



Current International Cooperation activities for ESI Japanese Perspective

November 17th, 2014

Asian workshop in Kyoto



Kazuyuki Takada

**New Energy and Industrial Technology
Development Organization (NEDO)**

Contents



1. Introduction of NEDO
2. Ongoing Smart Community Projects
3. Summary

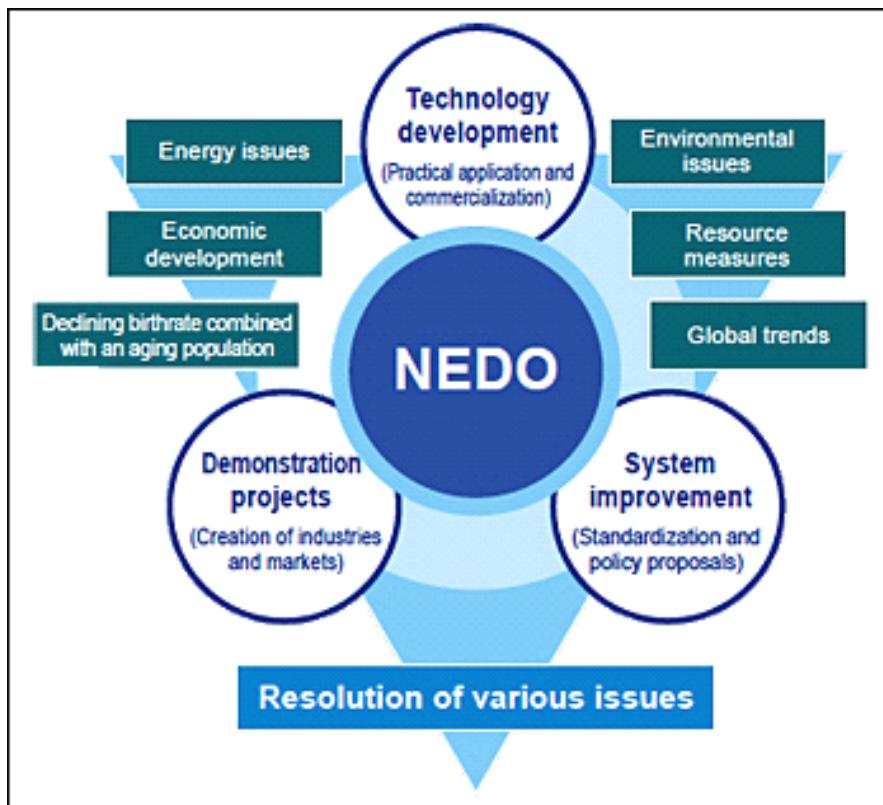
What is NEDO

New Energy and industrial technology Development Organization



NEDO is Japan's largest public R&D management organization.

Following the two oil crises of the 1970s, the need for energy diversification increased. Against this backdrop, NEDO was established as a governmental organization in 1980 to promote the development and introduction of new energy technologies.



Personnel 800
Budget 148 billion yen (FY2014)

NEDO's Science and Technology I



Basic Research

Technology Development

Demonstration



Renewable energy



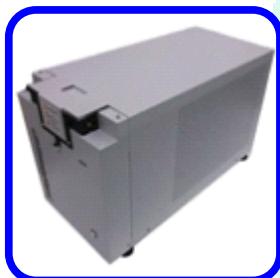
Energy conservation



Electronics /ICT



Materials/nanotech



Energy storage



Water treatment

Smart community



**Environment/
clean coal**



Robotics



Bio/medical



Demonstration Project in Japan (FY2000-FY2010)

- Established grid integration technologies for high penetration of Renewables.



Clustered PV System (Ota)



**Large-scale PV plant
(Wakkanai)**



**Energy Storage for Wind Power
(Tomamae)**



Microgrid (Hachinohe)



**Multiple Power Quality Microgrid
(Sendai)**

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NEDO's Smart Community Projects in Overseas



Lyon (France)

Smart city applications for re-developed urban area



New Mexico (USA)

Energy management for power systems with the large scale PVs



Manchester (U.K.)

Energy switching of heat consumption of households and aggregation of energy storage capability



Malaga(Spain)

Navigate EV drivers to charging stations efficiently considering with power system and solve traffic congestions



Java (Indonesia)

Supplying reliable quality electricity to industrial parks



Maui (USA)

Maximizing the use of renewable energy by managing EV charging



Demonstration in NM



Opening ceremony @ LAC site on Sep. 2012

■ Schema of US – Japan Formation

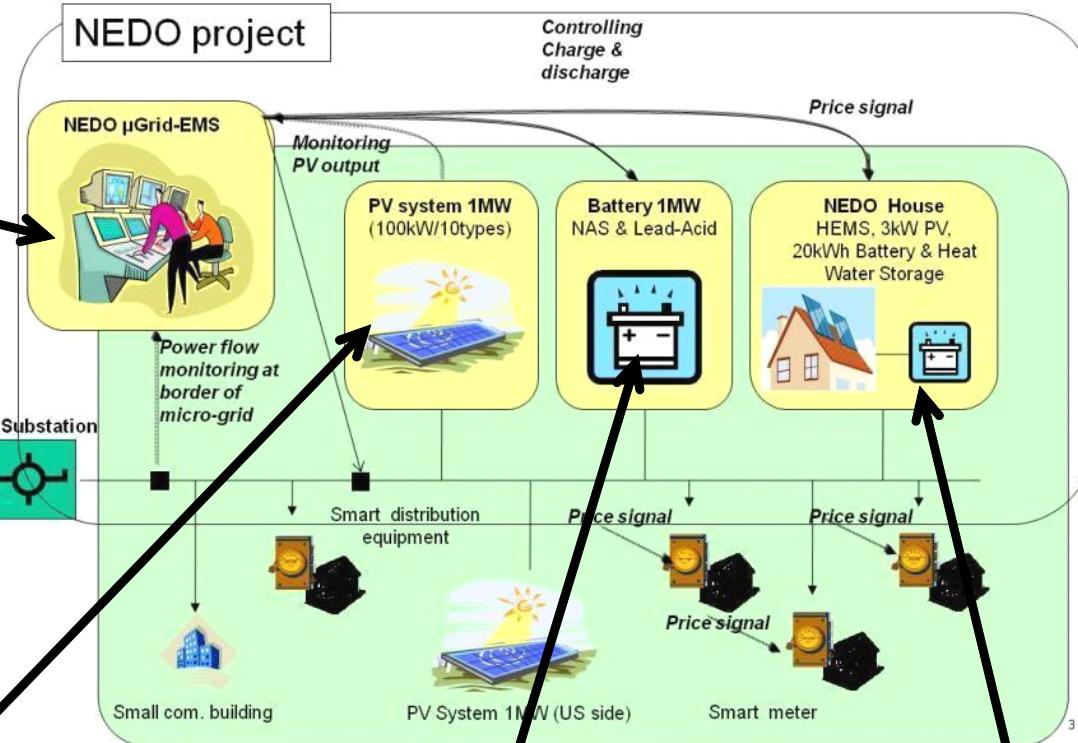
US partners

The State of New Mexico,
The County of Los Alamos,
LANL, SNL, PNM, UNM, Mesa del Sol

