

Profile of NEDO

FY2023 2023.4 - 2024.3

Contributing to Society by Accelerating Innovation and Achieving Results in a Timely Manner

My name is SAITO Tamotsu, and I was appointed to the post of Chairman of the New Energy and Industrial Technology Development Organization (NEDO) in April 2023.

Following the two oil crises of the 1970s, NEDO was established in 1980 to promote the development and introduction of new energy technologies. Since then, NEDO has become one of the largest public research and development management organizations in Japan, and it works with the government to implement economic and industrial policies. In this capacity, NEDO undertakes research, development and demonstration activities to carry out the two basic missions of addressing energy and global environmental problems and enhancing industrial technology by integrating the combined efforts of industry, academia, and government.

NEDO's Fifth Five-Year Plan began in April 2023. NEDO is carrying out the plan with a focus on the three pillars of creating innovation through research and development management, fostering technology-based startups, and strengthening and accumulating technology intelligence that contributes to policy making and research and development management.

First, as a specific effort to create innovation through research and development management, NEDO is striving to enhance management functions through

the project manager system and further strengthen its management capabilities. These efforts are expected to maximize research and development outcomes and allow NEDO to respond quickly to changes that occur due to innovations around the world, thus promoting practical applications by businesses. Second, in order to foster technology-based startups, NEDO has developed a system to provide consistent support from the seed phase to practical application. NEDO's activities include giving assistance to discover startups capable of bringing about innovation, thereby creating new industries. NEDO is also contributing to the establishment of a startup ecosystem through cooperation with other public organizations. Third, NEDO is strengthening and accumulating technology intelligence that contributes to policy making and research and development management, which will lead to the cultivation and practical use of innovation in the future. In addition to providing the evidence necessary for policy making, technology strategies utilizing Japan's competitive advantages are being formulated by anticipating innovation trends faster and more accurately than in other countries. NEDO is then planning and carrying out industry-academia-government collaborative projects.

NEDO is also implementing eight funding projects, including the Green Innovation Fund, to achieve policy goals such as revitalizing industrial technology, promoting innovation, achieving carbon neutrality, and ensuring economic security. In this manner, NEDO strives to meet greater expectations and shoulder its responsibilities to usher in a sustainable society. NEDO also remains committed to supporting the energy and environmental policies of Japan and playing a leading role in Japan's innovation policy.

NEDO intends to enhance its role as an innovation accelerator that promotes the practical application of project results and to contribute even further to the resolution of social issues.



New Energy and Industrial Technology
Development Organization

Chairman **SAITO Tamotsu**

About NEDO

- NEDO is a national research and development agency that creates innovation by promoting technological development necessary for realization of a sustainable society.
- NEDO acts as an innovation accelerator to contribute to the resolution of social issues by developing and demonstrating high-risk innovative technologies having practical application.

NEDO's Missions

Addressing energy and global environmental problems

NEDO actively undertakes the development of new energy and energy conservation technologies. It also conducts research to verify technical results. Through these efforts, NEDO promotes greater utilization of new energy and improved energy conservation. NEDO also contributes to a stable energy supply and the resolution of global environmental problems by promoting the demonstration of new energy, energy conservation, and environmental technologies abroad based on the knowledge obtained from domestic projects.

Enhancing industrial technology

With the aim of raising the level of industrial technology, NEDO pursues research and development of advanced new technology. Drawing on its considerable management expertise, NEDO carries out projects to explore future technology seeds as well as mid- to long-term projects that form the basis of industrial development. It also supports research related to practical application.

Three Initiatives Based on NEDO's Fifth Five-Year Plan

Managing Technological Development to Utilize Results in Society

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Fostering Technology-Based Startups

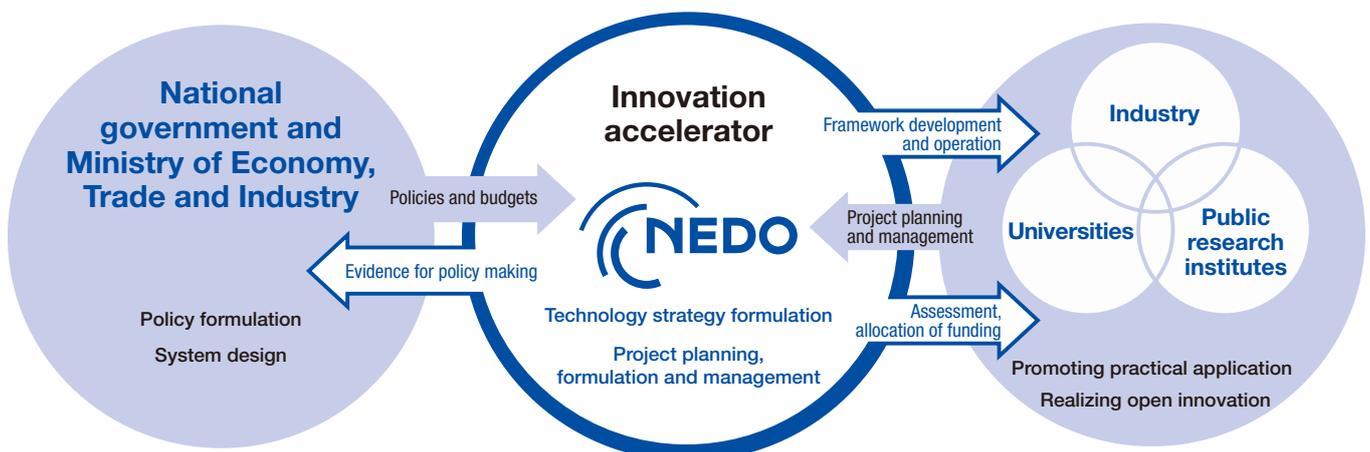
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Determining the Direction of Mid- to Long-Term Technology Development

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Positioning of NEDO as an Innovation Accelerator

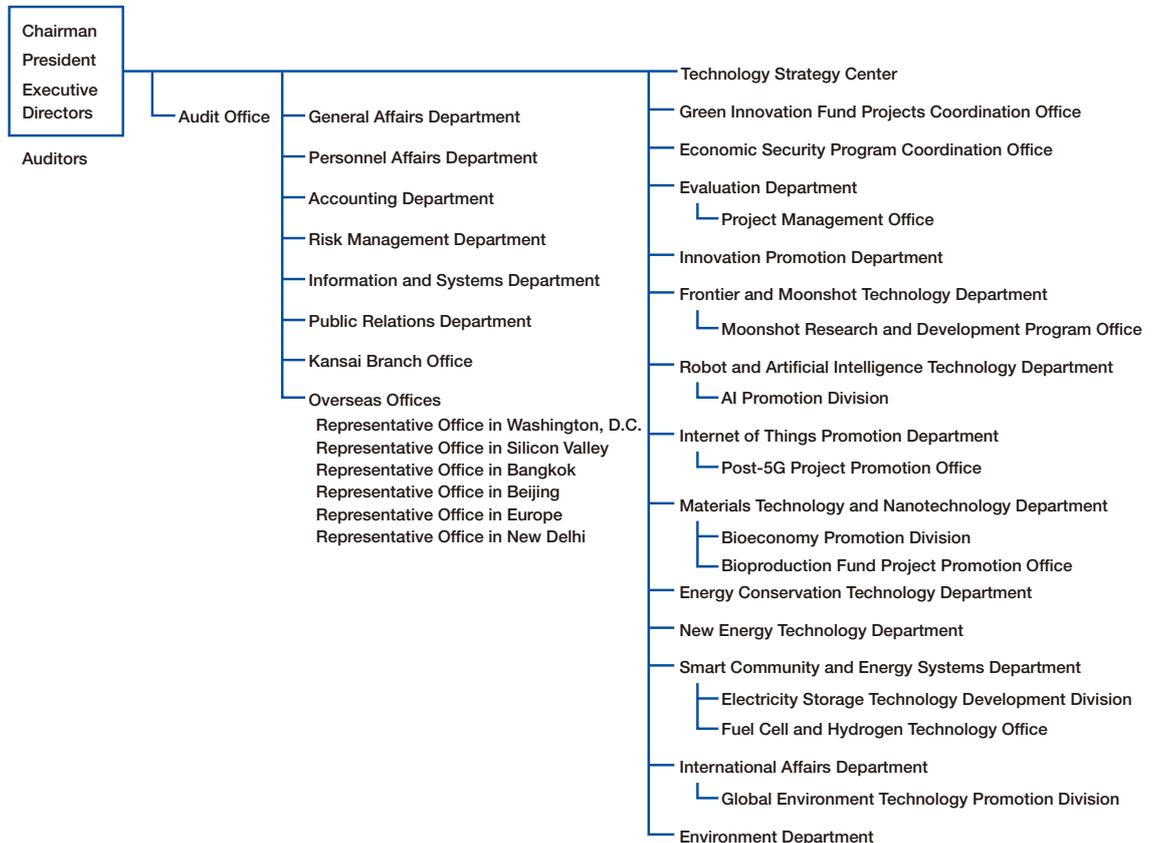
In order to contribute to the resolution of social issues, NEDO formulates technology strategies and project plans and, as part of its project management, establishes project implementation frameworks by combining the capabilities of industry, academia, and government. NEDO also promotes technology development by carrying out, evaluating, and allocating funding to promising projects to accelerate the practical application of project results.



