NEDO

2024

NEDO Project Success Stories 2024

New Energy and Industrial Technology Development Organization

Challenge for

Introduction

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 technology 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. In order to further advance its activities, NEDO has formulated technology development strategies with a mid- and long-term perspective, and has planned and proposed new projects based on its strategies. In addition, with the aim of creating greater innovation, a new project manager system has been introduced to improve management capabilities and enhance NEDO's role as an intermediary for discovering technology seeds and facilitating the commercialization of innovative technology.

NEDO is carrying out its Fourth Five-Year Plan that began in April 2018 with a focus on its three pillars of achieving results for practical application through technology development management, fostering technology-based startups, and providing a new direction for mid- and long-term technology development.

First, as a specific effort to achieve results for practical application through technology development management, NEDO is striving to further strengthen its management capability to promote challenging research and development activities based on technology strategies. This is expected to enable a quick response to innovation that is taking place around the world and produce practical applications that utilize research and development results as much as possible. Second, NEDO will develop and public-private support hub for venture businesses and open innovation. Third, a new direction for mid- and long-term technology development is being established, which will lead to cultivation and practical use of innovation in the future.

In addition to providing evidence necessary for policy making, technology development strategies utilizing Japan's competitive advantages will be formulated by anticipating innovation trends faster and more accurately than in other countries. NEDO will then plan and carry out industryacademia-government collaborative projects.

As this fiscal year marks the 40th anniversary of its establishment as a governmental organization and also the mid-point of its Fourth Five-Year Plan, NEDO will further enhance its approach to achieving goals with the aim of promoting ongoing development of three social systems necessary to realize a sustainable society. To this end, NEDO will continue to make every effort to contribute to society by providing opportunities to produce innovation through industry-academia-government collaboration and achieving results in a timely manner.

New Energy and Industrial Technology Development Organization
Chairman SAITO Tamotsu

Innovation

NEDO's role as an innovation accelerator

New paths to commercialization.
To make technologies available in society as products and services, researchers need to overcome various challenges through repeated trial and error.

To assist in surmounting such challenges, NEDO combines the efforts of industry, academia, and government to drive progress to create innovation.

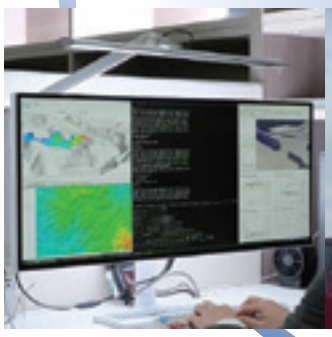
In its pursuit of achieving a sustainable society, NEDO promotes the practical application of the results of its research and development in society, thereby helping to solve social issues.

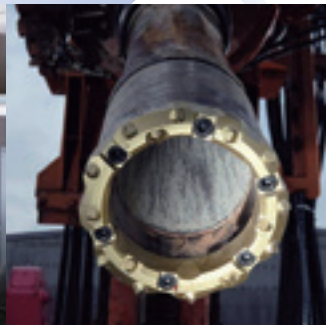
Contents

About NEDO Project Success Stories

Behind every accomplishment in NEDO's research and development projects is a story of how companies overcame daunting technical challenges to achieve commercialization.

New Energy



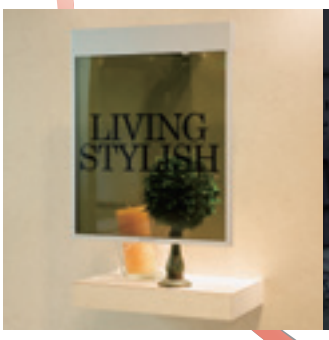


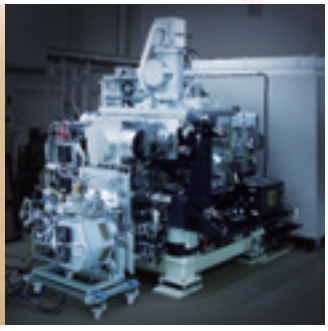
Resolution of Global Environmental Problems

The results of NEDO projects

Energy Conservation

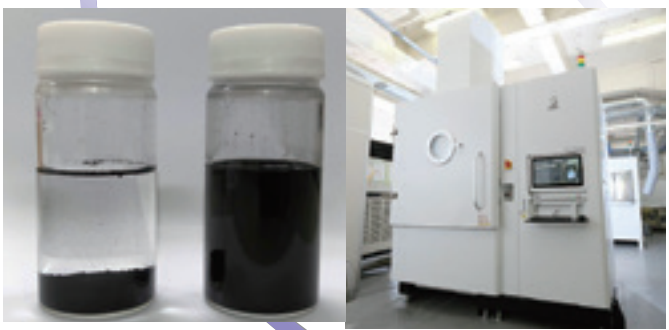
Electronic / Information



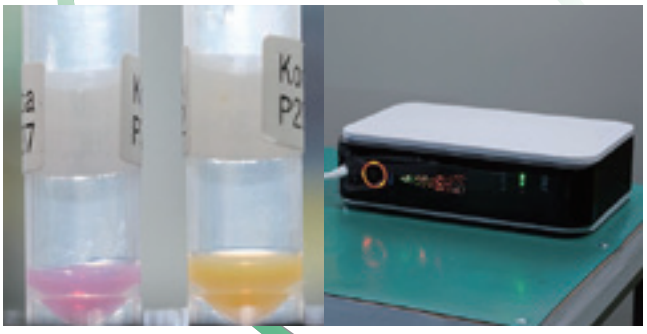


NEDO carries out a post-project evaluation after a project is completed by conducting follow-up monitoring to determine how project results have spread throughout society. Based on the products and services identified in the monitoring, interviews are conducted with related companies, and then the products and services are introduced in NEDO Project Success Stories, which are posted on NEDO's website. NEDO Project Success Stories have introduced more than 130 technology development themes since publication of such stories was started 16 years ago.

Material



Medical Biotechnology



contribute to a better future.

Robots / AI / Welfare Equipment

This brochure outlines three new success stories of technology development leading to commercialization.

KDDI CORPORATION

Drones and Robots for Ecologically Sustainable Societies Project

Realizing a World With Drones Traffic management System for Simultaneous Operation of Multiple Drones

KDDI was involved in NEDO's project on Drones and Robots for Ecologically Sustainable Societies from 2017. (Source: KDDI CORPORATION)

Screenshot of a flight plan being created with the 4G LTE traffic management system (Source: KDDI CORPORATION)

Screenshot of the traffic management system (Source: KDDI CORPORATION)

NEDO's Role

Use of drones and robots in logistics, infrastructure inspection, and other fields is expected to bring about energy savings, but doing so means that developing a flight environment where many drones operate safely is essential.

In this project, NEDO promoted the development of drones and robots that can be used in logistics, infrastructure inspection, disaster response, and other fields, and at the same time, developed evaluation methods necessary for social implementation, developed systems, and carried out flight demonstration experiments. NEDO will continue working to expand the market for drones and more.

Goal	Challenges	Achievements
To establish a drone traffic management system for Level 4 flight, where drones are flown over populated areas beyond the visual line of sight	**Identifying challenges in each use case (region) and countermeasures for them**	**In 13 regions across Japan, 52 drones were successfully operated simultaneously in an integrated manner.**

The potential of drones as connected devices

KDDI has been focusing on drones as promising candidates for the next generation of connected devices following the smartphone. Around 2016, KDDI launched experiments on SmartDrone control using mobile communications. In March 2017, they achieved Japan's first fully autonomous flight, paving the way for flight beyond the visual line of sight.

Sharing knowledge with Japan's leading players

Drone flying is classified into four levels according to how they are operated and where they fly. KDDI believed it necessary to use its own technologies and work with players in different industries during development to build a SmartDrone traffic management system for Level 4 drone flight, where drones are flown over populated areas beyond the visual line of sight as the ultimate goal. In 2017, KDDI joined NEDO's large-scale project, the Drones and Robots for Ecologically Sustainable Societies (DRESS) project. Sharing knowledge with companies and organizations involved in this project and leading the domestic drone industry through five years of consultation and collaboration, KDDI's SmartDrone traffic management system has moved ahead in leaps and bounds.