Japan

NEDO,
TOSHIBA, Shimizu, Kyocera,
HITACHI, NGK, SHARP, NEC,
Meidensha,
Fuji Electric, Tokyo Gas, MHI,
Furukawa Electric, Furukawa Battery,
Cyber Defense, Itochu, CTC, Kandenko,
NTT Facilities, Accenture

Micro-grid demonstration in Los Alamos



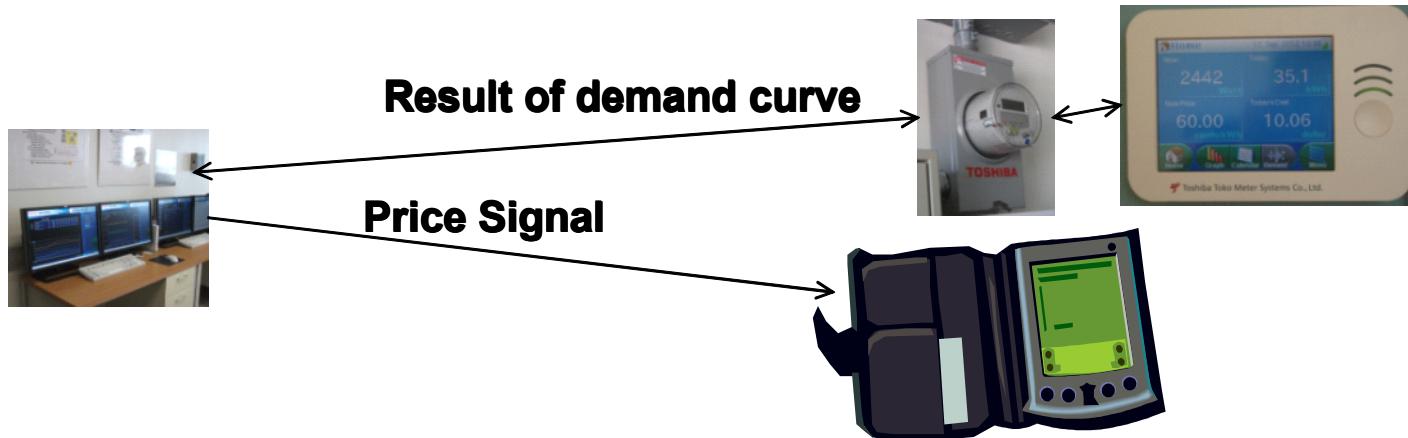
Main Demonstration Contents in Los Alamos



◆ Feeder level Micro grid operation I



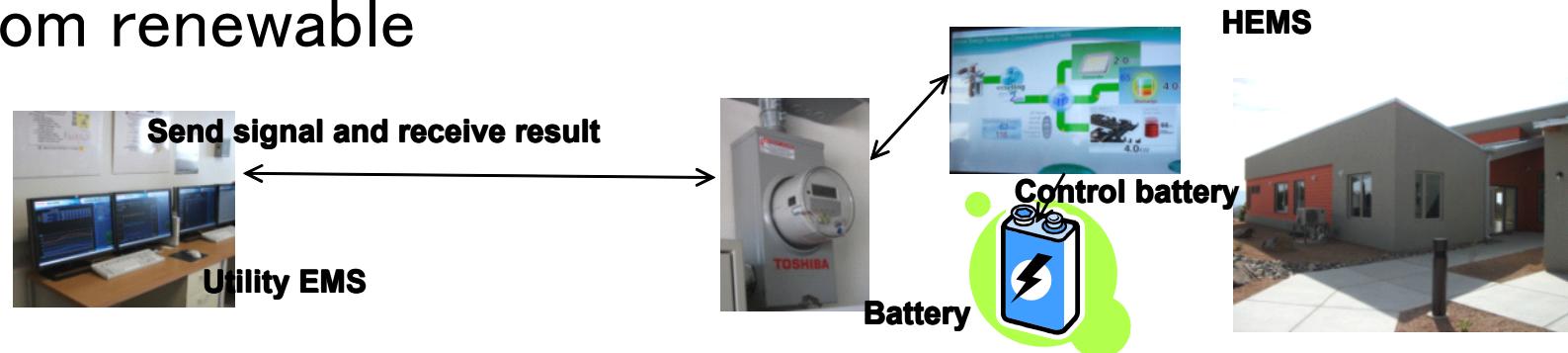
◆ 900 houses participating Demand Response Demo I



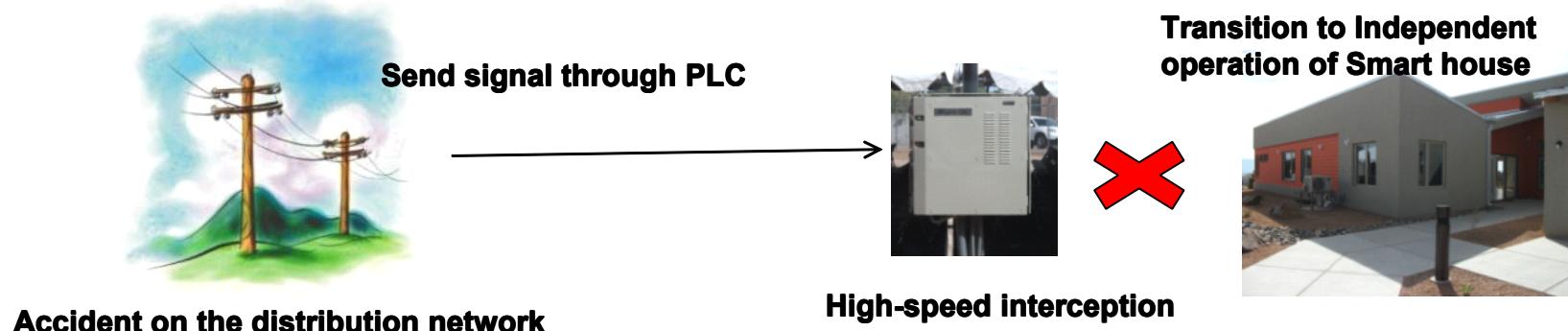
Main Demonstration Contents in Los Alamos



