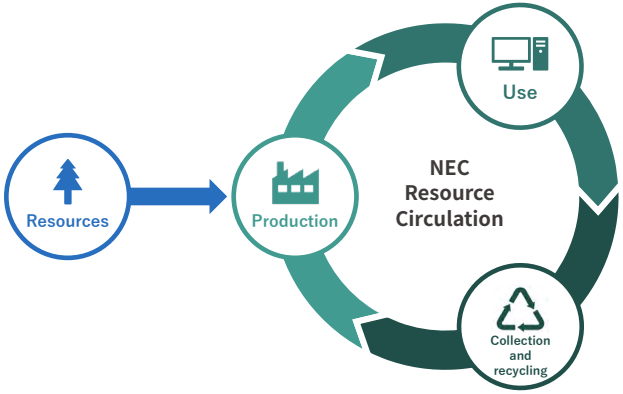
Resource Circulation and Pollution Prevention Initiatives

Our Approach

To help realize a sustainable society, NEC strives for effective use of limited resources and is committed to activities based on our Environmental Policy, which affect every process from production to use. This includes initiatives to promote resource circulation and efforts to lessen environmental impact through waste reduction or other methods. In particular, we are working to collect and recycle hardware products that have been used by customers, since many resources are used in their production.

Collection and Recycling



Resource Circulation Initiatives

Total Waste Emissions

In order to reduce its environmental impact, NEC conducts activities with an annual goal of reducing its total waste emissions by 0.7% per year, compared with fiscal 2019.

In fiscal 2021, NEC reduced total waste emissions by 7% year on year, thereby achieving its goal. This is due to efforts such as enhanced waste segregations, conversions to sellable materials, paper reduction by digitalization, and the reuse of cushioning materials.

In an effort to be increasingly diligent in our pursuit of proper waste disposal, we also perform regular on-site checks targeting contractors to ensure that outsourced industrial waste goes through an appropriate disposal process.

Waste with High Environmental Impact

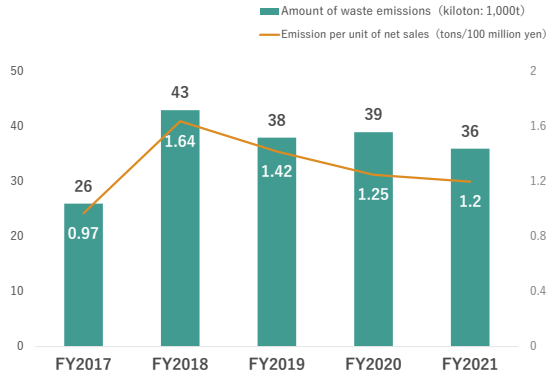
NEC engages in the sale and manufacture of information equipment such as servers, routers, and wireless communication equipment. These products are made using a wide variety of chemical substances, and if these substances are not disposed of properly after use, they will have a major impact on the environment. Therefore, in 2001 NEC became a certified processor of industrial waste, a first for the electronics industry, and since then the Company has become committed to collecting and recycling its products. Moreover, when procuring parts necessary for the manufacture of our products, we are mindful, starting from the product design stage, of selecting parts that will be easy to recycle and will not cause environmental damage.

Recovery of used information equipment totaled 1,922 tons in fiscal 2021. The recycling rate*1 was 98% of that in the previous fiscal year, and the resource-reuse rate*2 was 91% of that in the previous fiscal year, maintaining our high standards. Going forward, we will continue to recycle limited resources to make effective use.

*1 Recycling rate: The ratio of the weight of reused, material-recycled, and thermal-recycled items to the total weight of the collected IT devices

*2 Resource-reuse rate: The ratio of the weight of materials that can be used as recycled products (parts reuse) or resources (material recycling) to the total weight of the collected IT devices (defined by the Law for the Promotion of Effective Utilization of Resources)

Total Waste Emissions and Emission Intensity



Breakdown of Waste Emissions

(Unit: Tons)

