

Transition Governance of Energy System in Japan after Fukushima

– Local Experiments, National Strategy and Possible Role of Technology Assessment –

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Background

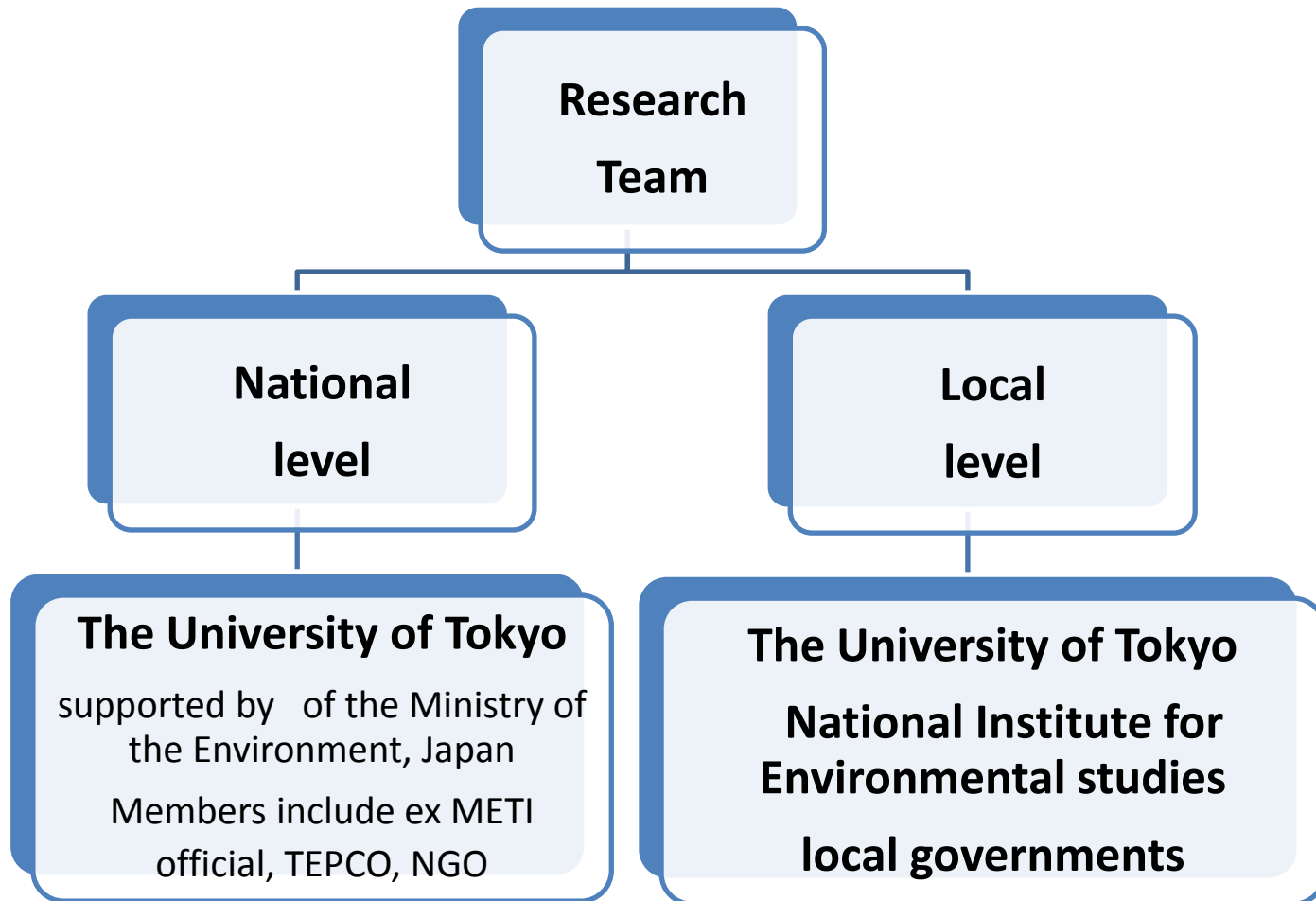


- After East Japan great earthquake disaster and Fukushima accident in March 2011, increasing the ratio of renewable energy dramatically and promoting efficiency of energy use using smart grid is imperative regardless uncertain future of nuclear energy in Japan.
- Even before Fukushima accident, several local experiments were undertaken.
- Besides local experiments, central government also introduces new policies facilitating renewable energy. For example, Law on FIT (Feed in Tariff) system was enacted recently.

