Response to Climate Change

Our Approach

As the world shifts course dramatically and heads toward realization of carbon neutrality by 2050, ICT companies are expected to fulfill an increasingly large number of roles and responsibilities. NEC will reduce the environmental footprint of its products and services while helping customers decarbonize through the use of ICT.

NEC has positioned climate change (decarbonization) as one of the Company's priority management themes from an ESG perspective—materiality.

Based on the NEC Environmental Policy and the Course of Action for Climate Change Towards 2050, we have extended the climate change countermeasures of our environment-oriented business management beyond the use of ICT in reducing the CO_2 emissions of customers and society to encompass preparations for the range of impacts from climate change. As a result, our climate change countermeasures are providing value both in terms of mitigation and adaptation.

In March 2021, NEC announced NEC Environmental Targets 2030. Setting these additional climate change-related targets will help us to step up business-based strategic activities as well as activities aimed at reducing our environmental footprint.

Disclosure in Line with the TCFD

In 2018, NEC announced its endorsement of the Task Force on Climate-related Financial Disclosures (TCFD). Pursuant with the TCFD's recommendations, we are disclosing climate-related risks and opportunities while projecting and managing their financial effect on our businesses going forward.

TCFD Recommendations		Disclosure
Governance	The organization's governance and climate-related risks and opportunities	P.35
Strategy	The actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning	P.36, 39–42
Risk Management	The processes used by the organization to identify, assess, and manage climate-related risks	P.35, 36, 39–42
Metrics and Targets	The metrics and targets used to assess and manage relevant climate-related risks and opportunities	P.28–32, 43

Scenario Analysis

To enhance its resilience in the face of an uncertain future, NEC uses multiple scenarios to forecast possible future societies and consider countermeasures. As we use a significant amount of electricity at our business sites, we believe the 2°C scenario, in which carbon prices would be expected to increase, is important. In addition, we conduct analysis based on a 4°C scenario, in which significant climate change is envisioned.

In developing the scenarios, we referred to the IPCC's Representative Concentration Pathway (RCP) 2.6 and RCP 8.5, respective Nationally Determined Contributions, the *World Energy Outlook*, Shared Socioeconomic Pathway (SSP) 1, SSP 3, and ICT technology trends and forecasts. Our scenario analysis envisions 2030 and 2050 and covers the entire extent of supply chains.

● The 4°C Scenario

In this scenario, there are more weather disasters, and business continuity risk increases. NEC conducts most of its business in Japan. According to a climate change impact assessment report released by the Ministry of the Environment in December 2020, the likelihood of severe risk materializing is high with respect to increased flooding due to heavy rainfall. In the 4°C scenario, society sees this risk rise. In such a society, the operational stability of the data centers supporting our customers' businesses would become more important than ever. NEC has been strengthening its BCP measures through such efforts as building data centers in locations with low risk of natural disasters and ensuring that, in the event of an emergency, data centers can operate for 72 hours using only in-house power generation. We have been strengthening our BCP measures, and we will continue taking countermeasures in anticipation of increasingly severe weather disasters.

On the other hand, as society must adapt to climate change, demand for ICT-enabled adaptation solutions will increase. For example, areas in higher latitudes may become suitable for crops, and farmers may need to grow new crops. For example, CropScope, an ICT platform developed by NEC in collaboration with the major food processer KAGOME CO., LTD., can support farmers' implementation of such adaptation measures. Specifically, sensors collect data on crop growth, weather, and the soil environment, which can be shared among stakeholders to generate new insights. Moreover, AI analysis can suggest the best way to manage each field. NEC's ICT solutions for visualization, analysis, and responses will also contribute greatly to society's adaptation measures in the areas of disaster prevention and mitigation in relation to increasingly severe rainfall and flooding, infrastructure maintenance, and heat stroke prevention.

● The 2°C Scenario

In this scenario, carbon pricing is introduced worldwide to curb greenhouse gas emissions, and costs arising from the CO_2 emissions of our business activities increase. The *World Energy Outlook 2019* estimates that the carbon price will reach $100 per ton of CO_2 in 2030. If it achieves the SBT of a 55% reduction in CO_2 emissions versus the fiscal 2018 level, NEC will record Scope 1 and 2 CO_2 emissions of approximately 210,000 tons per year in fiscal 2031. If carbon pricing were applied to these residual emissions, NEC would incur a cost of ¥2.3 billion per year, assuming a foreign exchange rate of US$1.00=¥110. To minimize this transition risk, in 2021 NEC joined the RE100 and is increasing its use of renewable energy.