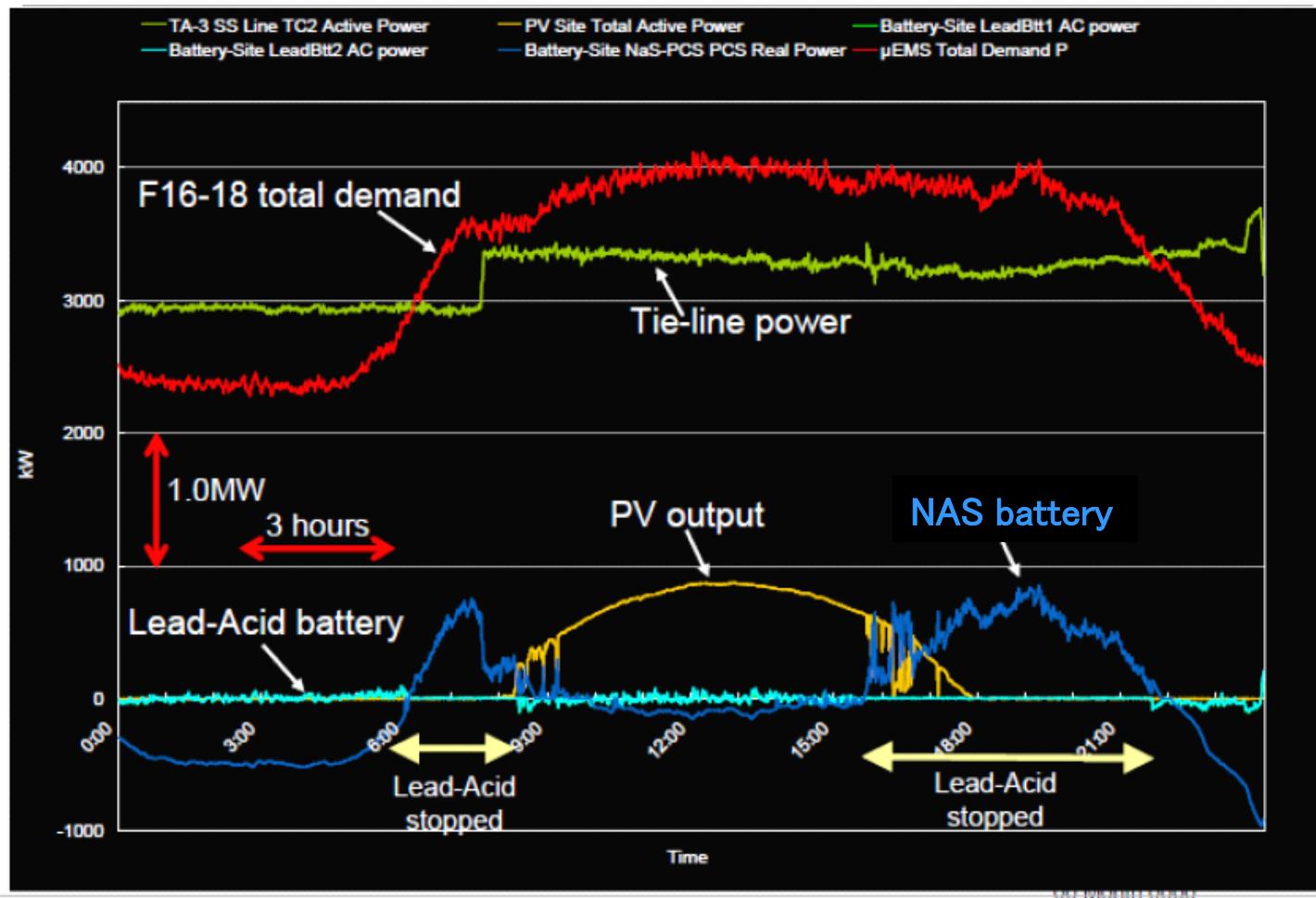
- ◆ Auto Demand Response absorbing surplus energy from renewable



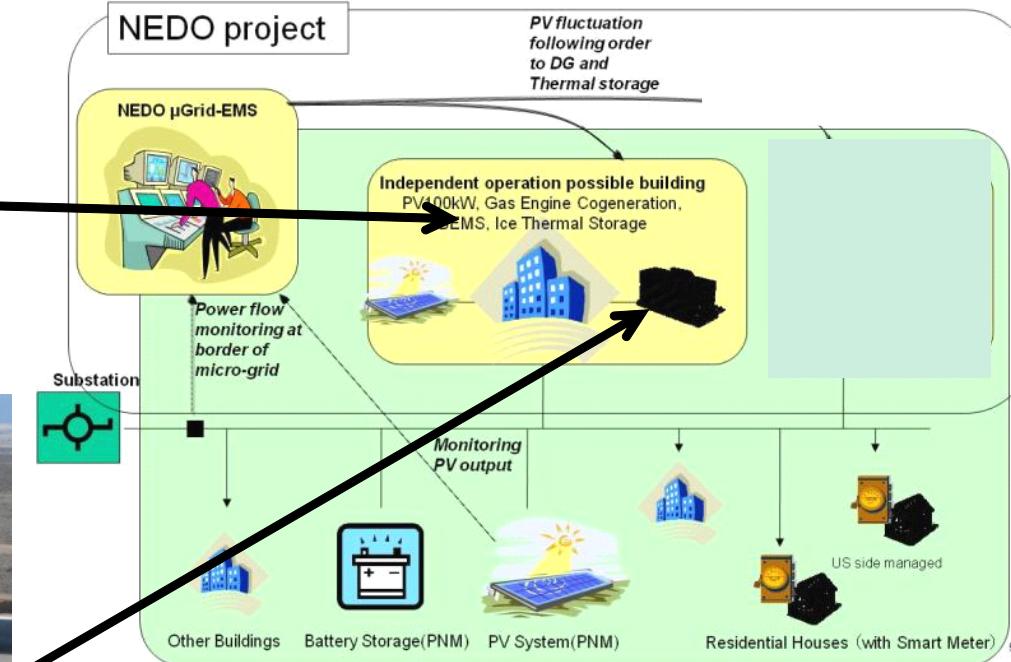
- ◆ Independent operation of smart house