Background Information

- Designation** National Research and Development Agency
New Energy and Industrial Technology Development Organization (NEDO)
Business name: New Energy and Industrial Technology Development Organization (NEDO)
- Foundation** Originally established on October 1, 1980; reorganized as an incorporated administrative agency on October 1, 2003
- Foundation Purpose** The purpose of NEDO is to enhance industrial technology and promote commercialization by comprehensively performing functions such as: promoting research and development carried out using skills from the private sector; promoting research and development carried out by the private sector with regard to technology for non-fossil energies, combustible natural gas, and coal; promoting the technology required for the rational use of energy and technology in mining and industry; and promoting the utilization of such technology in cooperation with the international community; to thereby contribute to ensuring a stable and efficient energy supply in accordance with the changes in the domestic and foreign economic and social environments and to the development of the economy and industry.
- Details of Major Operations** Operations relating to research and development management (national projects and practical application promotion activities)
- Minister in Charge** Minister of Economy, Trade and Industry
- Governing Laws** Act on General Rules for Incorporated Administrative Agencies Act on the New Energy and Industrial Technology Development Organization
- Personnel** 1,464 (as of April 1, 2023)
- Budget** Approximately 1.14 billion US dollars (initial budget for FY 2023)
*Converted at the exchange rate of 1 US dollar = 133.04 yen
Additional funding programs are also being implemented.
- Executives**
 - Chairman Mr. SAITO Tamotsu
 - President Mr. YOKOSHIMA Naohiko
 - Executive Directors Mr. YOSHIOKA Masatsugu, Dr. YUMITORI Shuji, Mr. HAYASHI Shigekazu, Mr. NISHIMURA Tomoyasu, Dr. IIMURA Akiko
 - Auditors Mr. YABUTA Keisuke, Ms. FUKUSHIMA Michi (as of October 1, 2023)

Organization



(as of July 1, 2023)

NEDO History

In the 1970s, the world experienced two oil crises. To improve Japan's energy diversification, NEDO was established in 1980 to help usher in energy conservation and new energy technologies. In 1988, NEDO added research and development of industrial technology to its activities. Today, it uses its role as a research and development management organization to boost innovation and promote research and development on energy, environmental technology, and industrial technology.

- 1974 ● Long-term Sunshine Project aimed at developing new energy technologies started
- 1978 ● Long-term Moonlight Project aimed at developing energy conservation technologies started
- 1980 ● **New Energy Development Organization established**
- 1988 ● **Research and development on industrial technology added. Name changed to New Energy and Industrial Technology Development Organization (NEDO)**
- 1993 ● New Sunshine Project started
- 1996 ● Integration with Coal Mine Damage Agency. Coal mine damage compensation program added.
- 2003 ● **Incorporated Administrative Agency New Energy and Industrial Technology Development Organization established under the Act on the New Energy and Industrial Technology Development Organization**
- 2006 ● Kyoto Mechanisms Credit Acquisition Program added
- 2007 ● Transitional operations related to coal mine damage recovery completed
- 2012 ● Coal and geothermal operations transferred to Japan Oil, Gas and Metals National Corporation
- 2014 ● Technology Strategy Center established
- 2015 ● **Status changed from incorporated administrative agency to national research and development agency**
- 2016 ● Kyoto Mechanisms Credit Acquisition Program discontinued
- 2021 ● Green Innovation Fund Projects started



1986
Experiments on a large-scale grid-connected photovoltaic power system started for the first time on Rokko Island in Hyogo Prefecture

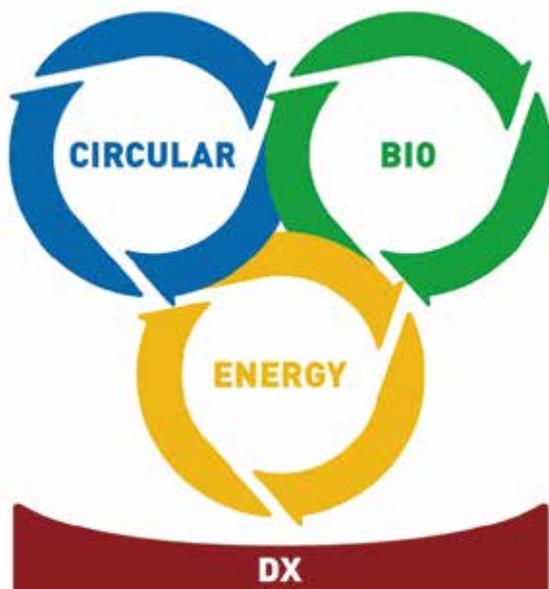


1998
Development started on underlying optical disc technologies that later led to Blu-ray discs



2012
Commercial model demonstration hydrogen station constructed

3 Essential Social Systems for a Sustainable Society



ESS logo

In order to realize a sustainable society, it will be necessary to promote the three social systems shown below on an ongoing basis. To this end, NEDO has defined such social systems as the “Three Essential Social Systems for a Sustainable Society” and created an ESS logo. NEDO works to promote and expand public awareness of these social systems.

1. Circular Economy

(Blue symbolizes the Earth.)

2. Bioeconomy

(Green symbolizes organisms.)

3. Sustainable Energy

(Orange symbolizes energy.)

+Digital Transformation (DX)

(DX, the foundation of the three essential social systems, is represented in wine color.)

An ESS logo to symbolize the Three Essential Social Systems for a Sustainable Society was introduced in February 2020.

The logo was revised to a new design with the addition of DX in February 2023.

FY 2023 Budget

1.14 billion US dollars

(initial budget for FY 2023)

NEDO aims to address energy and global environmental problems and raise the level of industrial technology through the integrated management of research and development. This ranges from the discovery of technology seeds to the promotion of medium- to long-term projects and support for practical application.

As only an outline of NEDO's activities is given below, individual budget amounts do not add up to the total.

Energy Systems
420 million US dollars

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Areas of focus

- System provision technology
- Energy storage technology, such as batteries
- Technology related to hydrogen production, storage, transport, and use
- Renewable energy technology

Energy Conservation and Environment
318 million US dollars

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Areas of focus

- Innovative energy-saving technologies
- Environmentally friendly steel manufacturing technology
- Development of high-efficiency coal-fired power generation technology
- CO₂ capture, utilization, and storage technologies
- Fluorocarbon recovery technology
- 3R technology, including resource screening and metal refining technology
- International demonstrations, Joint Crediting Mechanism activities, and other activities

Industrial Technology
283 million US dollars

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Areas of focus

- Robot and AI technology
- IoT, electronics, and information technology
- Manufacturing technology
- Materials and nanotechnology
- Bioeconomy

New Industry Creation and Discovery of Technology Seeds
68 million US dollars

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Areas of focus

- Fostering research and development based startups
- Promotion of open innovation

NEDO promotes the development of key future technologies (including technology demonstrations) that are difficult for private enterprises to develop on their own due to the high level of risk leading up to practical application. Instead of hiring its own researchers, NEDO coordinates and integrates the technological capabilities of private enterprises and the research capabilities of universities. These capabilities are then leveraged for national projects focused on research and development.



NEDO also promotes open innovation and provides support to small and medium-sized enterprises and startups that are becoming new leaders in innovation, thereby discovering promising technology seeds and creating new industries.

In addition to the above, the following programs will be funded and conducted as publicly solicited research and development projects.

- Moonshot Research and Development Program 196 million US dollars
- Research and Development Project of the Enhanced Infrastructures for Post-5G Information and Communication Systems 5.97 billion US dollars
- Green Innovation Fund Projects 17.2 billion US dollars
- Program for Developing Important Economic Security Technologies 1.87 billion US dollars
- Programs for Specified Semiconductor Production-Related Development 8.02 billion US dollars
- Support Project to Secure a Stable Supply of Specified Important Goods 6.23 billion US dollars
- Research and Development of Technologies to Promote Biomanufacturing 2.25 billion US dollars
- Deep-Tech Startups Support Program 752 million US dollars