	FY2017	FY2018	FY2019	FY2020	FY2021
Total waste	25,853	42,593	38,318	38,589	35,886
General waste	2,198	2,251	2,156	2,328	1,823
Industrial waste	20,225	36,611	35,030	31,993	26,772
Specially controlled industrial waste	3,113	3,380	633	2,756	5,755
International waste	317	351	499	1,512	1,536
Recycling	22,564	36,686	34,504	36,612	29,057
Recycling rate	87.3%	86.1%	90.0%	94.9%	81.0%

● Response to the Issue of Marine Plastics

NEC is working to resolve the issue of marine plastics through its business activities and through in-house initiatives. In terms of business activities, we support the development of products that utilize biomaterials as well as microplastic analysis driven by AI. In-house initiatives include reducing PET bottle usage and eliminating plastic bags at company shops.

● Recycling Home Gateway Devices

NEC provides rentals of home gateway devices, including Wi-Fi routers and security devices. To reduce waste when rental devices are returned, we are actively engaged in effective resource reuse.

The Kakegawa Plant of NEC's affiliate NEC Platforms, Ltd. is involved in recycling the Wi-Fi routers it has produced back into finished products. Routers that have exceeded their useful life are collected from customers and the plastics used in the cases are disassembled, crushed, and pelletized, and then remolded into Wi-Fi router cases to turn them back into finished products.

This initiative is highly regarded outside the company, which has received awards including the Resource Circulation Technology and Systems award.

● NEC's Local Resource Circulation Services

NEC aims to promote local resource circulation and community building with the goal of creating circular economies.

This service is intended to encourage the circulation of resources and energy within local communities by generating visual data on resident participation and recovery of resources, such as food waste collected at local garbage collection points.

Residents can record their recycling activities by simply holding a special IC card at a check-in terminal whenever they visit a garbage collection point.

Upon recording their activities, residents receive "gratitude feedback" based on the nudge theory*3 of behavioral economics, a process supervised by Professor Akira Goto of Meiji University. We expect that this feedback will increase residents' motivation to continue recording their activities.

*3 "Nudging" is a means of encouraging people to perform desirable actions of their own accord through methods and frameworks drawn from behavioral science.

Verification Trials of ICT for Generating Visual Data on Food Waste Sorting

Verification trials were conducted jointly by NEC Group company NEC Solution Innovators, Ltd., Amita Corporation, and Rias Engineering, aimed at raising awareness of residents' participation in the separation and collection of food waste. These experimental trials received the "Best Nudge Award" in the Best Nudge Award Contest in 2019, hosted by the Ministry of the Environment.

Issues to be resolved

We would like to increase the effectiveness of the biogas facility established by Amita Corporation, to be a base for the local circulation of resources and energy. Therefore, it is necessary to increase the amount of waste collected in order to raise the level of food waste sorting with the cooperation of local residents.

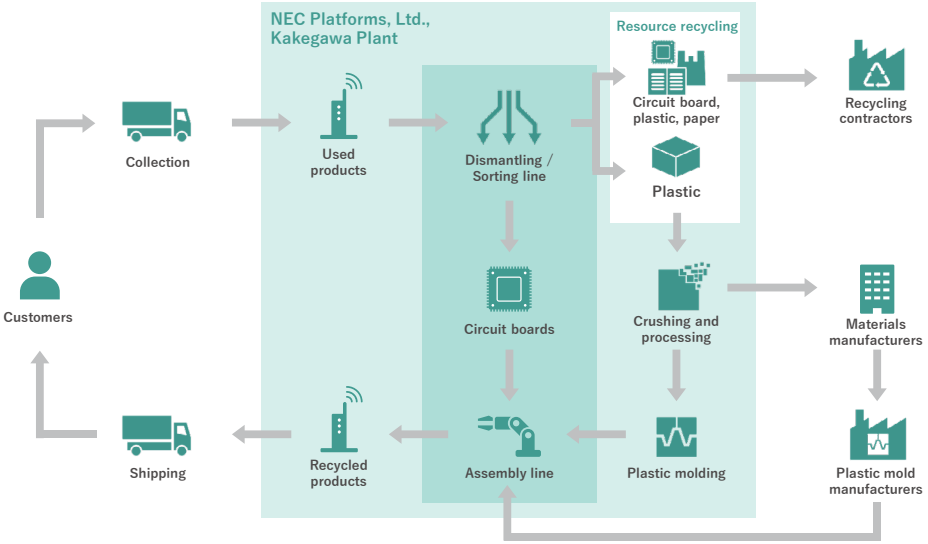
Initiatives

- Efficient monitoring of participation in food waste sorting
- Provide positive feedback for participation (a message of gratitude as feedback for disposal and separation)

