

Ensuring the positive coexisting of nature and humanity

The NTT Group is contributing to solving environmental issues as well as achieving economic growth.



message

Message from Management
(Senior Executive Vice President)



Akira Shimada

Representative Member of the Board
(Senior Executive Vice President)

Addressing environment problems with “NTT Green Innovation toward 2040”

Climate change and other environmental issues are increasing in severity year by year, and are leaving a greater social and economic impact as natural disasters become more extensive on a global scale. The NTT Group views resolving issues like climate change as one of its key corporate activities in its goal of building a sustainable society, and implements various initiatives in line with its “Your Valued Partner” management philosophy.

In September 2021, we unveiled our new environment and energy vision, “NTT Green Innovation toward 2040” aimed at achieving zero environmental impact while continuing economic growth, by reducing the environmental impact of our business activities and creating breakthrough innovation. This vision was designed so that the NTT Group is able to achieve carbon neutrality in fiscal 2040, ten years before the 2050 goal for carbon neutrality set by the Japanese government. As interim milestones, we are aiming to reduce greenhouse gas emissions by 80% from fiscal 2013 levels by fiscal 2030, as well as achieve carbon neutrality for our mobility communications (NTT DOCOMO) and data center businesses—two areas in particular where electricity usage is expected to rise—by fiscal 2030.

More specifically, rolling out our “IOWN (Innovative Optical and Wireless Network) Concept” will help us to significantly reduce power consumption throughout networks and other infrastructure, resulting in a 45% reduction in greenhouse gas emissions by fiscal 2040. This will be in conjunction with better energy-saving efforts to cut emissions by a further 10%. We will be slashing greenhouse gas emissions by another 45% by fiscal 2040 through greater use of renewable energy sources.

We are also placing a greater emphasis on green financing initiatives as a means of achieving a sustainable society, by issuing green bonds of around 300 billion yen for the year applicable to 5G-related investments, FTTH-related investments, and research and development toward building the IOWN concept.

Contributing to the Reduction of Society’s Environmental Impact

In addition to reducing our own impact on the environment, NTT is working on initiatives aimed at reducing the environmental impact of society as a whole. One way to achieve this is with the IOWN concept, which promises to slash electricity consumption. By working to increase uptake and scope of applications in not just the communications but also other industrial sectors such as computers, we are aiming to help cut greenhouse gas emissions throughout Japan by 4% by fiscal 2040 (and a 2% reduction on a global level). In May 2020, NTT became the first private company in Japan to conclude a comprehensive collaboration agreement with the International Thermonuclear Experimental Reactor (ITER) Project, where we will support the successful development of nuclear fusion reactors—the most promising power source of the future—by providing IOWN’s ultra-low-latency, high-speed, high-capacity network and digital twin computing. We established “NTT Space Environment and Energy Laboratories” in July 2020 to conduct research into the regeneration of the global environment and development of a sustainable society. In addition to these developments, NTT DOCOMO will also begin offering consumers green energy plans, with “docomo Denki” kicking off from March 2022. Initiatives like these illustrate just some of the ways that the NTT Group is helping to alleviate the impact that society as a whole has on the environment.

Efforts for climate change-related information disclosure

Ensuring disclosure and transparency to society is vital. In May 2020, NTT declared its support for the Task Force on Climate-related Financial Disclosures, or TFCF, which is a framework encouraging companies to disclose information related to their climate change initiatives so investors can make sound investment decisions, in line with the target of keeping global temperatures to well below 2°C above pre-industrial levels as stipulated under the 2015 Paris Agreement. NTT discloses information related to climate change, while improvements to ensure that its own growth strategies remain sustainable. In conjunction with the Environment and Energy Vision “NTT Green Innovation toward 2040” that we have developed, we also raised NTT Group’s fiscal 2030 greenhouse gas emissions reduction target from the “well-below 2°C level” of Science Based Targets (SBT) (approved in 2020) to the “1.5°C level,” a move that was approved by SBT in December 2021. The NTT Group will continue to set more challenging targets as part of its initiatives for tackling climate change.

Greater awareness by each and every employee

Reducing society’s impact on the environment calls for a major shift in attitude, from traditional business activities involving the consumption of resources and energy, to decarbonized and circular business activities. Moving to such decarbonized and circular businesses processes will only be possible when both employees and management team alike have a thorough understanding of the vision we have developed, and employees take autonomous and independent action accordingly. Moving forward, employees and management will be working together as a single team to help develop a decarbonized and circular society.



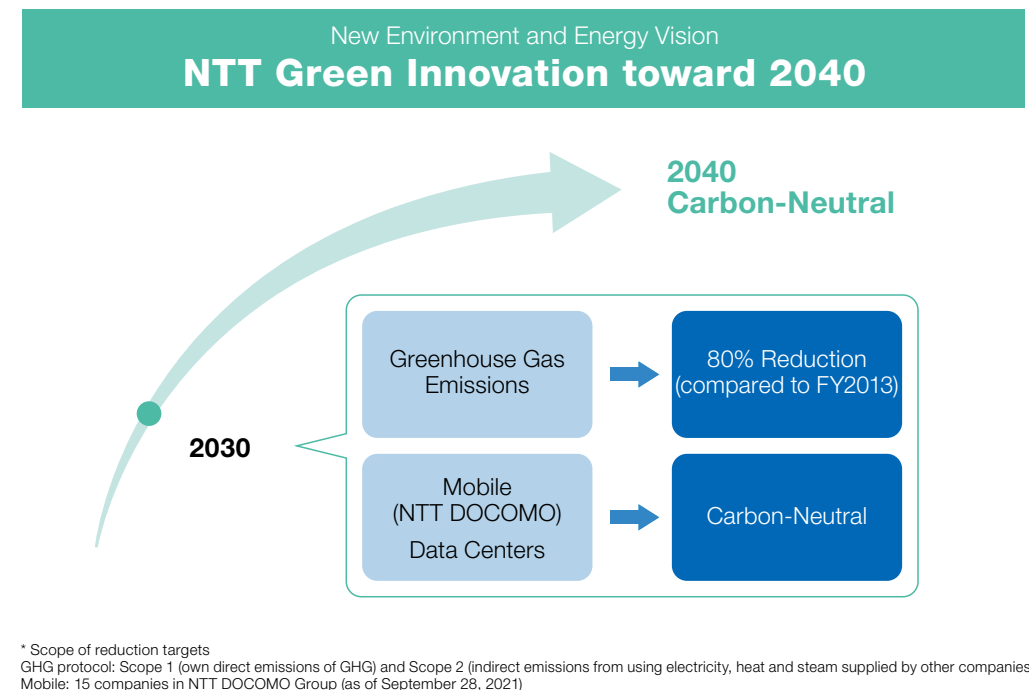
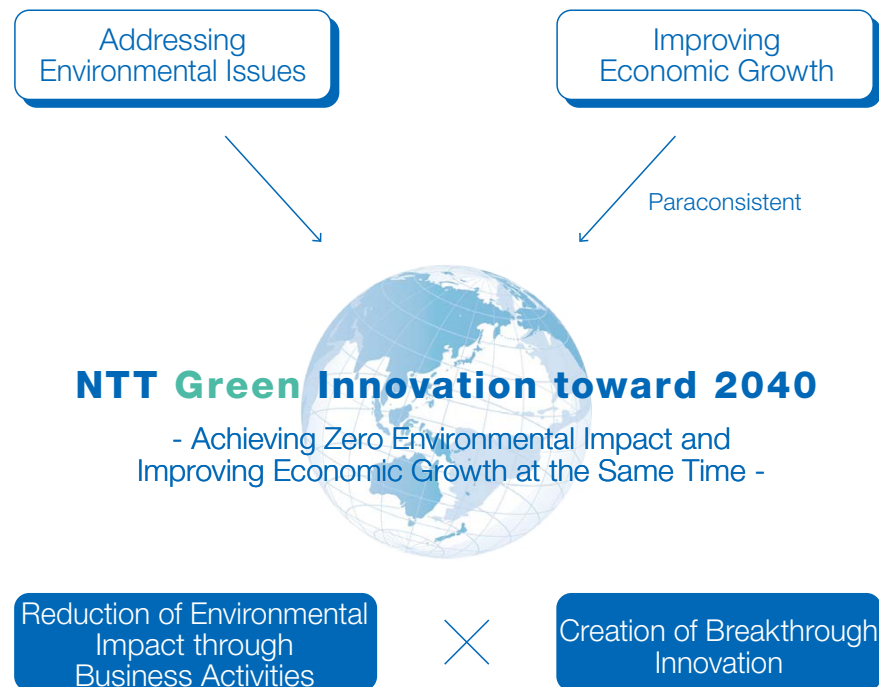
Feature 1: Environment and Energy Vision

Achieving carbon neutrality

In September 2021, the NTT Group unveiled its new environment and energy vision, “NTT Green Innovation toward 2040” for achieving “zero environmental impact” while continuing “economic growth” by reducing the environmental impact of its business activities and creating breakthrough innovation, with the aim of creating a well-being society and boosting corporate value through ESG initiatives. NTT will aim to achieve carbon neutrality by fiscal 2040 based on this vision.

“NTT Green Innovation toward 2040” targets

NTT has set targets for groupwide carbon neutrality by fiscal 2040 on its way to achieving zero environmental impact. The mobility communications (NTT DOCOMO) and data center business will be the first within the NTT Group to achieve carbon neutrality, as targets have been set to reduce greenhouse gas emissions by 80% of fiscal 2013 levels, by the fiscal year ending March 31, 2031. This target was approved as the 1.5°C level by SBT in December 2021.



Feature 1: Environment and Energy Vision

Achieving carbon neutrality

Basic Policy and Action Guidelines

Basic Policy

The NTT Group is committed to achieving a new level of prosperity where humanity can coexist and preserve nature for generations to come. To this end, we will work to balance solving ecological problems and improving economic development by reducing the environmental impact of our business activities and creating new technologies and innovations.

Action Guidelines

1. Reducing greenhouse gas emissions

The NTT Group is committed to initiatives that reduce greenhouse gas emissions throughout its business activities and society as a whole, by rolling out IOWN technology, increasing development and use of renewable energy sources, and providing services that contribute to carbon neutrality.

2. A commitment to resource recycling

We will shift from a one-time use consumption-oriented company to a recycling-oriented one. We will promote the effective use of resources throughout the entire life cycle of products and systems, from procurement to use and disposal.

3. Conserving ecosystems

Through our business and employee activities, we will promote initiatives related to conserving ecosystems within nature.

4. Compliance with laws and regulations and fulfillment of social responsibilities

We comply with the laws and regulations related to environmental issues in each country and region, and act with high ethical standards.

5. Establishing and maintaining environmental management systems

We will establish the Green Innovation Committee chaired by the Representative Director and Senior Executive Vice President, and discuss basic strategies concerning environmental issues, the status of implementation of activities, and information disclosure, and implement relevant initiatives.

6. Stakeholder engagement

We will engage with stakeholders throughout our entire value chain to help resolve environmental issues.

NTT Group's Environmental Activities

The NTT Group established the NTT Group Global Environmental Charter in 1991 based on the NTT Group CSR Charter, which lays out the basic policy for CSR activities. The NTT Group Global Environmental Charter outlines the basic principles and policies for conservation of the global environment, and was used as the basis for formulating the "The NTT Group Environmental Statement," "The Eco Strategy 2030" and the "Environment and Energy Vision" that NTT Group as a whole has adopted for its environmental activities.

1991	April	Set up the Environmental Response Office.
	July	Set up the Global Environmental Protection Promotion Committee as a decision-making organ.
	October	Established the NTT Global Environmental Charter stipulating the basic environmental principles, basic policies and promotion system. Formulated the Basic Program of Environmental Protection to set targets for key action plans.
1992	March	Formulated a detailed program compiling the action plans of each business unit.
1997	November	Set up issue-based committees for promoting initiatives on six key issues.
1999	July	Changed the name of the organization to the Environmental Protection Office following the restructuring of NTT. Established the new NTT Group Global Environmental Charter to clearly express our basic principles and policies. Formulated NTT Group Ecology Program 21 as our basic concept for promoting environmental protection.
2000	March	Set our targets for fiscal 2010 on global warming prevention, waste management, etc.
2006	May	Formulated the NTT Group Vision for Environmental Contribution.
2010	November	Added "conservation of biodiversity" to the basic policy of the NTT Group Global Environmental Charter. Announced THE GREEN VISION 2020 as the NTT Group's environmental vision for fiscal 2020.
2016	September	Announced "The NTT Group Environmental Statement," which expresses the future of our planet and the kind of enterprise we would like to become in that future. Set "The Eco Strategy 2030" as the targets for fiscal 2030.
2018	October	Became a Member of the "EP100" and "EV100" Global Initiatives.
2020	May	Formulated the "Environment and Energy Vision." Declared our support for the TCFD.
	October	Obtained SBT "well-below 2 degrees" certification.
	December	Earned first top rating for Japanese telecommunications company in CDP Climate Change Evaluation, securing an 'A List' position.
2021	September	Formulated the Environment and Energy Vision "NTT Green Innovation toward 2040."
	December	Obtained SBT "target 1.5 degrees" approval.

Feature 1: Environment and Energy Vision

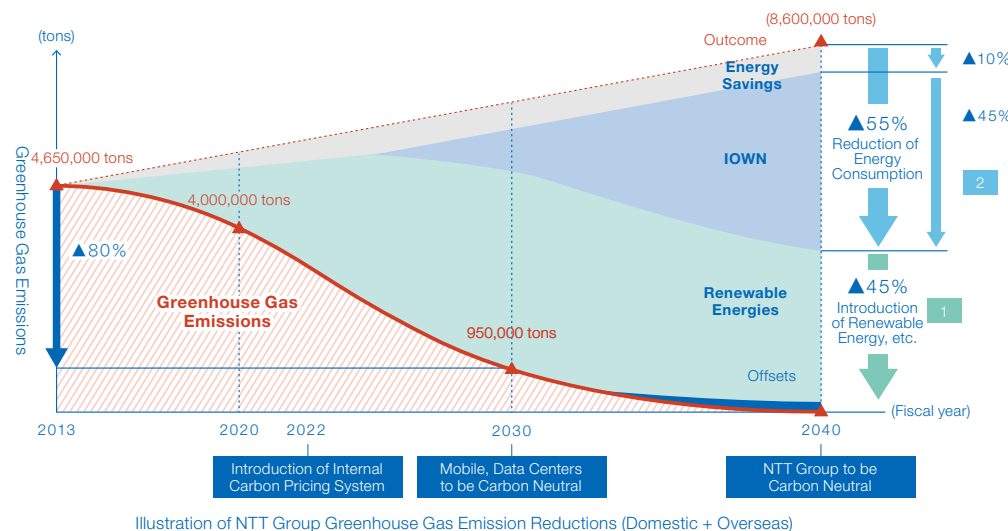
Achieving carbon neutrality

Key Initiatives Toward Carbon Neutrality

With the current situation, data traffic will increase significantly, leading to an increase in energy consumption and thus greater greenhouse gas emissions. In order to achieve carbon neutrality, IOWN will be rolled out to reduce energy consumption, increase the use of renewable energy sources, and cut down on greenhouse gas emissions.

Illustration of NTT Group Greenhouse Gas Emission^{*1} Reductions

- **Increased use of renewable energy:** Reduce greenhouse gas emissions by 45%^{*2} — 1
- **Lower energy consumption with IOWN technologies:** Reduce greenhouse gas emissions by 45%^{*3} — 2



^{*1} GHG Protocol: for Scope 1 and 2

^{*2} Estimated Introduction of Renewable Energy (including actual renewable energy through Non-Fossil Fuel Certificates)
→ FY2020, 1.0 billion kWh; FY2030 to FY2040, around 7.0 billion kWh. The introduction of renewable energy will have the optimal types of energy determined on the basis of each country's energy composition, etc.
Approximately half of the domestic renewable energy usage is anticipated to be from energy sources owned by NTT (FY2030).

^{*3} Estimated Reduction of Energy Consumption through the Introduction of IOWN (Comparison to Outcome).
→ FY2030, (2.0) billion kWh (15%); FY2040, (7.0) billion kWh (45%) Percentage of Introduction of IOWN (Photonics-electronics Convergence Technologies, etc.) out of Total Energy Volume
→ FY2030, 15%; FY2040, 45%

Initiatives for the reduction of society's environmental impact

The concept of "Self as We," where people will seek to increase their happiness along with the happiness of others, forms the basis of NTT Group's initiatives for achieving a sustainable society, while every effort is being made toward "Green by ICT" to help reduce the environmental impact of society as a whole. Due to the very nature of the NTT Group's businesses, greenhouse gas emissions arising from the supply chain (Scope 3) are much higher than direct emissions from the group's own activities (Scope 1+2), and measures will be implemented to reduce such emissions from across the entire supply chain.

