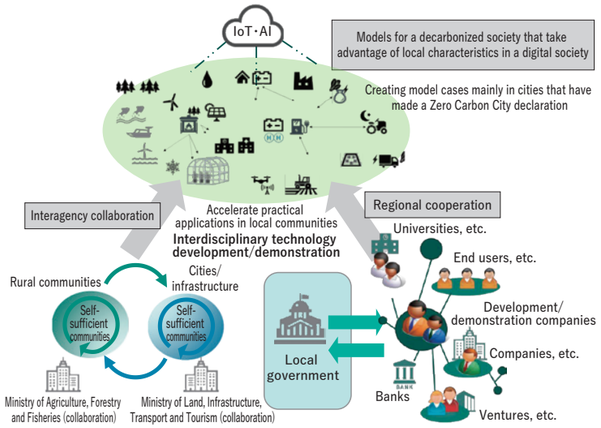
Carbon Neutral Technology Research and Development Program

2023

環境省

What is the Carbon Neutral Technology Research and Development Program?

To reduce greenhouse gas emissions by 46% by fiscal 2030 and realize a decarbonized society by 2050, it is necessary to develop and demonstrate technologies that will be rolled out in society, including the renewal of existing infrastructure. It is important to support leading initiatives in cities that have adopted a zero-carbon city declaration, and to build vibrant communities that coexist with nature and are decarbonized, sustainable, and resilient -- by taking advantage of local characteristics. This program supports the research, development and demonstration (RD&D) of cross-sectoral local co-creation technologies that are rooted at the local level and contribute to the realization of a decarbonized society, working across multiple disciplines and stakeholders.



About the program

We will implement the following initiatives to promote technological development and demonstration in collaboration with local governments, build a model of a decarbonized society that makes use of the characteristics of each region, support the simultaneous achievement of regional revitalization and a decarbonized society and attract decarbonization dominoes.

Local Co-Creation and Cross-Sectoral Themes("Climate Change + Buildings," "Climate Change + Rural Communities," "Climate Change + Local Transportation")

Under this program, themes are determined based on national policies and linked to the needs of local communities and initiatives of government ministries and agencies, and various stakeholders participate as partners in innovation to implement local co-creation and cross-sectoral initiatives. In order to respond to the needs of regions aiming to decarbonize, this program supports the rapid implementation of innovative technologies in society through interagency collaboration to address issues unique to specific regions and in common across regions while taking advantage of regional characteristics, and to foster awareness public awareness about decarbonization at the local level.

Bottom-Up Stream – Area-Specific RD&D Category

Projects are implemented targeting RD&D to build a circular and ecological economy and to realize a decarbonized society, by leading to stronger future climate actions, where CO_2 emission reductions are relatively significant in each sector, but where development-related risks or other constraints would limit progress if only voluntary private sector efforts were relied upon.

Awards Stream - Innovation Discovery and Acceleration of Large-scale Rollout Category

Through implementation of feasibility studies, research, development and demonstration, this stream aims to bring to reality the ideas of organizations that have been awarded under the Minister of the Environment's Award for Climate Action (Innovation Discovery and Acceleration of Large-scale Rollout Category).

※Minister of the Environment's Award for Climate Action：https://www.env.go.jp/earth/ondanka/min_action_award/

Startup Stream - Business Promotion Support for Start-up Companies

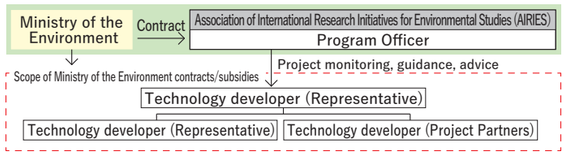
This stream supports R&D projects that contribute to the reduction of energy-derived CO_2 emissions, conducted by small and medium-sized enterprises, mainly startups, that have creative and innovative technologies.

※Shizuoka Environment Resources Association(SERA)：http://www.siz-kankyou.jp/hojo.html

Project Structure

A dedicated program officer with experience in technology development and commercialization will be assigned to each project. From the perspective of project management, the program officer monitors progress and how evaluation results are reflected, and as required, provides guidance and advice on project planning, etc. In implementing the project, it is necessary to cooperate by sharing information about the project with the program officer.

※ For the Startup Stream, the Shizuoka Environment Resources Association is handling applications and administering subsidies. Details: http://www.siz-kankyou.jp/hojo.html



Application/ Project Implementation Schedule

Application Screening			Selection	Conducted the technological development	
Applications	Document review	Hearing	Contract signing, grant decision	Interim review	Post-project review※
First call Jan-Feb	Feb	Feb-Mar		Oct – Nov Interview	Sep – Oct Interview
Second call May-Jul	Jul	Aug-Sep			

※Conducted the fiscal year after project completion

The Carbon Neutral Technology Research and Development Program welcomes inquiries from any party considering an application. Our personnel will advise on the key points for implementing any proposed technology development/demonstration project, namely, novelty, CO_2 reductions, and prospects for commercialization.