Experiment of TA by Third Party

- Our research team mainly consists of The University of Tokyo and National Institute for Environmental Studies to perform technology assessment of the transition process of the power supply constitution after East Japan great earthquake disaster.
- The University of Tokyo team evaluating the action at the national level, funded by Ministry of Environment, is comprised of researchers belonging to university, a former employee of the Agency of Natural Resources and Energy, a former employee of the Tokyo Electric Power Company, and a NGO member.
- The team investigating the problem at the local level consists of members from the University of Tokyo, National Institute for Environmental Studies, local governments.
- This research tries to assess based on experts brainstorming and case studies focusing on energy and related systems, especially focusing on interaction between local experiments and national strategies.

Research team of TA



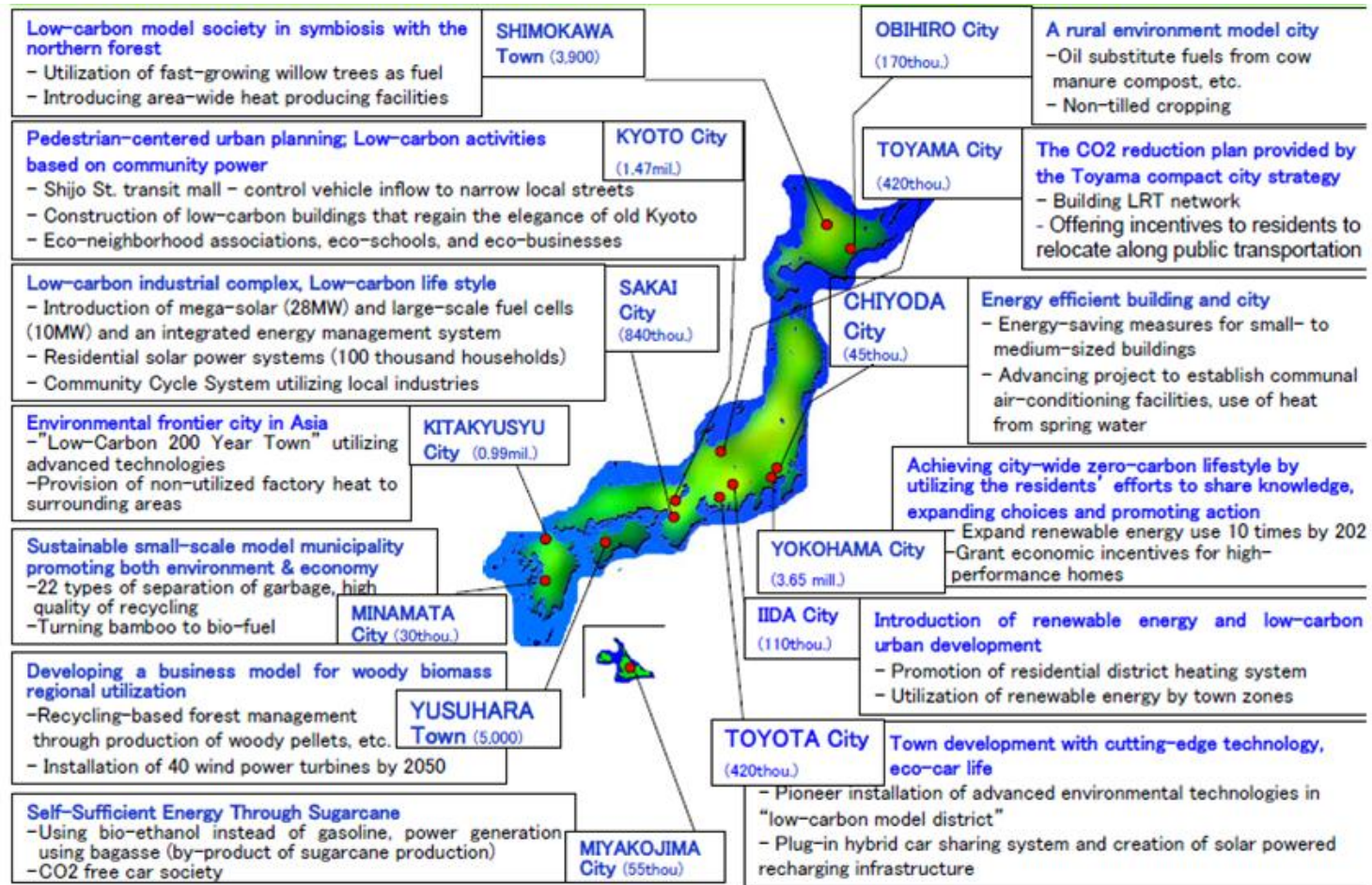
Findings: local level

Various National Programs on Local Development

- At the local level, various experiments have been conducted.
- Eco-model city launched in 2008
 - Regional Revitalization Bureau, Cabinet Secretariat selected Eco-model city that challenge pioneering initiatives in pursuit of ambitious goals and provide support for their implementation. 13 cities have been selected so far.
 - This program asks cities to achieve low carbon societies for which the central government set national target of 60-80% GHG reduction by 2050.
 - > mainly environmental department is in charge
- Next-Generation Energy and Social Systems in April 2010
 - The Ministry of Economy, Trade and Industry (METI) selected Yokohama City, Toyota City, Kyoto Prefecture (Kansai Science City) and Kitakyushu City for demonstration projects.
 - > mainly economy and technology department is in charge
- FutureCity Project in Dec 2012
 - Regional Revitalization Bureau, Cabinet Secretariat selected 11 cities as FutureCity.
 - combining environmental and social sustainability (such as health care for aging society), in addition to economic sustainability
 - > cross-departmental collaboration is necessary

Findings: local level

(1) Eco-model city program



Source: <http://ecomodelproject.go.jp/en/>

(2) Demonstration of Next-Generation Energy and Social Systems

- “Demonstration of Next-Generation Energy and Social Systems” program mainly focuses on the technological feasibility to realize low carbon societies by applying technological innovations at the district scale.