Field test result/ Tie line scheduling control



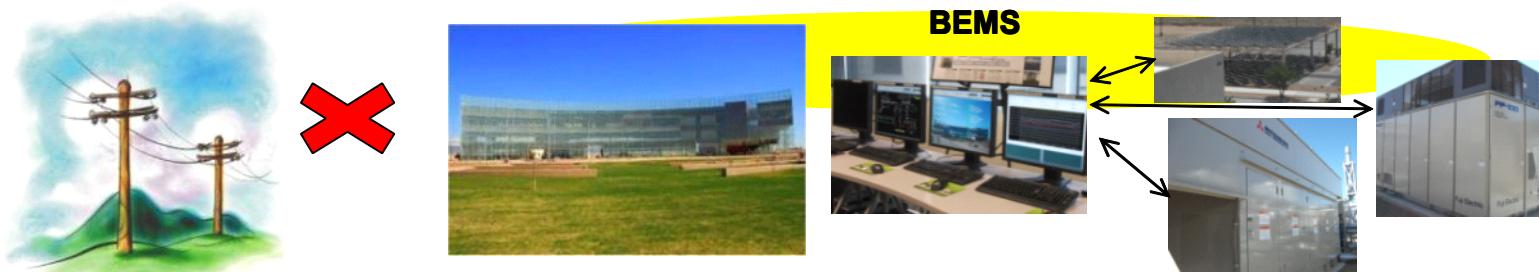
Micro-grid demonstration in Albuquerque



Main Demonstration Contents in Albuquerque



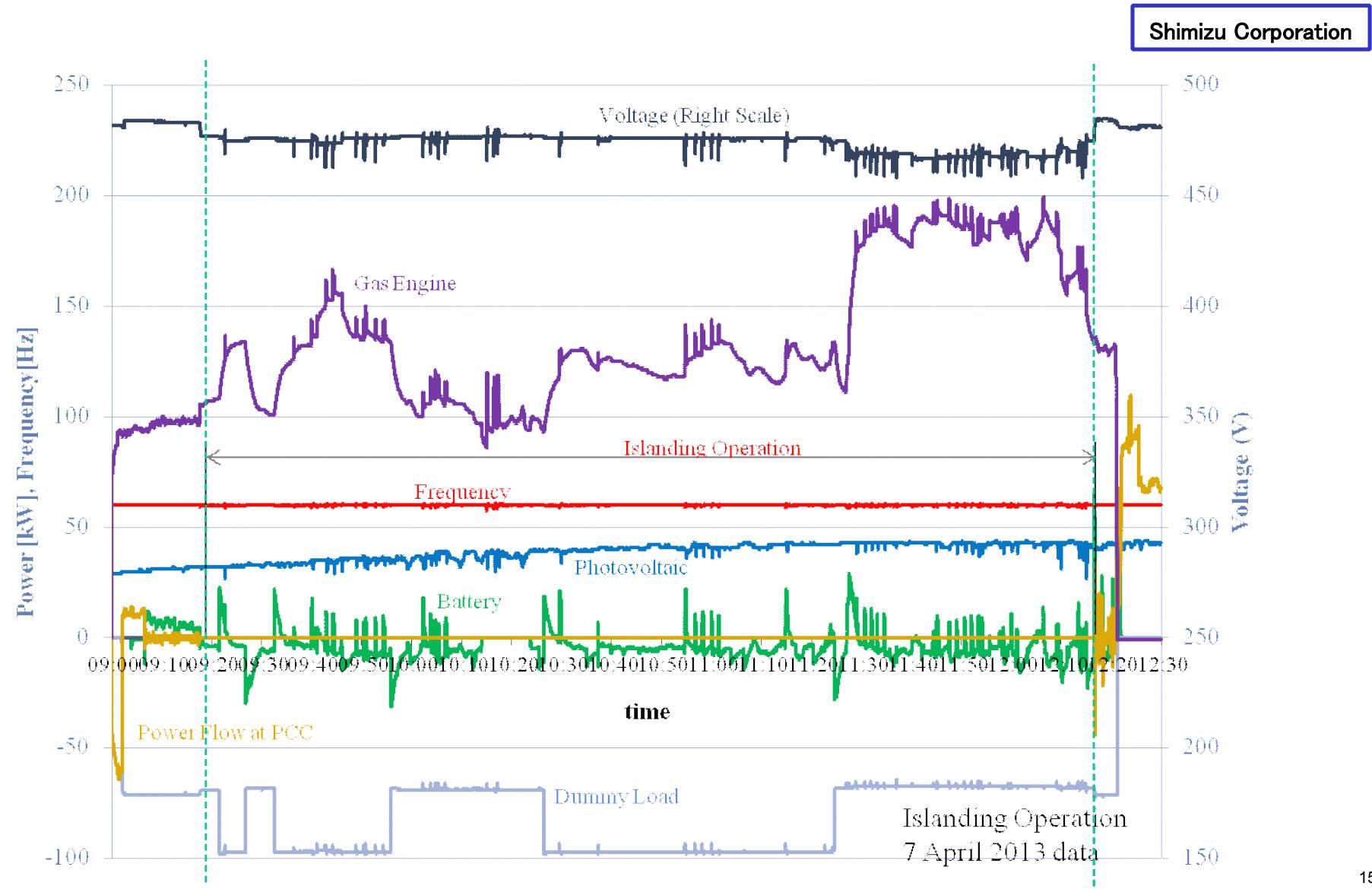
◆ Independent operation of Building



◆ Absorbing PV fluctuation by building equipment Ⅰ



BEMS control results in islanded mode





HITACHI
Inspire the Next



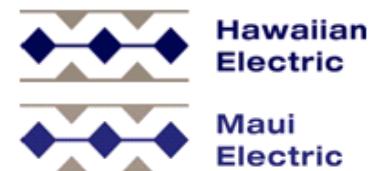
JUMPsmartmaui
SMART ENERGY. SMART CARS. SMART GRID.



