

ARRA Energy Storage Demonstrations

Recipient	Project Title	Project Description	Commissioned Date (Plan or Actual)	Status Narrative (As of Feb. 2013)
SustainX	Demonstration of Isothermal Compressed Air Energy Storage to Support Renewable Energy Production	1.5MW/1MWh non-grid-tied above-ground isothermal compressed air energy storage (CAES) pilot system	Nov-13	Fabricating/assembling full-scale pilot ICAES system for 9 month pilot test (non-grid-tied)
City of Painesville	Painesville Municipal Power Vanadium Redox Battery Demonstration Program	1 MW/8MWh vanadium redox flow battery for load following for Painesville Municipal Power station	Late 2013	Essentially all R&D has been completed. Battery building construction complete. Ready to gear up for production of flow battery stacks.
Aquion Energy	Demonstration of Sodium-ion Battery for Grid-level Applications	Demonstrated Aquion Energy's 10-15 kWh prototype sodium ion battery at Aquion's facility (non-grid tied)	NA	Project completed
New York State Electric & Gas Corporation	Advanced CAES Demonstration 150 MW Plant Using an Existing Salt Cavern	150MW compressed air energy storage system for bulk energy storage. Project has been terminated.	NA	Recipient requested termination after phase 1 feasibility study. Termination was effective Nov 2012. https://www.smartgrid.gov/document/seneca_compressed_air_energy_storage_caes_project
Amber Kinetics	Demonstration of a Flywheel System for Low Cost, Bulk Energy Storage	20KW (2 x 10kW) flywheels storing 80kWh energy in a pilot demo for demand management in SDG&E territory	Jan-14	Beginning phase 2 scale-up for grid-tied demo with commercial partner/customer. http://www.smartgrid.gov/sites/default/files/pdfs/tpr_final_phase1_amber_kinetics.pdf
Public Service Company of New Mexico (PNM)	PV Plus Battery for Simultaneous Voltage Smoothing and Peak Shifting	750KW/2.8MWh advanced lead acid battery for voltage smoothing and PV firming on PNM distribution feeder.	Sep-11	1.5 years into a 2-year demo. Executing various test plans for smoothing, shaving, and firming. Also working on predictive models for cloud cover. http://www.smartgrid.gov/sites/default/files/pdfs/PNM_TPR_rev2_09_24_12.pdf
Detroit Edison Company	Detroit Edison's Advanced Implementation of Community Energy Storage Systems for Grid Support	S&C Electric, 18 CES units DowKokam Li-ion batteries + 2 CES units secondary use EV batteries Li-ion Bosch Batteries (total 20 units @ 25kW/50kWh each of 500kW/1MWh) for distribution side service providing aux. power for increase service reliability and quality.	Jun-13	5 CES units are currently being installed.
Hazle Spindle LLC (Beacon Power)	Beacon Power 20MW Flywheel Frequency Regulation Plant	20MW (200 x 100KW) flywheels for frequency regulation in PJM	Sep-13	Site clearing has been completed. Rough grading well underway. Majority of equipment and material orders have been placed. GC has been selected for site construction.
Primus Power Corporation	Wind Firming EnergyFarm™	25MW/75MWh zinc bromine flow battery system for wind firming in Modesto Irrigation District	Aug-14	Design has been frozen. Beginning to fabricate pilot stacks for pilot testing and 3rd party validation testing. Once complete, design may be refined using knowledge gained. Full-scale production of demo stacks will follow.
Ktech Corp	Flow Battery Solution for Smart Grid Renewable Energy Applications	250kW/1MWh EnerVault Iron Chromium flow battery for firming PV	Oct-13	Detailed design for 250 kW system is complete and system components procurements are underway.
Seo Inc	Solid State Batteries for Grid-Scale Energy Storage	~25kWhr Seo prototype in conjunction with solar PV	Jun-13	Prototype pack design is complete and the pack manufacture is in process.