Contributing to the reduction of society's environmental impact, together with reductions throughout the NTT Group

Expanding adoption of IOWN technologies from the telecommunications field into other industries

- Contribute to the reduction of greenhouse gases in Japan and the world^{*1}
Japan ⇒ reductions, over 0.02 billion tons; reduction rate, over 4%
World ⇒ reductions, over 0.3 billion tons; reduction rate, over 2%
- Further accelerate DX^{*2} (such as introduction of digital twin computing)
- Promote greenhouse gas reduction across the entire supply chain

Providing new services that contribute to carbon neutrality

Strengthening development and expanding introduction of NTT Group's Renewable Energy Plan

- Promotion of local energy production for local consumption

^{*1} Conditions for reduction estimates

- Target: beginning in FY2040
- Adoption rate of IOWN for electric semiconductors, etc. (Photonics-electronics convergence technologies, etc.): approximately 50%
- CO₂ Emission factor: Japan, 0.185kg-CO₂/kWh; World, 0.130kg-CO₂/kWh

^{*2} CO₂ Reduction potential: approximately 50% (2030; Target, World; calculated based on GeSI and IEA estimates)

Feature 1: Environment and Energy Vision

Achieving carbon neutrality

Specific Initiatives

In addition to the “Green of ICT,” which will curb the environmental impact of NTT Group by introducing IOWN technologies and increasing the use of renewable energy, we will also work on “Green by ICT,” which will contribute to reducing the environmental impact of society as a whole.

	Reduction of Environmental Impact through Business Activities	Creation of Breakthrough Innovation
Green by ICT Contributions to Reducing Society's Environmental Impact	Reducing society's environmental impact • Further acceleration of DX and promotion of Remote World • Promotion of regional urban development and the introduction of new social infrastructure development • Reduction of greenhouse gases across the entire supply chain • Provision of new services that contribute to carbon neutrality • Contribute to local production and consumption of energy, through smart grids based on battery farms • Increase in green electricity retail	Creation of innovative environmental energy technology • Use of 4D digital platform for future predictions / optimal use of urban assets* • Optimal operation of fusion reactors (ITER / QST) • Lightning charging • Applied genome-editing technology for “Green” (Collaboration) * Energy, transportation, logistics, etc.
Green of ICT Reducing NTT's Own Environmental Impact	Introduction of IOWN and Expansion of Renewable Energy • Reducing power consumption by introducing IOWN technologies • Developing and expanding the use of renewable energy • Introduction of internal carbon pricing system • Issuance of green bonds	Achievement of Ultra-Low Power Consumption • Photonics-electronics Convergence Technologies (IOWN All-Photonic Network) Creation of Decentralized Technology • Photonic disaggregated computing • Space integrated computing network

Toward Introduction of Internal Carbon Pricing System

The NTT Group will introduce an Internal Carbon Pricing System from FY2022, as it is planning to revise its procurement system that factors in carbon pricing. NTT believes that this framework will be essential for lowering risks related to a decarbonized society and for promoting decarbonization.

Social Challenge 1

Moving toward a decarbonized society

Business Activity

1. Promoting energy conservation
2. Reduction of power consumption by introducing IOWN technologies
3. Developing and expanding the use of renewable energy
4. Providing new services that contribute to carbon neutrality
5. Creation of innovative environmental energy technology



Why it matters

The NTT Group views one of its core roles as helping to resolve environmental issues that society faces, and is continuing its existing activities aimed at reducing greenhouse gas emissions. There are increasingly high hopes that the ICT sector will be able to help resolve environmental issues, and this has been outlined in the Paris Agreement. The NTT Group remains committed to measures that utilize ICT services and cutting-edge technology to reduce greenhouse gas emissions.

Future vision

The NTT Group is pushing ahead with research and development aimed at curbing climate change, encouraging employees to take part in nature conservation activities, increasing awareness inside and outside the group of its activities that help improve the environment, and many other activities to contribute to a reduction in greenhouse gas emissions throughout society as a whole.

What can be accomplished

The NTT Group is committed to initiatives that reduce greenhouse gas emissions throughout its business activities and society as a whole, by rolling out IOWN technology and increasing development and use of renewable energy sources.



message

Message from Management
(Executive Vice President,
Head of Research and Development Planning)



Katsuhiko Kawazoe

Executive Vice President
Head of Research and Development Planning

Promoting Sustainability based on the IOWN Concept

The NTT Group has created the Sustainability Charter based on the philosophy of “Self as We” to guide us in contributing to the well-being of the planet, society and people everywhere. At the heart of this Sustainability Charter is our IOWN (Innovative Optical and Wireless Network) Concept, a future communication infrastructure that will enable environmentally friendly, sustainable growth and diversity-tolerant total optimization. This concept is characterized by ultra-high capacity, ultra-low latency, and ultra-low power consumption, which is made possible through adoption of photonic and other innovative technologies.

Three Technological Layers that Constitute IOWN

IOWN comprises three main technology components: “All-photonic networks” communications infrastructure that uses photonic-based technologies for everything from networks to terminals; the “Cognitive Foundation” for optimal matching of all manner of ICT resources and distributing necessary information inside the network; and “Digital Twin Computing” for analyzing and feedback processing in real-time using physical world models recreated in cyberspace. In other words, IOWN a new communication infrastructure enabling for enormous communications bandwidth through the use of photonics-based communications infrastructure, technology with multi-orchestration capabilities for low-latency control of information within the network, and interactive connectivity with communications between the real world and cyberspace.



IOWN Concept for Reducing Environmental Impact and Achieving Well-being

IOWN also contributes significantly to reducing the environmental impact on the planet, as outlined in the Sustainability Charter. The NTT Group has already successfully developed optical semiconductors (optical nonlinear devices) with the world’s lowest energy consumption, using nanostructures called photonic crystals that can control the speed that light is confined. The results of this development were published in “Nature Photonics” in 2019. Optical semiconductors have minimal electrostatic capacity and operate with an extremely low current, and have been developed with significantly lower energy loss when converting between optical signals and electrical signals. These results are slated to be applied in the future for forming light transmitting circuits on silicon chips, and developing opto-electronic integrated optical transmitter receiver and modules. The next step of development will be to replace all chips with optical semiconductors, such that the functions of CPUs, GPUs, storage, memory, and other devices are all based on photonics. Connecting all devices with optical signals essentially means building a new type of low power consumption computing architecture that extends far beyond that of mere server boxes. IOWN aims to improve power efficiency by 100 times by maximizing the use of such optical technology.

And as processing power increases, computations required for interactions between digital twins and for long-term forecasting of their behavior will become available, leading to highly accurate future prediction and resolution of various social issues. The NTT Group views happiness not as an instantaneous event but, rather, as an integral value that can be sustained from the past into the future. By harnessing the immense computing power of IOWN, the NTT Group aims to deliver comprehensive and sustainable happiness to society as a whole. Indeed, IOWN will help achieve well-being for all members of society. In addition to rolling out this IOWN Concept, the NTT Group remains committed to the diversity and consistency of future research topics, and will work with its various operating companies as well as industry players in a broad range of sectors to help resolve various social issues and achieve a sustainable society.

Business Activity 1

Promoting energy conservation

Our commitment

The NTT Group is committed to converting its corporate fleet to electric vehicles (EV) and improving the energy efficiency of its operations (EP100•EV100)

Our objectives

Two times

2025: Power efficiency (compared to FY2017)

100%

2030: Ratio of EV adoption in Japan

*1 ICT Ecology Guideline Council: An organization established jointly by the Telecommunications Carriers Association, Telecom Services Association, Japan Internet Providers Association, Communications and Information Network Association of Japan and ASP-SaaS-IoT Cloud Consortium to drive industry-wide efforts to address the issue of global warming.

ICT Ecology Guideline Council
<https://www.tca.or.jp/information/ecoict/index.html>

*2 The eight NTT Group companies are NTT, NTT East, NTT West, NTT Communications, NTT DOCOMO, NTT DATA, NTT FACILITIES, and NTT COMWARE.

*3 Power Usage Effectiveness: PUE is calculated by dividing the total power consumption of a data center by the power consumption of the computing equipment it houses. It is a figure larger than 1, with higher efficiencies represented by values approaching 1.

*4 EP100: An international initiative comprising companies pledging to double the energy efficiency of their operations (improve energy efficiency by 50%) as participants.

*5 EV100: International initiative for promoting commercial use of EV and development of the service environment.

Pursuing Initiatives across the Industry for Energy-Efficient ICT Devices

NTT is a member of the Telecommunications Carrier Association (TCA) and in that capacity, participates in the ICT Ecology Guideline Council^{*1}, an organization that seeks to enhance the energy efficiency of telecommunications-related products. The council formulates guidelines on the criteria for evaluating the energy efficiency of telecommunications devices, and NTT has contributed to the technical aspect of this effort. The NTT Group's Energy Efficiency Guidelines are based on the guidelines created by this council. In August 2010, eight NTT Group companies^{*2} acquired the Eco ICT Logo on submitting self-evaluations of their CO₂ emissions reduction efforts, including the establishment of Energy Efficiency Guidelines. The Eco ICT Logo was created by the ICT Ecology Guideline Council to signify efforts by telecommunications service providers to reduce CO₂ emissions. We will continue to drive the development and procurement of energy-efficient equipment, and work with the ICT Ecology Guideline Council to help bring both vendors and carriers together to promote the industry-wide procurement of energy-efficient equipment. We will ensure that vendors are consistently provided with requirements for NTT Group specification processes, and include energy efficiency information disclosure and our corporate stance on energy efficiency in our criteria for selecting vendors.

Group-Wide TPR Campaign to Reduce Electricity Usage

The NTT Group has been working on Group-wide energy conservation activities named the TPR (Total Power Revolution) Campaign since October 1997 with respect to the electricity it consumes, which accounts for over 90% of the CO₂ emissions from its business activities. By promoting efficient energy management at buildings owned by NTT and installing energy-efficient electrical power units, air conditioning systems and telecommunications equipment, we managed to continue to reduce electricity usage across the NTT Group by approximately 380 million kWh from projected levels in fiscal 2020.

Energy-Saving Data Centers

NTT Communications offers data centers with a PUE^{*3} of less than 1.2, and NTT COMWARE offers data centers with a PUE of less than 1.1, which are at the top worldwide for energy efficiency. We are striving to enhance PUE for our other data centers as well, introducing five-star equipment with the highest level of energy efficiency in accordance with the NTT Group Energy Efficiency Guidelines. NTT FACILITIES has been developing technology for reducing the electricity consumption of data centers by incorporating higher efficiency technology for electrical power units and air conditioning systems as well as central air conditioning control systems.

Promotion of EP100 & EV100



The NTT Group is committed to using power more efficiently as a means of reducing the risk of business disruptions and mitigating climate change. It has set itself the target of improving power efficiency per data transmission of the telecommunications business including data centers to double fiscal 2017 levels by fiscal 2025. It is also committed to reducing its corporate fleet and converting to electric vehicles (EV). We will replace 50% of our general-purpose vehicles with EV by 2025 and 100% of our fleet by 2030. Accordingly, we are establishing battery charging stations for EVs on the grounds of our telecommunications buildings.

To demonstrate our commitment to the public, in October 2018 NTT became the first telecommunications operator in the world to become a member of the Climate Group's EP100^{*4} and EV100^{*5} initiatives. In May 2020, we established the Electric Vehicle Promotion Consortium in a joint effort with Hitachi, Ricoh, and Tokyo Electric Power to expand the use of electric vehicles in the commercial sector. Looking ahead, we will promote the shared use of vehicles, decarbonization in the area of mobility, use of EV at times of a disaster, and initiatives related to systems and regulations.

Business Activity 2

Reduction of power consumption by introducing IOWN technologies

Our commitment

The reduction in power consumption resulting from rolling out IOWN will help reduce greenhouse gas emissions throughout the NTT Group's its business activities and society as a whole

Our objective

Reduce power consumption with the introduction of IOWN, and reduce the NTT Group's greenhouse gas emissions ^{*1} compared to outcome.

Background and Concepts

There is urgent need to create a society that can cope with global environmental changes such as climate change, major disasters, and pandemics. Developing next-generation energy technologies and technologies to enable resilient environmental adaptation will reduce the burden placed on the global environment and thereby prevent environmental destruction, opening the door to a sustainable society in which humans can continue to live in harmony with the environment.

The NTT Group is committed to initiatives that reduce power consumption emissions throughout its business activities and society as a whole, by rolling out IOWN technology and increasing development and use of renewable energy sources.

Initiatives for Realizing the IOWN Concept

The development of ICT has dramatically increased the volume of information being transmitted through networks. Up to now, energy has been saved by enhancing power efficiency through the introduction and renewal of highly energy-efficient telecommunications equipment. However, the performance and efficiency of integrated circuit technology which has grown in line with Moore's law, is thought to be approaching its limits in terms of speed and energy consumption due to the restrictions of nanoscale fabrication and integration density. NTT Laboratories is advancing research and development that incorporates optical technology into signal processing with the aim of using photonics to realize a base for a new kind of computing. This has resulted in the development of a modulator with the lowest ever reported energy consumption and an optical transistor which transfers a high-speed optical signal to another light with gain (announced in April 2019).

The NTT Group is advancing the development of photonic technology and we have established the IOWN (Innovative Optical & Wireless Network) concept as one of the pillars of an all-photonic network that incorporates photonic-based technology throughout entire networks, including terminals. The target of this all-photonic network will be to realize power efficiency that is 100 times greater in areas where photonics technology is applied, and we expect it will radically reduce energy consumption.

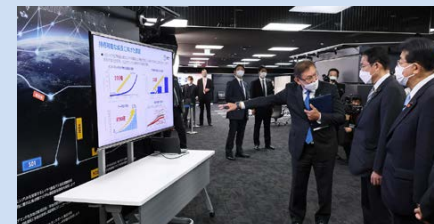
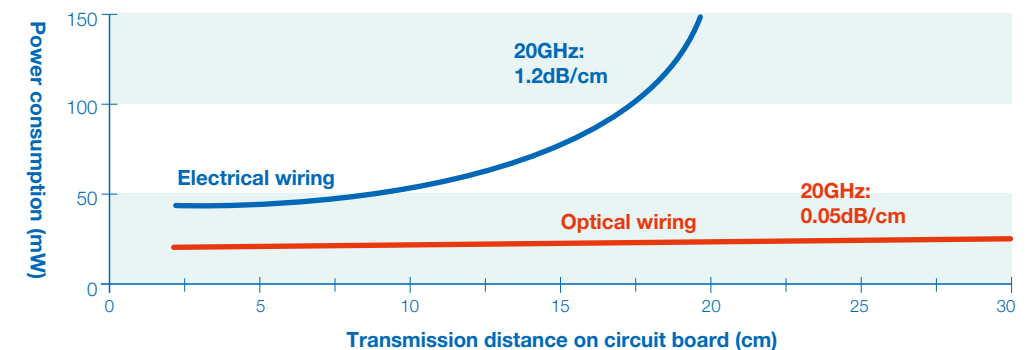
We are collaborating with global partners and specialists in a wide range of research and technological fields with the aim of realizing the IOWN concept.

Promoting Energy Conservation with IOWN

Conservation of the global environment and development of a sustainable society is the management theme of countless companies. The use of the NTT

Group's next-generation communication platform "IOWN" for various ICT services used at customer companies not only helps to support these initiatives, but using IOWN extensively throughout NTT Communications' data centers, networks, and other infrastructure will lead to energy savings, paving the way to achieve carbon neutrality at data centers and networks by fiscal 2030.

Higher efficiency and lower power consumption using light



Highlighting the reduction in power consumption and other benefits of IOWN to the government

The NTT Group highlighted to the Japanese government the benefits of using its IOWN advanced technology, as a cutting edge communications infrastructure with major future potential for developing businesses in a wide range of fields.

Rolling out IOWN to reduce power consumption and help achieve carbon neutrality provides Japan with a significant opportunity to lead the world in this sector.