Integrated simultaneous operation of 52 drones in 13 different regions across Japan

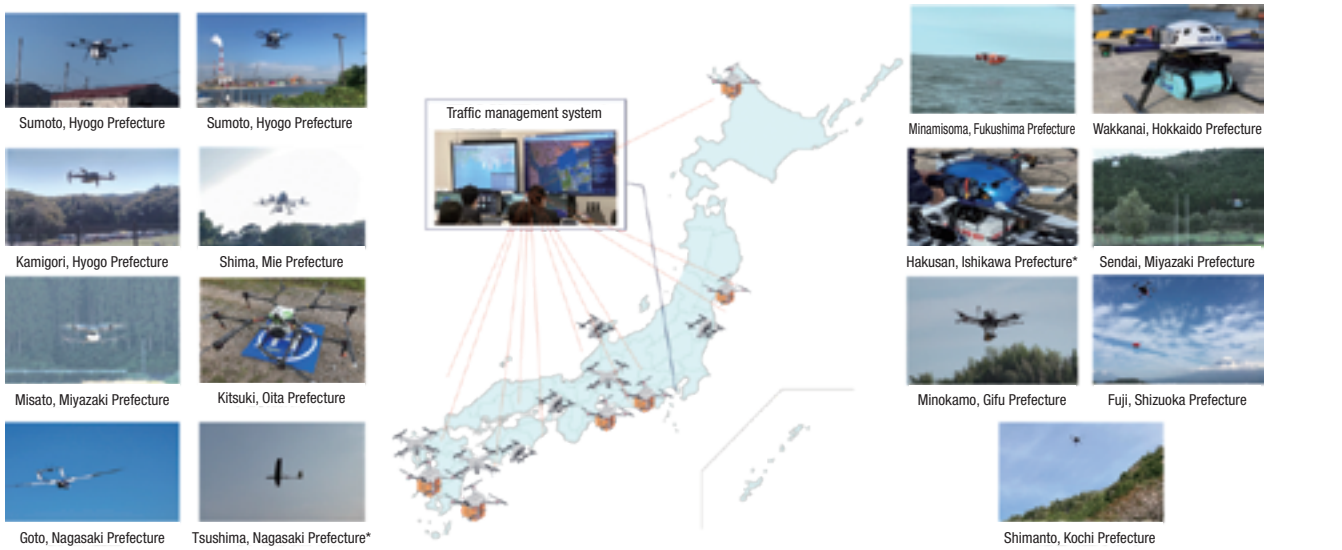
KDDI's role in the DRESS project was to take charge of verifying the traffic management system. This involved taking regional characteristics and expandability as a theme into account and running multiple demonstration experiments to simulate use cases that cover regional characteristics and the ability to be used for industrial revitalization in each region. Finally, on October 27, 2021, KDDI conducted Japan's largest demonstration experiment where it succeeded in controlling 52 drones flying in 13 different regions across Japan in an integrated manner.

Toward the social implementation of the drone traffic management system

NEDO is implementing the Realization of Advanced Air Mobility (ReAMo) project, which inherited the achievements of the DRESS project. In the ReAMo project, KDDI is playing a leading role as well. The drone traffic management system KDDI is working on in the ReAMo project needs to be linked with public systems and use commercial applications to serve as a hub for commercial drone flight once it has entered the market. Also, there is a plan to grow this drone flight operating technology developed in Japan into a global standard platform so it can be used in other countries as well.

Outline of the demonstration experiment where drones were operated simultaneously in 13 different regions across Japan(Source: KDDI CORPORATION)

* The demonstration took place in early November in Hakusan City, Ishikawa Prefecture and Tsushima City, Nagasaki Prefecture.



In Many Ways, Drones Are My Calling

Needed by the places I visited as a university student

Sugita Hiroshi has long been involved with developing SmartDrone platforms. Sugita said that the drone industry is his calling. He has felt a mysterious connection with drones ever since his days at university.

"I was a member of the hiking club at university and traveled to mountainous areas and natural reserves all over Japan. What I found especially impressive after I started working on drones is that I had been to most of the places visited for demonstration in the DRESS project while a member of the hiking club at university, including Iriomote Island and Hakuba in Nagano. They are places still rich in nature and sparsely populated. Yet some people do make their living there. I'm now working hard to develop the drone business into an infrastructure-related industry. I feel a mysterious connection because I've been needed by the places I visited when I was a university student. After joining this company, I've engaged in various areas of work, including semiconductors, cameras, communications, and robotics. I feel an interesting link to drones because working with them requires all these experiences. In many ways, the drone industry is my calling."

SUGITA Hiroshi

Leader, LX Platform Development Department Business Exploration & Development Division
KDDI CORPORATION
General Manager, Platform Service Development Department
KDDI SmartDrone Inc.

Success Fueled by Failure

Asking personnel to do more than communications while at a communications company

Yamazaki So became a member of NEDO's DRESS project team immediately after joining KDDI as a new graduate. He cannot forget the words of NEDO's staff.

"I joined KDDI because I wanted to work in a range of industries. At the interview with the personnel department of a communications company, of all places, I said I wanted to try something new that wasn't communications. So, they assigned me to the drone project, and I'm still working there, and I am very motivated. I'm grateful to the personnel department for their decision. Just as I had wanted, I was offered opportunities to work with people from different industries through the DRESS project. At the same time, I was able to establish a foundation and mindset for my career. At the demonstration flight conducted for media representatives in the early stage of the DRESS project, even though we should have demonstrated our technology, the first drone did not fly. However, the presentation eventually succeeded after immediate corrections. On that occasion, NEDO staff encouraged us by saying that failure is not necessarily a bad thing. Failures like this are inevitable when you're working on such an enormous project."

YAMAZAKI So

LX Platform Development Department Business Exploration & Development Division
KDDI CORPORATION
Platform Service Development Department
KDDI SmartDrone Inc.

Comments by NEDO Personnel in Charge

Acting as a Buffer between Different Corporate Cultures and Offering Support to Build a Consensus

MORI Masato

Project Coordinator, Robot and Artificial Intelligence Technology Department, NEDO

Many companies participated in this project, including large ones like KDDI and venture capital businesses. NEDO was there to act as a buffer between different corporate cultures and offer support to build a consensus among them.

Until then, drone traffic management systems could only be verified at dedicated test facilities. However, we took on the challenge of operating drones simultaneously in the field in 13 different regions around Japan. KDDI not only carried out the necessary work on that day but also held interviews with people in these 13 regions before and after the verification to unearth challenges linked to introducing the drone traffic management system as an institution, which was of great help.

This project saw many companies and organizations collaborating to launch a new industry, which was an extremely valuable experience for me. Currently, the ReAMo project, which has inherited the achievements of the DRESS project, is underway. NEDO will focus on conforming with international technical standards as we proceed with the project.

Basic Knowledge

Traffic management system for simultaneous operation of multiple drones

In Level 4 drone flight, drones can be flown over populated areas beyond the visual line of sight. Doing so requires a system to obtain and combine not only flight information about our own drones but also information about other nearby drones and helicopters in order to constantly monitor flight safety and control multiple drones.

This traffic management system for the simultaneous operation of multiple drones is expected to be commercialized in the future. It enables smart drones communicating on 4G LTE networks to fly autonomously according to a prescribed route and monitors these smart drones simultaneously while identifying individual units, thereby allowing one administrator to control multiple drones at the same time.

In addition, it works with flight information systems for other aircraft flying on different control systems. When another drone or helicopter in flight approaches, an alert appears on the system in real-time, ensuring safe flight for all operators.

This system also manages not only flight information but also the radio wave conditions, weather information, and information on restricted-access zones in the flight area in an integrated manner. This makes it possible to set safe flight routes and avoid various risks in advance.

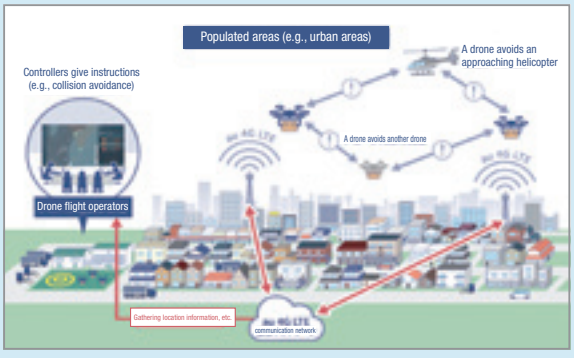
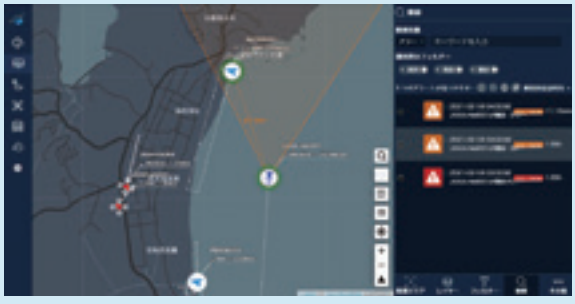


Illustration of drone traffic management system operated in combination with a variety of information (Source: KDDI CORPORATION)



Screenshot of the drone traffic management system developed and operated by KDDI (Source: KDDI CORPORATION)

Panasonic Holdings Corporation

► Technology Development to Realize a New Delivery Service Using Self-Driving Robots Project

For Everyday Situations Where Humans and Robots Coexist
Automated Delivery Robot HAKOBO

Automated delivery robot HAKOBO traveling around Fujisawa Sustainable Smart Town

Multiple HAKOBO robots are operated by a single operator (Source: Panasonic Holdings Corporation)

Four HAKOBO robots are remotely operated by a single operator (Source: Panasonic Holdings Corporation)

Experimental distribution service with HAKOBO (Source: Council for Area Development and Management of Otemachi, Marunouchi, and Yurakucho)

NEDO's Role

Delivery services, from distribution bases and retail stores to residences and designated addresses (last-mile delivery), are encountering challenges that include a labor shortage in the logistics industry, an increasing number of parcels to deliver, and a growing demand for daily necessities and other purchases. Overcoming these challenges requires the early introduction of new delivery services using autonomous robots. NEDO has been providing various kinds of support. This includes monitoring the progress of development, providing technical guidance through external experts, showcasing developed products at exhibitions, publicizing developed technologies at seminars and symposiums, and examining and sharing overseas trends.