- Ministry of Economy, Trade and Industry (METI) called for project proposals for this program and reviewed the submitted proposals in consideration of the opinions of experts.
- As a result, the following areas were selected as “Next-Generation Energy and Social System Demonstration Areas”: Yokohama City, Toyota City, Kyoto Prefecture , Kitakyushu City
- It consists of initiatives such as diffusion of renewable energy, joint and efficient use of electricity and heat among different consumers, energy storage to adjust energy supply and demand, dynamic pricing to ask behavior changes using smart meters, and others.

(2) Demonstration of Next-Generation Energy and Social Systems

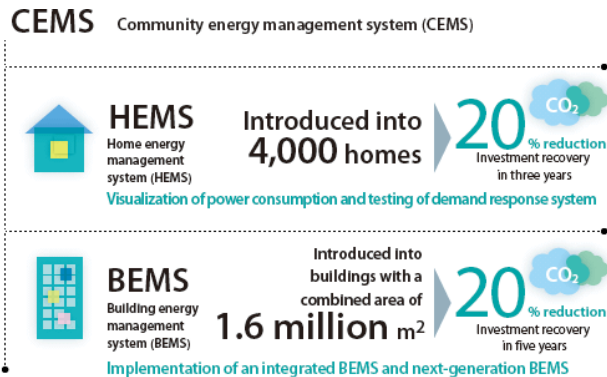
City	Outline
Yokohama City	<ul style="list-style-type: none">• Aims to deploy systems mainly in three areas, which are existing urban areas where both new and old houses exist and people actually live.• Plans to conduct a large-scale energy management project for 4,000 households, while inviting citizens to participate.
Toyota City	<ul style="list-style-type: none">• Aims to make households capable of self-supplying over 60% of their energy requirements by encouraging them to deploy solar power generation, fuel cells, heat pumps, storage batteries, and next-generation vehicles.• Plans to provide detailed support to prompt actions so that people can maximize the reduction of CO2 emissions from their daily lives and travel while maintaining the quality of life at a comfortable level.

Source: http://www.meti.go.jp/english/press/data/20100811_01.html

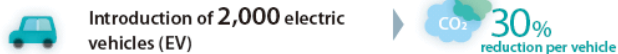
(2) Demonstration of Next-Generation Energy and Social Systems

City	Outline
Kyoto Prefecture	<ul style="list-style-type: none"> • Aims to apply advance technologies developed in the city, such as an “on-demand power management system” and “power coloring” (virtual technology), to the demonstration. • Plans to achieve more efficient energy use throughout the area and maximize the use of renewable energy by connecting together homes, buildings and electric vehicles for exchanging necessary data with the power grid system and using such approaches as local storage battery control and demand response.
Kitakyushu City	<ul style="list-style-type: none"> • Plans to conduct an energy management project that effectively uses regional energy sources through measures such as producing energy from waste heat and hydrogen available at nearby factories to be supplied to households and allowing buildings to interchange power. • Plans to implement dynamic pricing, a scheme to change power rates according to the regional energy supply and demand balance, and control home electrical appliances.

