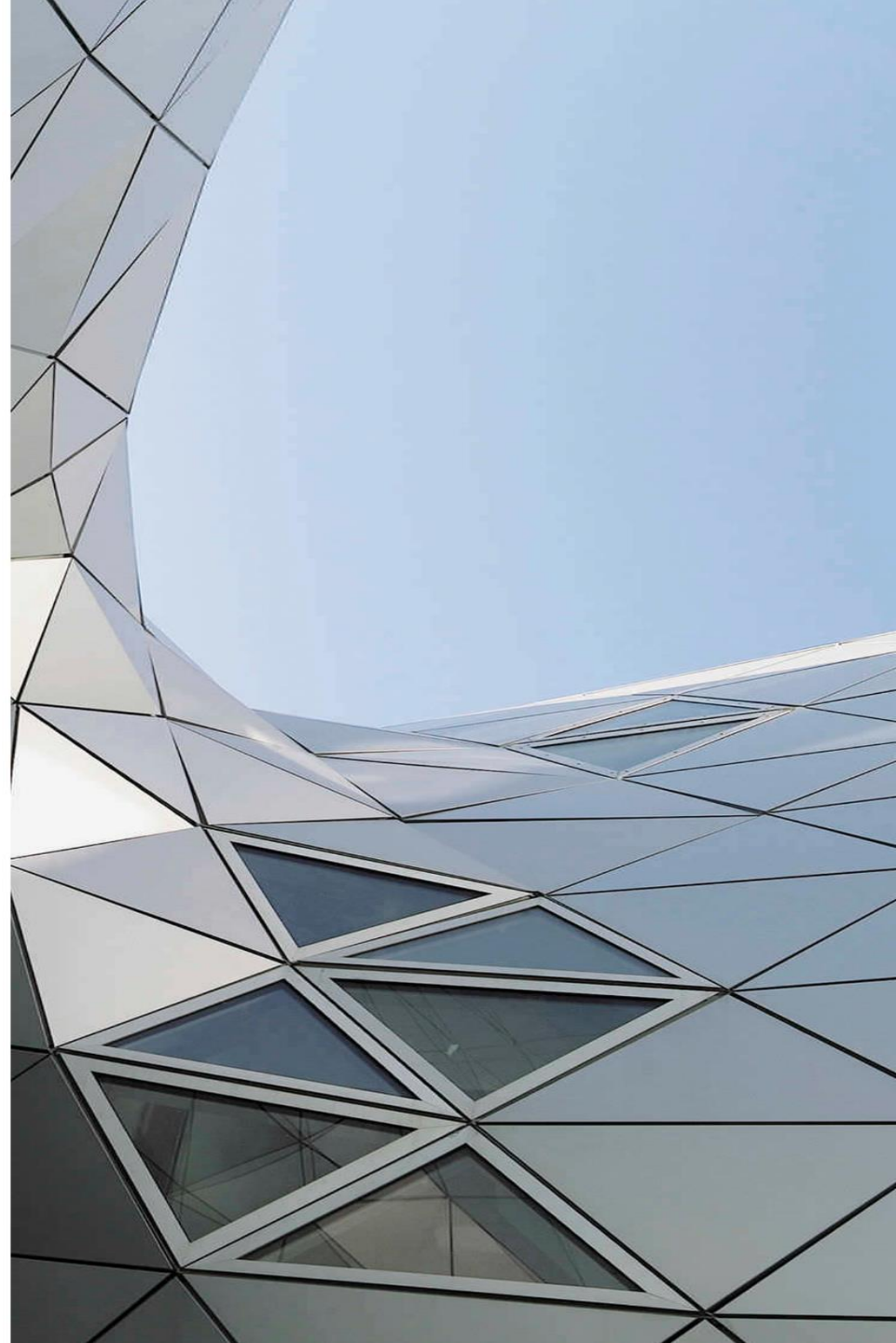




**En+**  
G R O U P

Pathway to Net Zero

October 2021



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## Net zero overview

- Production chain
- Aluminium industry outlook
- Energy industry outlook
- Climate change challenges and opportunities for Metals segment
- Climate change challenges and opportunities for Power segment
- Pathway to net zero
- Green Aluminium Vision

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## Our approach to net zero

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- Strategic approach to net zero
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## Actions in Metals segment

- High degree of vertical integration in the aluminium production process
- Metal segment's modernisation program
- Other initiatives in Metals segment
- Metals segment. Taishet construction

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- Value chain of Power segment
- New energy modernisation programme
- CHP modernisation programme
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- Other Power segment projects
- Future projects of Power segment
- Nature-based solutions – compensation and neutralisation

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## Driving our commitment

- Partnerships and cooperation
- Transparency
- Task Force on Climate-related Financial Disclosures (TCFD)
- Our recommendations on policy

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Our approach  
to net zero

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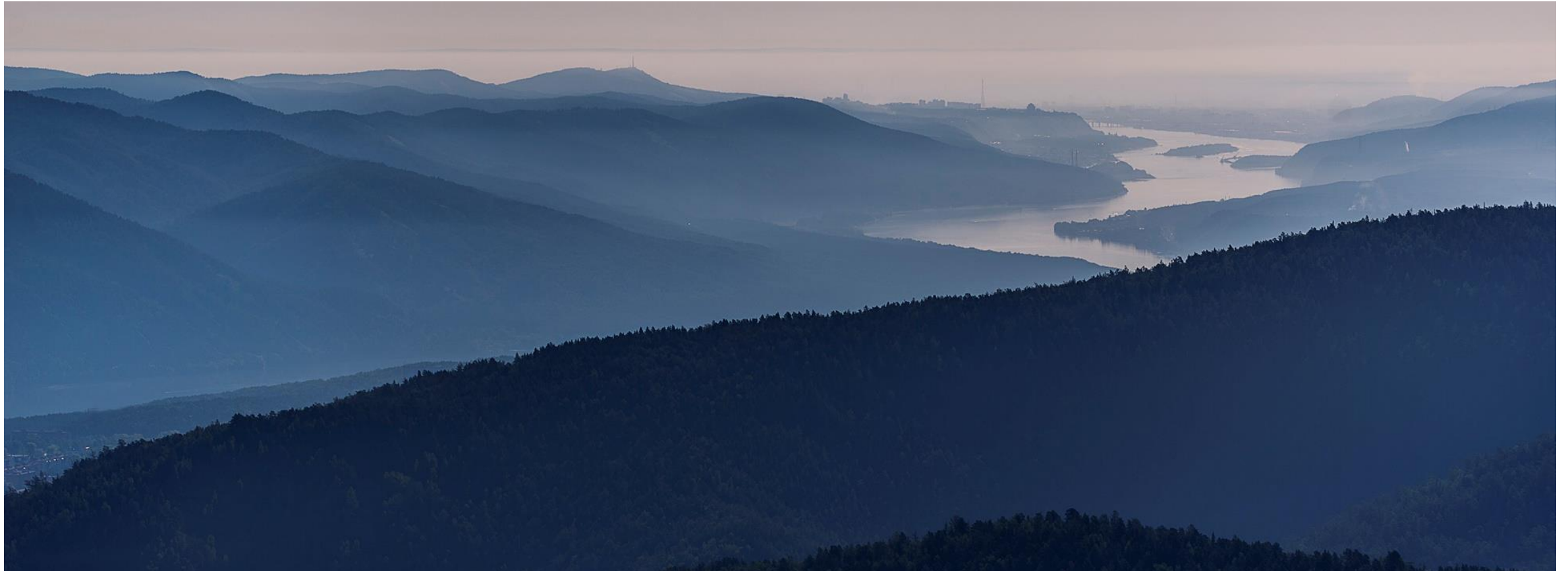
Actions in  
Metals segment

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Actions in  
Power segment

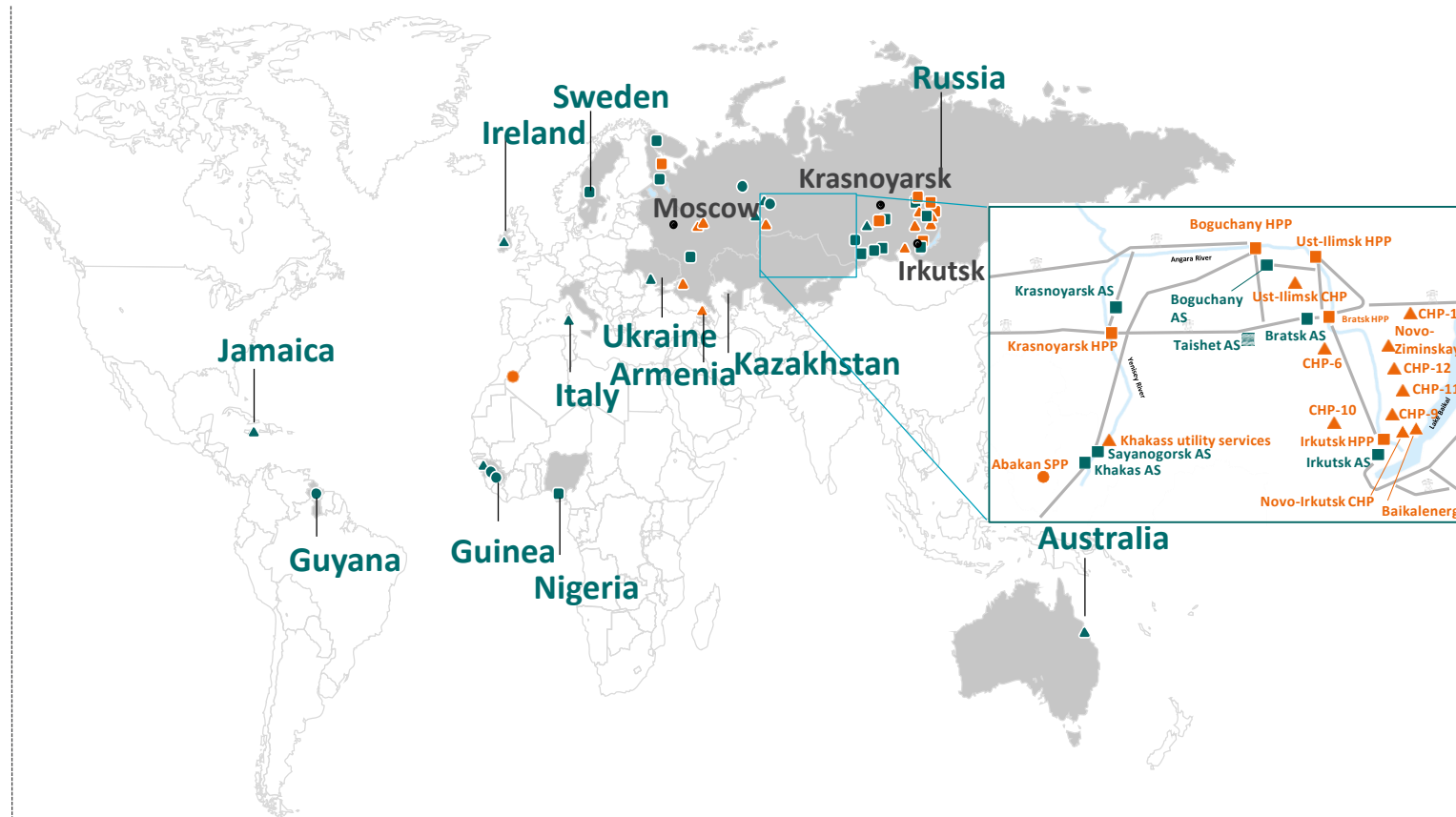
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Driving our  
commitment



# En+: Best Positioned to Enable the Transition to Low-Carbon Aluminium

- ✓ Industry leader in low-carbon aluminium
- ✓ Lowest-cost aluminium producer
- ✓ Strong long-term fundamentals for aluminium market
- ✓ Strong and resilient cashflow generation
- ✓ Continued strengthening of global leadership to address climate change and broader ESG
- ✓ Tangible commitments to drive the global aluminium industry towards the low-carbon economy
- ✓ Investments in scientific advances and critical industrial process improvements
- ✓ Acquisition of EN+ shares from VTB in February 2020 – providing optionality to increase free-float