FY 2023 Project List

Project name	Period (FY)	Department	Project name	Period (FY)	Department
Energy Systems			New Industry Creation and Seed Discovery		
Research and Development of Wind Power Generation Technologies	2008 - 2024	New Energy Technology Department	Project to Construct a Basis for Research and Development of Innovative Robots	2020 - 2024	Robot and Artificial Intelligence Technology Department
Project for Supporting the Introduction of Wind Power Generation	2013 - 2027	New Energy Technology Department	Development of AI-Based Innovative Remote Technologies	2021 - 2024	Robot and Artificial Intelligence Technology Department
Development of Production Technologies for Biojet Fuels	2017 - 2024	New Energy Technology Department	Realization of Advanced Air Mobility (ReAMo) project	2022 - 2026	Robot and Artificial Intelligence Technology Department
Research and Development for Total Cost Reduction of Heat Utilization as Renewable Energy	2019 - 2023	New Energy Technology Department	Development of Quantum/AI Hybrid Use-Case Technologies in Cyber-Physical Space	2023 - 2027	Robot and Artificial Intelligence Technology Department
Development of Technologies to Promote Photovoltaic Power Generation as a Primary Power Source	2020 - 2024	New Energy Technology Department	Cross-ministerial Strategic Innovation Promotion Program (SIP) 3rd Phase	2023 - 2027	Robot and Artificial Intelligence Technology Department
RD&D for Innovative Technologies Applied to Geothermal Exploration and Exploitation	2021 - 2025	New Energy Technology Department	Project for Innovative AI Chip and Next-Generation Computing Technology Development	2016 - 2027	Internet of Things Promotion Department
Support Project for Creating Sustainable and Effective Supply Systems of Woody Biomass Fuels	2021 - 2028	New Energy Technology Department	Basic Technology Development Project for Metal Additive Manufacturing Parts	2019 - 2023	Internet of Things Promotion Department
Development of Technologies for Realizing a Hydrogen Society	2014 - 2025	Smart Community and Energy Systems Department	Technology Development Project to Strengthen the Semiconductor Manufacturing Base of Energy-Saving Electronics	2021 - 2025	Internet of Things Promotion Department
Development of Technologies for Hydrogen Refueling Stations	2018 - 2023	Smart Community and Energy Systems Department	Research and Development Utilizing Wireless Communication Technologies to Reinforce the Dynamic Capabilities of the Manufacturing Industry	2021 - 2025	Internet of Things Promotion Department
Next-Generation Power Network Stabilization Technology Development for Large-Scale Integration of Renewable Energies	2019 - 2023	Smart Community and Energy Systems Department	Digital Infrastructure Development Project for Digital Transformation of Industries	2022 - 2024	Internet of Things Promotion Department
Development of a Multi-Purpose and Multi-Terminal High Voltage Direct Current Transmission System	2020 - 2023	Smart Community and Energy Systems Department	Development of Technology for Designing Energy-Efficient AI Semiconductor Chips and Systems	2023 - 2027	Internet of Things Promotion Department
Collaborative Industry-Academia-Government research and development Project for Solving Common Challenges Toward Dramatically Expanded Use of Fuel Cells and Related Equipment	2020 - 2024	Smart Community and Energy Systems Department	Development of Technology for Building a Chiplet Design Platform	2023 - 2027	Internet of Things Promotion Department
Technology Development for the Utilization and Production of Ammonia as Fuel	2021 - 2025	Smart Community and Energy Systems Department	Development of Innovative Sensing Technology to Realize an IoT Society	2019 - 2024	Materials Technology and Nanotechnology Department
Research and Development Initiative for Scientific Innovation of New Generation Batteries 3	2021 - 2025	Smart Community and Energy Systems Department	Development of Continuous Production and Process Technologies of Fine Chemicals	2019 - 2025	Materials Technology and Nanotechnology Department
Next-Generation Power Network Stabilization Technology Development for Large-Scale Integration of Renewable Energies	2022 - 2026	Smart Community and Energy Systems Department	Development of Bio-Based Production Technology to Accelerate Carbon Recycling	2019 - 2026	Materials Technology and Nanotechnology Department
Development of Flexible and Distributed Energy Resources Control Technology to Mitigate Congestion in Power Systems (FLEX DER Project)	2022 - 2026	Smart Community and Energy Systems Department	Technology Development Project for Social Implementation of Marine Biodegradable plastics	2020 - 2024	Materials Technology and Nanotechnology Department
Evaluation of All-Solid-State Battery Material and Foundational Technology Development for Next Generation	2023 - 2027	Smart Community and Energy Systems Department	Cellulose Nanofiber Related Technology Development to Contribute to a Carbon Cycle Society	2020 - 2024	Materials Technology and Nanotechnology Department
Development of Technologies for Building a Competitive Hydrogen Supply Chain	2023 - 2027	Smart Community and Energy Systems Department	Development of New Innovative Composite Materials and Forming Technologies	2020 - 2024	Materials Technology and Nanotechnology Department
Research and Development on New Energy Technology for Discovering Technology Seeds and Commercializing Developed Technologies	2007 -	New Energy Technology Department and Innovation Promotion Department	Development of Materials for Aircraft Engines and Bases for Material Evaluation Systems	2021 - 2025	Materials Technology and Nanotechnology Department
NEDO Feasibility Study Program	2014 -	Frontier and Moonshot Technology Department	Development of a Technology Base and Applied Technologies for the Manufacturing Processes of Next-Generation Advanced Ceramics	2022 - 2026	Materials Technology and Nanotechnology Department
International Demonstration Project on Japan's Technologies for Decarbonization and Energy Transition	1993 - 2025	International Affairs Department	Development of Technologies for Separation and Refinement of Heavy Rare Earths	2023 - 2027	Materials Technology and Nanotechnology Department
Program to Facilitate Overseas Promotion of Low Carbon Technology Through the Joint Crediting Mechanism (JCM)	2011 - 2027	International Affairs Department	Development and Demonstration of General-Purpose CubeSat and Microsatellite Buses	2023 - 2025	Frontier and Moonshot Technology Department
Research and Development Program for Promoting Innovative Clean Energy Technologies Through International Collaboration	2020 - 2025	International Affairs Department	NEDO Feasibility Study Program	2014 -	Frontier and Moonshot Technology Department
Research for Strategy Formulation	2000 -	Technology Strategy Center	International Demonstration Project on Japan's Technologies for Decarbonization and Energy Transition	1993 - 2025	International Affairs Department
Energy Conservation/Environment			Research and Development Program for Promoting Innovative Clean Energy Technologies Through International Collaboration	2020 - 2025	International Affairs Department
Development of Technologies for Carbon Recycling and Next-Generation Thermal Power Generation	2016 - 2026	Environment Department	Research for Strategy Formulation	2000 -	Technology Strategy Center
Research, Development and Demonstration of CCUS Technology	2018 - 2026	Environment Department	Specified Proposal-Based Research and Development		
Innovative Plastic Resource Circulation Process Technology Development	2020 - 2024	Environment Department	Moonshot Research and Development	2018 -	Frontier and Moonshot Technology Department
Development of Advanced Circulation Technology for Aluminum Materials	2021 - 2025	Environment Department	Research and Development Project of the Enhanced Infrastructures for Post-5G Information and Communication Systems	2020 -	Internet of Things Promotion Department
Development of Refrigeration and Air-Conditioning Technologies for Practical Use of Next-Generation Low-GWP Refrigerants	2023 - 2027	Environment Department	Green Innovation Fund Projects	2020 -	Green Innovation Fund Projects Coordination Office
Development of Basic Technology to Process E-Waste for an Advanced Resource Circulation System	2023 - 2027	Environment Department	Program for Developing Important Economic Security Technologies	2021 -	Economic Security Program Coordination Office
Strategic Innovation Program for Energy Conservation Technologies	2012 - 2024	Energy Conservation Technology Department	Deep-Tech Startups Support Program	2022 -	Innovation Promotion Department
Program to Develop and Promote the Commercialization of Energy Conservation Technologies to Realize a Decarbonized Society	2021 - 2035	Energy Conservation Technology Department	Research and Development of Technologies to Promote Biomufacturing	2022 -	Materials Technology and Nanotechnology Department
NEDO Feasibility Study Program	2014 -	Frontier and Moonshot Technology Department	Programs for Specified Semiconductor Production-Related Development/Support Project to Secure a Stable Supply of Specified Important Goods		
International Demonstration Project on Japan's Technologies for Decarbonization and Energy Transition	1993 - 2025	International Affairs Department	Specified Semiconductor Funding Program	2021 -	Internet of Things Promotion Department
Program to Facilitate Overseas Promotion of Low Carbon Technology Through the Joint Crediting Mechanism (JCM)	2011 - 2027	International Affairs Department	Program for Specified Semiconductor Interest Subsidies	2022 -	Internet of Things Promotion Department
Research and Development Program for Promoting Innovative Clean Energy Technologies Through International Collaboration	2020 - 2025	International Affairs Department	Support Project to Secure a Stable Supply of Specified Important Goods	2022 -	Economic Security Program Coordination Office
Project for International Promotion and Dissemination of Carbon Recycling and Advanced Thermal Power Generation Technologies	2022 - 2026	Environment Department			
Research for Strategy Formulation	2000 -	Technology Strategy Center			
Industrial Technology					
Research and Development of Advanced Aircraft Systems for Practical Application	2015 - 2023	Robot and Artificial Intelligence Technology Department			
Development of Integrated Core Technologies for Next-Generation AI and Robots	2018 - 2023	Robot and Artificial Intelligence Technology Department			
Technology Development Project on Next-Generation Artificial Intelligence Evolving Together with Humans	2020 - 2024	Robot and Artificial Intelligence Technology Department			

*Each project to which a specific fund is allocated is listed with the year in which a budget for the fund was approved as its starting year.

- National Projects
- Proposal-Based Activities
- International Demonstration and Joint Projects
- Survey Activities
- Specified Proposal-Based Research and Development
- Programs for Specified Semiconductor Production-Related Development
- Other Projects

▼ Three Initiatives Based on NEDO's Fifth Five-Year Plan

1

Maximizing results and promoting social implementation by businesses

Creating Innovation Through Research and Development Management

Start

Collecting information and formulating strategies for each field

As research and development activities become increasingly competitive worldwide, NEDO eagerly collects information on a variety of different fields both inside and outside of Japan. Such information is then used to formulate technology strategies, set milestones, and develop project plans.

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1 to 2 Years

Research and development to support progress in fields with a promising future Project planning

NEDO sets goals for research and development by studying domestic and international research and development trends and consulting with experts. It aims to use innovation to drive economic growth and solve societal problems. Projects are planned by looking five, ten, and twenty years into the future.