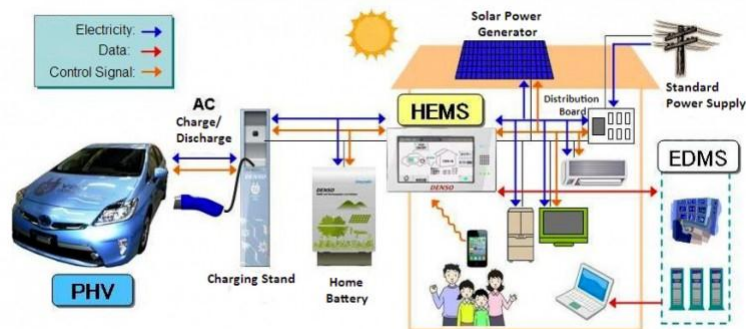
(2) Demonstration of Next-Generation Energy and Social Systems



Other initiatives in this project include:



Source: <https://www.toshiba.co.jp/csr/en/>



Source: <http://www.toyotaonfront.com>

Yokohama City

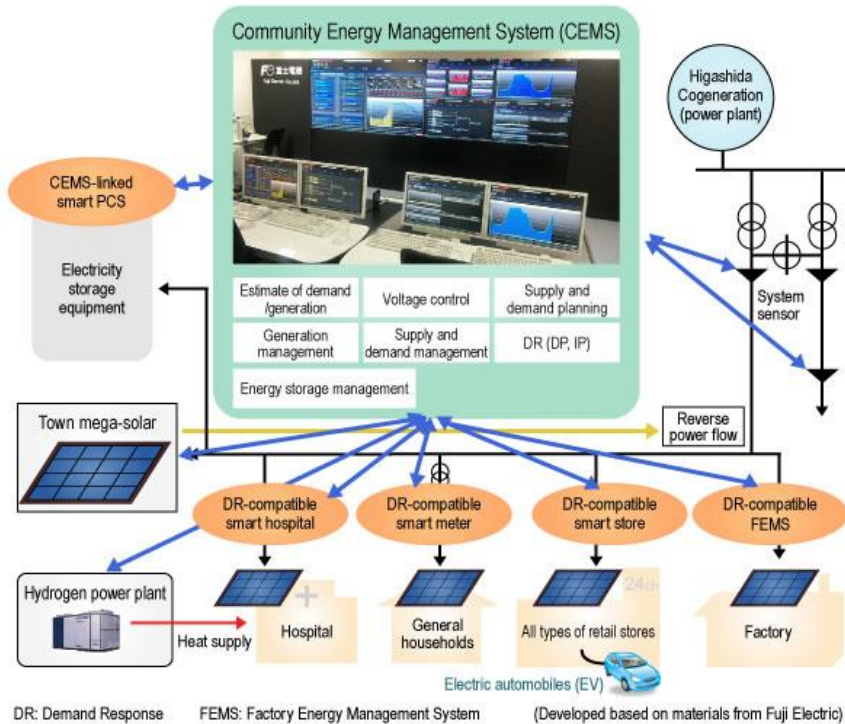
- Yokohama City has greater difficulty because they try to introduce home energy management system (HEMS) into 4000 existing homes.

Toyota City

- Toyota City creates new housing zone to realize smart community living with next generation vehicle such as EV&PHV.
- However current regulations do not allow residents to turn on any electrical devices inside house thorough advanced wireless ICT systems - **regulatory issue**.

