



Partnership Forum:  
Innovation for Smart and Resilient  
Communities  
Asia Development Bank

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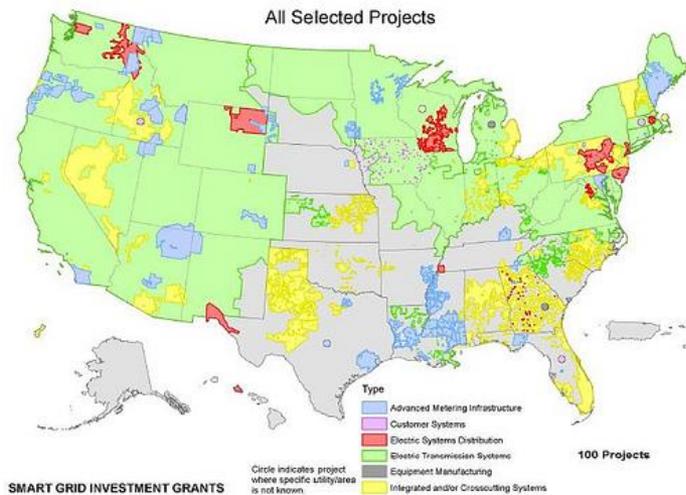
# Lab to Market for Resilient and Smart Communities

Solving What Matters Most™

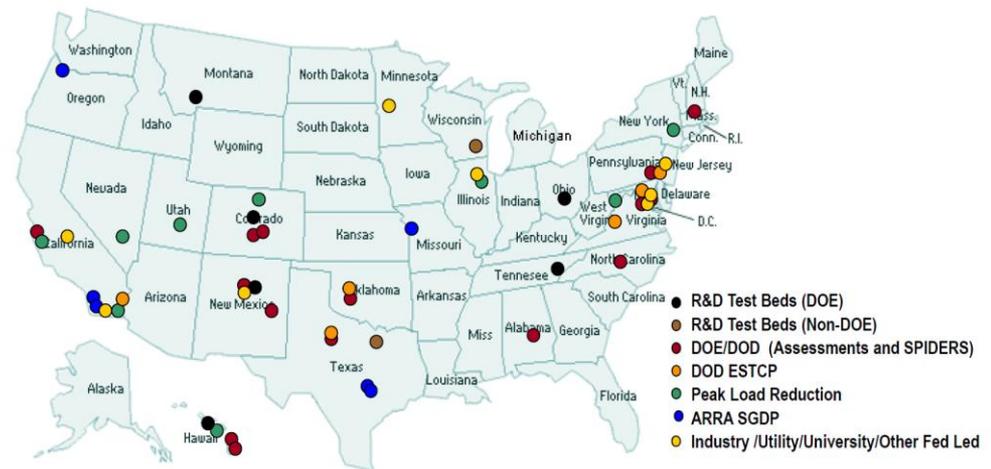
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# Building on Experiences of USDOE Smart Grid Activity

## Smart Grid Investment Grants

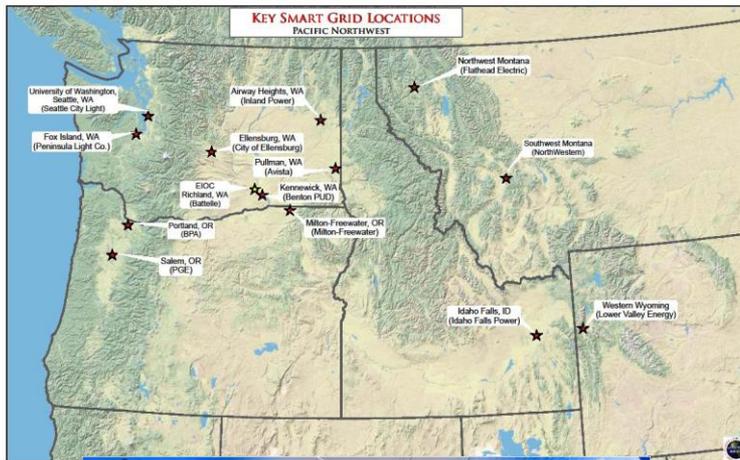


## Smart Grid Initiatives



Between 2009 - 2014  
 32 projects overall (16 demonstrations)  
 \$870M total w/ \$435M from DOE (50%)

# Battelle Engaged in the Two Largest US DOE Smart Grid Demonstration



- PNNL - \$177.6 million (\$88.8 million DOE funding) PNNL led this project which involved 60,000 consumer sites to demonstrate two-way communications, storage, demand response, interoperability standards, cybersecurity.
- BMI - \$150.3 million (\$75.2 million) infrastructure for 110,000 consumers testing 13 technologies including distribution automation and control, smart meters and appliances, home area networks, plug-in hybrid electric vehicles, energy and battery storage, and renewable generation

# Final Reports from USDOE Demonstrations Smart Grid Technology Performance Reports

- Discussions of **interactions with project stakeholders**.
- Descriptions of the technologies and systems used in the project, including **how the capabilities and functions are being used to produce grid impacts and benefits**.
- Descriptions of the methodologies and algorithms for **estimating the physical and financial performance** of the smart grid systems.
- Summaries of the results of the **performance of the smart grid systems and technologies** derived from lab tests, field tests, or grid-connected applications.
- Summaries of the results of the analysis of grid impacts and **estimation of benefits**.
- Summary of the major findings and conclusions including **lessons learned and best practices**.

# Where Communities Should Work Closely Together

| Challenges                      | Approaches   |
|---------------------------------|--|
| Making the unfamiliar, familiar | Modeling and case studies to provide a comprehensive but clear view of the system and benefits                                 |
|                                 | Involving individuals and organizations that have not been in the power business   |
| Getting the incentives right    | Allow utilities to keep benefits of efficiency gains; provide rebates to consumers   |
|                                 | Advanced IT is treated as a operating rather than capital expense. Thus utilities often cannot increase rates and gain an ROI. |
| Allow the market to work        | Rate regulations may need to evolve to allow for dynamic, real-time pricing  |
| Interoperability and security   | Adopt interoperable protocols, ensure systems-level, built-in cybersecurity and privacy guidelines regarding household data    |

# Grid Command Distribution (GCD) provides optimization by analyzing various grid scenarios

- Unique capabilities for distribution modeling, including physical load models and market mechanisms
- Easy-to-use modeling tools built on the dominant US government grid software program, the GridLAB-D platform

## Capabilities

Renewable integration  
Distributed generation  
Demand response  
Electric vehicles  
Volt-VAR control  
Energy storage  
Microgrids



*Power Systems • Loads • Markets*





# Battelle

*The Business of Innovation*

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