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NEDO projects make it possible!

- Medium- to long-term initiatives
- Research and development coordinated with standardization
- Cross-industrial cooperation
- Full-scale demonstration
- International cooperation

NEDO support draws on a wealth of knowledge

Partnership agreements with foreign countries

NEDO leads international cooperation to bring Japanese technology to the world. It also carries out overseas projects to disseminate Japan's advanced technologies and gather information, enters into agreements with institutions in various countries, and eagerly supports international development.

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IP and Standardization strategies for social implementation

NEDO aims to establish international standards that will link research and development results to social implementation. It also provides support to research teams participating in projects for consensus building regarding intellectual property. This promotes practical application and global market acquisition.

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Diverse human resource networks

NEDO organizes committees on project adoption, evaluation, technology, and other issues as needed by making use of its network of outside specialists and experts from industry and science.



NEDO's Fifth Five-Year Plan covers the plans NEDO is executing from FY 2023 to FY 2027. The plan's aim is to maximize the research and development results. NEDO is committed to creating innovation through advanced research and development management, fostering research and development based startups that are expected to become new leaders in innovation, and strengthening and accumulating technology intelligence that contributes to research and development management.

In the energy and environment sector, NEDO promotes the discovery and development of innovative technologies to achieve carbon neutrality by 2050 based on the implementation plan of the Green Growth Strategy. In the industrial technology sector, NEDO aims to fuse technology with Japan's strengths in manufacturing. It hopes to focus on artificial intelligence (AI) and robotics to build Society 5.0 and distill the wisdom of industry, academia, and government to deliver the world's most advanced technology to society.

2 to 6 Years

Research and development and demonstration testing

NEDO promotes research and development projects and large-scale demonstration projects that are difficult for private sector companies to carry out on their own. It aims to make the most of its results. To do so, it focuses on authentication and systems for society to use, while anticipating future developments from a global perspective.

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10 Years

Project review and follow-up monitoring

After a project is completed, an evaluation is conducted by a third party, and project results are thoroughly assessed. In addition, NEDO conducts follow-up monitoring of results to examine the economic and social effects of the project. Information collected during monitoring is also used to improve future project management.

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NEDO supports social implementation based on authentication, evaluation, and systems

NEDO also considers establishing new authentication and evaluation methods, and the revision of systems to support research and development and social implementation by businesses while obtaining the collaboration of various government ministries and agencies. This allows unprecedented technologies and innovative results to be used by society.



Public relations for disseminating easy-to-understand information

NEDO holds press conferences and meetings to publicize and disseminate the research and development results in an easy-to-understand form. It works hard to publicize results using a variety of approaches, such as opening databases to the public.



Promoting practical application through business matching

NEDO supports activities that lead to business so as to accelerate the commercialization of research and development results. This includes using exhibitions inside and outside of Japan to cultivate new needs and provide users with product samples.



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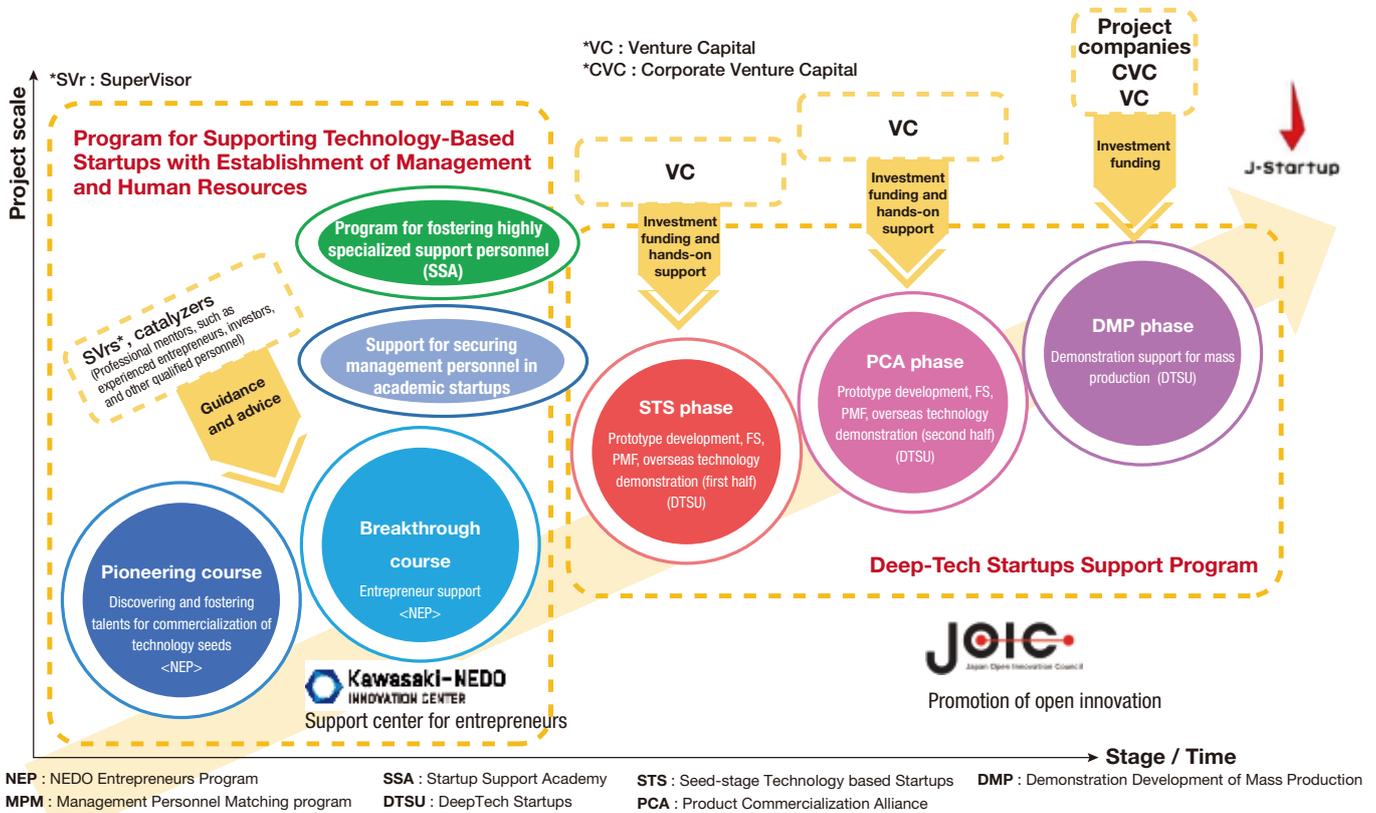
Discovering new leaders in innovation and linking them to creation of new industries

Fostering Technology-Based Startups

In order to revitalize the economy and create new industries and jobs, it is important to foster novel and dynamic technology-based startups. Accordingly, NEDO promotes building the startup ecosystem by providing seamless support from the discovery of technology seeds to the commercialization. In addition, NEDO aims to contribute to the growth of technology-based startups by promoting cooperation with public and private support institutions and universities.

Providing technology-based startups with accompanied support for commercialization

- Discovering and fostering entrepreneurs who have technology seeds and business concepts
- Discovering and fostering management personnel / Supporting business matching between management personnel and startups
- Supporting practical development, overseas technology demonstration and mass production demonstration for deep tech startups
- Fostering highly specialized support personnels for the growth of technology-based startups