Findings: local level

(2) Demonstration of Next-Generation Energy and Social Systems



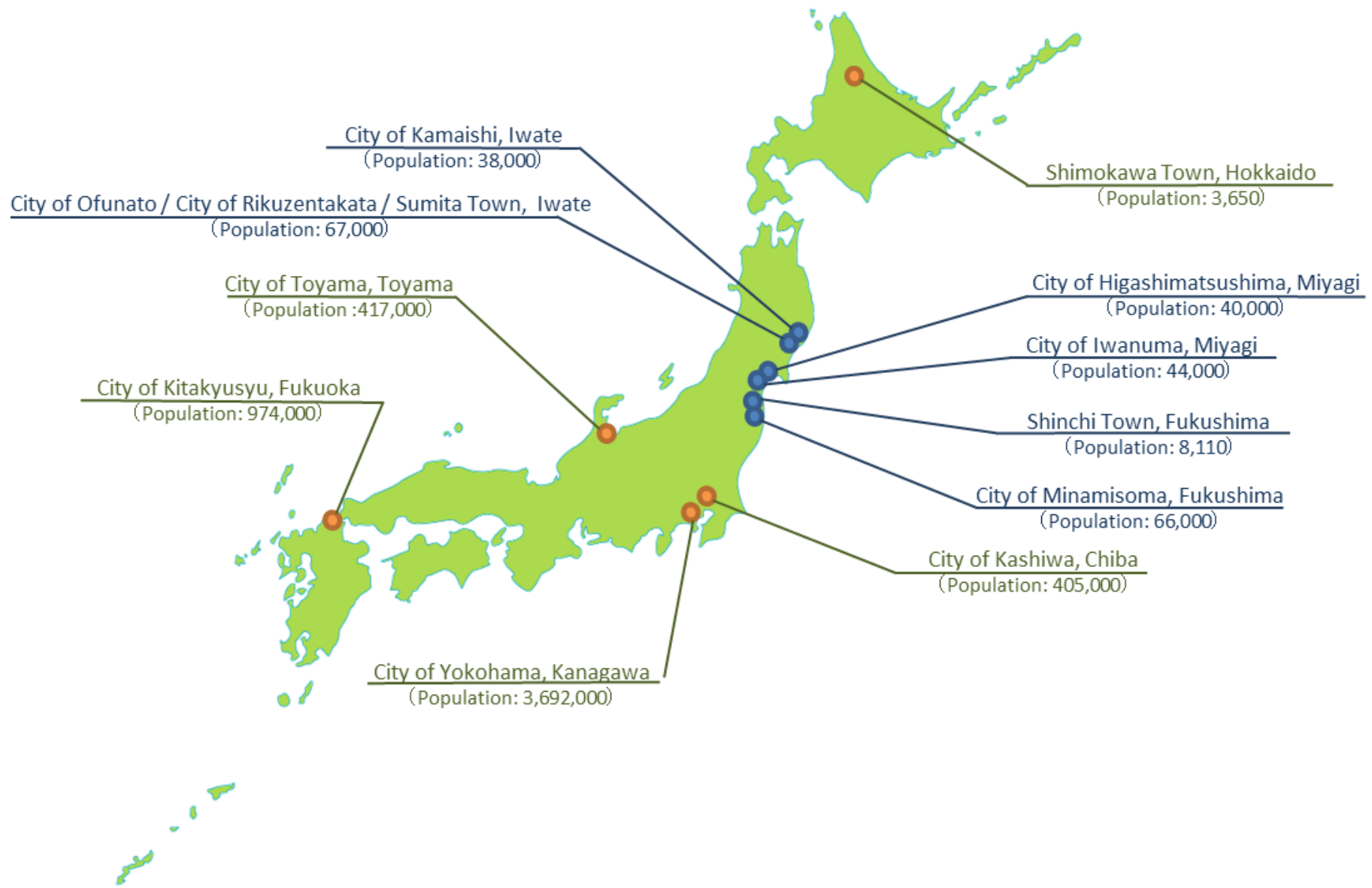
Kitakyushu City

- In the Higashida district a special supply area that uses the power lines operated by Nippon Steel Corporation, dynamic pricing to promote adjustment of the power consumption by changing electricity rate has been performed by the leadership of Kitakyushu City. However **issue of who coordinate this service** after experiment is not fixed yet.

