

Microgrid Research in Japan & New Mexico Project

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Representative NEDO Representative office in Washington DC

New Energy and Industrial Technology Development Organization

What is NEDO



New Energy and Industrial Technology Development Organization

As Japan's public management organization promoting research and development as well as the dissemination of industrial, energy and environmental technologies, NEDO has a crucial mission to carry out.

- Enhancement of Japan's industrial competitiveness
- Addressing energy and global environmental problems

Foundation

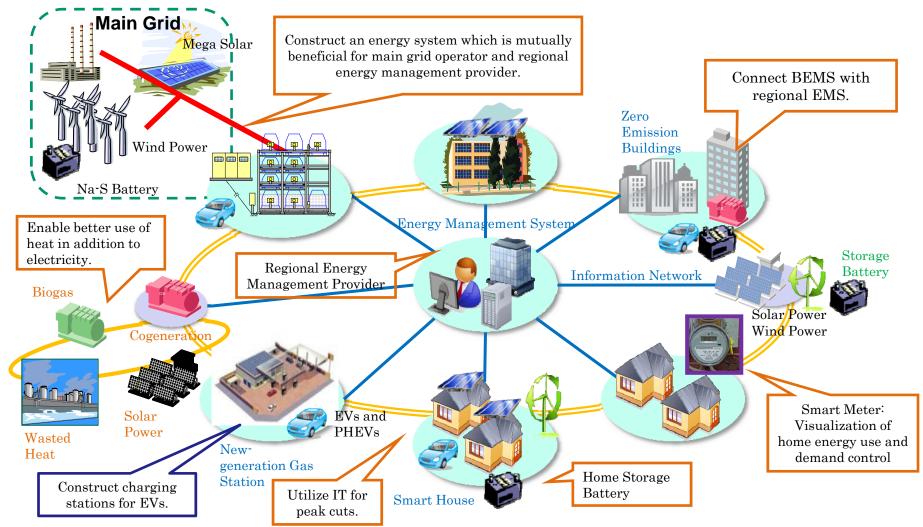
Originally established as a semi-governmental organization on October 1, 1980; reorganized as an Incorporated Administrative Agency on October 1, 2003.

Chairman		Mr. Seiji Murata			
Minister in charge		The Minister of Economy, Trade			
and Industry					
Location	Kawasaki city, Kanagawa Pref., Japan				
Personnel	About	1,000			



Japan's Smart Community Goal

To achieve a more convenient, reliable and greener social system by means of IT through coordination and cooperation between power suppliers and demand side users.



Japan's Smart Community Roadmap



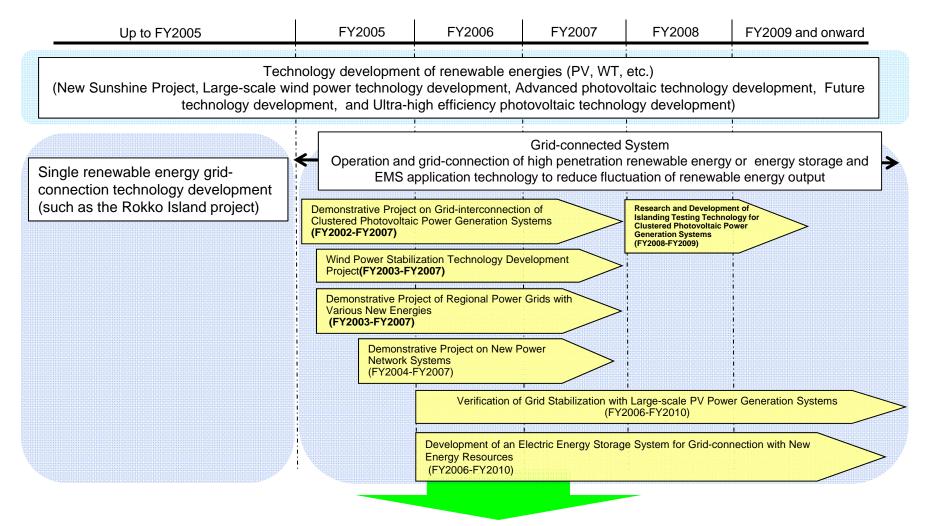
To address the 3Es simultaneously, it is important to realize the best mix of power sources by introducing large-scale RE utilizing storage and nuclear power. This roadmap illustrates a future social system we are aiming at, concentrating on regional EMS and lifestyle changes, under such an energy supply structure.