Scan here to schedule a consultation

Budget and Project Period

The budget per project in a single fiscal year (April to March) is approximately 30 - 500 million yen based on the total project cost (subsidies are for a maximum of 50% of total project cost, or 15 - 250 million yen per project). In principle, the implementation period for each project is a maximum of three years.

Example of Local Co-Creation and Cross-Sectoral Category

Net zero energy greenhouse (ZEG) for decarbonization of horticulture

National Agricultural and Food Research Organization
2022 - 2024

1 Outline and Purpose

Reducing winter heating costs CO_2 emissions are important issues in greenhouse horticulture in Japan. In this demonstration project, we propose the concept of a zero-energy greenhouse (ZEG), aiming to make greenhouse horticulture carbon neutral. Core technologies include: (1) a high-efficiency heat pump for greenhouse horticulture that utilizes unused heat in rural areas; (2) a laminated high-performance inner curtain that promotes heating and cooling effects and photosynthesis in plants; (3) a high-precision environmental measurement and control system that controls the plant growth environment inside the greenhouse; and (4) a ZEG system that integrates these components. The purpose is to demonstrate the decarbonization of greenhouse horticulture by constructing a ZEG greenhouse.

2 RD&D Details

• Key Components

A1 Development and demonstration of heat pump for greenhouse horticulture

Develop and demonstrate a new heat pump for greenhouse horticulture by using a groundwater heat source to overcome disadvantages of both air source heat pump defrosting and ground source heat pump brine circulation.

A2 Research and development of wavelength selective laminated film materials

Develop and demonstrate technology that reduces heating and cooling loads and improves crop productivity using new curtain materials that have heat retention properties during heating and heat shielding properties by reflecting near-infrared light.

A3 Development and demonstration of environmental control system applied to ZEG

Develop and build control logic that maximizes the effectiveness of heat pumps for greenhouse horticulture and new curtain materials, as well as high-precision environmental measurement and control equipment that minimizes unevenness and waste in the indoor environment.

A4 Development of sensor network design and information communication platform

Develop a sensor network method to homogenize and optimize the ZEG environment. We will propose draft communication standards related to measurement, control, and information communication through IEEE and other organizations.

B1 Developing a new ZEG system that contributes to decarbonization

Developing a system that includes (1) heat pumps for greenhouse horticulture, (2) new curtain materials, (3) high-precision environmental control equipment, and developing/building basic technologies for mainstreaming of ZEG.

B2 Basic design of ZEG and environmental measurement and evaluation in demonstration greenhouse

Conduct environmental measurements in accordance with ZEB and ZEH as applied in the building environment, consider the definition of ZEG requirements and evaluation methods, develop greenhouse year-round thermal budget simulation models, and evaluate the effectiveness of ZEG in carbon neutral agriculture.

B3 Construction and evaluation of ZEG

Design and construct a greenhouse with ZEG specifications and establish a ZEG performance evaluation method.

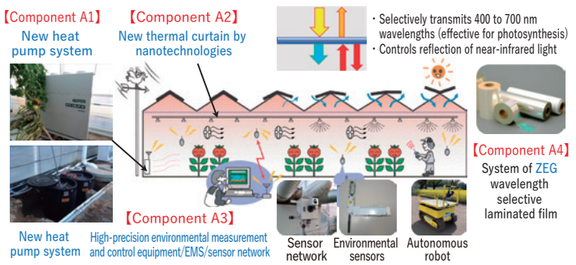
C1～3 Demonstration in tomato, cucumber, and orchid cultivation

Evaluate yield/quality improvement and CO_2 emissions by ZEG in demonstration greenhouses with different crops.

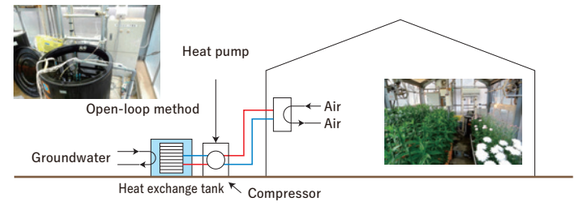
D Formulation of commercialization plan

Develop business plans and create financial simulations of agricultural management models.

