

# F-REI

Fukushima Institute for Research, Education and Innovation



# Fukushima Research Education Innovation

Embodying the dreams and hopes of realizing the reconstruction of Fukushima and other parts of the Tohoku region,  
driving Japan's scientific and technological capabilities and industrial competitiveness,  
and contributing to economic growth and the improvement of people's lives.

## F-REI History to Date

June 2014	<p>Report by the Study Group on the Fukushima International Research and Education Center (Fukushima Innovation Coast Framework*)</p> <p>* An initiative that aims to build new industrial bases in the Hamadori region and other areas.</p>
June 2020	<p>Final Summary on the Fukushima International Research and Education Center: Aiming to realize reconstruction and creation in the Fukushima Hamadori district (Expert Group: SAKANE Masahiro, Chair, Advisor to Komatsu Ltd.)</p>
March 2022	<p>"Basic Concept of the Fukushima Institute for Research, Education and Innovation" (Decision by Reconstruction Promotion Council)</p>
June 2022	<p>Enforcement of law to partially amend the Act on Special Measures for the Reconstruction and Revitalization of Fukushima</p>
July 2022	<p>Nomination of YAMAZAKI Koetsu, former President of Kanazawa University, as F-REI's first President</p>
August 2022	<p>Formulation of Basic Plan for Research and Development for the Creation of New Industries (Decision by Prime Minister)</p>
September 2022	<p>Decision on location of the Fukushima Institute For Research, Education and Innovation (Decision by Reconstruction Promotion Council)</p> <ul style="list-style-type: none"><li>○ The location of the Fukushima Institute for Research, Education and Innovation (here in after referred to as the "F-REI") is as follows.</li><li>○ Facilities of F-REI (Headquarters) : Kawazoe district, Namie Town, Fukushima Prefecture</li><li>○ Temporary office : Public facility in Gongendo district, Namie Town, Fukushima Prefecture</li><li>○ The Government of Japan and F-REI shall cooperate with Fukushima Prefecture, municipalities, universities and other research institutes, etc., and promote efforts to spread the effects of the establishment of F-REI over a wide area.</li></ul>
	<p>Publication of English name and abbreviation</p> <ul style="list-style-type: none"><li>○ English Name : Fukushima Institute for Research, Education and Innovation</li><li>○ Abbreviation : F-REI</li></ul>
April 2023	<p>Establishment of F-REI</p> <p>Instructions for medium-term objectives by competent ministers</p>

The Fukushima Institute for Research, Education and Innovation (F-REI) is a special legal entity that was newly established by the Government of Japan in April 2023 under the Act on Special Measures for the Reconstruction and Revitalization of Fukushima. I am honored to be appointed by Prime Minister KISHIDA Fumio as the first President of F-REI.

Although it has been over a decade since the Great East Japan Earthquake, the Fukushima Hamadori region and other areas affected by the nuclear accident continue to be afflicted by medium- and long-term challenges, which include, among them, shrinking populations, lack of industrial leaders, and expansive areas of unused and underutilized land as a result of long-term evacuation periods and other impacts.

### **(1) F-REI' s mission**

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F-REI has an important mission to play: to become a world-class, core center for creative reconstruction, embodying the dreams and hopes of realizing the reconstruction of Fukushima and other parts of the Tohoku region, raising Japan' s industrial competitiveness to the highest level on the international stage, and contributing to economic growth and improving people's lives.

### **(2) World-class R&D, practical implementation of research outcomes in society and industrialization**

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To accomplish this ambitious goal, F-REI' s main focus is on research and development; however, the institute is also involved in the practical implementation of research outcomes in society and for industrialization and human resources development, in order to turn solutions to challenges in Fukushima and the world into reality. F-REI also simultaneously plays a role as a cross-functional control tower to coordinate activities by research facilities and other existing organizations located in Fukushima.

