



Smart Grid Related Activity in NEDO

Smart Grid Advisory Meeting October 2009

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Representative

NEDO Representative office in Washington DC

New Energy and Industrial Technology Development Organization

What is NEDO



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

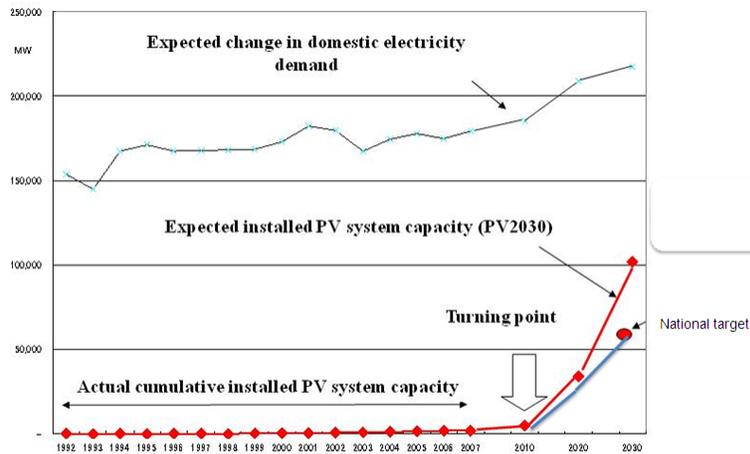
Minister in charge The Minister of Economy, Trade and Industry

Location Kawasaki city , Kanagawa Pref., Japan

Personnel About 1,000



Why Smart grid is needed

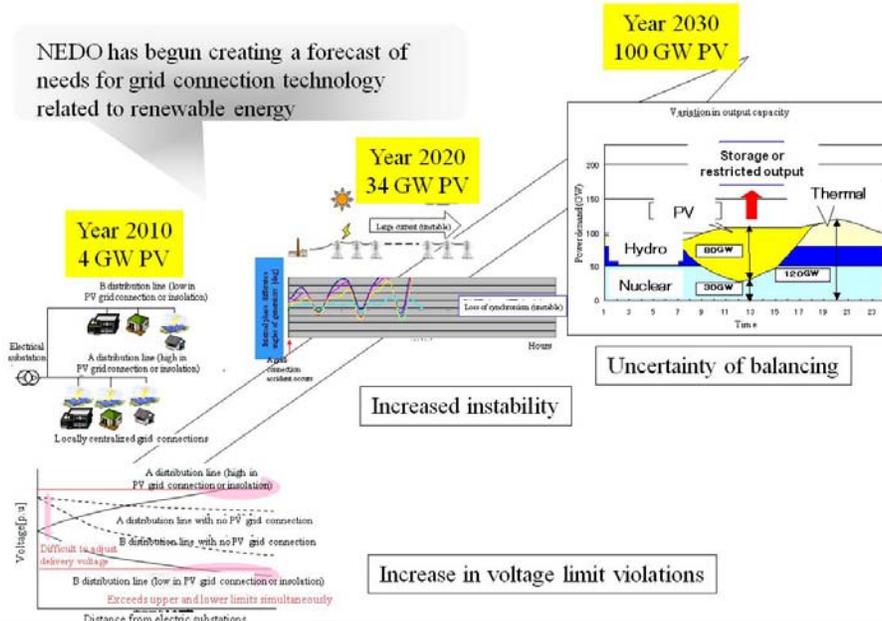


After year 2010, generated energy cost will become cheaper than average residential electricity price. Therefore, NEDO expects high penetration of PV will come after year 2010 in Japan.

