

The background of the slide is a photograph of a city skyline, likely New York City, with various skyscrapers and buildings. In the foreground, a large, white, rectangular antenna or communication tower is mounted on a metal lattice structure. A large, white, stylized arrow graphic points from the top right towards the bottom left, partially obscuring the city view.

NOKIA

Task Force on Climate Related
Financial Disclosure (TCFD) Report 2023

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Forward-looking statements

Certain statements in this report that are not historical facts are forward-looking statements. These forward-looking statements reflect Nokia's current expectations and views of future developments and include statements regarding, among others, expectations, ambitions, plans, benefits or outlook related to our strategies, sustainability and other ESG targets, operational key performance indicators, expectations, plans or benefits related to future performance of our businesses (including the expected impact, timing and duration of potential climate events and of general or regional macroeconomic conditions on our businesses, our supply chain and our customers' businesses); ability to execute, expectations, plans or benefits related to changes in organizational structure and operating model; and any statements preceded by or including "continue", "believe", "commit", "estimate", "expect", "aim", "influence", "will", "target", "likely", "intend", "may", "could", "would" or similar expressions.

These forward-looking statements are subject to a number of risks and uncertainties, many of which are beyond our control, which could cause our actual results to differ materially

from such statements. These statements are based on management's best assumptions and beliefs in light of the information currently available to them. These forward-looking statements are only predictions based upon our current expectations and views of future events and developments and are subject to risks and uncertainties that are difficult to predict because they relate to events and depend on circumstances that will occur in the future. Factors, including risks and uncertainties that could cause these differences, include those risks and uncertainties identified in our 2023 annual report on Form 20-F published on 29 February 2024 under Operating and financial review and prospects—Risk factors and in our other filings or documents furnished with the U.S. Securities and Exchange Commission. Other unknown or unpredictable factors or underlying assumptions subsequently proven to be incorrect could cause actual results to differ materially from those in the forward-looking statements. We do not undertake any obligation to publicly update or revise forward-looking statements, whether as a result of new information, future events or otherwise, except to the extent legally required.





About this report

About this report

This is Nokia Group's inaugural climate-related financial report prepared in accordance with the framework recommended by the Task Force on Climate-related Financial Disclosures (TCFD). The report presents a detailed discussion of our approach to disclosure recommendations of the TCFD framework under the four core elements: climate-related governance, strategy, risk management, and metrics and targets. The scope of the 2023 TCFD report covers Nokia Group.

This report was published in March 2024 and is only available in digital format. The report can be found online. We have published annual corporate responsibility reports since 1999 and the reports are available in digital format

from 2003 to the present in our online [report archive](#). This report can be read in tandem with the other reports which provide more details and reflect our approach to sustainability topics over time.

Our [Sustainability report](#) 'People and Planet report' is prepared in accordance with the GRI Standards. As part of our reporting, we also recognize other sustainability reporting frameworks, such as SASB Standards and the UN Global Compact.

Nokia's sustainability strategy, selected initiatives and ESG risks and opportunities are also discussed in our corporate annual reports, including the annual report on Form 20-F that is filed with the US Securities and Exchange

Commission. The Board review of Nokia's 2023 Annual Accounts by Nokia's Board of Directors includes non-financial information as required by the Finnish Accounting Act implementing the EU Non -Financial Reporting Directive and disclosures required in accordance with the EU Taxonomy Regulation.

Information stated in this report should be read in conjunction with the information provided in our interim reports, annual financial reports, and our sustainability reports as well as with the risk factors and forward-looking statements included in such reports. For more information on our financial results, operations and reporting structure, please visit our [investor site](#).



Governance

Governance

Managing sustainability and climate governance

Climate change falls under the highest level of governance within the Nokia Group. We have a sustainability governance structure and robust processes to effectively engage the Board of Directors (The Board), its committees, the management and working groups in managing climate-related risks and opportunities. This ensures that all material issues across our operating geographies are addressed in line with our strategy, commitments and targets.

The Board oversees the overall sustainability and climate related strategies, and reviews the materiality matrix which includes climate-related topics. Topics related to the progress and performance of the Group's climate

commitments are reviewed regularly as needed. Climate-related topics are also included in the Annual Report and People and Planet Report which are reviewed by the Board.

In line with our mode of operation, the Group Leadership Team approves our sustainability-related strategy, overall targets and operational frameworks, within which corporate functions and business groups can operate. Climate issues are an important part of these strategy, target and framework reviews. Specific climate and circularity topics are reviewed as needed. This governance enables accountable and empowered business groups while maintaining appropriate strategic

and operative oversight. Internal councils and committees, such as the Sustainability council, are used to steer, align and ensure the implementation of these strategies, targets and frameworks and review recommendations to the Group Leadership Team. In 2023, the Sustainability council was managed by the Vice President of Sustainability, who reports to the Chief Corporate Affairs Officer. During the year the council convened 10 times.

In 2023, the short-term incentive plans of our CEO and the Group Leadership Team, included a carbon emission reduction component (Scope 1,2 and 3), commensurate to the member's role. The Scope 1, 2 and 3 carbon

emission reduction targets will also be introduced in the 2024 long-term incentive plans of that group. To our knowledge we are one of the very few companies on the market to include Scope 3 targets in incentive plans. This demonstrates our commitment to deliver our long-term emission reduction goal and to be at the forefront of addressing climate change.

Our overall sustainability governance framework and responsibilities are shown in Figure 1. More information about our corporate governance practices is available in our annual reports and on our [website](#).

Figure 1: Sustainability governance framework and responsibilities

Nokia Board of Directors	<ul style="list-style-type: none">• Approves ESG strategy and evaluates ESG practices, related risks and target setting as well as their implementation and effectiveness.• Specific sustainability topics are reviewed by Board Committees based on their responsibilities, including ESG reporting, materiality assessment, ethics and compliance, cybersecurity, privacy, culture, human capital management and embedding sustainability in our technologies.		
Group Leadership Team	<ul style="list-style-type: none">• Reviews and approves implementation of and changes to sustainability-related policies, management and operational frameworks, strategy, targets and performance, annual sustainability report, and links to rewarding.• Conducts sustainability review and provides feedback minimum 2 times per year and as topic-specific areas require.• CEO, CFO and business group presidents review additional sustainability topics minimum two times per year as part of Nokia business reviews.		
<div>Sustainability Council<ul style="list-style-type: none">• Steers the alignment of sustainability strategy, priorities, and the implementation of sustainability activities across Nokia.• Contributes to the sustainability strategy and materiality assessment, and reviews sustainability targets and performance.• Provides additional insight to sustainability-related risks and opportunities.Members<p>Senior leaders from units representing all Business Groups, Customer Experience, Corporate Affairs, People, Finance, Strategy and Technology, and Legal and Compliance</p><p>Convened ten times in 2023.</p></div>	<div>Donations and Sponsorships Committee<ul style="list-style-type: none">• Sets principles for allocation of corporate donations and investments for universities and communities.• Approves funds for donation allocation an reviews major sponsorships. Assesses the impact of all donation programs.• Assesses the impact of all donation programs.Members<p>Chief Financial Officer, Chief Corporate Affairs Officer, Chief People Officer, Chief Technology Officer, Chief Compliance Officer, VP Head of Customer Experience Finance.</p><p>Convened one time in 2023.</p></div>	<div>Inclusion and Diversity Steering Committee<ul style="list-style-type: none">• Reviews annual inclusion and Diversity (I&D) plans• Sets Nokia-level I&D ambitions and measures impact and targets.• Evaluates business group level I&D actions and provides feedback to business groups.Members<p>Chief Legal Officer, Head of Inclusion & Diversity, other senior leaders from business groups, Human Resources, ESG and legal, and representatives from employee resource groups.</p><p>Convened zero times in 2023.*</p></div>	<div>Human Rights Due Diligence Council<ul style="list-style-type: none">• Governs high-level alignment on Nokia’s Human Rights Policy and implementing procedures.• Steers decisions on Nokia businesses from a human rights point of view.• Ensures alignment between all business groups and functions and appropriate mitigations are put in place.Members<p>Chief Legal Officer, Chief Corporate Affairs Officer, Chief Compliance Officer, VP of Sustainability, VP of Technology Leadership, other senior leaders per need. Head of Human Rights, and Legal Counsel.</p><p>Convened two times for 2023.</p></div>
ESG function	The corporate ESG function drives the implementation of the ESG strategy and actions needed to achieve targets at the operational level. Subject matter experts contribute fact-based input to the different functions and business groups. Ensures corporate sustainability reporting is in line with requirements and regulations.		<div>Ethics and Compliance function</div> <p>Supports employees with training and guidance, fostering ethical decision making and choices that are consistent with our values, policies, and laws. Promotes an open reporting culture and oversees robust and impartial concern reporting, investigation, and remediation processes.</p>

* Due to reorganization the Inclusion and Diversity Steering Committee did not meet during 2023 and the sustainability governance model will be reviewed and updated in 2024.



