National policy on smart energy in Japan

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New Energy and Industrial Technology Development Organization

October 27, 2014

New Energy and Industrial Technology Development Organization(NEDO)

Mission:

- Address energy and global environmental problems
- Enhance Japan's industrial technologies development

Organization: Established in 1980; reorganized in 2003 as an incorporated administrative agency under the Ministry of Economy, Trade and Industry of the Government of Japan

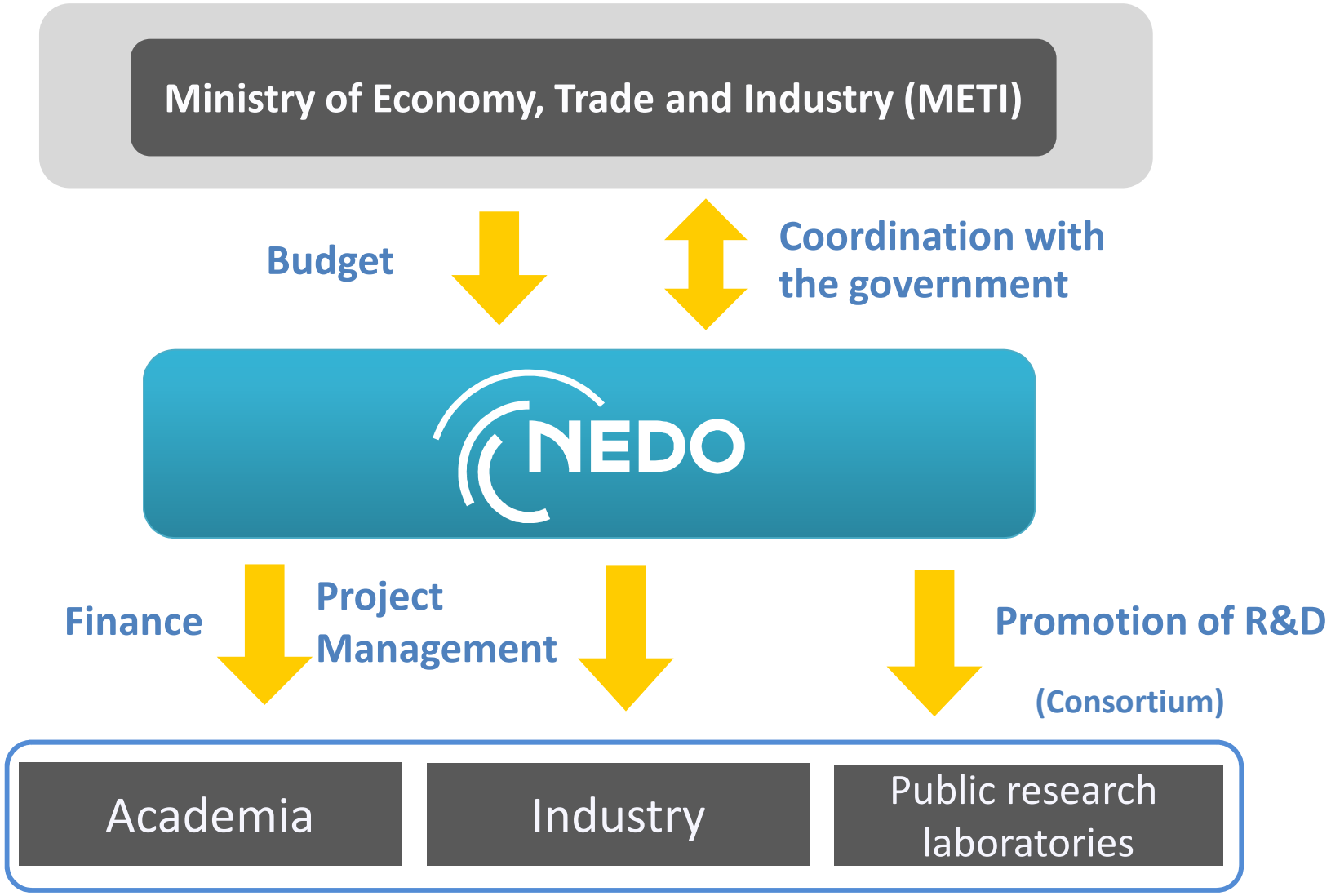
Head Office: Kawasaki City, Japan

Personnel: About 900

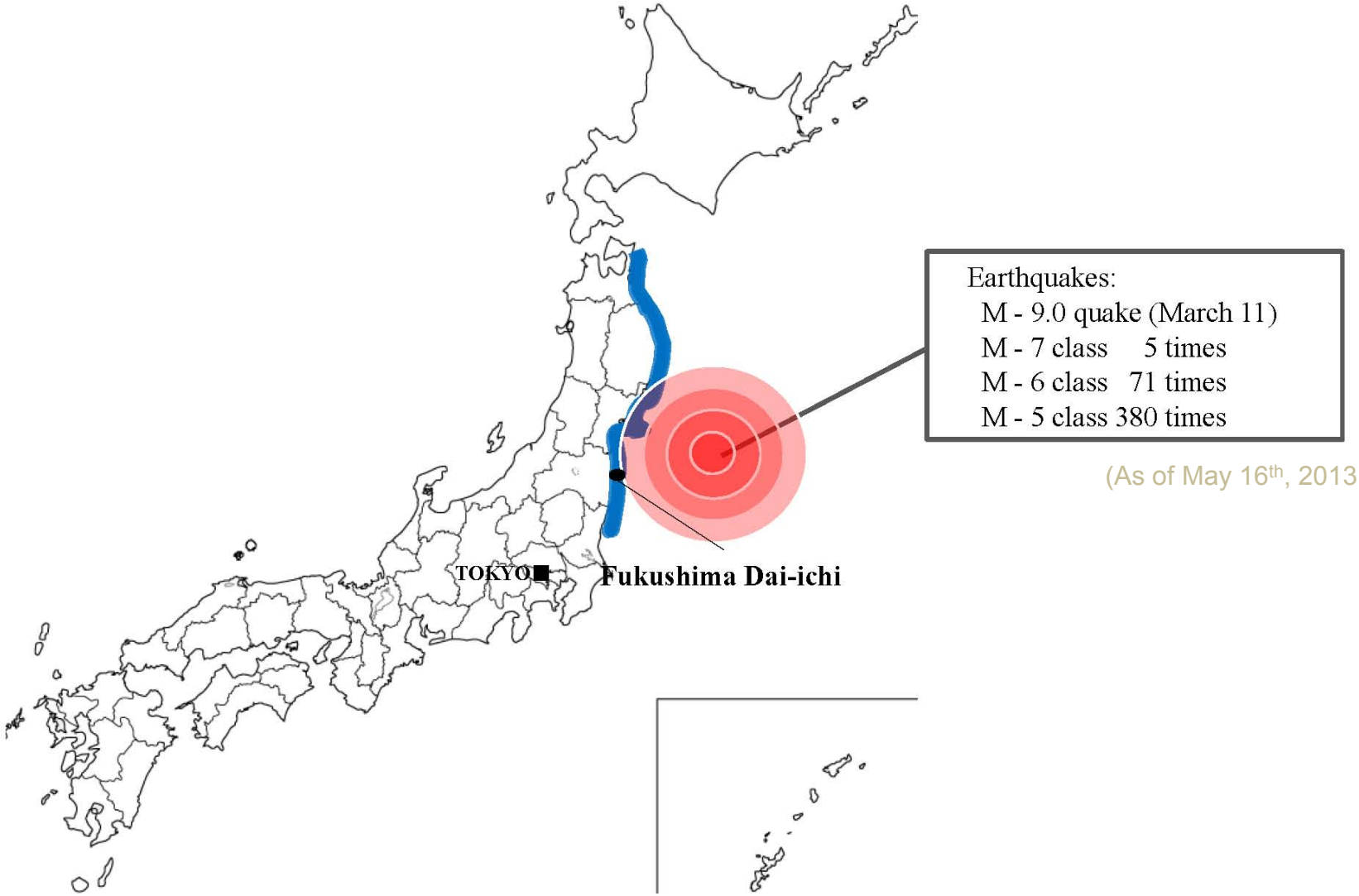
Budget: Approximately US$1.5 Billion (FY2014)

Chairman: Mr. Kazuo Furukawa

Role of NEDO


Ministry of Economy, Trade and Industry (METI)
Budget
Coordination with the government
NEDO
Finance
Project Management
Promotion of R&D
(Consortium)
Academia
Industry
Public research laboratories

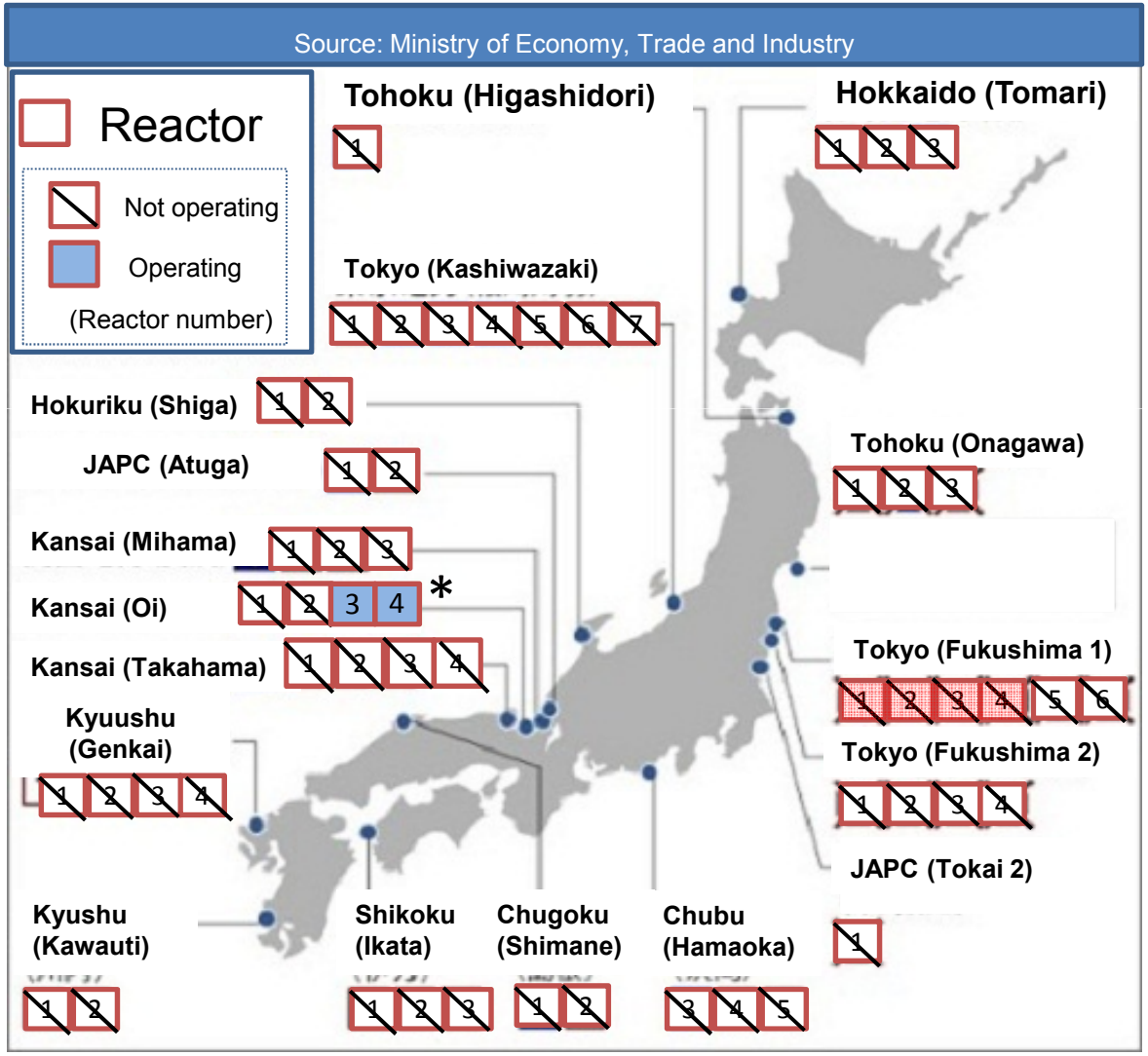
Japan Faces an Unprecedented Challenge: The Great East Japan Earthquake and Aftershocks