Source: <http://jscp.nepc.or.jp/en/index.shtml>

Findings: local level

(3) Future Cities

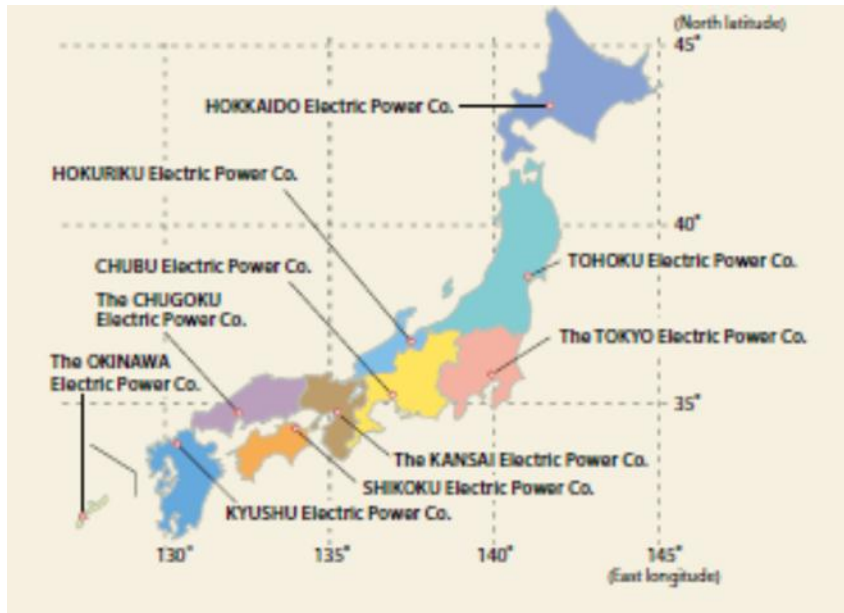


Findings: local level

- These experiments tell us that such community scale initiatives make big impact when they have **the backing of business groups** such as Toyota Motor Corporation (Toyota-city) and Nippon Steel Corporation (Kitakyushu-city) - but **the issue of built in bias remains**.
- In 2009 Democratic Party of Japan took office and began to plan Future City program to solve not only energy and environment problems but super-aging, international competitiveness in city scale.
- Thereafter East Japan Earthquake and nuclear power accidents enhanced the priority of this program.
- This initiative stresses on **the necessity of inter-sectoral project management and knowledge platform**.
 - cf. Resource for healthcare can be used for energy/ environment
- Regulatory **institutional reform** has to come with new technology introduction.

Findings: National level

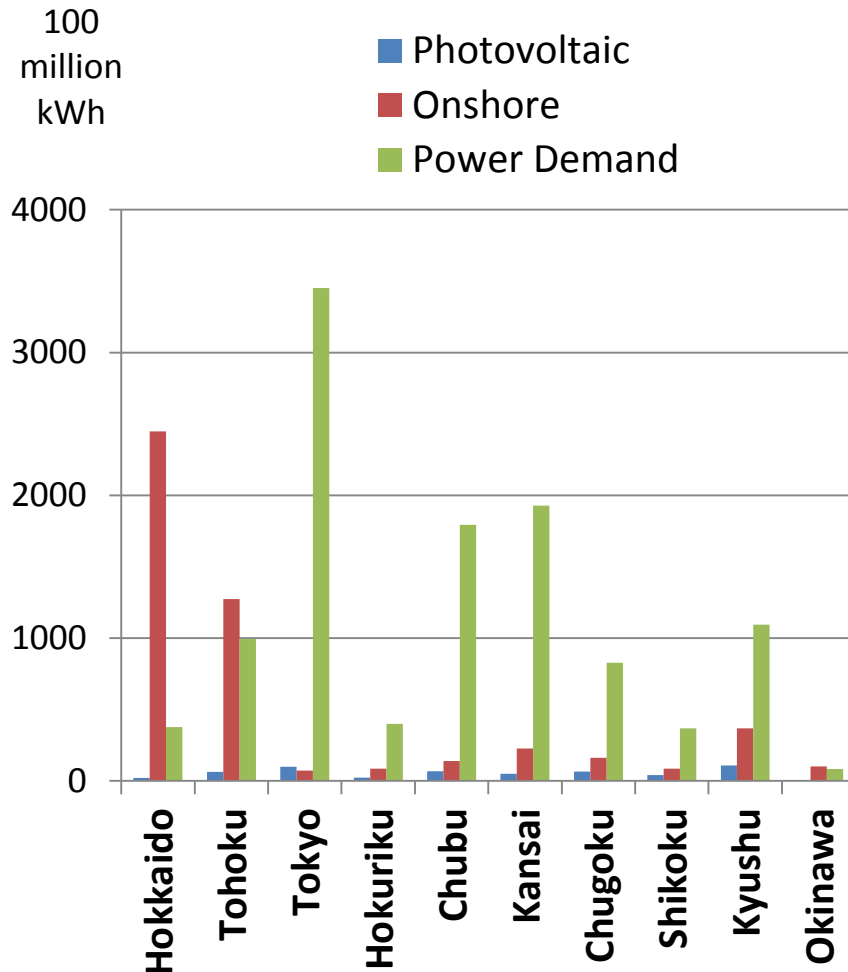
The ten electric power companies by service area



Source: <http://www.fepec.or.jp/>

- Though Japan has a population of over 100 million, it is an island country and must deal with power supply risks such as blackouts by oneself, **because grid is not connected with other countries (←→Europe)**.
- The ten privately-owned major electric power companies have supplied electricity from power generation to distribution to the consumers in their respective service area.