Strategy

Strategy

First comprehensive risk and opportunity analysis related to climate change

In early 2023, the company set up a TCFD working group with expert representatives from business groups, technology, finance, risk management, sustainability and legal to undertake climate-related analysis, including risk and opportunity identification and a materiality assessment aligned with the TCFD framework. In this assessment we looked at transition risks and opportunities related to our customers, and physical and transition risks related to our own operations and supply chain.

As the basis for the climate scenario assessment undertaken to understand the physical, financial and transition risks and opportunities, we set the following short-, medium-, and long-term planning horizons in the context of climate change.

- **Short term:** to 2026 (up to 3 years). This mirrors our financial planning horizon.
- **Medium term:** to 2030 which is the timeline we use in the context of strategic planning, and reflects the timeline of our current key science-based climate target (SBT) of 50% reduction in our total GHG emissions (Scope 1, 2 & 3) by 2030 (baselined to 2019).
- **Long term:** until 2050 which reflects the common ambition level for net zero emissions across the value chain by no later than 2050 as envisaged in the Paris Agreement.

This report marks the first comprehensive scenario analysis related to climate change beyond traditional emissions calculations and related reduction projections. In our approach to this report, we recognized that our business produces a limited amount of direct emissions in comparison to the high emitting industries (energy, manufacturing, transportation) and our previous experience has shown no material losses from physical climate change events. We therefore concluded that a qualitative analysis without detailed mathematical modeling or future projections would be most appropriate.

¹ SSP stands for Shared Socio-Economic Pathway. SSP3 is one of the five qualitative descriptions of possible different futures based on changes in demographics, human development, economy and lifestyle, policies and institutions, technology, and environment and natural resources. Together with radiative forcing (7.0Wm² in this case) those are used for building future trajectories of greenhouse gas concentrations in the atmosphere and resulting global warming temperatures in the year 2100.

² IPCC, 2022: Climate Change 2022: Mitigation of Climate Change. Working Group III Contribution to the IPCC Sixth Assessment Report (p. 17)

Scenario analysis of climate-related physical risks

We have primarily used the SSP3-7.0 scenario¹ for physical risks assessment, being the current likely worst-case scenario based on IPCC Sixth Assessment Report² considering the climate actions already taken to limit global warming. This scenario projects the global average temperatures to increase by 3.6°C above pre-industrial levels by the end of the century - by 2050 the global warming has reached 2.1°C. Using this scenario, we have aimed at ensuring that we capture all potential material physical risks. However, differences in the global surface temperature between the contrasting scenarios of SSP1-1.9 (the scenario we use primarily in the transition risk and opportunity assessment) and SSP3-7.0 would begin to emerge in around 20 years. Both scenarios land at 1.5°C average global warming temperature in 2030.³

Nokia is a global company with operations today in more than 130 countries. For the purposes of scenario building related to physical risks, we scoped our assessment to major manufacturing, distribution and R&D locations on the assumption that material impacts could only be expected to occur at these locations. Through both interviews and questionnaires, we reviewed climate driven physical risks (extreme heat, heavy rain/snow fall, floods, drought, wildfires, severe storms and tropical cyclones, sea level rise, water scarcity and air pollution) in the selected 50 locations. Relevant climate change-related physical risks we explored using tools such as IPCC WGI Interactive Atlas, Aqueduct Water Risk Atlas, Sea level projection Tool by NASA and assessments published by the IPCC⁴ and the local authorities. Use of these tools comes with the limitation of having to use regional averages. We further explored the business implications of the identified risks and the risk response actions taken with respect to the relevant risks.

Nokia has around 10,000 suppliers around the world. In the supply assessment, we looked at geographical distribution of our key suppliers, related sourcing strategies, and selected a sample of critical suppliers to study their external disclosures related to climate change and risks they have identified. We also conducted assessments regarding our outdoor products and services to conclude how sensitive those may be to climate change.

³ IPCC, 2021: Climate Change 2021: The Physical Science Basis. Working Group I Contribution to the IPCC Sixth Assessment Report (p. 30)

⁴ Intergovernmental Panel on Climate Change (IPCC) is a United Nations body for assessing the science related to climate change. It provides regular assessments on the scientific basis of climate change, its impacts and future risks, and options for adaptation and mitigation.

Identified physical climate change related risks

So far, we have not experienced material business disruptions from climate change related physical risks. However, by 2050, the weather extremes (extremes of heat, duration of heatwaves, precipitation, tropical storms, droughts and flooding in some locations) will increase in frequency and intensity.⁵ Our scenario analysis showed that our operations are most exposed to extreme heat, heavy rain and pluvial flood. We have operations in extreme high water stress areas and in areas where tropical cyclones occur, which in both scenarios are expected to become more intense and more frequent. Heat waves will likely lead to a significant

increase in the consumption of energy to cool laboratories and offices. Floods may disrupt transportation and buildings, causing damage to equipment. Drought may limit hydro-based power generation and our water-based cooling systems. As many companies are moving their data and application to the cloud, data center cooling capacity and potential problems with it would have a direct impact on company operations. These conditions may further ignite the local authorities to control local power and water usage which could be limiting our operating capacity. Severe storms, drought and heavy snow fall may cause power outages, halting manufacturing and R&D work. As storms and cyclones are projected to increase in intensity, those have

the potential to cause significant damage to property and assets inside.

Many of the production sites of our suppliers and partners are geographically concentrated, with a majority of such suppliers and partners based in Asia.⁶ We rely on efficient logistics chain elements, such as regional distribution hubs and transport chain elements (main ports, streets, and airways). In the event that any of these geographic areas are affected by adverse climatic conditions, it can disrupt production or deliveries from our suppliers and partners. We recognize that sometimes local conditions may have a global reach, for instance, when those conditions prevent usage of or shrink capacity in planned transportation routes or methods. One current example of

drought reducing traffic and capacity can be seen in the Panama Canal.

We see no major risk in the design of our products from a pure climate change perspective. We build and test our products according to telecom product standards that address climatic conditions and environmental hazards (heat, cold, rain & wind, dust/air pollution and earthquakes that can be considered in the context of tropical cyclones, hurricanes and typhoons).

Potentially material physical climate related risks linked to our own operations and our supply chain have been identified and summarized in table 1.

Table 1: Key climate-related physical risks identified

Category	Risks	Time horizon	Potential impact on Nokia	Management response
Acute physical risks	Increased severity of extreme weather events disrupting own operations or supply chain.	Risk in mid- to long-term.	Business interruption including power outages, delays in supply, manufacturing & delivery, project execution, or R&D operations. This may impact timing of revenue recognition and increase costs. Such extreme weather events could also potentially damage our properties or other assets increasing costs.	Every function regularly maintains business continuity plans, including preventive maintenance, protective equipment and backup power supply. We also consider such climate related risks in site and location strategies. We have continued to optimize our manufacturing, distribution and supplier network across the regions, including maintaining safety buffers of components. We mitigate the risk of financial damage to own properties and other assets via insurance contracts.
Chronic physical risks	Increase in intensity and frequency of heat waves and drought disrupting own operations or transportation.	Risk to transportation already in short-term. Risk to own operations in mid- to long-term.	Inadequate cooling capacity may lead to downtime in R&D operations and service providers' data centers with loss in work productivity. Unfavorable or unfeasible weather conditions prevent usage of or shrink capacity in planned transportation routes/methods. Such risks could delay our deliveries and increase transportation costs.	Building automation systems monitor and control the heat and humidity conditions. We have on-site water tanks in most sensitive locations to secure cooling for hydro-based systems. Business Groups and IT maintain business continuity plans to address potential downtime in operations. We consider such climate related risks in our site and location strategies. Regionalization of supply helps to reduce the length of the trip the products need to travel.