CyberDefense



**mauiECONOMIC
DEVELOPMENT BOARD**



HNEI
Hawai'i Natural Energy Institute
University of Hawai'i at Mānoa

US Japan Collaboration



- Explore the sustainable way of life for future generations
 - ◆ Integrate high levels of renewable energy
 - ◆ Maintain safe and reliable power.
- Develop and demonstrate smart tech together
 - ◆ The control of electric vehicle (EV) charging to manage Distributed Energy Resources.



Maui: The ideal demonstration site



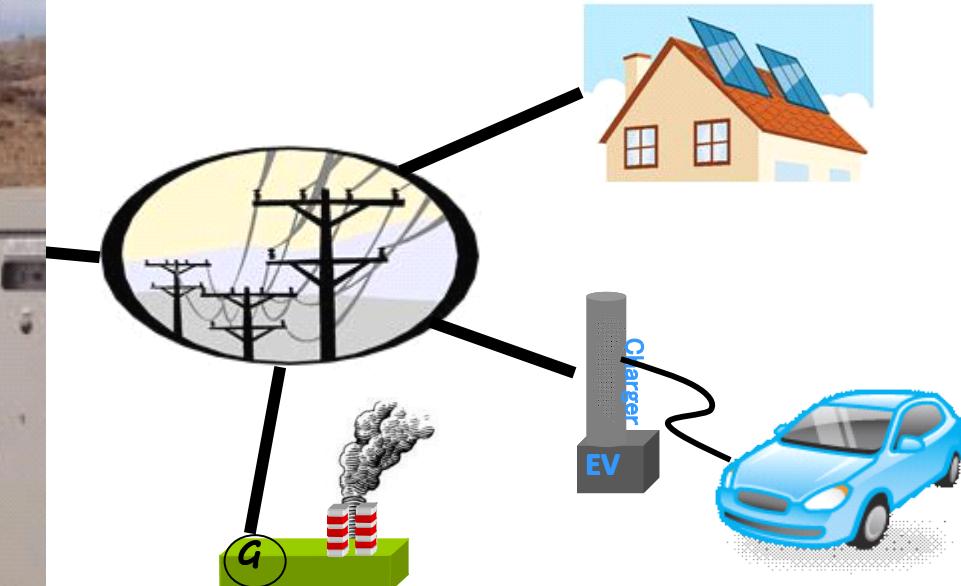
- ❖ High cost of energy is driven by variable oil prices.
- ❖ Energy security effected by dependence on imported fuel.
- ❖ The rapid growth of intermittent renewable generation (wind and solar) negatively impacts grid operations and reliability.
- ❖ Advanced smart grid technologies can enhance grid stability and balance demand. Examples include management of electric water heaters, EV chargers and other home appliances.



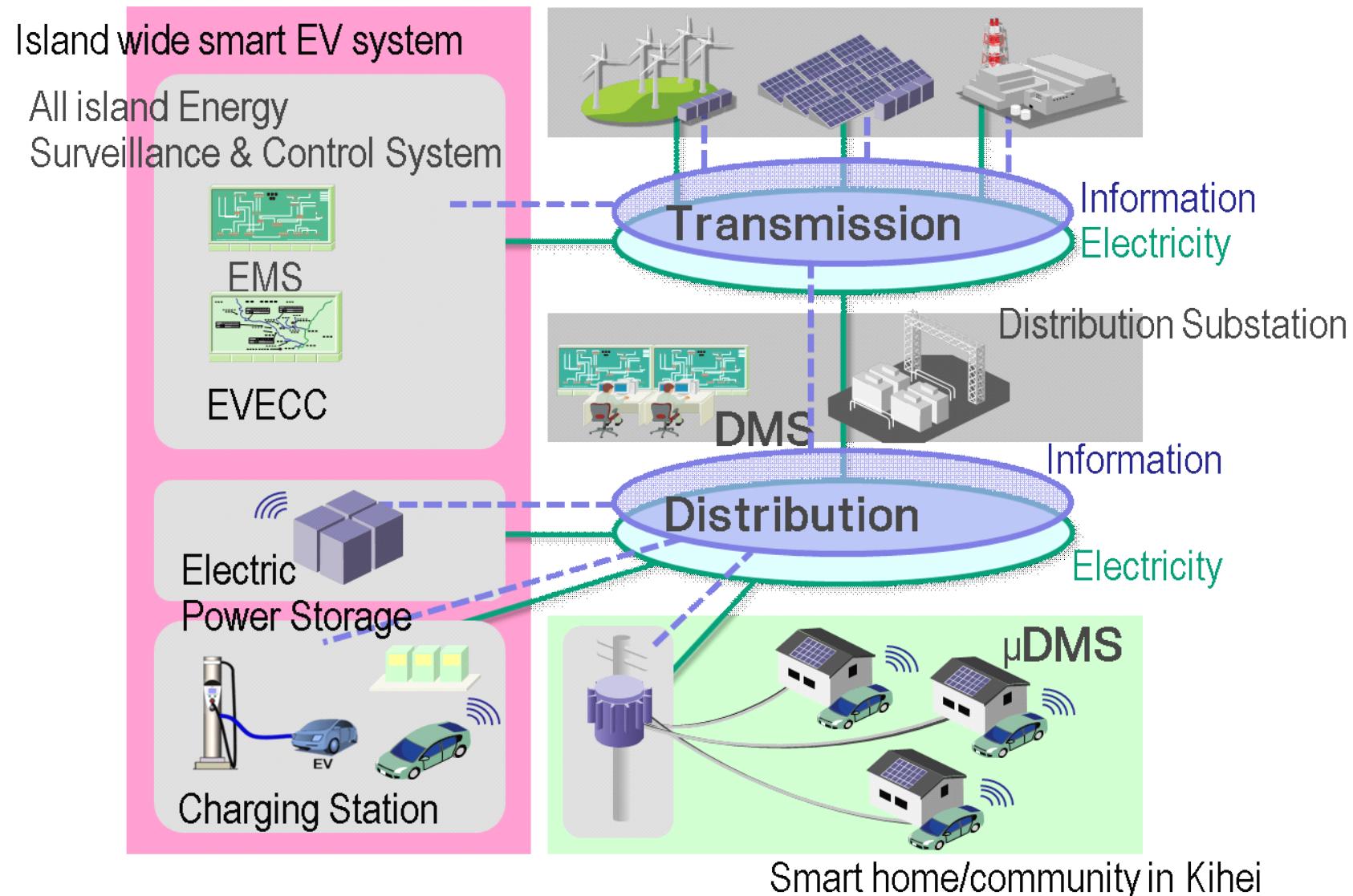
What the project proposes?