**No 1**  
aluminium producer  
excluding China

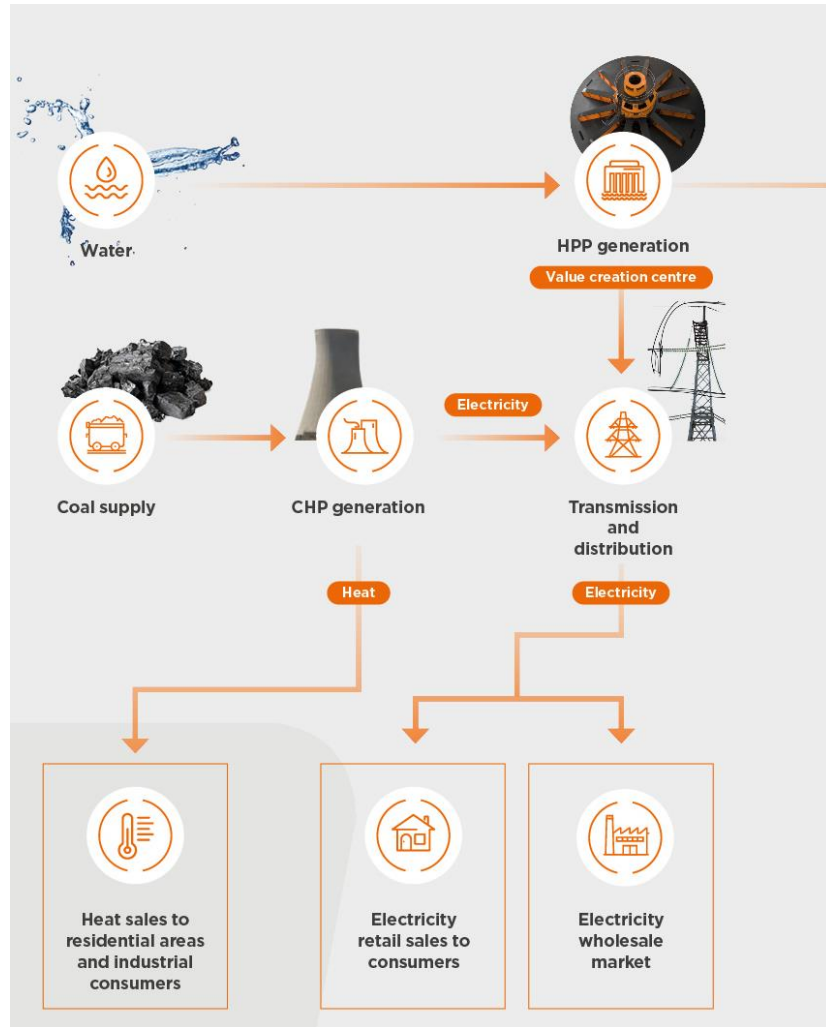
**69.3<sup>1</sup> TWh**  
low-carbon hydro power  
generation

Metals segment	Power segment
■ Aluminium	■ Hydropower
▲ Alumina	▲ Thermal Power
● Bauxite	● Solar

(1) Excluding Onda HPP with installed power capacity 0.08 GW and production level of 0.5 TWh in 2020 (located in European part of Russia, leased to UC RUSAL).

# The power of our integrated business – production chain

## How we generate power



- En+ Group benefits from its unique assets that results in a fully integrated and highly self-sufficient business
- Hydropower is used to refine raw materials and produce aluminium in Siberia
- More than 98% of aluminium is made using electricity already generated by hydropower

## How we produce aluminium



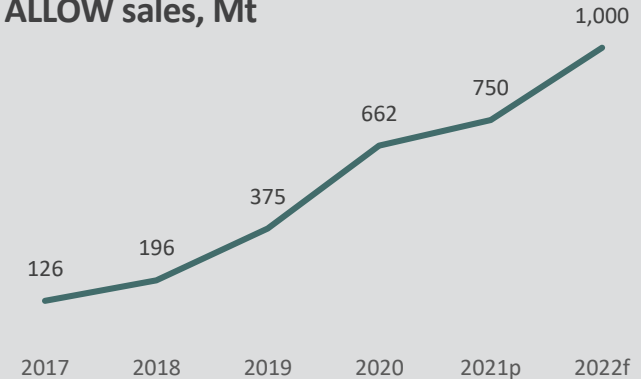
## Growing demand in the aluminium industry



En+ Group's Metals segment, RUSAL, is the world leader for the production of low-carbon aluminium, recognised in the market through its **ALLOW** brand

➤ By the end of 2022, we expect to sell more than 1 million tonnes of ALLOW, reflecting growing market demand for low-carbon aluminium

ALLOW sales, Mt

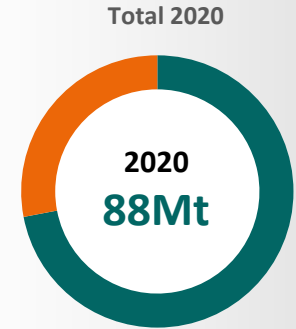


**2.4<sup>1</sup>**

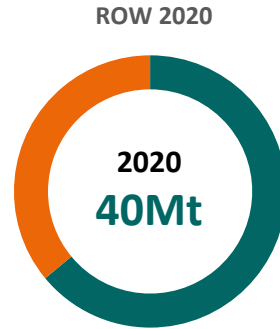
Carbon footprint of ALLOW, t CO<sub>2</sub>/t Al

**12.5<sup>2</sup>**

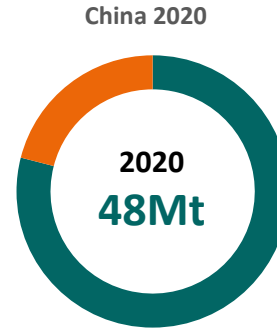
Average carbon footprint of aluminium industry, tCO<sub>2</sub>/t Al



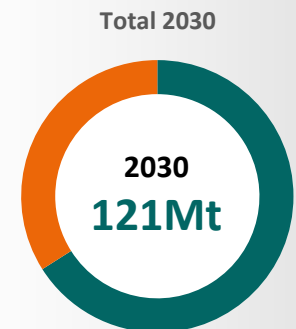
■ Primary 63.8Mt 72%  
■ Recycled 24.3Mt 28%



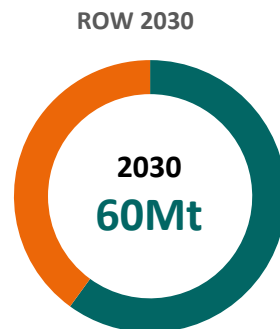
■ Primary 25.9Mt 64%  
■ Recycled 14.4Mt 36%



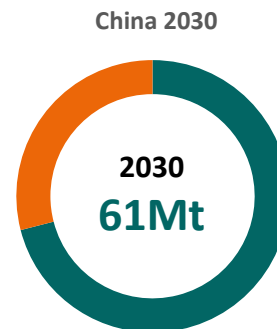
■ Primary 37.9Mt 79%  
■ Recycled 9.9Mt 21%



■ Primary 79.2Mt 66%  
■ Recycled 41.7Mt 34%



■ Primary 36.1Mt 60%  
■ Recycled 24.0Mt 40%



■ Primary 43.2Mt 71%  
■ Recycled 17.7Mt 29%

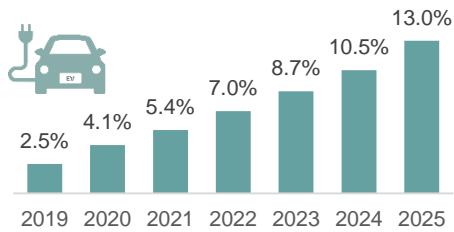
(1) Level 1 in accordance with International Aluminium Institute (2018), Aluminium Carbon Footprint Technical Support Document, [www.international-aluminium.org/wp-content/uploads/2021/08/AL31DA1-1.pdf](http://www.international-aluminium.org/wp-content/uploads/2021/08/AL31DA1-1.pdf).

(2) IAI data, 2018. Level 1 in accordance with Aluminium Carbon Footprint Technical Support Document (2018), [www.international-aluminium.org/wp-content/uploads/2021/08/AL31DA1-1.pdf](http://www.international-aluminium.org/wp-content/uploads/2021/08/AL31DA1-1.pdf).

## Low-carbon aluminium demand across sectors and geographies

### SMART MOBILITY

EV penetration accelerates across all segments



**7%**

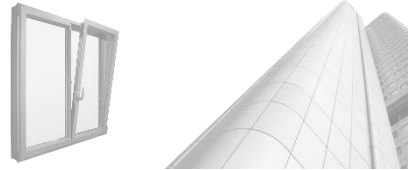
CAGR  
2020-2025

global aluminium demand growth in Transportation sector

### GREEN BUILDING

Improve energy-efficiency of old and new buildings

Refurbishments to improve insulation, replace windows, reduce air leakage, improve heating (and cooling) systems, and switch fuels towards renewable energies



**3%**

CAGR  
2020-2025

global aluminium demand growth in Construction sector

### RECYCLABLE MATERIALS

Can revolution 2.0: Aluminium replaces plastic

**6.2%**

**+10**

Mio cans

increase in aluminum can shipments in the US in 2020

was imported in the US in 2020

**4%**

CAGR  
2020-2025

global aluminium demand growth in Packaging sector

### RENEWABLE ENERGY

Tripling Renewables Investment to Reach Climate Goal



Frame for solar panels



Aluminium conductors for wind farm

**4%**

CAGR  
2020-2025

global aluminium demand growth in Electrical sector

## INDUSTRY WINNERS



Automotive



Packaging



Electrical



Building & Construction

> **110**  
COUNTRIES

ACCOUNTING FOR

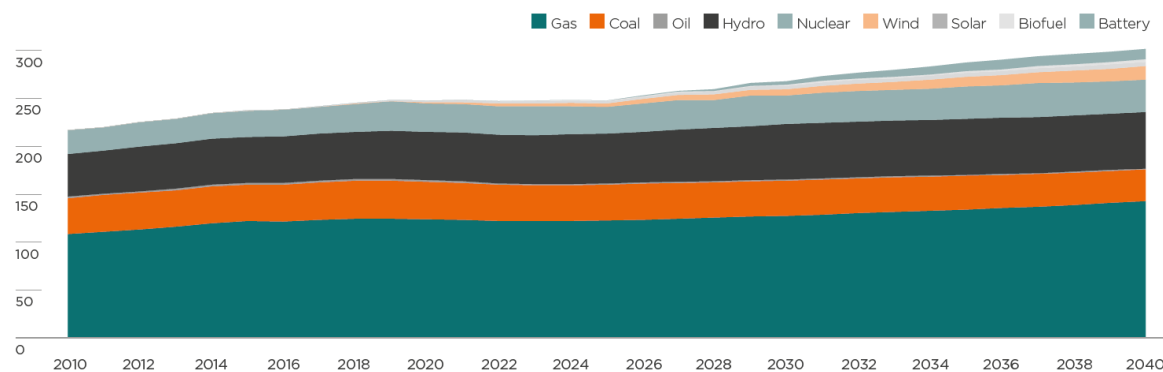
> **65%**  
OF GLOBAL GDP

HAVE PLEDGED TO BE **NET ZERO** BY MID OF CENTURY

**Aluminium demand to grow at 4-5% CAGR Over Next Five Years**



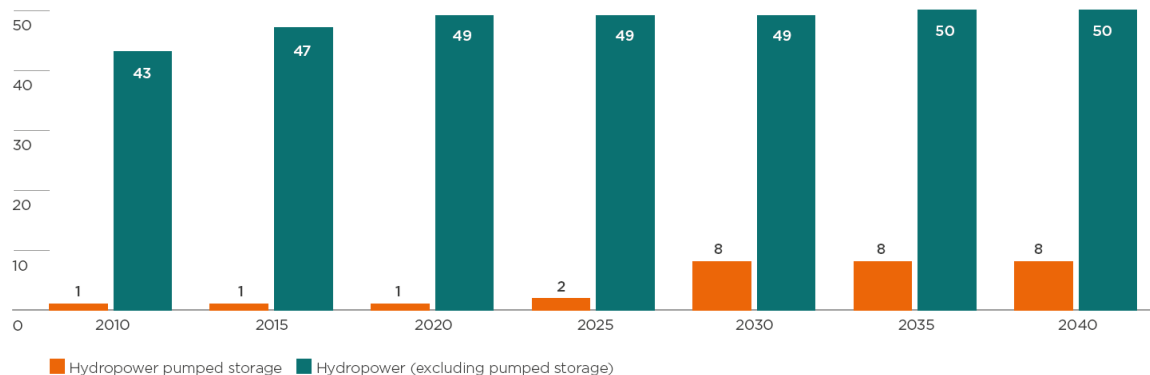
## Capacity outlook in UES Russia to 2040, GW<sup>1</sup>



## Capacity outlook in Russia

- By 2040 the share of fossil-fuelled power plants in the capacity mix will slip eight percentage points from 67% to around 59%, with nuclear and hydropower remaining around 12% and 20% respectively
- The share of renewables (mainly wind, solar, and biofuel) is destined to rise from 1% to exceed 7%
- Storage capacity will become increasingly important and will start impacting the sector from around 2025, with the share increasing to around 3.5% by 2040
- Between now and 2040, Russia's overall generating capacity will grow about 1% per year on average

## Hydropower capacity outlook by main type to 2040, GW



## Hydropower outlook in Russia

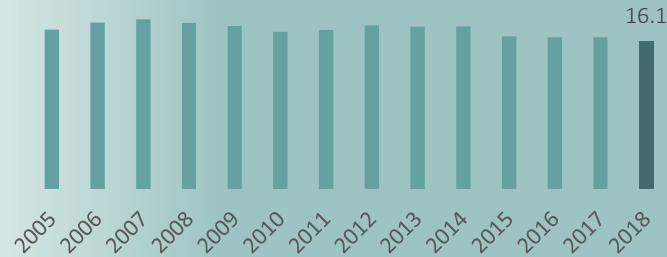
- Hydropower capacity will grow on average by around 0.8% per year.
- UES Russia's hydropower capacity will grow from around 49.9 GW in 2019 to just over 58.6 GW in 2040
- Most of the additions will enter the system after 2026. The Group's power generation assets are located in the Angara and the Yenisei. The Group operates four HPPs, including three of the five largest in Russia, or twenty largest globally, in terms of installed electricity capacity

(1) SEEPX Energy (March 2021), Russian Power Sector 2010-40 Datasheet Overview, [www.seepx.com/\\_webedit/uploaded-files/All%20Files/Free%20Content/Russian%20Power%20Sector%202040%20Outlook%20%28updated%20March%202021%29.xlsx](http://www.seepx.com/_webedit/uploaded-files/All%20Files/Free%20Content/Russian%20Power%20Sector%202040%20Outlook%20%28updated%20March%202021%29.xlsx).