^{*1} GHG Protocol: for Scope 1 and 2

Looking to the Future: IOWN

NTT R&D is envisaging the arrival of new smart societies that are not yet possible with today's Internet, with features such as mobility as a service (MaaS) for extreme fail-safe systems and entertainment services offering deep immersion. To realize such smart societies, we will require innovation that cannot be achieved merely by extending the trajectory of current technologies; we will need to realize ultra-low power consumption, high-speed signal processing, and the fusion of virtual worlds that can equal or surpass reality with sophisticated prediction technologies. The NTT Group has proposed the Innovative Optical and Wireless Network (IOWN) concept to realize new smart societies, and we are committed to realizing this concept.

In January 2020, the IOWN Global Forum was established in the United States by industry leaders NTT, Intel Corporation, and Sony Corporation, all three of which have superior expertise in the technological areas that form the core of IOWN. Wide-ranging recruitment efforts began in March 2020, with many companies both in Japan and overseas signing up as members, and specific technological considerations commenced through the use of online video conferencing. Going forward, we will work with a variety of partners for the earliest possible implementation of the IOWN concept.

Three Technological Layers that Constitute IOWN

Cognitive Foundation®

We seek to achieve optimal matching of all manner of ICT resources and distributing necessary information inside the network. We will lead the shift from a world of electronics to a world of photonics and drive technological development for resolving various global social issues and creating innovative services.

Technology development roadmap for realizing the IOWN concept
<https://group.ntt/en/newsrelease/2020/04/16/200416a.html>
 NTT proposes the "Digital Twin Computing Initiative"
<https://group.ntt/en/newsrelease/2019/06/10/190610a.html>

Advantages of the All-Photonics Network

Low power consumption

Power efficiency:

100 times higher^{*1}

Transmission media

Optical fiber cables



Transmission systems

Light (wavelength) throughout



Information processing platform

Photonics-electronics convergence devices



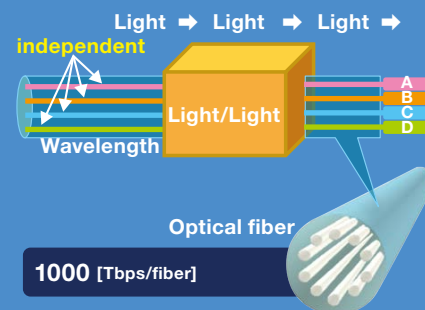
^{*1} Target power efficiency for portion where photonics technology is applied

High quality and high capacity

Transmission capacity:

125 times higher^{*2}

• Wavelength (optical signal)



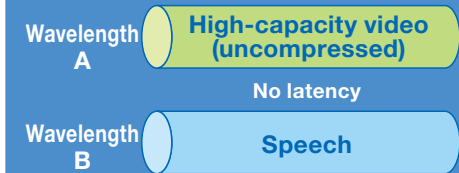
^{*2} Target communication capacity per optical fiber cable

Low latency

End-to-end delay:

1/200^{*3}

- Transmission per wavelength
- No queueing
- No data compression



^{*3} Target latency in video traffic not requiring compression within the same prefecture

Research and Development to Support the IOWN Concept

By using light as a means for transmitting signals inside the processors that perform information processing and calculations inside a computer, we hope to create a hybrid opto-electrical processor that will solve problems that arise with electrical processing, such as power consumption and increase in heat emission, and realize ultra-low power consumption and high-performance information processing. We have realized ultra-compact photo-electric conversion elements such as an optical transistor that uses nano-photonics technology.

To conduct a comparative time experiment by connecting several optical lattice clocks that are more precise than atomic clocks, the current standard for measuring seconds, we used the optical fiber network of NTT East for an optical frequency transmission experiment with the University of Tokyo. As a result, the required frequency precision for the comparative experiment was achieved, representing a major step toward conducting the experiment.

Increasing the Capacity of Optical Fiber Communication Networks

Increasing the capacity of mission-critical optical fiber communication networks has become an economic necessity. We have developed new proprietary technology for digital signal processing and ultra-wide area optical devices, increasing the channel capacity per wavelength to the point that transmission speeds achieve a level more than 10 times that of current commercial systems, and achieving a global first of 1 Tbps of capacity in long-distance wavelength-division multiplexed transmission trials. Furthermore, we also succeeded in developing an ultra-high-speed compact optical front-end module with integrated compact, wide-band InP optical modulator.

As another accomplishment, we realized high-capacity wireless transmissions at approximately 10 times the speed of LTE and Wi-Fi, and five times that of 5G, by using the following two technologies.

The first one enables wireless transmissions at rates of 100 Gbps by using a method devised by NTT combining a principle called "OAM multiplexing" with MIMO technology. This generates multiple radio waves of different frequencies so that they can transmit simultaneously without interfering with each other. The result is a dramatic increase in the volume of data that can be transmitted simultaneously, enabling large-capacity communications.

The second one, which was jointly developed with the National University Corporation Tokyo Institute of Technology, enables wireless transmissions of 100 Gbps in the 300 GHz band. It is easier to expand the transmission bandwidth or terahertz waves, including the 300 GHz band, although they require high-performance devices. We developed an ultra-high-speed integrated chip (IC) for wireless front-end devices, leading to the world's first 100 Gbps wireless transmission in the 300 GHz band.

Optical Transistor Capable of High-Speed Operation with Ultra-low Power Consumption

As Moore's law approaches its limit in electronic circuits, there are expectations for a new, high-speed, energy-saving computing platform that incorporates optical technology. Achieving this requires technologies that have hitherto been considered difficult to achieve with low energy consumption, such as opto-electronic signal conversion and high-speed signal processing in the optical area. NTT has been developing a semiconductor nanostructure called photonic crystals with which to realize various tiny optical devices. In this work, we used our nanotechnology to realize a nano electro-optic modulator (E-O converter) and a nano photodetector (O-E converter) with extremely small capacitance and low energy consumption. Moreover, through their integration, we also realized an O-E-O conversion optical transistor. These nano-optical technologies have opened the way to realizing high-speed, low-energy integrated opto-electronic information processing.

Business Activity 3

Developing and expanding the use of renewable energy

Our commitment

Developing and promoting greater use of renewable energy

Our objective

Increase the use of renewable energy, and reduce the NTT Group's greenhouse gas emissions*¹ compared to outcome*².

Development of Renewable Energies

Renewable energy like solar power, wind power, geothermal, and biomass do not generate greenhouse gases when producing power, an advantage that makes developing and expanding the use of renewable energy an essential part of initiatives aimed at achieving a decarbonized society. The NTT Group established NTT Anode Energy in June 2019 with the aim of delivering smart energy solutions that leverage the technology, expertise, and resources of the NTT Group. Focused on achieving a decarbonized society and the promotion of local energy production for local consumption, NTT Anode Energy operates on three core approaches: (1) Providing customers with green energy solutions; (2) Promoting NTT's own decarbonization efforts; and (3) Utilizing battery farms to increase use of renewable energy.

NTT Anode Energy is working together with various partners to develop renewable energy power plants in order to meet the green energy requirements of NTT Group companies. With a primary focus on sustainability, the company advancing development that takes into consideration ecosystems and living environments.

The power generated from renewable energy at these plants is supplied to customers in a range of different plans catering to their specific requests. This is achieved through a corporate PPA (Power Purchase Agreement), where customers use the electrical power generated from renewable energy power plants constructed on their sites or in remote locations. Leading companies focus on the "Additionality" concept, where companies are encouraged to make investments in renewable energy projects as their selected source of financing, as a way of displacing the use of fossil fuels. NTT Anode Energy projects comply with the "Additionality" framework, so customers are able to use power generated from renewable energy via a corporate PPA.

One key fact to note is that with communications facilities located around Japan, the NTT Group accounts for approximately 1% of total electricity in Japan. The NTT Group is pushing ahead with development of renewable energy sources with the

aim of generating around half of its renewable energy target, or 3.8 billion kWh/year, from its own facilities by fiscal 2030.

The NTT Group is also expanding its concept of local energy production for local consumption to stabilize the power grid by charging and discharging its constructed battery farms. There are some 7,300 NTT buildings located around Japan, housing around 4 million kWh of battery storage capacity that the NTT Group uses to maintain communications in the event of power outages. The group will develop battery farm operations around Japan by utilizing these battery farms to increase the use of renewable energy and help stabilize the power grid.

With these businesses, NTT Anode Energy will partner with subsidiaries ENNET and NTT Smile Energy to help overcome various challenges on the way to developing a carbon-free environment for all of society.

Expanding the Use of Renewable Energy

The whole NTT Group is increasing its use of renewable energy as part of efforts to achieve the NTT Group's Environment and Energy Vision.

In 2020, the NTT Holdings head office and four facilities of NTT Laboratories made the switch to effectively 100% renewable energy. The NTT East Group has also followed suit, with office buildings, communications buildings, data centers and other facilities in eastern Japan making the shift to renewable energy; as of April 2021, 132 buildings in eastern Japan have completed their switch to effectively 100% renewable energy, including the head office building in Hatsudai. The NTT West Group is in a similar situation, with office buildings, communications buildings, data centers and other facilities in western Japan making the shift to renewable energy; as of October 2021, 58 buildings in western Japan have completed their switch to effectively 100% renewable energy.



NTT Anode Energy

Supplying 100% renewable energy to Seven & i Holdings stores and operations

In a joint project with Seven & i, NTT Anode Energy began powering 40 Seven-Eleven stores and the Ario Kameari shopping center completely with renewable energy. NTT Anode Energy supplies electricity via the power grid from two solar power plants established through an off-site corporate PPA*³. The NTT Group's green power plants are used to cover any shortfall in power supply.

*1 GHG Protocol: for Scope 1 and 2

*2 The introduction of effectively 100% renewable energy (including actual renewable energy through non-fossil fuel certificates) will have the optimal types of energy determined on the basis of each country's energy composition, etc. Approximately half of the domestic renewable energy usage is anticipated to be from energy sources owned by NTT (FY2030).

*3 Japan's first off-site corporate PPA scheme, which involves business operators building renewable energy power plants in locations removed from users for use exclusively by specified consumers, such as companies or municipalities, and supplying these users with electricity via the power grid over the long term.

Business Activity 4

Providing new services that contribute to carbon neutrality

Our commitment

Promoting the provision of new services that contribute to carbon neutrality

Our objective

Provide new services designed with the environment in mind, such as the development of services that use renewable energy, and visualization of the reduction in greenhouse gas emissions.

NTT Group's Strengths

In addition to the Green of ICT, which will curb the environmental impact of NTT Group by introducing IOWN technologies and increasing the use of renewable energy, we will also work on Green by ICT, which will contribute to reducing the environmental impact of society as a whole.

NTT DOCOMO Initiatives

In September 2021, NTT DOCOMO announced its commitment to reduce the greenhouse gas emissions arising from its business activities effectively to zero by 2030. In addition to its own business activities, DOCOMO has started a new ecosystem called "Caboneu™" together with its partner companies, under the slogan "Saving Our Planet With You" to help achieve carbon neutrality throughout the whole of society.

(1) Development of services that use renewable energy

The ratio of effectively 100% renewable energy (includes non-fossil fuel certificates designated as renewable energy) to total electricity consumption will be greater than the ratio of the number of 5G subscriptions to DOCOMO's total subscriptions, making 5G environmentally friendly without greenhouse gas emissions. From October 1, 2021, 5G services will be rolled out as Green 5G™. The docomo Denki™ service planned to be rolled out from March 2022 (tentative) will be available with "docomo Denki Green," an earth-friendly plan that makes extensive use of effectively 100% renewable energy (includes non-fossil fuel certificates designated as renewable energy).

(2) Provide new services designed with the environment in mind

Environmentally friendly services include providing THEO Green and the addition of SDGs/ESG as topics investment targets for the Points Investment service. A dedicated section for environmentally friendly brands and products was also opened on the d fashion® website. A range of services will be provided with the aim of achieving carbon neutrality with customers.

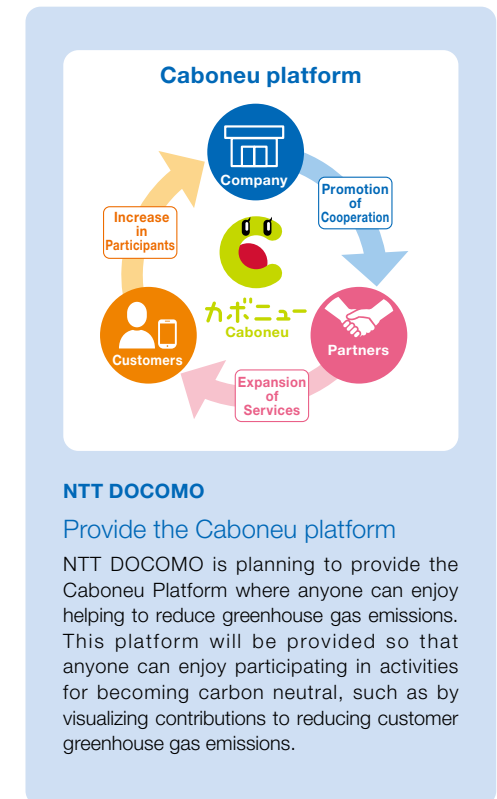
See the following docomo site for more details.
https://www.nttdocomo.co.jp/corporate/csr/ecology/enviromanagement/carbon_neutral/

(3) Provide the Caboneu platform

A platform is planned where anyone can enjoy participating in activities for becoming carbon neutral, such as by visualizing contributions to reducing customer greenhouse gas emissions. Studies are being conducted for partner companies supporting the Caboneu initiative, as well as the type of content that will be provided on the platform.

NTT DATA Initiatives

NTT DATA is implementing companywide initiatives with the aim of making society carbon neutral. Examples of these initiatives include the creation of standards for measuring CO₂ emissions from a software development and system development perspective, enhanced cooling efficiency and the shift to immersion cooling to help conserve energy at data centers, projects that make use of metal 3D printers, and measures for accurately measuring CO₂ absorption volumes by focusing on forests as carbon sinks on a global scale. The new Green Innovation Office was also established in October 2021 to develop companywide green innovation strategies aimed at achieving carbon neutrality.



Business Activity 5

Creation of innovative environment and energy technologies

Our commitment

Creation of innovative environmental energy technology for reducing global environmental impact

Our objective

Promoting the creation of innovation with next-generation energy technologies.

Regenerating the global environment and achieving a sustainable society

The NTT Group is creating innovative technologies aimed at addressing a range of issues related to the environment and energy such as climate change. In July 2020, we established the NTT Space Environment and Energy Laboratories for regenerating the global environment and achieving a sustainable and inclusive society. We will create technologies that will drive innovation in the field of smart energy, including next-generation energy, and for the future of the global environment.

Energy network technologies

Indoor direct-current power supply technology—a field that the NTT Group excels at—is being developed for outdoor use with the aim of achieving a high-resilience, autonomous, decentralized, and co-ordinated energy network to link NTT buildings and consumers in the surrounding area with direct current supply, for a flexible and efficient power supply system that is also reliable when disasters strike. Research is being conducted into technology that simulates information on energy demand, generation and storage capacities in cyberspace in an integrated manner, and applies the optimal figures to control the actual grid and achieve an ideal balance between supply and demand. Another field of study is focusing on technology for the spatial and temporal reallocation of communications traffic between multiple regions or calculations and other information processing capabilities for more efficient use of renewable energy, which is prone to fluctuations due to weather conditions.

Sustainable systems technologies

Practical applications of technology that reduces CO₂ in the atmosphere or water are being developed, covering artificial photosynthesis (based on an electrochemical approach) achieved with semiconductor technology and catalyst technology, as well as technology that maximizes the capabilities of plants and algae (based on a biological approach). The electrochemical approach utilizes materials informatics to test combinations of materials that would not have been possible to discover using traditional experimental techniques or existing concepts. The biological approach involves research using digital twins, where various cultivation environments are recreated in cyberspace to test the effects of genome editing or climate control, before applying them to the real world for additional testing.

Proactive environmental adaptation technologies

We are focusing our efforts on research topics enabling society to take a proactive stance and adapt physically to extreme weather or environmental conditions. Lighting is an example of research being conducted on weather control. We have developed advanced technologies as a means of protecting communications facilities from lightning strikes, and we are now expanding our research in this field to develop lightning control and lightning charging technologies. More specifically, this research involves high-precision forecasting of areas prone to lightning strikes, employing lightning control technology so that drones trigger lightning strikes, and then lightning charging technology to store the energy from that lightning. The future goal is to develop floating lightning energy absorption systems that operate autonomously using natural energy including that from lightning strikes to absorb energy before the lightning strikes the ground.