3 System Design



ZEG system and component technologies



Heat pump for greenhouse horticulture using groundwater heat source

4 RD&D Objectives

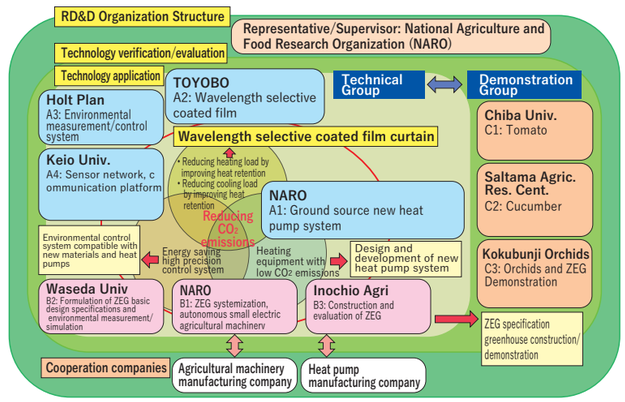
Expected Users and Benefits

The intended users are domestic and international greenhouse horticulture producers and production companies. The curtain material is made of a film that selectively reflects only near-infrared rays, which only raise the temperature of the greenhouse and does not contribute to plant growth, and allows maximum visible light, which is effective for photosynthesis, to enter. In addition, one curtain material can be used for multiple purposes, such as a heat shielding film that brightens crops when used in the summer, and a heat insulation film that helps save energy when used in the winter.

Target Specs and Performance

The system combines the use of greenhouse horticulture heat pumps with a coefficient of performance (COP) exceeding 4.0, laminated high-performance lining curtains that can be used for heat shielding and heat retention, and high-precision environmental measurement and control systems that optimize performance according to season and crop type. This is anticipated to reduce CO_2 emissions from existing combustion-type heaters by 25% by 2030 and increase crop yield or quality by 20% during the hot summer period through efficient use of air conditioning.

5 Project Structure



6 Implementation Schedule

	2022	2023	2024
Technical element 1.	Heat pump prototype production/ improvement and performance evaluation →		
Heat Pump	COP 4.0	COP 4.5	COP 5.0
Technical element 2.	Curtain prototype /improvement →		
Wavelength Selective Laminated Film		Product specifications/production equipment design →	
Technical element 3.	Development and demonstration of environmental control system adapted to ZEG →		
Environmental Measurement and Control			
Systematized ZE G, A4, B1-3	Systematization of ZEG that contributes to decarbonization →		
		Evaluation of practicality of ZEG →	
Demonstrations ZEG, B1~3	Demonstration of cultivating tomatoes, cucumbers, and moth orchids. →		
Formulation of commercialization plan	Business plan and financial simulation of agricultural management model →		

Example of Bottom-Up Stream – Area-Specific RD&D Category

Construction and evaluation of a concept ship with optimization of a high-efficiency propulsion system and power-saving system

NAIKEN R&D
2022 - 2023

1 Outline and Purpose

There are currently more than 5,000 non-international coastal transportation vessels in operation in Japan, but Japan's domestic construction capacity is only around 100 vessels annually. Even if alternative fuels and EV technology are developed, it will take a considerable amount of time before all vessels are replaced. Therefore, it is necessary to introduce CO_2 emission reduction technologies as soon as possible. It is important for the technology to be applicable without changing hull shape, to be safe and reliable, and to be able to be installed on existing ships. This proposal brings together various proven technologies that can reduce CO_2 emissions when the ship is in operation, during cargo handling, and berthing/unberthing. Some of the technologies can also be adopted on existing ships.

2 RD&D Details

• Key Components

A1 Technology for CO_2 reduction during operation

We focused on technologies that do not require major design changes such as improving the hull shape. In this project, an optimally designed propeller and energy-saving attachment are installed. They are based on hull performance estimation using CFD.

A2 Technology for CO_2 reduction during berthing/unberthing

Conventional side thrusters cannot move a vessel directly sideways and require time for ballast adjustment after cargo handling. The new thrusters installed on a ship can move the vessel sideways, and eliminate time otherwise required for ballast adjustment. The aim is to reduce the CO_2 emissions by shortening the time for the berthing/unberthing.

A3 Technology for CO_2 reduction during cargo handling and berthing/unberthing

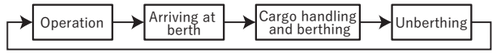
Aiming to build an energy-saving system using electrified and digital equipment, this proposal focused on cargo handling and berthing/unberthing, and a low-output battery system installed on the ship.

B&C System integration and demonstration of development elements

We built a new coastal transport vessel (499GT cargo ship) equipped with the developed A1, A2, and A3 products, collected and evaluated operational data, and demonstrated that it was possible to reduce CO_2 emissions by 12% for the entire coastal transport vessel.

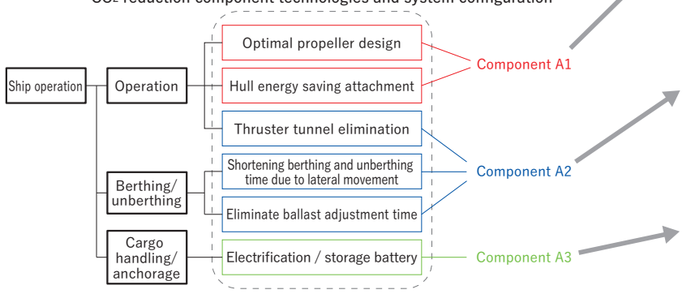
3 System Design

• Ship operation cycle



• Composition of CO_2 reduction element technology during ship operation

CO_2 reduction component technologies and system configuration



Optimized propeller and wake distribution image from the propeller

Appearance of existing thruster and new thruster

Container type battery

4 RD&D Objectives

Expected Users and Benefits

It is possible to reduce CO_2 emissions at domestic shipyards and without changing the existing ship type.

