

# CLIMATE CHANGE

## How has the Company's climate change approach evolved over the past 10 years?

With a view to facilitating global energy transition and adapting to climate change, the Company has focused on building a corporate climate change management system, investing in environmentally friendly technologies, and upgrading its core production facilities. We also actively engage in international and national initiatives to combat climate change, while also fostering collaborations with various stakeholders.

As early as 2013, Nornickel publicly acknowledged the risks associated with climate change and presented measures to mitigate their adverse impacts. In 2017, we adopted the Renewable Energy Sources Policy. In 2021, the Company established a Sustainable Development and Climate Change Committee under the Board of Directors and approved the Environmental and Climate Change Strategy further updated in 2023. Currently, Nornickel is developing procedures for managing climate-related risks and opportunities. In its pursuit of carbon neutrality, the Company has identified key initiatives aimed at reducing gross greenhouse gas emissions and minimising its carbon footprint<sup>1</sup>.

<sup>1</sup> Key steps towards achieving carbon neutrality were approved by the Board of Directors in early 2024.



# HIGHLIGHTS AND RESULTS

## Highlights and results

<b>7.5</b> mt of CO <sub>2</sub> equivalent Actual GHG emissions (Scope 1 and 2)	<b>2.2</b> mt of CO <sub>2</sub> equivalent Sulphur Programme GHG emissions provision (Scope 1)	<b>5.1</b> mt of CO <sub>2</sub> equivalent GHG emissions, downstream Scope 3	<b>1.3</b> mt of CO <sub>2</sub> equivalent GHG emissions, upstream Scope 3
---	--	--	--

**Global Warming Potential (100 years) based on ISO 14044, g of CO<sub>2</sub> equivalent per g of metal<sup>1</sup>**

Pd —	Pt —	Rh —
<b>28.6</b>	<b>29.2</b>	<b>40.0</b>

**Global Warming Potential (100 years) based on ISO 14044, kg of CO<sub>2</sub> equivalent per kg of metal in product<sup>1</sup>**

Metallic Ni	Ni sulphate	Metallic Co	Co sulphate	Cu cathodes
<b>8.5</b>	<b>2.4</b>	<b>1.9</b>	<b>6.0</b>	<b>43.2</b>

**Buildings and Structures Monitoring System project:**

<b>&gt;950</b> facilities connected to the information and diagnostics monitoring system, including:	<b>218</b> facilities — use automated monitoring	<b>55%</b> Group-wide share of power from renewable sources
	<b>12%</b> share of renewables in total power and fuel consumption across the Group	<b>RUB 5.1 bn</b> — expenses to run climate action initiatives <sup>2</sup>

## Corporate climate agenda: key results and plans

**2022 – results**

- Approaches to climate change risks and opportunities assessment developed
- With the support of climate scientists of the Russian Academy of Sciences, climate change modelling performed across the Company's footprint through 2050, key climate change risk factors identified and pilot assessment completed to evaluate their impact on the production assets of Norilsk, Kola, Trans-Baikal and Energy Divisions
- International best practices in climate change risk adaptation for various cities and companies
- Proprietary scenarios for global economy and climate change developed by Nornickel
- Register of transition risks and opportunities compiled with their pilot assessment
- Scenario analysis of the consolidated financial and economic model completed in line with the global economic and climate change scenarios
- Amendments to the Company's guidelines prepared in connection with climate change risk management (including the Risk Management Regulations)
- Methodology developed to calculate the internal carbon price
- Testing of internal carbon price launched for the purposes of assessing investment projects
- Upstream Scope 3 GHG emissions calculated for the first time
- Possible options analysed for the development of in-house power generation facilities up to 2050 based on low-carbon technologies
- Training on climate change and climate change risks provided to more than 200 employees at the Head Office and in the divisions
- Group-wide GHG emissions data and carbon footprint of products for 2022 verified by TÜV AUSTRIA Standards & Compliance, an international testing, inspection and certification company
- Methodologies for calculating direct GHG emissions and indirect energy-related GHG emissions developed and validated by an international verifier for the Company's internal accounting purposes
- A report on Nornickel's GHG emissions submitted to the Russian Ministry of Economic Development with a view to adding relevant data to the registry of GHG emissions<sup>1</sup>

**2023 – results**

- The Environmental and Climate Change Strategy updated, and the key focus areas of carbon neutrality drafted<sup>2</sup>
- Implementation of the roadmap to comply with the TCFD recommendations (approved in 2021) completed
- The concept for assessing climate change risks reviewed by the Risk Management Committee of the Management Board
- Adaptation and mitigation approaches developed for transition risks and for physical risks (including with respect to individual production assets)
- The first ever climate change report published
- Statistics of historical values for climate risk factors retrieved starting from the 1960s
- GHG emission issues included in the scope of the Company's supplier due diligence
- The corporate methodology for assessing the carbon footprint of products harmonised with the industry-wide model
- Cooperation with the Siberian Federal University started to develop approaches to running the Company's nature-based climate solution project
- An innovative approach developed to use waste generated by core operations for the purposes of absorbing CO<sub>2</sub>
- The professional competency model updated in the area of sustainable development, including by adding climate change issues to the assessment framework
- Climate change workshops held for the Company's employees
- The 28th UN Climate Change Conference (COP28) attended
- Group-wide GHG emissions data and carbon footprint of products for 2023 verified by TÜV AUSTRIA Standards & Compliance, an international testing, inspection and certification company
- Russia's first corporate system for background monitoring of permafrost soils unveiled on the Taimyr Peninsula

**Key short-term plans**

- Submit to the Sustainable Development and Climate Change Committee of the Board of Directors a concept for assessing climate change risks
- Develop a Climate Change Action Plan through 2025 in furtherance of the completed roadmap to comply with the TCFD recommendations. The Action Plan shall provide for:
  - update of in-house scenarios for global economy and climate change;
  - implementation of a system for monitoring climate risk factors and events caused by such factors;
  - development of a system for monitoring buildings and structures erected on permafrost soil and for background monitoring of permafrost;
  - creation of a corporate training course on climate change.
- Develop a list of measures to reduce and/or offset greenhouse gas emissions

<sup>1</sup> Group data for 2023, including foreign companies of Kola Division.

<sup>2</sup> Including energy efficiency and setting up the monitoring system for buildings and structures built on permafrost.

<sup>1</sup> In accordance with Federal Law No. 296-FZ On Limiting Greenhouse Gas Emissions dated 2 July 2021.

<sup>2</sup> Both documents were approved by the Company's Board of Directors in 2024.

# APPROACHES TO CLIMATE CHANGE MANAGEMENT

## Climate change management

GRI 2-9, 2-12, 2-13



## Responsibilities

The Board of Directors reviews and approves our Environmental and Climate Change Strategy, relevant Policy and any subsequent amendments thereto, as well as risk appetite, and supervises the risk management framework for climate change.

The Company has the Sustainable Development and Climate Change Committee established under its Board of Directors. In 2023, the Committee reviewed the medium-term emission reduction goals until 2031 and resolved to continue the technological study and consideration of options for the development of in-house power generation facilities for the period until 2050 using technologies with minimised carbon footprint. The Committee also reviewed the Environmental and Climate Change Strategy and key focus areas of carbon neutrality.

The Management Board and its Risk Management Committee implement climate change risk management measures and procedures. Members of the Board agree upon parameters of the Company's risk appetite, including those relating to climate change, and make recommendations to the Board of Directors regarding their approval. The key risks, including climate change threats, are reviewed on a quarterly basis.

The Vice President for Ecology and Industrial Safety at Norinickel is responsible for the development and implementation of the Company's Environmental and Climate Change Strategy. The Vice President for Investor Relations and Sustainable Development is responsible for setting strategic ambition and vision for climate change and developing the relevant Policy, as well as monitoring its implementation.

The Sustainable Development Department is responsible for providing methodology support to the Company on climate change and related risks, support of risk owners, monitoring progress against the roadmap to comply with the TCFD recommendations, and reporting on climate change.

Units of the Head Office, branches and Group companies are responsible for relevant aspects of the Climate Change Policy and the Environmental and Climate Change Strategy within their scope.

## Corporate documents on climate change:

The Company's climate change vision is outlined in a number of corporate documents approved by the Board of Directors:

- Climate Change Policy;

- Environmental Policy;
- Renewable Energy Sources Policy;
- Environmental and Climate Change Strategy.

The fundamental corporate document on climate change is [MMC Norilsk Nickel's Climate Change Policy, which sets out the Company's key commitments.](#)

### The Company's key commitments in accordance with the Climate Change Policy

- Develop and regularly update our climate change strategy
- Organise regular audits of climate change risk management and publicly disclosed climate change indicators
- Identify and measure the contribution of the Company's products to the low-carbon economy in the process of life-cycle assessment
- Implement management systems and risk management tools to respond to climate change and have them integrated into the risk management system in line with the TCFD requirements
- Attract and effectively allocate capital to implement the Company's climate change strategy

- Adopt key performance indicators (KPIs) related to climate change goals for managers and employees of the Company
- Review commercially viable opportunities to reduce carbon footprint, including the use of assessment tools for responsible value chain management and the development of green technology partnerships to accelerate the decarbonisation of the Company's operations
- Promote advance practices and innovations
- Apply GHG emission offsetting mechanisms, including natural climate solutions (including conservation and restoration of forests and other ecosystems that absorb carbon

- dioxide) where the application of such solutions appears to be the most feasible and commercially viable solution
- Expand engagement and partnership with stakeholders on climate change agenda
- Ensure transparent and regular disclosure of GHG emission targets and other relevant indicators and aspects in accordance with the Russian laws and best global standards.