⁵ IPCC, 2021: Climate Change 2021: The Physical Science Basis. Working Group I Contribution to the IPCC Sixth Assessment Report, Technical Summary (p. 82-84, 122-127)

⁶ Our geographically dispersed manufacturing network consists of both our own manufacturing (18% of the network) and contract manufacturing partners to minimize geographic and geopolitical risks. Our network is strategically located around the world which breaks down by number of sites as: Europe 23%, Asia Pacific, Japan/India 30%, China 35% and the Americas 13%. Each year our spending by location will vary depending on our regional demand and in 2023 our spending was approximately broken down as: Europe 27%, Asia Pacific, Japan/India 42%, Greater China 18% and Americas 13%.

Scenario analysis of transition risks and opportunities

We have used primarily the SSP1-1.9 scenario to identify transition risks and opportunities. This is the only scenario that meets the Paris Agreement’s goal of keeping global warming to around 1.5°C above preindustrial temperatures.⁷ As an EU headquartered company, this scenario determines our regulatory compliance landscape. The European Union is leading the way on climate change action and related regulation and is seen as setting the bar high for other regions with what are considered to be the strictest and most forward-leaning climate and sustainability regulations in the world.⁸

The assessment was done on a qualitative basis. In our assessment we have used the “shifts needed”⁹ to limit warming to 1.5°C, as consolidated and monitored by the Systems Change Lab and to the extent deemed relevant from a pure climate

change perspective, to identify key risks and opportunities while also including our own assessment and understanding of the upcoming regulations. We have used publicly available narratives and information sources, such as the IPCC Scenarios Data Explorer – Our World in Data and the Network for Greening the Financial System’s (NGFS)¹⁰ low emission scenarios (Net Zero 2050 and Low Demand) to explore the risks. We also visited SSP3-7.0 and NGFS’s Fragmented World scenario narratives to determine if any other potentially material risks or opportunities might have been omitted using the lower emission scenarios.

We have grouped the topics and discussions into four perspectives: shifts in technology, customer requirements, supply challenges or opportunities and changes in rules and regulations potentially directly impacting Nokia’s own operations.

Identified risks and opportunities related to the transition to a low carbon economy

Today, energy use is the number one sustainability business topic in product-related discussions with our customers as a significant amount of their operating expenses are spent on their energy bill. Another important aspect is the amount of GHG emissions related to the use of our products and energy reduction roadmaps. In 2023, 97% of our GHG emissions footprint came from our products in use by our customers in their networks (see ‘Metrics and targets’ section, Figure 3). We can impact our footprint by constantly reducing power consumption, increasing energy efficiency, and innovating, for instance, in terms of the silicon, software and hardware we develop. GHG emissions from our own operations account for only 1% of Nokia’s total carbon emissions, but we remain committed to decarbonizing our operational footprint. Decarbonization of power supply and increased availability of renewable energy play an important role in our ambition to minimize our GHG emissions and reach our climate targets. As a result, product energy efficiency and power consumption are the key product related aspects in the context of climate mitigation and can be both a risk and/or an opportunity depending on the competitive market position of our products.

Our focus on energy efficiency will continue going forward. In our assessment we concluded that energy efficiency is an essential component of the low carbon path regardless of the scenario chosen. Increased costs of

carbon-intensive inputs, such as energy and raw materials are likely to drive companies to find savings and improvements in power consumption and operational efficiency through digitalization and connectivity. Global electricity consumption increases in SSP1-1.9 and SSP3-7.0 scenarios.¹¹ The SSP1 narrative depicts “investment in environmental technology and changes in tax structures lead to improved resource efficiency, reducing overall energy and resource use”.¹² The Network for Greening the Financial System (NGFS) says that by 2050 oil prices increase gradually in all of their scenarios, and the price of biomass under the Net Zero 2050 scenario is even higher than the oil price.¹³ The SSP1 under *extended* SSPs for energy sector¹⁴ assumes introduction of “policies supporting energy efficiency improvements” and a gradual transition to a globally uniform carbon price starting from 2020. The EU is taking steps in this direction with the Carbon Border Adjustment Mechanism (2020 is the baseline year for the SSP and NGFS scenarios). Also, under the extended SSP3 scenario, there is a transition to a globally uniform carbon price but only by 2050, while the scenario depicts limits on trade in energy as policies over time become increasingly oriented toward national and regional security issues.

Zooming out, we see where our biggest opportunities with respect to climate change lie. With our customers we deliver solutions

⁷ IPCC, 2021: Climate Change 2021: The Physical Science Basis. Working Group I Contribution to the IPCC Sixth Assessment Report (p. 232)

⁸ European Commission. State of the Union – Leading the green transition, 31 August 2022, https://state-of-the-union.ec.europa.eu/state-union-2022/state-union-achievements/leading-green-transition_en. Accessed March 2024.

⁹ Systems Change Lab. Shifts, <https://systemschangelab.org/shifts>. Accessed February 2024.

¹⁰ NGFS is a group of central banks and supervisors committed to sharing best practices, contributing to the development of climate- and environment-related risk management in the financial sector and mobilizing mainstream finance to support the transition towards a sustainable economy.

¹¹ Global Change Data Lab. Our World in Data - IPCC Scenarios Data Explorer, <https://ourworldindata.org/>. Accessed February 2024.

¹² O’Neill et al (2015) The roads ahead: Narratives for shared socioeconomic pathways describing world futures in the 21st century. Elsevier Ltd. Fig 1.

¹³ Network for Greening the Financial System – Workstream on Scenario Design and Analysis (2023) NGFS Scenarios for central banks and supervisors – November 2023. NGFS.

¹⁴ Bauer et al (2016) Shared Socio-Economic Pathways of the Energy Sector – Quantifying the Narratives. Elsevier Ltd.

that help the world respond to climate change through the more efficient use and reuse of the world's resources, restore productivity growth by bringing digital to the physical industries it has not yet reached, and provide more inclusive access to opportunity – work, healthcare, education and markets. Digital technologies, such as 5G and 6G in the future, Artificial Intelligence and Digital Twins can help accelerate climate action. Those are essential to cutting emissions and in adaptation to climate change. The continuing and potentially broader need for connectivity may open new customer segments and markets.

Climate change may lead to supply shortages. Depletion of raw materials is an increasing risk as global consumption continues to grow. SSP1 scenario assumes improved resource efficiency and reduced resource use overall (in contrast to resource-intensive consumption patterns under SSP3 scenario).¹² However, projections by the OECD point out that in the absence of new policies, the primary materials use globally is projected to roughly double by 2060 from 2017.¹⁵ According to an analysis conducted by Sustainalytics, as the “development and adoption of clean

energy technologies remains central to decarbonization efforts”, specific industries may well experience an elevated risk of raw material shortfalls by 2030.¹⁶ Rapid digitalization, which underlies the SSP1 scenario, will increase the usage of semiconductors. Semiconductors are the bedrock of the modern economy and living on which digitalization will be built. Chip production consumes vast amounts of energy and water which may see scarcity as a result of global warming.

Both scenarios (SSP1 and SSP3) are likely to result in increases in costs for our supply chain and cause cost pressure for us and our customers with the implementation of stringent policies, limitations, standards, required investments and as a domino effect from high-emission industries. With such a broad country footprint as Nokia has today, we see that climate change related actions and maturity vary between different jurisdictions. The amount of climate change related regulation is increasing with, for example, strengthened and expanded carbon accounting and taxation mechanisms around the world, mandates on climate-related

disclosures to promote transparency in markets including enhanced emissions-reporting obligations and policies to improve energy efficiency and move industries rapidly to a low carbon economy. NGFS has concluded that reducing carbon emissions will affect all sectors. The shadow carbon price, which is a proxy for the impact of government policy intensity and change in technology and consumer preferences, is highest in the Net Zero 2050 scenario. By 2050, the largest emitter is the transportation sector, while the industry sector (such as cement, chemicals, non-ferrous metal and steel) is expected to almost eliminate its net GHG emissions.¹³

A rising tide of climate-related litigation has been observed across industries and markets. These include claims against directors or companies for contributing to climate change, situations concerning a company's failure to consider emissions, and cases that accelerate climate actions and complaints against actions perceived as misrepresentations of the environmental performance of products and services.