In addition, the 2°C scenario assumes a rigorously decarbonized society in which advanced, ICT-enabled measures to reduce CO_2 emissions are in place. For example, logistics optimization solutions can help reduce CO_2 emissions by shortening transportation lead times and reducing inventories. In Japan and international, NEC provides services that make logistics visible through the use of the IoT, radio-frequency identification (RFID), AI, cloud computing, and other technologies. In India, NEC has established NICDC Logistics Data Services as a joint venture with National Industrial Corridor Development Corporation Limited. The new company provides the Logistics Data Bank service, which allows users to check the exact location of in-transit containers in real time, thereby remedying the problem of not knowing when containers will arrive. Through improvements in transport efficiency and the accuracy of production plans, this service contributed to a year-on-year reduction in annual CO_2 emissions of approximately 170,000 tons in fiscal 2018. Since then, we have broadened the scope of the service, and as of 2021 more than 95% of containers in circulation are visible. As society moves toward decarbonization, demand for this type of NEC service is set to become even greater.

● Introduction of Internal Carbon Pricing

With the aim of improving energy efficiency and promoting the introduction of low-carbon facilities and equipment, we have set an internal carbon price. This price allows us to convert the CO_2 reduction that would result from a given capital investment into a monetary value, which we can then use as a reference when making investment decisions.

Furthermore, the aforementioned carbon pricing mechanism will drive our decarbonization activities going forward and reduce the risk associated with potential increases in carbon taxes and emissions trading in a carbon-free society of the future.

Risks and Opportunities

NEC categorizes the short-, medium-, and long-term impacts of climate change on its businesses as either risks or opportunities.

In studying risks or opportunities, we began by mapping out the positions of existing businesses in relation to climate change.

	Mitigation	Adaptation
Opportunities	Opportunities to help with climate change mitigation	Opportunities to help with climate change adaptation
Risks	Risks related to climate change mitigation	Risks related to climate change adaptation

◆ Endorse the TCFD recommendations and regularly assess risks and opportunities from short-, medium-, and long-term perspectives*3
◆ Identify assets in relation to risk countermeasures and opportunities

*3 SSP 1 (2°C scenario) and SSP 3 (4°C scenario) projected through 2050

Risks	Description	Countermeasures
Migration risk	Impact of carbon pricing on profit (Carbon tax: US$40–80/t$CO_2$ in FY2021, projected to be US$50–100/t$CO_2$ in 2030)	Thorough efforts to improve efficiency and expansion of renewable energy in order to reach the SBTs by 2030 and achieve zero CO_2 emissions by 2050
Physical risk	Disruption of the supply chain due to weather-related disasters (floods, landslides, water shortages, etc.), long-term outages of lifelines such as electricity, gas, and water	Risk assessment of the entire supply chain, BCP measures with provisions for weather-related disasters, and strengthening of power generators in data centers

Opportunities	Description	Countermeasures
Value toward migration risk countermeasures	Development of low-emission transport infrastructure	Logistics visualization and route optimization driven by AI and IoT; EV/PHV charging cloud
	Support for expanding renewable energy use	Virtual power plants, management of power supply and demand, commercialized resource aggregation (RA) for the supply and demand adjustment market, xEMS, etc.
	Support for reducing energy waste	Process reforms using DX initiatives (work automation, smart factories, supply and demand optimization), products, and technologies that help save Data Center energy (phase change cooling, new refrigerants, etc.)
Value toward physical risk countermeasures	Preparation for increase in weather-related disasters	Pre-disaster detection using AI, IoT, image analysis, flood simulation, evacuation support, etc.
	Preparation for increase in forest fires	Forest fire monitoring and quick response systems, disaster monitoring by satellite, etc.
	Preparation for changes in areas suitable for agricultural production	Simulations that forecast effects and changes in agriculture, agriculture-oriented ICT solutions, etc.
	Preparation for the spread of infectious diseases	Infectious disease countermeasures using NeoFace, preparation of a logistics information management platform in the event of a global infectious disease, remote work, telemedicine support, etc.

Then, we used scenario analysis to assess how climate change could affect these businesses. Next, we outlined a vision of our responses to climate change issues. For particularly large risks and opportunities, we set out measures and included them in the Mid-term Management Plan 2025.

● Helping with Mitigation

Our ICT solutions reduce the overall CO_2 emissions of customers by enabling their operations to become paperless and by improving the efficiency of work, the movement of people, and the movement and storage of goods. As customers and society move forward with measures to lower CO_2 emissions, the opportunities for NEC's ICT solutions to make a contribution will increase.