Target Specs and Performance

The target is to reduce CO_2 emissions by 9% during operation, 4% when unberthing and unberthing, over 50% during cargo handling and berthing, and 12% during overall coastal vessel operation.

5 Project Structure

Project lead

NAIKEN R&D

Development of CO_2 reduction technology during vessel operation
Development of CO_2 reduction technology when unberthing and unberthing
Development of CO_2 reduction technology during cargo handling and berthing
Demonstration of CO_2 reduction effect
2 years of development work results
Track record of developing remote berthing/unberthing equipment

Project partners

Yamanaka Shipbuilding Co., Ltd.

Hull construction, equipment installation, trial runs
70 years of shipbuilding

Cooperation

National Institute of Maritime, Port and Aviation Technology

Development of automatic berthing systems, etc.

Provision of sites for field testing

Imabari City, Ehime Prefecture

Organizing of maritime industry exhibitions, support for promotion of maritime industry

6 Implementation Schedule

	2022	2023
A1. CO_2 reduction technology during operation	Design and manufacture of optimized propellers	Evaluation in actual operation
Optimal propeller design	→	→
A2. Technology for CO_2 reduction during berthing/unberthing	Manufacture and installation of new thrusters	Evaluation in actual operation
Development of a new type of thruster	→	→
A3. CO_2 reduction technology during cargo handling and berthing	Battery design and installation	Evaluation on actual ship
Development of container type battery	→	→
B, C. System integration and verification	Land support system manufacturing	Evaluation by onshore support system
Demonstration using a 499GT cargo ship	→	→
D. Rollout activities/ commercialization plan	Brush up business model	Research for rollout (intellectual property strategy, etc.)
Consideration of high added value and intellectual property strategies	→	→

Example of Bottom-Up Stream – Area-Specific RD&D Category

Technology for absorbing surplus renewable energy electricity in aquifer thermal energy storage systems

Osaka Metropolitan University
2023 - 2025

1 Outline and Purpose

• The main objective of this project is to develop the world's first fast-cycle heat storage and release functionality, with multi-level thermal storage, in order to add new energy storage functions to the Aquifer Thermal Energy Storage (ATES) system, which possesses a large energy storage capacity. The goal is to develop a surplus renewable electric energy absorption system to be more cost-effective and space-efficient than electric batteries and hydrogen. It is hoped that this new ATES technology can help to address the issue of surplus renewable energy that is slowing the adoption of renewable energy as a major energy source in the government's CO_2 reduction strategies, as well as to enhance the energy demand management capabilities of densely developed urban cities and factories that have onsite photovoltaic power generation.
• ATES verification will be conducted with the cooperation and collaboration of Osaka City and the Japan Association for the 2025 World Exposition.

2 RD&D Details

• Key Components

A1 Development of Surplus Renewable Energy Absorption and Negawatt Function

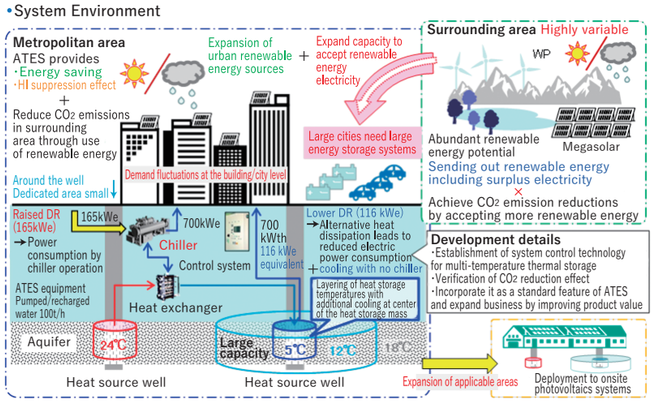
Envisioning applications for urban/regional models and onsite power generation/consumption models for factories, in this we phase will investigate the required capacity to absorb surplus renewable energy, then determine the adjustment functions required for the design of the system, and compare this system's performance with other surplus energy absorption systems. (Expected practical application level by 2024)

A2 Establishment of Optimal Operation Methods for the System Developed

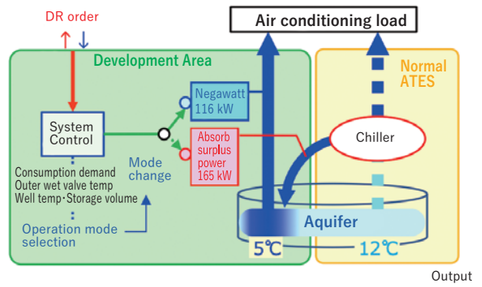
Development of a system that controls optimal thermal storage, taking into account multi-temperature thermal storage in the aquifer in response to fluctuations in surplus renewable energy, as well as direct cooling functionality in summer without the use of chillers for heat dissipation. Additionally, efforts will be made to reduce heat storage losses and maintain the annual heat balance. (Expected practical application level by 2025)

3 System Design

• System Environment



• System configuration



4 RD&D Objectives

Expected Users and Benefits

• Businesses aiming for Zero Energy Building (ZEB) construction or urban redevelopment → Reduce cost of procuring electricity from renewable energy sources to reduce CO_2 emissions and minimize cost of energy storage facilities.
• Businesses planning significant solar power generation installations in factories and facilities → Efficient utilization of surplus electricity generated during holidays, and cost reduction in energy storage facilities.