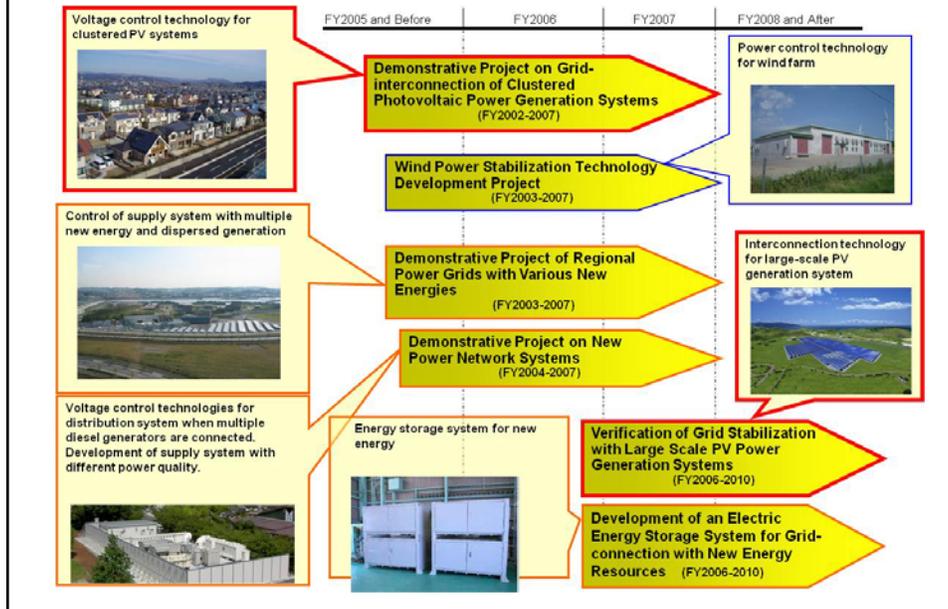
Why Smart grid is needed



NEDO has begun creating a forecast of needs for grid connection technology related to renewable energy



NEDO's experience



Clustered Photovoltaic Project



Demonstrative Project on Grid-interconnection of Clustered Photovoltaic Power Generation

Test Bed 30 inverter are tested

- (1) Development of the technology to avoid restriction of PV system output.
- (2) Development of function to prevent unintentional islanding.
- (3) Development of applied simulation technologies.
 - (3-1) Power flow of harmonics
 - (3-2) Battery storage operation and network voltage distribution
 - (3-3) Islanding operation detection mechanism



PV systems installed: 553
Total PV capacity: 2,129 kW
Avg. system capacity: 3.85 kW

Large Scale PV



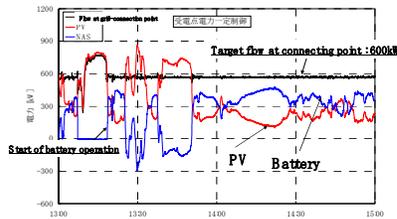
Verification of Grid Stabilization with Large-scale PV Power Generation Systems

Battery storage (1.5MW-7.2hr) operation is tested.

(1) Technology for reduction of fluctuation of voltage and frequency using battery storage will be demonstrated. Also, countermeasure of harmonic will be developed and demonstrated.



(2) Developing simulation method related technologies mentioned above



Reactive power controlled by PCS.

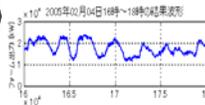
Wind Power Stabilization



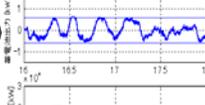
Wind Power Stabilization Technology Development Project



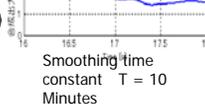
Output of Wind Power



Charging and discharging of batteries



Reformed output of wind power



Redox-Flow battery
Inverter Capacity : 6000kW
(Same as short term output rate of battery)

Battery nominal capacity : 4000kW

Storage capacity : 6000kWh



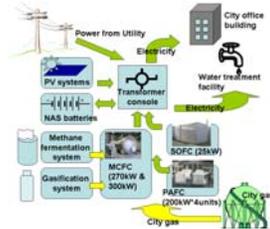
Regional Power Grids

Demonstration Project of Regional Power Grids with Various New Energies



(1) Creating energy supplying system from new energy economically. (Also, this system should be less influence of fluctuation of output from new energy to power system.)

(2) Measuring power quality and other data such as operation cost in the system.



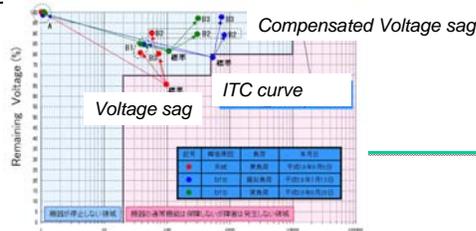
New Network Systems

Demonstrative Project on New Power Network Systems

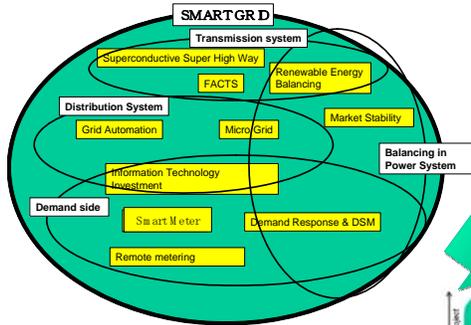


(1) Establishing system control technologies for keeping power quality (voltage), when many distributed generators are connected.