Goal	Challenges	Achievements
To achieve last-mile delivery with robots on public roads	Developing technologies that enable robots to travel safely and autonomously on public roads, and monitoring and controlling multiple robots remotely in real time	Full remote operation of four robots by a single operator without safety personnel

Shifting research and development from autonomous vehicles carrying humans to robots carrying goods

Panasonic Holdings Corporation (Panasonic HD)* has been conducting research and development on autonomous vehicles at its premises since 2015. However, the COVID-19 pandemic reduced the movement of people and increased the flow of goods, including delivery services. In July 2020, applying its accumulated mobility technologies, the company shifted its R&D to autonomous cargo-carrying robots. In November of the same year, Panasonic HD began Japan's first demonstration experiments for delivery services to residential areas using the automated delivery robot HAKOBO on public roads. This experiment was conducted within the Fujisawa Sustainable Smart Town (FSST).

Success solving multiple challenges and simultaneously operating four HAKOBO robots

Around the same time that Panasonic HD launched its demonstration experiment using public roads, it was selected as a member of the Technology Development to Realize a New Delivery Service Using Self-Driving Robots Project, and various demonstration experiments were conducted accordingly.

The company was working to improve not only the robots but also remote monitoring and control systems to reduce running costs. As the number of robots that a single operator can run increases, the running cost decreases. When Panasonic HD launched the demonstration experiment within the FSST, only one HAKOBO robot was operated by a single operator. However, three months later, the number of HAKOBO robots operated by one operator was successfully increased to two in February 2021, to three in June, and four in August. At that time, however, there was a regulation that required at least one safety personnel member to be present when operating a HAKOBO robot in town, making it unrealistic to commercialize the system as an actual service. The company subsequently continued its efforts towards full remote operation of HAKOBO robots without any safety personnel. In April 2022, it received a permit for full remote operation without any safety personnel on public roads for the first time in Japan—succeeding in full remote operation of four robots by a single operator.

Major items for verification within the NEDO project

- Verifying technology to detect, stop, or avoid obstacles (pedestrians and bicycles)
- Verifying technology for autonomous robot movement along designated routes under expected restricted conditions
- Verifying remote monitoring systems that enable situation-dependent manual operation of robots
- Verifying technology to create maps for autonomous robot movements automatically
- Verifying the interface for enhancing convenience for both the deliverer and receiver
- Verifying detection technology for robot abnormalities
- Verifying the evaluation of communication stability for real-time remote monitoring
- Surveying public acceptance of robots (e.g., speed, distance, size) in environments where humans and robots coexist

Aiming to remotely monitor and control 10+ HAKOBO robots by a single operator

HAKOBO continues to evolve. Panasonic HD was selected as a member of a NEDO project that was launched in FY2022: the Project to Construct a Basis for Research and Development of Innovative Robots, with the theme of "Development of Delivery Robots and Their Operation System Assuming Coexistence of Humans and Robots and Realization of Delivery Services in Residential Areas, etc." To increase the number of HAKOBO robots that can be remotely monitored and operated by a single operator to 10 or more, Panasonic HD is developing a system that uses AI to determine which robot to monitor by priority, as well as AI models to detect boundaries between sidewalks and roadways to assist in monitoring.

Panasonic HD's attempt to create delivery services using autonomous robots began at its premises and in designated public areas. Development is still underway to shift current delivery tasks to robot tasks and normalize the coexistence of robots and humans in town.

*In April 2022, Panasonic Corp. was renamed Panasonic Holdings Corporation. "Panasonic Holdings Corporation" is used throughout.

Our Work Creates a New World through Acceptance

I was impressed when I saw people receive items from HAKOBO

Toujima Masayoshi, who is responsible for Panasonic HD's Mobility Service Platform X-Area Project and worked on the social implementation of services using HAKOBO, said that he was impressed when he saw people receive items from HAKOBO. Initially, he was worried about whether or not people would accept or buy goods from robots without any delivery or sales staff around them when HAKOBO would visit to deliver or sell goods.

"I watched HAKOBO from the shadows and was impressed when I saw customers receive parcels or products from the robots we made."

It was then that he realized the significance of what they were doing for the first time and felt that this came through to users.

"We're proud of making something unprecedented and for paving the way for it, but it's not enough. I believe that our work can only create a new world when people accept what we are doing. To do so, I need to bring together the capabilities of everyone in our group. That's why my job is so interesting."

TOUJIMA Masayoshi

Head of RaaS Business Strategy
Mobility Business Strategy Office & CEO of the X-Area Business Promotion Project
Panasonic Holdings Corporation

Taking HAKOBO Somewhere New

Mobility can solve future social challenges

Fujikawa Dai, who oversees the development of HAKOBO hardware, feels his job is rewarding the moment HAKOBO operates in a new place.

"When we bring HAKOBO to areas outside the FSST, people from each area show different reactions, which makes me want to take HAKOBO elsewhere to see what other reactions we will get. I believe that bringing HAKOBO to more places also means helping people in more places. I really want to keep doing it."

Fujikawa studied motor control for electric vehicles at university. During that time, it occurred to him that mobility could solve social challenges in the future as the workforce decreases.

"I thought that autonomous vehicles would surely be something to look forward to and that my parents would be happy about them. With these thoughts, I decided to embark on a career centered on mobility."

This decision drives Fujikawa, who is now involved in developing autonomous robots, and keeps him dedicated to his job, which he believes has the potential to solve a range of social issues.

FUJIKAWA Dai

Section 1, Mobility Solutions Department
Digital and Artificial Intelligence Office
Technology Division
Technology Sector
Panasonic Holdings Corporation

Comments by NEDO Personnel in Charge

Active Involvement in Use-case Development

TSURUTA Takehiro

Project Coordinator, Robot and Artificial Intelligence Technology Department, NEDO

What was amazing was that Panasonic HD worked hard to develop not only technologies but also use cases, such as what the developed robots would carry, what applications these robots would be used for, and whether or not there were any applications other than carrying goods.

In addition to technological development, I realized the importance of business- and use-case development too. Currently, another project is ongoing with the next goal of operating ten HAKOBO robots with a single operator. NEDO will continue its support here.

Basic Knowledge

What is required for autonomous robots to coexist with humans?

A variety of systems are needed for robots and humans to exist side by side in everyday life.

The most basic element is to install various sensors to detect humans and obstacles. HAKOBO is equipped with various sensors to automatically stop if it detects danger. The sensors are durable and incorporate systems for failure detection.

These robots must also be able to identify sidewalks and roadways and recognize outdoor environments, such as crosswalks and steps. There is also a need for systems that can observe traffic rules and other rules that are part of human life.

These robots primarily operate outdoors, so they must be designed to operate in any weather, including rain and snow.

When the robots operate in crowded places, they must alert people around them by using visual and auditory signals. HAKOBO can notify people around it of its next action so they can prepare for it.

In addition, when HAKOBO is operating, an operator at the control center can monitor the robot with images from cameras mounted on it and operate it remotely through telecommunications. HAKOBO is programmed to automatically stop if communications are interrupted. However, when traveling over a street crossing, HAKOBO will not stop until it completes the crossing. This is an example of how HAKOBO is designed to assess situations automatically.

Various onboard sensors

Recognition of outdoor conditions

Uses AI for risk prediction

All-weather design

Alerts humans with visual and auditory signals

Monitoring and remote operation by the operator

Robots that operate autonomously outdoors must meet a variety of requirements. This includes being equipped with various sensors for detecting humans and obstacles, the ability to assess the environment and situations, an all-weather design, and alert functions that use visual and auditory signals.

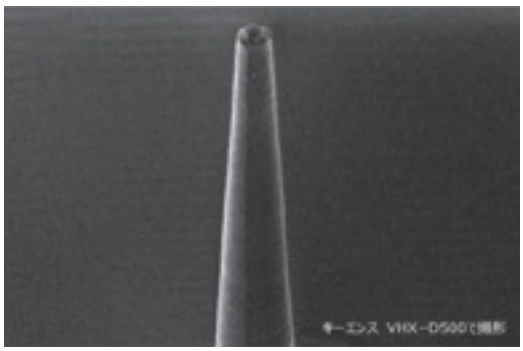
Medical
Biotechnology

Think-Lands Co., Ltd.

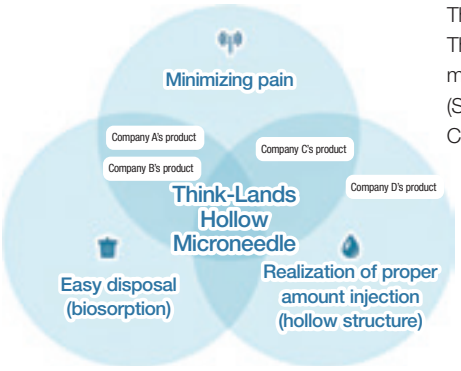
► Technology-Based Startup Support Program

Painless Needles Bring Innovation to the Fields of Cosmetics and Medicine:Hollow Microneedles

A hollow microneedle, with manufacturing technology established by Think-Lands with NEDO's support (Source: Think-Lands Co., Ltd.)



A painless hollow microneedle, made from a microneedle of about 100 micrometers in width with even smaller through-holes (Source: Think-Lands Co., Ltd.)