Helping Companies Achieve Net Zero through the Resource Aggregation Business

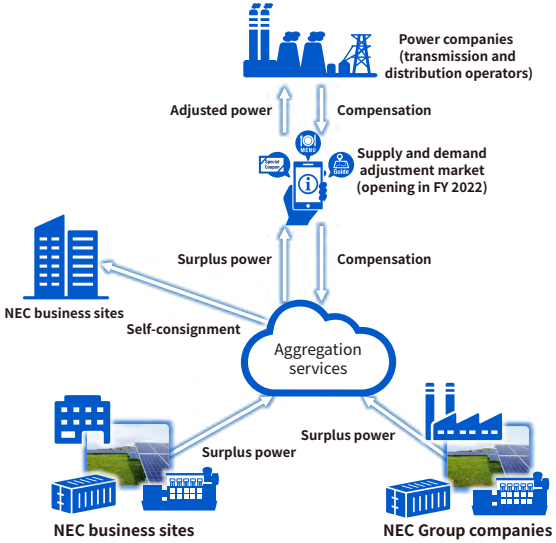
With the aim of achieving carbon neutrality, efforts to make renewable energy humanity's mainstay source of electricity are proceeding on a global scale. In Japan, with the increased introduction of solar power and wind power, which have large fluctuations in power output, maintaining a balance between demand and supply in power grids is becoming more challenging. To address this problem, in April 2021 a reserve capacity market was established, which facilitates reserve capacity trading and thereby helps maintain a balance between supply and demand through absorption and augmentation in response to fluctuations in the supply of power from renewable energy. In the past, reserve capacity was supplied by aging thermal power plants with low operating rates. Since the opening of the market, however, storage batteries, private power generators, and other distributed power sources that can respond to fluctuations with a high degree of flexibility have also been able to supply their reserve capacity. As the reserve capacity supplied by distributed power sources can replace the reserve capacity supplied by aging thermal power plants, distributed power sources will play a major role in establishing renewable energy as society's mainstay power source.

By using new energy management technology that enables the integration and remote control of such distributed power sources as the power generation facilities and storage batteries of companies, NEC

realizes virtual power plants that are an aggregation of all distributed power sources and function just as if they were actual power plants. In this way, we are helping to stabilize the power grid and make renewable energy the mainstay power source. Since 2019, NEC has been offering the NEC Energy Resource Aggregation Cloud Service, which is enabled by NEC's IoT technology. This service uses ICT to forecast demand and control and optimize multiple energy facilities, such as solar power generation installations, storage batteries, and electric vehicles (EVs). By remotely controlling consumers' storage batteries and energy management systems in light of the supply–demand balance and using demand response*2 to curb demand, the service helps stabilize the power grid. As these types of control also eliminate the unevenness and waste in solar power generation, they pave the way to zero emissions for individual companies. With its sights set on decarbonizing society as a whole, NEC will use the aforementioned technologies to become a resource aggregator that controls distributed power sources within the Group and at customers' sites and participates in the power trading market.

*2 Curbing consumers' use of power by changing power consumption patterns through the pricing of power or the payment of incentives when the market experiences price hikes or when grid reliability is low

Our Aggregation Service



● Helping with Adaptation

The social infrastructure business, on which NEC is focusing its efforts, can help society adapt to the range of impacts stemming from climate change, including disasters, water shortages, food shortages, and health hazards.

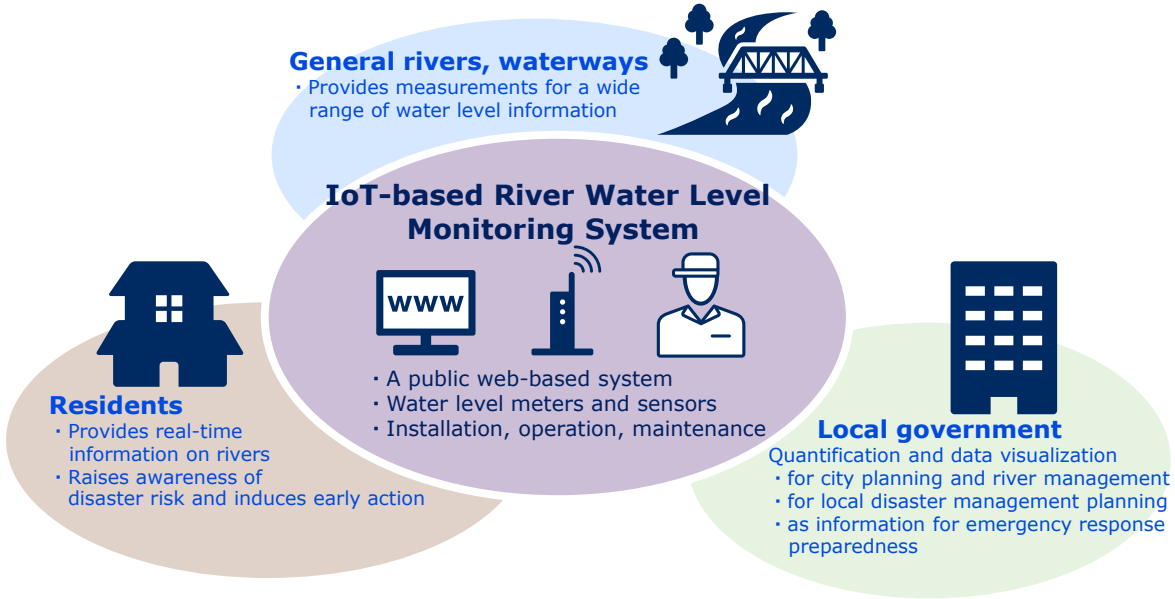
IoT-based River Water Level Monitoring System