(As of May 16th, 2013)

Japan's Nuclear Plant Situation

Operational Status of Nuclear Reactors in Japan (54 reactors)



*Under annual inspection
(As of Oct. 31, 2013)

Source: Ministry of Economy, Trade and Industry

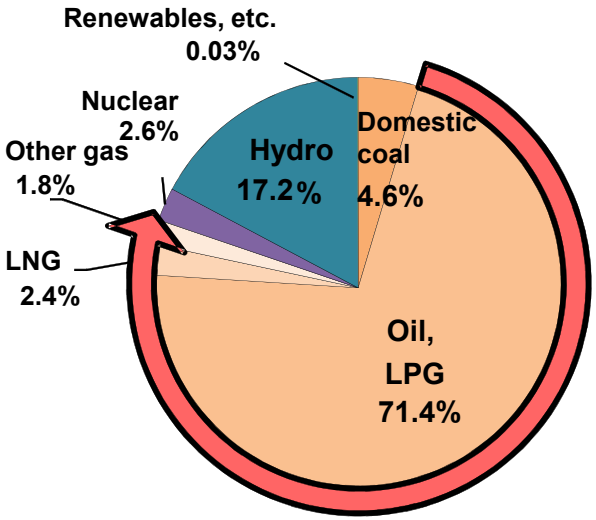
New Challenges on Energy Sources After the Great East Japan Earthquake

Increased dependence on imported fossil fuels

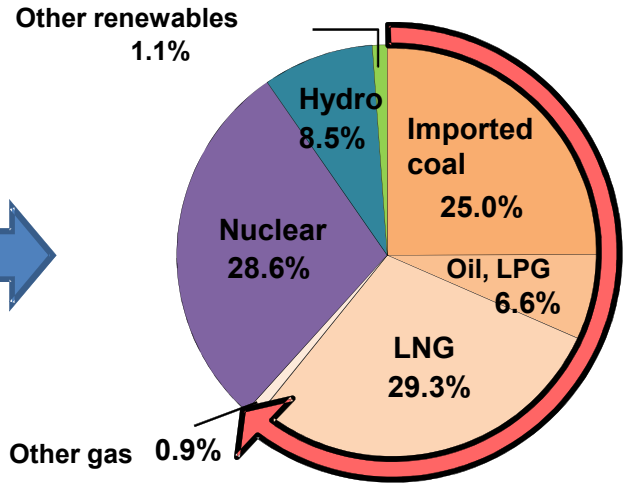
- Japan's dependence on imported fossil fuels for electricity generation increased to 88% in FY2013 following the Great East Japan Earthquake. This is higher than first oil crisis level of 76%.

Trends in Power Source Composition

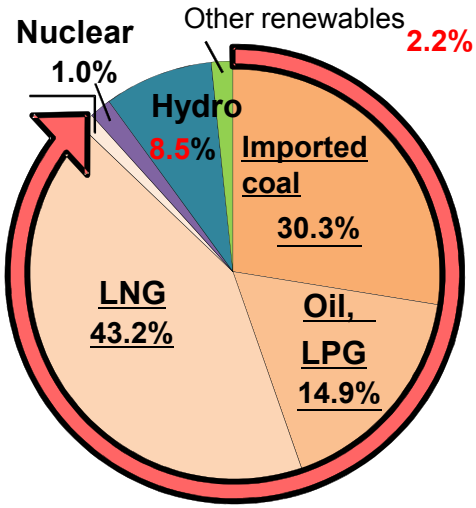
FY1973 (First oil crisis)
Dependence on fossil fuels: **76%**



