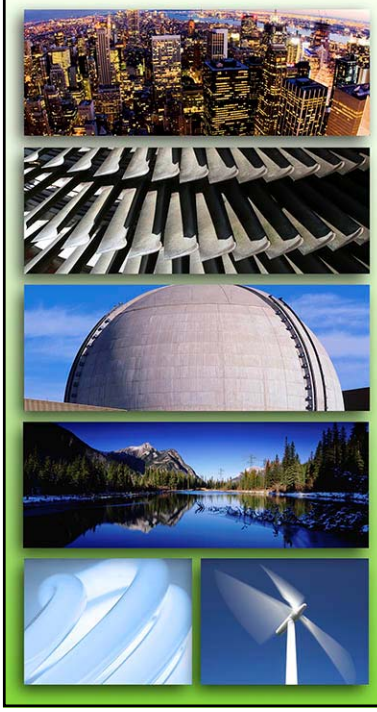

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## Demonstration Projects

## *Collaboration with Smart Grid Partners*

**Stephanie Hamilton**
Collaborations Manager

**Smart Grid Advisory Meeting**
Albuquerque, NM
October 12 - 14, 2009

## *Collaboration with Smart Grid Partners – International*

At our last advisory meeting – we talked about collaboration being fulfilling purposes together and the value of doing so.

Today my presentation will continue to focus on:

## Task 4: Tech Transfer

Status of demonstrations, DOE, National Laboratory Collaborations International SG RD&D



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## Collaboration with Smart Grid Demo Partners - described in EPRI Report #1016931

- ✓GWAC – Grid-InterOp Sessions
  - ✓ EPRI SG Demos: PNM, AEP, EdF
  - ✓ DOE RDSI: SDG&E, FT Collins, Cost Benefit Tool
- ✓National Resources Canada
- ✓NIST – PAPs & next SG Advisory
- ✓SDOs (IEEE, IEC, ANSI, etc)
- ✓CERTS – MicroGrids
- ✓DOE National Labs
  - ✓ NETL – Cost Benefit
  - ✓ ORNL – CIGRE & Load Responsiveness
  - ✓ Sandia – 4th Intn'l Conference
  - ✓ PNNL – GWAC - Grid InterOp
  - ✓ LBL – MicroGrids
- ✓DOE – RDSI projects & future
- ✓State R&D Agencies (CEC, NYSERDA) - 4th Intn'l Conf
- ✓EPRI IntelliGrid & ADA – Next SG Advisory meeting




## Future Collaboration with Smart Grid Demo Partners? - EPRI Reports Circa March 2010

- ADDRESS – Intn'l project
- APERC (WVU)
- APEC (UCI)
- CEATI
- FERC
- FREEDM
- GRIDAPP
- NARUC
- PSERC
- SINTEF
- U of WY
- _____
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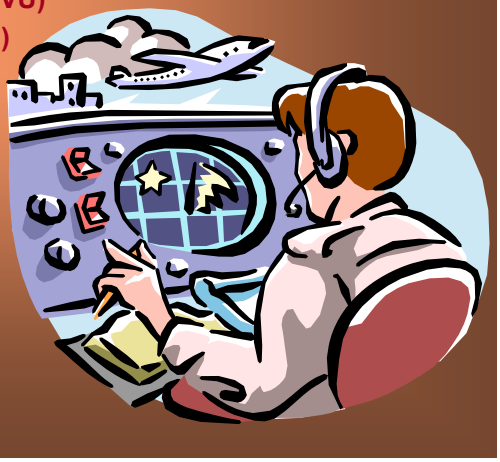

## Collaborate at Grid-Interop & Smart Grid Demo Program – Denver Nov. 17-19th

**Panel Sessions – DOE & EPRI program collaborators**

- Highlight and showcase host demonstrations showing focusing on how the project is dealing with interoperability.
- Describe the challenges anticipated and actually encountered.
- Describe lessons learned.
- Show in presentations how demos are addressing and contributing to implementation of the NIST roadmap.