## Aluminium production is currently one of the world's most energy-intensive industries

### From challenges

Global average carbon footprint by primary aluminium sector  
tCO<sub>2</sub>e per t primary aluminium<sup>3</sup>



- Carbon intensive
- Hard-to-abate sector

Global carbon footprint by aluminium sector  
mn t CO<sub>2</sub><sup>4</sup>



### To opportunities

#### Aluminium as a critical element of sustainability/transition

- Low-carbon
- Recyclability
- Durability and impermeability
- Low Weight
- Corrosion Resistance

**2.4 CO<sub>2</sub>/t Al t<sup>1</sup>**

- We produce our ALLOW brand with 2.4 tonnes of CO<sub>2</sub> e emissions per tonne of aluminium
- **5 times** below the global industry average of 12.5 CO<sub>2</sub>e/t Al<sup>2</sup>

(1) Level 1 in accordance with International Aluminium Institute (2018), Aluminium Carbon Footprint Technical Support Document, [www.international-aluminium.org/wp-content/uploads/2021/08/AL31DA1-1.pdf](http://www.international-aluminium.org/wp-content/uploads/2021/08/AL31DA1-1.pdf).

(2) IAI data, 2018. Level 1 in accordance with Aluminium Carbon Footprint Technical Support Document (2018), [www.international-aluminium.org/wp-content/uploads/2021/08/AL31DA1-1.pdf](http://www.international-aluminium.org/wp-content/uploads/2021/08/AL31DA1-1.pdf).

(3) International Aluminium Institute (June 2021), Greenhouse gas emissions aluminium sector, [www.international-aluminium.org/wp-content/uploads/2020/09/ghg\\_emissions\\_aluminium\\_sector\\_1\\_June\\_2021\\_read\\_only.xlsx](http://www.international-aluminium.org/wp-content/uploads/2020/09/ghg_emissions_aluminium_sector_1_June_2021_read_only.xlsx).

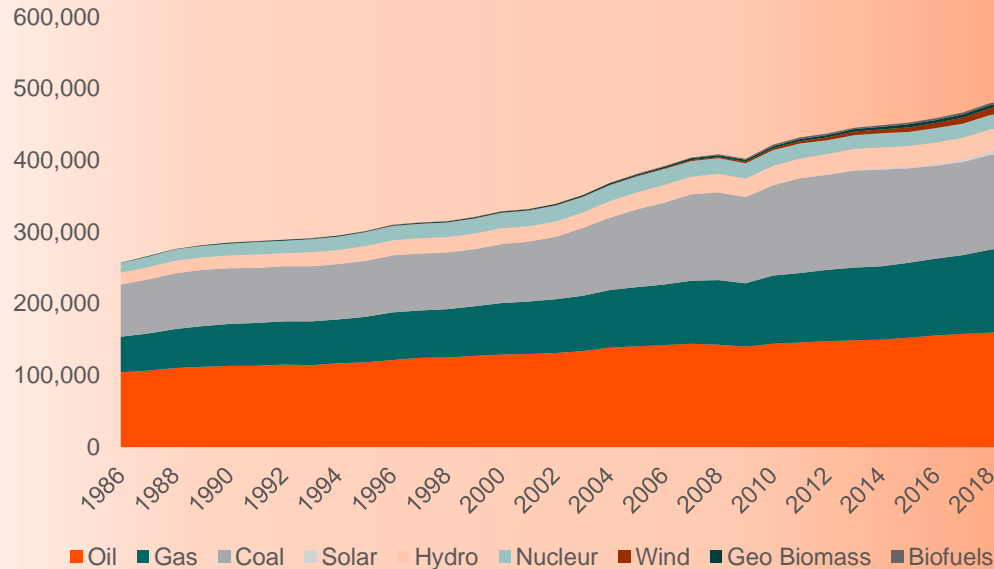
(4) Ibid.

## Energy mix transitioning from fossil fuels to renewables

From challenges

To opportunities

Energy consumption by source<sup>1</sup>, TWh



- Energy mix dominated by fossil fuels

**>15 GW**

of the Power segment's portfolio comes from hydroelectric power plants ("HPPs")

(1) Source: Statistical Review of World Energy 2021, BP.

In January 2021, En+ Group announced its mid-and long-term GHG reduction targets. The Group believes that these stretching targets represent the most ambitious climate change targets in the global aluminium industry

## 2015

- RUSAL set five GHG reduction goals for the period until 2025

## 2016

- RUSAL set two additional GHG reduction goals for the period until 2025

## 2017

- Launch of ALLOW, low-carbon aluminium brand

## 2019

- Group's sustainability report 2018

## 2020

- Group's sustainability report 2019 verified by an independent auditor
- Disclosure in line with the TCFD recommendations

## 2021

- Pathway to net zero
- Sustainability report 2020
- The Group committed to
  - 35% GHG emissions by 2030
  - Net zero by 2050
- Submission of the climate targets for approval to the SBTi
- En+ Climate Change Taskforce established
- The Group will participate in COP-2026, Glasgow

### En+ targets<sup>1</sup>:

- To become net zero by 2050
- To reduce GHG emissions by at least 35% by 2030

### Key actions to achieve climate change targets:

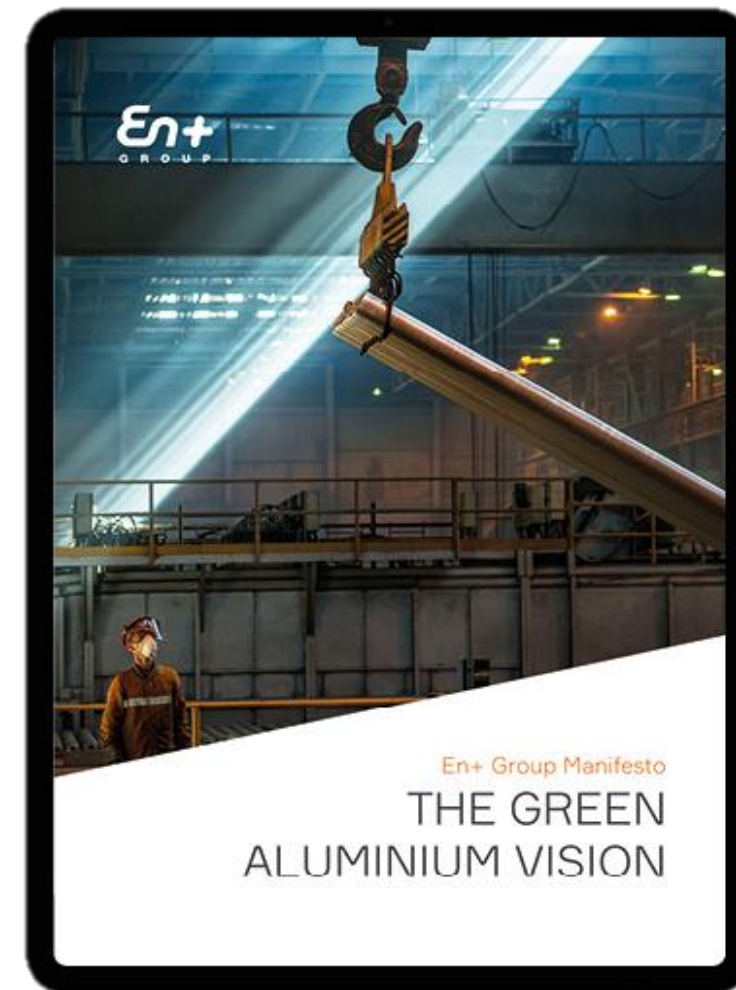
- R&D and advanced technologies
- Innovative technologies through the production chain
- Renewable energy: hydropower and solar generation
- Implementing nature-based solutions
- International and local partnerships



(1) Scope 1 and 2, as benchmarked against the Group's 2018 GHG emissions.

In July 2020, En+ Group launched its Green Aluminium Vision. It set out nine principles to lead the industry into the low-carbon economy by developing a new asset class of green aluminium

1. Determination to reduce emissions across the production process
2. Low-carbon aluminium branding
3. Carbon footprint transparency
4. Circularity
5. Sustainability labelling
6. Liberalisation of trade for low-carbon primary aluminium
7. Elimination of excess capacities to ensure fair and green trade
8. Facilitation of research and development
9. Support for a renewed multilateralism



# En+ Group and the Victoria & Albert Museum

The Victoria & Albert Museum in London in front of 'Between Forests and Skies', the art installation sponsored by EN+ and made from one of the first batches of our aluminium created using our groundbreaking inert anode technology.

The pavilion is currently on display at the Victoria & Albert Museum after which it will travel to Glasgow for COP 26.

To see a short film on the making of the artwork, please look it up on YouTube using this code or link:

<https://www.youtube.com/watch?v=Kwc1W2VixB8>



The art installation 'Between Forests and Skies', Victoria & Albert Museum

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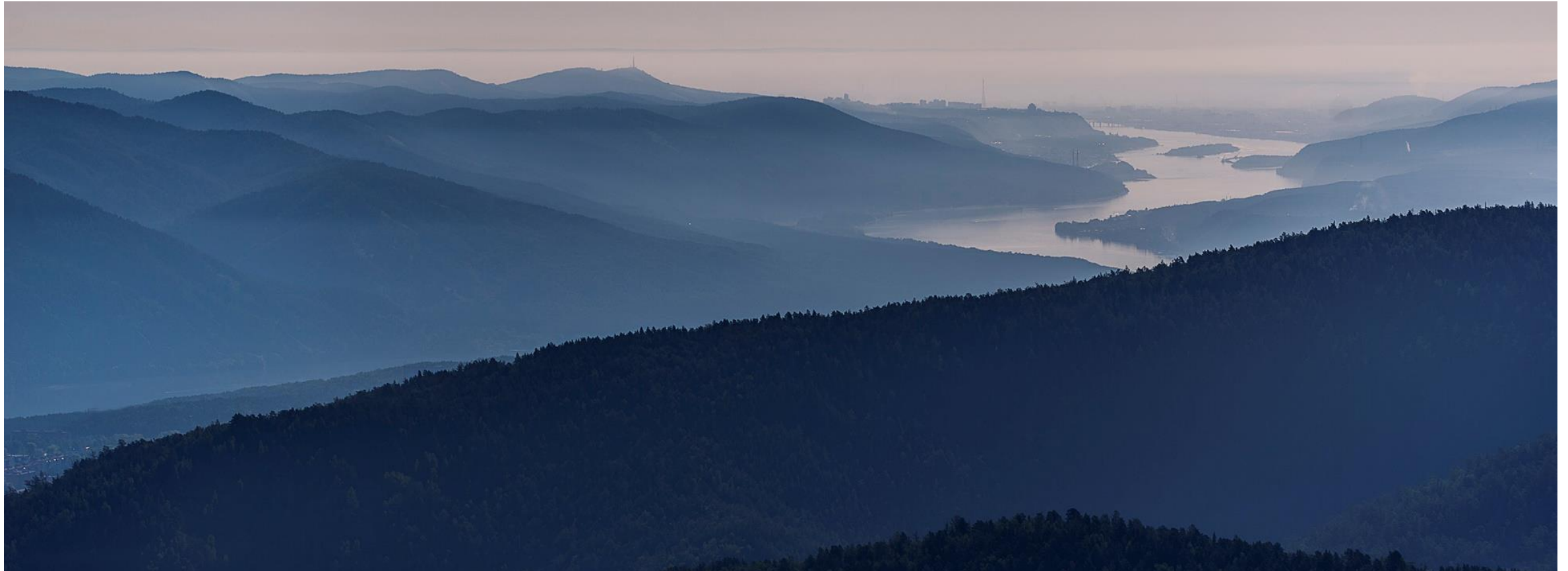
Actions in  
Metals segment

27

Actions in  
Power segment

35

Driving our  
commitment



To manage our pathway to net zero, we have created the En+ Climate Change Taskforce to drive our transformation.

