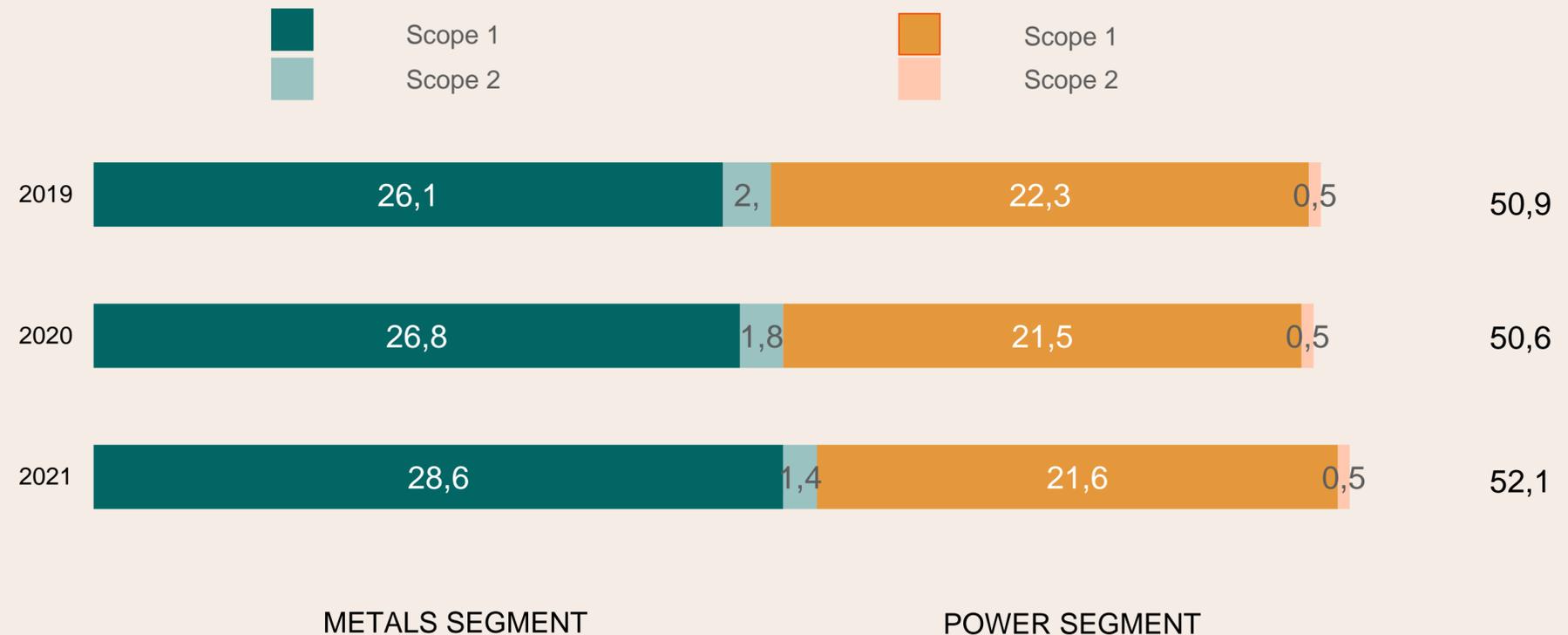
CLIMATE AGENDA

In January 2021, En+ Group announced its mid- and long-term goals to reduce greenhouse gas emissions. The Group considers these targets to be the **most ambitious climate change targets in the aluminum industry**.

! ACHIEVE NET ZERO GHG EMISSIONS BY 2050

! REDUCE GHG EMISSIONS AT LEAST 35% BY 2030

Direct (Scope 1) and indirect (Scope 2) greenhouse gas emissions of En+ Group, mt CO2e



The growth of emissions is due to the expansion of the perimeter of covered enterprises.

CLIMATE GOALS OF RUSAL

GOALS UP TO 2025

RESULT 2021

95%

To purchase at least 95% of electricity from hydropower plants and other carbon-free sources of power generation for aluminium smelters



98.7%

HYDROPOWER

The energy mix at RUSAL aluminium smelters was as follows:

- hydropower (HPP): 98,77%
- nuclear (NPP): 0,01%
- wind: 0,58%
- fossil fuels (CHP): 0,64%

15%

To reduce direct specific greenhouse gas emissions by 15% at existing aluminium smelters



11.6%

There was a 11.6% reduction in the specific GHG emissions as compared to the 2014 level

10%

To reduce direct specific GHG emissions by 10% in existing alumina refineries



2.4%

The reduction in the specific GHG emissions stood at 2.4% compared to the 2014 level

7%

To reduce specific electric power consumption by aluminium smelters by 7%



4.2%

The reduction of average specific electric power consumption by aluminium smelters stood at 4.2%