	Today - Year 2020	2020 - 2030	> 2030 -
Relation between regional EMS and entire grid	 Solar panel prices will decrease significantly due to large-scale introduction of panels to houses as well as commercial buildings. Measures to maintain the quality of electricity during the large-scale introduction of PV will be carried out mainly for the grid side. Storage cells will be installed at substations. As regional EMS are further demonstrated, technology and know-how will be accumulated. The cost of storage cells will go down due to technology development and demonstration. 	 Due to a decline in PV prices, more PV systems will be installed at houses. Regional EMS, which contribute to effective use of RE generated at houses, will become more important. Regional EMS will be realized as storage cells become cheaper are further disseminate. Distribution and transmission networks that enable two-way communication between demand side and grid side will be actively established. 	 Cost competitiveness of RE will improve as fossil fuel prices increase by more than double. Use of RE will be prioritized and nuclear power will be used as a base. EMS that can provide an optimized balance in terms of economy and security between regional EMS and grid will be established. EMS that creates demand by charging EVs at the time of excessive RE, and supplies energy to grid at high demand, will be used.
Houses	 Remote reading using smart meters will start. HEMS will be disseminated. Some houses will install home servers. Demand response demonstration will start. Demonstration of EVs will start. 	 HEMS and regional EMS will be integrated. All power generated at houses will be used optimally. Various services using home servers will be disseminated. EVs will be used for power storage. 	A fully-automated HEMS will be realized.
Buildings	ZEB introduction will start.	ZEB will be realized at new public buildings.	ZEB will lead to a greatly reduced level of emissions for all new buildings as a group.

Smart Community Related Experience



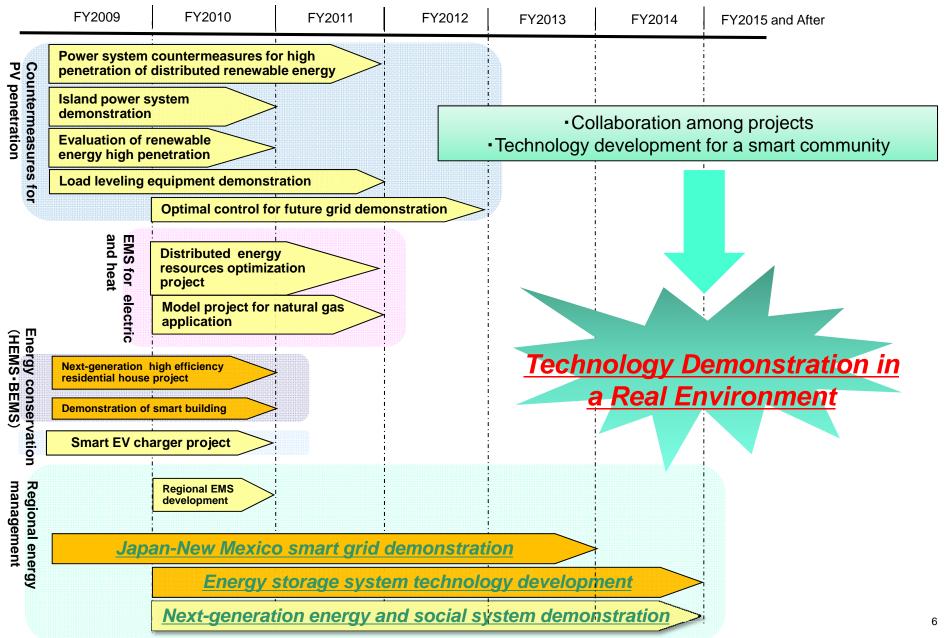
- Technology development of renewable energies (PV, WT, etc.)
- Grid-connection technology development and demonstration related to renewable energy