We have summarized identified transition risks and opportunities in table 2 and 3.

¹⁵ OECD (2019), Global Material Resources Outlook to 2060: Economic Drivers and Environmental Consequences, OECD Publishing, Paris.
https://read.oecd-ilibrary.org/environment/global-material-resources-outlook-to-2060_9789264307452-en#page1

¹⁶ Spanjersberg, M. The Raw Materials Crunch: Industry Risks Due to Physical Scarcity, Supply Concentration and Intense Demand, Sustainalytics, 16 October 2023, <https://www.sustainalytics.com/esg-research/resource/investors-esg-blog/raw-materials-crunch-industry-risks-due-to-scarcity-supply-concentration-and-intense-demand>. Accessed February 2024.

Table 2: Key climate-related transition risks identified

Category	Risks	Time horizon	Potential impact on Nokia	Management response
Technology risk	Competitiveness of our products and solutions in transition to lower carbon networks.	Risk in all time horizons.	Environmental criteria, such as energy efficiency of our products and related improvement plans, are increasingly influencing customer (CSP) vendor selection decisions. Energy efficiency has also a significant impact on our GHG emissions footprint. Product energy efficiency represents both a risk and an opportunity to us . This risk (or opportunity) may impact revenue as well as has business and reputational impact.	<p>Energy efficiency is one of the key areas in our technology and product development. We invest significantly in research and development to continuously improve the energy efficiency of our products and develop new energy efficient solutions.</p> <p>We proactively address changing customer preference through extensive research and innovation on energy efficient solutions.</p> <p>From 2023 onward, we started to collect customer-specific emissions factors from our customers as we believe this could give a better indication of our total Scope 3 category 11 (use of sold products) GHG emissions than just using a GHG Protocol-mandated global emissions factor.</p>
Market risk	Abrupt shifts in energy costs and cost of raw materials.	Risk in mid- to long-term.	Transition to low carbon in supply and transportation potentially driving need for new investments or upgrades, introduction of new standards or limitations to operations, increase in cost of carbon which together with a domino effect from high-emission industries such as mining and chemicals sectors, are potentially resulting into increase in our procurement costs.	<p>We have robust supplier engagement processes to drive resource efficiency and circularity across the value chain.</p> <p>We sustain focus on improving our product cost, and carefully manage customer pricing. In our supply chain, we build resilience through strong partnerships and our regional approach.</p>
Market risk	Constraints on availability of critical minerals and materials.	Risk in the long-term.	<p>Acceleration of digitalization and automation, fueled by the transition to a low carbon economy may lead to depletion of certain critical raw materials and cause semiconductor component shortages as global consumption continues to grow.</p> <p>This could increase costs and decrease availability of materials and components.</p>	<p>We have strong existing circular economy and recycling programs that can help address this risk.</p> <p>We look to increase recycled content in source materials targeting:</p> <ul style="list-style-type: none">• cast aluminum used in mechanical parts to 90%• wrought aluminum, steel and copper alloys, as well as polycarbonate plastics used in mechanical parts targeted to 50%. <p>We work closely with our supply chain towards closing the loop on circular products and materials. We apply design for environment principles from initial design to end-of-life across our product portfolio.</p>
Policy and legal risk	Increased compliance costs and legal risks due to emerging policies and regulations.	Risk in short- to mid-term.	Strict corporate emissions and substance reporting requirements, strengthened and expanded carbon pricing mechanisms/systems, fragmentation of such frameworks, and increased likelihood of related compliance risks may all increase costs and negatively impact our reputation.	We engage with policy and standard making bodies and actively follow regulatory developments to understand the likelihood and impact of actions and policies, and to prepare for implementation of new regulations or standards.

Table 3: Key climate-related opportunities identified

Category	Opportunity	Time horizon	Potential impact on Nokia	Management response
Energy source	Increased availability of renewable energy.	Opportunity in all time horizons.	Decarbonization of power supply across our value chain reduces our GHG emissions footprint and takes us towards reaching our climate targets.	We are committed to using 100 percent renewable electricity in our own facilities by 2025. We are working with our value chain to transition to renewables as countries decarbonize their electricity grids.
Products and services	Development of lower emission, energy and resource efficient products and technologies.	Opportunity in all time horizons.	The energy efficiency of our products and new innovation in silicon, software, hardware and services can have significant impact on our product competitiveness and GHG emissions footprint.	We invest significantly in research and development to continuously improve the energy efficiency of our products and develop new energy efficient solutions. Nokia's strategy to turn its ESG strengths into a competitive advantage for the business, driving value creation and new revenue streams, was advanced this year by new product launches giving customers improved energy efficiency. As the volume of network traffic rises in a more connected, digitalized world, we work on separating this growth in traffic from an equivalent growth in energy consumption. We proactively address changing customer preference through extensive research and innovation on energy efficient solutions.
Markets	Digitalization of other industries.	Opportunity already in short-term.	Nokia's solutions enable other industries to transition to a low carbon economy. The continuing and potentially broader need for connectivity may drive revenue growth and open new revenue streams through new customer segments and markets. Digital technologies such as 5G and 6G, AI and Digital Twins can help accelerate climate action - those are essential in cutting emissions and in adaptation to climate change.	As part of our strategy, we provide low-latency connectivity, private wireless networks, new IP routing and optical solutions, sensors, and AI/ML as the basis of the decarbonization through digitalization (Green Digital) proposition in our enterprise portfolio. We are working within our ecosystem to identify methodologies that better measure the enablement effect and articulate the business case for transformation to accelerate and scale adoption. We work with a growing range of enterprise partners to reduce emissions and improve productivity. We collaborate with companies working on a variety of smart technologies, cloud-based technologies, and automation. We are considered the leading vendor of private wireless to enterprises, with over 710 private wireless customers by the end of 2023.
Resource efficiency	Efficient resource use and circular practices.	Opportunity in mid-term.	Circular products & services including refurbishments and design to use recycled material content in our products (such as aluminum) provides us business opportunities and helps us to mitigate risks related to virgin raw material scarcity.	We actively engage across our value chain and work with our suppliers to raise the standards in our ecosystem in key ESG areas like climate and circularity. We focus on opportunities to promote hardware circularity by managing the sourcing and reuse of key source materials. We build on our existing waste processes and circular products and services offering, proactively increasing the takeback of products from customer modernization projects and end-of-life equipment and increasing the availability and sales of refurbished products. We also look to increase the use of recycled materials in our products, augmenting the inclusion of recycled plastics, steel, copper, nickel and aluminum in our product design. We apply design for environment principles from initial design to end-of-life across our product portfolio.
Resilience	Development of adaptive capacity to respond to climate change.	Opportunity in all time horizons.	For us, climate resilience and response to climate change involve energy efficiency, circularity, product resiliency and new solutions as described above.	We drive continuous energy efficiency improvement and circularity. We innovate and develop new climate related solutions which help us and our customers to mitigate or adapt to climate change. We also engage in policy advocacy and standards setting activities in this regard. We take into account extreme weather conditions such as heat, cold and moisture in the development and testing of our products.

Climate change impact on our business and strategy – our climate action journey

Climate change has been a major topic for Nokia Group for more than a decade and as such we have worked consistently to develop and refine our approach to understanding and tackling the risks and opportunities that climate change presents to our business. Equipped with this knowledge, we have been able to make informed business decisions, set goals and targets, and focus on critical climate actions over the years.

Our approach to sustainability, including key aspects of climate change, is built upon our company's purpose – to create technology that helps the world act together. ESG represents the sixth pillar of our corporate strategy.

Nokia's sustainability strategy aims to ensure we maximize our impact in the ESG areas most important to our company. For climate, we look to be the leader in energy efficiency in silicon, software, and systems, providing the networks and operational skills to scale smart energy solutions. We also intend to accelerate our first mover ambition in energy efficiency in 5G-Advanced and 6G through early engagement in standardization and ecosystem development. For circularity, we focus on opportunities to promote hardware circularity and manage the sourcing and reuse of key source materials. Please refer to our [People and Planet 2023 report](#) for further information.

Sustainability topics are integral to our Technology Vision and Strategy 2030 and are reflected in how we operate and the business decisions we take. Nokia Bell Labs, our renowned research arm, looks to help solve the future needs of humanity through technological innovation.