To use an internal carbon price when making strategic and investment decisions



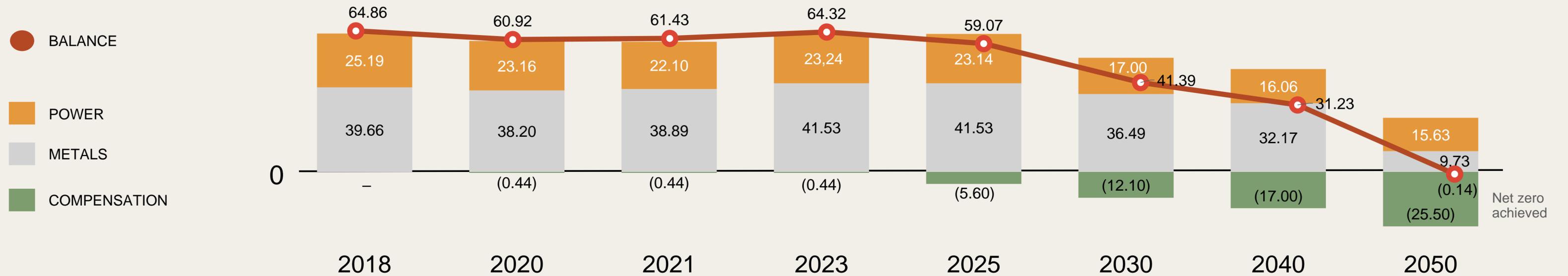
Since 2017, the Company has been applying an internal carbon price in the process of making strategic and investment decisions

To support Russian and international initiatives and associations advocating for actions to prevent climate change and backing carbon prices, provided they are aligned with the Company's strategic goals



The Company actively participates in a number of climate initiatives

DECARBONISATION ROADMAP



SHARE IN CARBON FOOTPRINT

MINING

3%



REFINING

60%



SMELTING

25%



ENERGY FOR SMELTING

2%



TRANSPORT

2%



OTHER

8%



PROJECTS TO REDUCE CARBON FOOTPRINT

OPTIMISATION OF RAW MATERIALS SUPPLYING

- ENERGY EFFICIENCY MEASURES
- MEASURES TO CAPTURE CO₂
- USE OF HYDROGEN

- ECO-SODERBERG TECHNOLOGY
- PRE-BAKED ANODE TECHNOLOGY
- INERT ANODE TECHNOLOGY

INCREASING THE SHARE OF RENEWABLE SOURCES

CONVERSION OF TRANSPORT TO ELECTRICITY OR BIOFUEL

RECYCLING OF ALUMINIUM

DECARBONISATION OF THE ALUMINA DIVISION

Energy efficiency measures

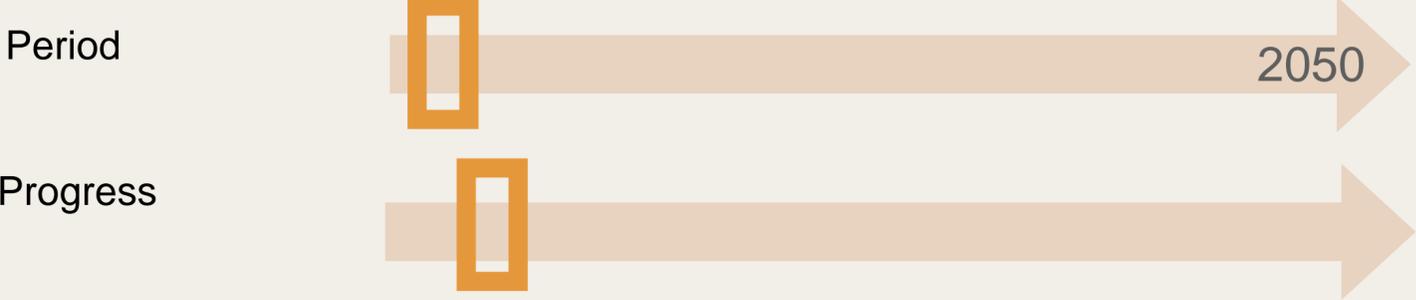


The measures will reduce both the overall energy consumption and the energy intensity of production.

Project status

- Measure plans to improve energy efficiency at Russian alumina refineries have been formulated and adopted for implementation to reduce GHG emissions.
- Energy efficiency measures are implementing in all business units of the division (work is underway in all areas: from improving the thermal insulation and energy efficiency of equipment and pipelines to measures to improve production processes)/
- Implementation of project for the transfer of steam production from hydrocarbon fuel to electricity using renewable energy sources (electric boiler construction) at Auhghinish Alumina (Ireland) continues.
- Windalco (Jamaica) is implementing projects to convert outdoor lighting to solar panels and modernise the lighting system of production sites, warehouses and premises. The overall effect from the implementation of projects is a reduction of up to 200 tonnes of CO₂ annually, as well as cost savings of 50 thousand US dollars per year.

Measures to capture CO₂



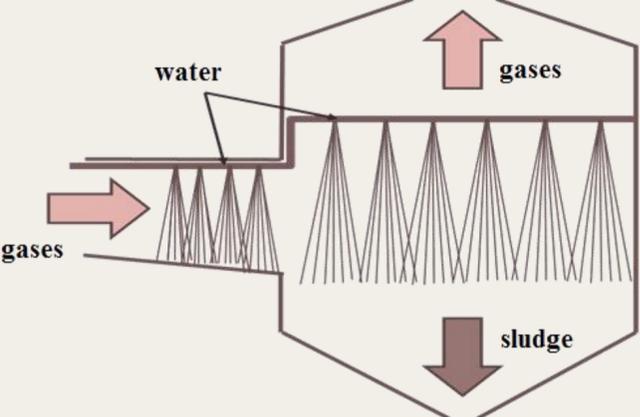
CO₂ capture is one way to reduce greenhouse gas emissions from alumina refineries.