FY2010 (Before Great East Japan Earthquake)
Dependence on fossil fuels: **62%**

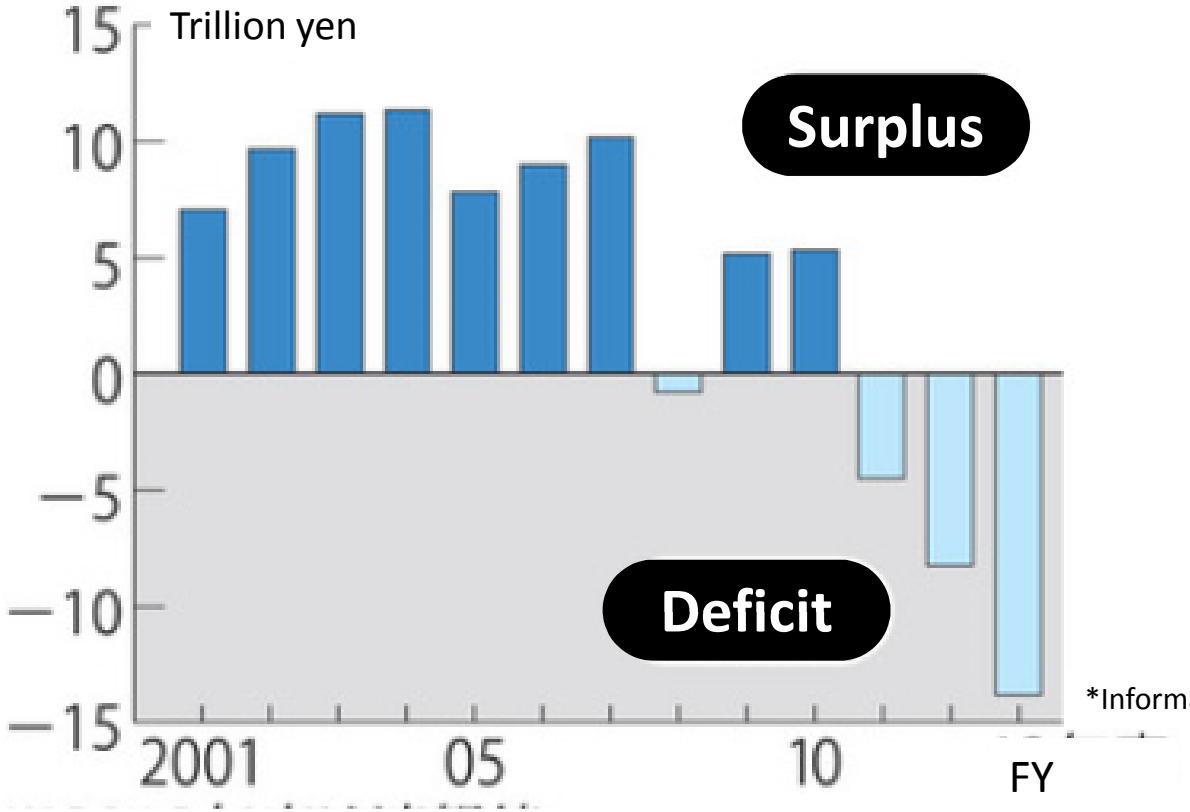


FY2013 (Latest data)
Dependence on fossil fuels: **88%**



Source: Agency for Natural Resources and Energy
Source: Federation of Electric Power Companies of Japan, *Composition of power generation by energy source*

Trends in Japan's Balance of Trade



*Information for FY2013 is preliminary.

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Impact on Japanese people and economy

1) Higher fuel costs due to substitution of thermal power for nuclear power

• Japan's fuel costs rose by an estimated ¥3.6 trillion in FY2013, increasing the financial burden on Japanese citizens by about ¥30,000 per person.

2) Sharp increase in cost of electricity

• Electricity costs rose about 20% from the pre-Great East Japan Earthquake level. The monthly electricity bill for a standard household increased from ¥6,300 to ¥7,900.

Global warming caused by increased CO_2 emissions

• Carbon dioxide emissions of general electricity utilities increased by 110 million tons. This accounts for about 9% of total emissions in Japan.

Source: Agency for Natural Resources and Energy

Japan's New Energy Policy

~ 3 E+S (Safety, Energy Security, Economic Efficiency and Environment) ~

Ⅰ Diversified and Multilayered Primary Energy Structure

1. Production / Procurement

< < Diversify electricity sources >>

(1)Maximize introduction of renewable energy
- ①Deregulation
  (E.g. Accelerate procedures for environmental assessments)
- ②Enhancing grid
- ③R&D for cost reduction

(2)Restart nuclear power plants once safety is assured under the strictest rule in the world.

(3)Introduce high-efficiency thermal power plants (coal and LNG) while considering the environmental impact

<< Diversify fuel sources >>

(1)Procure low-cost LNG and another fossil fuels.

(2)Promote development of domestic energy sources including methane hydrate.

2. Distribution

(1) Electricity market reform

①Full liberalization of generation and retail.

②Unbundling

③Nation wide transmission operation

(2)Strict assessment of power rate
(Cut down fuel cost)

3. Consumption

(1)Enhance competitiveness and promote energy efficiency by installing cutting edge and efficient facilities in industries.

(2)Enhanced energy conservation by adding house/buildings, in the Top Runner Program.

(3) Promote efficient energy management systems such as demand response.

Ⅱ Suitable Secondary Energy Structure

(1) Well-balanced configuration of electric power
(2) Promote introduction of co-generation and renewable heat
(3) Realize the "Hydrogen Society"

Road Map for Electricity System Reform in Japan

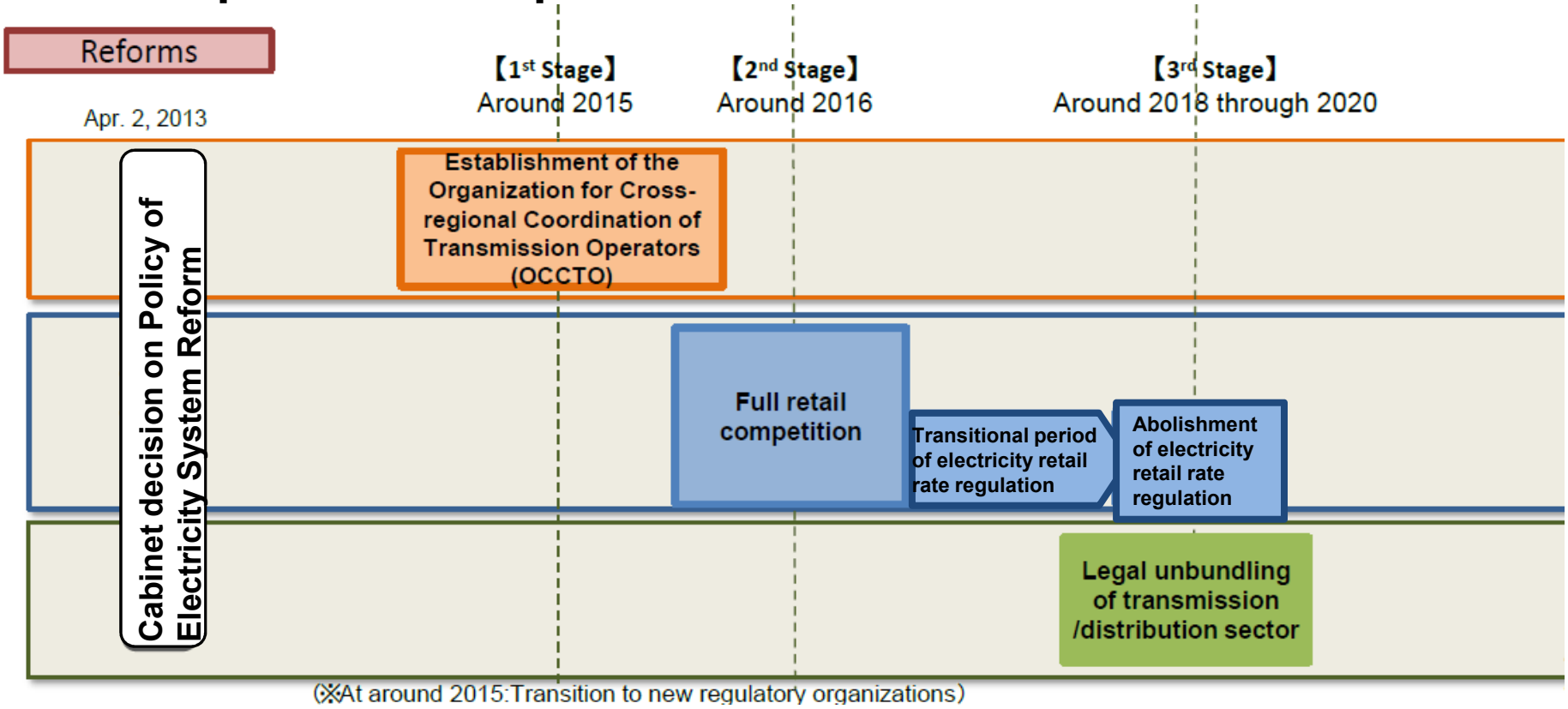
Three objectives of electricity system reform