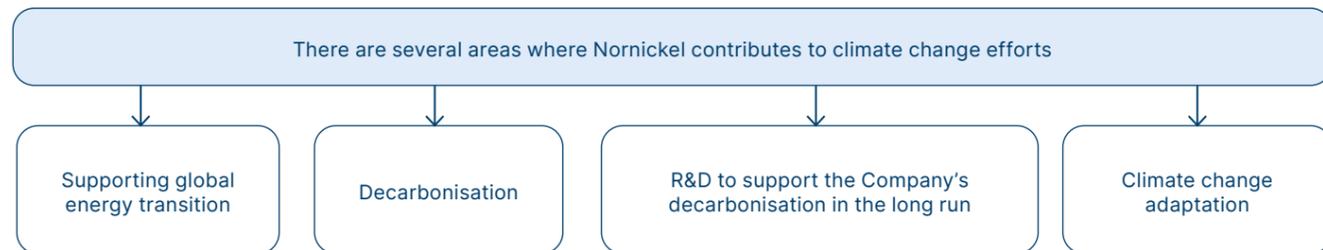


## Nornickel's strategic vision on climate change

Nornickel closely monitors the aspects of intense global warming, permafrost thawing, and increasing frequency of extreme weather events. These factors may have a significant impact on the economy and well-being

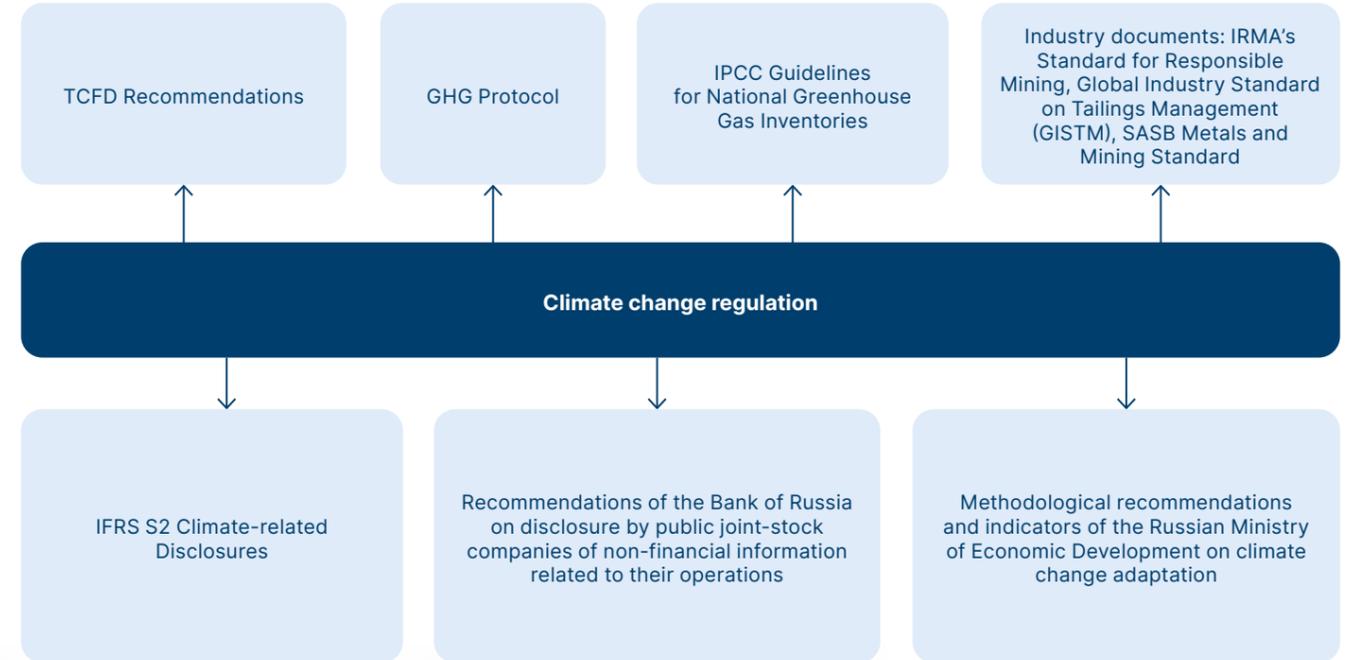
of the regions where the Company operates. Nornickel is committed to building resilience to climate change risks, reducing GHG emissions, and fostering innovation.

Alongside that, the low-carbon transition of the global economy is opening up new opportunities for Nornickel's green metals. Decarbonisation of transport and focus on renewable and hydrogen energy will be driving demand for our products in the long run.



The Company supports the UN SDGs, in particular SDG 13 Climate Action, unconditionally shares the principles of the Paris Agreement, and supports its goal of keeping the global average temperature increase well below 2 °C and making efforts to limit the increase to 1.5 °C.

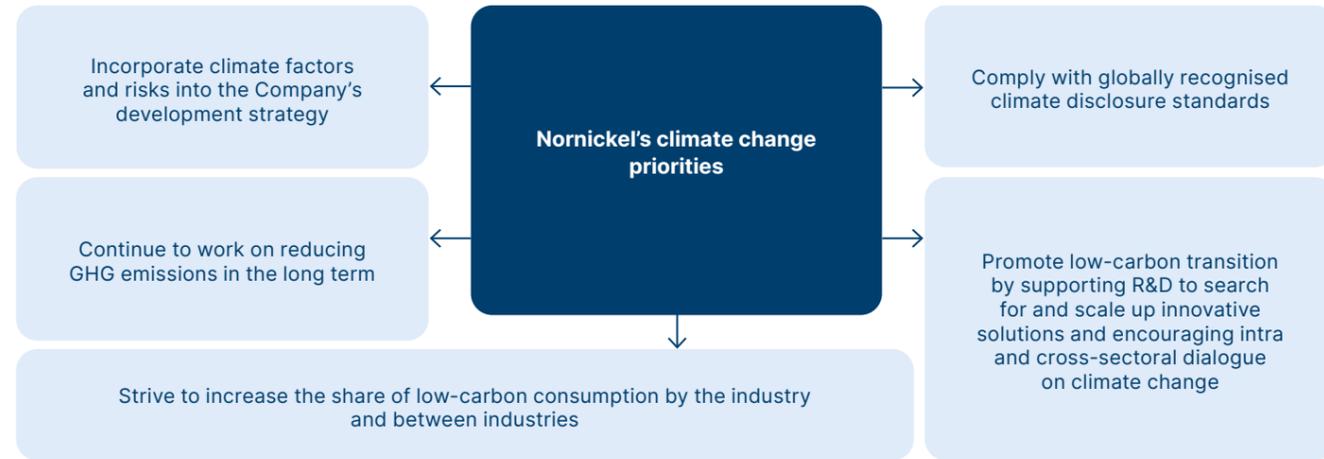
In developing strategic and operational documents and initiatives, Nornickel is guided by leading international standards that address corporate governance, climate risk management, and related disclosures.



In December 2023, the Company issued its first public **Climate Change Report**. The report was drafted in accordance with the TCFD Recommendations to demonstrate the progress made towards achieving the goals of the Paris Agreement. The report describes the Company's key projects and results aimed at adaptation to climate change and its consequences.



Nornickel's climate action targets are set out in the Environmental and Climate Change Strategy through 2031.



In 2023, the Strategy underwent an update and was divided into mandatory and voluntary parts. Targets values are to be refined in 2024–2025.

In addition, during the year we worked on developing the key focus areas of carbon neutrality<sup>1</sup>. The document sets out main efforts consistent with best business practices to reduce gross GHG emissions and carbon footprint of products in the short,

medium, and long term. The main focus is on opportunities to develop low-carbon energy sources, climate projects, use of energy-efficient technologies and equipment, artificial intelligence, conversion of vehicles to alternative fuels. The Company analyses the possibility of implementing projects on CO<sub>2</sub> capture and storage, as well as entering into deregulated bilateral contracts for purchase and sale of electricity.

Norilsk Nickel Group's annual team KPIs in 2023 include GHG emissions reduction metrics (Scope 1 and 2) and achieving zero environmental incidents with a weight of 10%.

Internal carbon price

In 2023, Nornickel continued to implement the internal carbon price, a management tool to mitigate climate change risks.

The Company analysed the practices of peers in the global market and chose an approach it deemed most appropriate – shadow pricing, which involves the calculation of theoretical costs or expenses that are taken into account when making investment decisions.

The purposes of shadow pricing are:

- assessing the economic consequences of GHG emissions;
- assessing new investments;
- assessing the net present value of projects;
- assessing the economic efficiency of initiatives;
- assessing business models;
- business strategy development.

For testing, the Company uses several price ranges that vary subject to current and prospective tax liabilities, potential payments under the carbon border adjustment mechanism, and the pace of decarbonisation. For the baseline price range in 2023, the carbon price was set at USD 47 per tonne of CO<sub>2</sub> equivalent. Nornickel intends to continue testing the methodology to determine an optimal approach to incorporating cost evaluations of GHG emissions into investment project decision-making.

Development of employee competencies

Nornickel is consistently developing employee competencies in climate change monitoring. In 2023, we updated the professional competency model of the sustainable development vertical, with test questions developed to evaluate

the knowledge of employees, including in terms of the climate agenda; we also held workshops on climate change. The Company is developing a training course on all aspects of the ESG agenda, including climate change.