Project status

- At the Achinsk and at other alumina refineries, experimental developments are underway to capture CO₂ using alkaline bottom-sludge water; using different options for wet scrubbing of gases.
- The implementation of such measures is primarily considered for the calcination process, as well as for CHP's emissions.

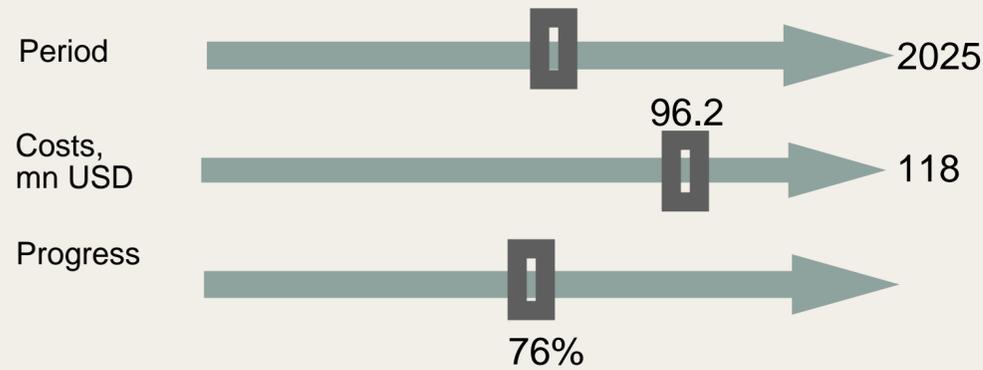
Effect of 1 to 10% CO₂ uptake

Built-in nozzles create a curtain of splashes of undersludge solution in the gas duct, which, entering into a chemical reaction with CO₂ in the flue gases, binds it, preventing it partially from GHG being released into the atmosphere.



MODERNISATION OF ALUMINUM PLANTS

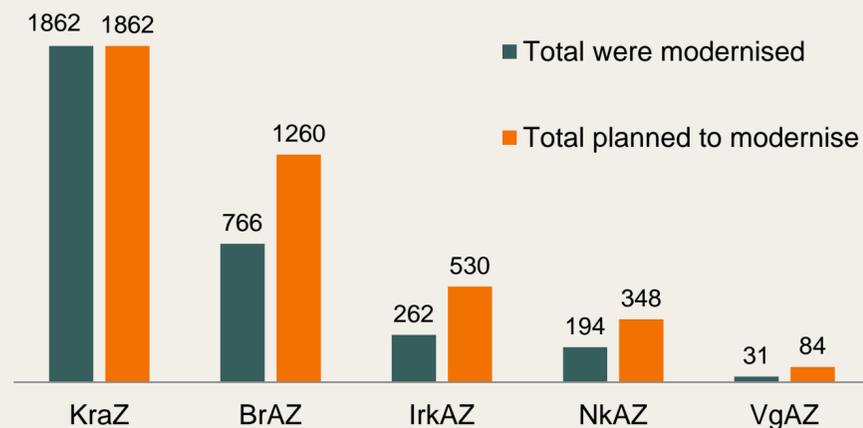
Switching to Eco-soderberg



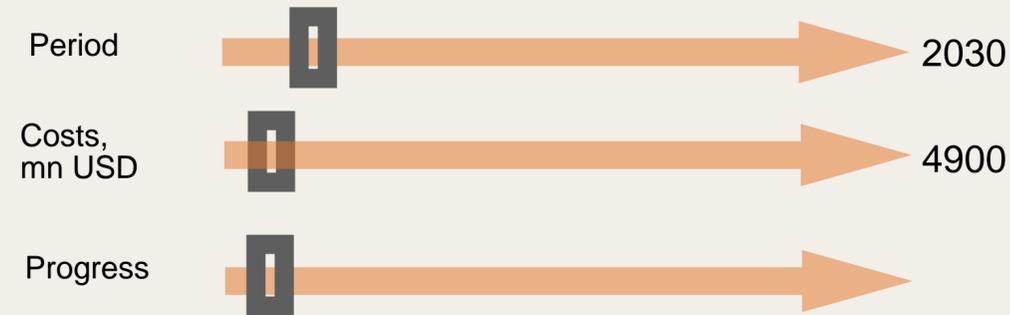
Switching to Eco-soderberg allows to significantly reduce emissions of perfluorocarbons (PFCs) from the electrolysis process at Soderberg technology.