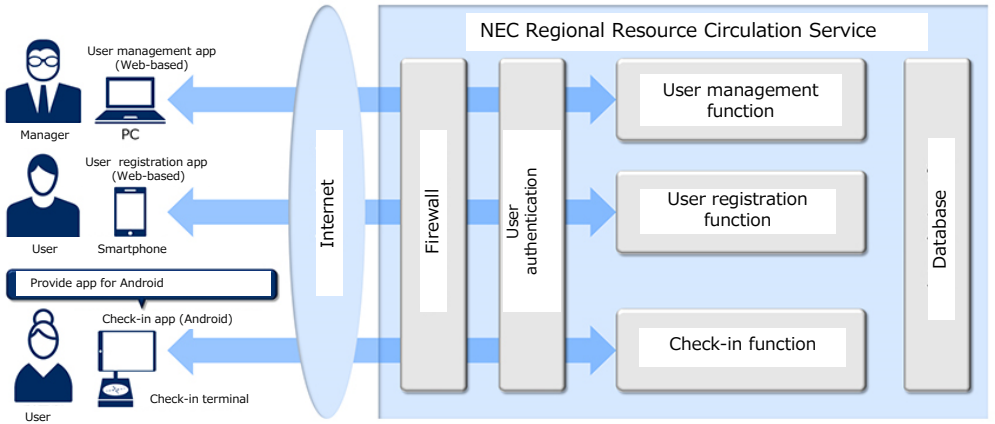
Results

- Both the amount of waste collected and the level of waste sorting increased in areas where the system was introduced.
- Efficient tracking of participation in food waste separation and the use of nudge methodology based on "gratitude research" encouraged a change in behavior toward separating waste.

Closed loop Recycling System for Home Gateway Devices



Verification Trials of ICT for Generating Visual Data on Food Waste Sorting

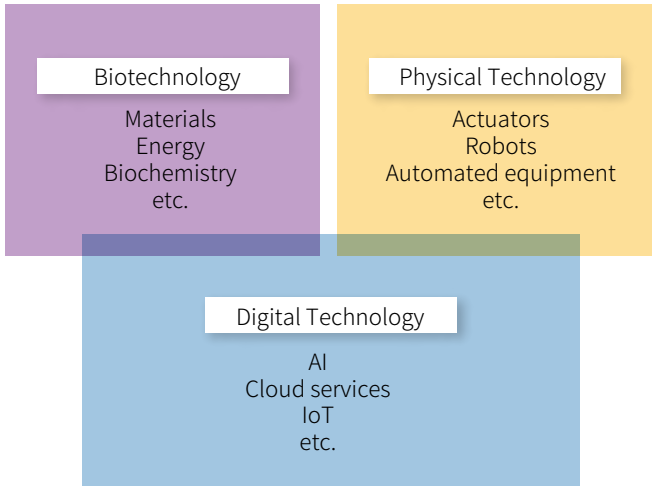


Shifting to Circular Society with NEC's Digital Technology

To make the shift to a circular society, it is necessary to understand the condition, location, and usage of resources and products throughout their entire life cycles. It is therefore necessary to create a mechanism that will facilitate the sharing and co-creation of data with stakeholders in the value chain regarding resources, equipment, and products. It is also important to promote a shift away from a business model focused on selling products to one focused on providing services. Since we utilize digital technology to maintain a constant connection with customers, we are able to visualize the operational status, consumption, and usage of our devices, which makes it possible to set up a system for device and resource circulation that includes product recovery.

Another part of the shift toward a circular society, aside from the spread of digital technology, is the ongoing fusion of this technology with biotechnology, which involves materials and other elements, and with physical technology, which includes manufacturing equipment, logistics, and 3D printing. We need to devise a company system that will help bring about a circular society in the future, and it is important that this system takes advantage of these three evolving technologies and verifies their effectiveness.