Integrating climate change into the supply chain

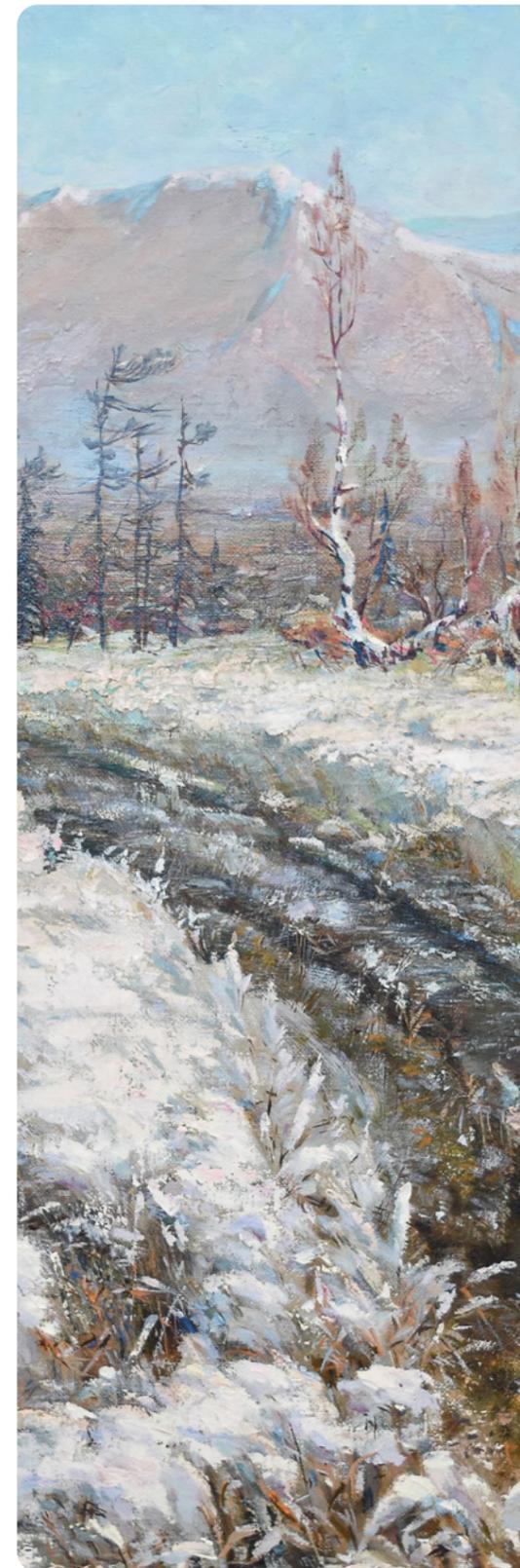
The Company has approved [MMC Norilsk Nickel's Supplier Code of Conduct](#), which outlines the area of responsibility of contractors, including in terms of climate change and GHG emissions reduction:

- Suppliers are required to develop a climate change risk management system to create effective policies and procedures and implement strategies to reduce GHG emissions
- Suppliers should specify, in their policies and procedures, targets for achieving zero emissions in line with the Paris Agreement and commit to publishing GHG emission reduction targets on an ongoing basis.
- Suppliers should endeavour to support research and relevant state-run and non-governmental organisations to monitor the impact of GHG emissions across their footprint

- Suppliers should adopt a methodology to assess the carbon footprint throughout the life cycle of their products supplied to Nornickel and provide Nornickel with relevant data upon request, after verification by an internationally recognised organisation approved by the Company
- Suppliers should calculate GHG emissions in accordance with the requirements of the GHG Protocol
- Suppliers should endeavour to disclose financial information in accordance with the TCFD Recommendations

In order to assess the impact of suppliers' operations on climate change and to encourage decarbonisation measures, questions on GHG emissions were included in the supplier due diligence in 2023.

➔ For more details, please see the [2023 Responsible Supply Chain Report](#)



<sup>1</sup> Approved by the Board of Directors in 2024.

## Nornickel's roadmap to comply with the TCFD recommendations

In 2023, Nornickel completed the implementation of the roadmap to comply with the TCFD recommendations adopted in 2021, which included more than 50 measures

aimed at improving the system for managing climate change-related risks and opportunities. Alongside that, the Company started developing

the Climate Change Action Plan through 2025 in furtherance of the TCFD roadmap it had previously completed.

« We place heavy emphasis on climate risk management. Among other things, we are developing energy saving technologies and implementing a geotechnical monitoring system for permafrost soils. This helps us identify potentially hazardous defects and deviations in a timely manner, thus reducing the likelihood of accidents. In our decision-making, we take into account the territorial singularities of the Arctic in order to adapt our operations to the specific conditions in this region.

**Alexey Devochkin,**

Polar Division's Deputy Director for Industrial Ecology and Sustainable Development (length of service with the Company – 29 years)

## CLIMATE CHANGE RISKS AND OPPORTUNITIES

### GRI 201-2

Guided by the TCFD Recommendations, COSO standards and the Environmental and Climate Change Strategy, Nornickel is building procedures for managing climate change risks and opportunities. The Company uses the TCFD classification to identify two types of risks and opportunities:

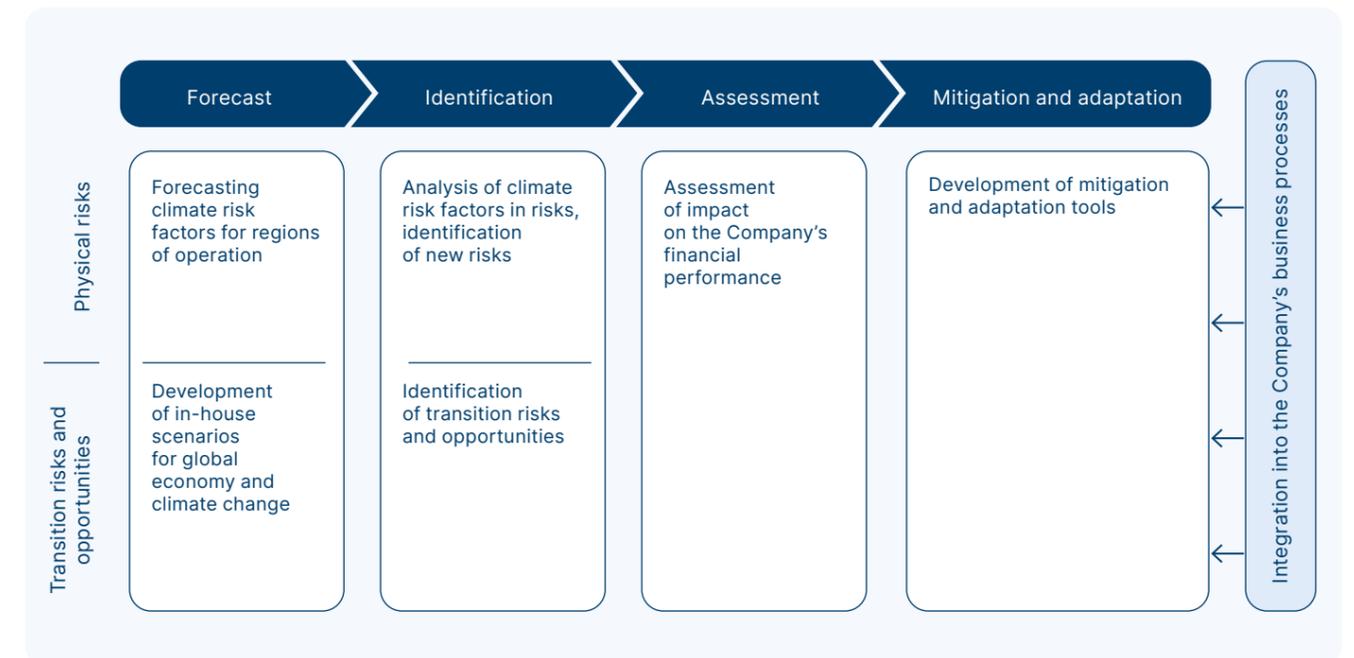
- physical risks, with impacts arising from abnormal weather events (acute risks) or chronic weather changes (chronic risks);

- transition risks and opportunities associated with the changing market, regulatory, technological and political environment during the transition to a low-carbon economy.

In 2023, the Company continued to enhance its approaches to assessing physical risks and transition risks and opportunities. The Risk Management Committee of the Management Board reviewed the concept for assessing climate change risks.



To those, the Company is implementing the following procedures:



# Physical risks

In 2022–2023, the Company made significant progress in identifying and assessing physical risks. The first step made was a joint project with the Institute of Atmospheric Physics of the Russian Academy of Sciences (IAP RAS) focusing on the analysis of historical climate change data starting from the 1960s. The analysis confirmed a trend in the change of several climate factors.

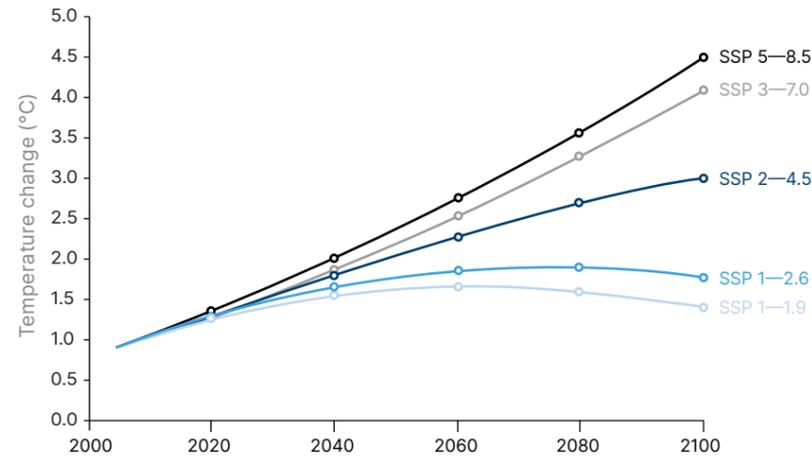
For example, in Norilsk, the temperature has been increasing by 0.6 °C every decade, suggesting that temperatures in the Arctic are rising faster than the global average.