Project status

- The transition of electrolyzers to Eco-soderberg technology continues
- In the 1st half of 2022, were put into operation:
 - BrAZ: 109 electrolyzers
 - IrkAZ: 45 electrolyzers
 - NkAZ: 16 electrolyzers
 - VgAZ: 10 electrolyzers



Transition to pre-baked anode technology

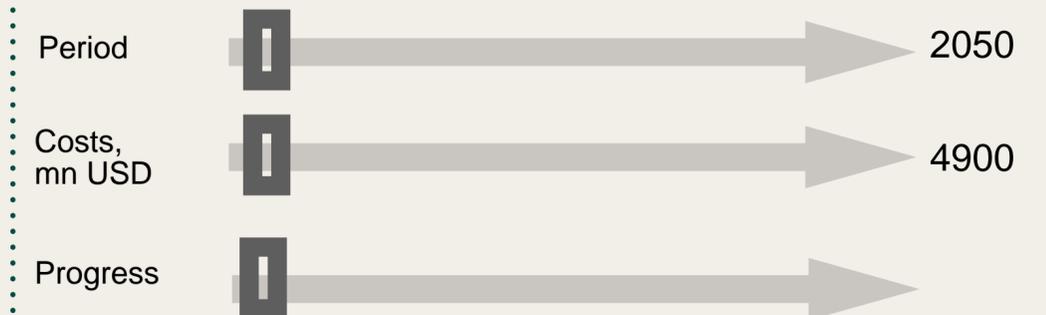


The partial transfer of enterprises to modern electrolyzers with baked anode technology allows reducing GHG emissions from electrolysis by at least a quarter.

Project status

- Developed design documentation and launched environmental impact assessment for modernisation projects
- Within the framework of projects for the environmental modernisation of the plants, it is planned to transfer to the pre-baked anode technology:
 - KrAZ - 535 thousand tonnes / year of raw al.
 - BrAZ - 535 thousand tonnes / year of raw al.
 - IrkAZ - 235 thousand tonnes / year of raw al.
 - NkAZ - 75 thousand tonnes / year of raw al.
- Taishet AS launched in commissioning mode

Conversion of capacities to inert anode technology



Switching to inert anode will completely eliminate GHG emissions from aluminum electrolysis technology.

Project status

- Achieved further improvements in electrolysis technology at the pilot site for aluminium electrolysis on inert anodes
- Registered ALLOW INERTA trademark
- Industrial pots with inert anodes in Krasnoyarsk have already produced over 3700 tonnes of aluminum with the lowest carbon footprint in the world

3700 t

Of aluminum produced with the lowest carbon footprint in the world

OTHER PROJECTS OF METALS SEGMENT

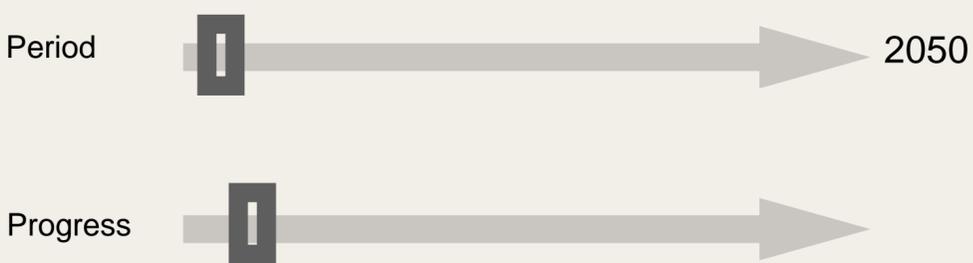
Recycling



Forestry projects



Transportation



Involvement in the production of secondary aluminum can significantly reduce GHG emissions in the production of aluminum alloys and is in line with the goals of circular economy.

The Group's efforts to offset its emissions, which, for technical and economic reasons, cannot yet be eliminated, are an important direction in achieving the global goal to fight with the climate change.

Working with service providers to eliminate GHG emissions reduces the aluminum carbon footprint at all stages of the production chain.

Project status

- RUSAL initiated the creation of a recycling and sustainable development sector within the framework of the Aluminum Association
- During 2021, RUSAL, together with Ecoplatform and Legends of Baikal, participated in a joint project to place reversible vending machines in retail stores
- Pilot projects have been launched at two RUSAL plants: KUBAL in Sweden and the Volgograd aluminum smelter.

Project status

- 505 thousand hectares in the Krasnoyarsk Territory are under aviation forest protection
- 1.1 million trees planted in Krasnoyarsk Territory and Irkutsk Region
- 440 thousand tonnes of CO₂ offset annually
- Forest projects related to effective forest management are being considered
- Group's Forest Climate Strategy is underway to form

Project status

- In 2021, RUSAL entered into an agreement with PJSC Transcontainer on strategic cooperation for the purpose of low-carbon development in logistics. To reduce GHG emissions, companies are committed to jointly develop and implement new low-carbon technologies for the transportation of raw materials and aluminum products