The three benefits of Think-Lands hollow microneedles (Source: Think-Lands Co., Ltd.)

NEDO's Role

NEDO aims to create and foster technology-based startups to revitalize the economy and stimulate new industries and employment. To do so, NEDO is supporting technology-based startups for commercialization under this project.

Specifically, NEDO is granting financial assistance for research and development, offering opportunities for presentations and exhibitions for business matching, and offering advice from influential people, thereby reinforcing the growth of technology-based startups.

Goal	Challenges	Achievements
To introduce painless needles to eliminate the pain and fear of injections	Overcoming the fact that painless needles are difficult to manufacture (e.g., generating needles of the required length and strength that do not deteriorate upon injection)	Succeeded in mass-production of hollow microneedles with a length of 100 μm and longer

Eliminating pain and fear of injections

Miyaji Kunio, CEO of Think-Lands Co., Ltd., decided to develop painless needles upon seeing his diabetic colleague receive insulin injections every day, and he wanted to relieve his friend's pain and burden. When he met Prof. Omatsu Takashige, who was studying optical vortex laser technology at Chiba University, he got the idea that it might be possible to use biodegradable polymer resin to make painless hollow microneedles.

Trial and error to develop 100-μm-long needles

Microneedles are mainly classified into four types according to shape and usage. Among them, hollow microneedles allow the amount of injected drug solution to be controlled, but some structural integrity is lost due to the holes within the needles, and the needles are also difficult to manufacture, resulting there hadn't been any successful cases of mass production of hollow microneedles.

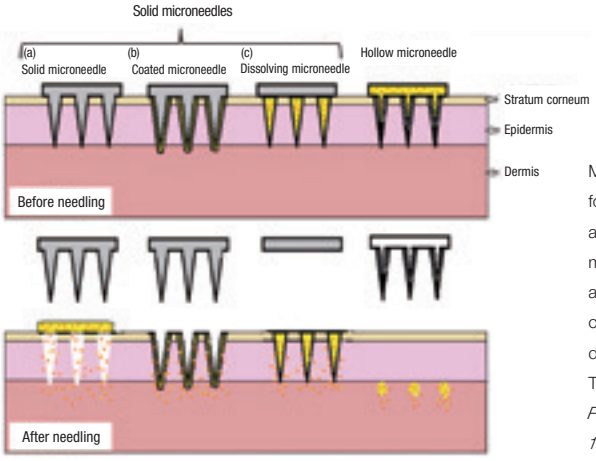
The development of hollow microneedles by Think-Lands, which was only recently founded, was supported by NEDO's Technology-Based Startup Support Program. Thanks to NEDO's support, Think-Lands successfully established a technology to manufacture 100-μm-long microneedles.

Towards the development and commercialization of medical microneedles

Think-Lands had achieved some positive results in its R&D and decided to aim to commercialize cosmetic microneedles as the first step. As a result, the world's first click-type hollow microneedle cosmetic product, Seleia, was born. This was developed to protect skin health with a focus on skin wrinkles. Seleia sold over 15,000 units per year and became a hit, and the product was very well received by its users.

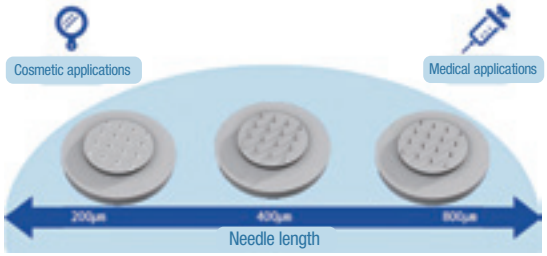
However, Think-Lands' final goal is to commercialize medical microneedles to eliminate the pain and fear of injections as originally planned. For medical use,the needle tips must reach the dermis, where blood vessels are located, meaning that a length of at least 400 μm is required. Think-Lands has achieved a length of 800 μm through further research and development and is now working to develop longer microneedles with a length of 1,500 μm or more. Although many hurdles to attaining longer needles and commercializing medical microneedles remain, Think-Lands continues to pursue R&D with the aim of reaching clinical trials by the end of 2026.

Microneedle types and applications



Microneedles are mainly classified into four types according to their shape and application: solid microneedles, coated microneedles, dissolving microneedles, and hollow microneedles. An advantage of hollow microneedles is that the injection dose can be flexibly controlled. (Source: Think-Lands Co., Ltd., *Biomedicine & Pharmacotherapy 109 (2019) 1249-1259, Fig. 3*, partially modified)

Hollow microneedles for cosmetic and medical applications



The length of microneedles differs for cosmetic and medical applications. They are designed to have a needle tip shaped like a volcano summit so that the needle tip does not dig deeper than necessary. (Source: Think-Lands Co., Ltd.)

FACE Developer Profiles — Thoughts of Developers Who Dared to Innovate —

A Project Achieved through Interactions with Various People

MIYAJI Kunio

CEO
Think-Lands Co., Ltd.

Businesses can be created through personal connections

Miyaji Kunio joined a major cement company after graduating from university and worked on research and development of injection molding. He then worked in the field of optical communications. In 2014, he founded Think-Lands as CEO.

Miyaji was quite mischievous as a child but was already good at getting along with people.

"I tell employees that I do not have any skills or anything else to offer. But if I were to say something I have to offer, it would be my connections with people. When I started this company, I collected about 4,000 business cards in three years. After workshops, I would always stay there until the after-networking events ended and exchange business cards with all participants."

Even those who have nothing can start a business by building personal connections. His philosophy likely plays a significant role in the successes we've achieved in this project.

A Desire to Contribute to Medicine as well as Cosmetics

KIMURA Yasuharu

General Manager, Microneedle Division
Think-Lands Co., Ltd.

Brought closer to patients through microneedles

Kimura Yasuharu worked on R&D for new drugs at a pharmaceutical company for many years. Taking advantage of that experience, he plans and conducts pharmacological experiments at Think-Lands to demonstrate the benefits of medical microneedles and works to develop cosmetic products.

Before entering university, Kimura couldn't decide what to major in.

"I wanted to become a doctor but majored in pharmacology because I didn't like seeing blood. I then joined a pharmaceutical company. There, I took part in research and development on new drugs. At that time, I had few opportunities to see patients, but I decided I wanted to work in a more clinical setting. The microneedle is the very medical device that enables me to get close to patients."

He now hopes to contribute to the field of cosmetics as well.

Skillful and Crafty since Childhood

HASHIMOTO Yoshihiro

Deputy General Manager,
Microneedle Division
Think-Lands Co., Ltd.

Single-handedly handling hollow microneedle R&D

Hashimoto Yoshihiro originally conducted research primarily on optical communication devices as a new field of business while working at a major cement company. After that, he temporarily produced metal molds at his family's mold production factory. But in 2019, he joined Think-Lands as the company's corporate policy resonated with him. Ever since, he has been involved in the entire research and development of hollow microneedles, including increasing the needle length and intentionally dulling the needle tip.

"Looking back, I have been skillful with my hands and have enjoyed making things since childhood. After reaching adulthood, I became a part of the optical technology industry and worked on tiny things known as optical fibers. Now, at Think-Lands, I'm working on microneedles, which are also minuscule structures. This seems to be my calling in life."

Comments by NEDO Personnel in Charge

Providing Solid Support to Overcome Technical Challenges and Achieve Commercialization

KAWAHARA Nobuhiro

Technical Researcher, Innovation Promotion Department, NEDO

I think there are three important factors for startups to grow: money, public relations, and human resources. NEDO focuses on providing financial support and advice, and we aim to help startups accomplish the goals they have proposed for subsidy programs.

Think-Lands has grown dramatically with firm ideas about not only technical challenges but also commercialization.

We will continue to listen and respond to what startups need, always considering our stance.

Basic Knowledge

▶ The secret to pain-free needles

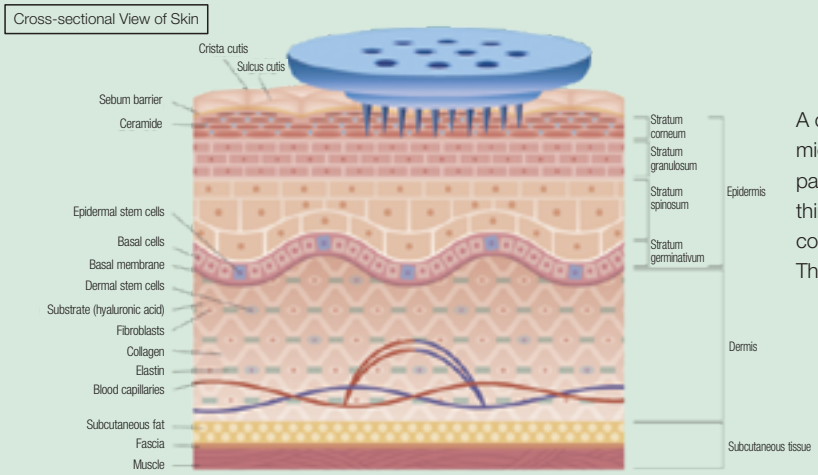
Why don't microneedles cause pain? The answer lies in both the needle's length and thickness.

Nerves are located deep in the skin. A short needle will not reach the part of the skin where pain is felt, so it will cause little, if any, discomfort.