Grid-Interop™



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## Collaboration with DOE Distribution Integration Awards - Today & Future

- Allegheny Power, WVU, NC State, Research & Development Solutions, Augusta Systems, Tollgrade – **West Virginia Super Circuit**
- ATK Launch Systems, Rocky Mountain Power, P&E Automation – **integration of renewables, DG, and storage (compressed air).**
- Chevron Energy Solutions, Alameda County, PG&E, VRN Power Systems, SatCon, Univ of Wisc., NREL, LBNL, E3 – **Solar, fuel cell and storage microgrid**.
- **City of Fort Collins, Colorado State Univ, InterGrid Lab, Comm Found of Northern Col, Governor's Energy Office, Advanced Energy, Woodward Spirae, Eaton – 3.5 MW mixed distributed resources for peak load reduction**.
- IIT, Exelon/ComEd, Galvin Electricity, S&C – **"Perfect Power" demonstration**
- **Con Edison, Verizon, Innovative Power, Infotility, Enernex – Interoperability between utility and end use customers for DG aggregation.**
- **SDG&E, Horizon Energy Group, Advanced Control Systems, PNNL, Univ of San Diego, Motorola, Lockheed Martin – Integrating multiple distributed resources with advanced controls.**
- Univ of Hawaii, GE, HECO, MECO, Columbus Electric Coop, NM Inst of Mining and Tech, Sentech, UPC Wind – **Mgt of distributed resources for improved quality and reliability, grid support, and transmission relief**.
- Univ of Nevada, Pulte Homes, Nevada Power, GE Ecomagination – **Integrated PV, battery storage, and consumer products with advanced metering**.



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## Benefits of Collaboration with International SG Demonstration Projects

- Problem definition – different ways of looking at the challenges of the SG
- Different approach to demonstration projects – relative importance of critical elements
- Different starting point – some more or some less advanced than in the U.S
- Solutions to common problems – maybe the same problem was examined or is being examined in a similar project
- Shared findings
- Common issues related to standards development





## *Collaboration with Smart Grid Demo Partners – European Candidates*

**European Union**

- **ADDRESS (Active Distribution network with full integration of Demand and distributed energy RESourceS)**
- **MORE Microgrids (eight sites)**
- **IRED/ISET**
- **EUREC**
- **Solar Europe Industry Initiative (SEII) *Grid integration priorities for PV***

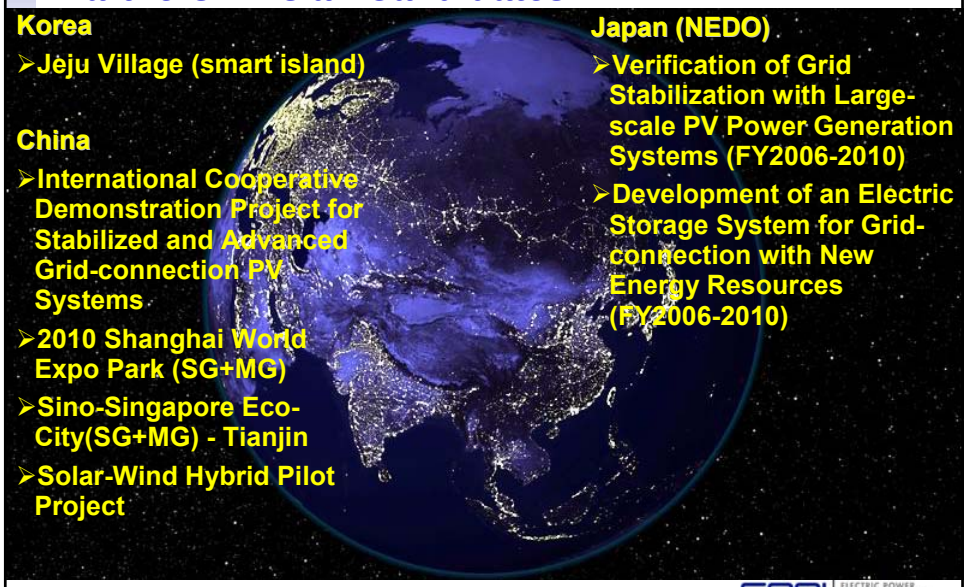
**Germany**

- **Model Region Cuxhaven: high percentage of renewable energies (wind), energy storage**
- **Model City Mannheim: Active distribution network**