## Initial setup

- January 2021 – Climate targets approved by Board of Directors
- February 2021 – Taskforce setup and working group created to develop a plan and assess available options

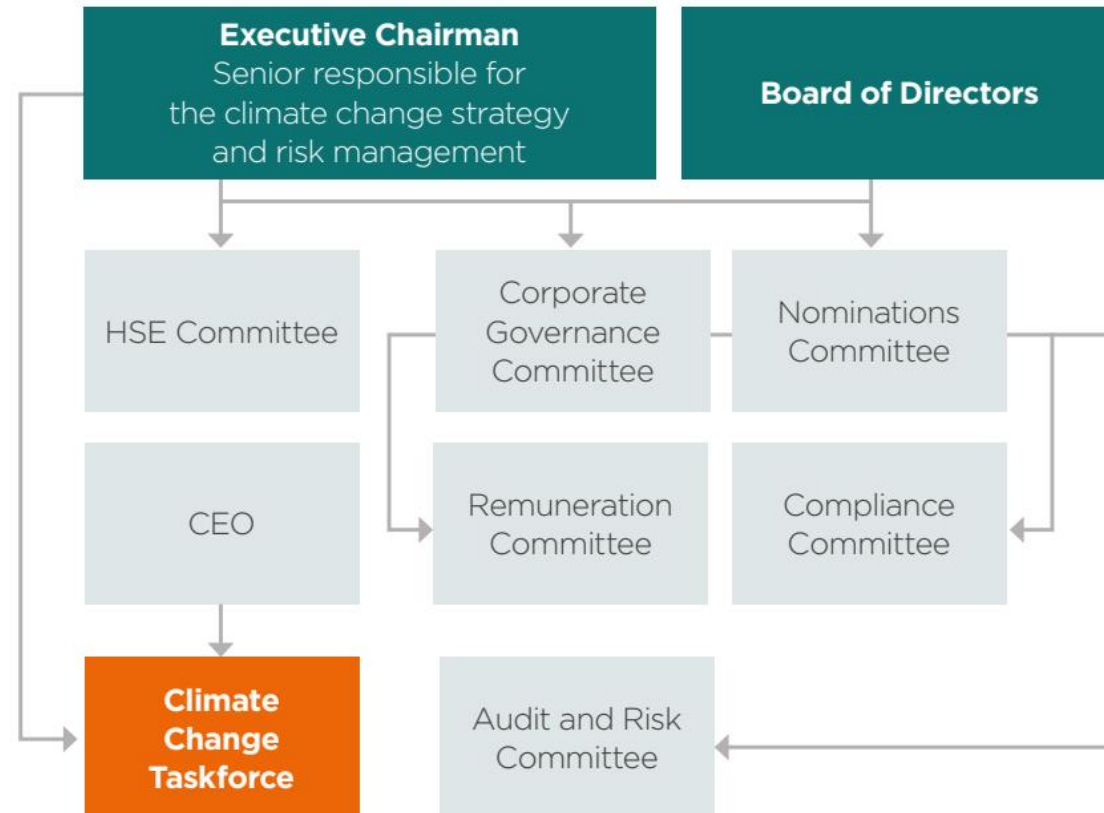
## Key objective

- develop an integrated climate strategy that will enable us to achieve our ambitious net zero GHG emissions goal by assessing climate change risks and opportunities

## Participants

- Chair of the Steering Committee - V. Solomin, Chief Operating Officer
- Working in continuous collaboration across multiple business lines
- Key “Transformation Verticals” formed each with ownership of dedicated senior executive from management team

Climate risk governance structure





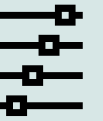
## SCIENCE-BASED APPROACH

- Adoption of science-based targets (SBTs) are an important component of our decarbonisation strategy in alignment with the 1.5-degree future.
- The Metals segment will introduce SBTs for Scope 1 & 2 in line with the aluminium sector GHG Pathways to 2050 report developed by the International Aluminium Institute



## MITIGATION STRATEGY

- Emission abatement
- Avoided emissions
- Compensation and neutralisation



## TIMEFRAME

- Short-term: RUSAL set seven GHG reduction goals until 2025
- Mid-term: 2030 GHG emissions 35% reduction <sup>(1)</sup>
- Long-term: Net zero



## SCOPE OF CLIMATE IMPACTS

- Scope 1: targets covering GHG emissions that are under our direct control
- Scope 2: indirect GHG emissions related to energy generation
- Scope 3: emissions from purchased goods and services, fuel and energy related activities



## BOUNDARIES

- Our target boundaries include the production facilities of both the Metals and Power segments, and cover all material sources of GHG emissions under operational control



## SCOPE OF ACTIVITIES

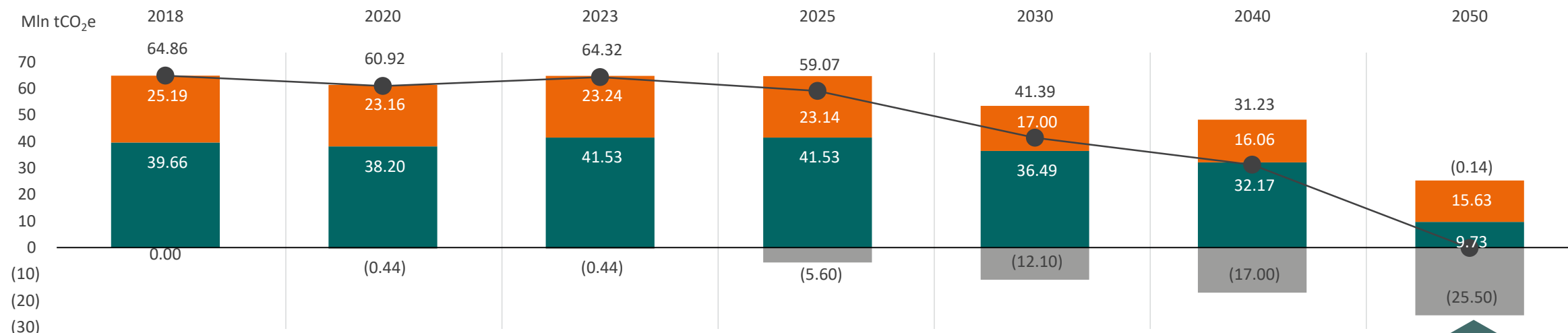
- All operations
- Value chain
- Products



(1) Scope 1 and 2, as benchmarked against the Group's 2018 GHG emissions.

# Our roadmap to achieve net zero

## EN+ decarbonisation pathway



**2050  
Net zero**

- 2020-2030**  
Modernisation. Switching half of the capacity at four of our facilities to pre-baked technology
- 2020-2030**  
Inert anode: intensive R&D
- 2020-2030**  
Energy efficiency projects at alumina refineries
- 2020-2030**  
Hydrogen: options research
- 2020-2030**  
Compensation measures (forestry projects and CCUS)
- 2030-2050**  
Confirmation of tests and switching to the inert anode technology
- 2030-2050**  
Electrification of bauxite mining
- 2030-2050**  
Gasification (alumina refineries)
- 2030-2040**  
Construction of the infrastructure
- 2040-2050**  
Implementation on alumina segment

■ Power segment 
 ■ Metals segment 
 ■ Compensation 
 ● Balance

## Green development strategy



Use unique sources of **hydropower energy** to achieve **vertical integration** and **self sufficiency across our value chain**



**Maintain and grow high margin, low-risk aluminium production** which is one of the key materials allowing world's green transformation



**Maintain robust financial strength and grow total shareholder returns**, including the payment of **sustainable and attractive dividends**



## MARKET SHARE

# 20%

*RUSAL share in global low-carbon aluminium production<sup>1</sup>*

En+ is an industry leader in low-carbon aluminium

## STRONG BRAND

# ALLOW

*guaranteed carbon footprint less than 4t CO<sub>2</sub>eq/t Al produced (Scope 1&2, at smelter)<sup>3</sup>*

Comes with average carbon footprint of 2.4 t CO<sub>2</sub>eq/tAl<sup>2</sup> produced (Scope 1&2, at smelter)

## PRICE DISCOVERY

# up to \$15/t

*Low Carbon aluminium upcharge, verified by independent market reporters in 2021 in Europe*

Several **benchmarks** have emerged in 2020 for low-carbon aluminium of no more than 4 t CO<sub>2</sub>eq/t Al produced (Scope 1&2, at smelter)<sup>3</sup>

## TECHNOLOGY

# INERT O<sub>2</sub> ANODE

Inert anode is a major innovative technology which will contribute to achieving the Company's climate change targets

(1) According to CRU data, Scope 1&2 emission <4tn CO<sub>2</sub> per tonne of Aluminium

(2) Level 1 in accordance with International Aluminium Institute (2018), Aluminium Carbon Footprint Technical Support Document, [www.international-aluminium.org/wp-content/uploads/2021/08/AL31DA1-1.pdf](http://www.international-aluminium.org/wp-content/uploads/2021/08/AL31DA1-1.pdf).

(3) IBID

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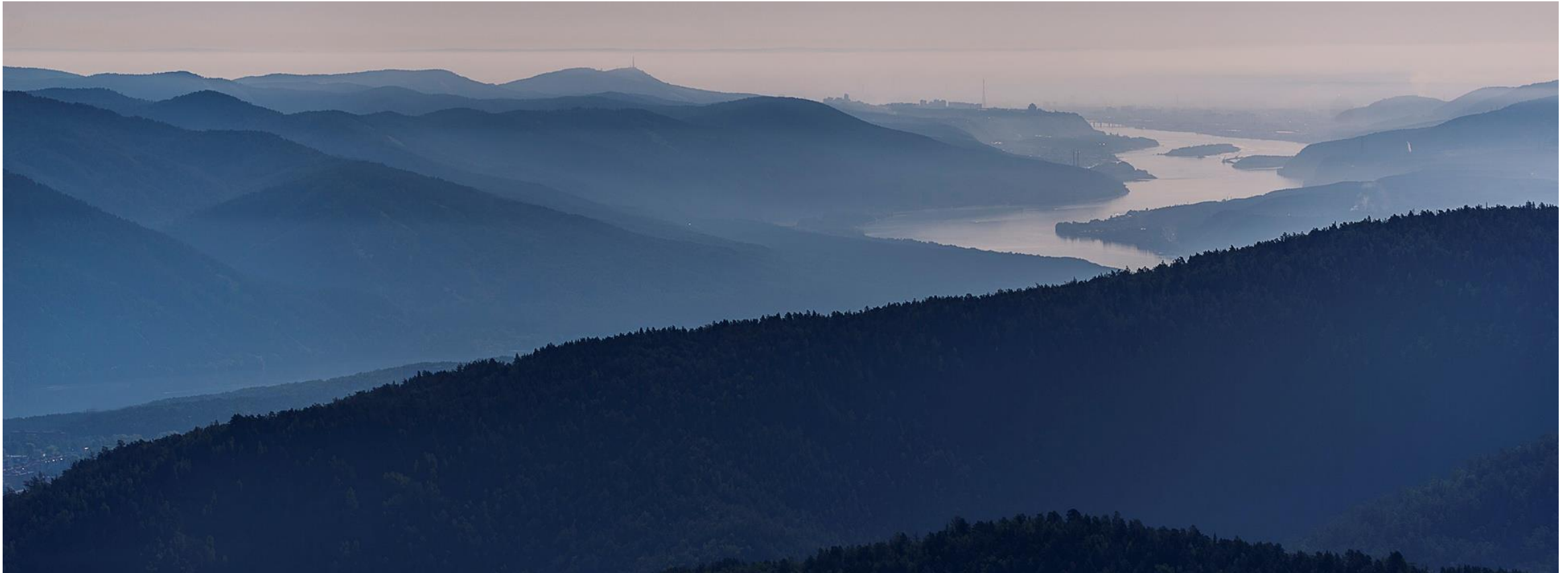
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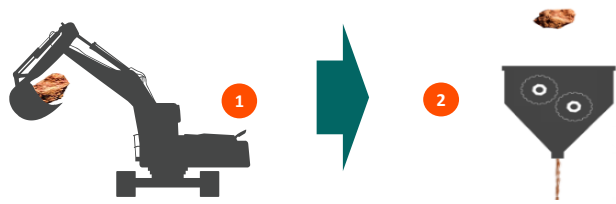
Driving our  
commitment



# High degree of vertical integration in the aluminium production process

Production process

## Bauxite and Nepheline



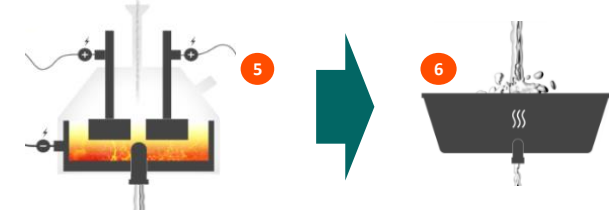
- Aluminium production starts with the raw material bauxite, a clay like soil type found in a belt around the equator. The bauxite is mined from a few meters below the ground
- The bauxite is then transported to plants where the clay is washed off and the bauxite passes through a grinder
- Aluminium production can also start with the raw material nepheline, a hexagonal mineral that is a usually glassy crystalline silicate of sodium, potassium and aluminium common in igneous rocks