### **(3) Core center for creative reconstrttuction**

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F-REI will collaborate with local municipalities, residents, companies and organizations in a variety of different partnerships to ensure that the establishment of this institute will have a ripple effect over a vast area. A wide-area campus that encompasses research and activities within its facilities and beyond, F-REI is committed to realizing the creation of the "only place in the world for research, demonstrations, and implementation", and to disseminating information on a global scale.

These very important missions undertaken by F-REI cannot possibly be accomplished overnight, and we will do our very best to make a contribution to Fukushima and Japan through steady accumulation of positive results.

We would like to ask you cooperation and support.

First President, F-REI

**YAMAZAKI Koetsu**



On July 22, 2022 A courtesy call on Prime Minister Kishida (on the right of the picture) after nomination of the first president of F-REI

# What is F-REI

- ◆ The Fukushima Institute for Research, Education and Innovation (F-REI) is an organization established by the Government of Japan as a special legal entity under the Act on Special Measures for the Reconstruction and Revitalization of Fukushima.
- ◆ Under the leadership of F-REI's President, four areas of activities will be promoted using an integrated approach: **research and development, industrialization, human resources development, and command post functions.**

## Four Functions of F-REI

1

### Research & Development

- Promotion of R&D that is second to none in Japan and abroad and helps solve problems in disaster-affected areas and around the world, with a focus on areas where Fukushima has a clear competitive advantage
- ① Robotics, ② Agriculture, forestry and fisheries, ③ Energy, ④ Radiation science, medicine and drug development, and industrial applications for radiation, and ⑤ Collection and dissemination of data and knowledge on nuclear disasters

2

### Industrialization

- Establishment of a collaborative system between industry and academia to make investment in F-REI ventures and joint research with companies
- Promotion of participation of stakeholders from Japan and abroad with the use of state-of-the-art facilities and demonstration fields, bold deregulation and other actions
- Secure initiatives for researchers through the strategic management of intellectual property, etc.

3

### Human resource development

- Utilization of joint graduate school programs. Collaboration with the IAEA, etc. to train international researchers who can also do much for the decommissioning site.
- Collaboration with technical colleges. Creation of diverse opportunities for students of elementary, junior and senior high schools and others to experience cutting-edge research.
- Development of specialized human resources for industrialization, through professional education and recurrent education targeting corporate personnel and working students.

4

### Control Tower

- Organization of a council and maximizing its functions as a command post to coordinate activities by existing facilities
- Strategic decisions on the allocation of research resources, security, etc. from the additional perspective of economic security
- Integration of existing facilities in Fukushima and consolidation of budgets from the standpoint of accelerating research and general coordination

## Co-jurisdiction by competent ministers

Prime Minister

Minister of Education,  
Culture, Sports,  
Science and  
Technology

Minister of Health,  
Labour and Welfare

Minister of Agriculture,  
Forestry and  
Fisheries

Minister of Economy,  
Trade and Industry

Minister of  
the Environment

- ◆ Management and evaluation with the use of medium-term objectives and plans over a seven-year period
- ◆ Secure budget required to allow F-REI to operate over the long term on a stable and sustainable