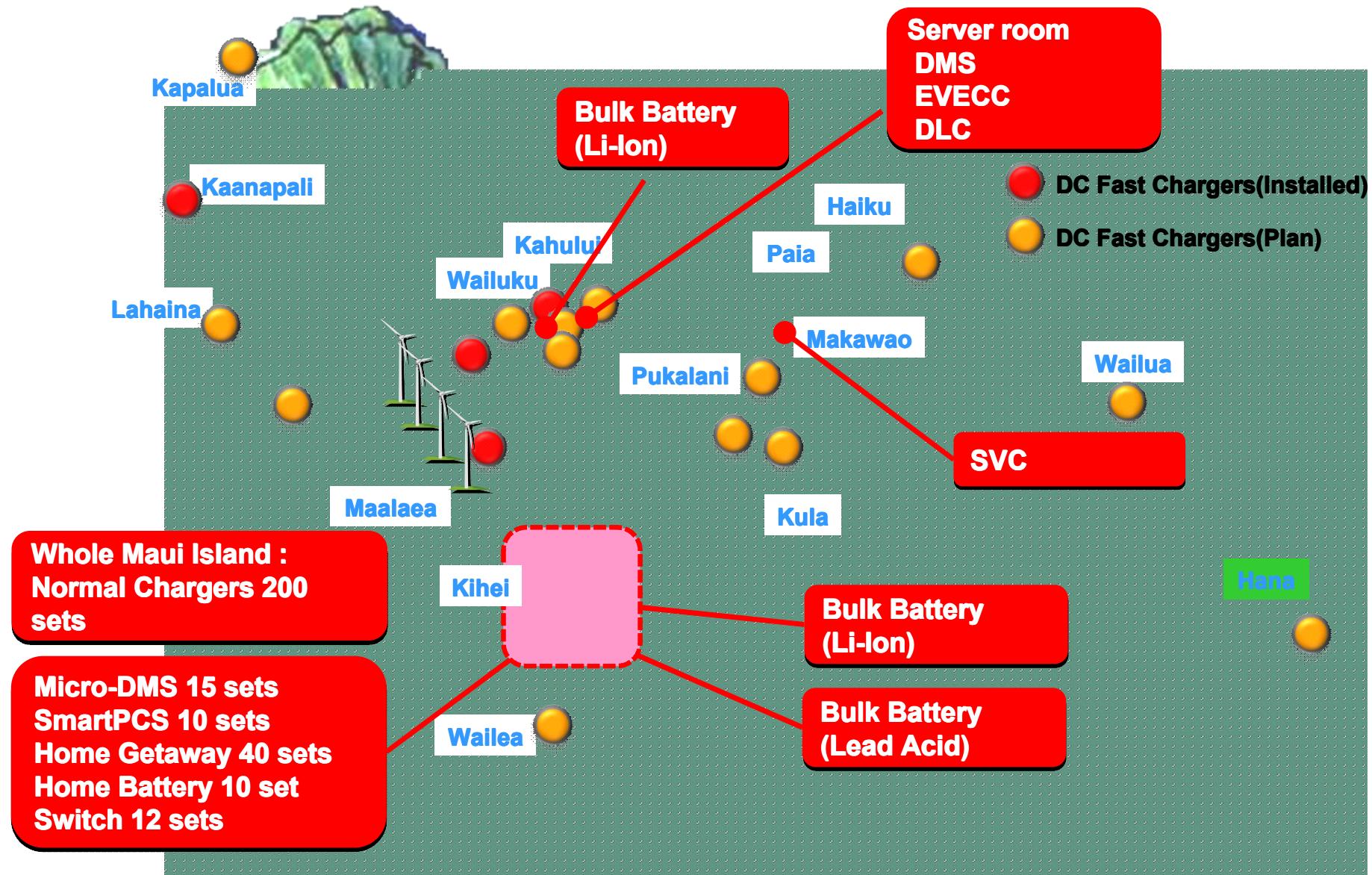
- Renewables (Wind and Solar) friendly EV charging
- Reduce fossil fuel consumption and its dependency
- Mitigate investment cost for absorbing fluctuation by Renewables



Overall View of System Configuration



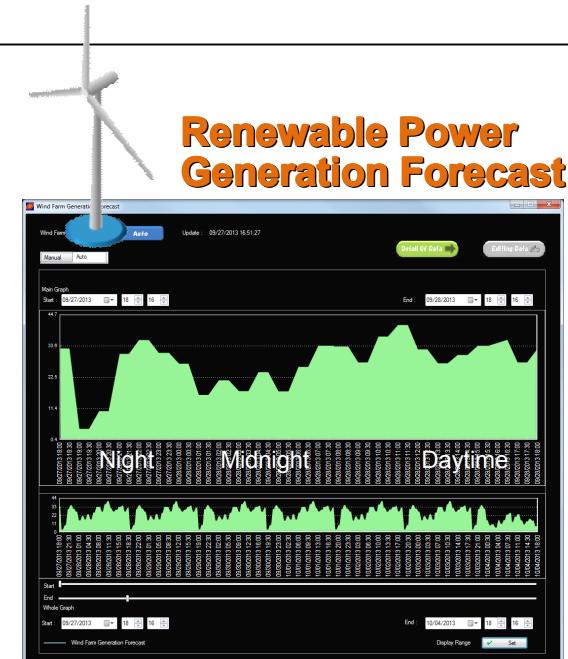
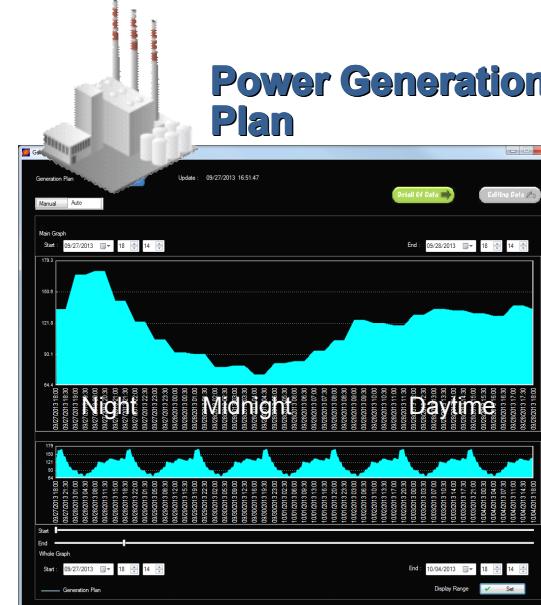
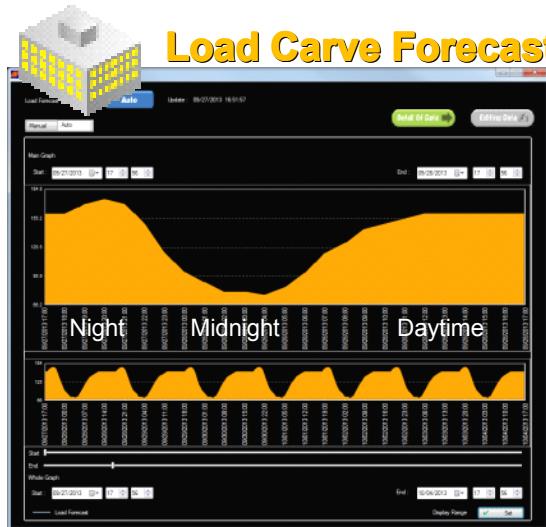
Geographical Locations of Devices in Maui



