



Energy Storage Systems Program 2010 Update Conference

Eddie Christy

Director, Energy Delivery Technologies Division

November 2, 2010



ARRA - Electricity Delivery and Energy Reliability

- For an additional amount for 'Electricity Delivery and Energy Reliability,' \$4,500,000,000: *Provided*, That funds shall be available for expenses necessary for electricity delivery and energy reliability activities to **modernize the electric grid**, to include demand responsive equipment, **enhance security and reliability of the energy infrastructure, energy storage research, development, demonstration and deployment**, and facilitate recovery from disruptions to the energy supply, and for implementation of programs authorized under title XIII of the **Energy Independence and Security Act of 2007** (42 U.S.C. 17381 et seq.): *Provided further*, That **\$100,000,000 shall be available for worker training activities**: {Text Removed} *Provided further*, That for the purpose of facilitating the development of regional transmission plans, the Office of Electricity Delivery and Energy Reliability within the Department of Energy is provided \$80,000,000 within the available funds to conduct a resource **assessment and an analysis of future demand and transmission requirements** after consultation with the Federal Energy Regulatory Commission: *Provided further*, That the Office of Electricity Delivery and Energy Reliability in coordination with the Federal Energy Regulatory Commission will provide technical assistance to the North American Electric Reliability Corporation, the regional reliability entities, the States, and other transmission owners and operators for the formation of interconnection-based transmission plans for the Eastern and Western Interconnections and ERCOT: *Provided further*, That such assistance may include modeling, support to regions and States for the development of coordinated State electricity policies, programs, laws, and regulations: *Provided further*, That \$10,000,000 is provided to implement section 1305 of Public Law 110-140: {Text Removed}

ARRA OE (Non-Demo) Efforts

- **SG Investment Grants:**
 - \$3.4B government value
 - 99 Awards made
- **State and Local Energy Assurance Grants –**
 - ~ \$55M government value
 - 94 awards made (51 (formula) to “States” and 43 (competitive) to “Municipalities”)
- **Public Utility Commission Support**
 - ~ \$50M government value
 - 49 (formula) awards made
- **Interconnection Planning**
 - ~\$80M government value
 - 6 awards to industry; 7 “awards” to National Labs
- **Workforce Training**
 - ~ \$100M government value
 - 53 awards made

Smart Grid Demo and ES FOA

- **Authorizing Language**

- *ARRA American Recovery and Reinvestment Act of 2009, Pub. L. 111-5*
- *Energy Independence and Security Act (EISA) of 2007*
- *Directly supported the Energy Storage Competitiveness Act of 2007*

- **FOA Schedule**

- *Issued - June 25, 2009*
- *Applications Due - August 26, 2009*
- *Announcement – November 24, 2009*

EISA 2007

- **SEC. 1304. SMART GRID TECHNOLOGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION.**
 - (b) SMART GRID REGIONAL DEMONSTRATION INITIATIVE.—
 - (1) IN GENERAL.—The **Secretary shall establish a smart grid regional demonstration initiative** (referred to in this subsection as the “Initiative”) composed of demonstration projects specifically focused on advanced technologies for use in power grid sensing, communications, analysis, and power flow control. The Secretary shall seek to leverage existing smart grid deployments.

Demo FOA Selections

- **32 Selections worth:**
 - \$620M of ARRA Funds
 - \$1.028B cost share
 - \$1.648B total project value
 - 62.4 % cost share
- **Demonstrations performed in 24 States**
- **Customer Base of the utilities participating in the 32 projects is approximately 100M**
- **Using the CEA formula (\$92,000/job), the total value of the 32 selections would result in ~ 17,900 jobs created**

Smart Grid Demonstration Selections

- **12 End-to-End demonstrations are valued at \$411.6M**
 - Encompass majority (7 encompass all) of EISA 1301 areas to create a full functionality Smart Grid
- **4 Technology specific demonstrations are valued at \$23.5M**
 - Fault current limiting transformer (Waukesha)
 - Modular/open-architecture software solution with mil-grade cyber security capabilities for transmission (Boeing)
 - DLR for potential 15% increase in HV-line power transmission (Oncor & Power Authority of NY)

Energy Storage Description

ENERGY STORAGE (Program Area of Interest 2)

An objective of this FOA is **to support demonstration projects for major, utility-scale, energy storage installations.** The projects will help to establish costs and benefits, verify technical performance, and validate system reliability and durability, at scales that can be readily adapted and replicated across the **United States.** Energy storage systems include the following technologies: **advanced battery systems (including flow batteries), ultra-capacitors, flywheels, and compressed air energy systems.** Application areas include wind and photovoltaic (PV) integration with the grid, upgrade deferral of transmission and distribution assets, congestion relief, and system regulation. Applications are also sought to demonstrate promising utility-scale storage technologies in order to rapidly advance their market readiness in the U.S.

ARRA Energy Storage – Aol #1 & #2

- **Area 1 – (\$60.8M) Battery Storage for Utility Load Shifting or for Wind Farm Diurnal Operations and Ramping Control**
 - Duke Energy Business Services LLC, “Notrees Wind Storage”
 - Southern California Edison Company - “Tehachapi Wind Energy Storage Project”
 - Primus Power Corporation “Wind Firming EnergyFarm(TM)”
- **Area 2 – (\$24.1M) Frequency Regulation Ancillary Services**
 - Beacon Power Corporation - Beacon Power 20 MW Flywheel Frequency Regulation Plant

ARRA Energy Storage – Aol #3

- **Area 3 - (\$19.1M) Distributed Energy Storage for Grid Support**
 - Premium Power Corporation, “Distributed Energy Storage System Demonstration”
 - The Detroit Edison Company DTE Energy's Advanced Implementation of Energy Storage Technologies
 - Public Service Corporation of New Mexico (PNM) PV Plus Battery for Simultaneous Voltage Smoothing and Peak Shifting
 - City of Painesville, “Vanadium Redox Battery Demonstration Program”
 - East Penn Manufacturing Company Grid-Scale Energy Storage Demonstration for Ancillary Services Using the UltraBattery Technology

ARRA Energy Storage – Aol #4

- **Area 4 - (\$54.6M) Compressed Air Energy Storage (CAES)**
 - New York State Electric and Gas - Advanced CAES Demonstration Plant (150 MW) Using an Existing Salt Storage Cavern
 - Pacific Gas and Electric Company Compressed Air Energy Storage

ARRA Energy Storage – Aol #5

- **Area 5 - (\$25.2M) Demonstration of Promising Energy Storage Technologies**
 - Seeo Inc, “ Solid State Batteries for Grid-Scale Energy Storage”
 - Ktech Corporation, “Flow Battery Solution for Smart Grid Renewable Energy Applications”
 - Aquion Energy = “Demonstration of Sodium Ion Battery for Grid Level Application”
 - Sustain X Inc. Demonstration of Isothermal Compressed Air Energy Storage”
 - Amber Kinetics Inc. – “Flywheel Energy Storage Demonstration”

ARRA Energy Storage Projects

- **Project Details on Wednesday**