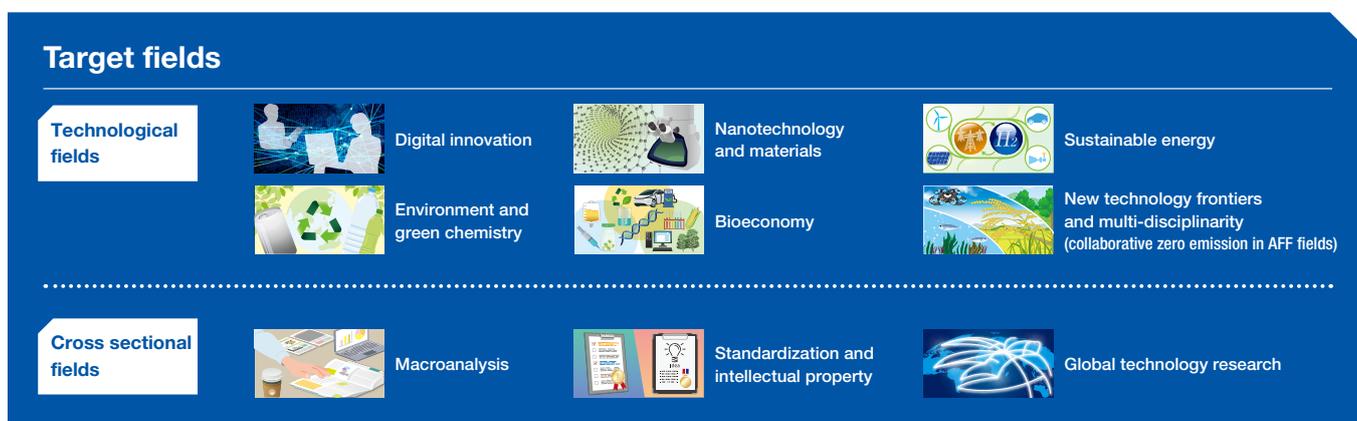


3

Discovering emerging innovation and linking it to social implementation

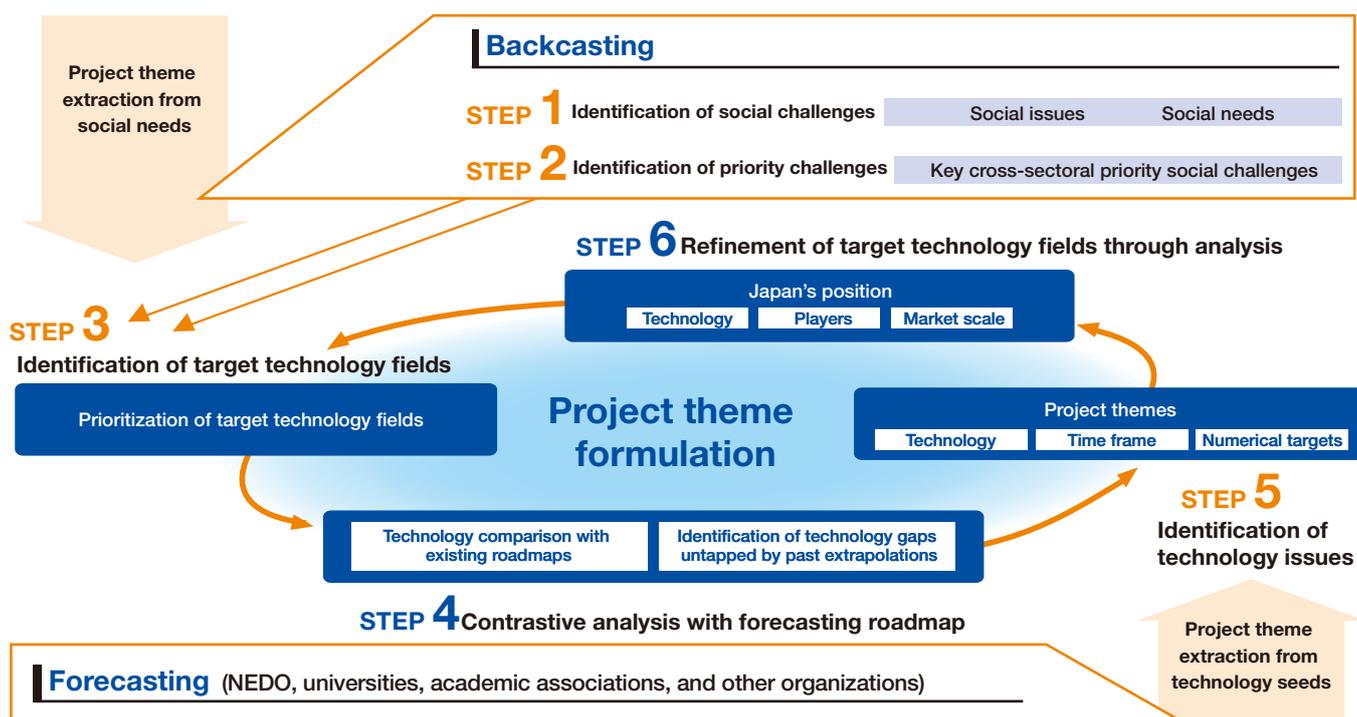
Strengthening and Accumulating Technology Intelligence

NEDO's Technology Strategy Center takes the lead in continually ascertaining and analyzing the movement of social and market trends. It works to discover promising technologies in energy, environmental technology, and industrial technology both within Japan and abroad. The Center also works to narrow down the research and development Japan should undertake, formulate technology strategies, and plan projects based on them. It aims to incorporate multifaceted analysis in strategy formulation and uses research and development projects to accelerate economic growth.



Process leading to project theme formulation

NEDO uses an approach it calls “allcasting” to formulate project themes. Allcasting is a combination of backcasting based on social needs and challenges and forecasting based on current technological conditions and seeds.



▼ NEDO's Research and Development Programs

Energy Systems

Energy system technologies

Storage batteries, hydrogen energy, fuel ammonia, smart communities, and system controls



Fukushima Hydrogen Energy Research Field (FH2R)



Microgrid operation with a large-scale battery system on an in-service distribution network (California)

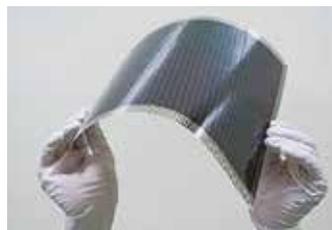
In the field of hydrogen energy, NEDO is promoting technology development, from production to transportation, storage, and the use of hydrogen, including fuel cells, hydrogen refueling stations, hydrogen power generation, large-scale hydrogen supply chains, and power-to-gas technology, in order to significantly expand the utilization of hydrogen. In the field of storage batteries, NEDO also conducts research to develop all-solid-state lithium-ion batteries with performance far superior to conventional lithium-ion batteries as well as other types of innovative storage batteries. In addition, NEDO is devising resilient, sustainable, and smart energy systems that efficiently tap into renewable energy, storage batteries, electric vehicles, heat pumps, and other distributed energy resources. For instance, it is working to overcome grid constraints with home-grown technologies. Various demonstration projects are underway around the world in different business settings to validate the technical and commercial viability of energy systems.

Renewable energy technologies

Solar power, wind power, ocean energy, biomass, geothermal energy, and renewable thermal energy



Research center that contributes to industrialization of microalgae-derived SAF production and CO₂ use efficiency improvement (Source: Institute of Microalgal Technology, Japan)



Large area (703 cm²; 24.15 cm × 29.10 cm) film-type perovskite solar module for the world's highest conversion efficiency (Source: Toshiba Corporation)

NEDO propels the grid integration of renewable sources on a massive scale so that they can become main sources of power supply. Along with relevant guidelines, it is developing cost-saving and other useful technologies for the extensive use of solar, wind, biomass and renewable thermal energy. These technologies are intended for harnessing

solar energy on exterior building walls and mobility-related platforms such as automobiles, thereby expanding their application in new markets, and achieving more reliable operations over the long term. NEDO supports the demonstration of floating wind turbine systems, the development of wind farms, and also engages in the development and demonstration of technologies for producing Sustainable Aviation Fuel (SAF) and establishing effective supply systems of woody biomass fuels. Technology development is underway to tap into supercritical geothermal resources and utilization system of renewable heat including solar and ground source heat.

NEDO promotes challenging research and development based on its technology strategy to address the various issues facing society. NEDO aims to lead the world in realizing innovation by shifting to new industrial systems, creating a society that thoroughly conserves energy, and accelerating the adoption of renewable energy.

Energy Conservation and Environment

Energy conservation technologies

Innovative energy-saving technologies



Chemical recycling demonstration facility using microwaves

The Sixth Strategic Energy Plan formulated by the Japanese government entails sweeping energy conservation measures, such as reduction of final energy consumption by around 62 million kL in oil equivalent by FY2030. In order to realize sustainable energy conservation compatible with Japan's economic growth, NEDO is promoting research and development of innovative energy-saving technologies. Initiatives are being carried out in various fields such as industries, consumer, transportation, energy conversion and supply, as well as cross-sectoral initiatives.

Next-generation thermal power plants and CCUS technologies

High-efficiency thermal power generation; CCUS; and hydrogen reduction ironmaking



Research, development and demonstration base for carbon recycling

Various innovative technologies must be employed in Japan's bid to reach carbon neutrality by 2050. Lower carbon emissions are pursued by NEDO through research to develop technologies for efficiently generating power, effective use of ammonia to provide a carbon-free process, and alternative ironmaking processes that employ hydrogen reduction. NEDO also engages in research to develop CO₂ capture, utilization, and storage (CCUS) technologies aimed at recycling and sequestering CO₂ rather than releasing it.

Environment and resource conservation technologies

3Rs, alternatives to hydrofluorocarbons, and water circulation



Automatic sorting system for metal resources contained in WEEE



Energy-efficient seawater desalination plant (Saudi Arabia)

NEDO is developing technologies to promote resource recycling and utilization by establishing a robust recycling system of valuable metals in urban mines, waste plastics, and aluminum materials.

In another initiative to reduce emissions of hydrofluorocarbons (HFCs), a type of greenhouse gas increasingly used as a coolant in refrigerators and air conditioners, NEDO is developing technologies to offer less harmful alternatives. In addition, it conducts overseas demonstrations of Japanese water treatment technologies and systems, including energy-saving and low-environmental-impact water circulation systems and seawater desalination, to hone the global competitiveness of relevant domestic industries.