Maximum Utilization of Renewable Energy

Advanced load shift using project batteries

Helps shift energy demand by integrating forecasts of renewable power generation with the operating schedule of the project's batteries.



The conventional load shift technology

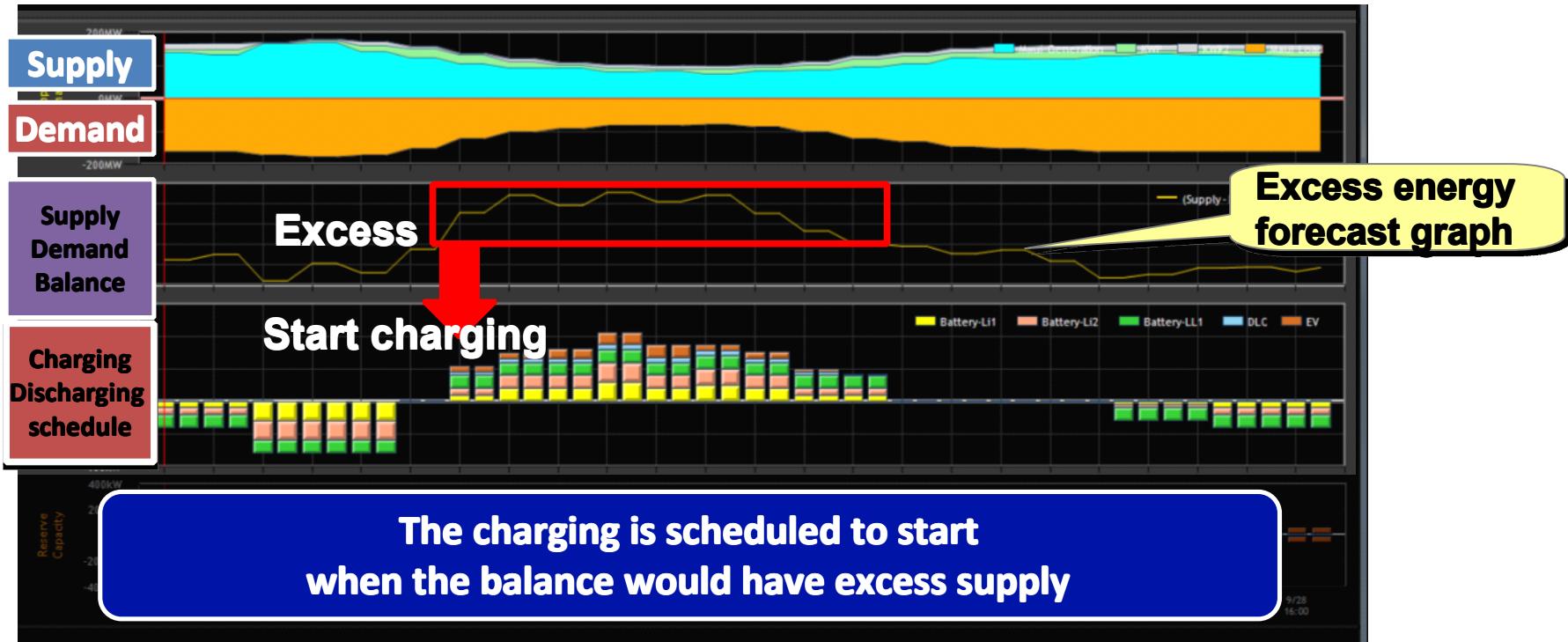


Advanced RE forecasts added

Maximum Utilization of Renewable Energy

Advanced load shift

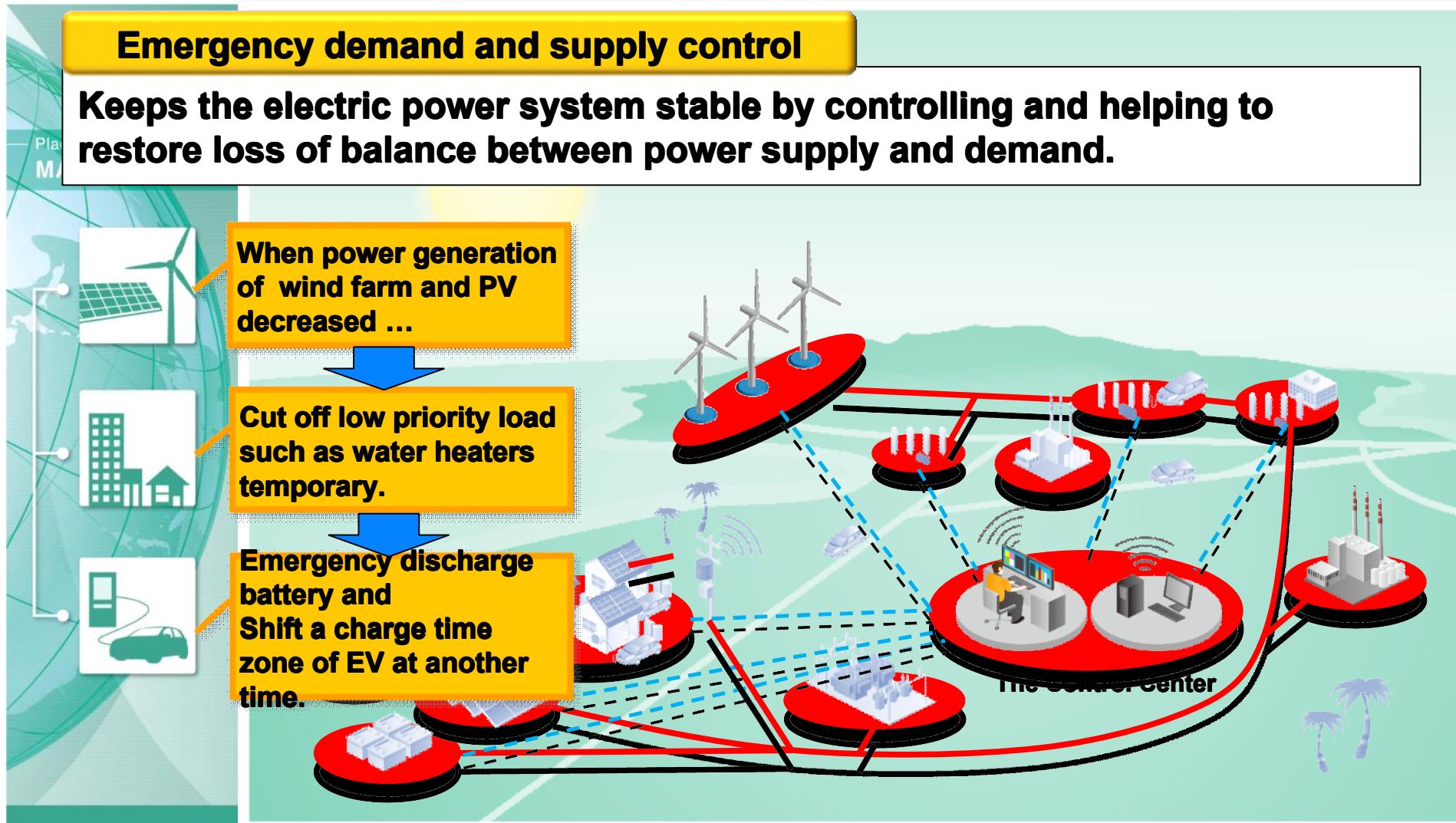
Helps shift energy demand by integrating forecasts of renewable power generation with the operating schedule of the project's batteries.



Stable Supply of Electric Power

Emergency demand and supply control

Keeps the electric power system stable by controlling and helping to restore loss of balance between power supply and demand.



Support from Maui Residents

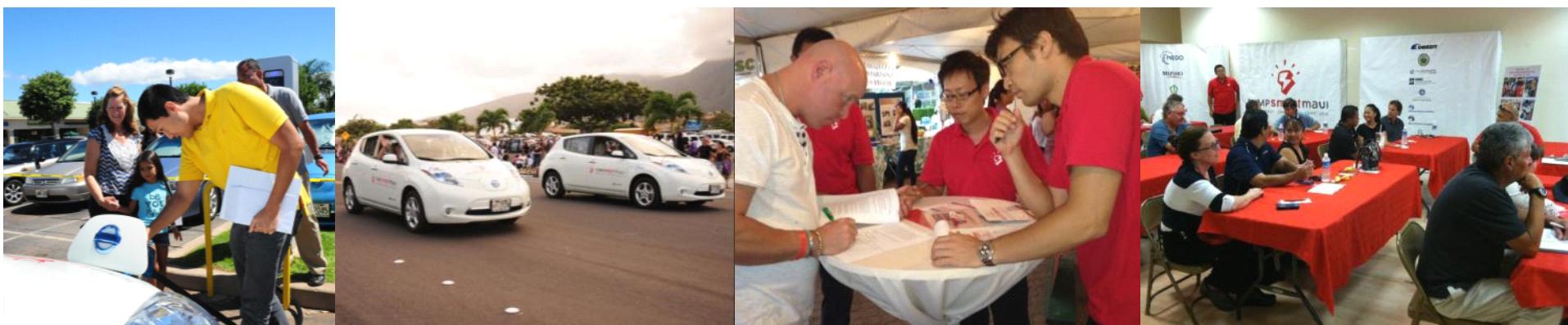


- ◆ Demonstration will be implemented by 200 EVs and 40 residential volunteers. Therefore, we have held various events to collaborate with Maui residents.

JUMPSmartMaui project dedication ceremony @ Queen Ka'ahumanu Center



Since September 2013, JUMPSmartMaui has held many events related to volunteer recruitment, including EV membership kick-off, EV parade in Maui Fair and orientations.



Schedule



Operation Starts December 17th, 2013



Use Case



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Use Case Repository

The EPRI Use Case Repository is a collection of use cases and requirements developed within the industry as well as through EPRI's smart grid demonstration initiative.

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Name**Size****Published**[Adaptive Transmission Line Protection](#)

254 KB Feb 15, 2010

[Advanced Distribution Automation with DER Function](#)