Human skin has three layers: the epidermis on the surface and the dermis and hypodermis underneath. In total, it ranges from 0.6 to 3.0 mm thick. The epidermis is approximately 0.2 mm thick, and the dermis is around 1.8 mm thick. Many pain spots are located deep in the dermis, so pain is not recognized unless a certain amount of stimulus reaches the deepest part of the dermis.

Pain also depends on needle thickness. To illustrate, we do not feel pain when bitten by a mosquito, presumably because the needle is very thin, around 60 to 80 μm thick. Pain spots are actually nerves that transmit pain to the brain, and these nerves spread like blood capillaries into the basal epidermal layer. A thinner needle is less likely to make contact with a pain spot, even if it reaches the basal epidermal layer. This means that a thinner needle is less likely to cause pain. However, when this idea is applied to syringe needles, drug solutions cannot be injected if the needle is too thin or short.

This means that the balance between needle length and thickness is important in order to commercialize microneedles as painless syringe needles.



A cross-sectional view of skin with a microneedle. Since the pain spots that cause pain are separated widely in the dermis, a thinner and shorter needle is less likely to come in contact with a pain spot. (Source: Think-Lands Co., Ltd.)

Examples of Practical Applications of NEDO Projects

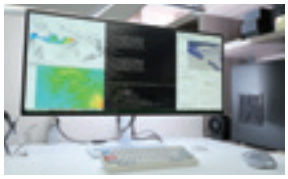
INDEX

An index of NEDO projects introduced as NEDO Project Success Stories up to 2023.

New Energy

20 themes

Shifting from Large Wind Tunnel Experiments to Simulation Drastically Improves Environmental Assessment Efficiency for Geothermal Energy Generation



OCT,NOV 2021

Central Research Institute of Electric Power Industry

Research and Development of Geothermal Energy Generation Technologies and on Environmental Conservation Technologies for Power Plants and other projects

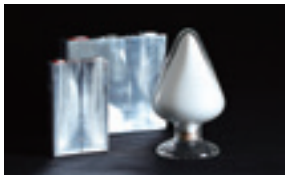
Wider Popularization of Aquifer Thermal Energy Storage Systems

NOV-DEC 2020

Japan Groundwater Development Co., Ltd.,
National Institute of Advanced Industrial Science and Technology (AIST)

Research and Development for Utilization of Heat as Renewable Energy and other projects

Next-Generation Lithium-Ion Batteries that support New Energy Applications



SEP 2018

Toshiba Corporation

Technology Development Project for the Application and Commercialization of Lithium-Ion Batteries and other projects

New Technology from Japan that Contributes to the Expansion of Bioethanol Production in Southeast Asia

NOV,DEC 2017

Yamaguchi University, SAPPORO HOLDINGS LTD.,
Iwata Chemical Co., Ltd.

International Projects for Increasing the Efficient Use of Energy and System Demonstration Projects and other projects

Development of Innovative Blowers for Fuel Cell Systems Indispensable for Realization of a Hydrogen-Based Society

NOV 2016

Techno Takatsuki Co., Ltd.

New Energy Venture Business Technology Innovation Program and other projects

The First of Its Kind in Industry! SOKODES Was Developed for Use with Solar Panels to Quickly Detect Faults and Estimate Their Location

JAN 2016

System JD Co., Ltd.

New Energy Venture Business Technology Innovation Program and other projects

Development of Small High-performance Hydrogen Production Equipment for Hydrogen Stations for Fuel Cell Vehicles that will become Popular in the Future

JAN 2014

Mitsubishi Kakoki Kaisha, Ltd.

Development of Technologies for Hydrogen Production, Delivery, and Storage Systems

Achieving Higher Efficiency by Gasifying Coal - "Integrated Coal Gasification Combined Cycle (IGCC)"

NOV 2013

MITSUBISHI HITACHI POWER SYSTEMS, LTD.
JOBAN JOINT POWER CO., LTD.

Project for the Development of an Entrained Bed Coal Gasification Power Generation Plant and other projects

Development of a Residential Fuel Cell System using a High-Efficiency Solid Oxide Fuel Cell (SOFC)

MAR 2013

Osaka Gas Co., Ltd.

Solid Oxide Fuel Cell System Technology Development and other projects

Biomass Gasification Power Generation System that Contributes to Reducing CO_2 Emissions and Enhancing the Local Vitality

OCT 2013

Chugai Ro Co., Ltd.

Development of Technology for High Efficiency Biomass Energy Conversion and other projects

Highly Efficient General Compact Wind Powered Generation System

JUL-SEP 2012

Zephyr Corporation

Industrial Technology Practical Application Development Support Project

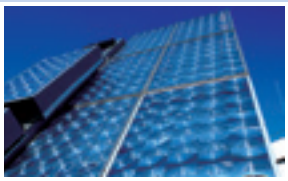
Realizing Energy Conservation with "DC for DC" - Leave it up to a stable supply of electricity!

SEP-DEC 2012

NTT FACILITIES, INC

Quality-Based Electrical Power Supply System Verification Studies and other projects

Developing Solar Cells to Achieve Record- breaking 40% Conversion Efficiency



FEB 2012

Sharp Corporation

Research and Development of Photovoltaic Power Generation Technology and other projects

World's First Gasification System for Sewage Sludge Transforms Fuel Gas into Power

OCT 2011

METAWATER Co., Ltd.
Bureau of Sewerage Tokyo Metropolitan Government

Development of Technology for High Efficiency Biomass Energy Conversion

High-efficiency Power Generators That Use Hydrogen: Development of Fuel Cells for Household Use

MAR 2011

TOKYO GAS Co., Ltd.

Establishing Platforms for the Widespread Use of Fuel Cells and other projects

From Wind Power Generating Systems for Remote Islands to Large Downwind Turbines

SEP–NOV 2010

Fuji Heavy Industries Ltd.

Technology Development of Advanced Wind Turbine Systems for Remote Islands and other projects

Development of Large-area High-speed Film Deposition Technology for Sharply Enhancing Solar Cell Productivity

MAR 2010

Mitsubishi Heavy Industries, Ltd.

New Sunshine Project / Research and Development of Photovoltaic Power Generation Technology and other projects

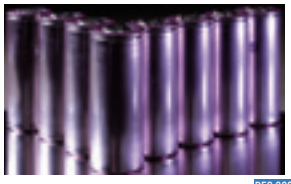
Mass Production of New Non-silicon Solar Cells

FEB,MAR 2010

SHOWA SHELL SEKIYU K.K.

New Sunshine Project / Research and Development of Photovoltaic Power Generation Technology and other projects

Mass Production of Lithium-ion Secondary (Rechargeable) Batteries for Hybrid Vehicles



DEC 2009–MAR 2010

Hitachi Vehicle Energy, Ltd.

Development of Technology for the Dispersed Storage of Battery Power and other projects

New Hybrid Solar Cells: Promising Technology for the Solar Cell Market

MAR 2009

KANEKA CORPORATION

Development of Technology to Accelerate the Dissemination of Photovoltaic Power Generation Systems

20 themes

Energy Conservation

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

AUG 2022

Mitsubishi Heavy Industries, Ltd

Development of Technologies for Carbon Recycling and Next-Generation Thermal Power Generation and others

Commercialization of a Single-Effect Double-Lift Absorption Chiller for More Effective Utilization of Unused Thermal Energy in Industrial Plants

OCT 2021

Hitachi-Johnson Controls Air Conditioning, Inc.

Research and Development Project on Innovative Thermal Management Materials and Technologies

Toward the Application of 3D Nano Structure Control Development of Super Fuel-Efficient Tires

OCT 2019

Bridgestone Corporation, JSR Corporation

Innovation Promotion Project, Nanotech Advanced Component Utilization Research and Development, and other projects

High-Efficiency, Energy-Saving Heating Technology Completion of a Heat Pump for Use in Vehicles

OCT 2019

DENSO Corporation

Research and Development Program for Innovative Energy Efficiency Technology

Commercialization of an Energy-Saving LED Lamp With Ultrahigh Intensity and Ultrahigh Flux

SEP 2018

Shikoku Instrumentation Co., Ltd.

Strategic Energy Saving Technology Innovation Program

Practical Application of "SiC Power Semiconductor" That Contributes to a Next-Generation Electric Society, as Rolling Stock Inverters Used in Railways

DEC 2016–FEB 2017

National Institute of Advanced Industrial Science and Technology (AIST)
Mitsubishi Electric Corporation Odakyu Electric Railway Co., Ltd.

Next-Generation Power Electronics Project Realizing Low Carbon-Emission Society and other projects

ECM Cement Reduces Energy Consumption and CO_2 Emissions by More Than 60%

DEC 2016–FEB 2017

ECM Joint Research and Development Team

Research and Development Program for Innovative Energy Efficiency Technology and other projects

Achieving Energy Saving on the Level of Industrial Complexes through the Sharing of Heat between Factories

DEC 2013–JAN 2014

Chiyoda Corporation

Strategic Development of Energy Conservation Technology Project and other projects

Optimally Adjusting the Ratio between Heat and Electricity to Suit the Place of Utilization - Development of a Gas Engine System that Expands the Scope for the Popularization of Natural Gas Cogeneration

DEC 2013

Mitsui Engineering & Shipbuilding Co., Ltd.