Decarbonization
of our entire
value chain by
2040

Accelerating our net zero ambition

In 2023, we collaborated with the Carbon Trust to investigate how to accelerate our net zero ambition and the related pathway and levers. In February 2024, Nokia announced that it is committed to reducing its total global greenhouse gas emissions (GHG) to net zero across the value chain (Scopes 1, 2 and 3) by 2040, accelerating its previous target by ten years, and putting it ahead of the Paris Agreement target of net zero by 2050. Nokia will also accelerate its existing near-term, or 2030, target. The plan was approved by the Nokia Group Leadership team.

Nokia has defined a net-zero pathway that will help it reduce emissions across its value chain. Key levers in the net-zero pathway include:

- **Product design and innovation:** With more than 95 percent of emissions resulting from products in use in our customers' networks, Nokia continues to improve the energy efficiency of its products and solutions.
- **Low-carbon electricity:** Nokia is committed to using 100 percent renewable electricity in its own facilities by 2025 and is working with its supply chain as it transitions to renewables.
- **Energy and material efficiency:** Nokia aims to achieve 95 percent circularity by 2030 in relation to operational waste (waste from offices, labs, manufacturing, installation, and product takeback), driving actions to reduce landfilling.
- **Carbon removals:** Credible, permanent carbon removals and storage may be required to neutralize some residual emissions to reach net zero. Nokia is examining credible solutions for carbon removals to support long-term net-zero targets.

Nokia is one of the few telecommunications vendors with its own fleet of marine vessels, playing a vital role in laying the cables that connect continents. With marine fleets globally still largely reliant on fossil fuels, this presents a unique challenge for decarbonizing Nokia's Scope 1 emissions. Nokia is targeting marine fleet emission reductions aligned with the International Maritime Organization decarbonization pathway and has already invested in more efficient vessels and trialed the use of biofuels to reduce emissions.

Impact on financial planning

Most of our emissions result from sold products when in use by our customers in relation to the energy use, and energy efficiency is one of the key factors in product competitiveness. Hence, the energy efficiency of our products and solutions continues to be one of the key areas in our technology development. In 2023, Nokia invested EUR 4 327 million in research and development (R&D). Energy efficiency is integrated into overall product development, and costs and investments to improve energy efficiency of our product portfolio are not tracked separately nor can it be separated as these are an integral part of Nokia's technology and R&D investments.

We also continue to invest in reducing GHG emissions in our own operations. However, these investments are not considered financially material in terms of overall investment.

As stated earlier, we are examining credible solutions for carbon removal to support long-term net-zero targets. The future financial impact of such solutions depends significantly on technology development, maturity of credible carbon removal markets and carbon pricing fluctuation.

Many of the risk response actions discussed above in the section 'Strategy' are business-as-usual activities. We have not identified other climate-related operating expenses nor capital expenditures such as restructurings, write downs or impairment of assets due to climate change which would potentially have a material impact on financial planning. We also do not foresee material risks related to access to capital.

Resilience

Supply, manufacturing and distribution

As we further develop a robust and sustainable supply chain that can best serve our customers, maintaining focus on resilience is critical. We continuously optimize our manufacturing, distribution and supplier network across the regions in which we operate to better serve our customers. We also further leverage artificial intelligence and machine learning capabilities to better develop our supply chain and factory network. Our regional approach will not only enable us to deliver a more rapid response to our customers' needs, but also reduce transportation costs and carbon emissions.

Technology

We are confident that there is a need for connectivity and that our purpose and strategy remain intact regardless of the scenario pathway chosen. Information and communication technology and systems are essential to build resilience and to cope with climate change. Digitalization and enhanced connectivity transform the way people communicate, work and live their daily lives. Our technology enables industries and cities to digitalize and automate, driving efficiency and productivity gains while enabling potential reductions in emissions and the use of resources. It supports improved worker safety and more secure, inclusive and safer communities. All of this is embedded in Nokia Technology Strategy 2030. Nokia Group's climate strategy, ambition and action plans address energy efficiency and circularity and are therefore at the center of climate-related risks and opportunities. The need for connectivity remains. Hence the network is critical to realize the enormous potential that emerging innovations and technologies such as AI, the metaverse and the cloud provide to communication service providers, industrials, enterprises and consumers as we approach 2030, including the contribution to mitigating climate change.

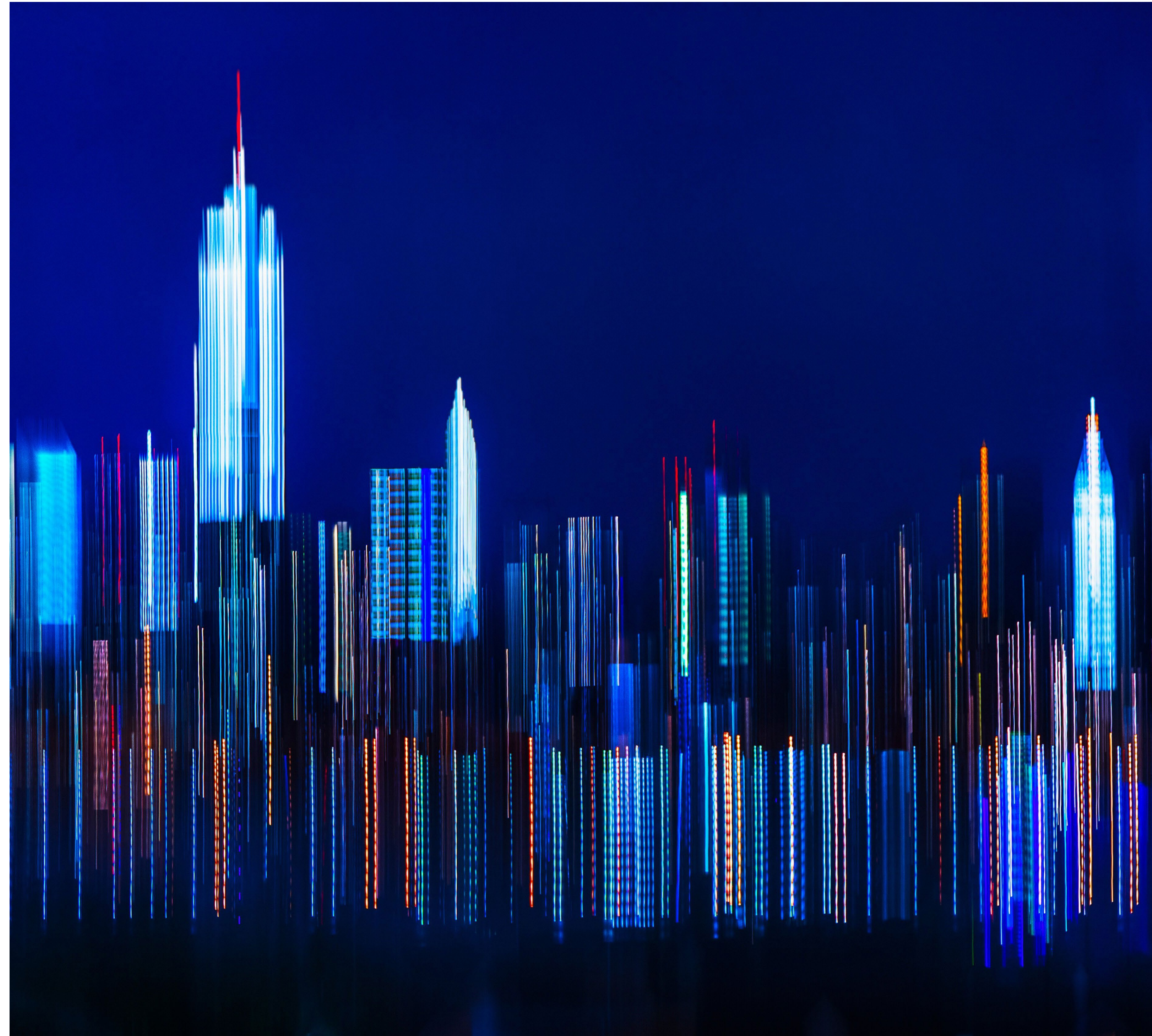


Risk management

Risk management

Nokia enterprise risk management's (ERM) purpose is to ensure that a systematic risk and opportunity analysis is embedded into financial planning, strategy creation and operative business management as well as in key decision-making. ERM is aligned to the overall Nokia governance model, where Nokia's businesses are accountable for meeting approved plans and targets as agreed within Nokia and it covers strategic, operational, financial, compliance, and hazard risks, including potential reputational consequences. Key risks and opportunities are analyzed, managed and monitored as part of business performance management.