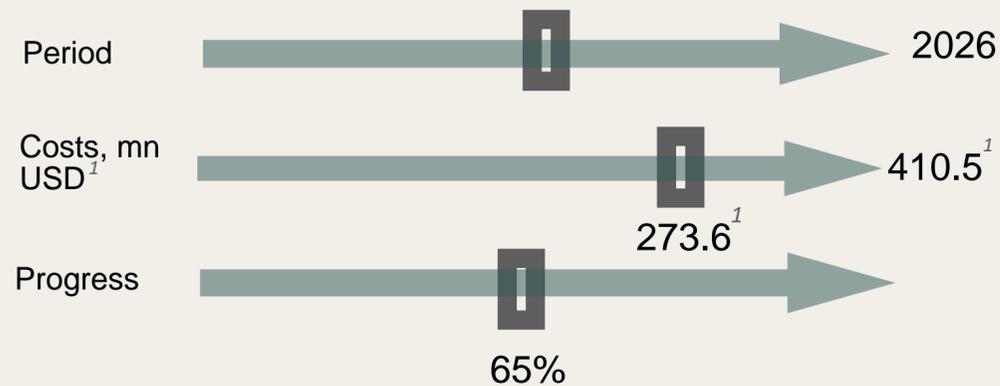
Scrap recycled

KUBAL, k tonnes		BrAZ, k tonnes ¹	
2021	1 h 2022	2021	1 h 2022
8.2	3.8	1.8	3.3

(1) With the involvement of external contractors

DEVELOPMENT OF HYDROPOWER

New Energy Programme



The programme is launched to increase electricity generation at existing HPPs with the replacement of generation at the CHP.

Construction of HPPs



The development of green energy is consistent with the low-carbon development strategy of the Russian Federation and ensures the socio-economic development of the regions.

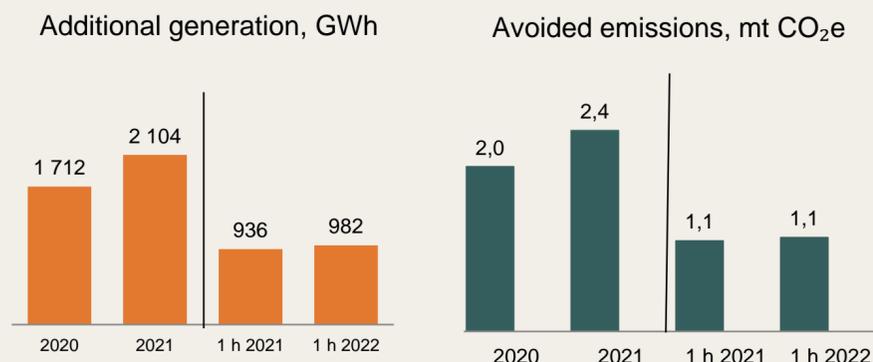
Measurement of GHG emissions from HPP reservoirs



In 2019, the IPCC approved a methodology for calculating GHG emissions from reservoirs. To ensure the correctness of the calculations, Group carries out instrumental measurements according to international methods from 2020.

Project status

- In 2021, a new hydroelectric unit was launched at the Irkutsk HPP. One impeller was replaced at the Bratsk HPP and replacement of another impeller began. Two new impellers were delivered to the Krasnoyarsk HPP, where technical re-equipment began.
- In 2022, replacement of the hydroelectric unit of the Irkutsk HPP, one impeller at the Krasnoyarsk HPP and one impeller at the Bratsk HPP.



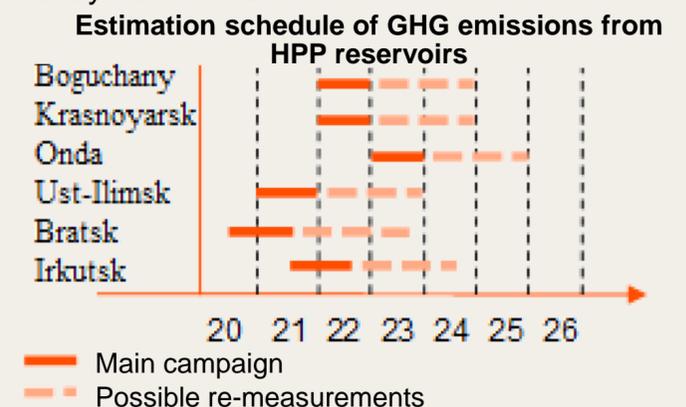
Project status

- At the small-scale Segozerskaya HPP, the installation of outlet and inlet channels is underway. Commissioning is scheduled for 2023.
- Projects for the Nizhne-Boguchany, Motygin'skaya, Krapiva and Telmamskaya HPPs are in different stages of development. Possible financing mechanisms, environmental and social risks for projects are being assessed.
- The construction of the Motygin'skaya HPP is connected with the implementation of plans for the development of green hydrogen.

HPP	Capacity, MW	Expected completion date
Segozerskaya	8.1	2023
Telmamskaya	450	2030
Nizhne-Boguchany	660	2030
Krapiva	345	2027
Motygin'skaya	1082	-

Project status

- In 2021, water samples were taken from the Bratsk and Ust-Ilimsk reservoirs for the balance of anthropogenic methane emissions, as well as other anthropogenic emissions and absorption of CO₂.
- The emission coefficients obtained are among the lowest in the range of global averages for boreal reservoirs.
- In 2023, measurements will be taken at the Onda and Krasnoyarsk HPPs.



(1) At the USD/RUB exchange rate as of June 30, 2022 is 51.16. Costs at the end of the first half of 2022 amounted to RUB 14 billion, with an estimated cost of RUB 21 billion until 2026.