Retrospective analysis was followed by scenario modelling of changes in climate risk factors through 2050. To do that, the Company selected three

global climate scenarios developed by the IPCC – SSP1-2.6, SSP2-4.5 and SSP5-8.5<sup>1</sup>, as well as CMIP 6<sup>2</sup>. The global scenarios were localised for all regions of the Company’s operation, including Finland. The assessment of climate risk factors was completed for Norilsk, Energy, Kola and Trans-Baikal Divisions, as well as Norilsk Nickel Harjavalta OY.

## Characteristics of IPCC scenarios

Scenario	SSP1-2.6	SSP2-4.5	SSP5-8.5
Temperature rise by 2100	by 1.8 °C	by 2.7 °C	by 4.4 °C
Greenhouse gas emissions	Greenhouse gas emissions are expected to decline and reach zero by 2055;	The current rate of increase in greenhouse gas emissions will be maintained, with carbon neutrality achieved by 2100;	The current level of GHG emissions will double by 2050



## Modelling of changes in climate factors up to 2050 performed by IAP RAS for the territories where the Company’s assets are located, in scenario 55P2-4.5

Climate factors	Expected changes in climate factors by 2050 vs 2022			
	Norilsk and Energy Divisions	Kola Division	Norilsk Nickel Harjavalta OY	Trans-Baikal Division
Changes in seasonal thaw depth, m	0.8	Irrelevant	Irrelevant	Irrelevant
This factor is mainly applicable to infrastructure risk assessment outside urban areas. The phrase “degradation of permafrost soil” is used in the assessment				
Number of days with heavy precipitation per year	1.4	0.6	2	-0.3
Precipitation occurring with a probability of 5%				
Number of days with a high risk of severe thunderstorm per year	6	2	2	5
Due to changes in temperature and humidity				
Annual precipitation, mm	58	4	41	23
Mainly due to changes in the trajectory of Atlantic cyclones and an increase in the moisture content of the atmosphere				
Average air temperature, °C	1.5	1.1	0.6	1
Change in sea level, mm	58	49	37	Irrelevant



The forecasting identified the following key climate risk factors for Norinickel: degradation of permafrost soil<sup>1</sup>, increased frequency of heavy precipitation, and higher annual precipitation. Most of the changes are expected to occur after 2040. Low water levels in rivers (a problem the Company faced in 2013) also pose a risk<sup>1</sup>.

<sup>1</sup> The following probability of risk occurrence was determined for the selected scenarios: SSP1-2.6 – 25%, SSP2-4.5 – 70%, SSP5-8.5 – 5%.

<sup>2</sup> Coupled Model Intercomparison Project.

<sup>1</sup> For the description, assessment of impact on the development strategy and targets, and mitigation measures, please see the [Internal Control and Risk Management](#) section.

Impact of permafrost soil degradation on the Company's assets

**Power infrastructure facilities**

- Hydropower plants
- Fuel storage tanks (heat and power plants / oil depots)
- Gas / gas condensate field
- Water intake facility in Norilsk
- Power lines
- Pipelines (gas, water, tailings)

**Logistics**

- Dudinka Sea Port
- Alykel (airport)

**Production facilities**

- Plants
- Mines
- Tailing dumps

Facilities most susceptible to permafrost soil degradation

The analysis found that most of the industrial buildings and structures in the Norilsk Industrial District are built on stable (rock) foundations; linear infrastructure such as pipelines and power lines is more susceptible to the impact of permafrost soil degradation.

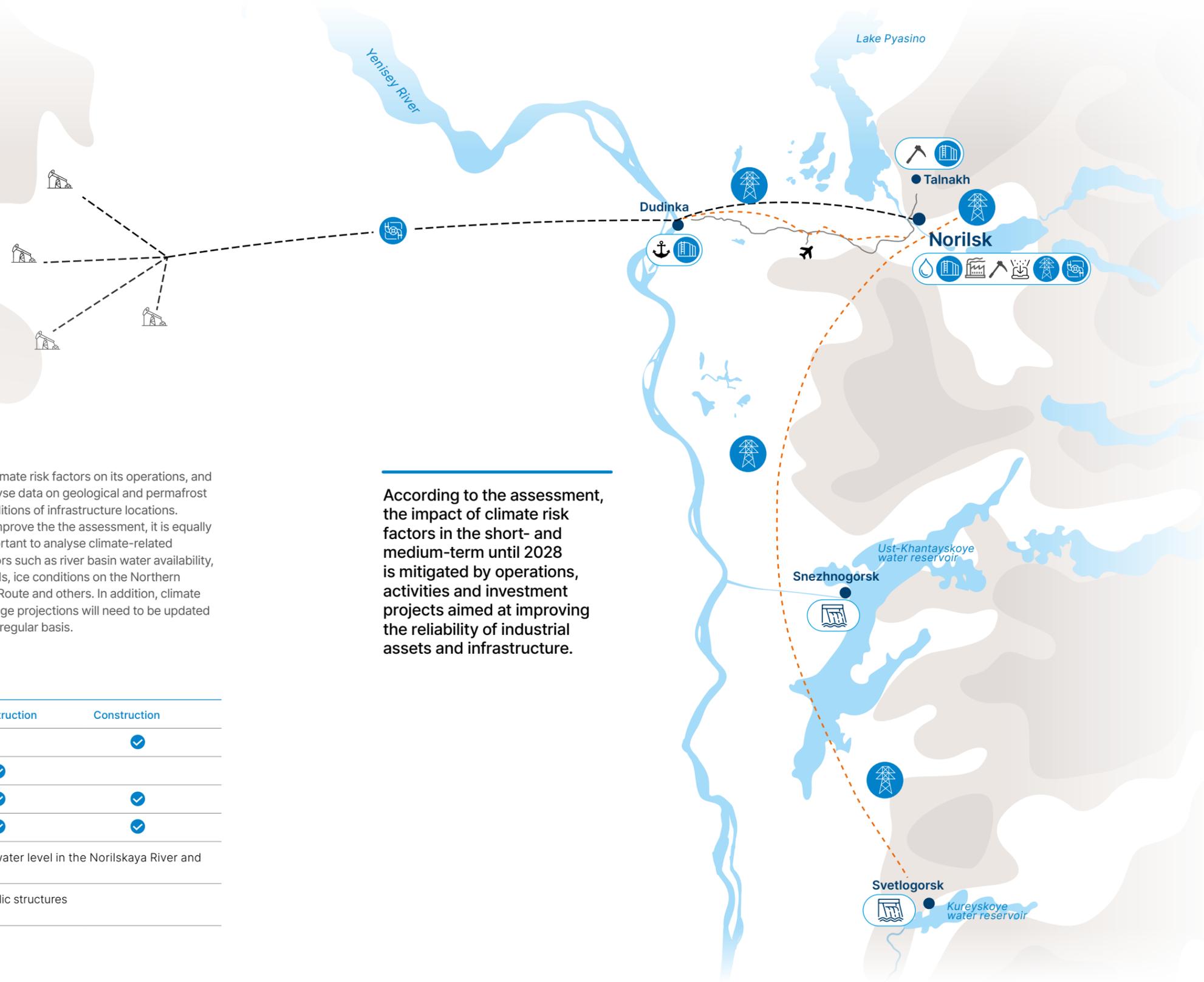
In order to mitigate the risks associated with the condition of permafrost soil in the Norilsk Industrial District,

the Company monitors the technical condition of assets on an ongoing basis through expert examinations, surveys, and monitoring of the condition of permafrost soils and basement foundations.

To estimate the long-term impact of climate risk factors on the Company's operations through 2050, we will need to improve climate modelling, collect additional statistics of the Company to assess the impact

of climate risk factors on its operations, and analyse data on geological and permafrost conditions of infrastructure locations. To improve the the assessment, it is equally important to analyse climate-related factors such as river basin water availability, floods, ice conditions on the Northern Sea Route and others. In addition, climate change projections will need to be updated on a regular basis.

Factor	Mitigation effort			
	Monitoring	Repair	Reconstruction	Construction
Degradation of permafrost soil				
• Power line	✓	✓		✓
• Gas pipelines	✓	✓	✓	
• Pipelines	✓	✓	✓	✓
• Fuel storage tanks	✓	✓	✓	✓
Higher frequency of heavy precipitation	Monitor the technical condition of facilities and control water level in the Norilskaya River and water reservoirs			
Higher annual precipitation	Maintain the technical condition of, and modernise, hydraulic structures			



According to the assessment, the impact of climate risk factors in the short- and medium-term until 2028 is mitigated by operations, activities and investment projects aimed at improving the reliability of industrial assets and infrastructure.

**Permafrost monitoring**

To mitigate the risk of natural and man-inflicted accidents, in 2021 the Company's Polar Division put in place an innovative system to monitor the technical condition of buildings and structures located in permafrost areas. The Buildings and Structures Monitoring Centre performs visual inspections and instrumental monitoring of deformations in the bases and foundations of buildings and structures, groundwater levels, soil temperatures, and thermal stabilisers.