Target Specs and Performance

• Realizes about 1/10 the cost (165 kW x 300 h ≒ 50,000 kWh, 7 million yen) compared to a storage battery system with similar capacity (165 kW x 6 h ≒ 1,000 kWh, 60 million yen) (ATES main unit costs about 160 million yen).
• The energy storage efficiency is around 70%, which is slightly lower than the 75-95% of storage batteries, but it is superior to hydrogen generation systems. The CO_2 emission reduction effect is 17 tons/year, which is lower than the 47 tons/year of storage batteries, but it does not consume scarce resources and does not generate waste. In both cases, we hope to reduce CO_2 emissions by absorbing surplus energy and expanding the introduction of renewable energy.

5 Project Structure

Project lead

Osaka Public University

(Oversight, development of surplus renewable energy power absorption and negawatt functions, establishment of optimal operation method of system developed, system integration, demonstration)
• Has track record for developing aquifer thermal storage system
• Has system simulation technology

Project partners

Mitsubishi Heavy Industries Thermal Systems, Ltd.

(Development of surplus renewable energy power absorption and negawatt function, system integration, demonstration, commercialization)
• Incorporate the developed system into ATES as a standard feature
• Responsible from project formation to post implementation maintenance, etc.

Project partners

Takenaka Corporation

(System integration, demonstration, commercialization)
• As a general construction company, can recommend this technology for development projects

Project partners

Kansai Electric Power Company

(Development of surplus renewable energy power absorption and negawatt function, demonstration, commercialization)
• Propose and promote this technology as an energy and virtual power plant (VPP) business

Project partners

Yasui Architects & Engineers, Inc.

(Demonstration, commercialization)
• As an architectural firm, responsible for heat source design for Expo facilities.
• Responsible for ATES system design.

Project partnersz

The University of Tokyo

(Development of surplus renewable energy power absorption and negawatt function)
• Track record of evaluating power systems and global warming countermeasures

Cooperation

Japan Association for the 2025 World Exposition

(Field utilization/publicity cooperation)
• ATES system utilization・Publicity cooperation

Project partners

Yasui Architects & Engineers, Inc.

(Overall cooperation, information dissemination)
• Consideration of further relaxation of groundwater extraction regulations (city budget)

6 Implementation Schedule

Details / Year	2023	2024	2025
A1.[Absorption of surplus renewable energy power and development of negawatt function]			
①Finalization of specifications for surplus renewable energy power absorption function through multiple temperature thermal storage	→		
②Specifications for Negawatt function determined by heat radiation of absorbed cold heat storage mass	→		
③Evaluation of introduction scenarios based on urban/regional models and onsite power generation/consumption models for factories	→	→	→
A2.[Establishing the optimal operating method for system developed]			
①Optimization of operation method by building a heat source + ATES coupled model	→		
②Development of optimal operation technology to reduce short-and medium-term heat storage loss	→	→	→
③Study of methods to improve the time response characteristics of chillers	→	→	→
System integration			
①Design of ATES operation mode switching mechanism and control system	→	→	
②Construction of piping/operation mode switching equipment		→	
C.[Demonstration]			
①Verification of effectiveness of surplus power absorption / negawatt mode		→	→
②Verification of effectiveness of measures to improve responsiveness of surplus power absorption		→	→
③Calculation of economic efficiency and CO2 emission reduction amount	→	→	→
④Removal of test equipment			→
D.[Commercialization]			
①Formulation of commercialization plan	→	→	→
②Technology development project publicity		→	→

Example of Bottom-Up Stream – Area-Specific RD&D Category

Energy storage technology using zinc to achieve carbon neutrality

Sharp Corporation
2022 - 2024

1 Outline and Purpose

Innovative electricity storage technologies that can store electricity from highly variable renewable energy sources at significantly lower cost than existing technologies are anticipated to help make renewable energy electricity a major power source in the pursuit of carbon neutrality by 2050. This project aims to develop a zinc air flow battery technology utilizing zinc as an energy storage medium. Zinc exists in abundance as a resource and can be safely and stably stored. In principle, the zinc air battery has a high energy density. In addition, output (W) and capacity (Wh) can be designed independently to be suitable for absorbing long-term power fluctuations while reducing equipment costs. This technology has the potential to be less expensive than pumped storage power generation. The purpose of this project is to develop component technologies of the energy storage systems, create system prototypes that contribute to technology rollout, and verify the economic efficiency and practicality of the technologies.