Next-generation energy technologies

We are involved in initiatives related to fusion energy and space-based solar power generation. Fusion energy is a power generation technology that uses nuclear fusion. NTT entered into a comprehensive partnership with the ITER International Fusion Energy Organization in May 2020, and concluded a collaboration and cooperation agreement with the National Institutes for Quantum Science and Technology, the ITER Japan Domestic Agency, in November 2020. The ITER experimental reactor is planned to begin operating from 2025, creating a miniature sun with plasma temperatures at the core reaching 150 million degrees Celsius. The immense amount of data obtained from sensors used with the experimental reactor will be transmitted via the ultra-low latency, ultra-high speed and capacity IOWN network and analyzed by AI and machine learning to instantaneously forecast the plasma conditions for real-time feedback control. Looking further ahead, we will be harnessing digital twin computing for future performance forecasting, as a way of helping to optimize operations.

Social Challenge 2

Implementing closed loop recycling

Business Activity

6. Increasing the reuse and recycling of communications equipment, mobile terminals, and other technologies
7. Reduction in plastics use and promotion of recycling
8. Proper treatment, storage, and management of hazardous waste
9. Appropriate and efficient management of water resources



Why it matters

Although our one-way society of mass production, mass consumption, and mass disposal has brought affluence and convenience to our lives, it has brought about various problems such as the creation of massive amounts of refuse, illegal dumping and concern about the depletion of natural resources. To resolve these issues we must first review how companies manage their businesses as well as our social and economic systems, and shift to a closed loop society.

Future vision

We will shift from a one-time use consumption-oriented company to a recycling-oriented one. We will promote the effective use of resources throughout the entire life cycle of products and systems, from procurement to use and disposal.

What can be accomplished

In an effort to realize a future with closed loop recycling, the NTT Group promotes the 3Rs (reduce, reuse, and recycle), working to reduce the amount of materials consumed by our business activities and reuse or recycle the resources that are consumed.

Business Activity 6

Increasing the reuse and recycling of communications equipment, mobile devices, and other technologies

Our commitment

Promoting the 3Rs (reduce, reuse, and recycle), working to reduce the amount of materials consumed by our business activities and reuse or recycle the resources that are consumed

Our objective

99% or higher

FY2030: Recycling ratio of disposed waste generated by the NTT Group

Targets and Results

The NTT Group has established a target for achieving a 99% or higher recycling ratio of disposed waste generated by the NTT Group by fiscal 2030.

We require a large amount of resources in order to sustain our business operations and provide various services including information communication. This is why we have set a target to contribute to both the avoidance of business continuity risks and achievement of closed loop recycling.

In fiscal 2020, the recycling ratio of disposed waste was 98.4%. We will continue to work hard to promote the 3Rs toward our goal of 99% or higher. Regarding decommissioned telecommunications equipment, we have achieved zero emissions (1% or lower final disposal ratio of waste) for 17 consecutive years since fiscal 2004.

Main Initiatives

The NTT Group owns various types of telecommunications equipment and related items including telephone poles, switching equipment, communications cables, public telephone booths, and public telephones. These are decommissioned and disposed of when they reach the end of their service life or are replaced during system upgrades for new services and so forth. We promote the reuse, or recycling, of telecommunications equipment within the NTT Group; for example: recycling concrete waste from discarded concrete poles as road building material. Public telephone booths and public telephones are taken to a specialized intermediate treatment plant, where parts of the booths are sorted into aluminum, stainless steel, glass, and plastic. Similarly, the baseboards, copper wires, and various plastics in the public telephones are meticulously sorted. They are then sent to a recycling plant to become recycled materials such as rare metals, copper, and pellets. The recycling rate there is reflected in the precision, as a result of careful hand sorting, at the intermediate treatment plant. To prevent the inappropriate treatment of the materials, such as illegal dumping, NTT East collaborated with NTT-ME to construct a system that uses GPS and photography to confirm proper disposal from the site of discharge to the disposal plant.



NTT DOCOMO

Recycling Process for Mobile Phones

Since 1998, NTT DOCOMO has collected used mobile phones from customers at its approximately 2,300 docomo shops throughout Japan, and through various events. Containing gold, silver, copper, palladium, and other metals, mobile phones could be regarded as a valuable recycling resource in Japan with its paucity of mineral resources.

1. In fiscal 2020, we collected about 3.09 million*¹ mobile phones, bringing our cumulative total to 118.32 million units collected.

2. In fiscal 2011, the company introduced a new recycling process for pyrolyzing any plastic used in mobile phones to turn it into oil for use as a fuel, after which gold, silver, and other metals are recovered from the residues of this process.

*1 The number of units collected for reuse is included in the figure after fiscal 2015.

Initiatives

Held in Japan for the first time in 56 years, the 2020 Summer Olympics and Paralympics featured 55 different sports events, far exceeding the 29 types at the 1964 Summer Olympics and Paralympics held in Tokyo in 1964. Hopes were high for the Japanese team to win an impressive medal haul. The Tokyo Organising Committee of the Olympic and Paralympic Games kicked off the "Tokyo 2020 Medal Project—Making medals using urban mines" citizen-participatory project from April 2017. Medals were made using gold, silver, and copper metals recycled from discarded electronic devices, including mobile phones and other small household appliances. Used mobile phones were collected at DOCOMO shops throughout the country, with existing recycling processes used to assist with the project.

In 2017, the number of households using mobile devices as telecommunications equipment was 94.8%. Of this figure, smartphones made up 75.1%*, exceeding that of personal computers. As information devices that are essential for day-to-day-life, results of a consumer trend survey indicate that people upgraded their mobile phones every four or so years. This was the first project of its kind in the world that aimed to achieve a 100% recycling rate for used mobile phones and other small household appliances, so that they can be remade into medals as part of a recycling program for these valuable resources.

Containing gold, silver, copper, palladium, and other metals, mobile phones contain extremely valuable resources in Japan, where such mineral resources are scarce. Used mobile phones were collected at the approximately 2,300 DOCOMO shops located throughout Japan. Initiatives aimed at recycling were extensive, and included collection of recyclable materials at a wide range of events throughout the duration of the Olympic and Paralympic Games, as well as collection activities organized by Tokyo 2020 Olympic partner companies. This project left a lasting legacy, as 2020 led to recycling of small household appliances becoming ingrained by the people, helping to achieve an environmentally friendly, sustainable society.



Tokyo 2020 Medal Project

- Collection period
April 1, 2017 to March 31, 2019
- Volume collected
Collected by NTT DOCOMO (collection of mobile phones)
Approx. 6.21 million units
(equivalent to 5,000 gold, silver, and bronze medals)
Collected by participating municipalities around Japan
(collection of small household appliances including mobile phones)
Approx. 78,985 tons



*1 2018 Ministry of Internal Affairs and Communications, Information and Communications in Japan Whitepaper, ICT Service Utilization

NTT Communications**Sustainable Systems Produced by Subsea Cable Recycling**

The normal length of subsea cables installed in Japan's territorial waters is 20 to 30 km per cable run, but the cable managed by NTT Communications connecting Kagoshima Prefecture with Okinawa Prefecture is 250 km in length as it passes through various islands en route. The cable went out of service in 2018 and was expected to result in about 850 tons of waste, presenting a significant challenge in terms of environmental impact and disposal costs. Therefore, NTT Communications concluded an agreement with South Africa's Mertech Marine, the only operator in the world capable of completely disassembling subsea cables to the level of raw materials, to develop a new scheme for controlling both environmental impact and disposal costs by recycling 99% of the cable that requires disposal. It is also contributing to creating regional safety nets through Marine Mertech with the employment of unskilled workers and donations to non-profit organizations engaged in initiatives such as supporting impoverished families.

Coal tar coating for
armor wire completely
separated and pelletized



Outer armor
wire properly
coiled



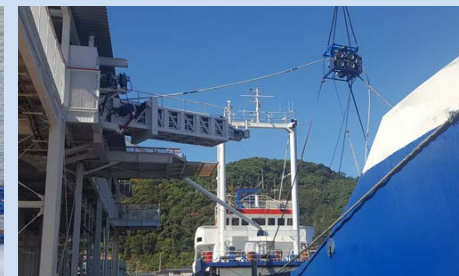
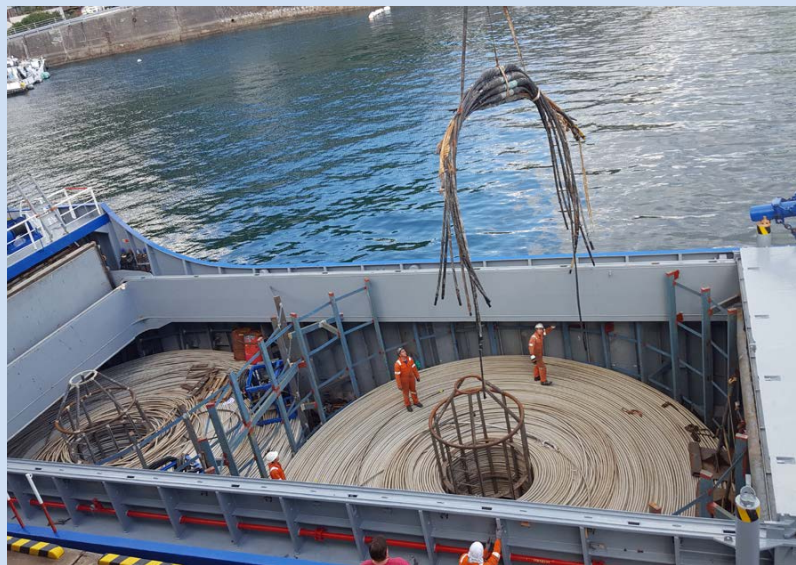
Copper tape
separated and
pelletized



High-purity polyethylene
used for outer cover can
be sold at high price if
completely separated
and pelletized



**Currently, all components other than optic fibers are
completely recycled (99% of total volume).**



Business Activity 7–8

Reduction in plastics use and promotion of recycling Proper treatment, storage, and management of hazardous waste

Our commitment

Reduction in plastics use and promotion of recycling
Proper treatment, storage, and management of hazardous waste

Our objective

Reduction in plastics use and promotion of recycling of plastics including telecommunications equipment, hazardous waste disposed of in compliance with laws and regulations, and ensure proper storage, management, and disposal.

Reduction in Plastics Use and Promotion of Recycling

The NTT Group is seeking to reduce the use of plastics and promoting recycling. For example, plastic parts of telecommunications equipment such as coverings for branch lines and ready access terminal boxes are used in a closed recycling system in which similar types of disposed covers are recycled into plastics to manufacture new products. We are also seeking to abolish the use of plastic packaging materials for devices used at customers' homes when connecting optical lines such as optical network units (ONU) and home gateway (HGW) units.

Hazardous Waste

For NTT Group operations, hazardous waste as defined by law applies to asbestos contained in waste generated from construction work on relay stations, waste such as transformers and condensers containing PCBs, and lead batteries. These are disposed of appropriately and in compliance with the Waste Management and Public Cleansing Law (Waste Disposal Law) as well as other laws and regulations, and the NTT Group does not have a record of disposing of such waste in foreign countries. We also pay meticulous attention to the proper storage and management of equipment containing PCBs and PCB contaminated wastes, and dispose of them with safe and appropriate methods in conformity with the Law Concerning Special Measures Against PCB Waste.



NTT BUSINESS SOLUTIONS

Demonstration Research into Various Methods for Reducing Food Loss and Decreasing Waste Volume

Reducing food loss and decreasing the volume of waste has become a major challenge in Japan. NTT BUSINESS SOLUTIONS has teamed up with Well Create to rent the “Four Stars” food waste fermentation/decomposition system to food-related business operators without any initial investment costs. The fermentation/decomposition beds are turned into fertilizer and soil enhancer, and provided or sold to farmers as part of the food recycling system it has developed. A “mobile recycling truck” equipped with the system is used to demonstrate the collection and processing efficiency, and we work with restaurant chains to predict future demand based on numbers of customers and orders, weather information and other data. Calculating the amount of required ingredients helps to reduce the amount of overall food waste.

Business Activity 9

Appropriate and efficient management of water resources

Our commitment

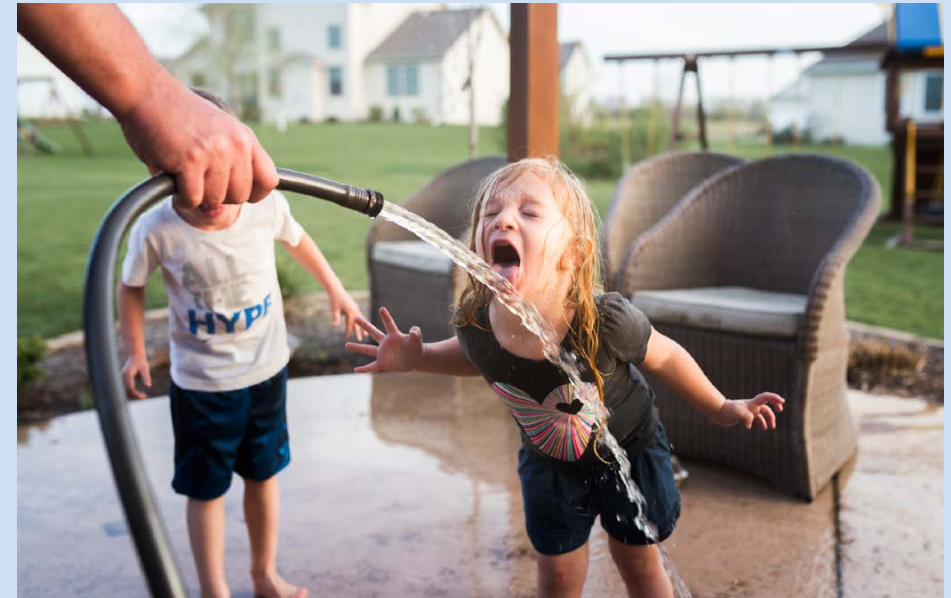
Managing water usage and
protecting valuable water
resources

Our objective

The NTT Group is Reducing its Consumption of Tap Water, and Implementing Thorough Measures Against Leakages of Chemical Substances into Wastewater.

Water Management

Due to the nature of the NTT Group's business, little water is consumed in our operations. In Japan, one-year domestic and industrial water consumption totaled 25.6 billion m³^{*1}, while the NTT Group's water consumption totaled 5.142 million m³, only about 0.02% of the total for all of Japan. Moreover, our water use is spread out across the country and so we believe our water intake does not have any significant impact on water sources. The NTT Group reduces its consumption of tap water by using recycled wastewater and rainwater. Research centers where we use chemical substances in our research activities implement individual measures against leakages of chemical substances into wastewater. For example, at the Atsugi R&D Center, which carries out research on the physical properties of materials, we have installed equipment to treat chemical-infused waste liquid discharged by the laboratories. Furthermore, we regularly monitor the quality of this wastewater to confirm that it is within legal regulation values. The NTT Group has not been involved in any significant spills.



NTT DATA Italia

Providing People All Over the World with Clean, Safe Drinking Water

NTT DATA Italia has been researching smart water management systems that incorporate IoT since 2016. Through processes such as hackathons, in which various engineers from throughout the company meet to share opinions and ideas, it has developed origAMI (original Advanced Metering Infrastructure).

In addition to enabling appropriate monitoring, such as reducing leakage rates by monitoring pipe networks in real time, this infrastructure also functions as a tool for the prevention of accidents by running simulations and accumulating measurement data for each region. Currently it is being used in public works in Italy and we plan to expand its use to other parts of Europe and then Asia.

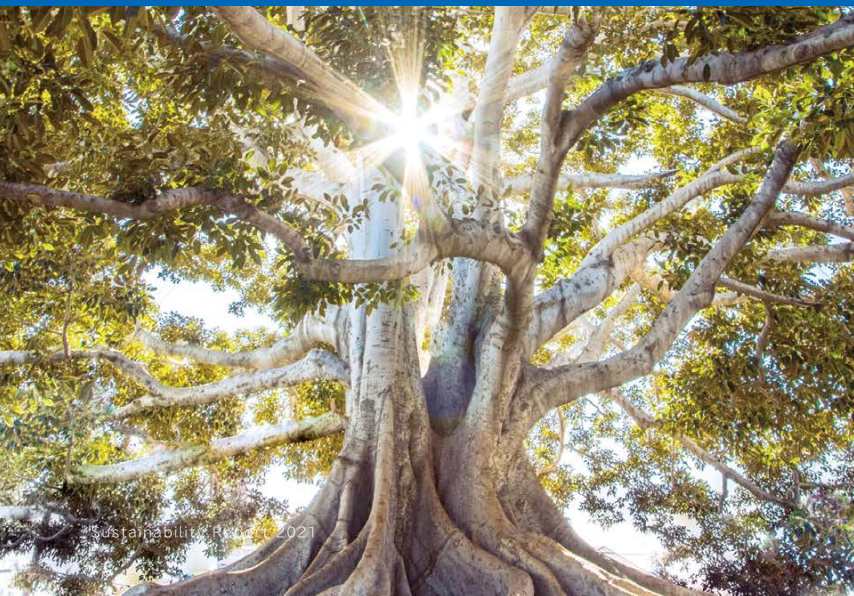
^{*1} From the Ministry of Land, Infrastructure, Transport and Tourism website. Actual water use in 2017 (water intake basis) was approximately 79.3 billion m³ per year (domestic and commercial use of water: approximately 14.6 billion m³; water for industrial use: approximately 11 billion m³; water for agricultural use: approximately 53.7 billion m³).