NEC will integrate these technologies and incorporate a series of visualization, analysis, and response processes centered on digital technology into various business activities throughout the value chain. We believe that these efforts will drive the shift toward a circular—and sustainable—society.



Visualization The First Step toward a Circular Society

With NEC's object recognition, video analysis, acoustic analysis, and other forms of advanced AI technology, it is possible to automatically identify resources and products, confirm the operating status of equipment and products, and see people's movements. With AI, we promote efficiency and optimization at a variety of sites while also working to visualize the entire supply chain by aggregating all the data generated from these individual sites. During this process, it is also important to have a system that allows stakeholders in the supply chain to share this data with a guarantee of safety and trust. As a result, NEC leverages its proprietary and secure high-speed blockchain as well as its secure computing technology to enable data sharing and distribution without harming the interests of its stakeholders.

Analysis Integrated Analysis Leading to Total Optimization

Integrated analysis powered by AI and machine learning brings to light previously hidden causal relationships and helps realize optimal Companywide process design. With the knowledge gained from this AI-driven analysis, we can create collaborative ties that go beyond companies and value chains, optimize processes, and engage in exchanges of equipment, resources, or other assets.

Response Implementing Real-world Solutions for the Elimination of Waste

To make a successful shift to a circular society, we need to be able to reflect the solutions derived by AI-driven analysis in real time, in the real world. A major key to this effort is tying this analysis to physical technology. NEC is developing controlled AI that allows people and machines to work together to perform complex tasks safely and efficiently.

In addition, the transition to a circular society requires the development of renewable materials, product design that incorporates these materials, and biotechnology that encourages both the recycling of these materials and the shift to renewable energy. NEC has been engaged in bioplastic R&D for several years and uses bioplastics in its products. We are also making full use of AI, including machine learning, to accelerate the development of new materials.

In many ways, the shift to a circular society is a full-blown effort in technological integration. NEC will work to realize a circular society through full use of its ever-improving and powerful digital technology, its range of know-how and environmental technology, cultivated as part of the manufacturing industry, and through co-creation with its various technological and business partners.

Chemical Substances

● Our Approach

NEC carefully examines the environmental impact and safety of chemical substances in all phases of its operations, from introduction and use to disposal. NEC takes all possible measures to reduce consumption and to replace harmful substances with safer ones.

● Volume of Chemical Substances Used

To reduce the volume of chemical substances used, we have set a goal of reducing the amount of chemical substances purchased by 1% compared to fiscal 2013 amounts. In fiscal 2021, we used 0.2 thousand tons of chemical substances, thereby achieving our target.

● Preliminary Evaluation of Chemical Substances

NEC has been conducting preliminary evaluations to examine environmental and safety aspects carefully when using a new chemical substance for the first time. These preliminary evaluations are a series of strict examinations of physical properties, toxicity levels, handling methods, emergency response measures, recycling methods, environmental impact, and other items related to chemical substances. Only substances that have passed these examinations are allowed to be purchased.

Safety data sheets (SDS) are obtained from manufacturers or prepared independently for all chemical substances used. These are used for reference when making judgments in considering safety countermeasures to apply when using the chemical substances. Manufacturing assessments are also carried out in all manufacturing processes to evaluate environmental and safety aspects of the chemical substances and production facilities.

● Conformance to the PRTR Act (Act on Confirmation, etc. of Release Amounts of Specific Chemical Substances in the Environment and Promotion of Improvements to the Management Thereof)

The balance of inputs and outputs of substances used by the NEC Group among the chemical substances that are subject to the PRTR Act (Class I Designated Chemical Substances: 462 substances) is summarized in the following illustration.

For chemical substances released into the atmosphere and public water bodies (including discharges into sewage systems), NEC has set its own voluntary standards, which are more stringent than the levels required by law, and ensures that these standards are strictly met.