2 RD&D Details

• Key Components

A1 [Development of charging unit]

We will develop a device to regenerate zinc slurry using an electrochemical reaction and confirm the stability of the reaction in practical use conditions, in order to verify the equipment cost. (Expected to reach practical level in 2024)

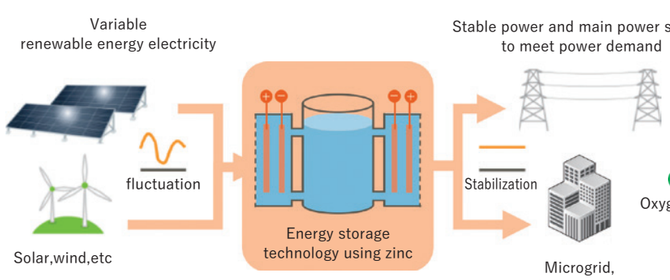
A2 [Development of discharging unit]

We will develop a power generation unit with multiple battery cells arranged to efficiently utilize zinc slurry as an energy source for power generation and confirm reaction stability in practical usage conditions in order to verify equipment costs. (Expected to reach practical level in 2024)

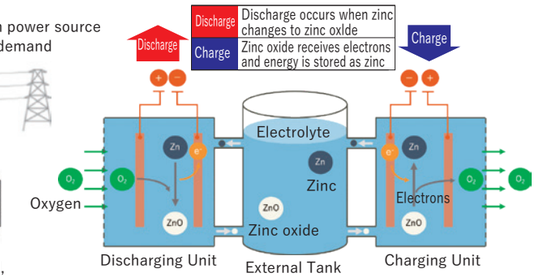
A3 [Environmental control]

Since the air battery is open to the atmosphere, the power generation unit is affected by carbon dioxide in the atmosphere. When verifying the lifetime, we will take measures such as implementing a carbon dioxide absorbent system and maintenance of the electrodes and electrolyte, and will evaluate the energy and economic efficiency. (Expected to reach practical level in 2024)

3 System Design



Usage environment of energy storage technology using zinc



Design of zinc air flow battery

4 RD&D Objectives

Expected Users and Benefits

We aim to provide power solutions that allow safe and inexpensive storage of large amounts of power. The main target of our solution is power generation companies with renewable energy sources such as medium- to large-scale solar power plants, which aim to avoid the risk of economic and environmental losses due to output curtailment.

Target Specs and Performance

Smallest unit (output = 1 kW, capacity = 12 kWh) will be developed for designing the commercialization product for power generation companies (target specifications: output = 210 kW, capacity = 2,520 kWh). Target system energy efficiency = 70%. Equipment cost = less than pumped storage power generation (23,000 yen/kWh)

5 Project Structure

Project lead

Sharp Corporation

(A-D, development demonstration of zinc air flow battery, formulation of commercialization plan) Has more than 8 years of experience in zinc air battery technology
Responsible for commercialization after project completion

Cooperation

Nippon Shokubai Co., Ltd.

(A1. Development of charging unit)
Achievements in research and development of separators for zinc batteries and zinc negative electrode materials

Cooperation

Sharp Energy Solutions Corporation

(D. Business strategy)
Developing energy business including solar cells
Achievements in sales of household storage battery systems, megasolar and grid storage battery EPC business.

Cooperation

Tokyu Land Corporation

(C. Demonstration field)
Renewable energy power generation company such as solar and wind power Solar farm demonstration site is operational in Higashimatsuyama from 2022

6 Implementation Schedule

	2022	2023	2024
Development of component technology A1	Control factor identification	Prototype evaluation of zinc regeneration unit	
Development of component technology A2	Control factor identification	Prototype evaluation of power generation unit	
Development of component technology A3	Basic data acquisition	CO_2 concentration control verification	
B. System integration		Prototype design	Evaluation/ demonstration
C. Demonstration		Prototype design	Evaluation/ demonstration
D. Formulation of commercialization plan		Formulation of intellectual property strategy	Formulation of commercialization plan

Example of Awards Stream – Innovation Discovery and Acceleration of Large-scale Rollout Category

Power traceability system using SaaS type P2P trading platform functions

UPDATER, Inc.
2021 - 2023

1 Outline and Purpose

- After the end of Japan's feed-in tariff (FIT) system, the introduction of renewable energy by independent power producers (IPPs) may stagnate as the government system no longer guarantees an all-quantity buyback. Consumers will lose the incentive to use renewable electricity, which can threaten the country's ability to achieve its net zero goals.
- This project therefore aims to establish a system in which customers can directly support renewable electricity producers and to lead to business opportunities.
- The project is to develop (1) a P2P electricity matching system that certifies customers' purchase of renewable electricity from a specific plant at a fixed price, and (2) a function that allows various users, including individual customers, to participate in the transaction (shared PPA, power purchase agreement). The system will be migrated to a Software as a Service cloud computing (SaaS) platform and made available to other electricity companies.
- In the technological development, UPDATER's existing electricity traceability system 'Enection 2.0' will be upgraded to this system so that the company will reduce production costs and improve efficiency.