Social Challenge 3

A future where people and nature are in harmony

Business Activity

- 10. Thoroughly implementing environmental assessment
- 11. Contributing to natural ecosystem conservation



Why it matters

The NTT Group's businesses have an impact on ecosystems. For example, the telecommunication equipment essential to our business operations, particularly telephone poles and communications cables, is installed in the natural environment. At the same time, we are sometimes affected by the ecosystem, for example cables are bit and damaged by squirrels or crows. Ecosystems full of biodiversity provide the bounty, such as water and food, which is critical to supporting all forms of life on earth, and thus require a proper approach for conservation.

What can be accomplished

Through our business and employee activities, we will promote initiatives related to conserving ecosystems within nature, in order to ensure that nature is left untouched for future generations.

Future vision

The NTT Group is working to preserve the ecosystems, which are the foundation of society's activities, while also conducting environmentally friendly business activities that take into consideration the mutual influence between ecosystems and the NTT Group.

Business Activity 10

Thoroughly implementing environmental assessment

Our commitment

Implementing environmental assessments during the construction of data centers and other buildings

Our objective

The NTT Group adheres to its Green Design Guideline for Buildings when constructing new data centers or other buildings, and endeavors to reflect the necessary aspects in the facility's design.

Environmental Assessments during the Construction of Data Centers and Other Buildings

When planning to construct new data centers or other buildings, we research the historical, social, geographical, biological, and environmental attributes of the prospective building site and surrounding district based on our NTT Group Green Design Guideline for Buildings, and endeavor to reflect the necessary aspects in the facility's design. For example, we use native plant species as vegetation for greening our data centers, which have in recent times become the core components of ICT infrastructure. When drawing up proposals for the construction of new data centers for customers, the NTT Group applies the Comprehensive Assessment System for Built Environment Efficiency (CASBEE^{*1}) and submits proposals designed to obtain the highest CASBEE rank of S. While paying due consideration to the environment in this way, we also take care to minimize noise and vibration and maintain the scenic appeal of the district during construction while endeavoring to ensure that exhaust heat and noise from the air conditioning outdoor units and emergency generators of functioning data centers will have minimal impact on neighboring areas.

^{*1} CASBEE: A system for the comprehensive assessment of the quality of a building from such perspectives as environmental performance, interior comfort, and scenic appeal

^{*2} ZEBs are defined as buildings using advanced architectural designs that aim to realize substantial energy savings while maintaining the indoor environment by (1) reducing the energy loads, (2) positively utilizing natural energy by applying passive technologies, and (3) introducing high efficiency equipment and systems. They additionally aim to achieve the highest degree of energy independence and reduce the annual primary energy balance to zero by (4) introducing renewable energy.



NTT Urban Development

Shinagawa Season Terrace acquires “ZEB Ready” certification

Compared to standard buildings, Shinagawa Season Terrace is able to reduce its annual primary energy consumption in its office areas by 51% (43% for the entire building), and acquired the top 5 star rating in the Building-Housing Energy-efficiency Labelling System (BELS) and ZEB^{*2} Ready” certification in December 2019 for the office area that is its main application. Featuring atriums filled with natural light and wind, a heat discharge system using cool external air, air-conditioning using a sewage heat recovery system, recycled water, and more, Shinagawa Season Terrace is one of the highest standard environmentally friendly office buildings in Japan, with eco designs and facilities offering excellent comfort and energy efficiency.

Business Activity 11

Contributing to
natural ecosystem
conservation**Our commitment**

Business activities that
contribute to preservation of the
ecosystem

Our objective

The NTT Group is working on activities that
contribute to preservation of the ecosystem
by harnessing our information dissemination
capabilities.

Activities That Contribute to Preservation
of the Ecosystem

As a company providing ICT services, we are working
on contribution activities that harness our information
dissemination capabilities. As with the portal site
“Midori no goo” that makes it possible to contribute to
environmental protection by using it, we are working
to disseminate information and support information
exchanges for raising greater awareness about the
importance of the ecosystem among society.



“Midori no goo”

From August 21, 2007, NTT Resonant began donating part proceeds from users using the “Midori no goo” service to environment conservation groups involved in addressing environmental issues. To date it has donated 58,790,000 yen to 46 environment conservation groups, including FoE Japan, the Wild Bird Society of Japan, the National Land Afforestation Promotion Organization, and the Nature Conservation Society of Japan to help support their conservation activities. (As of March 31, 2021) “Midori no goo” is endorsed by 59 companies and their employees, who are making extensive use of the service within those companies.

Lifestyle-related columns include write-ups about enjoying natural lifestyles, details on nature experiences and outdoor activities, and information about how to coexist with Japan’s beautiful and abundant nature. Content related to learning about nature and the environment includes features of a wide range of natural environments, information on environmental approvals, environmental terminology, and more.

**NTT Ltd.**Monitoring System to Protect
South African Rhinoceroses from
Poaching

It is feared that rhinoceroses will become extinct by the year 2025. To prevent their becoming extinct due to poaching, NTT Ltd. is implementing ICT infrastructure that monitors and tracks the movements of people in the rhino habitat. This provides safe havens for the rhinoceroses, without putting them under stress.

NTT Group Disclosures in Line with TCFD Recommendations

In May 2020, the NTT Group declared its support for Task Force on Climate-Related Financial Disclosures (TCFD) established by the Financial Stability Board (FSB), and in its sustainability report of the same year, began disclosing information related to eleven items recommended in the TCFD declaration.

The results of scenario analysis conducted on the impact that climate change will have on the NTT Group in the future revealed various risks, particularly those related to policies, regulations and social demand aimed at transitioning toward a decarbonized society. To address these risks, the NTT Group established the new environment and energy vision "NTT Green Innovation toward 2040" with the aim of reducing emissions by 80% by 2030 and becoming carbon neutral by the year 2040, by increasing development and use of renewable energy sources and rolling out IOWN to significantly reduce power consumption and alleviate the impact of these risks. The NTT Group will be focusing on resilience linked to growing its own businesses, while also helping to resolve social issues caused by climate change and develop a sustainable society by providing services that contribute to carbon neutrality.

Item	Details																													
Governance a. Supervision system for directors b. Role of executives	The NTT Group recognizes that environmental issues are one of the most important challenges for management, and items of particular importance such as creating environmental targets for the entire group are decided based on discussions held with directors. An example that highlights this is NTT’s environment and energy vision “NTT Green Innovation toward 2040” announced in September 2021—this was established following discussions with all directors, including outside directors, held three times throughout the fiscal year. The Board of Directors made the decision in November 2021 to include non-financial KPIs such as GHG emissions into the business plans of each group company, with those attainment levels to be reflected in the compensation of directors as critical indicators. The supervision system for directors consists of the Sustainability Committee (chaired by the President) established in November 2021 directly under the Board of Directors, with the Green Innovation Committee established as an internal unit under the Sustainability Committee. The Global Environmental Protection Promotion Committee had previously managed and implemented environmental activities policies and their progress across the entire group, but these functions will be transferred to the Green Innovation Committee moving forward, to create a system where policies related to sustainability (the Charter and creating and abolishing accompanying policies, particularly deciding critical indicators) will be decided by the Board of Directors via the Sustainability Committee, and other matters will be decided by the Executive Officers Meeting. The role of the senior executives is to identify environmental issues and risks, and promoting businesses while taking into consideration these situations.																													
Strategy a. Specific risks and opportunities b. Impact on businesses, strategy and financial planning c. Resilience of strategy	Risks Identified with Scenario Analysis ■ Increase in costs for decarbonization and renewable energy charges ■ Criticism related to fewer efforts toward ESG ■ Increase in natural disasters such as heavy rain and flooding ■ Increases in air-conditioning and other electricity costs Response measures (Environment and Energy Vision “NTT Green Innovation toward 2040”) Green of ICT ■ Reduction of power consumption by introducing IOWN technologies ■ Developing and expanding the use of renewable energy, etc. Green by ICT ■ Acceleration of DX and promotion of Remote World ■ New services that contribute to carbon neutrality ■ Green electricity retail, etc. To business strategy opportunities The NTT Group carried out scenario analysis based on its own processes for selecting key environmental issues. The results revealed various risks, particularly those related to policies, regulations and social demand aimed at transitioning toward a decarbonized society. To combat these risks, the medium-term management strategy was revised with a focus on addressing environmental issues as a key priority. These will be linked to businesses via activities such as “Enhancement of corporate value through ESG initiatives,” “Reducing power consumption with innovation such as IOWN,” and “Developing and expanding the use of renewable energy,” to help develop a sustainable society.																													
Risk Management a. Risk identification, assessment processes b. Risk management processes c. Integration into overall risk management	The NTT Group strives to minimize the impact of losses that could result from the materialization of risk by anticipating and preventing the occurrence of potential risks, and has established Risk Management Regulations with the aim of defining fundamental policies concerning risk management. The Business Risk Management Committee has also been established, chaired by the representative director and senior executive vice president. The Committee takes a 2-pronged approach by analyzing risks from their degree of influence on business operations and frequency of occurrence, and identifies risks with the potential to have the greatest impact as material risks. The degree of impact that climate change will have is also analyzed by the degree of influence on business operations and frequency of occurrence, and as such, measures to tackle climate change like reducing greenhouse gas emissions were identified as a material risk. Should the NTT Group’s efforts to tackle climate change or disclosure of related information be viewed as lacking, there is the possibility that it could affect business management due to an insufficient level of understanding amongst customers, partner shareholders, employees, the local community, and other stakeholders. Furthermore, there could also be an increase in costs if new laws and regulations are enacted or intensified, which has the possibility of impacting business performance and financial conditions. In light of such risks, the NTT Group responded by holding discussions three times throughout the fiscal year involving all directors, including outside directors, to establish the environment and energy vision “NTT Green Innovation toward 2040,” by announcing in September 2021 the NTT Group’s commitment to measures aimed at addressing environmental issues. Looking ahead, the Green Innovation Committee operating under the Sustainability Committee will manage related processes and progress, and coordinate with the Business Risk Management Committee to integrate efforts with overall risk management and operate a PDCA cycle.																													
Metrics and Targets a. Metrics b. Actual GHG emissions c. Targets and actual results	The NTT Group has set the target of an 80% reduction in Scope 1 + 2 by fiscal 2030 (compared to fiscal 2013 levels), with the aim of becoming carbon neutral by the year 2040. This target was subsequently approved as the 1.5°C level by SBT in December 2021. Of electricity purchased during fiscal 2020, switching to renewable energy sources for more than 1.2 billion kWh (approx. 11% of purchased electricity) used by the entire group reduced greenhouse gas emissions by 3.99 million tons, a reduction of 14% compared to FY2013 levels. Scope 3 emissions in fiscal 2020 were 22.23 million t, a 5% reduction compared year-on-year^{*1}. Furthermore, in addition to these targets, various metrics like EP100 and EV100 were incorporated into group company business plans, highlighting the commitment of the entire group for tackling climate change. ^{*1} Estimated based on the Ministry of the Environment’s “Basic Guidelines on Accounting for Greenhouse Gas Emissions Throughout the Supply Chain.” GHG emissions (Scope1,2) <table><thead><tr><th>Year</th><th>Results</th><th>Targets</th></tr></thead><tbody><tr><td>2013</td><td>4.65</td><td></td></tr><tr><td>2018</td><td>4.72</td><td></td></tr><tr><td>2019</td><td>4.61</td><td></td></tr><tr><td>2020</td><td>3.99</td><td></td></tr><tr><td>2030</td><td></td><td>0.95 (80% reduction)</td></tr><tr><td>2040</td><td></td><td>Carbon Neutral</td></tr></tbody></table> GHG emissions (Scope3) <table><thead><tr><th>Year</th><th>Results</th></tr></thead><tbody><tr><td>2018</td><td>2,363</td></tr><tr><td>2019</td><td>2,350</td></tr><tr><td>2020</td><td>2,223 (-5% y-o-y)</td></tr></tbody></table>	Year	Results	Targets	2013	4.65		2018	4.72		2019	4.61		2020	3.99		2030		0.95 (80% reduction)	2040		Carbon Neutral	Year	Results	2018	2,363	2019	2,350	2020	2,223 (-5% y-o-y)
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NTT Group Disclosures in Line with TCFD Recommendations

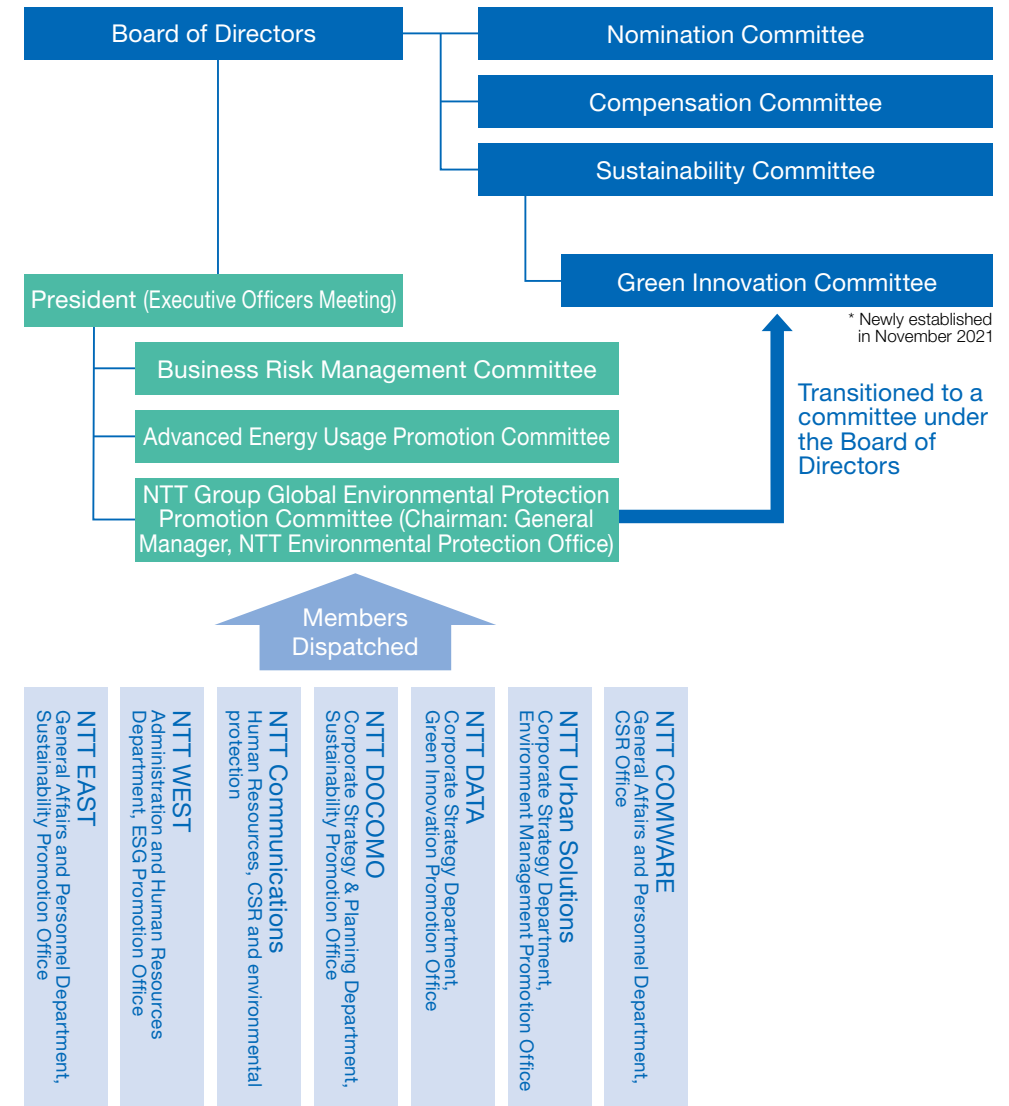
Environmental Management

The NTT Group recognizes that environmental issues are one of the most important challenges for management, and items of particular importance are decided based on discussions held with directors. An example that highlights this is the new environment and energy vision “Green Innovation toward 2040” announced in September 2021 – this was established following a decision made by the Board of Directors involving discussions with all directors, including outside directors, held three times throughout the fiscal year. In addition to incorporating greenhouse gas emissions into the business plans of each group company, attainment levels will be reflected in the compensation of directors as critical indicators.