In addition to visual inspections and instrumental measurements, as part of Polar Division's information and diagnostics system, Norinickel implemented a data collection, transmission, storage, processing and analysis framework enabling experts to oversee in the real-time mode (through a 24/7 control unit) the safe operation of buildings and structures not only in Polar Division, but also at the facilities of Norilsk and Energy Divisions, to process and analyse historical facility data, and to digitalise visual inspections of buildings and structures. Furthermore, the Company pioneered a two-level system of criterion values for the diagnostic indicators of structure and building conditions.

The most critical buildings and structures are now furnished with automated sensors, which transmit relevant signals to the system on a daily basis.

The information and diagnostics system helps issue recommendations, verifying their implementation, and produce reports on the monitored metrics.

<b>&gt;450</b> thermistor strings	For tracking the temperature of permafrost soil under buildings and structures
<b>43</b> air temperature and humidity measuring devices	For ensuring operational control of relevant indicators in crawl spaces, including for rapid response to accidents affecting heat and water supply systems
<b>1,200</b> inclinometers	For assessing displacements of certain elements of buildings and engineering structures
<b>1</b> automated weather station	For determining air temperature, humidity, and wind speed and direction
<b>30</b> accelerometers	For determining the static and dynamic characteristics of buildings or structures
<b>138</b> strain gauges	For monitoring relative deformation / mechanical stress in construction structures

**17** production sites of the Company are connected to Polar Division's information and diagnostics system

**>600** employees work in Polar Division's information and diagnostics system

**>950** facilities are connected to Polar Division's information and diagnostics system, including

**218** facilities equipped with a continuous automated monitoring system (data for the remaining facilities is entered manually)

In the first year since the system's launch, the Company decommissioned 49 facilities intended for various purposes (industrial, social, and other) to minimise the risk of accidents.

For improving permafrost degradation assessments, Norinickel joined forces with the Polar State University to develop a new scientific and methodological approach championing background monitoring at the facilities of Polar Division. To put this approach into practice, in 2023 we drilled 20 wells ranging in depth from 10 to 20 m, and another two wells with a depth of 200 m. There are plans to continue enhancing systems of background monitoring to identify geocryological hazards in 2024. This project won the top prize in the Science for Sustainable Development category at the 21st V.I. Vernadsky National Environmental Awards.

As a way to develop the monitoring system for buildings and structures, Norinickel approved a corporate geotechnical monitoring standard in August 2023. This standard incorporates not only the existing laws and regulations of the Russian Federation, but also in-house solutions and expertise, which enabled the Company to build a transparent and effective business process for supervising the technical condition of buildings and structures in a short period of time.

The standard regulates the planning and implementation of geotechnical monitoring initiatives, assigns roles to participants, and formalises requirements for connecting new facilities to the information and diagnostics system, a core framework ensuring the safe and reliable operation of the Company's assets.



# Transition risks and opportunities

To identify and assess relevant transition risks and opportunities, in 2022 Norinickel partnered with the Institute of Economic Forecasting of the Russian Academy of Sciences in developing three proprietary long-term scenarios for the global economy and climate change through 2050.

The Rapid Transition, Sustainable Palladium, and Global Growth scenarios rely on an analysis of over 190 public scenarios made available by the leading agencies and organisations (International Energy Agency, World Energy Council, International Renewable Energy Agency, OPEC, Bloomberg, NGFS, Shell, BP, DNV, etc.).

The estimated changes in global temperature under these scenarios are consistent with the three IPCC scenarios (SSP1-2.6, SSP2-4.5 and SSP5-8.5) that have been adopted by the Company to assess the physical climate change risks.

## Key characteristics of the scenarios developed to assess transition risks and opportunities through 2050

	Rapid Transition SSP1-2.6	Sustainable Palladium SSP2-4.5	Global Growth SSP5-8.5
Probability	25%	70%	5%
Strategic focus	Low-carbon development paradigm with the global community's efforts focused on the reduction of GHG emissions	Maintaining current socioeconomic trends. Traditional industries remain centre stage along with the green economy	Abandoning efforts to curb climate change with further economic growth fuelled by hydrocarbons
Inflation	High	Moderate	Low
Resource/energy intensity	Low	Moderate reduction	High
Climate regulation	Strict	Moderate	Insignificant
CO <sub>2</sub> prices	Major increase	Moderate increase	At 2021 levels
Temperature change by 2050 <sup>1</sup>	+1.7°C	+2.0°C	+2.5°C
Alignment with the Paris Agreement goal	+	-	-

The scenario assumptions differ from each other in qualitative terms, and these differences are directly related to the Company's product portfolio. Sustainable Palladium is considered to be the baseline scenario, which provides for traditional industries to remain centre stage along with the green economy. For example, ICE vehicles will retain a large market share, contributing to robust demand for palladium in the long run.

The Company will apply the other two scenarios in stress-testing of risks associated with climate change. In addition, a scenario parameter monitoring tool was developed to record actual deviations from the baseline scenario. A scenario analysis of the consolidated financial and economic model through 2050 showed revenue growth in all scenarios by 2050 against

the average value for 2017–2021 (for more details, please see the [Climate Change Report](#)).

The Company identified potential transition risks and opportunities based on the scenarios for global economy and climate change, analysis of proposed carbon regulations, market trends and stakeholder expectations.

## Identified transition risks and opportunities

### Technology

**Risks:**

- Failure to achieve the decarbonisation targets:
  - due to a mismatch between the real and expected impact of low-carbon technologies or the inability to scale low-carbon technologies
  - due to the lack of access to advanced international low-carbon technologies.

**Opportunities:**

- Use of low-carbon technologies due to their development and lower cost in the long term.

### Regulatory/financial

**Risks:**

- Compliance with carbon regulations in the Company's export markets.
- Compliance with national carbon regulations.

**Opportunities:**

- Use of ESG financing tools.
- Sale of carbon credits resulting from climate projects.

### Reputational

**Risks:**

- Negative stakeholder perception towards the Company's climate action.
- More protests by non-profit organisations and local communities, including indigenous northern peoples.

**Opportunities:**

- Higher stakeholder loyalty thanks to the Company's climate action.

To mitigate the risks caused by the need to comply with carbon regulations, the Company frequently monitors laws and regulations in both Russia and export markets.

The CBAM<sup>1</sup>, a cross-border carbon tariff introduced in the European Union in 2023, does not pose any risk to the Company in the short term as non-ferrous and platinum group metals are not currently included in the list of products subject to the tariff. The Company continues monitoring the evolution of carbon regulations and forecasting the amount of potential associated costs.

In the long term, Norinickel relies on its competitive advantage – one of the lowest product carbon footprints in the industry.

The Company is also exploring opportunities related to the trading of carbon credits that may be generated as a result of climate projects both in the Russian and foreign carbon markets.

### Market

**Risks:**

- Inability to raise additional debt financing on favourable terms.
- Limited sales opportunities due to insufficient carbon intensity reduction efforts compared to peers.
- Restrained demand for mined platinum group metals due to declining sales of internal combustion engine vehicles.
- Restrained demand for mined nickel due to a decline in overall vehicle production as a result of increase in ride sharing and autonomous vehicles and the development and mass production of new nickel-free batteries.
- Restrained demand for mined metals due to increased recycling.

**Opportunities:**

- Stronger demand for mined nickel and copper due to transport system electrification, growing hybrid vehicle market, and the development of renewables
- Stronger demand for mined platinum group metals due to the use of platinum and palladium in the hydrogen economy and palladium in vehicles hybridisation
- Benefiting from the low carbon footprint of products

<sup>1</sup> Growth in temperature vs pre-industrial levels.

<sup>1</sup> Carbon Border Adjustment Mechanism.

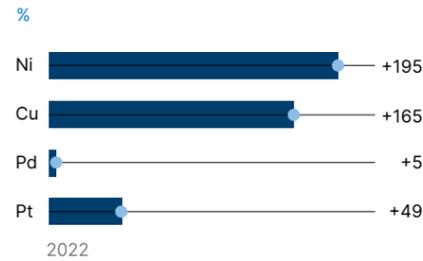
# Sustainability assessment of Nornickel’s product portfolio under three scenarios for the global economy and climate change

One of the key drivers of Nornickel’s long-term strategy is the growing demand for the Company’s metals to develop a low-carbon economy. The very fact of supplying green metals to the market means that the Company is actively contributing to the global transition to cleaner modes of transport and renewable energy.

Sustainable Palladium, the baseline scenario with a probability of 70%, envisages growing consumption of nickel, copper and platinum and expects palladium demand to remain at its current level.

➔ For more details on the metal demand forecasts and assumptions underlying the Rapid Transition and Global Growth scenarios, please see [Nornickel’s Climate Change Report](#).