Climate-related risks and opportunities are embedded within our ERM framework. We recognize and aim to mitigate the potential risks and negative impacts associated with our business whether related to technology, supply chains, climate, or people, while also driving opportunities within and beyond our business to contribute to achieving the UN SDGs.



Identifying, assessing and managing climate-related risks

The principles documented in the Nokia Enterprise Risk Management Policy, which is approved by the Audit Committee of the Board, require risk management and its elements to be integrated into key processes.

Our technology-related risks and opportunities are managed in the global network of R&D centers within Business Groups, each with specialities and ecosystems built around both competencies and technologies. Most of our near- to mid-term R&D is conducted within the business groups' structures. Beyond the R&D of our business groups, Nokia's dedicated Strategy and Technology (S&T) organization is focused on longer-term technology cycles. S&T is responsible for formulating a coherent corporate strategy and establishing a technology and architecture vision across the company. It also oversees the implementation of this vision in partnership with Nokia's business groups. Many of the fundamental technologies that are used in 5G standards were invented at Nokia and Nokia continues to be at the forefront of 6G research. Nokia Bell Labs is also at the forefront of non-traditional network research with a focus on AI and machine learning that is needed for future advanced communication capabilities.

The global ESG and legal teams monitor regulatory developments in key jurisdictions (e.g., EU and US) related to, for example corporate emissions and substance reporting

requirements, industrial policy measures (e.g. targeted use of subsidies), policies to improve energy efficiency and to increase natural sequestration, expansion of emission trading systems and carbon taxes. The teams together with the subject matter experts, raise identified significant risks, impacts and potential shortfalls for the attention of the Sustainability Council. Also, the Nokia sustainability research and standardization team participates in standards-setting activities within organizations and industry groups particularly on topics related to energy efficiency of telecommunications networks, the circularity of telecommunications products, responsible use of AI, responsible supply chain management, science-based emission reduction targets, radio spectrum allocation and other regulatory aspects.

The corporate ESG function is responsible for Nokia sustainability strategy. Together with the Business Group representatives, the ESG team develops and gains approval for a coordinated Nokia level risk response strategy and related target setting. This central team drives the implementation of the sustainability strategy and actions needed to achieve targets, such as the GHG emissions reduction targets, at the operational level. Subject matter experts contribute fact-based input to the different functions and business groups. The sustainability team also maintains key

principles, policies and governance frameworks related to key sustainability focus areas. The Chief Corporate Affairs Officer keeps the Group level leadership team and the Board updated on our performance against the sustainability strategy.

The Business Groups and relevant corporate functions are responsible for embedding the objectives set out in our sustainability strategy into their planning and operations. Detailed action planning and execution, such as related to products and services energy efficiency, circularity, or business continuity management, is within the responsibility of the Business Groups. During 2023 in sourcing and manufacturing, we developed our risk management capabilities supported by increased digitalization and automation to navigate the rapidly changing business environment. Inventories and safety buffers were largely kept upstream on a component level, increasing the flexibility to react to any potential short-term product type changes.

We have a consolidated global approach for business continuity. We maintain business continuity plans to ensure that products, services and solutions continue to be delivered at acceptable levels during a significant disruption to operations. Business continuity management includes, for example, response plans for IT outages, loss of building, people and disruption to supply, all relevant with

respect to climate change. Our insurance contracts include coverage for damage to properties or other assets.

Under our ERM process, we run annually a more comprehensive risk and opportunity update. Each function makes an assessment of their key risks and opportunities, including rating the risks against ERM risk impact rating scheme (impact to operations, strategy, people and environment, financials, reputation and compliance) to understand, what are potentially material matters to Nokia. This assessment is inter-related with the impact assessment which is specific to sustainability related risks and opportunities. Our global Environmental Management System provides the tools to analyze our most significant environmental impact on an annual basis and to systematically track progress on selected focus areas. The Business Groups and relevant corporate functions, in their day-to-day operations, are responsible for monitoring the effectiveness of risk and opportunity responses and taking corrective actions. In addition, any newly identified potentially material or cross-functional issues are raised to Group level leadership team, typically including relevant proposals from the Sustainability Council. This discussion and related decision making is not tied to any specific time intervals but done on a needs basis.

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Metrics and targets

Metrics and targets

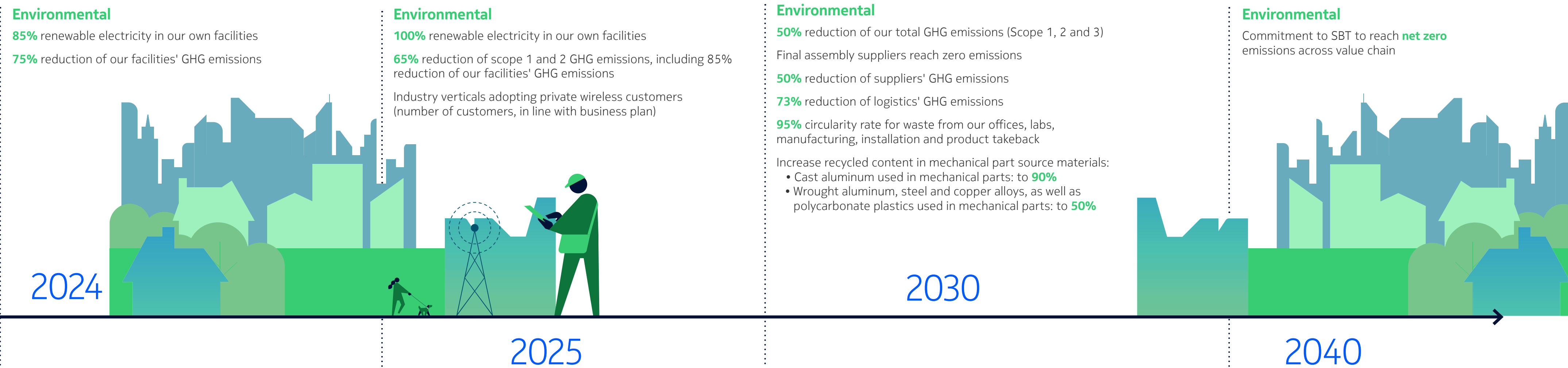
The TCFD framework forms the basis for our disclosure of any material climate related drivers and impacts on Nokia Group. We disclose a range of targets and metrics to give our stakeholders a better understanding of our efforts and progress in managing our key climate-related impacts, risks and opportunities.

We set short-, medium- and long-term environment and climate related targets (see figure 2).

More information on the initiatives that have contributed to our performance across these areas and other environmental metrics can be found in our People and Planet 2023 report and earlier reports available in [our archive](#).

Figure 2: Our climate action journey towards net-zero by 2040

Our ESG targets in 2024



Climate related targets

Our current climate strategy and targets have been developed and aligned with internationally recognized frameworks such as Science Based Targets initiative (SBTi) and the Paris Agreement. We recognize the importance of communicating how we manage our climate-related risks and opportunities to maintain stakeholder trust and confidence.

Nokia was the first telecoms vendor to set its science-based target (SBT) in 2017 using the ‘no greater than 2°C’ warming scenario. Our climate targets were then recalibrated in line with limiting global warming to 1.5°C and we committed to reduce our Scope 1, 2 and 3 GHG emissions by 50% by 2030 with a 2019 baseline. The target was accepted by the Science Based Targets initiative in 2021.

Our current 2030 science-based target covers the following activities:

- **Scope 1:** emissions from our facilities, car fleet and marine fleet own vessels
- **Scope 2:** market-based emissions from purchased energy
- **Scope 3:** emissions from the customer use of sold products (covering almost 100% of our current portfolio) and emissions from the logistics, the final assembly factories in our supply chain, and the marine fleet chartered vessels

In 2024, we announced our commitment to a new net zero target for 2040 across our value chain (Scopes 1, 2 and 3) as well as accelerating our existing interim 2030 SBT, including the complete decarbonization of our car fleet and facilities. Nokia has a marine fleet, responsible for subsea cable network implementation connecting continents and countries globally. The marine fleet represents 63% of our Scope 1 emissions in 2023 with specific challenges related to energy use at sea and at shore. We have defined long-term actions and pathways for the decarbonization of our entire value chain by 2040.