(1) Securing a stable supply of electricity

(2) Reducing electricity rates to the maximum extent possible

(3) Expanding choices for consumers and business opportunities

Three steps of roadmap for reform

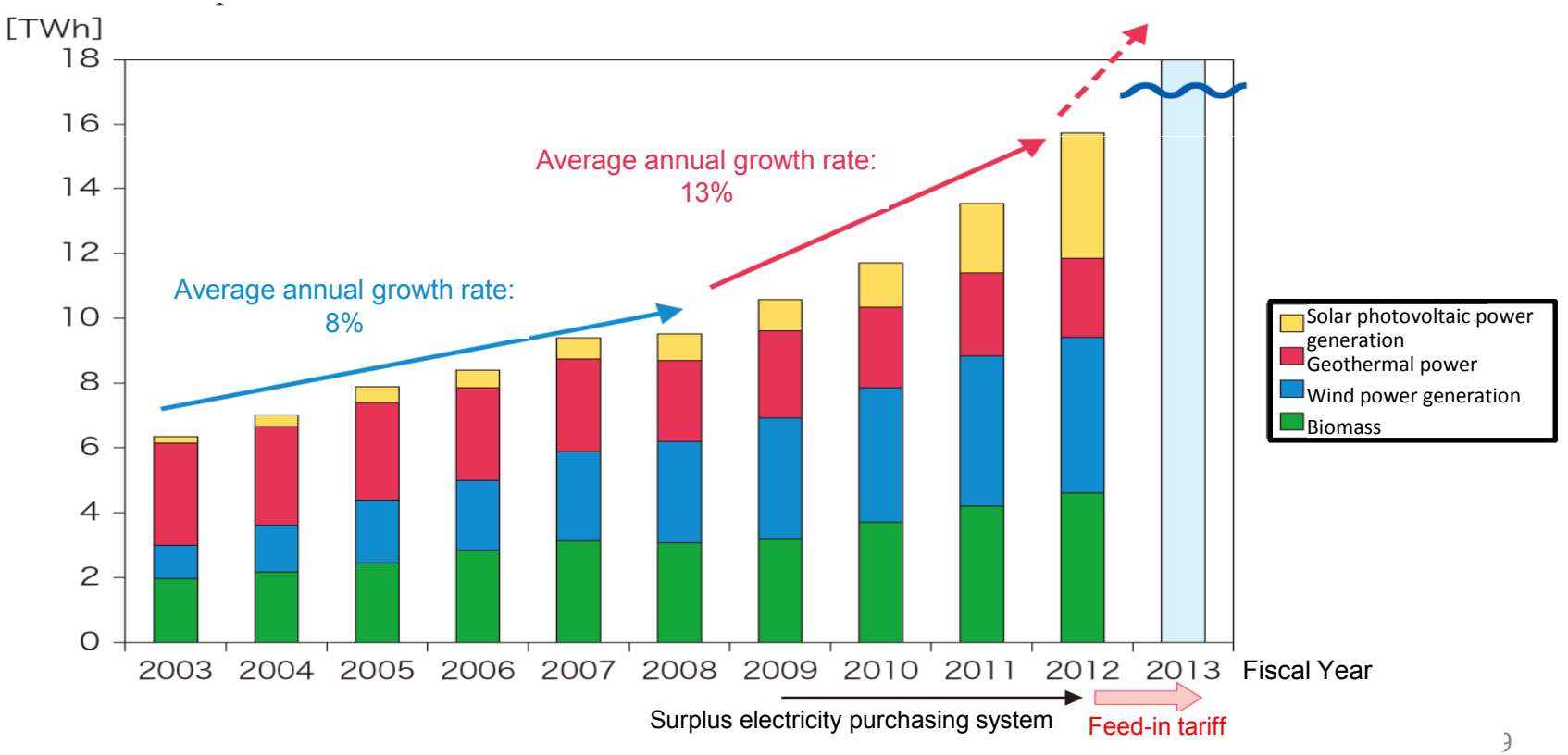


Source: Adapted from METI

Renewable Energy Penetration in Japan

- A feed-in tariff has provided a strong incentive for **accelerated penetration of renewable energy**.
- Introduction of facilities generating renewable energy as of July, 2014 has increased by 58% after the feed-in tariff scheme was introduced.