Industrial Technology

Robots and AI technologies

AI, Robots, drones, AAM, and electric aircraft



LANGX, AI support service for language learning



DeliRo, an automated delivery robot



Drones that "do not fall/ are safe even if they fall" with AI technology

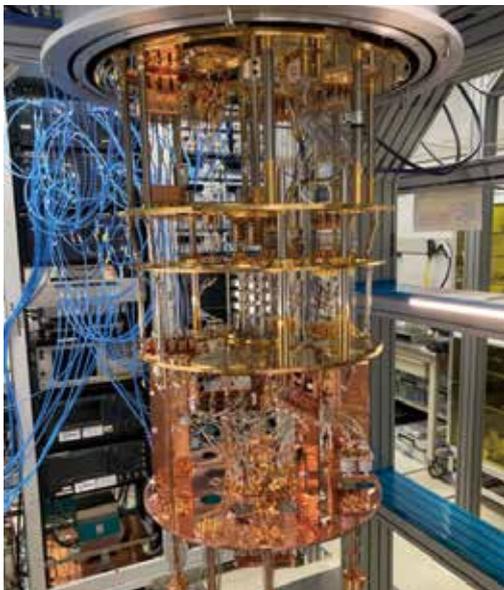
In order to realize Society 5.0, NEDO promotes various research and development with extensive adoption of artificial intelligence (AI), including social implementation of AI technology in the prioritized areas of "productivity" and "mobility," the development of an evolutionary AI system evolving together with humans and other innovative remote technologies, and next-generation AI technology to create use cases utilizing quantum-AI hybrid technology.

NEDO is also developing robots capable of handling production of multiple products in small quantities or delivery, pioneering the utilization of robots in sectors where the introduction of robots has not been progressing.

Furthermore, NEDO engages in research and development necessary to realize Advanced Air Mobility (AAM), such as the development of methods for evaluating the performance of Drone/ Unmanned Aircraft Systems (UAS) and AAM, and the development of AAM traffic management technologies for low-altitude airspace harmonization. It also works to research and develop a leading-edge electric propulsion system for aircraft.

IoT, electronics, and information technology

Internet of Things (IoT), computing, and power semiconductors



Superconducting quantum annealing machine



AI system board equipped with DRP-AI chip for vision-AI processing with high accuracy and low power consumption

In order to address social challenges by using IoT, AI, and big data, NEDO is collecting real-world data, providing feedback on societal applications for data accumulation, analysis, management and services, and conducting research and development at all stages. In addition, NEDO promotes both the hardware and software-related aspects of the relevant technologies from electronic devices that make low-power high-speed processing possible to power semiconductors, which are key to energy conservation and RISC-V system design platform development.

NEDO is contributing to the real-world implementation of IoT by creating services that lead to solutions to social problems and to the creation of new businesses that do not rely on existing businesses. In addition to its own technology development, NEDO collaborates with businesses, universities and research institutions that use IoT.

Manufacturing technology

Dynamic capabilities and additive manufacturing



A multi-skilled self-propelled robot with processing assist function

NEDO is developing new manufacturing systems that can greatly reduce energy consumption, such as a system for high-mix and low-volume manufacturing and a system for connecting to cyberspace. Specifically, NEDO is promoting the development of additive manufacturing (3D printing) technologies suitable for high value-added production and technologies to enhance dynamic capability through the use of 5G and other technologies. By putting these technologies into practical use, NEDO is contributing to the realization of "Society 5.0."

Materials and nanotechnology

Structural materials, functional materials, chemical production, and informatics



Gas mixture of hydrogen and oxygen generated from photocatalytic panel reactor

Japan's metals, plastics, ceramics, and other material industries boast a high level of technology worldwide. They are key industries sustaining the country's entire manufacturing industry. Nanotechnology (technology to control material structures on the nanoscale of 10^{-9} m) is being applied to material development in coordination with different industries and disciplines, both upstream and downstream. NEDO aims to strengthen Japan's industrial technologies by creating innovative materials.

Bioeconomy-related technologies

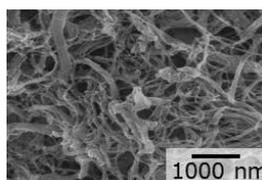
Cellulose nanofibers (CNF), bio-manufacturing, and marine biodegradable plastics



CNF-reinforced resin kneading extruder



CNF-reinforced resin (Cellenpia Plas[®]) masterbatch pellets



Cellulose nanofibers in CNF-reinforced resin pellets



30L-scale fermentation systems used for validation of practical applications and development of bio-manufacturing processes

Recent innovations in biotechnology have made strengthening competitiveness in this field an urgent necessity for Japan. In preparation for the future depletion of oil reserves, NEDO is developing technologies related to resin compound materials using CNF, technologies required for social implementation of marine biodegradable plastics, technologies for realizing bio-manufacturing by controlling and modifying plants and microorganisms, and the development of biofoundry infrastructure to efficiently bridge the gap to actual production.

New Industry Creation and Discovery of Technology Seeds

Commercialization support for startups and other small and medium-sized enterprises

Support from the discovery of technology seeds to research for practical applications



Collaborative picking robots that enable manpower saving and automation of picking operations in warehouses

NEDO provides cross-disciplinary support for various phases, from the discovery of technology seeds to research for practical applications. In addition, in order to promote commercialization from technology seeds, NEDO provides advisory support from venture capitals or experts in certain areas such as law, accounting, and IP for commercialization.

Encouraging open innovation

Matching support, and Japan Open Innovation Council (JOIC)



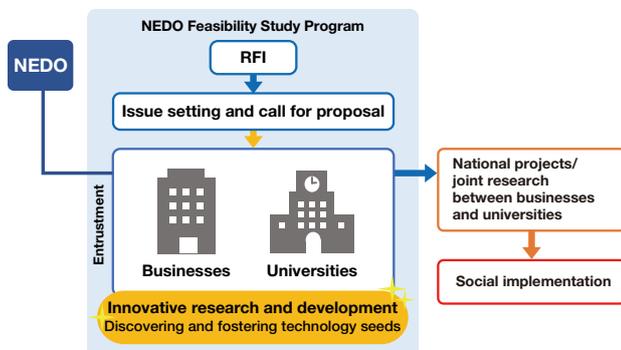
NEDO "Dream Pitch" (10th Innovation Leaders Summit)

To promote open innovation and create new business models, NEDO organizes matching events between NEDO project participants and external businesses and pitch events at JOIC, as well as researches and shares best practices both in Japan and abroad.

Fostering industrial technologies targeted for a vision beyond 2040

NEDO Feasibility Study Program

Conceptual diagram



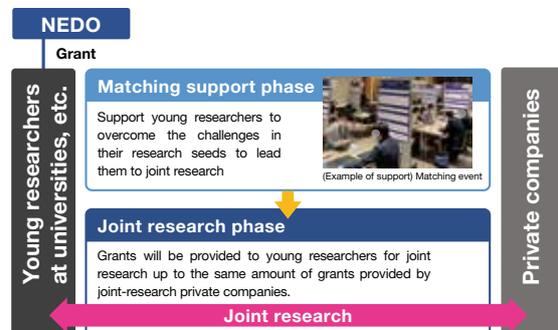
- Discovering and fostering technology seeds to lead them to national projects

In order to realize a carbon neutral society and to create new industries, NEDO will discover and foster innovative technology seeds with a view to practical application and social implementation after 2040. NEDO aims to lead them to joint research through industry-academia collaboration, including national projects.

Support for young researchers

Intensive Support Program for Young Promising Researchers

Conceptual diagram



- Promote joint research between universities, etc. and private companies, and foster future human resources in innovation.

This program identifies young researchers engaged in creative, practical and goal-oriented basic or applied research at universities, etc. and assists them to move to joint research with private companies. With this program, NEDO aims at fostering future human resources in innovation and improving Japan's industrial capabilities.

▼ Cross-Sectoral Proposal-Based Research and Development Activities

To realize achieving carbon neutrality by 2050 with bold investments

Green Innovation Fund Projects

In October 2020, within the growing global momentum for decarbonization, Japan declared that it aims to achieve carbon neutrality by 2050. However, carbon neutrality by 2050 cannot be realized through ordinary efforts. It is necessary to make structural changes in the energy and industrial sectors, and accelerate innovation with bold investments.

Outline

NEDO is promoting the Green Innovation Fund Projects, which aims to support companies and other organizations committed to ambitious goals related to achieving carbon neutrality from research and development through to demonstration to social implementation for up to a maximum of ten years.

● Support Targets

The Green Innovation Fund Projects focus on priority fields for which implementation plans have been formulated within the Green Growth Strategy, or key fields for which a future roadmap has been presented based on the "Basic Policy for Realization of GX", where policy effects are significant, and long-term continuous support is required to realize social implementation.

● Strategy for Maximizing Results

To ensure that research and development results are steadily implemented publicly, the Green Innovation Fund Projects seek the commitment of the managers of companies and other organizations to persevere in challenging these goals as long-term business issues.

Projects

Based on the Policy for Allocation of Funds for each Field (as of May 2023)

Field such as Green Power Promotion	Field of Energy Structure Transformation	Field of Industry Structure Transformation
<ul style="list-style-type: none"> •Cost Reductions for Offshore Wind Power Generation •Development of Next-generation Solar Cells •Development of CO₂ Reduction Technology for Waste Treatment and Circulation of Resources 	<ul style="list-style-type: none"> •Large-scale Hydrogen Supply Chain Establishment •Hydrogen Production through Water Electrolysis Using Power from Renewables •Hydrogen Utilization in Iron and Steelmaking Processes •Fuel Ammonia Supply Chain Establishment •Development of Technology for Producing Raw Materials for Plastics Using CO₂ and Other Sources •Development of Technology for Producing Fuel Using CO₂, etc. •Development of Technology for Producing Concrete and Cement Using CO₂ •Development of Technology for CO₂ Separation, Capture, etc. 	<ul style="list-style-type: none"> •Next-generation Storage Battery and Motor Development •Development of In-vehicle Computing and Simulation Technology for Energy Saving in Electric Vehicles •Smart Mobility Society Construction •Next-generation Digital Infrastructure Construction •Next-generation Aircraft Development •Next-generation Ship Development •Development of Negative Emissions Technologies in Agriculture, Forestry, and Fisheries Industries •Promotion of Carbon Recycling Using CO₂ from Biomanufacturing Technology as a Direct Raw Material •Decarbonization of Thermal Processes in Manufacturing

Outreach

A dedicated website for the Green Innovation Fund Projects has been launched to disseminate related information. In addition to introducing the initiatives of the Green Innovation Fund Projects by posting conceptual videos, feature articles, and project information, the website also includes a dashboard of information on industries and technologies related to the projects.