2 RD&D Details

• Key Components

A1 Smart Contract Blockchain System

Certifies transactions by matching the amount of electricity generated by the specified power plant zone per 30 minutes to the amount of demand from each customer.

A2 PPA processing system

Enables customers to directly purchase electricity from the plant they have designated. Incorporates three functions: corporate PPA, shared PPA, and crowdfunded PPA.

A3 Tools to improve utility value

Include applications for individual consumers and services for power producers. Will be migrated to SaaS and made available to multiple businesses.

B System integration

A1 will be integrated into A2 as a function of this system and evaluated to see if it works together as planned.

C Demonstration

A verification will be conducted to determine whether the system and services can reduce CO_2 emissions.

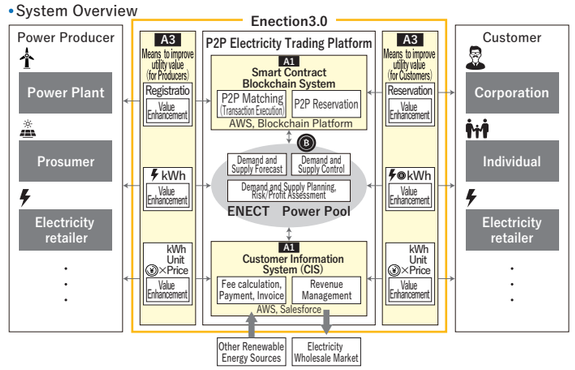
D Survey to materialize the business plan

A survey is conducted to commercialize the technology. A business plan is materialized and updated based on the survey. Feedback will also be provided for technological development.

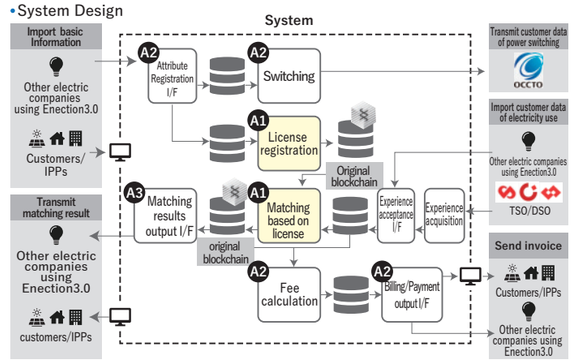
3 System Design

This system is equipped with three sub-systems: A1. blockchain system, A2. PPA processing system, and A3. tools to improve utility value.

•System Overview



•System Design



4 RD&D Objectives

Expected Users and Benefits

- Renewable electricity producers (IPPs): Investment recovery risk and financing risk in the construction of plants will be mitigated.
- Corporate customers (large-sized, connected to high voltage): Opportunities to select and own renewable electricity with the guarantee of additionality will be provided.
- Individual customers: Opportunities to select and own renewable electricity as needed will be added.
- Electricity retailers (PPS): Opportunities to provide customers with high-value added services and renewable electricity will be available.

Target Specs and Performance

P2P electricity transactions will be commercialized, and 0.1 to 1million users anticipated.

5 Project Structure

Project lead

UPDATER,Inc

- Overall management
- A1.Development of Smart Contract Blockchain System
- A2. Development of PPA processing system
- A3. Development of means to improve utility value
- B. System integration
- C. Demonstration ⟷ Cooperation

Demonstration fields
Kao Corp.
AMITA Corp.
Takasago Thermal Engineering Co., Ltd.

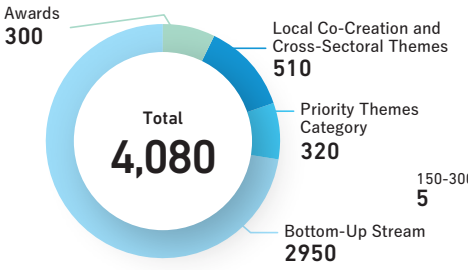
Project partner
EY Strategy and Consulting Co., Ltd.
Management support
D. Survey to materialize the business plan

6 Implementation Schedule

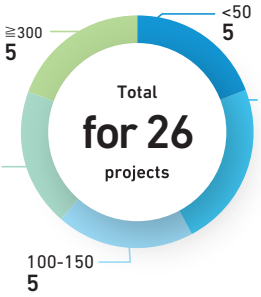
	2021	2022	2023
A1. Develop component technology	Basic development based on Solana	Full-scale development based on Polkadot	Functional modification
A2. Develop component technology	Development of basic function	Development of PPA job processing function	Development of function for power plant zone subdivision
A3. Develop component technology	Application development	Functional modification	Migration to SaaS
B. System integration	Cooperative operation test		Cooperative operation test
C. Demonstration		Performance verification	Performance verification
D. Survey	User needs survey	Survey for individual users	Formulation of commercialization plan