Penetration rate of renewable energy in Japan



Source: Prepared by NEDO from material for the 3rd meeting of the Basic Policy Subcommittee of the Advisory Committee for Natural Resources and Energy, Agency for Natural Resources and Energy.

Increase in Installed Renewable Power Generation Capacity Following Introduction of Feed-in Tariff (FiT)

Unit: Ten thousand kW

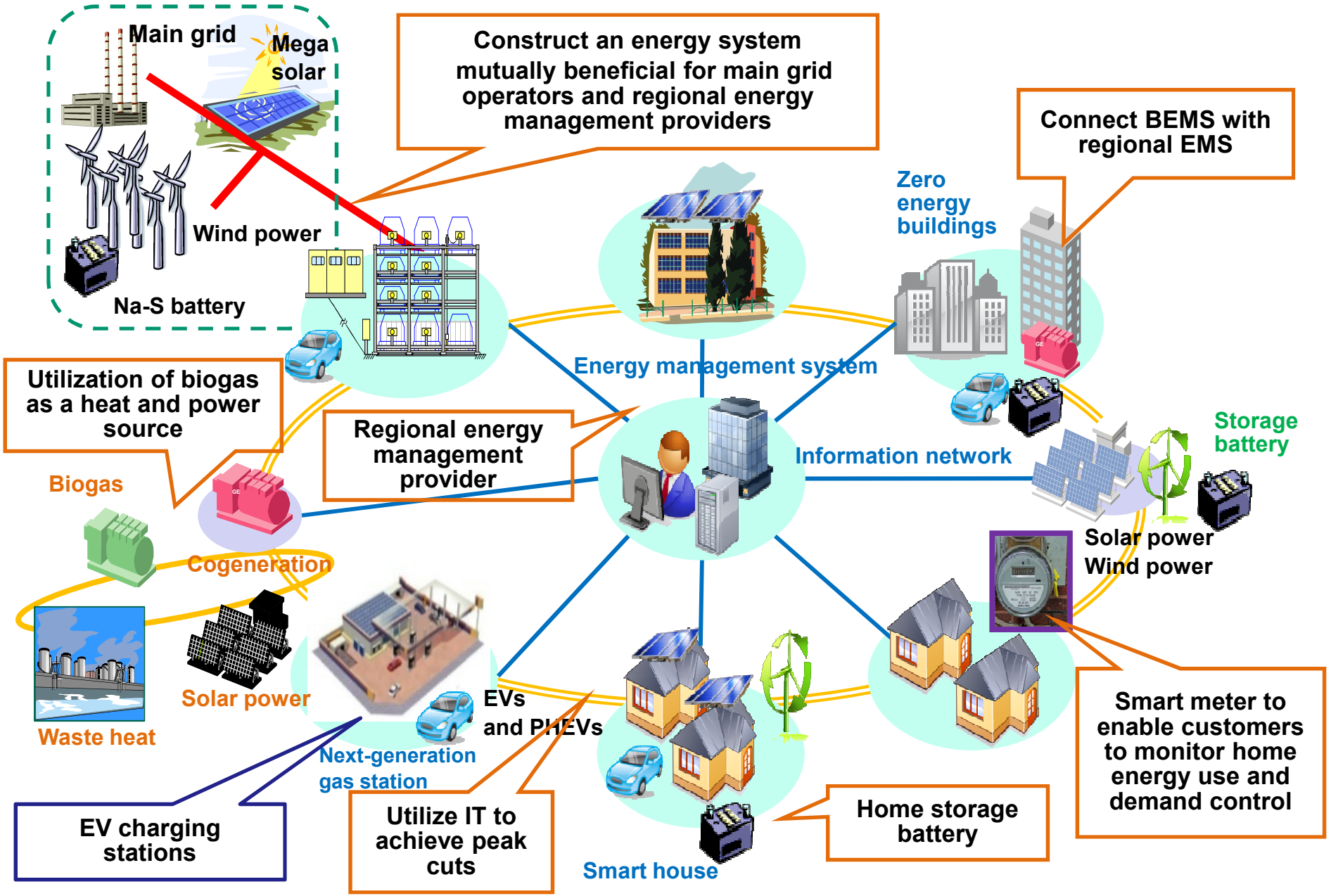
	Capacity as of end of June 2012	**Capacity as end of July 2014**	Total installed capacity approved by METI or local governments
	Before introducing FiT (Cumulative basis)	**25 months after introducing FiT** (Cumulative basis)	From July 2012 to the end of July 2014
Solar	560*	1,723 **(+1,163)**	6,934
Wind	260*	271 **(+11)**	123
Conventional hydro	960*	963 **(+3)**	32
Biomass	230*	239 **(+9)**	131
Geothermal	50*	50 **(+0)**	1
Total	2,060*	3,246 **(+1,186)**	7,221

* Figures are rounded.
** Figures in parentheses show increases.

Source: Prepared by NEDO based on data provided by the Ministry of Economy, Trade and Industry.