Strategic Development of Energy Conservation Technology Project

Ultra-low-temperature Freezing System that Achieves -60°C Using Air as the Refrigerant

NOV 2013

MAYEKAWA MFG. CO., LTD.

Strategic Development of Energy Conservation Technology Project and other projects

Clean Diesel Engine with the World's Highest Level Fuel Efficiency and Environmental Performance

JUL 2013

Mazda Motor Corporation

General Technological Development of Innovative Next-generation Low-emission Vehicles

Distillation Facilities Boasting Maximum Energy Conservation Effects of 60%

MAR 2013

Kimura Chemical Plants Co., Ltd.

Development of Energy Saving Distillation Technology using Internal Heat Exchange and other projects

Improving Fuel Efficiency of a Belt CVT by Increasing the Coefficient of Friction

MAR 2013

JATCO Ltd.

Development of Material Surface Control Technology for Low Friction Loss High Efficiency Drive Machines

Residential Heat Pumps - Contributing to Expanding the Market for EcoCute

MAR 2013

DENSO CORPORATION

Strategic Development of Energy Conservation Technology Project

Contributing to Solve Global Environment and Energy Issues with a World's Highest Level High Efficiency Large Sized Gas Turbine

DEC 2012

Mitsubishi Heavy Industries, Ltd.

Development of High Efficiency Gas Turbine and other projects

High Performance Industrial Furnace Greatly Contributing to Energy Conservation and Environmental Load Reduction in Industrial Fields

JUL 2012

Japan Industrial Furnace Manufacturers Association

Development of High Performance Industrial Furnace and other projects

Development of World's First Hybrid Hydraulic Excavator Contributes Greatly to Energy Saving and CO_2 Reduction

MAR 2012

Kobelco Construction Machinery Co., Ltd.
Kobe Steel, Ltd.

Strategic Technology Development for Energy Use Rationalization and other projects

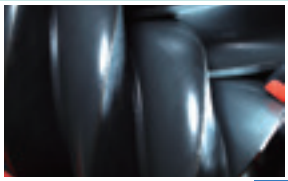
Air-conditioning System Uses Hydrate Slurry to Cool Large Facilities, Save Energy

SEP 2011

JFE Engineering Corporation

Strategic Development of Energy Conservation Technology Project and other projects

Micro Steam Energy Generator Effectively and Thoroughly Utilizes Manufacturing Steam



MAR 2011

Kobe Steel, Ltd.

Strategic Development of Energy Conservation Technology Project and other projects

Trucks and Buses Also Follow Hybrid Trends

DEC 2009

Mitsubishi Fuso Truck and Bus Corporation

R&D of Advanced Clean Energy Vehicles (ACE Project)

21 themes

Resolution of Global Environmental Problems

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

AUG 2022

Alhytec Inc.

Strategic Innovation Program for Energy Conservation Technologies and others

Realization of Widespread Use of Refrigerants with Low Greenhouse Gas Effects Revision of International Standards Based on Safety Evaluation Methods

NOV 2019

The University of Tokyo,
National Institute of Advanced Industrial Science and Technology (AIST)

Technology Development of High-Efficiency Non-Fluorinated Air-Conditioning Systems

Significant Reductions in Energy and Costs through Integrating Seawater Desalination with Sewage Treatment

SEP 2017

Global Water Recycling and Reuse Solution Technology Research Association (GWSTA)

Water Saving and Environmentally-Friendly Water Recycling Project and other projects

Recycling of Waste Plastic Reduces CO_2 Emissions in a Blast Furnace. Pulverization Further Improves Efficiency

FEB 2015

JFE Steel Corporation

Development of Technology to Recycle Waste Plastic Into a Blast Furnace Reducing Agent

Construction of a New White Goods Recycling System in Collaboration with Local Governments and Manufacturers

JAN 2015

Hitachi, Ltd.
Tokyo Eco Recycle Co., Ltd.

Development and Demonstration of a Home Appliance Recycling Plant

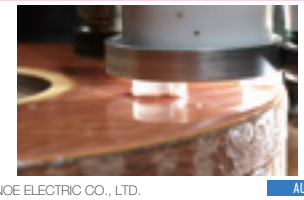
Development of "RPF", an Inexpensive New Fuel that Emits a Smaller Amount of CO_2 than Fossil Fuels

JAN 2014

EARTHTECHNICA Co., Ltd.
SEKISHOUTEN Co., Ltd.

Research and Development to Develop Revolutionary Environmentally-friendly Energy Technologies with Immediate Effects

A Technology that Halves the Consumption of the Rare Earth Element that Is Indispensable for Glass Grinding



AUG 2013

KOKONOE ELECTRIC CO., LTD.
Ritsumeikan University

Rare Metal Substitute Materials Development Project

Mass Production of Freon / Halon Substitute with a World's First Composition Methodennfou

FEB 2013

TOSOH F-TECH INC.

Energy Saving Freon Substituting Substance Composition Technology Development and other projects

An Innovative Device that Prevents Leaking of Gasoline Vapor

DEC 2012,MAR 2013

Tatsuno Corporation

Research and Development of Toxic Chemical Substance Risk Reducing Platform Technologies

Dual-Arm Construction Machinery, Expected to be Active in Sites of Building Deconstruction

DEC 2012

Hitachi Construction Machinery Co., LTD.

"Strategic Advanced Elemental Robot Technology Development" Project

Destruction of HFC-23 Through Burning and Cooling

FEB 2012

Tsukishima Kankyo Engineering Ltd.

Development of HFC-23 Destruction Technology and other projects

Asbestos Removal Robot Contributes to Safe and Efficient Workplace Through Remote Control and Automation

FEB 2012

TAISEI Corporation

Urgent Development of Fundamental Technologies for the Practical Reduction of Asbestos and other projects

From Tohoku to the World! Innovative Coating Process Reduces Use of Harmful Chemicals

DEC 2011

KAMI ELECTRONICS IND CO., LTD.

Development of Fundamental Technologies for Risk Reduction of Hazardous Chemical Substances

Non-Fluorinated CO_2-cooled Refrigeration System for Supermarket Showcases

DEC 2011

SANYO Electric Co., Ltd

Development of Non-fluorinated Energy-saving Refrigeration and Air Conditioning Systems

On-site Processing System for Safe, Stable and Highly Efficient Neutralization of Asbestos

NOV 2011

Hokuriku Electric Power Company

Urgent Development of Fundamental Technologies for the Practical Reduction of Asbestos and other projects

Development of a High-performance Insulating Coating Resin

DEC 2010

Showa Denko K.K.

Development of Fundamental Technologies for Risk Reduction of Hazardous Chemical Substances

Creation of a Safer Heat-resistant Material as a Replacement for Asbestos

OCT 2010

JAPAN MATEX CO., LTD.

Urgent Development of Fundamental Technologies for the Practical Reduction of Asbestos and other projects

Birth of COF_2: New Clean Gas for Semiconductor Manufacturing with Very Low Greenhouse Gas Effects

DEC 2009

Kanto Denka Kogyo Co., Ltd.

Research and Development of Semiconductor CVD Chamber Cleaning Systems for Electronic Device Manufacturing Using New Alternative Gases as a Substitute for SF6, PFCs and Other Gases and other projects

Achieving More Efficient, Cleaner Waste Incineration with New Technology

MAR 2009

JFE Engineering Corporation

Research and Development on Advanced High-temperature Air Combustion Control Technology

Developing an Eco-Diesel Engine with Clean Exhaust Gas

NOV 2008

NISSAN DIESEL MOTOR CO.,LTD.

R&D of Advanced Clean Energy Vehicles

New Catalyst for Maximum Cleaning of Diesel Fuel Oil

NOV 2008

COSMO OIL CO., LTD.

Research and Development of Petroleum Refining Pollutant Reduction

Electronic / Information

17 themes

Commercialization of a Transparent Display that adds a New Function to Window Glass

AUG 2022

Sharp Display Technology Corporation/ National Institute of Advanced Industrial Science and Technology

Clean Device Society Promotion Program

Establishment of Next-Generation Inspection Technology for the Semiconductor Manufacturing Process

AUG 2018

Lasertec Corporation

Development of Next-Generation Semiconductor Microfabrication and Basic Evaluation Technologies

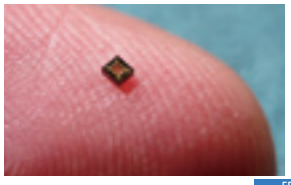
Development of an Eyewear Device for Low- Vision Aid That Uses Semiconductor Laser Technology

OCT 2017

QD Laser, Inc.

Development Promotion Project for Practical Use of Welfare Equipment and other projects

Realization of Compact, Light-weight, and High-performance Devices with "Moving" Semiconductors

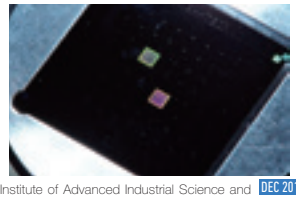


FEB 2014

OMRON Corporation

Micromachine Technology Research and Development Project and other projects

Realized the World's Smallest Scale Assuring a Single Atom Size Error



DEC 2013–FEB 2014

National Institute of Advanced Industrial Science and Technology (AIST)
Hitachi, Ltd. Hitachi High-Technologies Corporation

R&D of 3D Nanoscale Certified Reference Materials Project

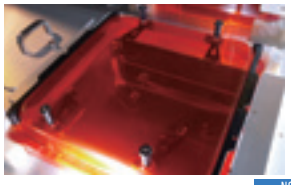
World's First Realization of an All Solid-state UV Laser Source with Advanced Waver-length Conversion Characteristic

DEC 2013

Osaka University
Kogakugiken Corp.