(2) Establish power quality (outage and voltage sag) control technologies by distributed generator and compensator.

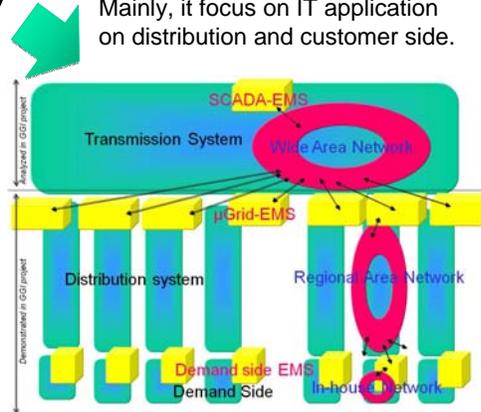


What is Smart Grid



Technically, smart grid consists power system and communication system which have bidirectional function. Mainly, it focus on IT application on distribution and customer side.

At first, term of "smart grid" means political term involving several grid related technologies.



NEDO participates in NMGGI



Work Shop in Albuquerque

Name of WS : "US-Japan Collaboration New Mexico Green Grid Project, NEDO/Industry Meeting with New Mexico Officials and US Industry"

Date : April 13-15, 2009

Site : Albuquerque Marriott

Sponsorship : The State of New Mexico government, NEDO

Participants : a little less than 100. 19 companies participate from Japan.

NEDO decided to construct demonstration micro grid system in NM.



Objects of NEDO demonstration



- Demonstrating technologies not be able to be adopted in Japan now.
 - Introducing Japanese manufactures to US market through demonstration.
 - Contributing international standardizations through the development of smart grid.
- * NMGGI is a project is studying future distribution system and identifying optimal share of role with transmission system. Also, discussing supporting IT system and cyber security through the demonstrations at several micro-grids.

Structure of NEDO project



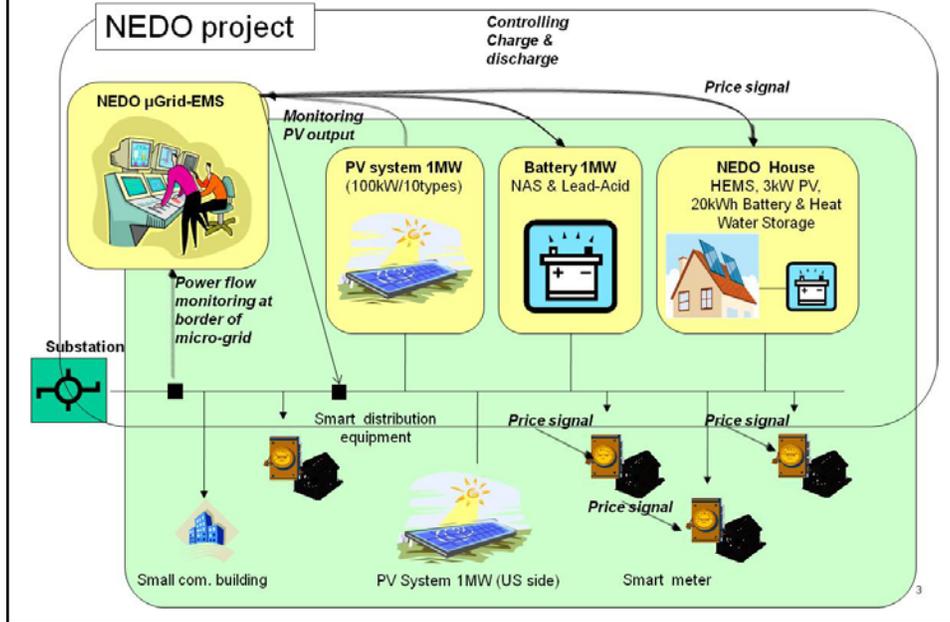
Demonstration at sites

- 1) Los Alamos County
 - NEDO Demo feeder
 - NEDO Demo House
- 2) Albuquerque
 - NEDO Demo EMS and commercial building
 - NEDO Second demo house (Future Option)