Pioneering a new frontier



Moonshot Research and Development Program

In a bid to spark home-grown disruptive innovations, the Japanese government has launched the Moonshot Research and Development Program, with nine specific goals established to boldly promote ambitious research and development activities. NEDO is conducting pioneering research and development projects to achieve Goal 4 under the program.

Outline

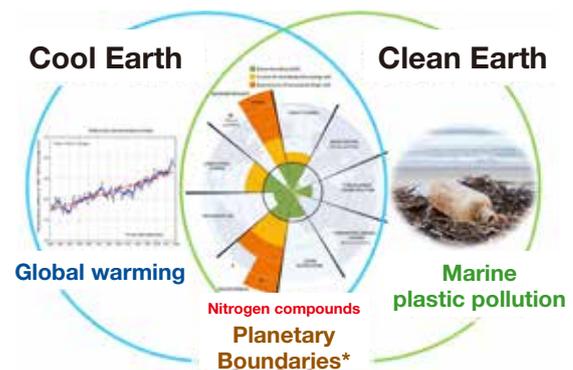
● Moonshot Goal 4

Realization of sustainable resource circulation to recover the global environment by 2050

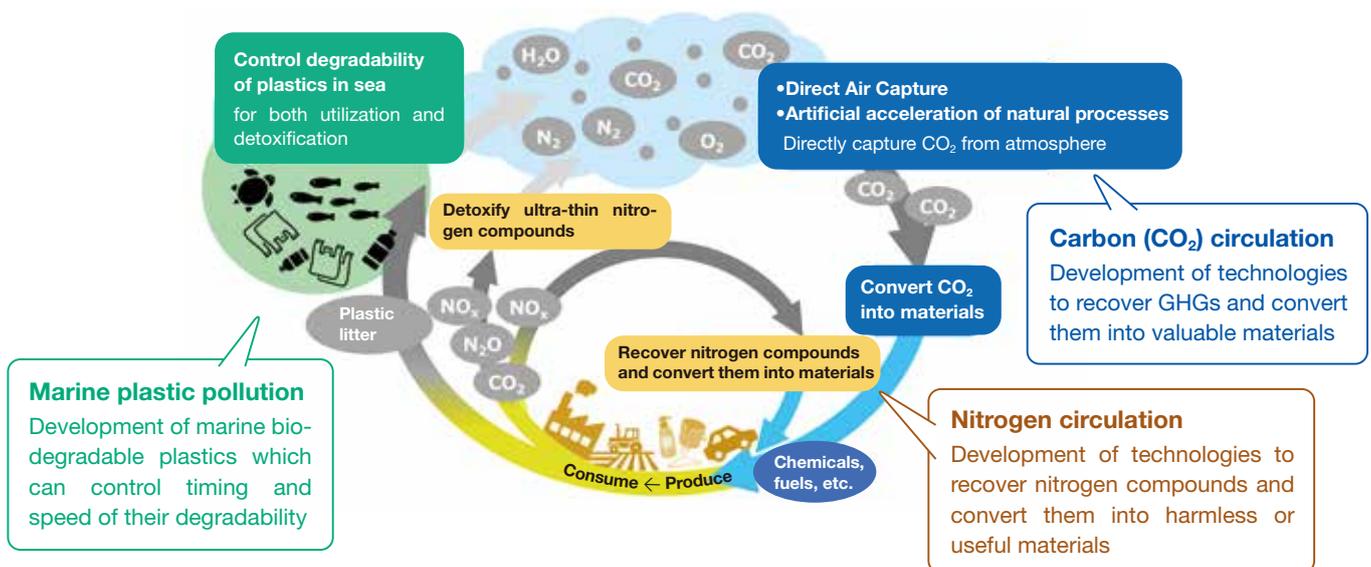
Committed to recovering the global environment, NEDO aims to realize more sustainable resource circulation by curbing global warming (referred to as the Cool Earth concept) and combatting environmental pollution (referred to as the Clean Earth concept).

Greenhouse gases, nitrogen compounds, marine plastic pollution, and many other harmful substances are continually being released into the environment. Efforts to reduce the amount of harmful substances being released must be combined with measures to recycle them.

*The concept of planetary boundaries refers to thresholds within which humans can continue to develop and thrive. Exceeding these thresholds, however, results in irreversible changes to the natural environment on which humans depend.



Goal 4 conceptual diagram



Aiming to strengthen information and communication technologies and manufacturing infrastructures toward the 5G expansion phase

Research and Development Project of the Enhanced Infrastructures for Post-5G Information and Communication Systems

In many countries, 5G mobile communication systems more advanced than their 4G predecessors have already been launched as commercial services. Post-5G systems, which possess even more advanced capabilities, such as ultra-low latency and multiple simultaneous connections, are expected to become a cornerstone for Japanese competitiveness in years to come. Post-5G technologies are also expected to be utilized in a variety of industrial applications, such as smart manufacturing and autonomous driving. In addition, such technologies are essential to realizing both a digital society and carbon neutrality.

Overview

This project aims to develop core post-5G technologies and enhance Japanese research and development and manufacturing infrastructure for post-5G information and communication systems.

More specifically, as well as developing post-5G information and communication systems and advanced semiconductors to be used in such systems, the project promotes the development of technologies for manufacturing advanced semiconductors so that Japan ensures its manufacturing capability in this sector.

(i) Development of post-5G information and communication systems (Commission, Subsidy)

The item aims to promote the development of systems important for realizing the levels of performance required in the post-5G era, and development of technologies for semiconductors used in these systems.

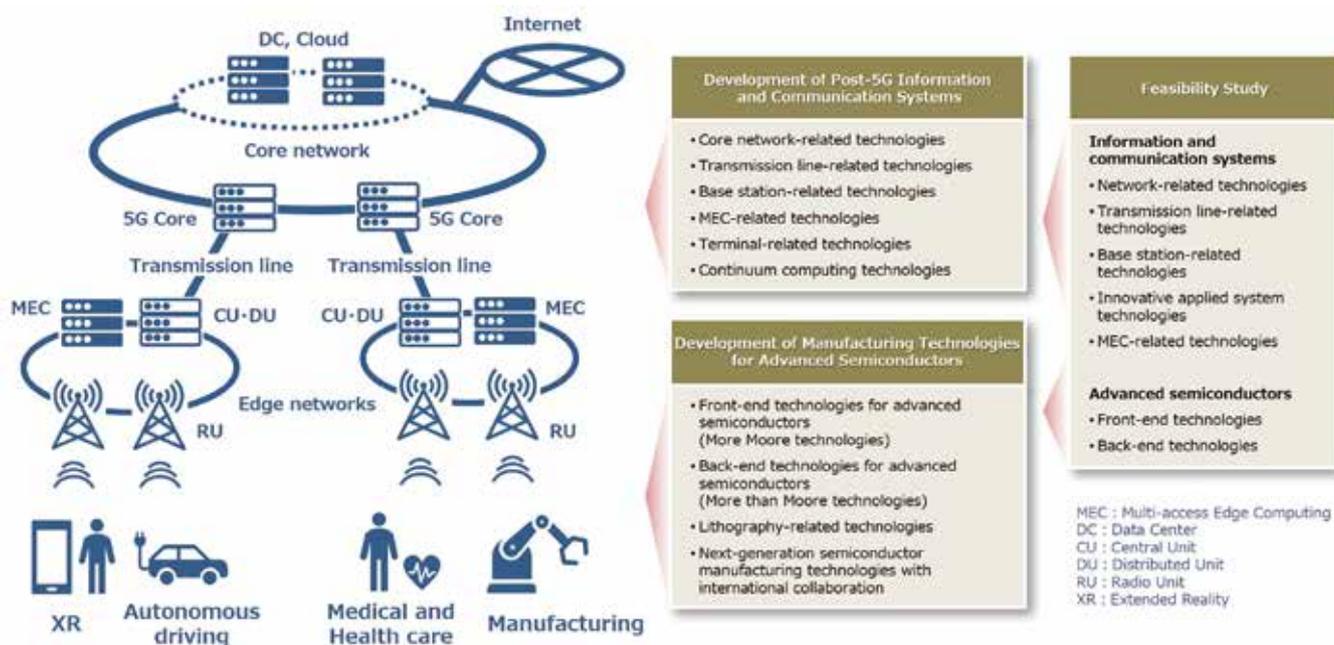
(ii) Development of manufacturing technology for advanced semiconductors (Subsidy, Commission)

Through the creation of pre-commercial manufacturing "pilot lines" and other activities, the item aims to promote the development of manufacturing technologies for leading-edge products, such as logic semiconductors which are not currently available in Japan. (Subsidy)

The item also promotes the development of core technologies where Japan ensures a competitive advantage, such as system design technologies for advanced semiconductors, technologies for realizing commercial-scale manufacturing technologies related to packaging and miniaturization. (Commission)

(iii) Feasibility Study (Commission, Subsidy)

Feasibility studies related to research and development items (i) and (ii) are also conducted. This item covers technologies that may not be ready for commercialization in the post-5G era but may be promising in the latter half of the post-5G era and the next generation.