## Recruitment and development of research environment



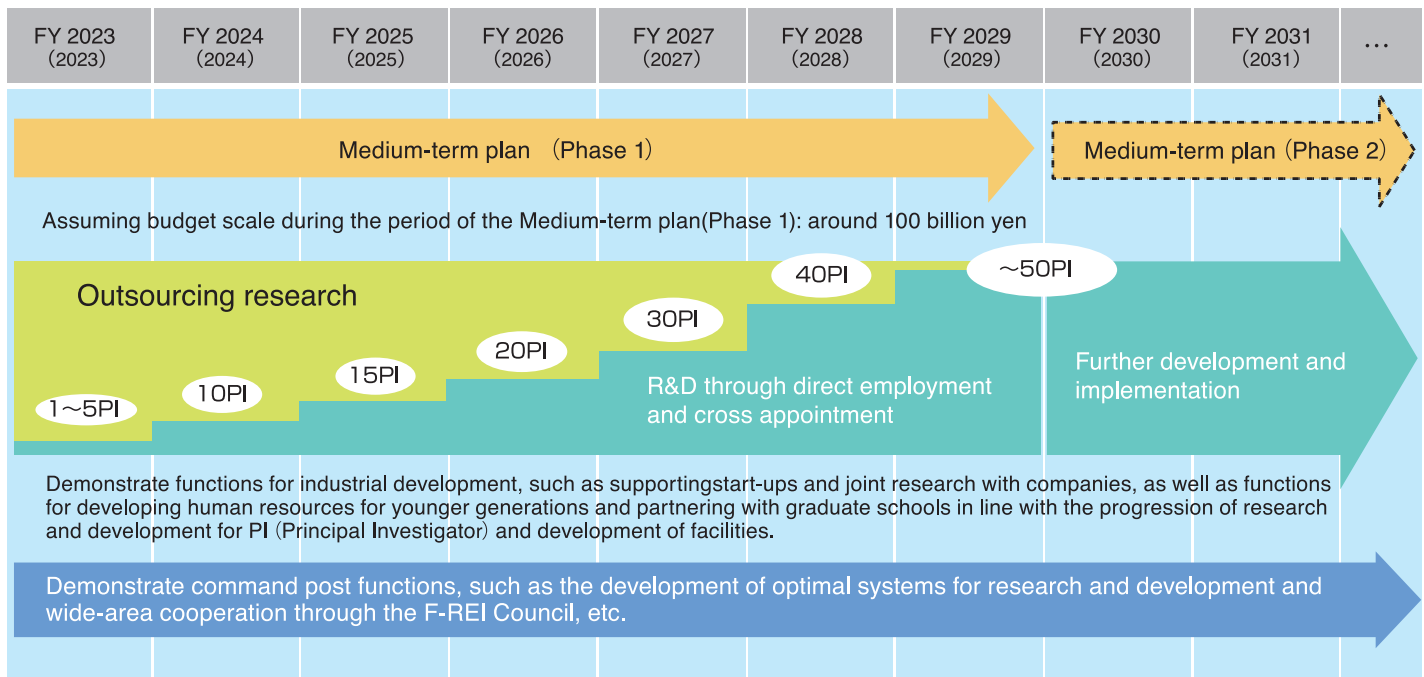
Several hundred outstanding researchers from Japan and overseas will be engaged in research activities at F-REI in



- ◆ Attractive environment for researchers (Development of standards for salaries and other benefits with consideration of the need to retain outstanding, globally-minded human resources)
- ◆ Active recruitment and promotion of young and women researchers



## F-REI Roadmap (Draft)



## F-REI Facilities (Concept)

### Functions and Rooms of F-REI Facilities to be Considered for Development in Future

#### Research and Development Functions

- Research offices and labs
- Shared research equipment space
- Computer rooms
- Research exchange plaza
- Libraries
- Specific experimental labs

#### Industrialization and Education Functions

- Industry-academia exchange plaza
- Lecture rooms
- Halls
- Meeting rooms
- PR exhibition plaza
- Short-term stay

Furthermore, office rooms, welfare space, etc.

**“In order to ensure steady, full-scale implementation of operations, the Government of Japan will implement the initial development of F-REI facilities.”**

**“Gradual commencement of service aiming for abolishment of Reconstruction Agency (End of FY2030) or before”**

“Basic Concept of the Fukushima Institute for Research, Education and Innovation” Decision by Reconstruction Promotion Council in March 2022

- ▶ Compilation of Basic facility plan (FY2023), Procedures of City Planning
- ▶ Basic and detailed design, Site purchase (Area to be purchased: approx.14 ha)
  - ▶ Ground preparation work
  - ▶ Construction of facilities → Successful provision of facilities as completed



## F-REI Related Projects Budget (Budget for FY2023 : 14.6 bln. yen)

### (1) Institutional management, other 1.7 bln.yen

- Development of institute structure
- Operation and management of offices
- Demonstration of command post functions with the organization of R&D Council for the Creation of New Industries