We have also submitted our net-zero letter of commitment to the Science Based Targets initiative, demonstrating our commitment to such targets and to proactively address climate-related risks. We have other short-, medium- and long-term targets in specific areas of our operations and the value chain to drive concrete actions that support and accelerate the achievement of the target.

The status of our climate targets at the end of 2023 is shown in table 4 on the next page.

50%

Reduction of
our total GHG
emissions by 2030

(Scope 1, 2 and 3)

73%

Reduction of
logistics' GHG
emissions by 2030

Nokia aims
to achieve

95%

circularity by 2030

Net zero

by

2040

Table 4: Progress of environmental targets in 2023

Focus area	Target year	Base year	Target	2023 results	Target status
Environment					
Climate	2030	2019	Our science-based target (SBT) ¹ : Reduce our greenhouse gas (GHG) emissions across our value chain (Scope 1, 2 and 3) by 50% between 2019 and 2030, and reach net zero by 2050.	Emissions covered by our SBT were 34 319 800 tons CO ₂ e ² , which is a 9% decrease from 2022. Despite this decrease, our current SBT emissions are now at the same level as the 2019 baseline year. This means that the 2030 SBT is still not on track with a linear reduction trajectory. While we continue to accelerate innovations in product energy efficiency and supplier collaboration, the availability and take-up of renewable energy by Nokia's customers must rapidly increase to support the achievement of the interim target.	⬅ Not on track
	2030	2019	Our final assembly suppliers reach zero emissions by 2030.	Our final assembly suppliers' emissions were 38 500 tons CO ₂ e which is a 49% reduction from 2019.	➡ On track
	2030	2019	Our suppliers ³ reduce GHG emissions by 50% by 2030.	Our suppliers' emissions were 540 500 tons CO ₂ e which is a 82% reduction from 2019. However, as this includes emissions data from hundreds of suppliers and the quality of allocated emissions data has been of concern, we are conscious that some of the reductions may be due to the quality of the data reported.	➡ On track
	2030	2019	Our logistics' GHG emissions reduced by 73% by 2030.	Our logistics' emissions were 140 900 tons CO ₂ e which is a 54% decrease from 2019.	➡ On track
	2025	2019	GHG emission reduction of 65% from scope 1 and 2 market-based emissions, including 85% reduction of our facilities' GHG emissions compared to 2019.	GHG reduction of 56% from scope 1 and 2 (facilities, car fleet, marine fleet), including 69% reduction of our facilities' GHG emissions compared to 2019.	➡ On track
	2025	N/A	Use 100% renewable electricity in our own facilities.	75% of electricity was renewable in our own facilities.	➡ On track
	2023	2019	50% reduction of average power consumption of 5G mMIMO Base Station by 2023 from 2019 baseline.	In Mobile Networks, we delivered first Habrok massive MIMO radios and in 2023, Nokia's AirScale 5G massive MIMO BTS power consumption has been reduced by 50% compared to 2019. This is enabled by continuous improvements in software functionalities, and new 5G products based on latest generation Nokia ReefShark SoCs.	✅ Achieved
	2023	N/A	Reach 75% renewable electricity in our own facilities.	Reached 75% renewable electricity in our own facilities.	✅ Achieved
	2023	2019	Reach 65% reduction of our facilities' GHG emissions compared to 2019.	Reached 69% reduction of our facilities' GHG emissions.	✅ Achieved
Circularity	2030	2019	95% circularity rate for waste from our offices, labs, manufacturing, installation and product takeback by 2030.	We have recognized areas where high circularity rate has already been achieved and also areas requiring further action. There are still data gaps to be closed but data accuracy has increased. Annual waste circularity outcome for 2023 was 86%.	➡ On track
	2030	N/A	Increase recycled content in mechanical part source materials: <ul style="list-style-type: none">• Cast aluminum used in mechanical parts: to 90%.• Wrought aluminum, steel and copper alloys, as well as polycarbonate plastics used in mechanical parts: to 50%.	We continued awareness raising and data collection on recycled materials. In 2023, we reached data collection levels of 43% cast aluminum, 10% wrought aluminum, 7% low alloy steel, 13% stainless steel and 3% on copper alloys.	➡ On track

Notes

1 The current SBT covers the following activities: Scope 1: emissions from our facilities, car fleet and marine fleet own vessels. Scope 2: market-based emissions from purchased energy. Scope 3: emissions from the customer use of sold products (covering almost 100% of our current portfolio) and emissions from the logistics, final assembly factories in our supply chain, and marine fleet chartered vessels.

2 CO₂e = carbon dioxide equivalents.

3 Refers to our material suppliers.

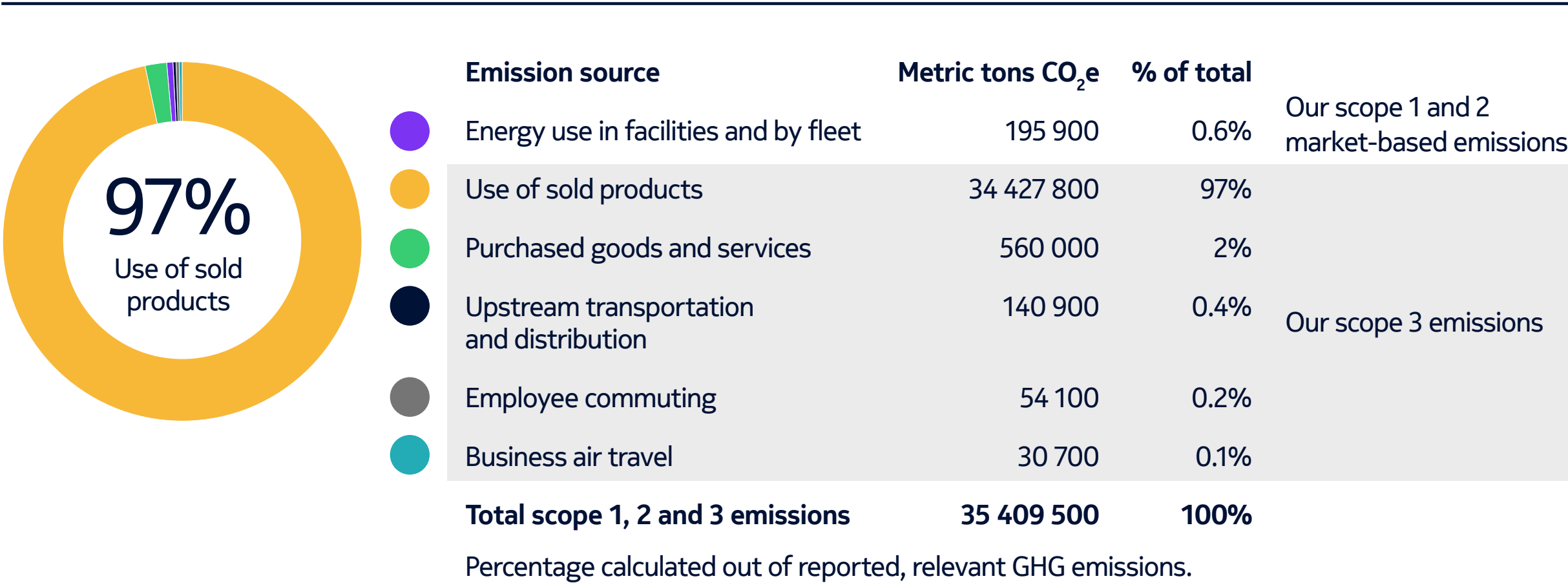
Climate related metrics

Nokia reports its scope 1, 2 and 3 GHG emissions annually. As depicted in figure 3, Nokia’s total CO₂e emissions from scope 1, 2 and 3 during 2023 were 35 409 500 tons CO₂e. From this total amount, scope 1 emissions were 111 100 tons CO₂e, scope 2 market-based emissions were 84 800 tons CO₂e and scope 3 emissions totaled 35 213 600 tons CO₂e. The scope of our SBT covers 34 319 800 tons CO₂e, which is 97% of our total 2023 emissions. Read more about the SBTi and the criteria for SBTs [here](#).