## Alumina



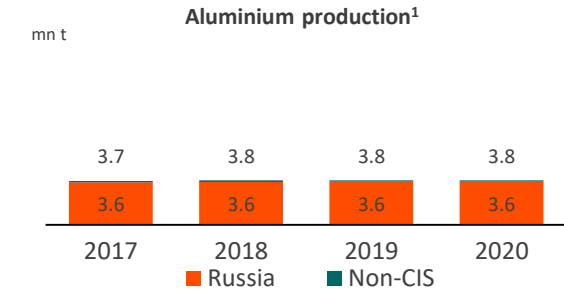
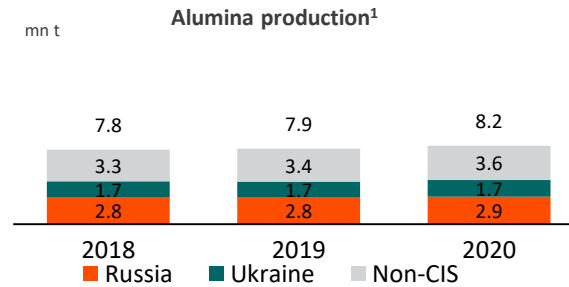
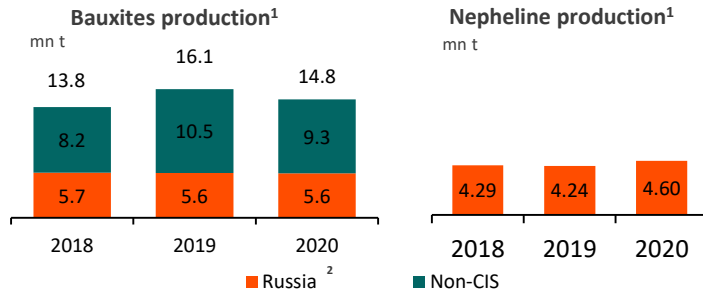
- Alumina, or aluminium oxide, is extracted from the bauxite through refining where alumina is separated from the bauxite by using a hot solution of caustic soda and lime
- The mixture is then heated and filtered, and the remaining alumina is dried to a white powder
- Alumina can be extracted via the Nepheline Process. Nepheline ore is first sintered with limestone. The resulting sinter cake is crushed, ground and leached, and alumina hydrate precipitated by carbonation. The alumina hydrate is washed, dried and calcined to produce alumina

## Aluminium



- Alumina is used to produce aluminium. Electricity is run between a negative cathode and a positive anode, both made of carbon. The anode reacts with the oxygen in the alumina and forms CO<sub>2</sub>
- The result is liquid aluminium, which can now be tapped from the cells. The liquid aluminium is cast into extrusion ingots, sheet ingots or foundry alloys

Production



Self-sufficiency

Projects to increase self-sufficiency in materials (>100% in alumina, ~80% bauxites and nephelines, ~90% in pre-baked anodes)<sup>3</sup>, efficient midstream and diversified product mix

- 1<sup>st</sup> stage of Dian Dian bauxite mine in Guinea was launched in June 2018
- Friguia alumina complex was relaunched in June 2018 and will increase alumina output (600 ktpa)
- Volgograd anode plant (104 Ktpa) with own calcined coke production capacities (95 ktpa) was test-launched in August 2018
- New calcined coke production capacities at Irkutsk smelter (89 ktpa) were launched in August 2017
- Taishet anode plant (1st stage - 217 ktpa) was launched in 1H20

Source: Company data.

(1) Bauxites and alumina are mainly delivered to Group companies and minor portion goes to third parties. 2) Bauxites production in Russia including nepheline ore volumes. 3) As of 31.12.2020.

# Metal segment's modernisation program (1/3)

## Upgrade in aluminium production technologies

	Eco-Søderberg	Pre-baked Anode (Ra-400; RA-550)	Inert Anode
<b>Energy sources</b>	Clean power	Clean power	Clean power
<b>Low-emissions technology pathways</b>			
AE frequency, AE/day	0.4	<0.04	0
Carbon anode consumption, t/t Al	0.5	0.4	0
Electricity consumption, MW*h/t Al	15.4	12.8	14.8
GHG emissions, t CO <sub>2</sub> eq/t Al	2.0	1.5	0
<b>Commercial horizon</b>	till 2026	till 2030	till 2050
<b>CAPEX estimates<sup>1</sup></b>	USD 118 million	USD 4.9 billion <sup>2</sup>	CAPEX is similar to the pre-baked anode

(1) Estimates are based on current macroeconomic conditions and company assessments of best available technology, subject to change.

(2) Including the construction of the Taishet Anode Plant and VAT.

# Metal segment's modernisation program (2/3)

- In June 2021 Rusal announced its intention to implement a modernization project to create new production facilities on the sites of its existing workshops of aluminium smelters
- The intention is to significantly improve the production technology and environmental sustainability of the plants
- In order to maintain the company's annual volume of aluminium sales, the Project will be carried out in line with a step plan to minimize the effects on production output

## Project schedule

**2021 - 2030**

**Total estimated capital expenditures**

**USD 4.9bn**

(including VAT)

Major part of investment taking place between **2023-2027**

## Taishet anode plant

To meet the growing demand for pre-baked anodes following the implementation of the Project, the Company also plans to increase the output of the Taishet anode plant

## Technology

### Eco-Soderberg



### Pre-baked anode



## Results of modernization

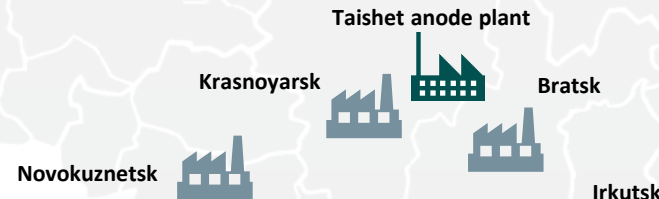
- Decrease of GHG emissions at modernized plant facilities
- Reduction of fluorides and benzopyrene emissions
- Decrease in power consumption of up to 17%

## Scope of the project

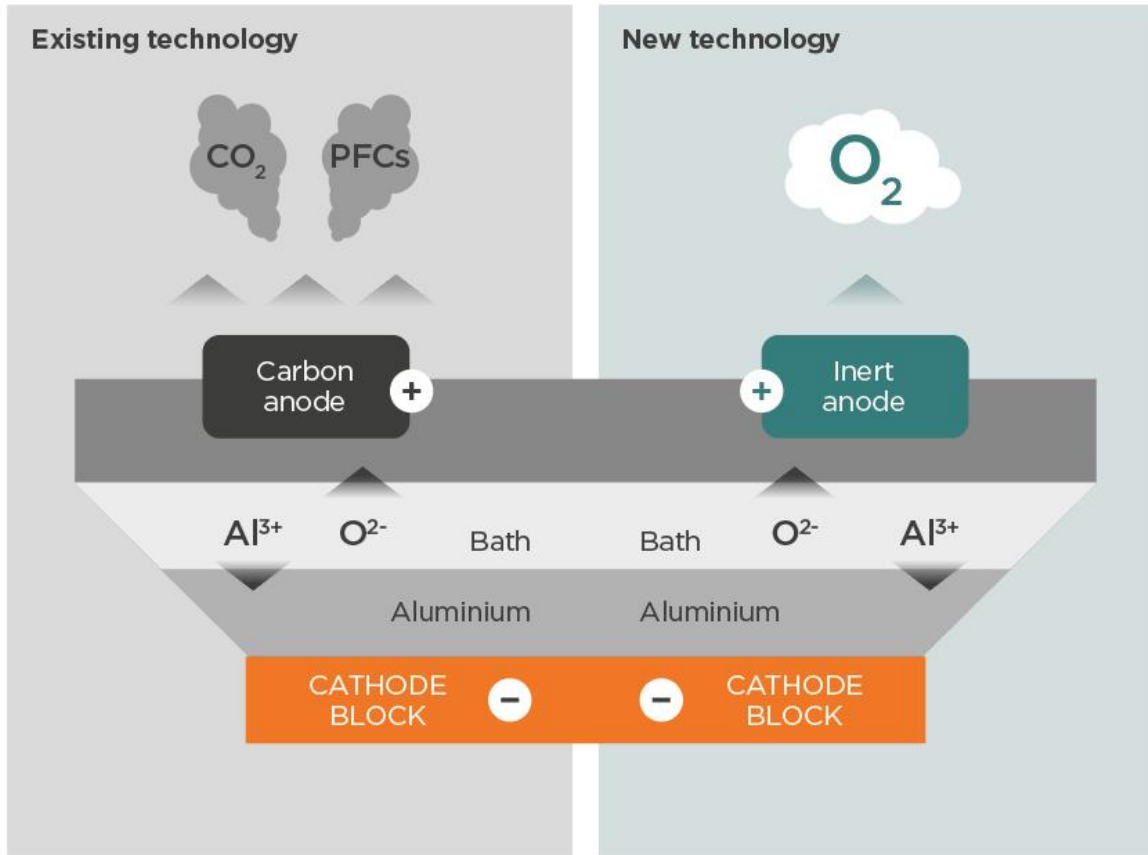
From EcoSoderberg technology to pre-baked anode with the following rebuilt capacity at each of the plants:

- Krasnoyarsk: **535 kt**
- Bratsk: **535 kt**
- Irkutsk: **235 kt**
- Novokuznetsk: **75 kt**

**Total capacity to be upgraded: 1,380 kt**



## Conversion to inert anode technology



**0.9T O2**

released per 1 T Al produced.  
The equivalent of around  
70 hectares of forest

*Present*

Intensive R&D



*by 2030*

Completion of confirmation tests  
Getting ready for industrial scale  
implementation



*by 2050*

Switching to the Inert  
Anode technology



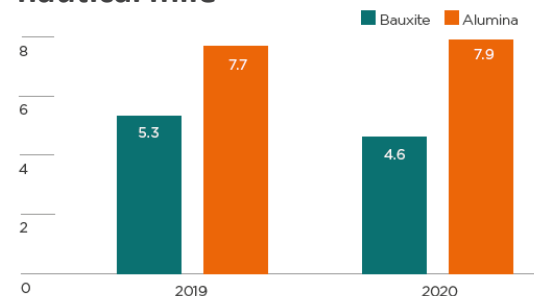
## RECYCLING

- Increasing the use of aluminium scrap is one priority of the strategy
- We aim to increase own annual secondary production **up to 250,000 tonnes by 2030**
- In 2020, RUSAL launched the pilot scrap project at VgAZ
- RUSAL initiated the creation of the Recycling and Sustainability sector within the Aluminium Association
- During 2021, RUSAL has participated with Ecoplatform and 'Legends of Baikal' in a joint project to place reverse vending machines in retail chain stores

## SHIPPING

- The focus is on energy efficient bulk carriers emitting fewer grams of CO2 per ton per nautical mile travelled
- We have been working with our shipping partners Cargill Ocean Transportation to investigate the potential impact of wind propulsion on a Kamsarmax bulk carrier, through the use of rigid wing sails

Average grams of CO2e per ton nautical mile



## Energy efficiency control on regular basis

Implementing more efficient equipment and improving operational control on alumina refineries

## CO2 emissions absorption by caustic soda

- Introducing the absorption of CO2 emissions by caustic soda
- The introduction of this technology is planned during 2022-2040

## LNG and natural gas

Alumina refineries are expected to switch to natural gas or LNG before 2030

## Transportation

- Switching transport from fossil fuel to electricity or biofuels will help to reduce GHG emissions from transport by up to 80-90%
- Power generation will also be converted to renewables