### (2) R&D projects, other (R&D, industrialization, human resources development) 12.6 bln.yen

- R&D and development of R&D environment
- Studies and design of collaboration systems for industry and academia for industrialization, other
- Implementation of "on-demand classes" as part of research outreach activities, other

### (3) Activities to improve/develop facilities 0.3 bln.yen

※Implementation by Reconstruction Agency

- Organization of various building functions as the initial stage in the development of facilities
- Required studies for acquiring sites, design, and construction, other



## Research Themes Undertaken by F-REI in FY2023 (Budget for FY2023: 12.6 bln. yen)

According to the Basic Plan for Research and Development for the Creation of New Industries adopted on August 26, 2022, the Fukushima Institute for Research, Education and Innovation (F-REI) will conduct R&D in the following five areas where Fukushima can demonstrate its competitive edge Considering the issues of Japan and the world, regional situations, etc.

R&D of FY2023 will be based on the R&D outcome of FY2022 as well as on the medium-term goals set by the ministers in charge for F-REI, and will contribute to solving medium-and-long term problems of Fukushima and other disaster-affected areas in Tohoku, and therefore, the global issues, to become a point of pride in Japan and beyond.

### Main Projects in Each Research Area

【Reference】

F-REI's Research and Activity (F-REI website)



### Robotics

Research and development on robots to support the steady promotion of decommissioning work and to enable responses in harsh environments, such as disaster sites, and at industrial sites where labor is in short supply.

#### (Research content of FY2023)

- R&D on robots operatable in harsh environments such as disaster sites and activities related to decommission works of damaged reactors.
- R&D on technologies that enables the operation of multiple robots in harmonized manners.
- R&D on high-performance large drones that enables heavy payloads and longtime flight powered by carbon neutral energy sources.



Drones work in natural disaster occasion



### Agriculture, Forestry and Fisheries

Demonstrations and research on intense labor-saving and ultra-low cost sustainable agriculture, forestry and fisheries with the aim to realize a regional circular economy model through smart agriculture, carbon neutrality, etc.

#### (Research content of FY2023)

- Construction and verification of production systems to implement diverse work styles
- Construction and verification of rural energy network management systems
- Construction and verification of pest control and wildlife damage prevention systems using advanced technologies
- Development, production and utilization of new agricultural, forestry and fishery resources
- Support for reconstruction and revitalization of agriculture, forestry and fishery in disaster-affected areas by using advanced technologies



Agricultural machinery control systems that move and operate autonomously across multiple agricultural fields



## Energy

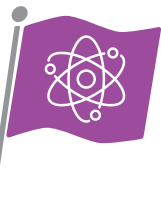
Building hydrogen energy networks and R&D on negative emission technology in order to posit Fukushima as a global pioneer in carbon neutrality, etc.

(Research content of FY2023)

- Laboratory-level implementation of ethanol production from high-yield plants and recycling of fermentation gas
- Trend survey on negative emission technology (BECCS/blue carbon) and development of techniques to improve absorption capacity
- Initiation of overall design and prototype development of hydrogen energy system using renewable energy
- Support for commercialization of renewable energy technologies owned by companies in the Hamadori, Fukushima



Production of plants with added functions, such as early growth and large-scale carbon absorption (BECCS)

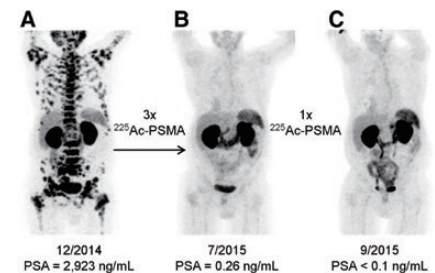


## Radiation Science, Medicine and Drug Development, & Industrial Applications for Radiation

Creation of an all-Japan research promotion system, conduct of basic research on radiation science, development of advanced medical applications and drug discovery technologies for RI, and industrial applications for radiation.