**Spain**

- **Álava Trial – VPP**
- **FENIX (EDF/ Iberdrola)**

## Collaboration with Smart Grid Demo Partners – Asian Candidates



**Korea**

- Jeju Village (smart island)

**China**

- International Cooperative Demonstration Project for Stabilized and Advanced Grid-connection PV Systems
- 2010 Shanghai World Expo Park (SG+MG)
- Sino-Singapore Eco-City(SG+MG) - Tianjin
- Solar-Wind Hybrid Pilot Project

**Japan (NEDO)**

- Verification of Grid Stabilization with Large-scale PV Power Generation Systems (FY2006-2010)
- Development of an Electric Storage System for Grid-connection with New Energy Resources (FY2006-2010)



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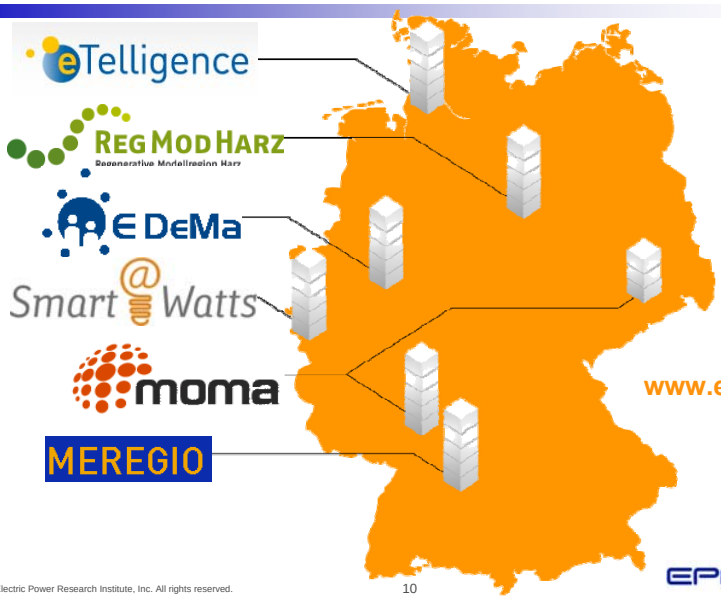
## The German SmartGrid Program

E-ENERGY




www.e-energy.de



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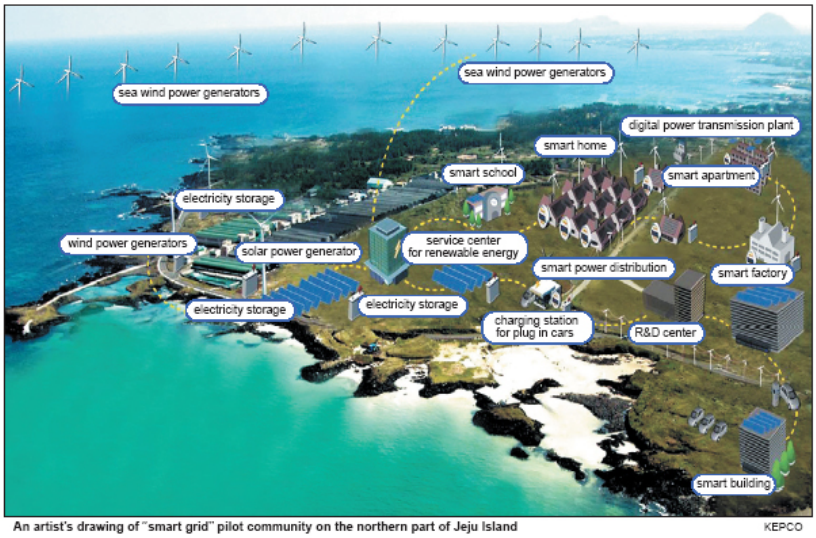
# Jeju Island Smart Grid Pilot Project