## Changes in metal demand by 2050 under the Sustainable Palladium scenario, %

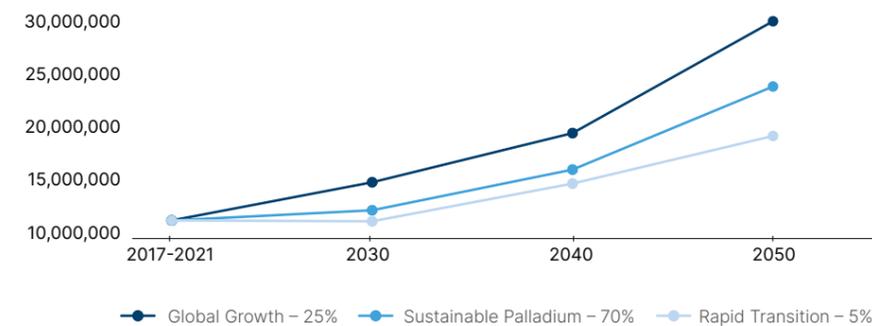


## Key climate change factors affecting demand for the Company’s key products

Factor	Ni	Pd/Pt	Cu
Growth of market share of battery electric vehicles (BEVs)	↑	↓	↑
Growing hybrid vehicle market	↑	↑	↑
Growing fuel cell market and hydrogen economy	➔	↑	➔
Growth of renewables / low carbon fuel in power generation	↑	↑	↑
Storage and grid expansion to support growth in EVs	↑	➔	↑
<b>Net effect</b>	↑	➔	↑

## Scenario analysis of the consolidated financial and economic model through 2050

### Revenue from Nornickel’s basket of metals



Based on the global economic development and climate change scenarios, Nornickel conducted a scenario analysis of the consolidated financial and economic model through 2050. The analysis shows revenue growth in all scenarios by 2050 against the average value for 2017–2021. The key revenue growth drivers in the Global Growth scenario are the highest GDP and population growth rate, which will fuel the strongest demand for palladium, nickel, and copper in 2050 vs the other two scenarios. Although the Rapid Transition scenario is based on the most aggressive decarbonisation rates, which is impossible without green

metals – nickel and copper, – the scenario projects the global economy to slow down, with the lowest GDP and population growth rates. On top of that, the total car

fleet, along with the fleet of passenger EVs, hydrogen cars, and plug-in hybrids in the Rapid Transition scenario will be lower than that in the Sustainable Palladium

scenario as a result of the general trend towards demotorisation and ride-sharing development.

## Product portfolio diversification

In 2023, the Company adopted the Innovation Strategy, which includes plans for developing new products as a way to mitigate market risks and leverage energy transition opportunities.

To mitigate the risk of restrained demand for platinum group metals due to declining sales of ICE vehicles in the Rapid Transition

scenario, the Company is exploring the outlook of producing palladium catalysts for the growing hydrogen energy market. Today the hydrogen energy market uses platinum- and iridium-based catalysts. Nornickel is considering catalyst efficiency improvements achieved through partial replacement of these metals with palladium, which, thanks to its extremely high

chemical resistance, may be more effective in catalysts than other platinum group metals.

Nornickel joined forces with the scientific community to create the first prototype of a palladium-based catalyst – nanosized material for membrane electrode assemblies used in the electrolysis of hydrogen.

Nornickel is exploring the prospects of using palladium in the production of the anode and cathode of a hydrogen-air fuel cell and a proton exchange membrane electrolyser. The Company’s Kola Division serves as a production site to manufacture limited batches of chemical compounds with platinum group metals. The latter can be used as the source material (precursor) to produce palladium-based catalysts.

The Company sees the development potential not only for catalysts, but also for other hydrogen energy segments such as membrane technologies for making, storing and transporting high-purity hydrogen.

To meet the growing demand of the rapidly developing battery sector for materials, the Company expands its portfolio of cobalt and nickel products, including by amplifying the production of sulphates and other nickel and cobalt compounds. Nornickel is also developing technologies for the manufacture of lithium compounds, precursors and cathodes for the battery sector.

In addition, Nornickel together with a partner are set to develop Russia’s most promising lithium deposit located in the Murmansk Region. The Kolmozerskoye deposit project envisages a 45 ktpa output of lithium carbonate and hydroxide.

The partners plan to set up a large-scale integrated production site spanning everything from mining and processing to high-tech production, helping to create over 1,000 new jobs and substitute the imports of lithium feedstock and battery components.

« The hydrogen energy market is still in the making, but it is increasingly evident that sooner or later hydrogen will find its niche in the technology sector by offering a viable alternative to traditional energy sources. We have every chance of emerging as one of the key players in this industry, which is desperately looking for innovative products such as the ones we are currently working on.

**Vitaly Busko,**  
Vice President for Innovations at MMC Norilsk Nickel

# GREENHOUSE GAS EMISSIONS AND CARBON FOOTPRINT OF PRODUCTS

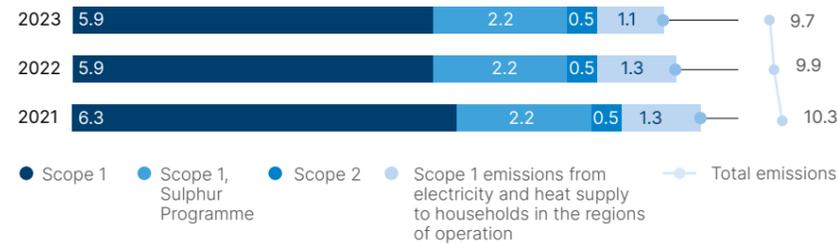
GRI 305-1, 305-2, 305-4/ SASB EM-MM-110a.1

Nornickel uses the GHG Protocol methodology to calculate its GHG emissions (Scope 1 and 2), taking into account carbon dioxide (CO<sub>2</sub>), nitrous oxide (N<sub>2</sub>O), and methane (CH<sub>4</sub>) emissions, with no or insignificant emissions of other greenhouse gases. The quantitative assessment of Scope 1 GHG emissions also includes the Company's estimated prospective GHG emissions associated with the implementation of the Sulphur Programme.

In 2023, direct and indirect GHG emissions (Scope 1 and 2) decreased by 0.2 mt of CO<sub>2</sub> equivalent y-o-y to a total of 9.7 mt of CO<sub>2</sub> equivalent, including the GHG provision for the Sulphur Project and the supply of heat and electricity to retail customers. The Company's direct GHG emissions amounted to 9.2 mt of CO<sub>2</sub> equivalent<sup>1</sup> and indirect energy emissions, to 0.5 mt of CO<sub>2</sub> equivalent. Indirect energy emissions were calculated using the location-based method, taking into account regional coefficients.

Trans-Baikal Division entered into a bilateral agreement for the purchase and sale of 212.1 million kWh of electricity (up 20% y-o-y) generated by third-party hydroelectric power plants. This initiative led to a reduction of Scope 2 GHG emissions in 2023 by more than 200 kt of CO<sub>2</sub> equivalent.

## GHG emissions (Scope 1 and 2)<sup>2</sup>, mt of CO<sub>2</sub> equivalent



The reduction in the Company's GHG emissions (Scope 1 and 2) was driven by the following factors:

- lower unit fuel consumption associated with electricity generation resulting from optimised equipment operation at heat and power plants;
- increased reliance on hydro power plants as part of overall energy system optimisation;
- reduction in the volume of diesel fuel used up by heat and power plants in 2023 compared to 2022.

The intensity of GHG emissions (Scope 1 and 2) was 6.1 t of CO<sub>2</sub> equivalent per RUB 1 mln of consolidated IFRS revenue.

In 2023, Nornickel submitted a report on GHG emissions to the Ministry of Economic Development of Russia for inclusion of relevant data into the registry of GHG emissions<sup>3</sup>.

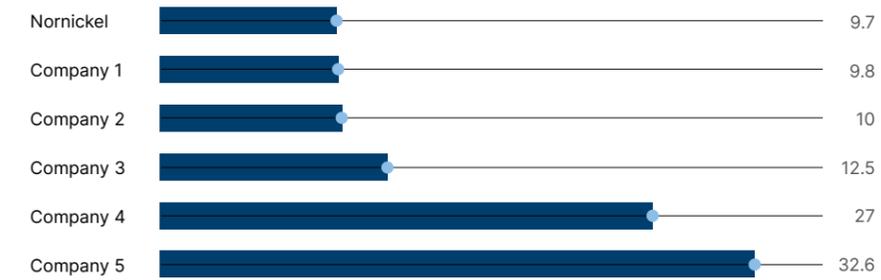
### Emissions data verification by an independent auditor

In 2023, TÜV Austria verified GHG emission sources and gross CO<sub>2</sub> emissions (Scope 1 and 2) across all divisions of Nornickel Group and issued a generalised verification statement.

Only direct GHG emissions are included in the quantitative assessment of emissions. GHG emissions are calculated in accordance with Order No. 371 On Approving Methods for Quantitative Assessment of Greenhouse Gas Emissions and Absorption dated 27 May 2022.

## Comparison with global metals and mining peers

### GHG emissions (Scope 1 and 2), mt CO<sub>2</sub> equivalent



Source: the Company's analysis based on the most up-to-date available data (2023 financial year) Peers include leading global diversified metals and mining companies: BHP Billiton, Rio Tinto, Vale, Glencore, and Anglo American.

## GHG emissions (downstream and upstream Scope 3)

GRI 305-3

The Company conducts an annual quantitative assessment of Scope 3 emissions that arise outside of Nornickel Group's operations and are beyond its control. These emissions are categorised as upstream and downstream emissions.

Their quantitative assessment follows the recommendations of the GHG Protocol and IPCC Guidelines for National Greenhouse Gas Inventories.



<sup>1</sup> Including a GHG emissions provision for the Sulphur Project and GHG emissions generated from heat and electricity supply to households.

<sup>2</sup> GHG emissions are calculated in line with the GHG Protocol methodology. The Group's GHG emissions include the following greenhouse gases: direct carbon dioxide (CO<sub>2</sub>) emissions of 9.5 mt, nitrogen oxide (N<sub>2</sub>O) emissions of 51 t, methane (CH<sub>4</sub>) emissions of 5.2 kt (mainly generated by gas transportation units), including the Sulphur Programme and the heat and electricity supply to households. The calculation includes potential GHG emissions after the completion of the Sulphur Programme. Group data, including foreign companies of Kola Division.