Promoting Continuous Efforts to Develop Smart Community Technologies 5

Future Plan for Smart Community Related Projects

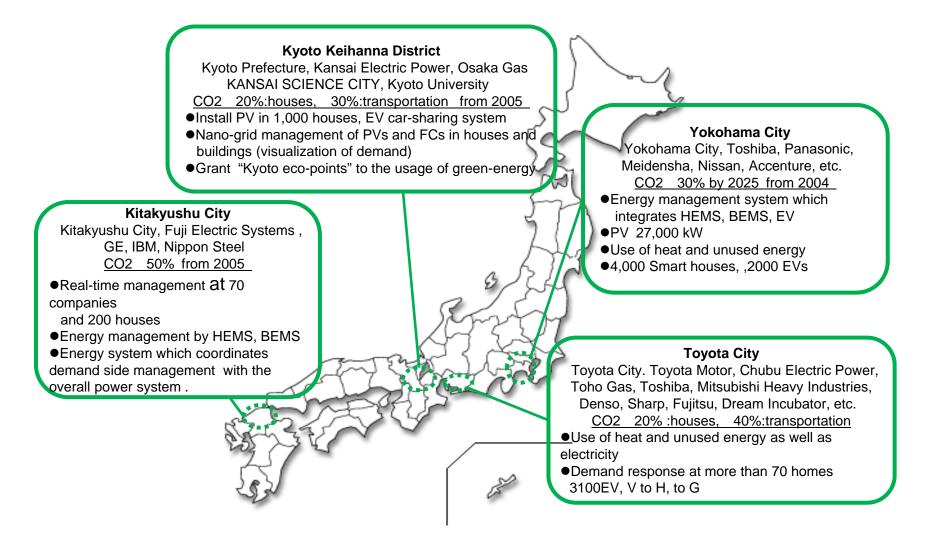




Large-scale Smart Grid and Smart Community Pilot Projects in Japan



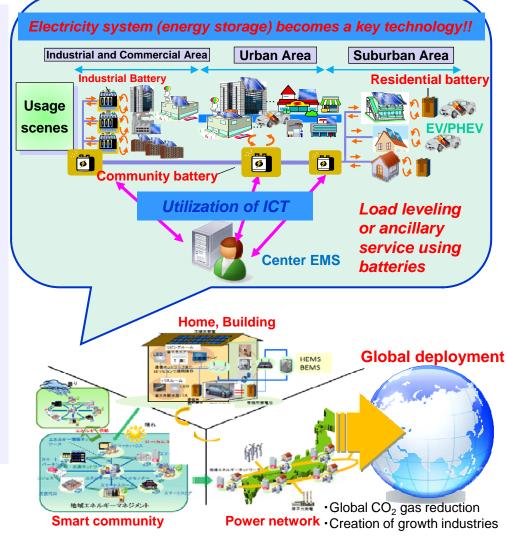
Selected areas for Next-generation Energy and Social System Demonstration



R&D of Practical and Integrated Energy Storage Systems

- Establish a demand side energy management model with the aim of realizing a Japanese smart grid. Future high penetration of PV systems and grid countermeasures after 2020 will be taken into consideration.
- This technology development will be carried out under a scheme called "Next-generation Energy and Social System Demonstration." The following activities will be facilitated:
 - a. Development of battery storage operated by demand side EMS.
 - b. Demonstration of the EMS mentioned above.
 - c. Standardization of systematization and evaluation technologies targeting international standardization

Future Energy Management System in a Community Unit Maintains a Complementary Relationship with the Grid



Advanced Smart Grid Concept



Japan-New Mexico Smart Grid Demonstration





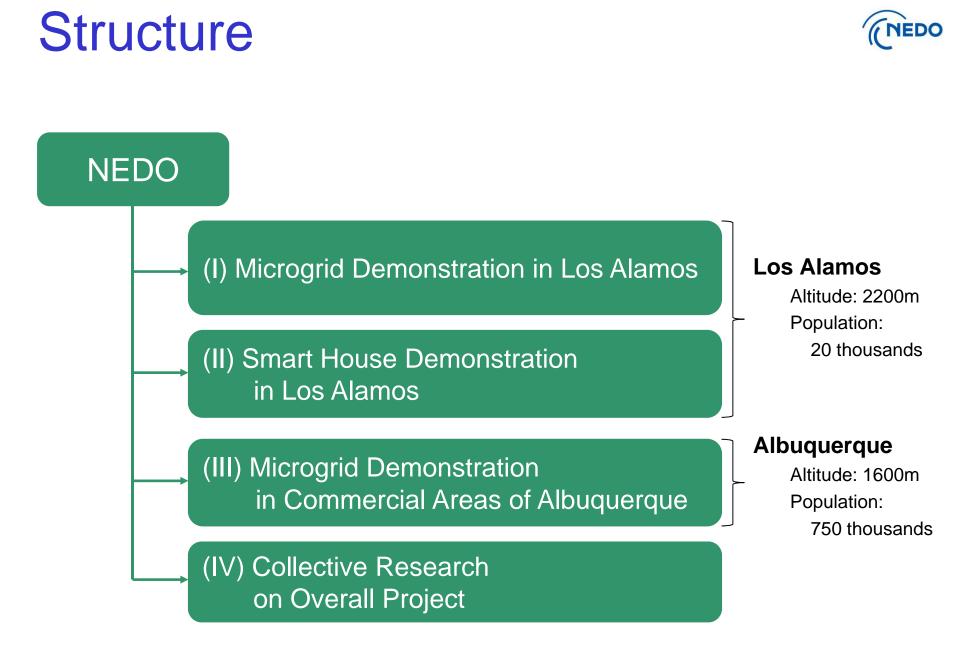




- Demonstrate technologies which are difficult to be adopted in Japan now.
- Introduce Japanese technologies to worldwide.
- Contribute international standardizations activities.