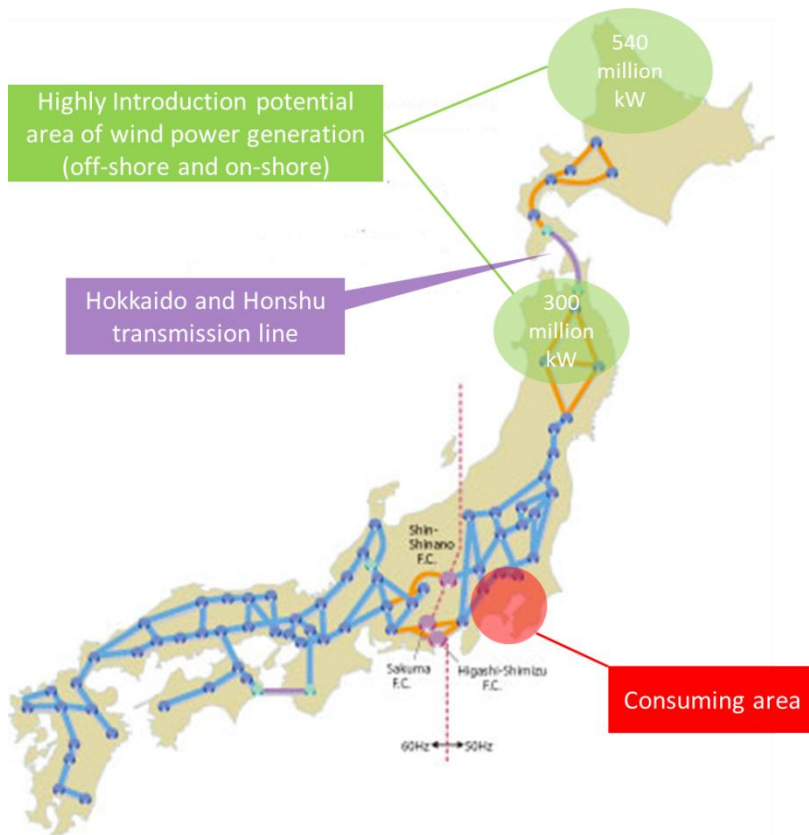
Findings: National level



- According to the survey by Ministry of Economy, Trade and Industry (METI), Ministry of the Environment, wind power generation and photovoltaic power generation have a large introduction potential in Japan.
- The area with much power demand has little introduction potential of wind power generation and photovoltaic power generation.