► Specified Proposal-Based Research and Development

Toward strengthening and promoting economic security in Japan



Key and Advanced Technology R&D through Cross Community Collaboration Program

(also known as the K Program)

Science, technology, and innovation are increasingly becoming key to prevailing in the global struggle for supremacy. In order for Japan to enhance its technological advantages and ensure indispensability, it is necessary not only to strengthen its research infrastructure, but also to actively promote and foster research and development of key technologies at the national level, rather than relying solely on market economy mechanisms.

Outline

In order to strengthen and promote economic security in Japan, the Cabinet Office, the Ministry of Economy, Trade and Industry (METI), and other relevant ministries and agencies will work together to promote the research and development process of advanced key technologies through to technology demonstration in a rapid and flexible manner. Taking into account the ambiguous nature of science and technology, NEDO promotes research and development projects that lead to not only commercial use but also public use and encourages the utilization of research and development results based on the vision and concept set forth by the government.

▼ Programs for Specified Semiconductor Production-Related Development

Support for facilities producing advanced logic semiconductors and memory semiconductors

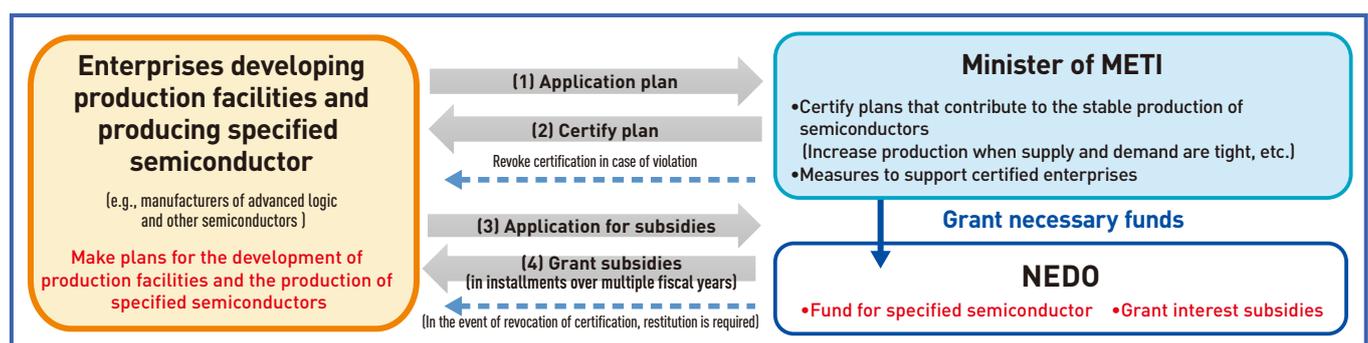
Specified Semiconductor Funding Program

The Action Plan of the Growth Strategy (approved by the Cabinet on June 18, 2021) indicated the need to promote the establishment of domestic production bases for high-performance semiconductors that support the digital society, and to build a reliable supply system.

Overview

Performed in close cooperation with METI and in accordance with Article 29 of the Act on Promotion of Developing/Supplying and Introducing Systems Making Use of Specified Advanced Information Communication Technologies(Act No. 37 of 2020), NEDO will create a fund and grant subsidies to businesses that have been certified under the Act (hereinafter referred to as “certified enterprises”), and will be engaged in the grant interest subsidies to financial institutions that provide loans to certified enterprises.

Funding mechanism



▼ Case Studies on the Practical Application of NEDO Project Outcomes

Achievements of completed NEDO projects

NEDO Project Success Stories

NEDO conducts follow-up monitoring to ascertain how the technology developed through a project has been utilized in products and services and how project results have been disseminated throughout society. NEDO then interviews businesses and developers about the products and services it has discovered and shares this information through NEDO Project Success Stories.



<https://webmagazine.nedo.go.jp/practical-realization/>

● Four new articles published in NEDO project success stories



Development of a Hydrogen Power Generation System That Enables Local Production and Local Consumption of Clean Energy



Commercialization of a Transparent Display That Adds a New Function to Window Glass



Leading the World in Commercialization of 1700°C-Class Gas Turbines for Next-Generation Thermal Power Generation



Ultra-High Dispersion Mass Production Eliminates the Biggest Obstacle, "Aggregates", to Utilize Carbon Nanotubes

Impact of NEDO project results

NEDO Inside Products

NEDO Inside Products are products and processes that use the results of NEDO projects as core technologies* and have been found to have a considerable socio-economic impact. A total of 122 products had been selected as of FY2022.

To clarify the medium- and long-term effects of these products, NEDO calculates their actual sales, CO₂ emission reductions, and primary energy consumption reductions.

*"Core technologies" refer to technologies at the research and development stage that a NEDO project took the opportunity to commercialize and without which new products or processes would not have resulted.

● Example of recently featured NEDO Inside Product



Defect inspection device for EUV mask blanks

- An EUV source with an extremely short wavelength was successfully employed to perform defect inspections on the entire surface of a mask blank.
- Compared to conventional devices, this successfully commercialized product can inspect deeper into mask blanks with considerably greater sensitivity in terms of defect detection, thereby improving the yield and defect management.
- In the oligopolistic markets found in both Japan and abroad, this device has given its manufacturer a leading competitive edge over its competitors.

Activities Around the World

Research and Development Program for Promoting Innovative Clean Energy Technologies Through International Collaboration

International Collaborative R&D for Low-Cost and High-Durability Solar Cells	UK & France
International Joint R&D for Multi-Junction Solar Cells Based on Innovative and Novel Structures	France
Development of Microbial Production of Next-Generation Polylactate from Biomass-Derived Sugars	Finland
International Joint Research on Efficient Intermediate Temperature Solid Oxide Electrolysis Cell	Germany, UK & Switzerland
Chemical Productions through Formate Intermediates by Solid Bis-metallic Catalysts	France
International Joint Research of Innovative Thermoelectric Devices and Advanced Evaluation Technology	France, Germany & Korea
Development of innovative solution growth technology that improves productivity and quality of SiC crystals	France
International Joint Research for Metal-free Redox Flow Battery	Italy
International collaboration on CCU for circular carbon in Steelmaking	Spain
International joint research and development of innovative high-temperature thermal energy storage technology	Sweden & India
International collaboration on CIS-based tandem PVs	Germany
International joint research and development of lead-free alloyed tin perovskite tandem solar cells	Italy
Long-term stabilization of automotive adhesion and the interfacial design	Germany
International Collaborative Research for Standard Ground Erosion Tests Against Blade Erosion	Denmark
International Collaborative Research for Electrochemical Ammonia Synthesis Under Ambient Conditions	UK
Reliability Assessment Methodology for Advanced Ceramic Matrix Composites (CMCs)	USA & UK
International Joint Research on High Voltage Devices and Power Electronics Element Technologies for the Effective Utilization of Renewable Energy	Switzerland, Germany & USA
International joint research for supply technology of high-pressure and purity of hydrogen by chemical compressor using formic acid	France, Korea, Saudi Arabia, UK, Norway & Netherlands
International joint R&D of CO ₂ direct utilization jet fuel synthesis for carbon recycle	Thailand
International Project of Innovative Artificial Apomixis Induction Technology	USA
International Joint Research on Solid Oxide Reversible Electrolyzer Cells	USA
International Joint Research and Development of Solar Concentrating Reactor for Carbon Dioxide Decomposition	USA
International R&D collaboration for low-cost CO ₂ recovery technology using novel zeolite adsorbent	USA
Development of advanced low-temperature sintering process using nanocrystals for next generation energy devices	USA



Introducing Japanese technologies to the world

● International Demonstration Project on Japan's Technologies for Decarbonization and Energy Transition

Flexible Load Management System Demonstration Project for Full Electrification of Buildings in California	USA
Demonstration Project for Energy Saving Seawater RO System	Saudi Arabia
Comprehensive Study to Conduct a Demonstration of Smart Mobility Technology using Energy Efficient Transportation Systems in Clark Area	Philippines
Demonstration Project for the Development of Micro Substation with Power Voltage Transformer to Realize High-Efficiency Power Supply in Undeveloped Areas of Distribution Network in India	India
Demonstration Project for the IT System to Support E-Mobility Operation of Last-mile Transport	India
The Model Project for Enhancement of Energy Saving Shrimp Aquaculture System with Biomass from Local Products	Vietnam

● Program to Facilitate Overseas Promotion of Low Carbon Technology Through the Joint Crediting Mechanism (JCM)

Demonstration Project for Low-Carbonized Operation of a Power Grid Utilizing Online Voltage-var (Q) Optimal Control "OPENVQ" with ICT	Thailand
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Energy-efficient seawater desalination plant (Saudi Arabia)



Signing of LOI for the Demonstration Project on Enhancement of Energy Saving Shrimp Aquaculture System with Biomass from Local Products

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