★: Sites for collaborative demonstration
 research conducted by NEDO
 ★: Sites for demonstration research
 conducted by the State of New Mexico

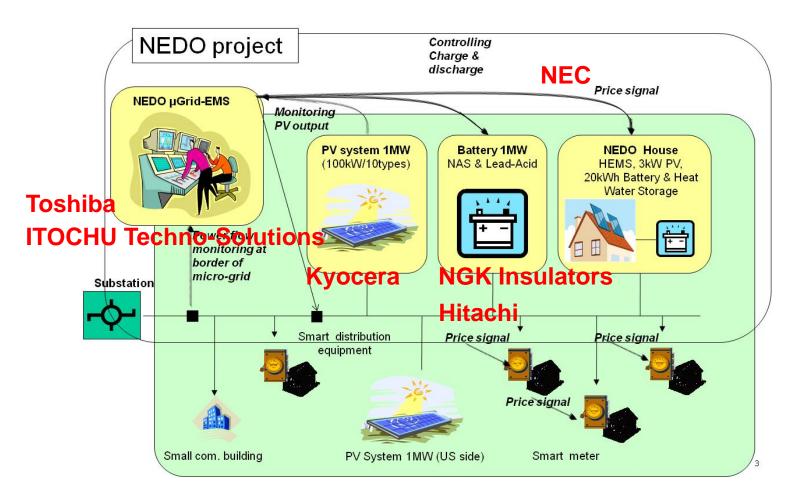


Microgrid Demo in Los Alamos



- EMS and ICT with changeable grid structure to switch the rate of PV power supply
- Distribution equipment with ICT capacity

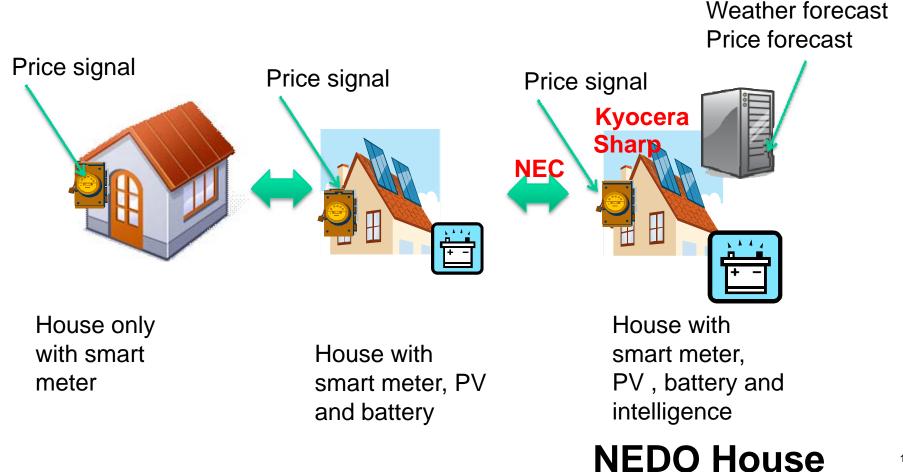
1) NEDO 1 MW + Los Alamos County 1 MW



NEDO

Smart House Demo in Los Alamos @

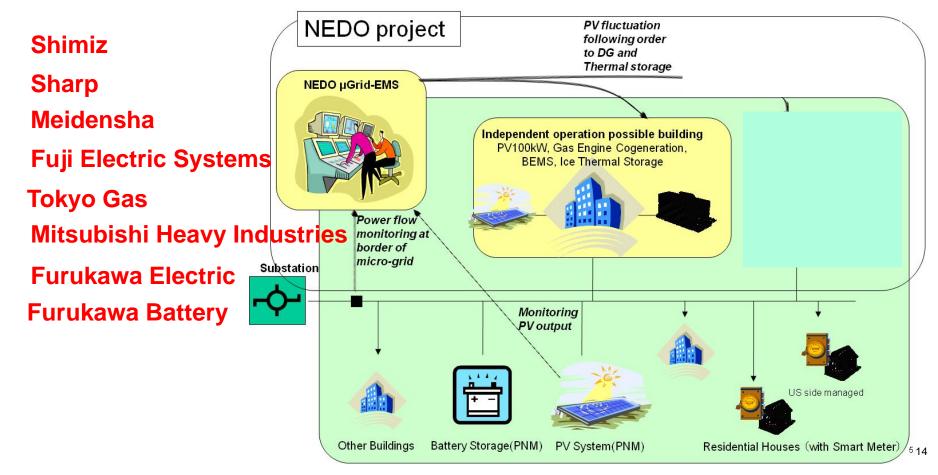
- Smart House with 3 kW PV, 20 kW storage batteries, heat storage equipment, demand side equipment, EMS with real time pricing and communication system.
- Comparison to ordinary houses