Research and Development for Photon Measurement and Processing and other projects

Electronic Beam Mask Writing Device Boasting an Overwhelming Share in the World

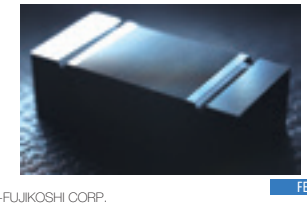


NOV 2012

NuFlare Technology, Inc.

Super Head Electronic Technology Development Promotion Project

High Precision Machining Equipment Enabling Accurate Optical Connector Mold Marking

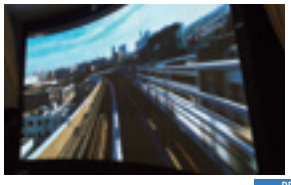


FEB 2012

NACHI-FUJIKOSHI CORP.

Integrated Development of Materials and Processing Technology for High Precision Components

Improvement of Curved-Surface Displays for Ultra-Large Screens

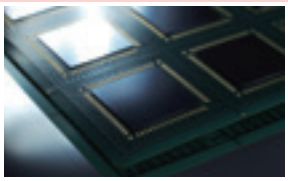


DEC 2011

Shinoda Plasma Co., Ltd.

Research and Development of Energy-saving Ultra-thin Film Large Light-emitting Display Devices and other projects

Development of Die Bonding Film Contributes to High Performance in Electronic Devices



OCT 2011

Hitachi Chemical Company, Ltd.

R&D on Nanostructured Polymeric Materials

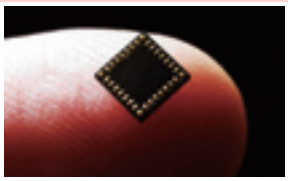
Revolutionary High-qua2lity Semiconductor Production Equipment

DEC 2010–JAN 2011

Tokyo Electron Limited

Development of Infrastructure Technology for High-efficiency Semiconductor Production Processes and other projects

Evaluation Technology Leads to Remarkable Improvement of Nonvolatile Memory Reliability



DEC 2010

Fujitsu Limited
FUJITSU SEMICONDUCTOR LIMITED

Research and Development on Next-generation Ferroelectric Memory (FeRAM) and other projects

Commercialization of a Perpendicular Magnetic Recording Method to Achieve High-density, Highly Reliable HDD

OCT 2010

HGST Japan

Super-advanced Electronics Technology Development Promotion Project

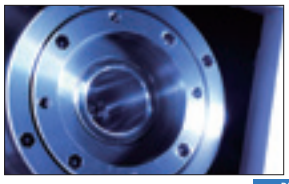
Development of Blu-ray Disc Offering High Image Quality

SEP–NOV 2010

Sony Corporation

Research and Development of a Nanometer-controlled Optical Disc System

Development of a Laser Light Source Indispensable for Surface Machining for Manufacturing Miniature Semiconductor Devices



DEC 2009

Gigaphoton Inc.

Development of F2 Laser Lithography Technology and other projects

Development of Metallic Glass for Improving Electronic Device Performance

FEB 2009

ALPS ELECTRIC CO., LTD.

Research and Development of Super Metal Technology

Controlling Your Home Remotely with a Home IT System

NOV 2008

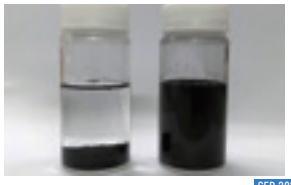
Toshiba Home Appliances Corporation

Digital Information Device Interoperability Infrastructure Project

Material

17 themes

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



SEP 2022,JAN 2023

GSI Creos Corporation

Project for Practical Application of Carbon Nanomaterials for a Low Carbon Emission Society

High-Reliability, Low-Cost, High-Speed, High- Precision Electron Beam Metal 3D Printer

OCT 2021

JEOL Ltd.

Project for Modeling Technology Development and Practical Applications of Next-Generation Industrial 3D Printers

Simultaneous Nanofiber and Resin Composite Production–Commercialization of Cellulose Nanofiber Composite Resin

OCT, NOV 2020

SEIKO PMC CORPORATION, Kyoto University

Development of Fundamental Technologies for Green and Sustainable Chemical Processes and other projects

Development of New Materials for a Highly Sustainable Society through Artificial Synthesis of Structural Proteins

NOV 2020

Spiber Inc.

Support for Ventures Involved in Innovation and Practical Application / Development of Super-high Function Fibroin Fiber for Commercialization and other projects

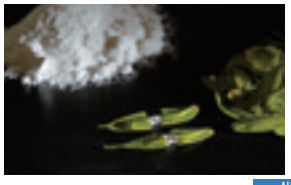
Succeeded in Commercialization of the World’s Highest Spec Sand 3D Printer for Casting

OCT 2019

National Institute of Advanced Industrial Science and Technology, Gun Ei Chemical Industry, Co., Ltd., CMET Inc., KOIWAI Co., Ltd.

Next-Generation Industrial 3D Printer Modeling Technology Development and Commercialization Business

Development of a High-Performance Bio-Resin from Plant Seeds



AUG 2018

Hitachi Zosen Corporation, Osaka University

Technology Development of Manufacturing Processes for Non-Edible Plant-Derived Chemicals and other projects

World's First Commercialization of a Promising New Material : Cellulose Nanofiber

Nippon Paper Industries Co., Ltd.,
The University of Tokyo

NOV 2018

Innovation Promotion Project, Nanotech Advanced Component Utilization Research and Development, and other projects

DDS (Drug Delivery System) Research into a Medicinal Hair Restorer for Women

NANOEGG Research Laboratories, Inc.

OCT 2017

Innovation Promotion Project

World's First Commercialization of Mass Production Processes Using Microwave Technology

Microwave Chemical Co., Ltd.

OCT 2016

New Energy Venture Business Technology Innovation Program and other projects

The World's First Mass Production Factory for Single-Walled Carbon Nanotubes Developed in Japan Starts Operation

Zeon Corporation
National Institute of Advanced Industrial Science and Technology (AIST)

JAN 2016–FEB 2017

Carbon Nanotube Capacitor Development Project and other projects

Development of Visible Light Responsive Photocatalyst for Indoor use Provision of Sanitary and Comfortable Living Space

Showa Denko Ceramics Co.,
Ltd TOTO LTD.
Panasonic Corporation

FEB 2014

Project to Create Photocatalyst Industry for Recycling-oriented Society

Renovation of "Cutting, grinding, and Polishing" Hardest and Strongest "Super Diamond"

Sumitomo Electric Industries, Ltd.

AUG 2013

Grant for Practical Application on Industrial Technology

Plastics that Soften when subject to High Speed and Strong Impact

Toray Industries, Inc.

NOV 2012

Precision High Polymer Technology Project

Development of Film Improves Visibility of LCD Displays from any Angle

Zeon Corporation

DEC 2011

Development of High-performance LCD TV Technology

Vacuum Insulation Panel Contributes to Residential Energy Conservation

Panasonic Corporation

NOV 2010

Strategic Development of Energy Conservation Technology Project

Melt-spinning Cellulose to Create Fiber Having Correct Cross-sectional Shape

Toray Industries, Inc.

NOV 2009

Fundamental Technology Research Facilitation Program

Polymer Simulation for Enhancing the Efficiency of Material Development

JSOL Corporation

FEB 2009

Development of Advanced Functional Material Designing Platforms

14 themes

Robots / AI / Welfare Equipment

Commercialization of the "Five Senses" AI-Enabled Camera That Predicts and Prevents Crimes and Accidents by Implementing AI in Security Cameras

Earth Eyes Co., Ltd.

OCT 2021

Development of Core Technologies for Next-Generation AI and Robotics

3D Distance Image Sensor for Safety Protection

Nippon Signal Co., Ltd.