>> [Non-financial KPI performance evaluations](#)

The supervision system for directors also consists of the Sustainability Committee (chaired by the President) established in November 2021 directly under the Board of Directors, with the Green Innovation Committee established as an internal unit under the Sustainability Committee. The Global Environmental Protection Promotion Committee had previously managed and implemented environmental activities policies and their progress across the entire group, but these functions will be transferred to the Green Innovation Committee moving forward. Under this system, policies related to sustainability (the Charter and creating and abolishing accompanying policies, particularly deciding critical indicators) will be decided by the Board of Directors via the Sustainability Committee, and other matters deemed important will be decided by the Executive Officers Meeting. The role of the senior executives is to identify environmental issues and risks, and promoting businesses while taking into consideration these situations. The Global Environmental Protection Promotion Committee is chaired by the NTT executive vice president, who is the head of NTT's Environmental Protection Office (Head of Research and Development Planning), with membership comprising the heads of the environmental departments at major Group companies. This committee met twice a year to raise suggestions for the basic policy related to environmental conservation such as developing the Environment and Energy Vision, as well as manage targets and resolve issues.

As electricity usage accounts for more than 90% of the NTT Group's greenhouse gas emissions, the committee also coordinates efforts with the Advanced Energy Usage Promotion Committee (chairperson: Vice President), responsible for managing the NTT Group's energy conservation activities (Total Power Revolution [TPR] campaign), to develop plans for reducing electricity consumption as well as managing implementation and progress.



NTT Group Disclosures in Line with TCFD Recommendations

Scenario Analysis

The NTT Group formulated the medium-term management plan “Your Value Partner 2025” to resolve social issues by advancing digital transformation through the Group’s business activities. Under the keywords “Your Value Partner,” we are working to achieve this plan by utilizing the Group’s management resources and capabilities, such as R&D, ICT infrastructure, and personnel as well as collaborating with partners.

In accordance with TCFD recommendations, we used two scenarios to identify risks and opportunities involved in the Group’s operations based on climate change: the first scenario limiting the increase in average temperatures at below 2°C from before the industrial revolution (2°C Scenario); and the second scenario where temperatures will increase by almost 4°C with measures to combat global warming maintained at existing levels (4°C Scenario).

Applying NTT Group’s selection process for identifying key issues to the 2°C scenario revealed transition risks associated with policies, regulations, and social demand aimed at transitioning to a decarbonized society. The 4°C scenario is also likely to bring about physical risks including those required for responding to frequent or more intense heavy rain and flooding, as well as increasing electricity costs due to severe temperature increases. In contrast, increased demand for cutting greenhouse gas emissions and switching to renewable energy sources as society as a whole moves toward decarbonization is thought to present an opportunity for the NTT Group as it will be able to provide a range of ICT services that help achieve carbon neutrality. Details of each risk and the degree of impact they may have, as well as the results of analysis and assessment of the growth opportunities arising from addressing each of these risks are outlined below.

[>> Key Issues Identification Process](#)

STEP1 Scenario Definitions

Scenario	Overview	Reference Methodology for Scenario
Transition Risk Scenario	Scenario in which the decarbonization of society is achieved rapidly..... a future in which the target increase of below 2°C (1.5°C) has been attained	IEA WORLD ENERGY MODEL DOCUMENTATION 2019
Physical Risk Scenario	Scenario in which physical risks materialize..... a future in which the average temperature has risen by 4°C	IPCC Fifth Assessment Report, Synthesis Report on Observations, Projections and Impact Assessments of Climate Change, 2018

STEP2 Risks and Opportunities Identified with Scenario Analysis (Overview)

Overview	2°C*1 Scenario	4°C*1 Scenario	Type	Timeframe*2	Response
Increase in costs for decarbonization and renewable energy charges	Loss ▼▼	—	Transition risk (policies, regulations)	Long-term	- Initiatives for realizing the IOWN concept - Introducing and expanding the use of renewable energy - Promotion of energy conservation, high-efficiency data centers
Social criticism related to fewer efforts toward ESG (drop in market share)	▼	Minor	Transition risk (market, criticism)	Long-term	Proactive disclosure of information on environmental initiatives
Expanding sales of services that help reduce society’s environmental impact	▲▲	Profit ▲	Opportunity (products and services, energy)	Long-term	- Creating new services that contribute to carbon neutrality - Increase in green electricity retail
Achieve the IOWN concept	▲▲	▲	Opportunity (investment toward R&D)	Long-term	- Acceleration of DX and promotion of Remote World - Reduction of greenhouse gases across the entire supply chain
Disasters caused by heavy rain and typhoons	Minor	▼	Physical risk (acute)	Short-term	Provide disaster response and disaster prevention training
Increased air-conditioning costs due to increasing temperatures	Minor	▼	Physical risk (chronic)	Long-term	Promoting energy conservation

*1 Degree of impact with 2°C scenario and 4°C scenario in FY2030

*2 Timeframes refer to Short-term (less than 3 years), Medium-term (3-6 years), Long-term (6 years or more). Degree of impact expressed in 3 levels (▲, Low; ▲▲, Medium; ▲▲▲, High)

NTT Group Disclosures in Line with TCFD Recommendations

Strategy

STEP3 Response to Risks and Growth Opportunities (2°C Scenario)

Risk Outline	Increase in costs for decarbonization and renewable energy charges	
Type	Transition risk (policies, regulations)	
Timeframe	Long-term	
Risk Details	The NTT Group uses more than 8 billion kWh of electricity each year to operate its telecommunications facilities in Japan, and this figure is expected to increase moving forward as data-driven society gains momentum. As society approaches decarbonization, renewable energy charges due to greater use of renewable energy and carbon tax systems will have a significant impact on the NTT Group's businesses. The Act on Special Measures concerning the Procurement of Renewable Electric Energy by Operators of Electric Utilities, which came into force in July 2012, stipulates that renewable energy charges due to the feed-in tariff will be recovered from users through a surcharge on electricity charges. Electricity prices were also raised in October of the same year on the use of all fossil fuels as part of measures to combat global warming. Carbon taxes aimed at achieving decarbonization of society as a whole are also already being introduced by governments in many countries and regions, and there are concerns about ever-increasing prices, as highlighted by the ten-fold increase in prices within the EU in five years.	
Response to Risks and Growth Opportunities	In September 2021, the NTT Group unveiled the new environment and energy vision, "NTT Green Innovation toward 2040" aimed at achieving zero environmental impact while continuing economic growth, by reducing the environmental impact of our business activities and creating breakthrough innovation. In accordance with this Vision, the following initiatives will be implemented with the aim of reducing emissions by 80% by 2030 and becoming carbon neutral by the year 2040^{*1}, to alleviate the impact of carbon taxes and associated risks. Key initiatives toward becoming carbon neutral by 2040 (1) Increase the use of renewable energy, to reduce greenhouse gas emissions by 45% (2) Lower energy consumption with IOWN technologies, to reduce greenhouse gas emissions by 45% (3) Reduce greenhouse gas emissions by 10% with ongoing energy conservation initiatives Meanwhile, increasing demand for switching to renewable energy sources as society as a whole moves toward decarbonization will present an opportunity for the NTT Group. In addition to reducing our own environmental impact (Green of ICT), the Environment and Energy Vision also covers initiatives to reduce the environmental impact of society (Green by ICT) by providing services that help to achieve carbon neutrality. An example that highlights this is the planned green electricity retail, where renewable energy sources developed by NTT Group are not only used within the company but also made available to customers. As companies seek to cut their greenhouse gas emissions, they will switch from on-site data centers to cloud-based data centers that have a higher energy efficiency. This is expected to increase demand for such services, and the increased use of high-efficiency data centers is another area that presents an opportunity for the NTT Group.	

>> [\[Feature 1\] Environment and Energy Vision
NTT Green Innovation toward 2040](#)

>> [Business Activity 3
Developing and expanding the use of renewable energy](#)

>> [Business Activity 2
Reduction of power consumption by introducing IOWN
technologies](#)

>> [Business Activity 4
Providing new services that contribute to carbon neutrality](#)

>> [Business Activity 1
Promoting energy conservation](#)

^{*1} Compared to FY2013 (GHG Protocol: for Scope 1 and 2)

NTT Group Disclosures in Line with TCFD Recommendations

Strategy

STEP3 Response to Risks and Growth Opportunities (2°C Scenario)

Risk Outline	Social criticism related to fewer efforts toward ESG (drop in market share)								
Type	Transition risk (market, criticism)								
Timeframe	Long-term								
Risk Details	The NTT Group provides a comprehensive range of ICT services, including NW services and data centers. It is focusing efforts on cutting greenhouse gas emissions through increased use of ICT services, such as accelerating efforts toward DX for business operations, promoting Remote World including TV conference systems, and other forms of energy management systems. As awareness of issues related to climate change increase and there societal preferences toward companies making efforts to tackle climate change, there is the risk of decreased revenue and profits due to a drop in market share if the company is seen as lagging behind its competitors with respect to climate-related awareness. And should greenhouse gas emissions increase as a result of expanding business faster than energy-efficiency initiatives can cut down those emissions, stakeholders may view the NTT Group as lacking in its motivation to cut emissions and negatively affect their valuation of the company. This presents a financial risk caused by lower revenue and falling share prices as customers move to other companies.								
Response to Risks and Growth Opportunities	NTT Group will help develop a sustainable society by implementing the following initiatives to achieve carbon neutrality by 2040: (1) Expanding the use of renewable energy (2) Reduction of power consumption by introducing IOWN technologies (3) Ongoing energy conservation initiatives The NTT Group is also proactive in disclosing information to stakeholders, with proactive disclosure of information on environmental initiatives and through general meetings of shareholders and engaging in dialogue with stakeholders. In fiscal 2020, the NTT Group acquired the highest A List rating by CDP, the Carbon Disclosure Project. It also announced its environment and energy vision, “NTT Green Innovation toward 2040” in September 2021, outlining a specific target for achieving carbon neutrality. Approval of that target as the 1.5°C level was received by SBT in December 2021.		NTT Group's greenhouse gas emissions reduction target based on 1.5°C level approved by Science Based Targets initiative Tokyo, Japan - December 3, 2021 - NTT Corporation (NTT) has revised its greenhouse gas (GHG) emissions reduction target in the new environment and energy vision “NTT Green Innovation toward 2040”. The Science Based Targets (SBT)¹ initiative approves NTT Group's FY2030 GHG reduction target based on limiting global temperature rise to no more than 1.5°C. The NTT Group formulated the new environment and energy vision “NTT Green Innovation toward 2040”² on September 28, 2021. The NTT Group aims to reduce GHG emissions by 80% (carbon neutrality for mobile and data centers sectors) by FY2030 and to be carbon-neutral by FY2040. With respect to Scope 1 (direct emissions by businesses, such as fuel combustion) and Scope 2 (indirect emissions from the use of electricity, heat and steam supplied by other companies), we have raised the NTT Group's FY2030/31 GHG emissions reduction target from 30% (Well below 2°C level, approved in 2020) to 80% (1.5°C level), and is approved by the SBT initiative.  DRIVING AMBITIOUS CORPORATE CLIMATE ACTION NTT Group's GHG emissions reduction targets <table><tr><th>Scope</th><th>Target</th></tr><tr><td>Scope 1 and 2</td><td>80% reduction by FY2030/31 from a FY2018/19 base year (1.5°C level)</td></tr><tr><td>Scope 3³</td><td>15% reduction by FY2030/31 from a FY2018/19 base year</td></tr></table> For the benefit of society, the NTT Group will step up its efforts to achieve carbon neutrality to society and contribute to the Japanese government's targets of reducing GHG emissions by 46% in FY2030 from FY2013 levels and achieving carbon neutrality by 2050. 1 Scientifically based greenhouse gas emission reduction targets for corporates in accordance with the Paris Agreement. The SBT initiative, a climate change initiative led by the United Nations Global Compact (UNGC), the CDP (formerly the Carbon Disclosure Project), the World Resources Institute (WRI), and the World Wide Fund for Nature (WWF), designates the targets. 2 NTT Group's New Environment and Energy Vision “NTT Green innovation toward 2040” https://group.ntt/en/news/esss/2021/09/28/210728a.html 3 Scope 3: Indirect emissions other than Scope 1 and Scope 2 (emissions in the supply chain related to business activities)	Scope	Target	Scope 1 and 2	80% reduction by FY2030/31 from a FY2018/19 base year (1.5°C level)	Scope 3 ³	15% reduction by FY2030/31 from a FY2018/19 base year
Scope	Target								
Scope 1 and 2	80% reduction by FY2030/31 from a FY2018/19 base year (1.5°C level)								
Scope 3 ³	15% reduction by FY2030/31 from a FY2018/19 base year								

NTT Group Disclosures in Line with TCFD Recommendations

Strategy

STEP3 Response to Risks and Growth Opportunities (2°C Scenario)

Risk Outline	Disasters caused by heavy rain and typhoons
Type	Physical risk (acute)
Timeframe	Short-term
Risk Details	The NTT Group supports society and business activities through its telecommunications networks and information systems. In addition, the NTT Group provides a multitude of services that serve as necessary lifelines that ensure people's safety in their everyday lives. Earthquakes, tsunamis, typhoons, floods, and other natural disasters may cause disruptions to business operations, and present a risk in providing reliable services. The NTT Group may also be held liable for related damages, potentially damaging the NTT Group's credibility and corporate image.
Response to Risks and Growth Opportunities	Provide disaster response and disaster prevention training To reduce the risk of service interruptions due to natural disasters, the NTT Group is working to strengthen the resilience of our equipment and ensure early restoration of telecommunications services by expanding base stations equipped to deal with disasters, deploying and enhancing the functions of mobile power supply vehicles, portable satellite equipment, and other mobile equipment as well as participating in disaster drills held in the respective regions. NTT's telecommunications equipment and buildings are designed to withstand natural disasters. For example, our facilities are equipped with flood doors and other defenses according to their location to prevent the inundation of telecommunications equipment. Customers also face the same risk of natural disasters and system failures, and an increase in demand for BCP-related ICT services is expected as they also will seek appropriate contingencies. The NTT Group is focusing on the development of smart grids based on battery farms, to contribute to local production and consumption of energy.