Findings: National level

Introduction Potential of Wind Power Generation in Japan

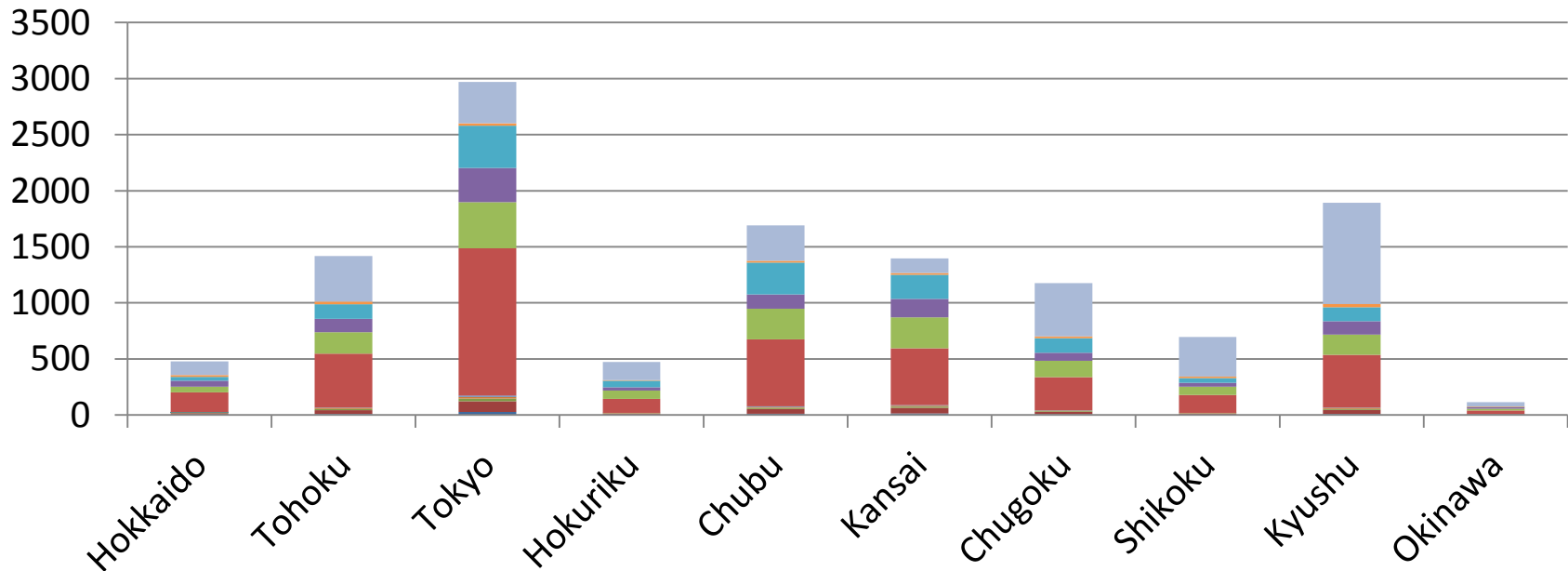
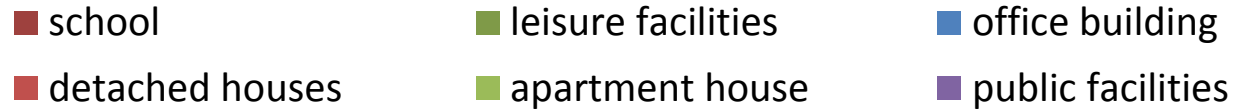


- Areas such as Tohoku and Hokkaido away from consuming area have a large potential of wind power generation.
- For dealing with such a supply-demand gap, transmission linking northern part to central part has to be strengthened - **partly the grid for nuclear energy can be reused.**
- As well as setting of the clear introduction target, **a framework to share the cost of facilities necessary for adjustment of power supply and a rule to coordinate various stakeholders** are needed for mass introduction.

Findings: National level

Introduction Potential of photovoltaic power generation in Japan

10 thousand kW



- Introduction potential of photovoltaic power generation spreads all over in Japan, however there is a problem that who should built branch lines to transmit from run-down fields to transmission line.

Conclusion

(1) Local governments and National mechanism

- Local governments face lack of resources (human resource, finance, technology).
- Lesson we learnt especially after East Japan Earthquake is that it is difficult for local governments to facilitate prompt and dynamic actions for revitalization.
- For example, even though Fukushima prefecture declared its goal to create a society without nuclear power, there is not enough coordination among several initiatives for renewable energy by different sections.
- Local initiatives are good for diversity of experiment but national mechanism for supporting local capacity is necessary.

(2) National regulation

- National regulation sometimes makes advanced experiments difficult.
- National regulatory reform need to be conducted responding local experiments.

Conclusion

(3) Securing of electric stability and quality

- Many new companies at the local level enter into electric power enterprises particularly photovoltaic power generation after introduction FIT in July, 2012.
- Because these new entrants at the local are not responsible for supplying electricity unlike former ten companies, securing of electric stability and quality are important problems for central local coordination.
- Experience in Japan so far shows the several challenges for energy transition, for which national - local coordination measures are indispensable.
- Further issues for TA - **TAs for speed and timing of transition, energy portfolio - but are they possible?**

Cf. Deliberative Polling on Energy Portfolio (2012 July to August)

- Opinion Polling by telephone → **Deliberative Forum (Polling before and after deliberation)**
- Organized by Cabinet Office (Agency for Resource and Energy in fact) cf. Review role by STS community in Japan
- Options: Status quo, Ration of Nuclear 15%, Ration of Nuclear 0%
- Criteria: **safety, supply security, environment (global warming), economic cost** - enough?
- Issues : selection of experts, suitability of RDD (Random Digit Dialing) for selecting participants- difficulties of reaching to one member families, those who have only mobile phones
- Result: Increase of 0% option
- Connection to formal process (Cabinet decision Sep 2012)- Informal reference to Nuclear 0 Option in 2030's on the condition of **further consideration of international relations especially with US and local government in siting area relations**
- Not implemented under the new Administration

Thank you very much for kind attention.

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