HYDROGEN ENERGY DEVELOPMENT

Development of cryogenic tank containers for transportation of liquid hydrogen



The goal of the project is to solve the problem of transporting hydrogen over long distances, which remains the main unresolved problem in the promotion of hydrogen.

Project status

- Assessed sales markets
- Developed the layout of the technological line for the small series production
- Carried out R&D to develop the design of a tank container

Development of the concept of hydrogen transport infrastructure for Krasnoyarsk

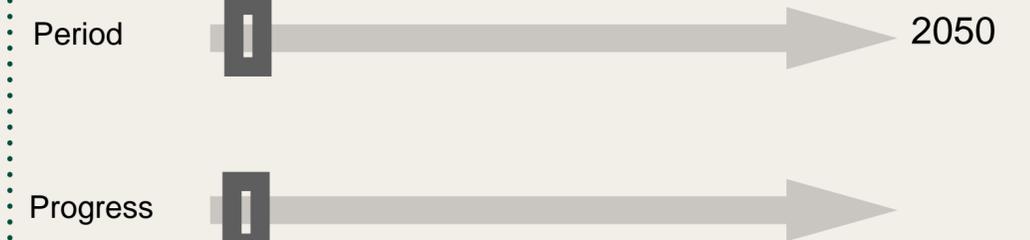


The project for the construction of a small-scale environmentally friendly hydrogen electrolysis using electricity from the Krasnoyarsk HPP, green hydrogen is used as a fuel for public transport.

Project status

- Completed preliminary feasibility study of the project
- Assessed the possibility of public-private partnership (attracting subsidies)

Hydrogen production by electrolyzers



Hydrogen plays an important role in the decarbonisation of industries, which it is difficult to reduce emissions through the supply of carbon-neutral fuels and raw materials.

Project status

- Due to restrictions on export markets and access to technology, the Group is working on projects on hydrogen transportation and consumption technologies

OTHER PROJECTS OF POWER SEGMENT

CHP conversion to gas



Switching power generation to natural gas is the most promising way to significantly reduce GHG emissions, but also to solve a environmental problems in the Irkutsk region.

Project status

- Gasification of the region requires significant investments
- A dialogue to assess the feasibility of implementing the project, including with authorities, is underway
- A decision is required on the value of the tariff and a solution to the social problem of monotowns depended on the extraction of coal used in CHPs

Carbon capture, use and storage technology (CCUS)



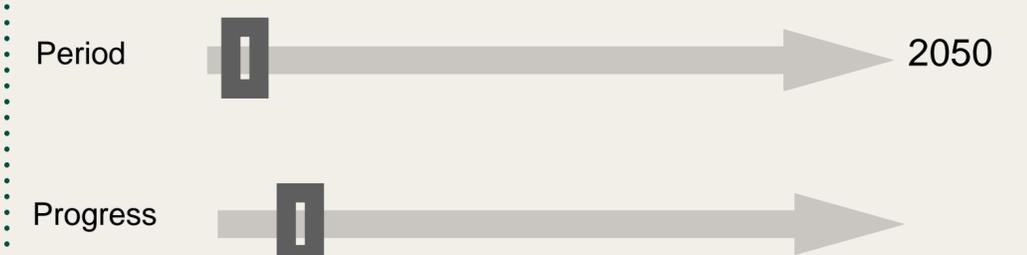
All over the world, CCUS technology is considered as the main tool for industries where there is no technical possibility to prevent GHG emissions.

The main method of carbon storage is the injection of liquid CO₂ into underground geological formations, which are able to reliably store CO₂ underground.

Project status

- Together with partners, the possibility of implementing the project in Irkutsk region, where there is a potential for CO₂ storage, is being explored.

Energy efficiency measures



The reduction of GHG emissions for the Power segment is closely linked to the increase in energy efficiency generation and transportation of energy resources.

Project status

- Within the framework of the developed Energy Efficiency Improvement Program from 2021 to 1 half of 2022:
 - 138,067 thousand kWh were saved
 - expenses amounted to 794.416 mn RUB
- As part of optimising the energy consumption of pumping stations of heating networks from 2021 to 1 half of 2022:
 - GHG emissions reduced by 4,875 t CO₂e
 - expenses amounted to 71.637 mn RUB

En+ Group CHALLENGES 2022

CHALLENGES

Volatility in supply, demand and (or) prices of commodities

Financial market restrictions. Influence on the capital allocation and the possibility of attracting loans

Disruptions of supply chains

MITIGATION MEASURES

Negotiation with suppliers of logistical services, cost reduction

Analysis of current funding opportunities, including alternative sources of green finance

Restructuration of supply chain

CHALLENGES

Difficulties in the supply of imported equipment and components

Restriction of contacts with international organisations

Termination of relations between Russian companies with international ratings, including CDP

MITIGATION MEASURES

Working with alternative equipment and components' suppliers

Continuing the course towards sustainable development and fulfillment of the undertaken commitments

En+ Group's Power Segment and Metals Segment will submit respective reports, which will be available on the CDP's website, accessible to all stakeholders without an official ranking.