An artist's drawing of "smart grid" pilot community on the northern part of Jeju Island KEPCO

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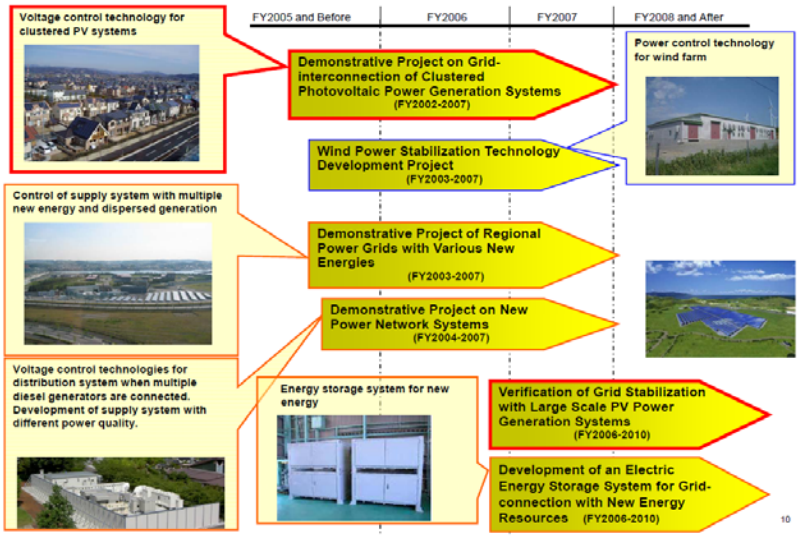
# NEDO Grid Related Connection Projects







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# NEDO: Large Scale PV Project

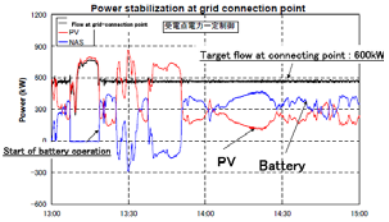
**Verification of Grid Stabilization with Large Scale PV Power Generation Systems (FY2006-2010)**

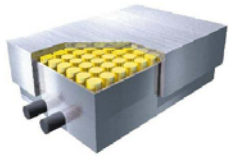
NEDO

## Achieving scheduled output from renewable energy

**Mega-solar capacity data**
◆Wakkanai site
2 MW, (5 MW will ultimately be installed). Most PV cells are crystalline.
◆Hokuto site
600 kW (2 MW will ultimately be installed).
26 types of PV arrays have been installed.

**Battery storage installed at Wakkanai site**
◆NaS (sodium sulfur) battery: 500kW-7.2 hrs (1500 kW-7.2 hrs will ultimately be installed.)







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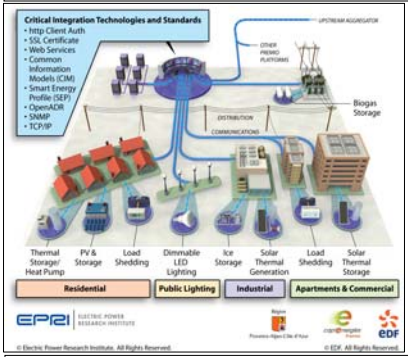
# EDF PREMIO: Distributed Energy Resources Aggregation and Management" PACA Region – CAP ENERGIES – EDF

**Objective: Demonstrate an innovative, open, and repeatable architecture to optimize the integration of distributed energy resources in order to provide load leveling/peak shaving, local network support and reduce CO2 emissions in the South East of France**