# Metals segment. Taishet construction

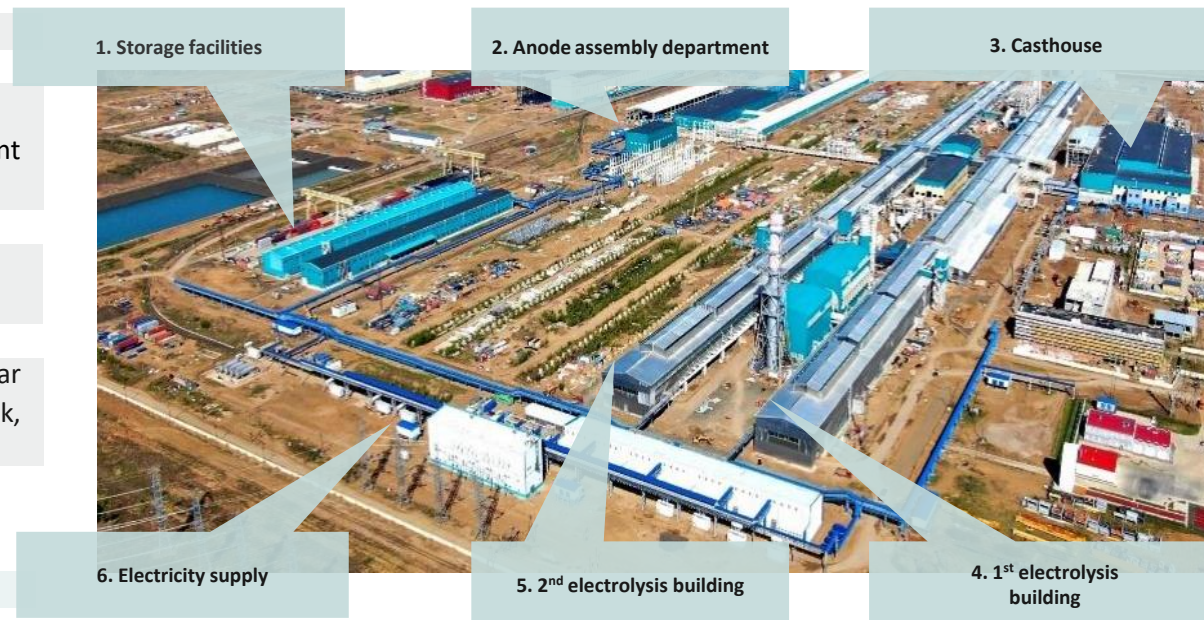
## Taishet Aluminium smelter

<b>Location</b>	<ul style="list-style-type: none"> <li>Irkutsk region</li> </ul>
<b>Capacity/technology<sup>1</sup></b>	<ul style="list-style-type: none"> <li>1st stage – 428.5 ktpa, 352 potcells RA-400, amperage 440 kA</li> <li>2nd stage – 536 ktpa, 352 potcells RA-550, amperage 550 kA (equipment purchased for power supply, infrastructure, maintenance)</li> </ul>
<b>Project timescale<sup>1</sup></b>	<ul style="list-style-type: none"> <li>Restarted in 1Q 2017</li> <li>First metal of the 1st stage is scheduled for 2021</li> </ul>
<b>Financing for further development</b>	<ul style="list-style-type: none"> <li>In December 2020 the Taishet aluminium smelter signed a 15 year syndicated loan agreement for up to RUB 45bn with VTB and Gazprombank, including own expenses made in 2020</li> </ul>

## Taishet anode plant

<b>Location</b>	<ul style="list-style-type: none"> <li>Irkutsk region</li> </ul>
<b>Capacity/technology<sup>1</sup></b>	<ul style="list-style-type: none"> <li>1<sup>st</sup> stage – the construction of anode baking furnace with a capacity of up to 217.5 ktpa of baked anodes<sup>2</sup></li> <li>2<sup>nd</sup> stage – the arrangement of calcined coke<sup>3</sup> and green anodes production with the capacity sufficient for the first and second stages as well as an increase in baked anodes output to approximately 400 ktpa</li> </ul>
<b>Project timescale<sup>1</sup></b>	<ul style="list-style-type: none"> <li>1<sup>st</sup> stage – construction was started in 2016. In H12020 the 1<sup>st</sup> stage was launched</li> <li>2<sup>nd</sup> stage – started in 2019 and completion of construction is scheduled for 2023</li> </ul>
<b>Financing for further development</b>	<ul style="list-style-type: none"> <li>The project is being financed by Rusal’s own funds and ECA<sup>4</sup> covered loans</li> </ul>

## Taishet construction site and key facilities



Approximate launch schedule	2020	2021	2022	2023
Taishet anode plant (1 <sup>st</sup> stage)	●			
Taishet anode plant (2 <sup>nd</sup> stage)				●
Taishet aluminium Smelter <sup>5</sup>		●		

(1) Data from preliminary management estimates as part of an overall project feasibility study under subject to further evaluation and review.  
 (2) For baking of SAZ green anodes during modernization of anode baking furnaces.  
 (3) Including additional calcined coke production for production of SAZ green anodes instead of purchased calcined coke.  
 (4) ECA – Export Credit Agencies.  
 (5) In regards to Taishet aluminium smelter table above indicates planned schedule of first metal.

4

Net zero  
overview

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Our approach  
to net zero

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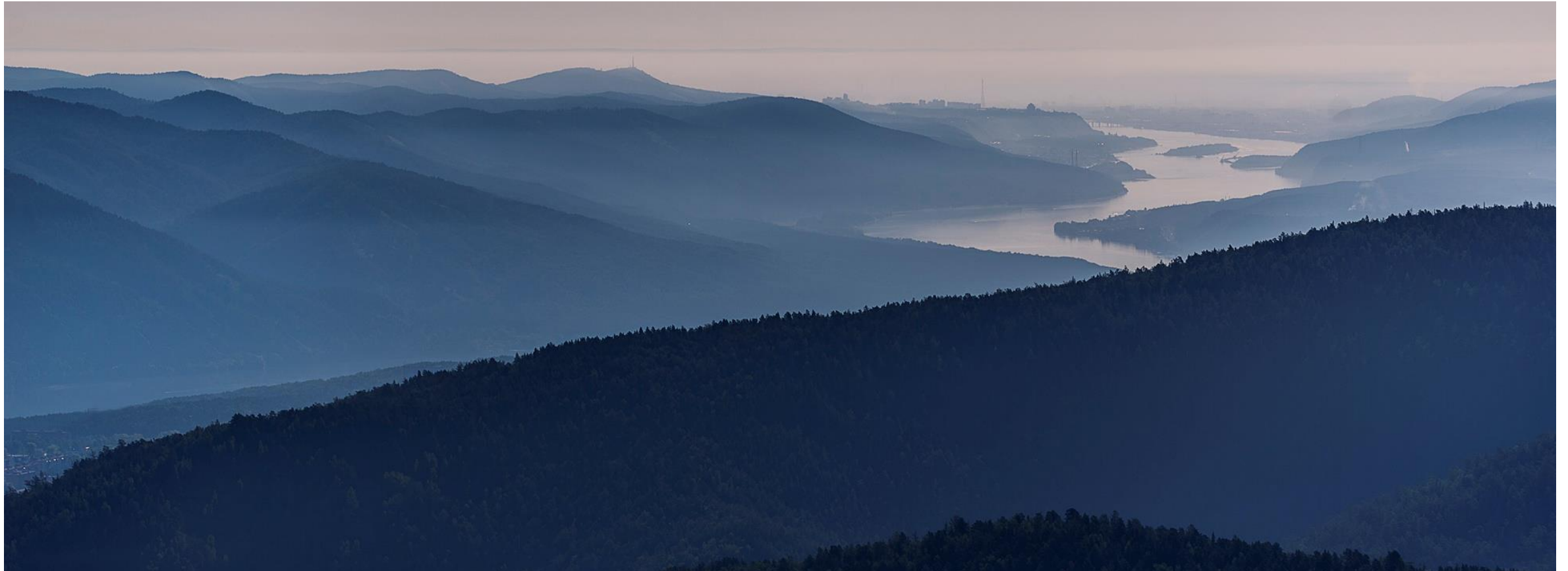
Actions in  
Metals segment

27

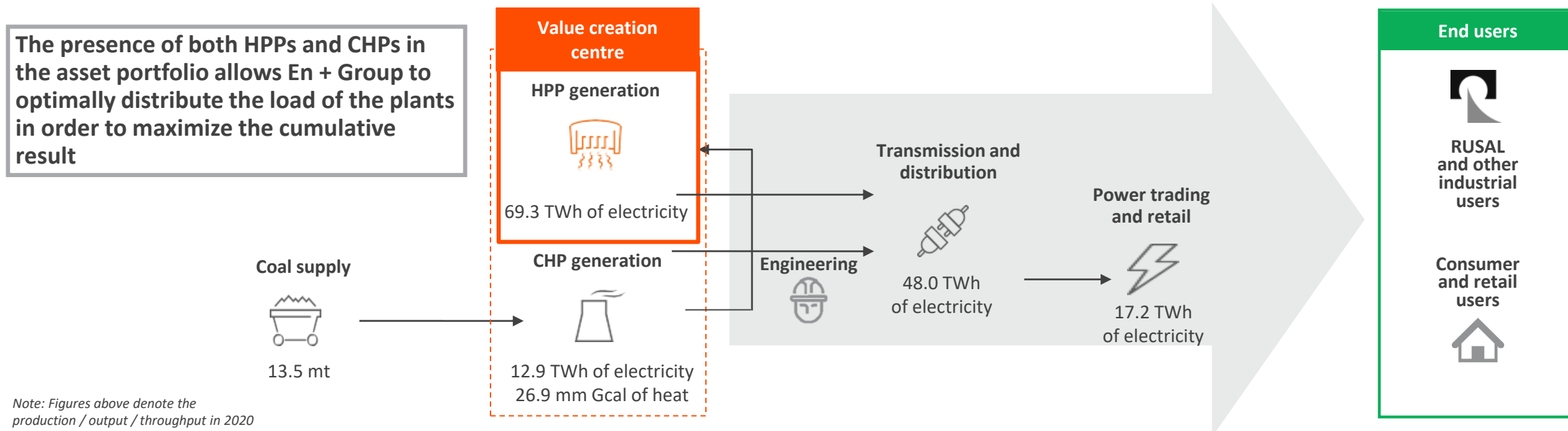
Actions in  
Power segment

35

Driving our  
commitment



Substantial degree of vertical integration provides En+ Group with significant advantages and additional sources of growth

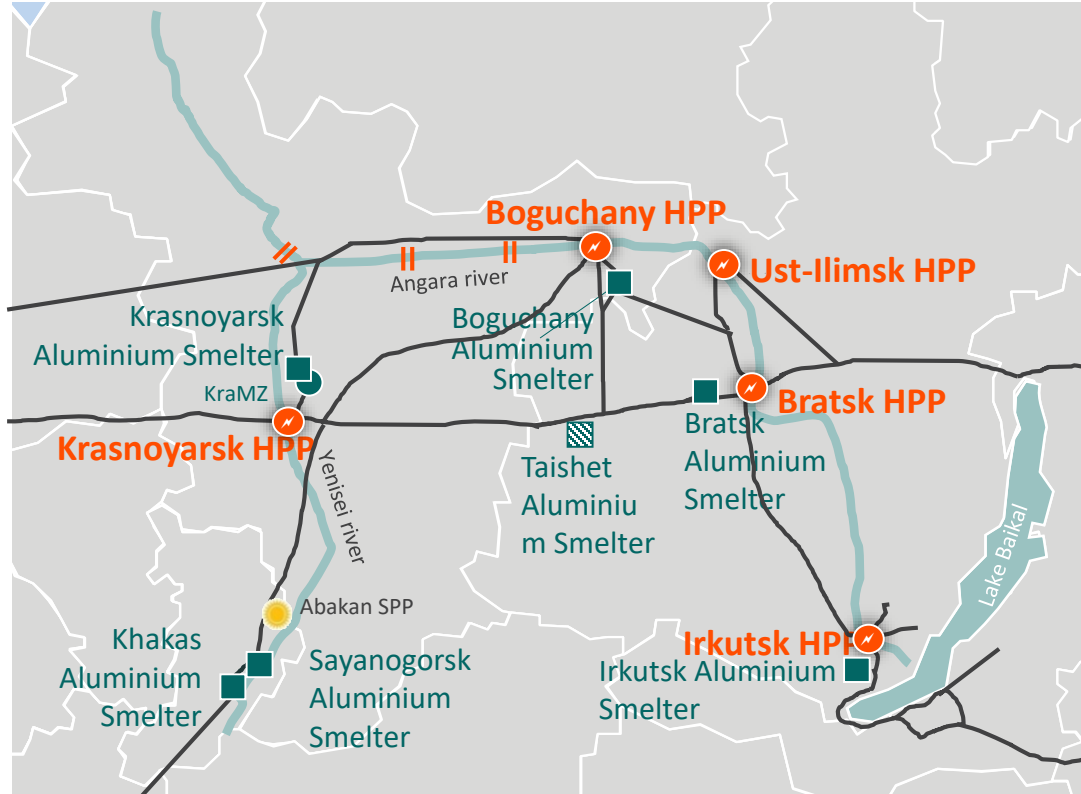


## Complementary businesses

Coal supply	Transmission and distribution	Trading and retail	Engineering
<ul style="list-style-type: none"> <li>Control over major cost item for coal-fired CHPs</li> <li>Security and reliability of coal supply</li> <li>Efficient management of coal quality and coal inventory</li> <li>Strong bargaining power with third-party suppliers</li> </ul>	<ul style="list-style-type: none"> <li>Full alignment of development programs between electricity generating and grid segments:                             <ul style="list-style-type: none"> <li>Efficient management of investment resources</li> <li>No difficulties with connection of new capacities to the electricity grid</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Ability to capture additional margin with no / limited exposure to fluctuations in power price</li> <li>Direct access to consumers, better understanding of consumers' needs and development plans</li> </ul>	<ul style="list-style-type: none"> <li>In-depth knowledge of the Group's power facilities which ensures quality assurance</li> <li>No truly competitive market for repair and maintenance services in the Russian power sector</li> <li>Strong bargaining power with third-party suppliers</li> </ul>

# New energy modernisation programme

## Geographical proximity of HPPs and aluminium smelters, Siberia



- Aluminium smelter
- Aluminium smelter development project
- Krasnoyarsk Metallurgical Plant (KraMZ)
- Solar Power Plant
- ⚡ Hydro Power Plants
- Boundary site
- Transportation and distribution network, 500 and 220 kV





### Key results in 2020

1.71 TWh increase in power output	1.98 mt of CO <sub>2</sub> e prevented GHG emissions
---	--

### Expected results by 2025

2.5 TWh annual increase of power generation	2.5 mt of CO <sub>2</sub> e prevented GHG emissions
--	---

The modernisation programme investment is expected to total USD 284 million in the period to 2026, including funds already invested in the project (~USD 150 million).