CHALLENGES

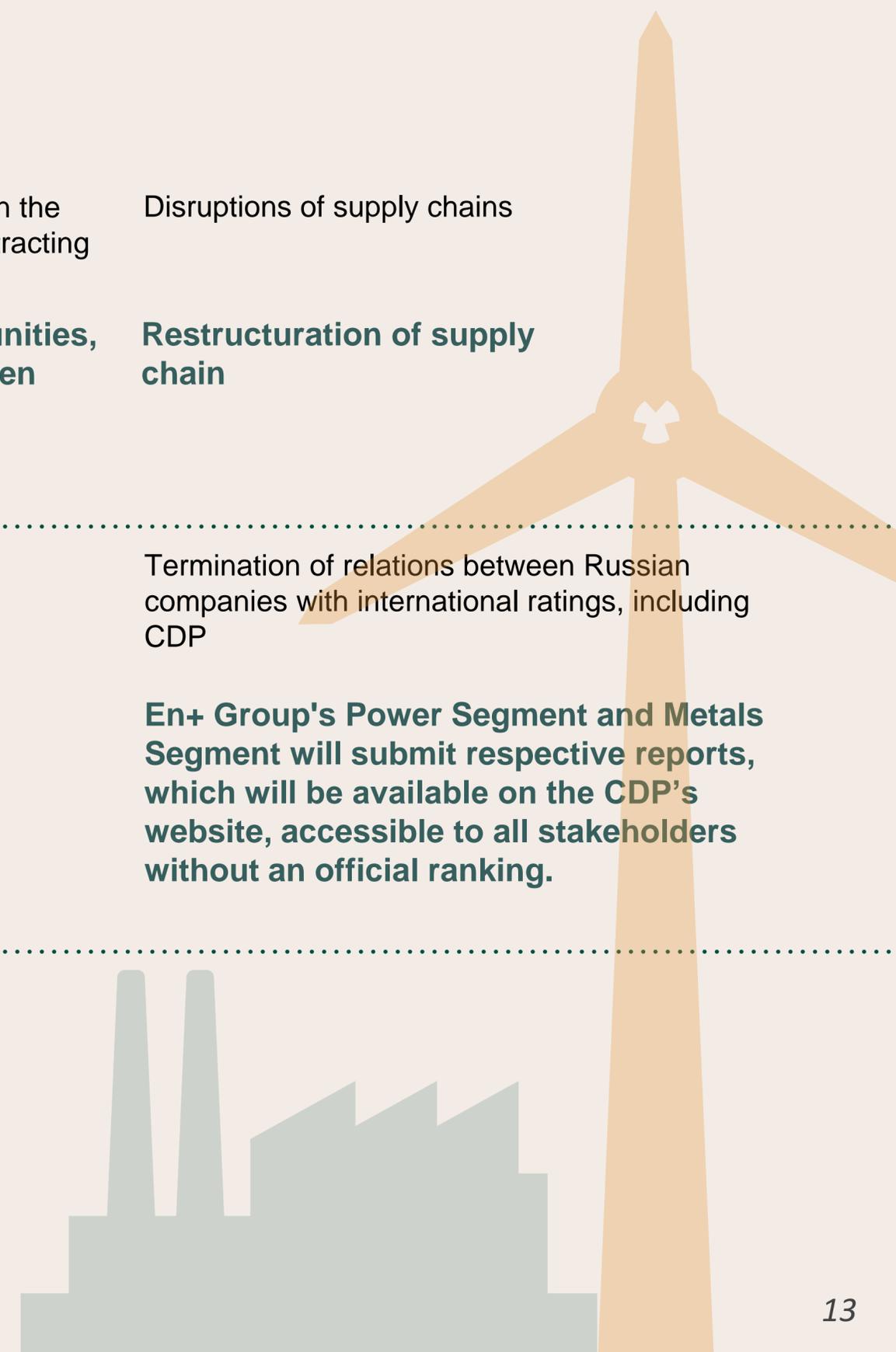
Termination of I-RECs certificates from Russian companies

Restriction of environmental legislation

MITIGATION MEASURES

Active support for the introduction of national legislation and national certificate system

Monitoring of regulatory changes, interaction with regulators



ASSESSMENT OF PHYSICAL RISKS AND OPPORTUNITIES ACCORDING TO THE TCFD METHODOLOGY

In 2021, the Group systematised information about its climate risks and opportunities according to TCFD standard.



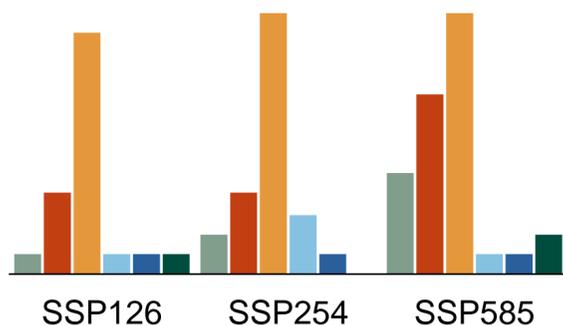
Quantitative assessment of identified physical climate risks

Qualitative assessment of identified physical climate risks

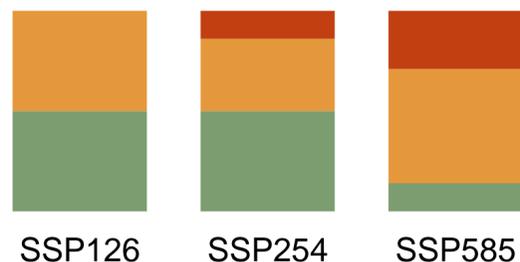
Qualitative and quantitative assessment of identified transitional climate risks

- The analysis showed that climate risks can affect almost every enterprise of the company.
- During analysis, existing measures to mitigate the consequences of risks were analysed and updated.