<sup>3</sup> In accordance with Federal Law No. 296-FZ On Limiting Greenhouse Gas Emissions dated 2 July 2021.

**GHG emissions (Scope 3),**  
mt of CO<sub>2</sub> equivalent<sup>1</sup>

Indicator	2021	2022	2023
<b>Upstream, including</b>	<b>1.4</b>	<b>1.4</b>	<b>1.3</b>
purchased goods and services	0.8	0.9	0.8
CAPEX	0.1	0.1	0.1
energy and fuel	0.4	0.3	0.3
other	0.1	0.1	0.1
<b>Downstream, including</b>	<b>4.0</b>	<b>3.9</b>	<b>5.1</b>
downstream transportation and distribution (category 9)	0.2	0.2	0.2
processing of sold products (category 10)	3.8	3.7	4.9
<b>TOTAL SCOPE 3 EMISSIONS</b>	<b>5.4</b>	<b>5.7</b>	<b>6.4</b>

In 2023, the Company continued to publicly disclose its quantitative estimates of upstream Scope 3 GHG emissions, covering all emission categories required by the GHG Protocol. The bulk of the emissions are related to the purchase of goods and equipment from third-party suppliers and to energy and fuel consumption (to the extent not included in Scope 1 and 2).

In 2023, total emissions (upstream Scope 3) amounted to 1.3 mt of CO<sub>2</sub> equivalent. The decrease in upstream Scope 3 emissions was primarily driven by the reduced reliance on diesel fuel for electricity generation in the Norilsk Industrial District, as well as the divestment of NordStar Airlines in 2022.

Downstream Scope 3 emissions are associated with the transportation of the Company's products from production assets to consumers and subsequent processing.

The assessment covers the following types of products: nickel, copper, cobalt, PGM, gold, copper and nickel semi-products, and iron ore concentrate. Among these, the bulk of emissions stem from the sale of semi-products to third parties beyond the Group.

The increase in downstream Scope 3 emissions was driven by changes in the Group's sales volumes, product mix and customer portfolio, as well as the geographical distribution of sales. The key driver behind higher

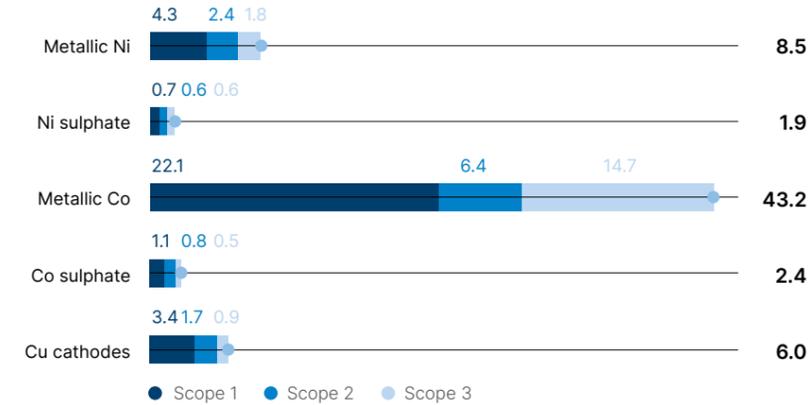
downstream Scope 3 emissions in 2023 compared to 2022 was the rise in sales of semi-products, primarily iron ore concentrate produced by GRK Bystrinskoye

The Company continuously improves the methodology for quantifying downstream Scope 3 emissions by monitoring international guidelines like ISO and ICMM standards, taking part in drafting industry recommendations through the Nickel Institute and International Platinum Group Metals Association, and collaborating with the buyers of its products to gather data on emissions during product processing.

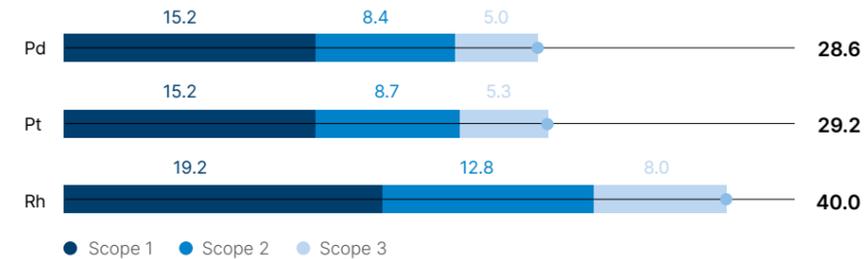
**Carbon footprint of products**

**Assessment of products' carbon footprint in 2023<sup>1</sup>**

**Carbon footprint of the product (non-ferrous metals),**  
kg of CO<sub>2</sub> equivalent per kg of metal in the product



**Carbon footprint of the product (PGM),**  
kg CO<sub>2</sub> equivalent per g of metal



**Scope of products' carbon footprint calculation**

End product manufacturers:

- Polar Division
- Kola MMC
- GRK Bystrinskoye
- Norilsk Nickel Harjavalta

Manufacturers of raw materials / resources or services:

- Medvezhy Ruchey
- NTEC
- Norilsk Production Support Complex
- Norilskgazprom
- Norilsktransgaz
- Murmansk Transport Division
- Norilsknickelremont

The carbon footprint of MMC Norilsk Nickel's products is calculated in accordance with:

- ISO 14067:2018, ISO 14040:2006, and ISO 14044:2006 standards;
- GHG Protocol Product Life Cycle Accounting and Reporting Standard methodology;
- LME passport guidance – Nickel Institute guidance for nickel producers to calculate their GHG emissions;
- the IPA's guidance: The Carbon Footprint of Platinum Group Metals: A Best Practice Guidance for the Calculation of GHG of Primary Produced PGMs.

In 2023, the Company made efforts to align its corporate methodology for calculating the carbon footprint of products with the industry model.

In the medium term, Norinickel plans to deploy an end-to-end automated system for calculating GHG-related indicators based on a unified methodology using a dedicated IT platform. This solution will allow for more efficient and accurate carbon accounting of all material flows, process stages and resources across the Group. In addition, the automated process will make it easier to provide information on the carbon footprint of products to all stakeholders in a timely manner.

<sup>1</sup> In order to standardise the approach to identifying sources of GHG emissions, the calculation uncertainty of upstream Scope 3 emissions was reduced by excluding insignificant sources within the categories of Purchased Goods and Services, and CAPEX from the calculation boundaries. As a result, the emissions data for 2022 was recalculated using the new approach. In 2022, total recalculated emissions amounted to 1.4 mt of CO<sub>2</sub> equivalent.

<sup>1</sup> Including the Sulphur Programme provision. Group data, including foreign companies of Kola Division.

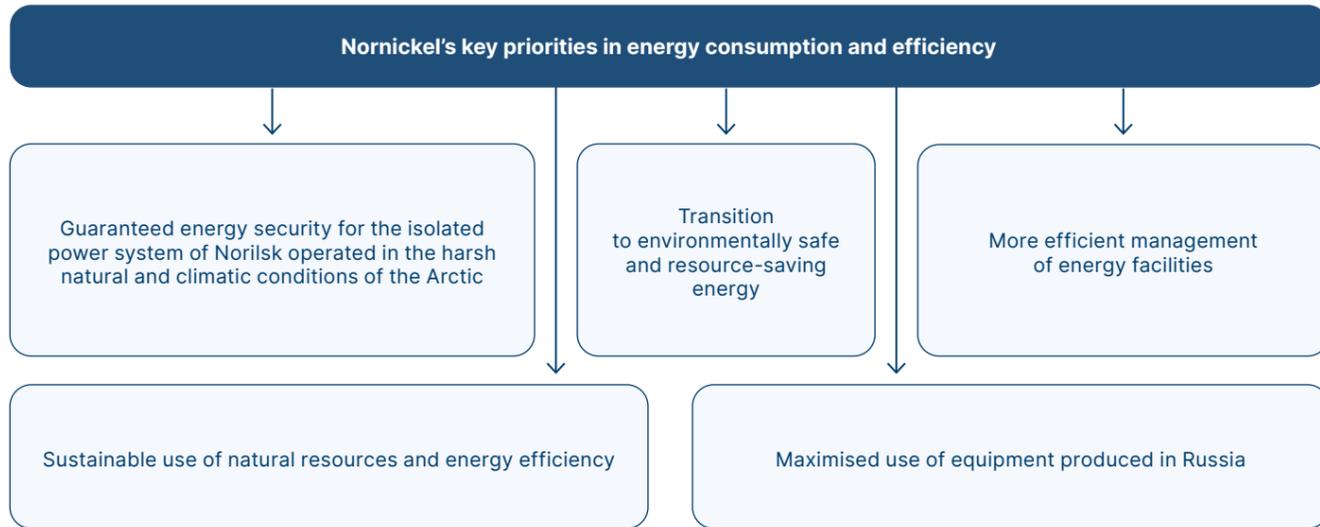
# ENERGY CONSUMPTION AND EFFICIENCY

SASB EM-MM-130a.1

Nornickel seeks to cover its primary energy needs from renewable sources, maintaining or reducing energy consumption and increasing

energy efficiency. The Company makes continuous efforts to reduce the consumption of energy sources such as natural gas, diesel fuel and coal,

as well as to provide subsidiaries with reliable and efficient energy sources in the long term, as set out in Russia's Energy Strategy to 2035.



Nornickel's Energy Division is a critical part of the Company's production process and a crucial link in the uninterrupted supply of power to local communities in the regions of operation.