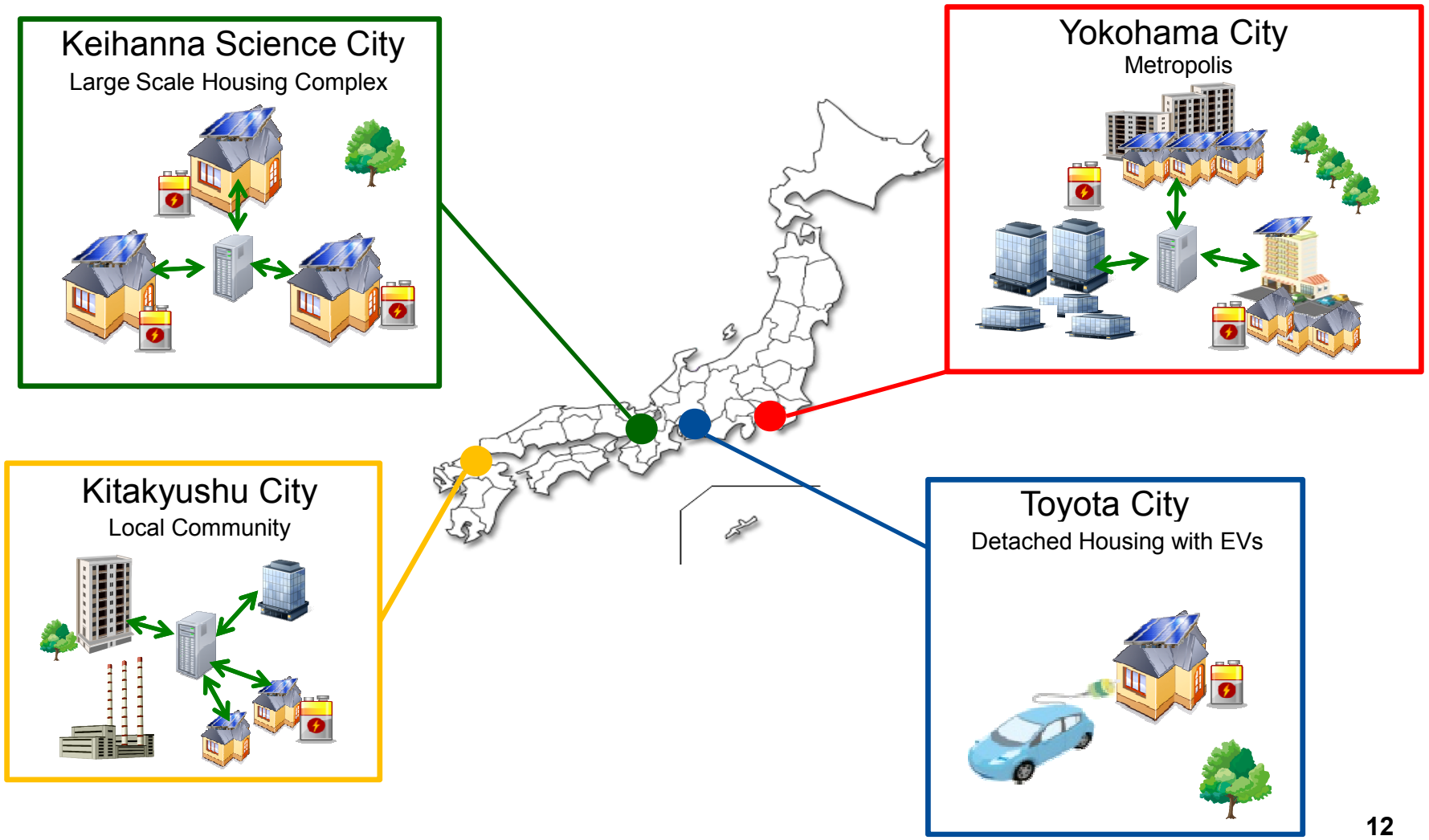
NEDO

Concept of Smart Community



Four Major Demonstration Projects in Japan

With the participation of many residents, municipalities, and enterprises, large-scale demonstration projects are in operation in four regions. They each have different characteristics and will be conducted for 5 years starting in 2010.



Results of Demand Response Demonstration in Kitakyushu

■ From the results of demand response demonstration, peak cut effects of 20% and energy-saving effects are statistically confirmed. A review is ongoing regarding reflection of these results in reform of power regulations.

Kitakyushu City

Results of the FY2012 demonstration trials (number of sample cases: 180)

	Summer (June to September)		Winter (December to February)	
Electricity price (*1)	Peak cut effect	Statistical significance (*3)	Peak cut effect	Statistical significance (*3)
Time of Use (TOU)	- (*4)	- (*4)	- (*4)	- (*4)
CPP= 50 yen	-18.1%	5% level	-19.3%	1% level
CPP= 75 yen	-18.7%	5% level	-19.8%	1% level
CPP= 100 yen	-21.7%	1% level	-18.1%	1% level
CPP= 150 yen	-22.2%	1% level	-21.1%	1% level

Keihanna Science City

Results of the FY2012 demonstration trials (number of sample cases: 681)

	Summer (July to September)		Winter (December to February)	
Electricity price (*2)	Peak cut effect	Statistical significance (*3)	Peak cut effect	Statistical significance (*3)
TOU (premium: 20 yen)	- 5.9%	1% level	-12.2%	1% level
CPP (premium: 40 yen)	- 15.0%	1% level	-20.1%	1% level
CPP (premium: 60 yen)	-17.2%	1% level	-18.3%	1% level
CPP (premium: 80 yen)	-18.4%	1% level	-20.2%	1% level

Source: Results of the statistical demonstration conducted by Dr. Takanori Ida, professor, Kyoto University, Graduate School of Economics, Dr. Ryuichi Tanaka, associate professor, National Graduate Institute for Policy Studies, and Dr. Ito , fellow, Stanford Institute for Economic Policy Research

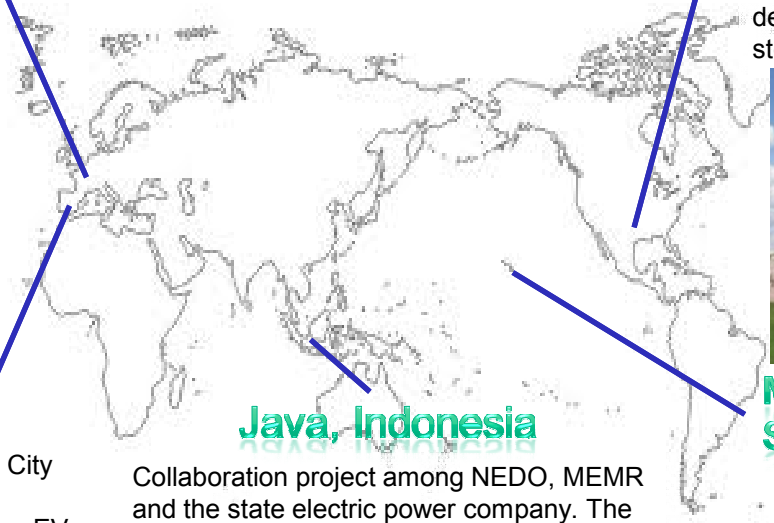
NEDO's Global Smart Community Projects

Lyon, France

Demonstration of a smart community in the Lyon Confluence premised on energy efficiency, large-scale renewable energy use, and widespread use of next-generation automotive vehicles.