Share by Category (2023)

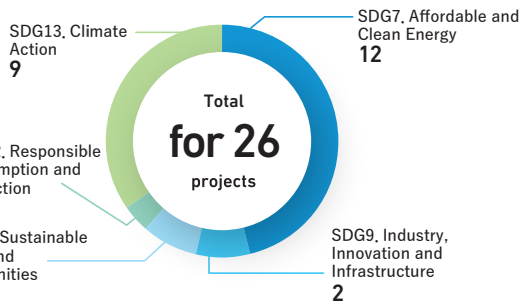
Budget allocation for each area (million yen)



Number of projects by budget size (million yen)



Number of projects by Sustainable Development Goal



Ongoing Projects in 2023

Local Co-Creation and Cross-Sectoral Themes			
"Climate Change + Buildings"			
	TAISEI CORPORATION	2022 - 2024	Renovation of existing buildings using Net Zero Energy Building model for realization of a circular and ecological economy
	MACNICA, Inc.	2023 - 2025	Utilization of perovskite solar cells in harsh environments such as harbors
"Climate Change + Agriculture"			
	National Agricultural and Food Research Organization	2023 - 2025	Field trial of carbon neutral irrigation supply systems adapting pumped storage hydropower and surplus water pressure in pipeline
	Toyohashi University of Technology	2022 - 2024	Semi-closed/all electric tunnel greenhouse with "speaking plant approach" environmental control system
	National Agricultural and Food Research Organization	2022 - 2024	Net zero energy greenhouse (ZEG) for the decarbonization of horticulture
Priority Themes Category			
	MARINE ENERGY Co., Ltd.	2020 - 2023	Regional circular-economy business scheme with intelligent wave power generation system
	AIR WATER INC.	2021 - 2023	Liquefied biomethane regional supply chain model using unused biogas
	TOYOTA ENERGY SOLUTIONS INC.	2021 - 2024	Zero-emission agriculture with cogeneration, using ammonia-fueled micro gas turbine
Bottom-Up Stream - Area-Specific RD&D Category			
	Mitsubishi Corporation	2021 - 2024	Low-carbon approach to heavy truck logistics using a distributed network of small-scale LNG filling stations
	NAIKEN R&D	2022 - 2023	Construction and evaluation of a concept ship with optimization of a high-efficiency propulsion system and power-saving system
	Nagoya University	2023 - 2025	Wideband gap semiconductors based high performance on-board charger systems for xEV
	Osaka Metropolitan University	2023 - 2025	Technology for absorbing surplus renewable energy electricity in aquifer thermal energy storage systems
	Ricoh Company, Ltd.	2021 - 2023	Circular-type energy storage system for edge data centers
	Sharp Corporation	2022 - 2024	Energy storage technology using zinc to achieve carbon neutrality
	Mitsui O.S.K. Lines, Ltd.	2022 - 2024	Ocean thermal energy conversion utilizing deep seawater on Kume-Jima for a circular and ecological economy
	Riamwind Co., Ltd.	2022 - 2024	200 kW mid-size wind lens turbine and multi-rotor system
	KOATSU GAS KOGYO CO., LTD.	2023 - 2025	Development of atmospheric pressure nitrogen acetylene gas carburizing method by direct control of acetylene gas
	AISIN CORPORATION	2023 - 2025	Pure hydrogen SOFC system technology development and demonstration to promote regional hydrogen utilization
	Hitachi Zosen Corporation	2020 - 2023	Next-generation waste treatment system for high-efficiency energy utilization
	Suzuki Shokai Co., Ltd.	2022 - 2024	Next-generation low-concentration aluminum dross effective utilization technology for carbon neutrality
	Sumitomo Mitsui Construction Co., Ltd.	2022 - 2024	Energy recovery technology using only manure from egg-laying chickens
	Sumitomo Corporation	2023 - 2025	Functional materials optimizing the material flow of rice husks for energy use
	Pacific Power Co., Ltd.	2022 - 2024	Optimization of renewable power generation based on real-time CO_2 emission intensity of electricity
	Elephantech Inc.	2023 - 2025	Mass production technology for low-carbon PCB manufacturing using inkjet printing
	Saibu Gas Co., Ltd.	2023 - 2025	Methanation local production for local consumption model for cost reduction using various local raw materials
Awards Stream - Innovation Discovery and Acceleration of Large-scale Rollout Category			
	UPDATER, Inc.	2021 - 2023	Power traceability system using SaaS type P2P trading platform functions

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The information in this pamphlet is valid as of October 2023.

Research, Development and Demonstration Program for Local Co-Creation and Cross-Sectoral Carbon Neutral Technologies
https://www.env.go.jp/earth/ondanka/cpttv_funds/