	Bratsk HPP	Irkutsk HPP	Krasnoyarsk HPP	Ust-Ilimsk HPP
<b>Runners completed and underway</b>				
<b>Replaced</b>	12 of 18	1 of 8	2 of 12	4 of 16
<b>Remaining to be replaced</b>	6	3	6	
<b>Plan to be replaced</b>	2026	2023	2025	

## State programmes for CHP modernisation

- The Group participated in the state programs for CHP modernisation providing guaranteed return on investment<sup>(1)</sup>
- Capacity Allocation Contracts to be signed between buyers, market regulator (ATS) and generating companies of the wholesale market, providing with the key criteria for modernisation, parameters of capacity supply after the modernisation and return on investment.
- Through this program the Group will improve reliability and safety of 1,445 MW of its CHP capacity (32.9% of total CHP capacity)
- The modernisation programme will enable the reduction of 151.7 kt of CO<sub>2</sub>e emissions
- Total expected CAPEX for CHPs of USD 230 mn in 2020-2027

## Optimisation of heat supply in Bratsk

- From 2023, expected GHG emissions reduction is 137 kt of CO<sub>2</sub>e emissions annually.
- Expected CAPEX of the project from 2018 to 2022 is USD 20 million.

## Optimisation of power consumption of heating network pump stations

- The expected reduction in GHG emissions from the project is 31.4 kt of CO<sub>2</sub>e
- Expected CAPEX of the project from 2019 to 2022 is USD 3 million

Note: Due to rounding, total may not correspond with the sum of the separate figures.

(1) The Group participated in the Competitive Capacity Auction (CCA) Modernisation Program providing with return on investment through Capacity Allocation Contracts (CAC)

(2) Calculated based on USD/RUB exchange rate 72.37 as of 30.06.2021.

## State programmes for CHP modernisation

Projects	Commence of capacity supply	Capacity, MW	CAPEX <sup>2</sup> USD mn
<b>Total CHP projects</b>	-	<b>1,445</b>	<b>229.7</b>
Novo-Irkutsk CHP			
Turbine 3	01.01.2023	175	23.3
Turbine 4	01.12.2025	175	41.9
CHP-10			
Turbine 2	01.01.2023	150	16.3
Turbine 7	01.05.2024	150	16.3
Turbine 5	01.12.2025	150	17.0
Turbine 8	01.01.2024	150	16.3
Turbine 4	01.12.2026	150	19.8
CHP-11 (Turbine 3)	01.01.2024	50	8.7
CHP-9 (Turbine 6)	01.01.2024	60	14.1
CHP-6 (Turbine 1)	01.08.2022	65	18.1
Ust-Ilimsk CHP (Turbine 3)	01.05.2025	110	17.7
Avtozavodskaya CHP (Turbine 9)	01.04.2025	60	20.1

# Opportunity to expand Power segment

## Hydropower

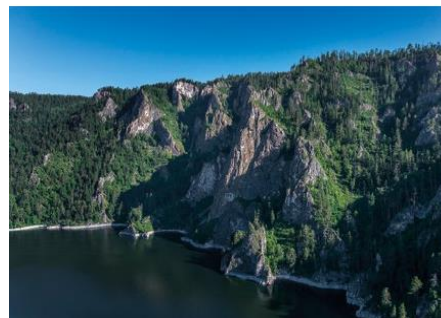
Segozerskaya HPP



Telmamskaya HPP



Nizhneboguchany HPP



### HPP

#### Output

8 MW

450 MW

660 MW

#### Expected completion date

2022

2030

2030

## Solar power



- Pilot project in Abakan, Russia
- Ambitions to expand solar energy generation

## Energy efficiency improvement programme

Period: 2021-2024

### Goals:

- Reduce losses in the Company's grids
- Take measures for energy saving and improving energy efficiency

## Digital transformation

- En+ Group developed smart grids

### Goals:

- Reduce the need for standby power
- Increase network capacity
- Reduce electricity losses

## Development of data processing centers and sales of electricity for mining

Bit+ is a joint venture of En+ Group and BitRiver, operator of the largest data centre offering colocation services for bitcoin mining in Russia, mining cryptocurrencies at low cost with a low-carbon footprint

## I-REC

- The first I-REC certificates were delivered in December 2020
- En+ Group made agreement with I-REC Services BV and became full-cycle supplier and trader of I-REC certificates in August 2021 to be able to offer I-REC buyers a wider range of services, including not only I-REC issuance, but also redemption
- As of mid-August 2021, En+ Group has around a 60% share of the Russian market in terms of delivered I-RECs and is active in securing new contracts for future deliveries

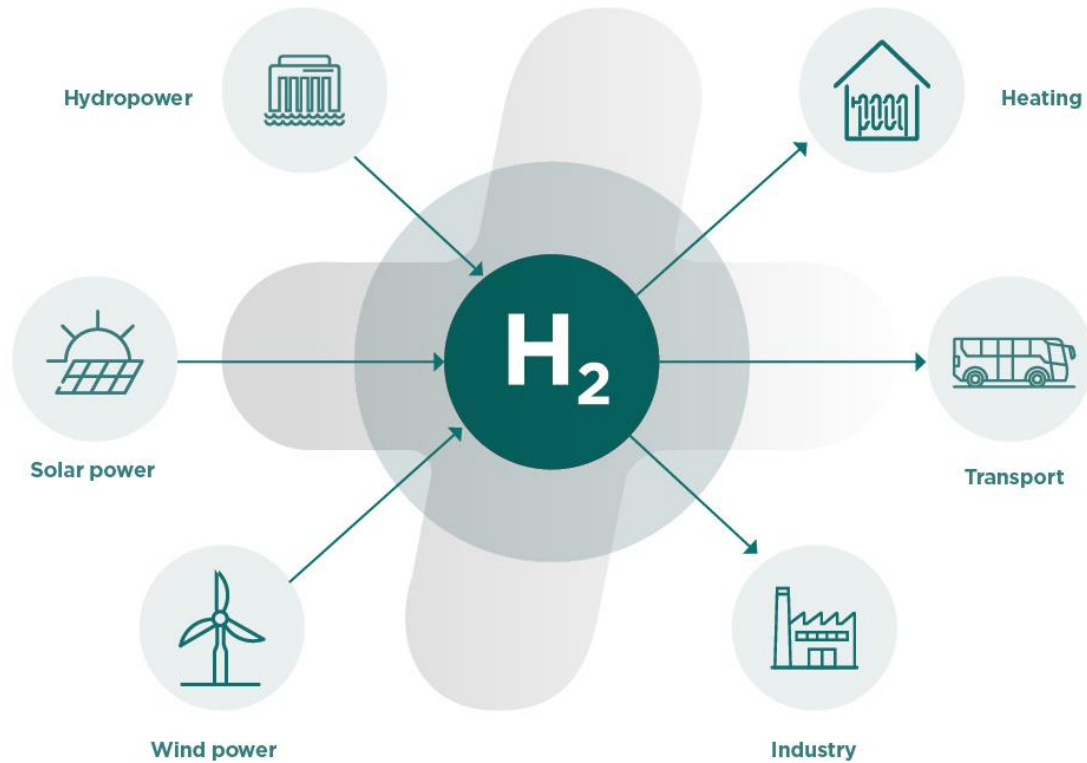


## Electric vehicle charging stations in Irkutsk

- En+ Group has installed three pilot charging stations for electric vehicles using CHAdeMO and CCS Combo (Type 2) connectors at DC with power of 50 kW in the Irkutsk Region
- In the medium term, En+ plans to install stations along motorways to Baikalsk, Khuzhir, and the Olkhonsky district
- Further development of the network of 'fast' chargers in Irkutsk and the Irkutsk Region will be subject to the continued growth of the local EV market







## EN+ opportunity to provide ancillary services such as storage, transportation and infrastructure

- En+ recently outlined plans to start production of 13 kt pa of green hydrogen using additional power capacity in Siberia and Karelia for sales to EU and Asian markets.
- An R&D project is underway to develop **aluminium containers for the transportation of hydrogen**.
- Another project is developing a concept for a **hydrogen transport infrastructure** for Krasnoyarsk. The project consists of the construction of small-scale green hydrogen electrolysers using electricity from Krasnoyarsk HPP, which is planned as **fuel for public transport**. The project also includes storage, dispensers and hydrogen fuel cell buses. EN+ plans to launch a feasibility study for the project in Q3 2021, to be completed by the end of 2021.
- En+ Group is also developing opportunities of giga-scale green **hydrogen production using electricity from captive new-build renewable projects (hydro and wind)** both in Siberia and in the Far East of Russia. For example, the construction of the 1 GW Motyginskaya HPP on the River Angara is planned solely for hydrogen production.

**228 MW**

Total capacity considered for hydrogen production

**13 kt pa**

Possible green hydrogen production using our existing HPPs

**1 GW**

Total possible capacity of Motyginsk HPP on the Angara River

**2020-2030**

Hydrogen: options research

**2030-2040**

Construction of the infrastructure

**2040-2050**

Implementation on Alumina Segment

Around 40% of emissions cannot be eliminated by applying the current level of technology and costs – these emissions need to be compensated by using technical and nature-based solutions:

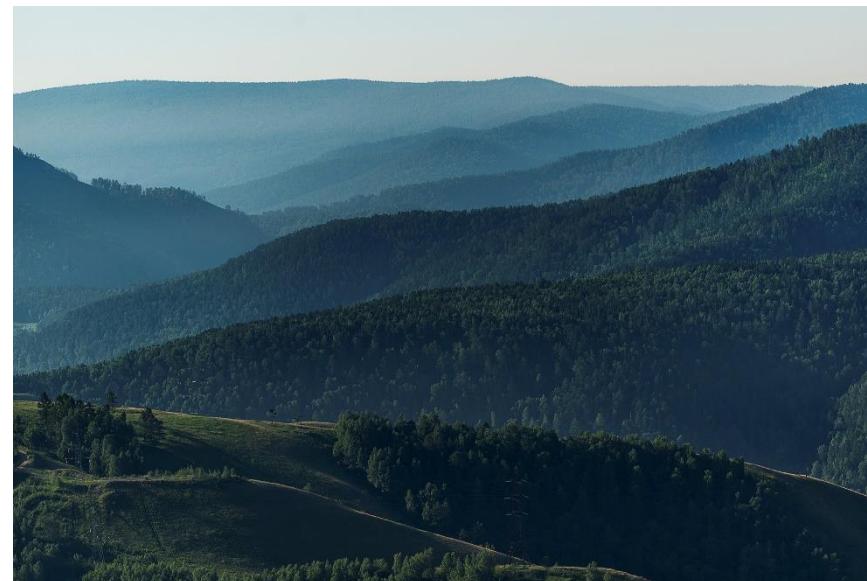
## FORESTRY PROJECTS

### Reforestation

- **2018**  
Together with the Russian Federal Forestry Agency (Rosleskhoz) began developing a plan
- **505,000 HECTARES**  
in the Krasnoyarsk territory are under aerial protection
- **1.1 MILLION TREES**  
planted in the Krasnoyarsk region and in the Irkutsk region
- **440,000 TONNES OF CO2**  
are compensated annually

### Aerial firefighting

- A set of services to protect forests from fires on an area of at least 500,000 ha on the territory of the Lower-Yenisei Forestry are in place
- Conservative estimates suggest that the absorption of CO2 for the area is 0.8-1.0 t CO2/ha per annum



## POSSIBLE TECHNICAL SOLUTIONS

- Possible technical solutions comprise carbon capture, utilisation and storage (CCUS) technologies. These require an appropriate CO2 gas compressing and transportation infrastructure to be created, that allows for the capture of concentrated CO2 from the emissions and its transport to places where it is possible to use or store the carbon underground (or anywhere it cannot escape)
- EN+ estimates it can capture and utilise or store around 7.5 million t CO2e per annum