New Mexico, USA

Collaborative project among NEDO, the State of New Mexico, national laboratories and other participants.
In an area where large-scale PV has been introduced, smart grid systems that combine demand response using real-time pricing and storage batteries will be constructed.



Malaga, Spain

Collaboration project among NEDO, Malaga City and the Centre for Industrial Technological Development (CDTI). The project will examine EV operating systems in a society where EVs have been disseminated. New business models that can achieve a low-carbon society by changing behavior in a community will then be developed.

Java, Indonesia

Collaboration project among NEDO, MEMR and the state electric power company. The project aims at technological and economic effectiveness of power stabilizing systems targeting industrial estates in Java, where market demand is expected to rise.

Maui Island, State of Hawaii, USA

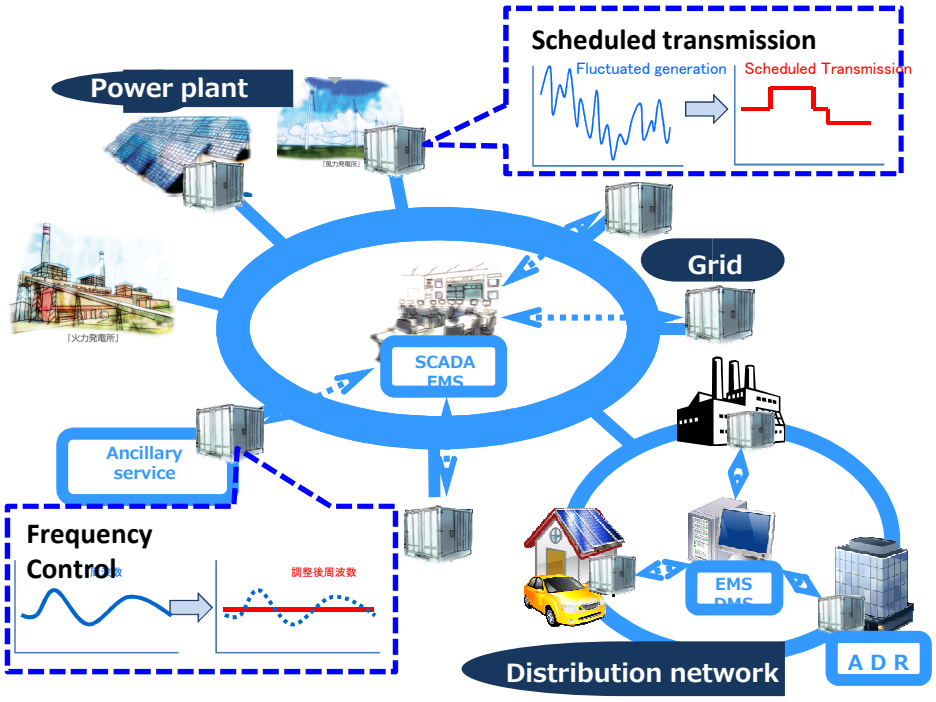
Collaborative project among NEDO, the State of Hawaii, Hawaiian Electric Company and national laboratories. The project will introduce large-scale renewable energy, including wind and solar power generation, and construct a low-carbon model city for remote islands using an EV charging control system.

Making It Possible to Have an Electricity Reserve for Grid Stability with Renewable Energy Resources

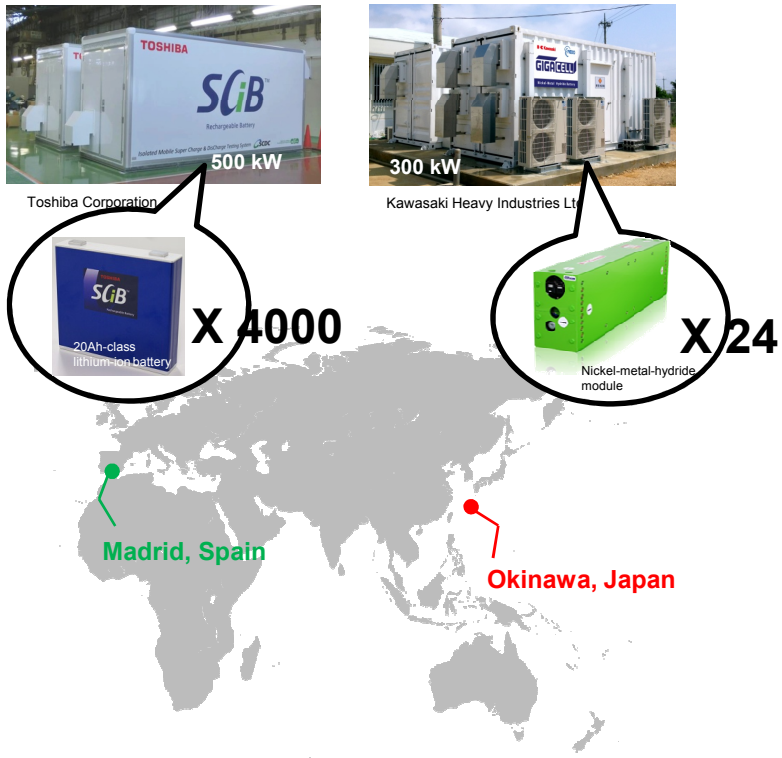
overview

・NEDO aims to develop large-scale, low-cost and long-life electrical energy storage systems for power system stability when integrating a large amount of renewable energy resources.

purpose for the battery



facilities



http://www.nedo.go.jp/english

Thank you very much
for your kind attention!