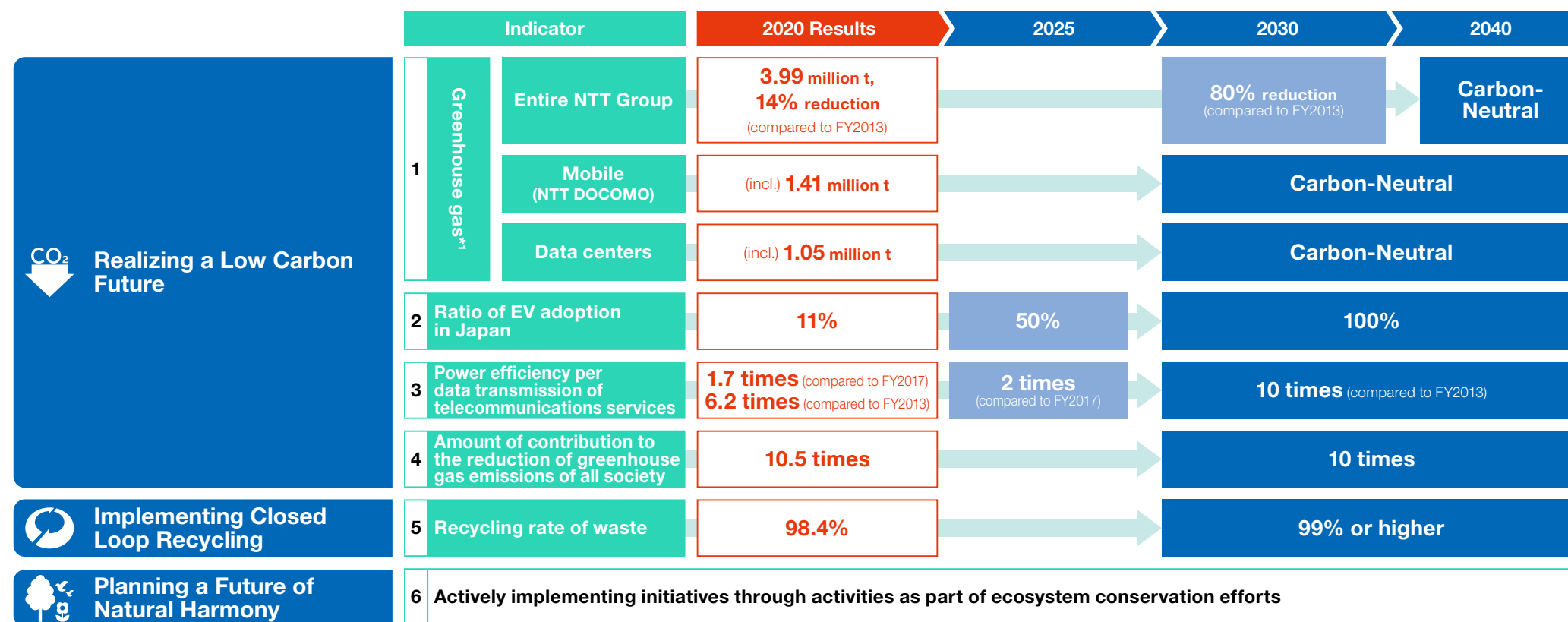
Risk Outline	Increased air-conditioning costs due to increasing temperatures
Type	Physical risk (chronic)
Timeframe	Long-term
Risk Details	The NTT Group owns a large number of communications buildings and data centers in Japan and abroad. The equipment used at our telecommunications facilities and data centers is set to operate within a specific range of temperatures. Those exceeding this range could cause equipment shutdowns and failures. For this reason, we maintain room temperatures within a certain range, including through the use of air conditioners. When ambient temperature rises, the energy efficiency of air conditioners declines and that in turn raises electricity consumption.
Response to Risks and Growth Opportunities	Promoting energy conservation We have been pursuing measures for reducing electricity usage related to air conditioning equipment to minimize the increase in operating costs. Specifically, we operate air conditioner optimal control systems that save energy. We have installed wireless temperature sensor modules that automatically control the air conditioners in response to temperatures detected by the sensors. We also seek to conserve electricity by maintaining appropriate temperature settings for air conditioners, by installing diffusers and blank panels to release exhaust heat from equipment, and by efficiently laying out double flooring to improve airflow and prevent hotspots. >> Business Activity 1 Promoting energy conservation

NTT Group Disclosures in Line with TCFD Recommendations

Metrics and Targets

In accordance with the NTT Group's selection process for identifying key issues, key performance indicators (KPIs) have been established for verifying the practicality and effectiveness, and monitoring progress of initiatives covered by the three challenges of "Ensuring the positive coexisting of nature and humanity."

>> [Key Issues Identification Process](#)



Disclosure Boundary

Boundary [C]: Greenhouse gas (No. 1), Amount of contribution to the reduction of greenhouse gas emissions of all society (No. 4)

Boundary [B]: Ratio of EV adoption in Japan (No. 2), Resource recycling rate (No. 5)

The telecommunications businesses subject to the calculation for power efficiency per data transmission of telecommunications services are the six domestic businesses of the telecommunications business segment appearing in our Annual Report (NTT East, NTT West, NTT Communications, NTT DOCOMO, and NTT DATA)

*1 GHG Protocol: for Scope 1 and 2

NTT Group Disclosures in Line with TCFD Recommendations

Greenhouse Gas Emissions

The NTT Group's emissions across its entire supply chain in fiscal 2020 was 26.21 million tons, a reduction of 1.89 million tons (7%) compared to the previous year. More than 1.2 billion kWh of renewable energy (approx. 11% of purchased electricity) was made available during fiscal 2020, resulting in Scope 1 + 2 emissions of 3.99 million tons, a reduction of 6.2 million tons (13%) compared to the previous year. Scope 3 emissions for fiscal 2020 were 22.23 million tons, a reduction of 5% compared to the previous year (estimated based on the Ministry of the Environment's "Basic Guidelines on Accounting for Greenhouse Gas Emissions Throughout the Supply Chain").

Due to the very nature of the NTT Group's businesses, greenhouse gas emissions arising from the supply chain (Scope 3) are much higher than direct emissions from the group's own activities (Scope 1+2), and measures will be implemented to reduce such emissions from across the entire supply chain. The NTT Group will revise its own Guidelines for Green Procurement to achieve more effective reductions through fiscal 2021.

>> [Guidelines for Green Procurement](#)

Amount of greenhouse gas from entire supply chain (Scope 1, 2, 3)

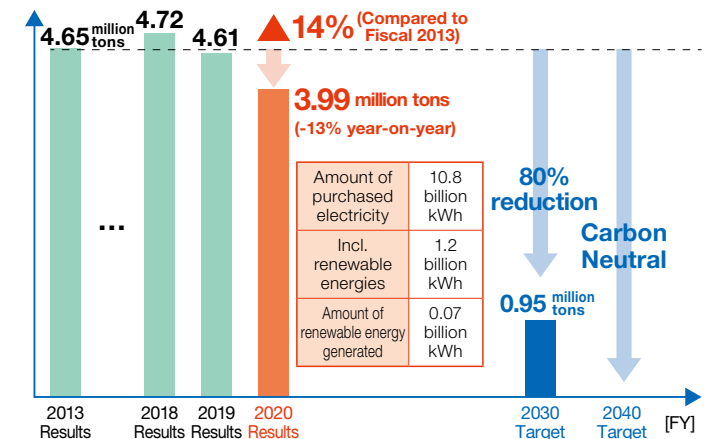
Scope, Category	Scope and method of calculation	Emissions (ten thousand tons)		
		Fiscal 2018	Fiscal 2019	Fiscal 2020
GHG emissions	—	2,835	2,811	2,621
Scope 1 (direct emissions)	—	25	25	24
Scope 2 (indirect emissions from energy use)	—	447	436	375
Scope 3 (indirect emissions from the value chain)	—	2,363	2,350	2,223
Category 1 Purchased goods and services	Calculation based on the number of units and monetary value of purchases of devices and services sold to customers	741	599	624
Category 2 Capital goods	Calculation based on capital investment costs on telecommunications and other equipment	591	628	554
Category 3 Fuel- and energy-related activities not included in Scope 1 or 2	Calculation based on annual consumption by energy type	38	60	61
Category 4 Upstream transportation and distribution	Calculation based on weight and distance, or number of devices with regard to the transport of devices sold to customers	8	5	8
Category 5 Waste generated in operations	Calculation based on volume of waste by type	1	1	1
Category 6 Business travel	Calculation based on paid expenses for business travel	10	19	4
Category 7 Employee commuting	Calculation based on paid expenses for employee commuting	6	7	3
Category 8 Upstream leased assets ^{*1}	Excluded from calculation ^{*1}	—	—	—
Category 9 Downstream transportation and distribution ^{*2}	Excluded from calculation ^{*2}	—	—	—
Category 10 Processing of sold products ^{*3}	Excluded from calculation ^{*3}	—	—	—
Category 11 Use of sold products	Calculation based on number of service subscriptions, number of devices and monetary value of telecommunications services and devices used by customers	706	735	668
Category 12 End-of-life treatment of sold products	Calculation based on number of service subscriptions, number of devices and monetary value of communications devices used by customers	5	5	4
Category 13 Downstream leased assets	Calculation based on amount of electricity consumption such as equipment by other businesses Calculation based on average use of leased assets	87	75	74
Category 14 Franchises	Calculation based on total floor area of sales franchises	11	9	8
Category 15 Investments	Calculation based on Scope 1 and 2 emissions of investees in proportion to shareholding	159	207	214

*1 We have excluded Category 8 (upstream leased assets) from the calculation because the fuel and electricity used by leased assets is included in Scope 1 and 2 calculations.

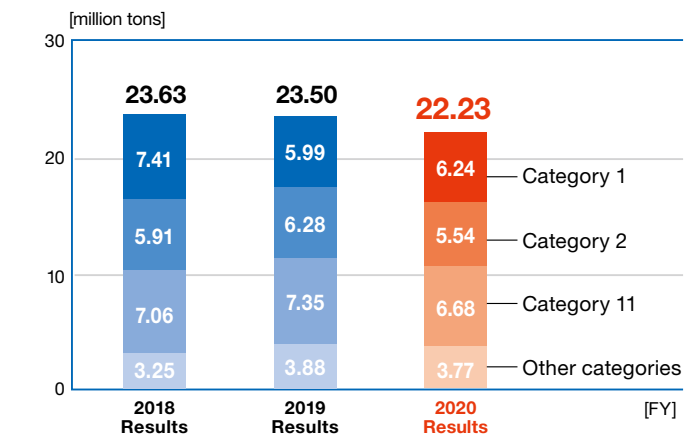
*2 We have excluded Category 9 (downstream transportation and distribution) from the calculation because these emissions are almost entirely from our own transportation and use in our own facilities (included in Scope 1 and 2) or from outsourced transportation (included in Category 4).

*3 We have excluded Category 10 (processing of sold products) from the calculation because our main businesses involve no processing of intermediate products.

Greenhouse Gas Emissions (Scope 1, 2)



Greenhouse Gas Emissions (Scope 3)



Change in calculation method

Calculations for Category 1 and Category 2 in FY2019 used emission intensity defined by the Ministry of the Environment, but for FY2020 emission intensity of each company is used for some supplier (calculated from figures released by each company), to factor in reduction efforts by each supplier.

NTT Group Disclosures in Line with TCFD Recommendations

Reduction of Greenhouse Gas Emissions across Society and Power Efficiency of the Telecommunications Business

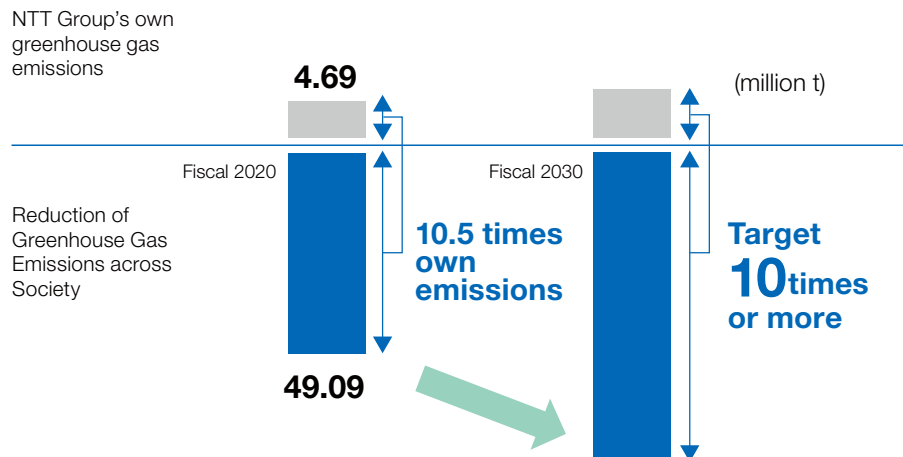
Reduction of Greenhouse Gas Emissions across Society

The NTT Group has established a target for fiscal 2030 calling for it to contribute to reducing greenhouse gas emissions of society as a whole by at least 10 times more than the NTT Group's own emissions through its services and technologies. This target is intended to contribute to the reduction of greenhouse gas emissions across society by providing ICT services and technologies while curbing greenhouse gas emission amounts from our own business activities. The use of information communication, which is expanding each year through the spread of smartphones and high-speed and large-capacity networks, requires energy. On the other hand, by improving efficiency and reduction of goods through digitalization, the use of information also contributes to the reduction of greenhouse gas emissions across society by reducing environmental load more than the energy consumption it requires.

* The reduction of greenhouse gas emissions across society quantifies the energy savings effects obtained through ICT services using greenhouse gas volume. The energy saving effect is quantified with references to the Telecommunication Technology Committee (TTC) Standard "Methodology for the assessment of the environmental impact of information and communication technology goods, networks and services (JT-L1410)" and the calculation method specified by the "LCA of Information and Communication Technology (ICT) business organizations" research group of the Life Cycle Assessment Society of Japan.

* The effects of energy savings obtained through the introduction of ICT services include, for example, reduced electricity usage by homes, companies and factories from energy management, alleviation of traffic congestion using analysis of congestion and operation information, and reduced electricity usage from the streamlining and optimization of transportation schedules.

* The amount of greenhouse gas emissions for the NTT Group includes the emissions from facilities necessary for other telecommunication carriers and data centers to provide their services.



Power Efficiency of the Telecommunications Business

The NTT Group has established the target for fiscal 2030 to improve the power efficiency per data transmission in our telecommunications business to at least 10 times higher*¹ than in fiscal 2013*¹. Electricity is essential to the continuity of the telecommunications business and it also accounts for more than 90% of the NTT Group's greenhouse gas emissions. We set this target because improving the efficiency of using electricity both reduces the risk of business disruptions and helps mitigate climate change. We are introducing highly energy efficient equipment and improving the efficiency of network structures based on our Energy Efficiency Guidelines.

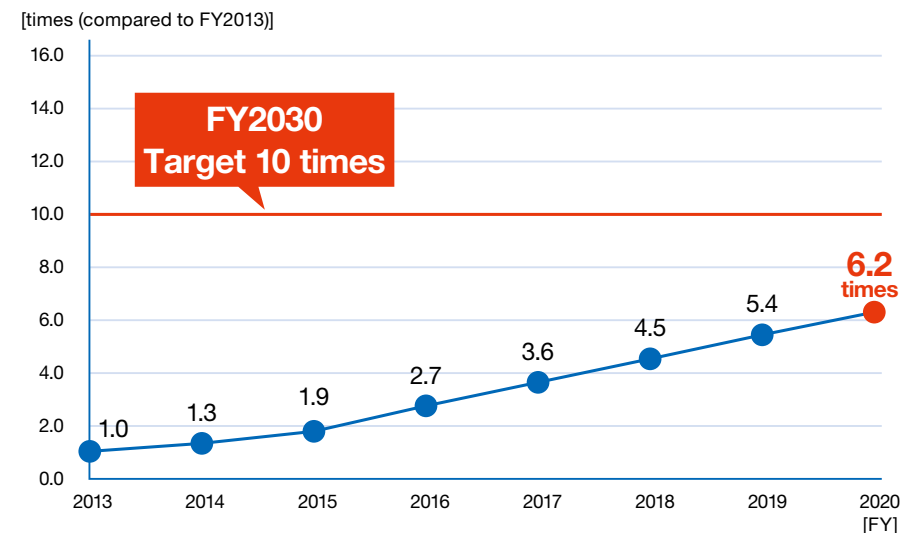
[>> Energy Efficiency Guidelines](#)

In October 2018, NTT became the first telecommunications carrier in Japan to join the EP100*² international initiative on energy efficiency led by The Climate Group. By participating in such an international initiative, we intend to publicly declare the NTT Group's commitment to the environment and express our stance on international environmental issues.

*¹ The telecommunications businesses subject to the calculation for power efficiency are the domestic businesses of the five telecommunications business segment appearing in our Annual Report (NTT East, NTT West, NTT Communications, NTT DOCOMO, and NTT DATA).

*² An international initiative comprising companies pledging to double the energy efficiency of their operations (improve energy efficiency by 50%) as participants.