4

Net zero  
overview

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Our approach  
to net zero

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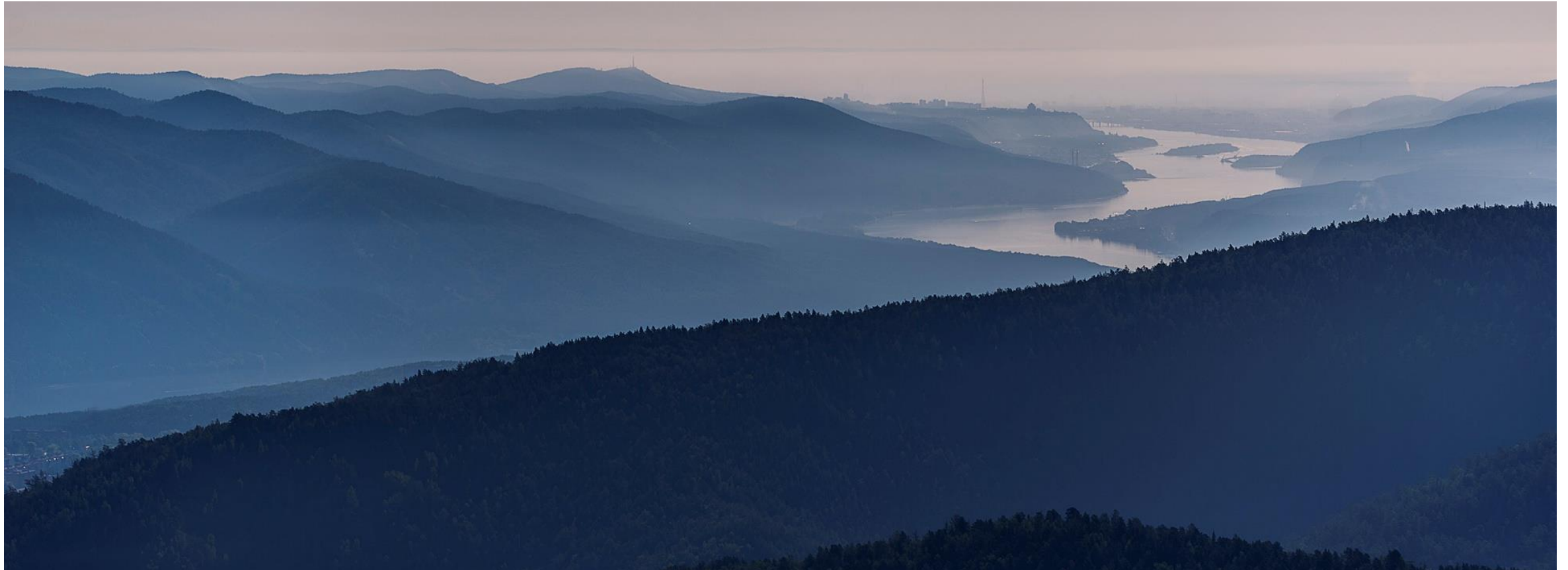
Actions in  
Metals segment

27

Actions in  
Power segment

35

Driving our  
commitment



En+ Group encourages all stakeholders in the aluminium and power industries to drive transparency



**A-**

Rating of RUSAL in CDP

**October, 2021**

RUSAL discloses sustainability data for new digital LME passport

## Selected partnerships and member organisations<sup>(1)</sup>

### Advocacy

- UN Global Compact (UNGC)
- World Business Council on Sustainable Development (WBCSD)
- Business 20 (B20)
- BRICS (Brazil, Russia, India, China, South Africa) Business Council
- International Chamber of Commerce (ICC) Russia
- Business and Industry Advisory Committee to the OECD (BIAC)
- UN High-Level Political Forum on Sustainable Development
- Japanese Climate Leadership Partnership
- International Policy Coalition for Sustainable Growth
- The U.S. – Russia Business Council (USRBC)

### Transparency and certification

- Aluminium Stewardship Initiative (ASI)
- International Aluminium Institute (IAI)
- Carbon Disclosure Project (CDP)
- Carbon Pricing Leadership Coalition (CPLC)
- The London Metal Exchange (LME)

### Energy Transition

- International Hydropower Association (IHA)
- Global Sustainable Electricity Partnership (GSEP)

(1) Full list of partnerships and collaboration with organisations on pages 49-54 of the Net Zero report.

## Customers and industry associations

We proactively build partnerships to deepen the decarbonisation of the value chain, to expand access to low-carbon aluminium, and to promote deployment of low-carbon solutions and technologies

2021

### January

RUSAL partnered with Henan Mingtai Aluminum, the large Chinese aluminium processing enterprise, to deliver low-carbon aluminium products to customers in response to growing market demand

### February

RUSAL was named the preferred global supplier of high-quality primary foundry alloys under its ALLOW brand for Kosei to supply wheel and auto components with a guaranteed low-carbon footprint worldwide

RUSAL partnered with Hodaka, the innovative producer of high-quality aluminium alloys, to deliver aluminium products with a low carbon footprint for a number of downstream applications

### July

RUSAL and the Ball Corporation announced a partnership to test ultra low-carbon aluminium produced with inert anode technology for aerosols and other containers, substantially reducing the carbon footprint of slugs, cans, and bottles

### September

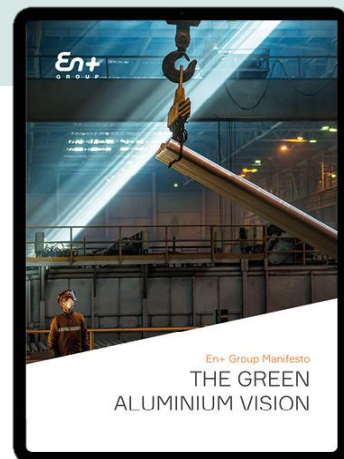
Budweiser Brewing Group together with RUSAL and ELVAL announce the launch of a pilot to produce a can with the lowest ever carbon footprint for an AB InBev beer can produced in Europe



## Traceability

**We promote enhanced product traceability**

- The ALLOW digital passport will provide our customers with easy access to a full set of environmental, social, and governance (ESG) information
- It will also be available on LME's platform to enable buyer decisions based on carbon footprint, ASI (Aluminium Stewardship Initiative) certification, and sources of energy used in its production
- En+ Group supports the notion that emissions transparency is the first step towards increased climate commitments
- The Group both discloses its own emissions and promotes industry-wide disclosure



## CO<sub>2</sub> content disclosure

**We advocate for transparent disclosure of CO<sub>2</sub> content as standard industry practise**

- We are campaigning for Level 1 carbon emissions to be stated on all warrants for London Metal Exchange (LME) as it is a necessary transformative step for the industry to meet the targets set by the Paris Agreement
- In 2020, RUSAL received an 'A-' by the Carbon Disclosure Project (CDP)
- ✓ First time in the aluminium industry
- ✓ RUSAL topped the CDP climate ranking among the world's aluminium companies with an 'A-' rating
- ✓ Top rated by CDP for 'Supplier Engagement'



## TCFD recommendations project is ongoing

### Governance

In 2020-2021, the Board and HSE Committee discussed climate-related issues in 18 out of 43 meetings. The main issues related to climate change, which were addressed by the HSE Committee, are as follows:

- Health, safety and environment KPIs
- Environmental risk management
- Results of the environmental audits
- Introduction of the UN Global Compact Business Ambition for 1.5°C initiative
- UN Global Compact's SDG Ambition Accelerator

### Risk management

- En+ Group appreciates the necessity to integrate the climate-related risks identification, assessment and management processes into the Company's risk management process
- The HSE Committee currently oversees climate-related risks and reports them to the Board of Directors to enable the Board to address the risks

### Strategy

- Climate-associated risks and factors have been identified, analysed and evaluated to make strategic decisions related to global climate change
- We are working on the development of a climate risk register covering the Group's assets (transition and physical risks analysis for the Group's consolidated operations)
- Climate risk analysis is conducted for the Metals and Power segments in the short, medium, and long terms
- Annual average temperature growth for En+ Group assets until 2050 was analysed according to climate scenarios SSP1-2.6, SSP2-4.5, and SSP5-8.5

### Metrics and targets

- The GHG emissions calculations were implemented in compliance with the GHG Protocol
- The GHG emissions calculation for the Metals segment is certified by independent authority TUV Rheinland as part of the audit and GHG verification process

Climate risk assessment project is in progress for the Power and Metals segment of the Group

## Carbon pricing

Since 2017, in order to assess climate-related risks and opportunities and factor them into investment decisions and business operations, the Group has used an internal carbon price of \$20/tonne CO<sub>2</sub>e.

### Key takeaways

- En+ Group and RUSAL are the only two Russian members of the Carbon Pricing Leadership Coalition (CPLC), a voluntary partnership under the auspices of the World Bank to advance global carbon pricing
- In 2021 Lord Barker, Executive Chairman of En+ Group, was appointed as one of the two CPLC High-Level Assembly Co-Chairs
- There needs to be a broader discussion on universal carbon pricing and building real climate action momentum
- Carbon pricing is one of the many essential solutions needed to address the threat of climate change illustrates how achieving inclusive economic growth and climate ambition need not be mutually exclusive

## Carbon Border Adjustment Mechanism

European Union's Carbon Border Adjustment Mechanism (CBAM) is still under development and there are no details of how it will directly affect En+ Group

### Key takeaways

- There is no precedent for carbon border adjustment at state level
- Applied to the aluminium industry, we do not believe CBAM will serve its purpose and will not help the EU prevent carbon leakage in primary aluminium production
- On the contrary, CBAM would generate extra costs for the downstream sector, which employs 90% of workers of the EU aluminium industry
- Thus, EU semi-fabricators will face growth of imports of aluminium products at lower prices, which will drive them out of the domestic market provoking carbon leakage in the downstream sector
- It would be unfortunate if CBAM were to cause substitution of domestically produced semi-finished aluminium products by imports of high carbon alternatives – thus negating the aims of CBAM



- 2015
  - RUSAL set five GHG reduction goals for the period until 2025
- 2016
  - RUSAL set two additional GHG reduction goals for the period until 2025
- 2017
  - Launch of ALLOW, low-carbon aluminium brand
- 2019
  - Group's sustainability report 2018
- 2020
  - Group's sustainability report 2019 verified by an independent auditor
  - Disclosure in line with the TCFD recommendations
- 2021
  - Pathway to net zero
  - Sustainability report 2020
  - The Group committed to
    - 35% GHG emissions by 2030
    - Net zero by 2050
  - Submission of the climate targets for approval to the SBTi
  - En+ Climate Change Taskforce established
  - The Group will participate in COP-2026, Glasgow

## CLIMATE ACTIONS AT GLANCE

# Climate actions at a glance

The En+ Group is striving to become a leader in the fight against climate change. We take actions to reduce GHG emissions across the whole value chain.

### New energy

En+ Group's large-scale modernisation project, 'New Energy', implemented at the Angara-Yenisei cascade HPPs is a key investment project for the En+ Group's Power segment. Investments in the New Energy programme will total USD 284 million by 2026. Comprehensive replacement of main equipment, like hydraulic units and impellers, and auxiliary equipment, will be carried out under the programme.

The New Energy programme is one of the Group's most ambitious ongoing production asset upgrade programmes. It will bring the Group's HPP efficiency to world class standard, providing better reliability and quality of power supplied to Siberian consumers. Additionally, it will have a positive impact on the environment in the Siberian regions and help to mitigate negative impacts on water resources.

For more information, please refer to p.

### SBTi

In September 2019, En+ Group joined the SBTi and committed to setting science-based emissions reduction targets in line with the recommendations described in the Assessment Reports of the IPCC and aligned with the 1.5°C trajectory. The Group developed and will submit its proposed decarbonisation pathway to the SBTi in 2021.

For more information, please refer to p.

### The leading low-carbon refinery in Ireland

After 20 years of continuous focus on decarbonisation Aughinish Alumina in Ireland now is the world's leading low-carbon high temperature refinery at 0.516 t CO<sub>2</sub>e / t Al<sup>1</sup> and with Rusal's ALLOW aluminium made from renewable hydropower, it has one of the lowest carbon footprints in the industry.

Aughinish alumina presently actively implementing various decarbonisation projects which also include installation of renewable energy electric boiler (25MW), which will further reduce Aughinish's carbon footprint. EU recognized this project by giving preliminary approval for grant funding from EU Innovation Fund.

For more information, please refer to p.

### CDP

In 2020, RUSAL received an 'A-' rating for the first time in the aluminium industry following its annual assessment by the Carbon Disclosure Project (CDP) and became one of the 160 leading CDP companies out of more than 4,800 participants committed to reducing climate risks along the entire supply chain.

For more information, please refer to p.

### Science Based Targets

For more information, please refer to p.

### Climate initiatives in Jamaica

Windalco, the alumina refinery in Jamaica, is developing projects to reduce GHG emissions and cost per tonne for smelting operations, as well as converting plant site lighting to solar power.

Windalco has already implemented measures at ancillary facilities to reduce GHG footprint - for example, the lighting of the pier at Port Esquivel is powered by solar energy.

For more information, please refer to p.

### Business ambition 1.5C

In May 2020, the En+ Group signed the UNGC and Business Ambition for 1.5°C's call to action. Together with a broad coalition of businesses, civil society, and UN leaders, we called on governments and policymakers to match the ambitions of companies already aligned with reaching net zero emissions well before 2050.

For more information, please refer to p.

### Inert anode

In 2020, RUSAL began testing operations in innovative technology for a pilot industrial electrolytic cell with inert anodes. Using it in the reduction process is considered a revolutionary solution in metallurgy, because it completely eliminates emissions of greenhouse gases (PFCs and CO<sub>2</sub>), polyaromatic hydrocarbons, benzo(a)pyrene, and sulphur from the reduction process, while significantly reducing the cost of production by saving anodes.

For more information, please refer to p.