● Reduction in Use of Strictly Regulated Chemical Substances

Ozone-depleting substances

The use of all specific chlorofluorocarbons as a cleaning agent in manufacturing processes was discontinued in 1993. By the end of fiscal 2011, efforts to totally discontinue the use of specific chlorofluorocarbons for refrigerant in air conditioners and specific halons used in fire extinguishers achieved a reduction of 96%, almost completely abolishing them from use.

● Strict Control of Equipment and Parts Containing PCBs

At present, NEC strictly controls disposed-of devices (equipment and parts, including fluorescent light stabilizers) containing polychlorinated biphenyls (PCBs) at its three plants and five Group companies under stringent double and triple measures for preventing leakage.

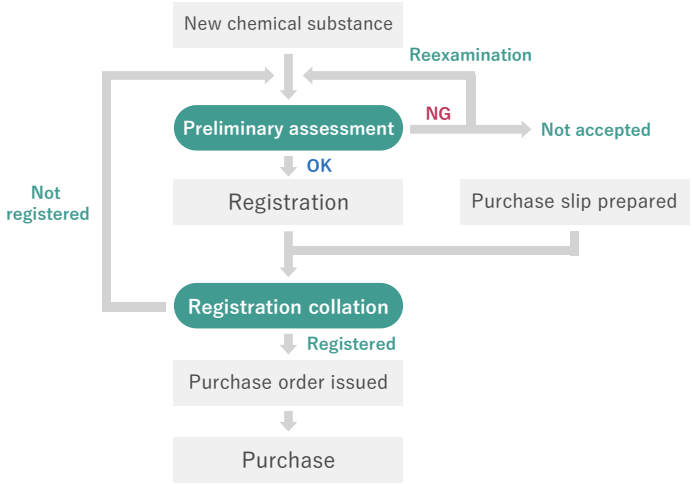
The Law Concerning Special Measures for Promotion of Proper Treatment of PCB Waste was revised in 2016, changing the processing period set in the basic plan for the disposal of PCBs.

In compliance with the change, NEC is revising its disposal plans to ensure that the waste is processed within the set deadline.

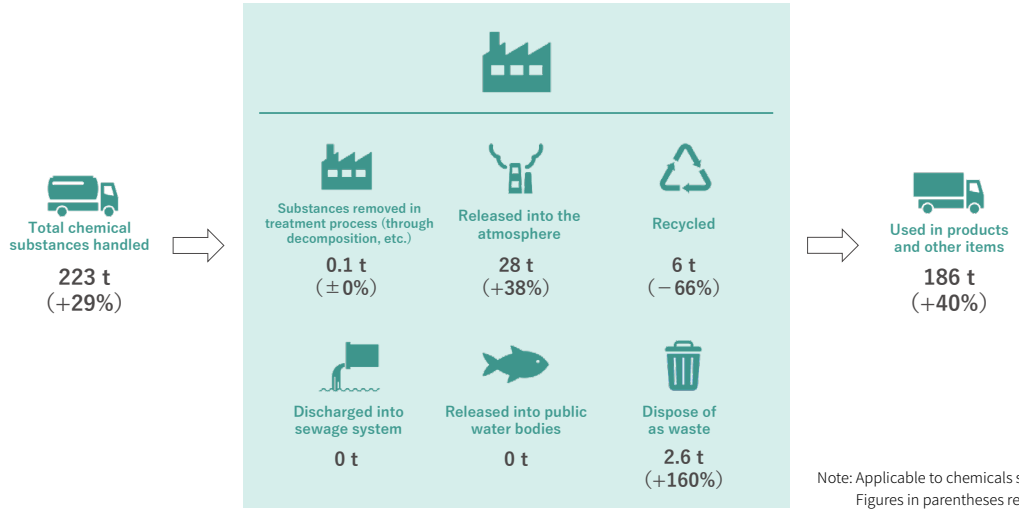
Amount of PCBs held by NEC (as of March 31, 2021)	High concentration: 32,908 kg Low concentration: 72,205 kg

Scope: NEC Corporation

Preliminary Evaluation Process for Chemical Substances



Chemical Substance Balance Control Chart (FY2021)



Note: Applicable to chemicals subject to the PRTR Act
Figures in parentheses refer to year-on-year difference.