Power efficiency of the telecommunications business (improvement rate with FY2013 as benchmark)



NTT Group Disclosures in Line with TCFD Recommendations

Environmental Performance Data (Realizing a Low Carbon Future)

			Unit	FY2016	FY2017	FY2018	FY2019	FY2020		
Status of ISO 14001 Certification Acquisition (employee coverage)			%	47.1	47.9	45.1	46.5	49.5		
			Unit	FY2016	FY2017	FY2018	FY2019	FY2020		
Direct Greenhouse Gas Emissions (Scope 1)			million tons of CO ₂	0.19	0.185	0.164	0.138	0.131		
Indirect Greenhouse Gas Emissions (Scope 2)* ²			million tons of CO ₂	4.40	4.21	3.29	3.06	2.87		
						(4.14)	(3.79)	(3.57)		
CO ₂ Emissions from Business Operations* ¹ , * ²	Total CO ₂ emissions		million tons of CO ₂	4.58	4.38	3.44	3.19	2.98		
						(4.29)	(3.92)	(3.69)		
	Breakdown	Use of electricity		4.375	4.183	3.259	3.031	2.839		
		Use of gas and fuel				(4.115)	(3.764)	(3.544)		
		Use of vehicle operation				0.134	0.135	0.118	0.101	0.096
		Use of heat				0.038	0.033	0.031	0.027	0.021
			0.029	0.027	0.029	0.03	0.029			
Greenhouse Gas Emissions other than CO ₂ Emissions (CO ₂ emissions-equivalent)	Total GHG emissions other than CO ₂		million tons of CO ₂	0.018	0.016	0.016	0.011	0.014		
	Breakdown	CH ₄ (methane)		0.002	0.003	0.002	0.002	0.002		
		N ₂ O (nitrous oxide)		0.003	0.002	0.002	0.002	0.001		
		HFC		0.01	0.007	0.007	0.006	0.009		
		PFC		0.003	0.003	0.004	0.0005	0.001		
		SF ₆ (sulphur hexafluoride)		0.001	0.001	0.001	0.0004	0.001		
		NF ₃ (nitrogen trifluoride)		0	0	0	0	0.0		
				0	0	0	0	0.0		
Electric Power Consumption	Electricity purchased* ²		billion kWh	8.36	8.23	6.54	6.59	6.67		
						(82.4)	(82)	(82.8)		
				0.09	0.08	0.07	0.07	0.07		
Total amount of non-renewable energy used* ² , * ³			billion kWh	9.36	9.2	7.43	7.38	7.41		
						(9.13)	(8.98)	(9.01)		
Clean Energy Generation (Solar power, wind power, etc.)			million kWh	5.204	5.822	5.858	6.764	6.33		
Number of Clean Energy Generators (Solar power, wind power, etc.)			Units	258	336	360	332	392		
Number of Low-Emission Company Vehicles (Hybrid vehicles, electric vehicles, natural gas vehicles, and methanol vehicles)			Units	2,065	2,181	2,346	1,740	2,760		
Fuel Consumption by Company Vehicles	Gasoline consumption		kl	12,545	10,631	10,111	8,767	6,646		
	Diesel consumption		kl	3,347	2,970	2,701	1,868	2,224		
	LPG/natural gas consumption		m ²	12,937	30,760	39,320	52,905	63,058		

*1 The CO₂ emissions from business operations exclude emissions of greenhouse gases other than CO₂.

*2 The NTT Group provides equipment and the like necessary for other telecommunications carriers and data center providers to carry out their businesses. To date, we have included the fuel and electricity required for this equipment in our disclosed emission and consumption volumes in accordance with reporting methods outlined by the Act on Promotion of Global Warming Countermeasures. However, as calculation methods have been established based on the Ministry of the Environment's Basic Guidelines on Accounting for Greenhouse Gas Emissions Throughout the Supply Chain (Ver. 2.3), we have adopted these for calculating the above CO₂ emissions as Scope 3. Emission amounts calculated using the previous method have been placed within parentheses. Similarly, for amounts of electricity purchased and total amount of non-renewable energy, from fiscal 2018 onward we are excluding the amount consumed by other telecommunications carriers and data center providers, and values calculated using the previous method will be placed within parentheses, and we have adopted these for calculating the above CO₂ emissions as Scope3 from fiscal 2019.

*3 For the total amount of non-renewable energy used, the volume of fuels such as gasoline and utility gas consumed have been converted into Wh values and added to the amount of electricity purchased.

* Disclosure Boundary: Boundary [B]

NTT Group Disclosures in Line with TCFD Recommendations

Environmental Performance Data (Implementing Closed Loop Recycling)

				Unit	FY2016	FY2017	FY2018	FY2019	FY2020
Waste and Final Disposal Waste	Total Waste			million t	0.608	0.531	0.562	0.744	0.469
	Recycling rate* ¹			%	98.8	98.6	98.9	98.7	98.4
	Recycling	Total amount of recycling		million t	0.601	0.524	0.556	0.735	0.462
		Breakdown	Recycled decommissioned telecommunications equipment	million t	0.24	0.22	0.176	0.146	0.14
			Recycled construction works waste	million t	0.175	0.133	0.223	0.325	0.185
			Recycled civil engineering works waste	million t	0.14	0.129	0.115	0.228	0.106
			Recycled office waste	million t	0.036	0.033	0.03	0.027	0.024
			Others	million t	0.01	0.008	0.012	0.009	0.007
	Amount of waste reduced by incineration			million t	0.001	0.001	0.001	0.001	0.001
Amount of final disposal waste			million t	0.006	0.006	0.005	0.008	0.006	
Final Disposal Ratio* ²	All waste			%	1.03	1.18	0.91	1.13	1.38
	Recycled decommissioned telecommunications equipment			%	0.07	0.07	0.05	0.06	0.19
Asbestos Removed from NTT Group Facilities	Total amount of asbestos removed			t	18	19	6	52	73
	Breakdown	Buildings		t	5	4	4	19	68
		Bridges		t	12	15	2	32	6
Use of Water Resources	Water Use*			Million m³	12.422	12.591	12.066	11.044	9.938
	Water Withdrawal (tap water)			Million m³	—	—	6.275	5.834	5.142
	Volume of recycled wastewater and rainwater	Reused		Million m³	0.524	0.492	0.489	0.167	0.358
		Reuse rate* ³		%	4.2	3.9	7.2	2.8	6.5
Virgin Pulp Consumption	Total			million t	0.019	0.017	0.014	0.012	0.008
	Breakdown	Telephone directories		million t	0.013	0.012	0.009	0.007	0.004
		Telegrams		million t	0.0002	0.0002	0.0002	0.0002	0.0
		Office paper		million t	0.002	0.002	0.002	0.002	0.001
		Billing statements		million t	0.004	0.003	0.003	0.003	0.003
Paper Consumption Reductions from Web Billing Service	Number of users			Millions	36.07	35.36	33.71	33.64	3201
	Paper consumption reductions			t	3,362	3,216	3,082	2,981	2,871

*¹ Recycling rate: Recycling/Total waste*² Final disposal ratio: Amount of final disposal waste/Total waste*³ The reuse rate shown up to fiscal 2017 corresponds to the total volume of tap water and sewage, recycled water, and rainwater used, while the reuse rate from fiscal 2018 onward corresponds to the total volume of tap water, recycled water, and rainwater.

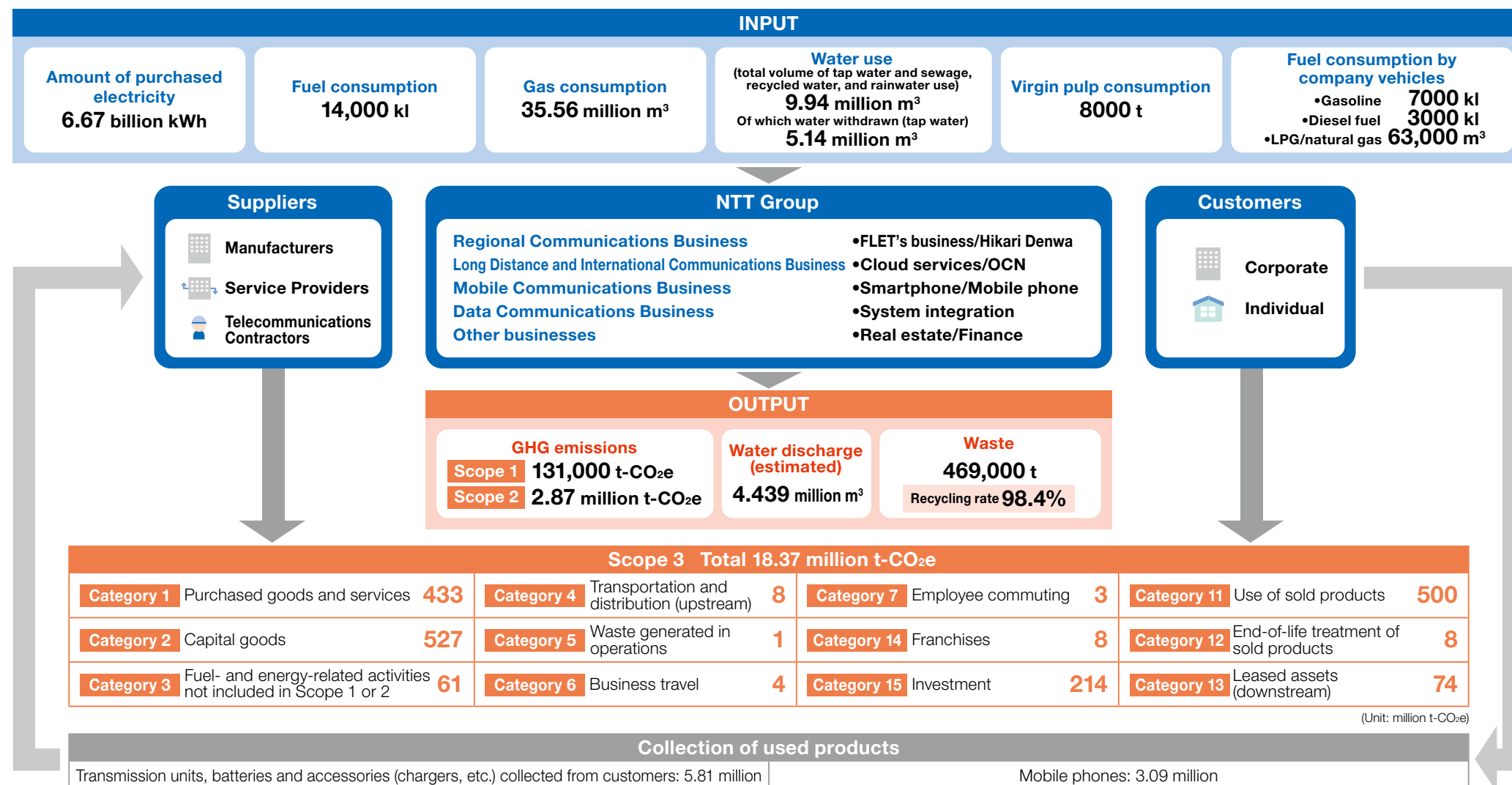
* Disclosure Boundary: Boundary [B]

	Unit	FY2016	FY2017	FY2019	FY2020
Expenditures on Biodiversity Preservation Projects	Million yen	421.4	544.7	558.0	332

NTT Group Disclosures in Line with TCFD Recommendations

Material Balance of the NTT Group (Fiscal 2020)

To minimize the environmental impacts of our business activities, the NTT Group endeavors to gather and analyze information on the resources and energy that it consumes and the resulting environmental impacts.



* Disclosure Boundary: Boundary [B]

NTT Group Disclosures in Line with TCFD Recommendations

Environmental Accounting

The NTT Group introduced environmental accounting in fiscal 2000 to boost the efficiency and effectiveness of its environmental conservation efforts by quantitatively determining the costs of environmental conservation programs undertaken as part of its business activities as well as their effects (economic and material benefits). Moving forward, we aim to implement even more efficient and effective environmental management by continuously carrying out quantitative monitoring and analysis to understand the effects of our environmental activities, clarifying outstanding issues, and sharing information.

- Scope of data
The companies subject to consolidated environment accounting are NTT, NTT East, NTT West, NTT Communications, NTT DATA, NTT DOCOMO and their group companies.
- Applicable period
Data for fiscal 2019 is from April 1, 2019 to March 31, 2020.
Data for fiscal 2020 is from April 1, 2020 to March 31, 2021.
- Accounting method
Accounting is based on the NTT Group Environmental Accounting Guidelines. These guidelines comply fully with the Environmental Accounting Guidelines 2005 issued by the Ministry of the Environment.
Environmental conservation costs are tabulated separately as environmental investments and environmental costs. Personnel costs and depreciation costs are also included in environmental costs.
Reductions in CO₂ emissions through energy conservation measures are calculated by subtracting actual emissions from projected emissions in the event that no such measures were taken.

Category	Environmental investment (billion yen)		Environmental costs (billion yen)		Economic benefits (billion yen)			Material benefits (thousands of tons)		
	FY2019	FY2020	FY2019	FY2020		FY2019	FY2020		FY2019	FY2020
(1) Business area costs	9.35	7.13	19.83	22.52						
• Pollution prevention costs	0.24	0.29	5.05	3.24						
• Global environmental conservation costs	8.92	6.77	3.01	7.98	Cost reductions through energy conservation	6.37	5.42	Reductions in CO ₂ emissions through energy conservation measures	119	102
• Resource recycling costs	0.19	0.07	11.77	11.30	Revenues from sale of recyclable waste (decommissioned telecommunications equipment, etc.)	6.51	5.96	Recycled decommissioned communications equipment	146	140
					Waste disposal cost reductions through recycling	0.16	0.19	Recycled construction waste	325	185
					Cost reductions through reuse of decommissioned telecommunications equipment	23.02	14.04	Recycled civil engineering works waste	228	106
					Cost reductions through reuse of telecommunications devices	13.86	11.21	Recycled office waste	27	24
					Cost reductions through reuse of office waste materials	0.00	0.00	Other recycled items	9	7
(2) Upstream/downstream costs	0.08	0.05	9.77	10.20	Revenues from sale of recyclable waste (subscriber communications devices, etc.)	0.47	0.71	Number of communications devices collected from customers (thousands)	7581	5810
					Cost reductions in postal expenses through computerization	1.37	11.90			
(3) Administrative costs	0.17	0.21	5.13	4.49						
(4) R&D costs	3.16	2.00	8.45	9.77						
(5) Social activity costs	0.00	0.00	0.06	0.04						
(6) Environmental remediation costs	0.00	0.00	0.00	0.00						
Total	12.76	9.40	43.24	47.01	Total	64.16	49.43			

NTT Group Disclosures in Line with TCFD Recommendations

Main Initiatives

Environmental Guidelines

NTT Group operations have the following four key attributes: (1) procurement of a great many products; (2) possession of many buildings; (3) high electricity consumption by telecommunications equipment; (4) in-house R&D facilities. To promote the effective reduction of our environmental impacts, we have drafted the following green guidelines that address each of these four key attributes:

- “Guidelines for Green Procurement”
- “Green Design Guideline for Buildings”
- “Energy Efficiency Guidelines”
- “Green R&D Guidelines”

In particular, the development and procurement of ICT devices with outstanding energy efficiency is essential for the effective reduction of greenhouse gas emissions of the NTT Group.

To address this issue, we have been applying the NTT Group Energy Efficiency Guidelines since May 1, 2010. These guidelines give concrete form to the ICT device-related energy-saving stipulations of our Guidelines for Green Procurement and Green R&D Guidelines, and define our basic philosophy and device-specific targets with respect to the development and procurement of routers, servers, and other ICT devices used in the NTT Group. Under the Energy Efficiency Guidelines, the NTT Group develops and procures ICT devices with consideration for energy-efficient performance in addition to function, performance, and cost. We are endeavoring to apply these initiatives to the reduction of electricity consumption and concomitant greenhouse gas emissions related to customer communications.

The “Guidelines for Green Procurement” were revised in April 2021, and now ask suppliers to include initiatives for reducing their environmental impact.

Disseminating Environmental Activities Policies and Measures among Employees

NTT Group conducts environmental education to disseminate NTT Group policies and measures among employees and develop a shared understanding of Group-wide activities for promoting environmental protection. In fiscal 2020, we also provided training related to the Group’s environmental activities for all employees, such as group training and e-learning.

The NTT Environmental Protection Office organizes environmental education for staff in charge of environmental issues at each Group company and has been holding study sessions every year since fiscal 2001. Along with lectures for disseminating our environmental policies and sharing outstanding issues, we invite outside lecturers to speak on recent topics. These study sessions are intended for the NTT Group throughout Japan and are therefore offered via a teleconferencing system so that staff in remote areas can attend and ask questions through two-way connections. This paperless approach is also another way the NTT Group is helping to reduce greenhouse gas emissions resulting from holding meetings.

In fiscal 2020, we invited experts on environmental management and CSR to explain the SDGs and ESG and to speak about environmental management. Furthermore, related staff in Group companies introduced their environmental initiatives with the aim of promoting environmental activities at each Group company.

Compliance with Environmental Laws and Regulations

The NTT Group complies with laws and regulations related to the environment and works to reduce its impacts on the environment. We have established a mechanism that can deal with cases of legal violations on a Group-wide basis by reporting to the Global Environmental Protection Promotion Committee. There were no legal violations nor payments of penalties in fiscal 2020, following the same result for fiscal 2019.

As part of its environmental management measures, the Group also tracks the number of complaints related to the environment for each fiscal year. In fiscal 2020, no complaints related to environmental impact were submitted, handled or resolved through our systems for dealing with complaints.

Going forward, we will maintain compliance with existing laws and regulations as well as set up a working group on environmental laws and regulations to help step up our preparations for complying with laws and regulations under review or scheduled to take effect.