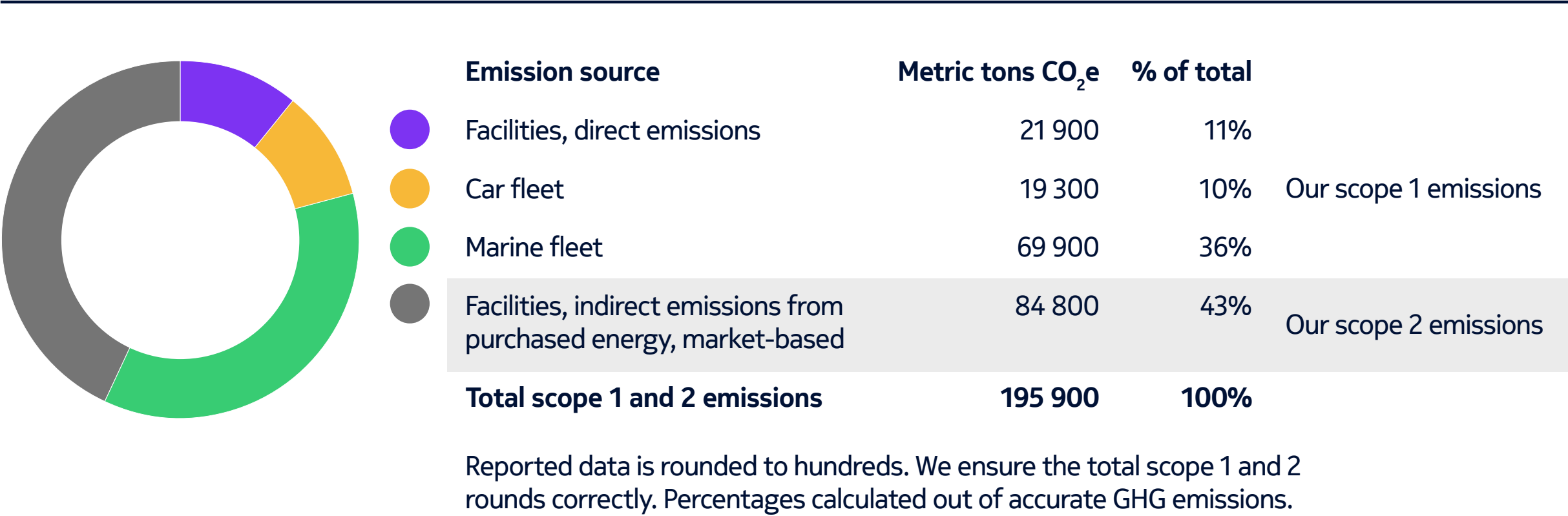


Figure 3: Our carbon footprint

Our carbon footprint (Scope 1, 2 and 3)



Our carbon footprint (Scope 1 and 2)



Tables 5, 6 and 7 present our GHG emissions achievements since 2019 (baseline).

More information about the metrics for GHG emissions including the data reporting principles, are available in our [People & Planet 2023 report](#).

Table 5: Nokia Group’s scope 1 GHG emissions from 2019 baseline

	2019	2020	2021	2022	2023	Year-on-year change 2022-2023	2023 data assured
Greenhouse Gas Emissions (metric tons CO₂e)							
Total GHG Scope 1 (Direct emissions from facilities and mobile sources)	117 300	96 500	101 100	103 500	111 100	7%	●
GHGs from fuel combustion in facilities (stationary and mobile sources)	20 800	19 500	18 400	23 700	21 600	-9%	●
Hydro-Fluoro-Carbon (HFC) refrigerants in facilities	300	600	400	600	400	-42%	●
Car fleet	29 600	21 000	24 400	22 400	19 300	-14%	●
Marine fleet, own vessels	66 600	55 300	57 900	56 800	69 900	23%	●

Table 6: Nokia Group’s scope 2 GHG emissions from 2019 baseline

	2019	2020	2021	2022	2023	Year-on-year change 2022-2023	2023 data assured
Greenhouse Gas Emissions (metric tons CO₂e)							
GHG Scope 2 (Indirect emissions from purchased electricity, cooling and heating), Market-based	327 200	263 600	224 500	135 300	84 800	-37%	●
Purchased electricity	311 300	245 900	207 900	122 100	71 800	-41%	●
Purchased cooling	8 200	10 900	8 900	8 600	8 400	-2%	●
Purchased heating	7 700	6 800	7 600	4 700	4 600	-1%	●
GHG Scope 2 (Indirect emissions from purchased electricity, cooling and heating), Location-based	421 900	380 200	377 300	354 800	322 300	-9%	●
Purchased electricity	406 000	362 500	360 800	339 800	307 700	-9%	●
Purchased cooling	8 200	10 900	8 900	8 600	8 400	-2%	●
Purchased heating	7 700	6 800	7 600	6 400	6 300	-2%	●
Total Scope 1 and 2 GHG emissions, Market-based	444 500	360 100	325 500	238 900	195 900	-18%	●
Total Scope 1 and 2 GHG emissions, Location-based	539 200	476 700	478 400	485 300	433 500	-5%	●

Note:
GHG emissions data presented in rounded numbers. The totals are calculated from exact data, and we ensure the totals are rounded correctly.

Table 7: Nokia Group’s scope 3 GHG emissions from 2019 baseline

	2019	2020	2021	2022	2023	Year-on-year change 2022-2023	2023 data assured
Greenhouse Gas Emissions (metric tons CO ₂ e)							
GHG Scope 3, Indirect emissions	39 279 800	35 614 900	40 659 700	39 476 400	35 213 600	-11%	
Category 1, Purchased goods and services	3 070 700	2 507 300	1 596 600	705 900	560 000	-21%	●
Category 2, Capital goods	417 000	380 300	455 200	444 800	Not reported	Not applicable	
Category 4, Upstream transportation and distribution	303 600	255 200	326 100	329 800	140 900	-57%	●
Category 6, Business air travel	71 700	13 300	5 600	26 700	30 700	15%	
Category 7, Employee commuting	110 900	39 000	17 200	50 100	54 100	8%	
Category 11, Use of sold products (with global average factor)	35 310 000	32 420 000	38 259 000	37 919 200	34 427 800	-9%	●
Category 11, Use of sold products (with usage specific factors)	Not reported	Not reported	Not reported	Not reported	33 691 400	Not applicable	●
Total Scope 1, 2 and 3 GHG emissions, Market-based	39 724 300	35 975 000	40 985 200	39 715 300	35 409 500	-11%	
Total Scope 1, 2 and 3 GHG emissions, Location-based	39 819 000	36 091 600	41 138 100	39 934 700	35 647 000	-11%	

Note:
GHG emissions data presented in rounded numbers. The totals are calculated from exact data, and we ensure the totals are rounded correctly.

The background features a series of overlapping geometric shapes. A large, light green parallelogram is positioned on the left. To its right is a darker green parallelogram. Further right is a large, light green trapezoid. The top-left corner of the image is a solid purple rectangle. The text "Summary and way forward" is written in white, sans-serif font, centered within the dark green parallelogram.

Summary and
way forward

Summary and way forward

This report marks the first comprehensive TCFD report for Nokia Group where all aspects of the four core elements are disclosed. Completing our climate risk analysis for both physical and transition risks on an organization-wide basis allows us to take two key actions. Firstly, we can identify areas of focus to further mitigate the material risks, and secondly, take advantage of the opportunities to offer our solutions to support a low carbon transition.

We continue to review and update our climate progress annually and deliver on our accelerated net zero targets. We plan to carry out further financial risk modelling on the identified risks while also enabling deeper integration of climate risk assessment and management into our overall risk management framework. Internally, we will develop climate knowledge and awareness at all levels of the company and externally, engage with value chain stakeholders on climate-related risks and opportunities. Given the rapidly changing reporting landscape, we continue to actively monitor developments in reporting regulations globally.



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NOKIA

About Nokia

At Nokia, we create technology that helps the world act together.

As a B2B technology innovation leader, we are pioneering networks that sense, think and act by leveraging our work across mobile, fixed and cloud networks. In addition, we create value with intellectual property and long-term research, led by the award-winning Nokia Bell Labs.

Service providers, enterprises and partners worldwide trust Nokia to deliver secure, reliable and sustainable networks today – and work with us to create the digital services and applications of the future.

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