## Key facilities of Energy Division



### Norilsgazprom

The company has been producing natural gas and gas condensate since 1969 (the Pelyatkinskoye, Severo-Soleninskoye and Yuzhno-Soleninskoye gas condensate fields and the Messoyakhskoye gas field). Gas and gas condensate reserves are estimated at 245.4 bcm and 4,527 kt respectively, while production of natural gas and gas condensate in 2023 came in at 2,720 mcm and 85 kt respectively.



### Norilsktransgaz

The company transports natural gas and gas condensate from the fields to consumers in the Norilsk Industrial District. The total length of gas and condensate pipelines is 1,653 km.



### NTEC

The company generates, transmits and supplies power and heat to consumers. The energy comes from both renewable (hydropower) and non-renewable (natural gas) sources. NTEC operates five generating facilities: three thermal power plants (with a capacity of 1,154 MW) and two hydropower plants (with a capacity of 1,102 MW). Power from renewable sources is generated at Ust-Khantayskaya and Kureyskaya HPPs.



### Taimyr Fuel Company

The company is a strategic supplier of light and dark petroleum products to the Far North, covering important commercial and social functions.

# 55% of electricity consumed came from renewable sources

More than half of the electricity is generated by two hydropower plants with a total capacity of 1,102 MW:

- Ust-Khantayskaya HPP – 502 MW;
- Kureyskaya HPP – 600 MW.

# 3 gas heat and power plants

The rest of the electricity and heat demand is covered by:

- CHP-1 – 315 MW;
- CHP-2 – 459 MW;
- CHP-3 – 380 MW;

with a total capacity of 1,154 MW.

# 7 gas boilers

One boiler in each Talnakh, Kayerkan and Alykel, and four boilers in Dudinka provide the district with heat.

The most essential projects implemented by Energy Division to improve equipment reliability, mitigate physical climate risks, enhance energy efficiency and increase output include:

- **replacement of a power unit at CHP-2** in Norilsk;
- **reconstruction** of the backup diesel fuel storage facilities at CHP-1, CHP-2 and CHP-3, boiler in Dudinka as well as at Ust-Khantayskaya HPP and Kureyskaya HPP;
- **modernisation** of the electricity, heat and water supply networks;
- **construction** of a water intake facility on the Norilskaya River;
- reconstruction of the municipal sewage system in Norilsk;
- **modernisation** of the gas transmission and gas distribution networks;
- **construction** and fit-out of five new gas wells at the Pelyatkinskoye gas condensate field;
- **comprehensive oil terminal reconstruction** programme: Norilsk, Dudinka and Kayerkan oil depots.

## Use of renewable energy sources

Nornickel runs energy infrastructure development initiatives aimed at both increasing the reliability of asset operation and reducing greenhouse gas emissions.

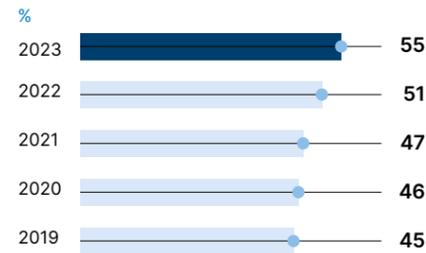
In 2023, the Group-wide share of power from renewable sources was 55%, up 4 p.p. y-o-y. Nornickel's investment programme includes projects intended to ramp up the use of renewable energy sources, to save fuel and energy resources, and to improve the reliability of power and gas supply.

Due to the harsh climate conditions of the Group's production assets, the use of solar, geothermal and wind energy is limited.

From time to time, the Company reviews new experimental and industrial carbon capture, transportation and storage solutions from Russia, and monitors confirmed positive experience with the implementation of such solutions at high-capacity gas heat and power plants.

In 2023, a partnership project was launched to meet the Company's production plans, involving the construction of small-capacity (around 300 MW) nuclear power plants in permafrost areas. At the moment, we are searching for the sites for nuclear power plants. One of the criteria is access to the surface of hard rock. This has to do with associated construction costs as well as the safety of operations in process and environmental terms.

### Share of renewable energy in total electricity consumption by Nornickel Group, %



In the long term, we plan to fully meet the Group's energy needs through synergies between nuclear, thermal generation and hydropower generation capacities.

### Total energy consumption by Norilsk Nickel Group, TJ

GRI 302-1, 302-3

Indicator	2018	2019	2020	2021	2022	2023
Fuel consumption	148,910	144,772	141,237	151,235	141,909	137,150
Energy from renewable sources (HPPs)	14,877	15,058	15,310	14,586	16,152	16,800
Electricity and heat procurement from third parties	10,931	11,331	11,200	10,891	11,005	8,701
Electricity and heat sales to third parties	18,926	18,766	17,254	19,974	18,968 <sup>1</sup>	19,216 <sup>2</sup>
Group's total energy consumption (1 + 2 + 3 - 4)	155,792	152,395	150,493	156,738	150,098	143,435
Energy intensity, GJ / RUB mln <sup>3</sup>	214	174	135	117	127	116

### Fuel consumption by Group companies by type of fuel, TJ

GRI 302-1

Indicator	2018	2019	2020	2021	2022	2023
Total fuel consumption	148,910	144,772	141,237	151,235	141,909	137,150
Natural gas	129,335	125,329	122,216	130,867	125,934	121,643
Coal <sup>4</sup>	1,660	2,087	2,180	1,557	2,027	1,562
Diesel fuel and fuel oil	13,788	13,535	13,939 <sup>5</sup>	15,097	13,623	13,080
Gasoline and jet fuel	4,127	3,820	2,902	3,715	325	312
Lignite	-	-	-	-	-	552

<sup>1</sup> Including 4,183 TJ of electricity and 14,785 TJ of heat energy.

<sup>2</sup> Including 4,203 TJ of electricity and 15,012 TJ of heat energy.

<sup>3</sup> To calculate internal energy intensity, the Group's total energy consumption and the consolidated IFRS revenue were taken as the numerator and the denominator.

<sup>4</sup> The Company uses coal as a chemical element in its production processes, with no coal used for heating purposes.

<sup>5</sup> Taking into account the diesel fuel lost as a result of NTEC's CHP-3 accident on 29 May 2020.

**Electricity and heat consumption by Group companies, TJ**

GRI 302-1

Indicator	2021	2022	2023	Including in 2023	
				Electricity	Heating and steam
Electricity and heat consumption by the Group companies	60,771	60,143	59,687	30,334	29,353
Including:					
• Polar Division	30,727	31,307	32,991	14,665	18,327
• NTEC	6,439	6,045	5,907	3,993	1,913
• Kola MMC	9,393	9,289	9,097	6,226	2,872
HPP share in total electricity consumption in the Norilsk Industrial District	52%	56%	58%	–	–
HPP share in total electricity consumption by the Company	47%	51%	55%	–	–
HPP share in total electricity and heat consumption by the Company	24%	27%	28%	–	–
Share of renewables in total power and fuel consumption	9%	11%	12%	–	–

**Fuel and energy savings resulting from energy consumption reduction and energy efficiency improvement initiatives in 2023**

GRI 302-4

Indicator	Group total	Including				
		Polar Division	NTEC	Kola MMC	Medvezhy Ruchey	Other companies
Total savings, TJ	469.5	4.8	163.1	171.5	54.9	75.3
Including:						
• electricity	55.1	4.8	–	5.9	4.2	40.3
• heat in water and steam	251.3	–	–	165.6	50.7	35.0
• fuel	163.1	–	163.1	–	–	–

The Company annually develops and implements initiatives to save fuel, energy, and water.

In 2023, RUB 4.3 bn was invested in energy efficiency improvements, which helped reduce fuel and power consumption by 469.5 TJ. Key

energy efficiency initiatives included replacement of transformers, installation of automated outdoor lighting furnished with twilight photocell and motion sensors, improvement of thermal insulation in pipelines, transfer of mine air heaters to another source of energy, and decentralisation of air supply to mines.

**RUB 4.3 bn**  
expenses on energy saving measures in 2023

**Promising areas for reducing GHG emissions**

**Climate-related projects**

Nornickel is considering potential climate-related projects to reduce the impact of its operations on climate change. To that end, the Company entered into an agreement with the Siberian Federal University to develop high-level approaches to implementing a comprehensive nature-based climate solution project.

from waste rock, or tailings. After that, tailings undergo special treatment and are sent to tailing dumps to be distributed across their entire surface. During weathering, which is long-term exposure to air, minerals contained in Nornickel's ores react with carbon dioxide to form stable secondary carbonates in tailing dumps. Nornickel's processes of ore mining and delivery to the surface thus create conditions for carbon dioxide capturing, or natural mineralisation.

The Company is currently developing a methodology to assess and account for the carbon sequestration capacities of tailings. Following an audit and verification by an external auditor, this methodology will be used in the Company's statements about GHG emissions and absorption capacities.

Going forward, the Company will focus on developing a technology for artificial mineralisation of tailings. New solutions in this area will significantly increase the carbon sequestration capacity of tailings compared to natural mineralisation. Once the technology is implemented across the Company's sites, it will also substantially reduce the carbon footprint of our products.

**Mineralisation of mining waste**

Another promising area for reducing carbon footprint is natural and artificial mineralisation of mining waste.

In natural conditions, tailings are capable of fixing from 4.5 to 17.9 kg of CO<sub>2</sub> per tonne of tailings through chemical reactions subject to the mineral composition of the waste rock. Based on the findings of a natural mineralisation study, we calculated the amount of CO<sub>2</sub> assimilated in 2022 and 2023 (around 300 kt of CO<sub>2</sub>).

In the process of mining, rock is extracted from under the ground and goes to concentrators, where grinding takes place and valuable content is separated