(Research content of FY2023)

- Development of new RI medical devices using alpha emitting radionuclides, promotion of world's most advanced R&D in the fields of drug discovery and medical treatment
- Detailed design of ultra-large X-ray CT machine, R&D in image processing technology, and study toward using actual data



Elimination of prostate cancer with alpha emitting radionuclides

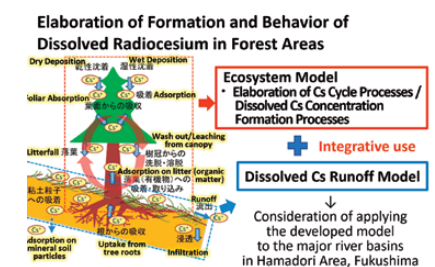


## Collection and Dissemination of Data and Knowledge on Nuclear Disasters

Contribution to environmental recovery from nuclear disasters and to knowledge on nuclear disaster preparedness at the global level, as well as to the elimination of harmful rumors by integrating the results of research in the natural and social sciences.

(Research content of FY2023)

- Case study of domestic and international long-term ecological research, development of a model for environmental impact assessment simulator
- Survey of radioactive cesium migration into natural resources, development and refinement of numerical models to reproduce migration behavior of radioactive cesium in forests, rivers, etc.
- Cooperation with International Commission on Radiation Units and Measurements in organizing ICRU's annual meeting and symposium; host/co-host international conferences of International Commission on Radiation Protection and/or other organizations
- Research on regeneration and revitalization of disaster victims, communities, affected areas, etc., international exchange and development of human resources, construction of networks and hubs involving various researchers for this purpose



Development, Elaboration, and Advancement of Environmental Dynamic Models

Courtesy of NIES

# F-REI and Related Facilities

## Ripple Effect through Wide-area Collaboration

- ◆ Activities by F-REI are not aimed only at neighbor areas; we would like to be perceived by the whole region involved in reconstruction as a 'core center of creative reconstruction' and we hope that this effect will spread nationwide.
- ◆ We will promote collaboration in diverse partnerships with municipalities, residents, companies and organizations, with F-REI as the core, based on understanding of seeds and needs of existing research centers, educational institutions, and communities related to the five research activity fields of F-REI through dialogs.
- ◆ Consider F-REI as a wide-area campus that encompasses research and activities within its facilities and beyond, to realize the creation of the "only place in the world for research, demonstrations, and implementation", centered in the Hamadori region, and for disseminating information on a global scale.
- ◆ We will work to contribute to regional industry accumulation, human resources development, and livable urban development so as to drive creative reconstruction of Fukushima and Tohoku, and furthermore, Japan's revitalization.