OCT 2020

Project for Practical Application of Personal Care Robots / Development of Person-Carrier Robots Based on Safety Technologies

Reduction of Operation Time to One Tenth Development of AI That Can Perform Concrete Crack Detection

Shutoko Engineering, Co., Ltd.,
National Institute of Advanced Industry Science and Technology (AIST), Tohoku University

NOV 2019

Robot and Sensor System Development Project for Infrastructure Maintenance and Disaster Survey: Development of an Infrastructure Status Monitoring System Using Imaging Technology

Realizing Small, Lightweight, High-Precision and Inexpensive Development of an Epoch-Making 3D Vision Sensor

YOODS Co., Ltd. SEP 2019

Technology Development Project for Robot Commercialization Applications: Development of robot platform technology (hardware), Platform technology development for a general-purpose robot vision system

Realization of Next-Generation Life Support Technology with a Smart Mobility Vehicle

Tmsuk Company Limited, NTT DOCOMO, INC., Kyushu University NOV 2018

International R&D and Demonstration Project in the Environment and Medical Device Sector, International R&D and Demonstration Project in the Robotics Field, and other projects

Electric Wheelchair that Makes Going out Fun Increased Popularity with the Release of the Standard Model

WHILL Inc. NOV 2017

Development Promotion Project for Practical Use of Welfare Equipment and other projects

Establishment of Safety Requirements and a Certification System that Underpin the Development of Safe and Trustworthy Service Robots

National Institute of Advanced Industrial Science and Technology (AIST) DEC 2016–FEB 2017
Japan Automobile Research Institute (JARI)
Nagoya University

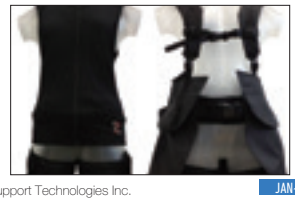
Project for the Practical Application of Service Robots and other projects

Three-Dimensional Vision Sensor That Gives Industrial Robots Seeing and Thinking Capabilities to Enable Automated Assembly Lines

3D MEDiA Company Limited OCT 2016

Innovation Commercialization Venture Support Project and other projects

Reducing the Fatigue of Agricultural and Care Work Development of the Smart Suit



Smart Support Technologies Inc.
Hokkaido University JAN–FEB 2016

Development Support Project for Practical Application of Problem-Solving Welfare Equipment and other projects

Easy and Safe Transferring from Bed to Toilet Development of New Transferring Equipment to Support Care in a Highly Aging Society

IDEA SYSTEM CO., LTD. JUL 2013

Promotion of R&D on Practical Welfare Equipment and other projects

A Rescue Robot Displaying High Driving Performance at Disaster Sites with Stairs and Rubble

CHIBA INSTITUTE OF TECHNOLOGY FEB 2013

Strategic Advanced Elemental Robot Technology Development Project

Automatic Wheelchair and Mattress Washing Machines That Reduce the Burden of Caregivers

ATAM Giken Co., Ltd. JAN 2013

Promotion of R&D on Practical Welfare Equipment

Robot Suit HAL®: Reading Intention to Support Physical Functions and Improve Quality of Life

CYBERDYNE Inc. JAN 2011

Project for Practical Application of Next-generation Robots and other projects

Improved Short Lower-limb Brace Offers Patients Better Walking Comfort

Kawamura Gishi Co., Ltd. OCT 2010

Promotion of R&D on Practical Welfare Equipment and other projects

Medical Biotechnology

19 themes

New Fluorescent Imaging with PID High- Brightness Fluorescent Nanoparticles

Konica Minolta, Inc. NOV,DEC 2021

Comprehensive Research and Development of an Early Stage Diagnosis Method and Instruments for Treating Cancer and other projects

A4-Size High-Concentration Oxygen Generator

VIGO MEDICAL Co., Ltd. NOV 2020

Development Promotion Project for Practical Use of Welfare Equipment / Small Oxygen Generator as a Respiratory Aid for Elderly People

Efforts to Reduce Waiting Time and Enhance the Efficiency of Medical Practice Administration Development of an AI-Driven Medical Interview System

AR advanced technology, Inc.,
Yokohama National University OCT 2019

Future AI and Robot Technology Development Project: Next- generation artificial intelligence technology area

Development of Groundbreaking Hip Joint Prostheses for an Aging Society

OCT 2018

Teijin Nakashima Medical Co., Ltd., Kyoto University

Innovation Promotion Project and other projects

Peptide Search System that Opened up New Avenues for Drug Discovery

NOV 2017

The University of Tokyo, PeptiDream Inc.

Technology Development for Accelerating Genomic Drug Discovery

Towards Regenerative Cell Therapy by Large- Scale Culture of Synovium-Derived MSCs

AUG 2017

TWOCELLS COMPANY, LIMITED,
Space Bio-Laboratories Co., Ltd.
Osaka University, Osaka Health Science University, Hiroshima University

Development to Accelerate the Practical Application of Human Stem Cells and other projects

Development of Innovative Culture Media for Human Pluripotent Stem Cells (ES and iPS Cells) and an Automated Cell Culture System

NOV 2016

Kyoto University Nissan Chemical Industries, Ltd.
Nipro Corporation

Development to Accelerate the Practical Application of Human Stem Cells / Development of Basic Evaluation Technologies for the Practical Application of Human Stem Cells

Development of Japan's First PET Device Dedicated for Breast Cancer and Able to Perform High-Precision Examinations Without Inflicting Pain

JAN 2016

SHIMADZU CORPORATION

R&D Project on Molecular Imaging Equipment for Treatment of Malignant Tumors

Development of a Procedure That Dramatically Streamlines Essential Screening in Medicine Development

JAN 2016

Mie University
HASHIMOTO ELECTRONIC INDUSTRY CO., LTD.

Innovation Commercialization Venture Support Project and other projects

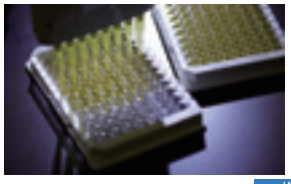
The World's First Reagent to Determine the Progression of Hepatic Fibrosis by Measuring Changes in the Sugar Chain

FEB 2015

Sysmex Corporation
National Institute of Advanced Industrial Science and Technology (AIST)

Technology Development Utilizing Sugar Chain Functions and other projects

The World's First Practical Application of High- Precision Cerebral Infarction Risk Assessment Through Biomarker Measurement

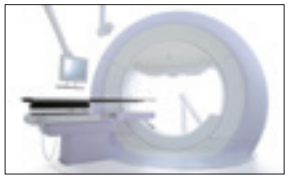


JAN 2015

Amine Pharma Research Institute Co., Ltd.

University-Launched Business Creation and Practical Application Research and Development Project and other projects

Development of a Next-Generation 4D Radiation Therapy System That Enables Irradiation of a Moving Cancer

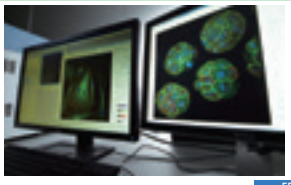


JAN-FEB 2015

Mitsubishi Heavy Industries, Ltd
Kyoto University
Foundation for Biomedical Research and Innovation

Fundamental Technology Research Facilitation Program

Development of a Confocal Laser Scanner for Live Cell Imaging



FEB 2011

Yokogawa Electric Corporation

Development of Technologies for the Analysis of Intracellular Network Dynamism

4D X-ray CT System Capable of Imaging a Heart in 0.35 Seconds

JAN 2011

Toshiba Medical Systems Corporation

Development of a High-speed Cone Beam 3D X-ray CT and other projects

Achieving Mass Synthesis of Glycans, "Third Chain" Molecules Holding the Key to Life Phenomena

MAR 2010

Tokyo Chemical Industry Co., Ltd.

Bio / IT Synthesis Equipment Development Project and other projects

Next-generation Operating Room Improves Brain Surgery Survival Rate

DEC 2009–MAR 2010

Tokyo Women's Medical University

Grant for Industrial Technology Research Development of a System for Complete Brain Tumor Removal and other projects

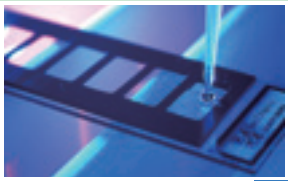
Electron Microscope Assists in Drug Discovery by Analyzing Membrane Protein Structure

DEC 2009

JEOL, Ltd.

Analysis of Biopolymer Conformation Information and other projects

Setting the World Standard in Glycan Profiling with Technology Made in Japan



FEB 2009

GP Biosciences, Ltd

Structural Glycoproteomics Project: Development of Glycan Structure Profiling Analysis Technology

The Laser Scanning Microscope: A Powerful Tool for Unraveling the Mechanisms of Living Things

DEC 2008

Olympus Corporation

Research and Development of a Graphical Analyzer for Human Chromosomes Using a Confocal Laser Scanning Microscope

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 as a semi-governmental organization on October 1, 1980; reorganized as an incorporated administrative agency on October 1, 2003	
History	October 1980	New Energy Development Organization established under the Law Concerning the Promotion of the Development and Introduction of Alternative Energy
	October 1988	Industrial technology research and development added; name changed to New Energy and Industrial Technology Development Organization
	October 2003	Incorporated Administrative Agency New Energy and Industrial Technology Development Organization established under the Act on the New Energy and Industrial Technology Development Organization
	April 2015	Redesignated and renamed National Research and Development Agency New Energy and Industrial Technology Development Organization to reflect the enforcement of a partial amendment of the Act on General Rules for Incorporated Administrative Agencies and the Act on the New Energy and Industrial Technology Development Organization
Missions	Addressing energy and global environmental problems NEDO actively undertakes the development of new energy and energy conservation technologies, verification of technical results, and introduction and dissemination of new technologies (e.g., support for introduction). Through these efforts, NEDO promotes greater use 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 knowledge obtained from its 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 know-how, 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.	
Details of Major Operations	Operations relating to technology development management	
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	1,525 (as of April 1, 2024)	
Budget	Approximately 182.8 billion yen (FY2023 initial budget) * Additional funding programs are also being implemented.	

New Energy and Industrial Technology Development Organization
Project Management Department
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Kanagawa 212-8554 Japan
https://www.nedo.go.jp/english/index.html

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