NEDO micro-grid in ABQ



- Islanding operation at a commercial building with PV, fuel cells, gas engine cogeneration, a thermal storage tank, storage batteries and Building Energy Management System.
- Absorption of fluctuated output from other large scale PV system connected into the same distribution area by using both EMS of the grid and the building.



Collective Research on Overall Project

With collected data from two sites of NEDO Demo and the other sites in NM, collaborative research will be carried out with NM partners. (Itochu, Accenture)

1. Collective research on a smart grid

- Each smart grid effectiveness and its influence on an upper-level grid (Toshiba, Hitachi)
- 2. Evaluation of distributed power systems (PV, etc.)
 - Comparison of PV performance between NM and Japan (Kyocera, NTT, TIT)
 - Evaluation of high altitude performance for gas engines and fuel cells (Fuji Electric Systems, Tokyo Gas, Mitsubishi Heavy Industries)
- 3. Study on safety technology for distributed power systems, such as an islanding detection device
 - Study of islanding detection concept and joint investigation of safety technology for distributed power systems (Kandenko, JET)
- 4. Research on cyber security and information (Toshiba, Cyber Defense Institute, CRIEPI)
 - IP base Measurement and management systems for a grid and demand points
 - Study of cyber security test methods and ICT concept
- 5. Development of model simulation techniques (Toshiba, NEC)

Schedule



- Has just selected 19 companies which will implement the project.
- Begins designing process for the demo details
- Expect to do the construction during next summer.
- After testing, the operation is expected to start spring of 2012
- 2 year operation is current plan.
- Estimated 30 millions US dollars as total



Japan Smart Community Alliance



Japan Smart Community Alliance







Japan Smart Community Alliance 1/2



- The "Japan Smart Community Alliance," a public-private organization, consists of a broad range of Japanese organizations, companies, etc. It held its inaugural meeting on April 6, 2010.
- JSCA carries out various work for development of roadmaps or dissemination of information to achieve international standardization, strengthening collaboration between wide range of people or organizations concerned.



Members: 352 As of May 31, 2010

Establishment: April, 2010

JSCA has members from the electric power, gas, automobile, information and communications, electric machinery, construction and trading industries as well as the public sector and academia.

Japan Smart Community Alliance 2/2



Japan Smart Community Alliance

PresidentToshibaBoardHitachi, ITOCHU, JGC, Mitsubishi Electric, Panasonic, TEPCO, Tokyo Gas, ToyotaSecretariatNEDO

International Strategy Working Group

This working group will identify domestic and global smart grid trends and JSCA will then share such information with international organizations. It will also study and develop strategies to support Japanese companies in their international deployment activities.

International Standardization Working Group

With the aim of achieving international smart grid standardization, this working group will facilitate practical activities in different areas. It will also develop strategies for future activities and work to achieve international standardization by identifying global trends in smart grid standardization, especially in Europe and the United States. Collaborative activities with organizations in Europe and the United States will also be carried out.

Roadmap Working Group

This working group will prepare a roadmap for smart grid technology development. In addition, it will promote technology development as part of a social system by developing a scenario for a next-generation society in which smart grid-related technologies have been disseminated. This is expected to generate a synergetic effect between technology development and dissemination.

Smart House Working Group

With a view to early commercialization of smart house technologies, this working group will review an information infrastructure (platform) that will enable visualization and monitoring of home energy use evaluation as a basic consumer service.



Summary

- Various Microgrid related demonstrations have been implemented in Japan. Common sense as a lesson learned was still likely costy.
- Current Smart Grid or Smart Community movements as a further progress for combination between power system and ICT may be helpful to solve it.
- It is common sense for power supply industries in Japan that Microgrid will be required for High penetration of renewables into existing distribution lines.
- Various smart grid related demonstrations which includes Microgrid have been conducted in many countries, then we are looking forward to sharing those lesson learned which will be created near future.



Future Smart Grid will be formed by an aggregate of plural Microgrids.

Research on harmonized operation among those plural microgrids will be imperative.

By Dr. Satoshi Morozumi, NEDO



Thank you for your attention.

More information can be found on NEDO's Web site at http://www.nedo.go.jp/english/index.html

Please don't hesitate to contact me.

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