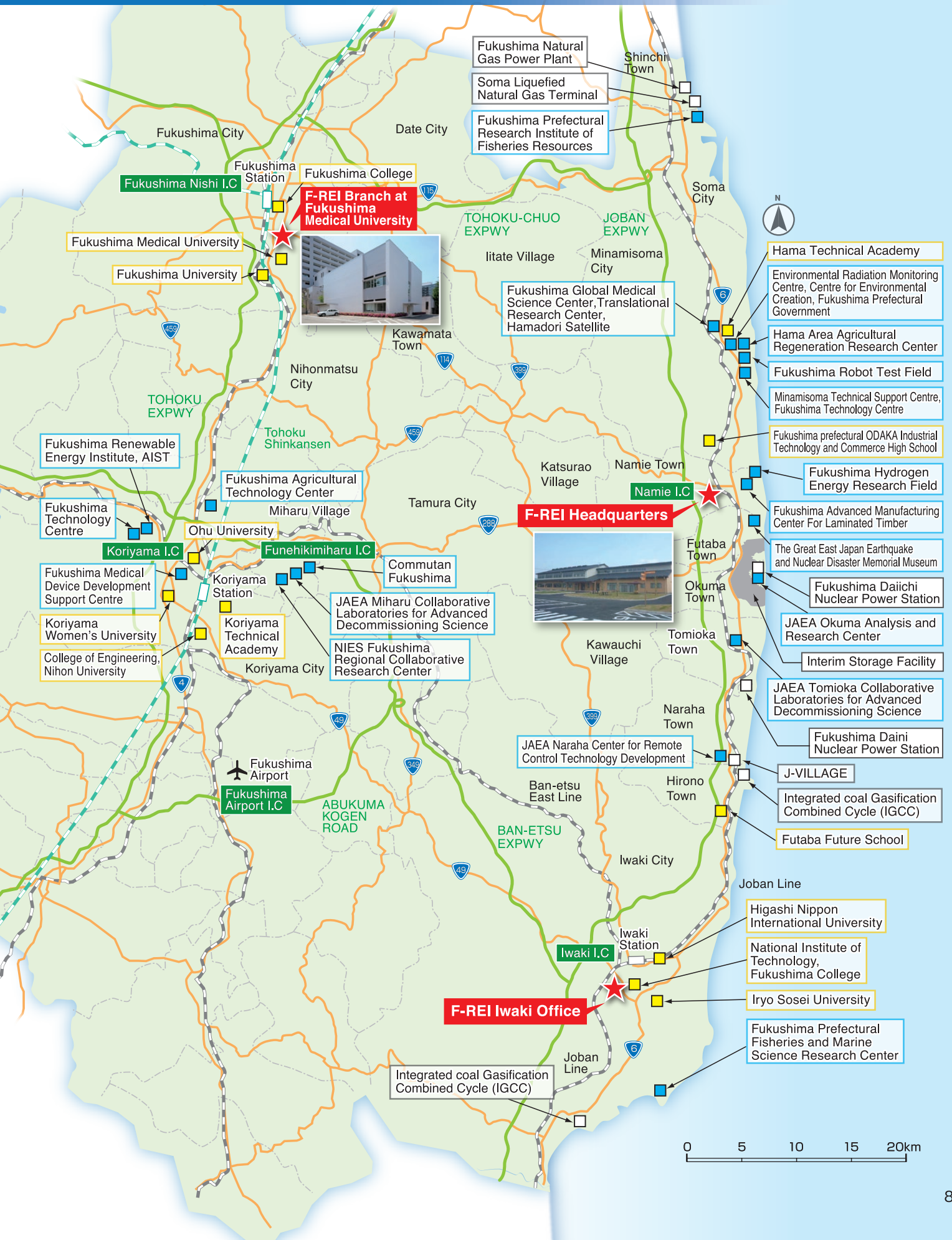


## Explanatory notes

- ★ Fukushima Institute for Research, Education and Innovation (F-REI)
  - Research facilities, etc.
  - Universities and High schools, etc.
  - Other facilities
- ※JAEA→Japan Atomic Energy Agency



## in Fukushima Prefecture



## Promotion of partnerships between F-REI and diverse entities

- ◆ Through partnerships with diverse entities, F-REI aims to make use of research outcome to contribute to regional industry accumulation, human resources development, and livable urban development.

(Examples of business development)

R&D on smart agriculture technology including autonomous control of agricultural machinery



Partnerships with municipalities and farmers

Use of farmlands in Hamadori region, etc. as demonstration fields



Expansion throughout Fukushima Prefecture and Japan

**Implementation of ultra-labor saving, high-value-added 'Japan' s most advanced agriculture' practicable for everyone, from youth to elderly people**

R&D on powerful, high-precision robots and drones operable even in harsh environments



Partnerships with municipalities

Demonstration and utilization in cooperation with local governments in Hamadori region, etc.



Expansion throughout Fukushima Prefecture and Japan

**Implementation of an affluent and stable society model invulnerable to natural disasters or labor shortage**

Development of P2G systems that efficiently store electricity as hydrogen

\*P2G = Power to Gas



Partnerships with municipalities and businesses

Building of 'next generation smart city' demonstration areas in Hamadori region, etc.