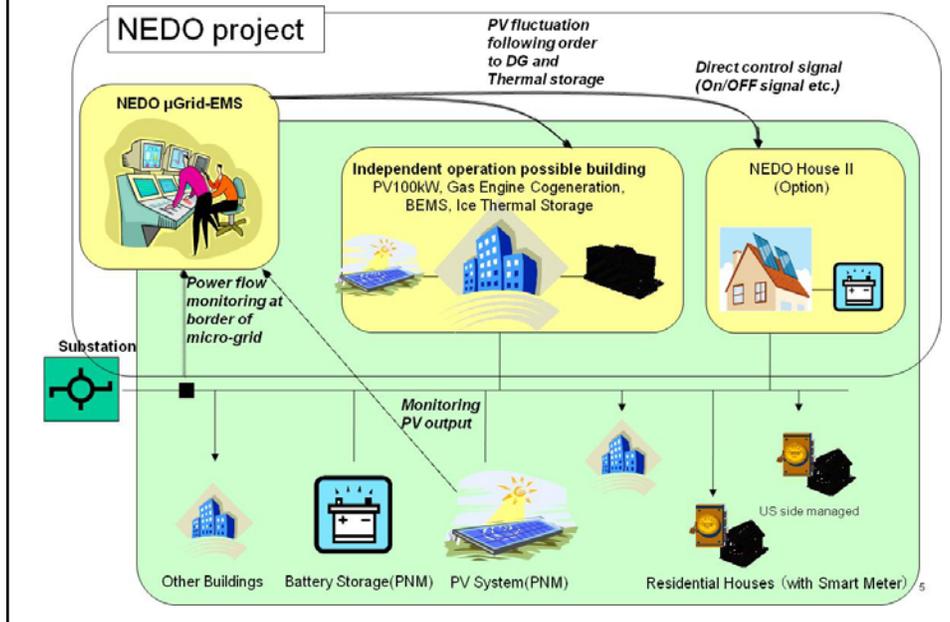
Research and Study

- Benefit evaluation of Smart Grid
- Modeling and simulation
- Performance evaluation of DG including PV
- Safety of grid connection including islanding detection
- IT including cyber security issue

NEDO micro-grid in LAC



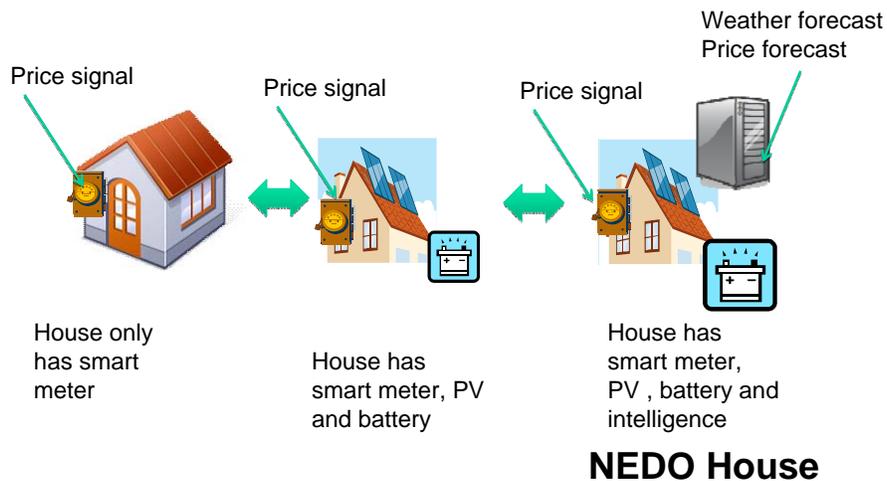
NEDO micro-grid in ABQ



NEDO demonstration house



Comparison demand response (especially **increase** side) among houses.



Studies through the project



- 1) Study proposal will be invited for Japanese participants by NEDO.
- 2) Once or twice per year, Japan and US researcher will introduced and discussed the results of those studies.

- **Smart Grid summary study:** Evaluating GGI micro-grids benefits and contribution to upper grid.
- **Modeling and simulation:** Establishing the methods of modeling and simulation for evaluating smart grid benefits.
- **Distribution generator performance evaluation:** Performance of almost 10 types of PV will be evaluated. Also, distributed generator performance on the high altitude site will be evaluated.
- **Safety technology test study:** Discussing treatment of islanding detection when building will be operated independently from grid. Also using Akagi test bed, standard of safety technology will be discussed.
- **Cyber security and IT system study:** Test methods of cyber security and design of IT system will be studied.

Future Schedule



(Actual)

April **Workshop in Albuquerque**

Jun-Aug **Preparation of proposal for DOE**

Aug **Conclusion of MOU between NEDO and NM**

Sep **Workshop in Tokyo and Kyoto**

Sep **Site tour of NEDO projects for proposer**

(Future schedule)

Nov **Start of call for participants**

The end of year or the start of the next year

Conclusion of participants



Thank You !!