● Compliance with Regulations on Chemical Substances Contained in Products

NEC strives to comply with both Japanese and international regulations regarding chemical substances. To ensure that we are in compliance with global regulations such as the Restriction of Hazardous Substances (RoHS) Directive and Registration, Evaluation, Authorisation and Restriction on Chemicals (REACH) regulations in the European Union (EU) and the Toxic Substances Control Act (TSCA) in the United States, we promote the exchange of information on chemical content throughout the supply chain as well as the enhancement of NEC's internal information management system.

Our approach toward the exchange of information on chemical content is not to introduce individual rules but to employ the common use of chemSHERPA, a scheme for the sharing and exchange of information on the chemicals contained in new products in supply chains compliant with international standard IEC 62474. Such an approach improves the work efficiency of those giving and receiving information while allowing both to respond more quickly.

NEC has built a compliance structure using chemSHERPA-CI*1 and chemSHERPA-AI,*2 which are operated by JAMP.*3

*1 Sheet for entering information on the chemical substances contained in a material or prescription to ensure compliance with laws and regulations
*2 Sheet for entering information on the chemical substances contained in the formed articles to ensure compliance with laws and regulations
*3 JAMP: Joint Article Management Promotion–consortium

● Risk Management for Chemical Substances Contained in Products

Complying with the EU RoHS Directive

The EU RoHS Directive bans, in principle, the inclusion of 10 substances, including lead, mercury, and cadmium, in electrical and electronic products. NEC requests its suppliers to comply with the EU RoHS Directive in products that they supply, and conducts surveys to determine whether purchased parts and materials contain any of the banned substances. These efforts ensure that NEC branded products comply with the EU RoHS Directive, in principle.

Progress of replacement initiatives

The NEC Group is moving forward to replace chemical substances in compliance with the restrictions put forth by the EU RoHS Directive.

Hexavalent chromium plating in the treatment of steel sheets and plates is being substituted by trivalent chromium plating, organic film, nickel plating, and stainless steel.

Pigments and paints have been changed to materials that do not contain lead, cadmium, or hexavalent chromium.

Lead solder has been replaced with lead-free solder.

Procurement of parts and materials containing polybrominated diphenyl ether (PBDE) and polybrominated biphenyl (PBB) has been banned since 1997, and other flame retardants are used instead.

NEC had already prohibited the inclusion of four phthalic acid compounds in purchased products one year before the enforcement of a law banning them, and has made progress in replacing them.

Management of exceptions

The EU RoHS Directive includes exceptions where the inclusion of prohibited substances is permitted under certain conditions. These can be used within a legally allowed period, but they must be replaced at an appropriate time.

NEC manages risks using an internal system called CHEMSIS, which centrally manages information on chemical substances contained in purchased products collected with chemSHERPA-AI, and then automatically determines whether contained substances exceed threshold values and the time limit on exemptions. At the same time, we ask suppliers to comply with the end of exemption periods six months in advance.

Confirmation by analysis

For purchased products that are deemed to be high risk, we obtain analysis data from the supplier, and when necessary, conduct our own individual analysis to confirm that prohibited substances are not contained in the products. The NEC Group has introduced fluorescent X-ray analysis systems in its production plants to create a system for confirming that certain prohibited substances, such as lead, cadmium, mercury, and hexavalent chromium, are not contained in the products.

Complying with EU REACH Regulations

The EU REACH regulations identify restricted substances that may not be included in products and Substances of Very High Concern (SVHCs), which may be included but require provision of information to product recipients if they exceed a certain threshold value.

NEC uses chemSHERPA-AI to request provision of the above chemical substance information from its suppliers and manages the response information obtained centrally on its internal green procurement support system, CHEMSIS, to control the presence of restricted substances and SVHCs in excess of threshold values. NEC then shares this information with sellers in the EU.

Complying with Other Global Regulations

In addition to the EU RoHS Directive and EU REACH regulations, NEC's business divisions all work together with local subsidiaries and relevant industry organizations in Japan and international to comply with regulations on chemical substances contained in products applicable to each respective country, including China and the United States.