Expansion throughout Fukushima Prefecture and Japan

**Deployment of Fukushima-type smart city model including mobility**

Evaluation of plants that absorb CO<sub>2</sub> Development of core technologies for negative emission



Partnerships with municipalities and farmers

Demonstration-scale verification through efficient use on undeveloped sites



Expansion throughout Fukushima Prefecture and Japan

**Realization of carbon neutral society**

R&D toward RI medical use to make possible innovative cancer treatment



Partnerships with universities and hospitals

Implementation of clinical trials in cooperation with universities and hospitals



Expansion throughout Fukushima Prefecture and Japan

**Realization of health and longevity society free of cancer**

### F-REI Top Seminar

Toward professional development aimed at young people responsible for the future of the region who will support medium-and-long term creative reconstruction and development of Fukushima

Target: Universities, College of technology (KOSEN) and high schools in Fukushima Prefecture

Lecturers: YAMAZAKI Koetsu (F-REI President) and other F-REI executives

Contents: Attractiveness and potential of leading-edge science and technology Importance of learning and future vision Role and future image of F-REI, etc.

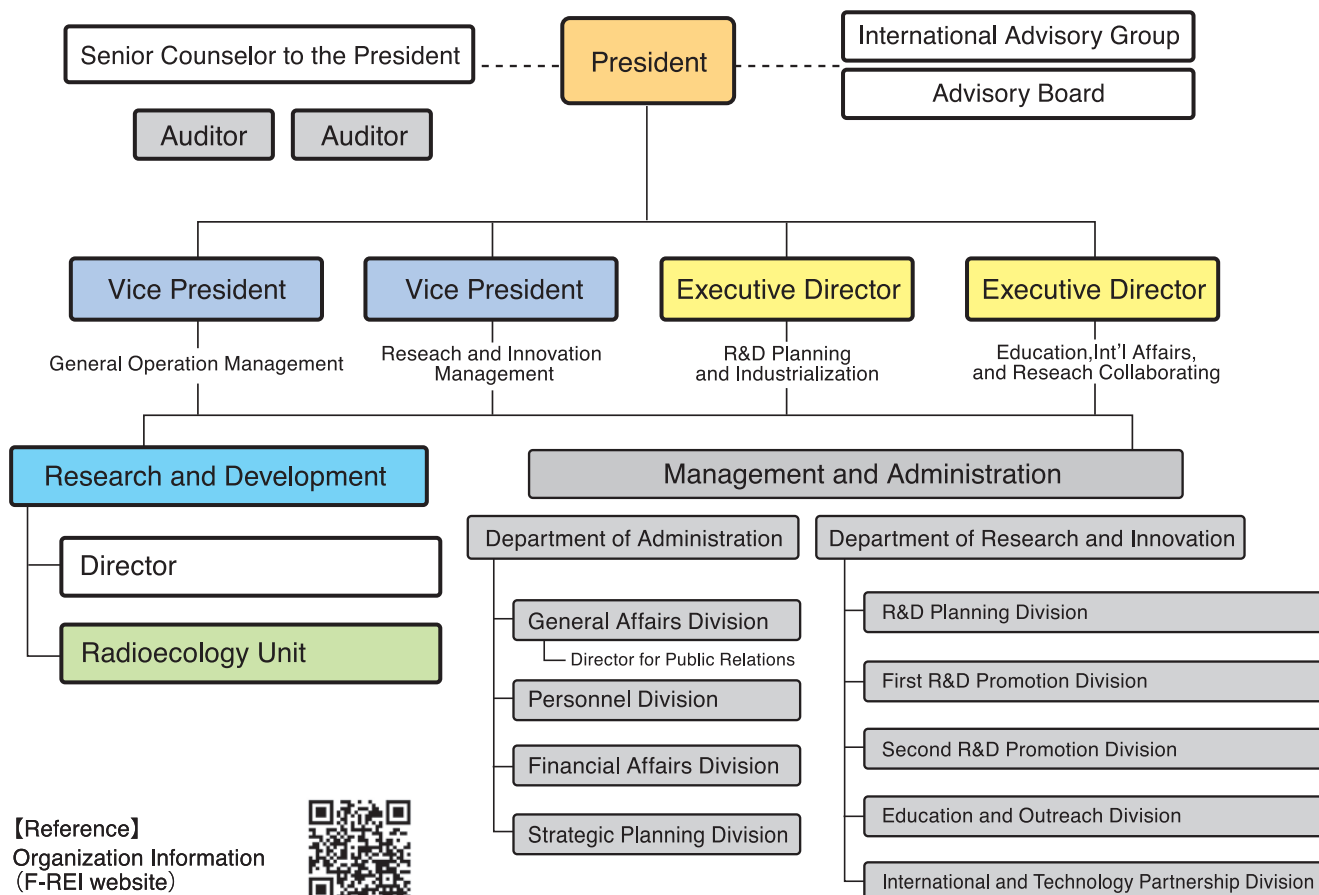
### F-REI Roundtable

Holding roundtable discussions with each municipality toward building regional partnership for R&D, industrialization and HR development

Target: 15 municipalities in Hamadori region, etc.

Contents: Direct dialog with municipality heads, local key players, businesses, etc.  
On-site inspection and opinion exchange to understand diverse seeds and needs

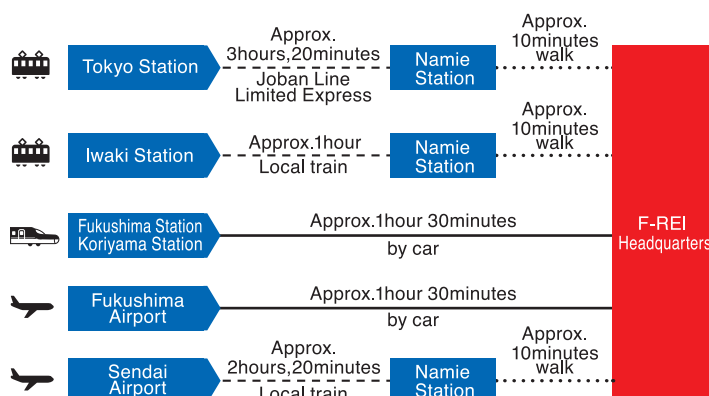
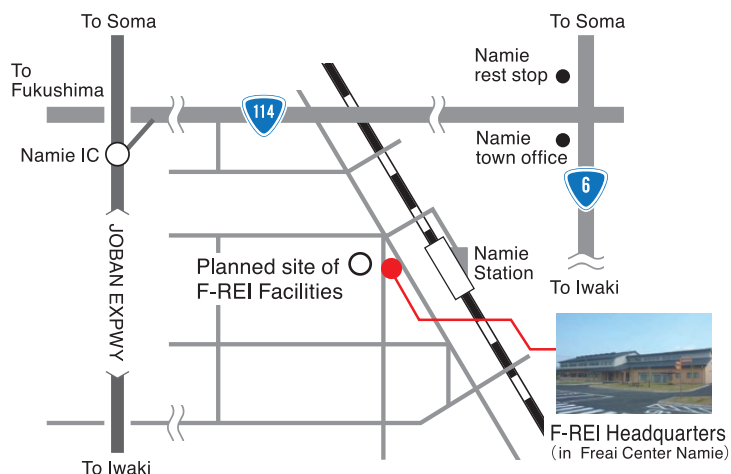
## Organizational Structure of F-REI



## Location of F-REI Headquarters and Branch

- **F-REI Headquarters**  
6-1, Yazawamachi, Gongendo, Namie-machi, Futaba-gun, Fukushima 979-1521  
TEL +81-240-41-9970 mail madoguchi.h5x@f-rei.go.jp
- **F-REI Branch at Fukushima Medical University**  
1, Hikarigaoka, Fukushima-shi, Fukushima 960-1295

### Access to Headquarters



# F-REI

Fukushima Institute for Research, Education and Innovation

## Inquiries

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○ Find more information about F-REI  
(F-REI website)