Asset exposure to risk factors



Share of assets exposed to physical risk, %



The following scenarios were chosen

- SSP 126 "Sustainability scenario"
- SSP 245 "Middle of the road scenario"
- SSP 585 "Fossil Fuel Economy scenario"

MAIN PHYSICAL OPPORTUNITIES:

- Reduction in the consumption of fuel and energy resources and the required capacity of thermal energy due to a shorter heating season
- Increasing the share of low-carbon electricity through the development of renewable energy



Climate risk factors

- abnormal heat
- abnormal precipitation and floods
- thunderstorms
- temperature transition through 0°
- wildfires

ASSESSMENT OF TRANSITION RISKS AND OPPORTUNITIES ACCORDING TO THE TCFD METHODOLOGY

MAIN TRANSITION RISKS

- ✓ Costs of arranging measures to adapt to and minimise the impact of the global climate change
- ✓ Expenses associated with the implementation of offset mechanisms
- ✓ Additional tax burden due to the CBAM introduction
- ✓ Capital expenditure on the transition to energy-efficient and energy-saving solutions in production processes
- ✓ Reduction or absence of additional government investments to reduce GHG emissions

- ✓ Increasing investment in the production of low-carbon generation
- ✓ Increasing investment attractiveness
- ✓ Increased demand for less carbon-intensive products
- ✓ The Group's regular annual GHG emissions reporting to the stakeholders

MAIN TRANSITION OPPORTUNITIES

EN+ GROUP CONTRIBUTION TO GLOBAL DECARBONISATION



Efforts of En+ Group and RUSAL in reducing GHG emissions is recognised as the best practice by the Carbon Pricing Leaders Coalition - CPLC in the annual **Carbon Pricing Leadership Report 2021/22**.



En+ Group became the first Russian company to join the **UN Energy Compact** initiative, committing to increase the production of clean electricity and promote access to it



En+ Group actively took part in the **UN Climate Change Conference (COP26)** in Glasgow

WE ARE COMMITTED TO TRANSPARENCY

- ✓ En+ Group supports transparency as it is the first step towards greater climate mitigation responsibility
- ✓ The Group discloses its own emissions and promotes industry-wide disclosure
- ✓ En+ Group's CDP reports for both Power and Metals segments will be available on the CDP website for stakeholders. In 2022, the Group's reports will not be assigned CDP rating indices.



CDP rating 2021
RUSAL «A-»
Eurosibenergo-Hydrogeneration «C»

Partnerships and collaboration



United Nations Global Compact



International Aluminium Institute



National ESG Alliance



Aluminium Stewardship Initiative



Climate Partnership of Russia



Carbon Pricing Leaders Coalition



International Policy Coalition for Sustainable Growth by U.S. Chamber of Commerce

COMMENTS FROM STAKEHOLDER REPRESENTATIVES

Andrey Sharonov
CEO of National ESG Alliance

”

The ESG Alliance’s study showed that the importance of the sustainable development agenda in the medium term will only increase, so it is important for Russian companies, as participants of the global market, to maintain this agenda to be competitive.

Chris Bayliss
ASI Director of Standards

”

The ASI standards, in addition to driving real sustainability improvements along the whole aluminium value chain, are designed to encourage companies to improve transparency and public disclosure of environmental, climate and social risks

Evgeny Shvarts

Honored Ecologist of the Russian Federation, Head of the Center for Responsible Nature Management, Member of the Board of directors of RUSAL

”

Before the Conference of the Parties to the Paris Agreement in Glasgow in the fall of 2021, the En+ group presented one of the first corporate Climate Strategies among Russian companies that meets the requirements and best practices - the main focus is on reducing greenhouse gas emissions from main production processes, but the actions of the "last steps of decarbonisation" are also calculated "- the use of the so-called "natural solutions" (Nature Based Solutions), incl. forest climate projects to achieve carbon neutrality by 2050. Purposeful actions of the company show a worthy example of the implementation of a corporate climate strategy in line with the best world practice

Anna Romanovskaya

Director of the Roshydromet Institute, Doctor of Biological Sciences, Corresponding Member of the Russian Academy of Sciences

”

When planning and implementing climate measures, companies need to stop copying other's experience directly so as not to harm Russian natural ecosystems. Russia needs climate projects that are based on international standards, but take into account national specifics, minimise possible risks, and are also necessarily checked for the reliability of the results. Climate change is global, and in order to find common ground with the international community in the future, it is important for Russian companies to develop this strategic direction.