According to the United Nations IPCC, climate change is expected to increase the risk of flood damage in large cities and the risk of infrastructure shutdowns due to extreme weather events. In Japan, damage caused by the flooding of small rivers during typhoons and torrential rain is becoming a problem. Consequently, there is a need to monitor river levels in real time and provide information to residents.

In response to this risk, NEC is developing the IoT-based River Water Level Monitoring System, which can help keep communities safe by using low-power wide-area (LPWA) technology to collect real-time data on changes in the water level of rivers and by making the collected data visible via the internet. The system's dirt-proof, non-contact remote sensors do not require separate power supplies and are easy to install. The sensors update data on river water levels hourly in normal times and every 10 minutes during heavy rain. This data is sent to a cloud server using LPWA technology and made available to the public through a website. Municipal authorities can use the information to establish local disaster prevention plans and emergency responses. In addition, residents can access information on rivers in real time, enabling them to prepare early and heightening their awareness of disaster prevention. As of March 2021, we have already begun conducting proving tests of the system in the regions of more than five municipal authorities in Japan.

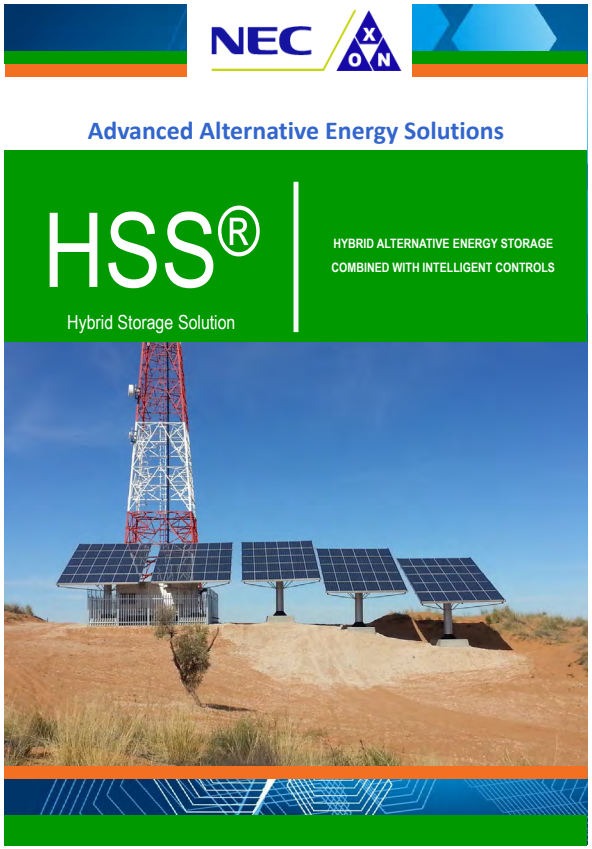
A sensor installed near a riverbank

IoT-based River Water Level Monitoring System



Reducing CO_2 Emissions in Africa with a Hybrid Energy Storage System

Registration with UNIDO's Sustainable Technology Promotion Platform



In the developing countries of Africa and other continents, cell phones are rapidly spreading and becoming an indispensable means of communication in daily life. With cell phones being used for internet communication that enables remittance services, remote medical services in rural areas, and education for children, providing stable mobile communication infrastructure is essential for the comfort and richness of life in developing countries.