3 MB Feb 15, 2010

[AEP AMI Network](#)

2 MB Aug 23, 2012

<http://www.smartgrid.epri.com/repository/repository.aspx>

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Case Study development - Sendai Microgrid-

 New Energy and Industrial Technology Development Organization

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The Operational Experience of Sendai Microgrid in the Aftermath of the Great East Japan Earthquake: A Case Study

February 22, 2013

The Sendai Microgrid was initially designed in 2004 as a test bed for a demonstration project of the New Energy and Industrial Technology Development Organization (NEDO). After the study was completed in 2008, the microgrid system has continued in operation under the management of NTT Facilities, Inc.

On March 11, 2011, the devastating Great East Japan Earthquake hit the Tohoku district, inflicting catastrophic damage on the district's energy supply system for a number of days. Despite the extreme devastation, the Sendai Microgrid resumed supplying power and heat to customers after a short interruption, proving its effectiveness.

This case study is an analysis of the operations of the Sendai Microgrid in the aftermath of the earthquake and will provide useful lessons for all microgrid operators and users around the world.

This study was drawn up under commission of NEDO and all copy right is reserved by NEDO.



Sendai Microgrid

Case study

 [The Sendai Microgrid Operational Experience in the Aftermath of the Tohoku Earthquake: A Case Study](#)
(431KB)

- ✓ NEDO has already decided to develop additional Case Studies with regard to the Smart Community projects after their completion.
- ✓ Look forward to sharing them through international relationship such as iiESI.



Mahalo! Ì