**EPRI CEs Addressed:**
- CE1: To further expose issues that need to be addressed and enable widespread integration of DER
- CE2: To evaluate integration issues and incentives associated with customer response and linking supply with demand
- CE3: To demonstrate integration tools and techniques to achieve full integration into system operations and planning
- CE4: To identify gaps associated with standards, harden critical integration technologies and advance adoption

**Activities over next 6 Months (Q4 2009)**
- Installation and documentation of experimentations
- Monitoring of the first field data, calibration of equipment and communications (residential, public lighting, apartments, commercial)
- Methodology for technical and economical impact assessment

**Q1 2010**
- Start of experimentations operation and monitoring

**Accomplishments to date and Lessons Learned:**
- Installation of the experimentations is in progress, the monitoring of the first field data is expected before the end of the year
- Integrate the recruitment costs in the cost benefit analysis
- Take into account local characteristics and energy consumption behaviors in the optimization process
- Better integrate TSO planning issues through a methodology accounting for DSM management actions at the distribution level
- Need to adopt a common semantic for the definition of actors, functions and data exchanges
- Demand Response needs a higher level of awareness in the public at large





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*Electricite de France EDF* – Project Summary
*"PREMIO: Distributed Energy Resources Aggregation and Management"*

| | | | |
|---|---|---|---|
| **Project Description:** Demonstrate an innovative, open, and repeatable architecture to optimize the integration of distributed generation, storage, renewable energy resources, demand response and energy efficiency measures to provide load relief, local network support and reduce CO2 emissions in the PACA region (South East of France) | | | |
| **Start Date:** 01/01/2008 | | **End Date:** 06/30/2011 | |
| **Project Manager: Olivier NORMAND** | **Phone:** +4972161051348 | **E-mail:** olivier.normand@edf.fr | |
| **Street:** Emmy-Noether strasse 11 | | **City:** KARLSRUHE | **State:** Germany |

**Project Participants:**

- EDF R&D – Main contributor
- CAPENERGIES (www.capenergies.fr) – Regional project lead and coordination
- "Conseil Regional PACA" – Regional orientation of the needs and dissemination of the results
- Municipality of Lambesc (10,000 inh.) – hosts the project in PACA
- Other industrials partners involved in the experiments: WATTECO, CARMA, GIORDANO, CYXPLUS, SAED, VERDESIS, ERDF
- University : Ecole Nationale des mines de Paris- Sophia
- DSM and environmental French agency : ADEME
- Transenergie : design and coordination of the monitoring and the evaluation

**CE1 – Integration of multiple distributed resource types**

Objectives: To further expose issues that need to be addressed and enable widespread integration of DER.
The project includes nine families of experiments/distributed resources:
1. Thermal storage for industrial and tertiary cooling applications
2. Hot water tank coupled to a heat pump to provide load shifting in houses
3. Individual electric storage unit coupled to PV panels
4. Load shedding module dedicated to residential and small tertiary buildings
5. Load shedding box for houses and apartments
6. Dimming of LED based public lighting
7. Electricity generation unit thanks to solar thermal storage
8. Solar heat pump along with hot water storage
9. Biogas storage for electricity generation

Progress: The installation of experiments 2, 3, 4, 5, 6 and 8 is in progress and should be operational by the end of the year. The customer recruitment is completely achieved for 2, 3, 4, 6, 8, some delay is expected for 1 (at least one over the 2 sites), 7 and 9.

**Key Deliverables:**

Lessons Learned:

- The set up of experimentation protocols (including recruitment costs) for public buildings/installations may affect the calendar (some delays are expected). For future replication analysis, the balance between the saving potentials for each family and the complexity (cost) of recruitment should be assessed.
- Schools have a high level of energy saving and peak shaving potential (heating systems)

Suggested Improvements for the Future:

- To challenge the opportunity/risks of experimentation on public buildings
- To integrate the recruitment costs in the cost benefit analysis



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# Together…Shaping the Future of Electricity

**Dōmo arigatō!!**
**Go raibh maith agat!!**
***Merci beaucoup!!***
**Thank YOU!!**


**Comments/Questions**

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307-200-1788



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