However, since most of the base stations of mobile communications carriers are located at off-grid sites, the stable operation of communication equipment is usually realized by running generators produce electricity around the clock (24 hours 365 days). These generators run on diesel, and continuously transporting diesel from cities to rural areas—sometimes far from hundreds of kilometers—is extremely costly and labor intensive. Moreover, from an environmental viewpoint, using and transporting a petroleum-based fuel emits a great deal of CO_2.

To address such social and environmental issues, NEC XON Holdings (Proprietary) Limited, an NEC Group company based in South Africa, has developed a Hybrid Energy Storage System.

Combining storage batteries, control systems, solar panels, and diesel generators, the system has IoT-enabled sensors that allow data to be collected from base stations. With reference to data on past load power usage and decades of weather data, AI-based data analysis technology is used to predict the power generation of the solar panels. These predictions are then used for suggestions on how best to combine base stations' power sources. As well as reducing the use of diesel and lowering CO_2 emissions, the system will facilitate the stable operation of base station communications equipment for mobile communications carriers. What is more, surplus power can be used through mini-grids by residents of nearby communities.

Our hybrid energy storage system can also be used in combination with the power grids, even in "bad grid" areas with power grids that are unstable and have frequent power outages, which is a common issue in developing countries. When power grid outages occur, the system has an automatic control function that switches over to the storage batteries or starts up the generator if the storage batteries are empty. Also, we provide the system in an outdoor-use cabinet with an anti-theft design. The aforementioned features allow flexible rollouts of the system that cater to the particular conditions in each developing country.

For example, in a trial in Kenya the system demonstrated that it can significantly reduce CO_2 emissions. Compared with levels before its trial introduction, the system achieved decreases of 80% in diesel consumption and 90% in diesel generator operating time.

Since 2018, we have introduced the system to South Africa, Nigeria, Kenya, Tanzania, Ethiopia, and the Democratic Republic of Congo, and the development and usage of the system is evolving constantly to meet the needs of customers and consumers.

In 2021, the system was registered with the United Nations Industrial Development Organization (UNIDO)'s Sustainable Technology Promotion Platform and certified as a solution contributing to SDGs 8 and 9.

Our hybrid energy storage system, which has been introduced to numerous countries

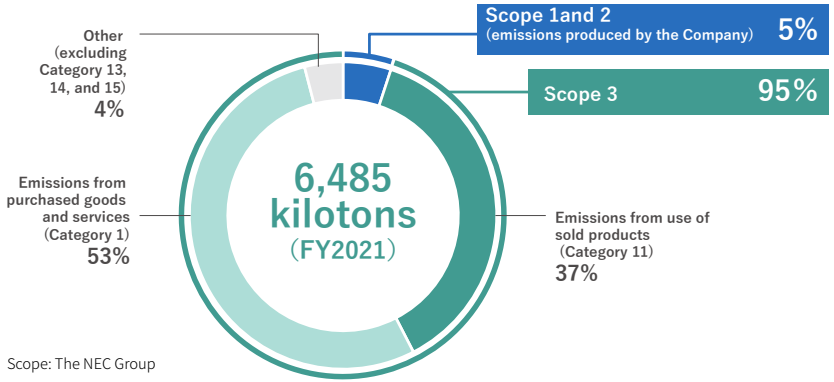
Indicators and Performance

● Overall Greenhouse Gas Emissions from Our Supply Chains

In NEC's case, greenhouse gas emissions from supply chains (Scope 3) are much larger than those from the Company itself (Scope 1 and 2). With this in mind, we are promoting the reduction of greenhouse gas emissions from our supply chains as a whole.

In fiscal 2021, our supply chains emitted 6,485,000 tons of greenhouse gas in total. Included in this amount, our Scope 1 and 2 greenhouse gas emissions decreased 46,000 tons year on year. This reduction was attributable to our greater use of renewable energy, the disposal of Group companies, and an increase in telework.

Greenhouse Gas Emissions, Scope 1 to 3



Breakdown of Scope 3 Greenhouse Gas Emissions ✓

Scope3

Unit: Kilotons

Category		Emissions
1	Purchased goods and services	3,445
2	Capital goods	147
3	Fuel- and energy-related activities not Included in scope 1 or scope 2	53
4	Upstream transportation and distribution	83
5	Waste generated in operations	6
6	Business travel	15
7	Employee commuting	1.2
8	Upstream leased assets	6
9	Downstream transportation and distribution	0.01
10	Processing of sold products	0.2
11	Use of sold products	2,389
12	End-of-life treatment of sold products	0.3
13	Downstream leased assets	-
14	Franchises	-
15	Investments	-
	Total	6,158