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Pacific Gas & Electric	Advanced Underground CAES Demonstration Project Using a Saline Porous Rock Formation as the Storage Reservoir	300MW CAES	Mar-21	Candidate sites were selected from counties east of San Francisco and core well samples are being taken to select optimum site for pressure testing.
East Penn Manufacturing	Grid-Scale Energy Storage Demonstration for Ancillary Services Using the UltraBattery™ Technology	3MW East Penn UltraBattery (ultra-capacitor/lead-acid) providing frequency regulation services	Jun-12	The energy storage system initiated operations in June 2012 providing frequency regulation services to the grid of PJM interconnection.
Premium Power	Distributed Energy Storage System Demonstration	1 MW Premium Power zinc bromide flow battery	2014/2015	Demonstration in conjunction with National Grid in planning.
Southern California Edison	Tehachapi Wind Energy Storage Project	8MW (32 MWh) Li-ion battery at substation within Tehachapi Wind Resource Area for voltage support, wind integration, frequency regulation, arbitrage	Early 2014	The majority of the construction activities are complete. Review and selection of battery provider in process.
Duke Energy Business Services	Notrees Wind Storage	36MW/24MWh Xtreme Power advanced lead acid battery for Wind Farm storage for frequency regulation as the targeted service.	Jan-13	Operational. Gathering data.
Battelle Memorial Institute	Pacific Northwest Smart Grid Demonstration Project	42kW/170kWh Demand Energy Networks advanced lead acid batteries (4 x 10kW/40kWh units + 2 x 1kW/5kWh units) for peak load management, demand response, and renewables firming	Mar-12	Operational
		125kW/125kWh ZBB zinc bromine flow battery peak load, demand response, and renewables firming	Mar-13	Operational
Long Island Power Authority	Long Island Smart Energy Corridor	5MW/1.25MWh EnerDel Li-ion battery for high-reliability zone/microgrid support.	Mar-13	To be located in Salem, OR
Long Island Power Authority	Long Island Smart Energy Corridor	12 sealed AGM lead acid batteries planned for demonstration of storage in the residential demonstration model at Farmingdale; 60 Amp., 720W, 12V.	Jul-13	AGM = absorbed glass mat
Kansas City Power & Light Co	KCP&L Green Impact Zone Smart Grid Demonstration	1MW/1MWh (13.2kV) Superior Lithium Polymer Battery Storage (SLPB) system, grid-connected	Jun-12	Operational
AEP Ohio	gridSMART SM Demonstration Project	100kW/100kWh (4 units @ 25kW each) S&C Electric PureWave Li-ion batteries for Community Energy Storage	TBD	15 of the 80 planned units were installed and subsequently removed from service and returned to the vendor for troubleshooting due to technical issues
Consolidated Edison Company of NY	Secure Interoperable Open Smart Grid Demonstration	Battery storage at 7 locations, lithium phosphate, capacity range is 25-200kWh, 40-500kW maximum output	May-13	Three units have been installed. PI indicates that remaining four installations may be dropped. http://www.smartgrid.gov/sites/default/files/OE0000197-Con-Edison-Technology-Performance-Report-July%205%202012-Revision_1.pdf
Center for Commercialization of Electric Technologies	Technology Solutions for Wind Integration in ERCOT	1MW/1MWh Xtreme/Samsung Li-ion battery for wind integration with Texas Tech and the South Plains Electric Coop	Dec-13	Purchase order issued for battery

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Southern California Edison	Irvine Smart Grid Demonstration	17 homes with Residential Energy Storage Units (4kW/10kWh LG Chem Li-ion battery)	Jul-13	LG batteries are automotive grade
		9 homes will share a community energy storage unit (25kW/50kWh battery)	Jul-13	
		100kW/90kWh battery supporting a grid-connected PV charging station for 20 cars.	Jul-13	
Pecan Street Project	The Pecan Street Project Energy Internet Demonstration	6kW/6kWh Sony Li-ion battery & 6kW/15kWh LineStar Energy Server Li-ion battery Both to be installed at Pike Powers Test Laboratory in Austin, TX	May-13	Testing/evaluation for residential use. Potentially other battery chemistries and vendors to be tested in the future.
City of Fort Collins	3.5 MW Mixed Distributed Resources for Peak Load Reduction	156kW (2 - 5kW PHEVs and 146kW of thermal storage). Power delivery from PHEVs to grid was not included.	Jun-11	Limited peak demand reduction.
Chevron Energy Solutions	CERTS Microgrid Demonstration	2MW/4MWh BYD iron phosphate battery	Mar-12	On a closed-loop micro-grid that includes wind and solar at the Santa Rita Jail in Dublin, CA (Alameda Co)
San Diego Gas and Electric	Borrego Springs	500kW/1500kWh Saft Li-ion battery installed at Borrego Springs substation.	Sep-12	Field testing and integration with DMS ongoing. The Advanced Energy Storage (AES) system will be used to perform functions such as scheduled dispatch, peak shaving, and load following.
University of Hawaii	Managing Distribution System Resources For Improved Service Quality and Reliability, Transmission Congestion Relief, and Grid Support Functions	1MW/1MWh A123 Li-ion battery installed at Wailea substation	Apr-13	Supports reactive power and peak demand management.
University of Nevada Las Vegas (UNLV)	Integrated PV, Battery, Storage, and Customer Products with Advanced Metering	9 units - Silent Power On Demand Energy Appliances (9.2 kW/8.8kWh each Saft Li-ion batteries) for peak shaving and PV integration sized for individual homes.	Jun-15	One unit installed as of February 2013, the remainder to be installed by June 2015.
ATK Launch Systems	Alliant Techsystems (ATK) Launch Systems Demonstration Project	300kW/1200kWh EaglePicher Technologies AGM Lead Acid Battery	Jun-15	For peak shaving and integration of 100kW wind farm and 100 kW waste heat generation unit
Consolidated Edison Co.	Interoperability of Demand Response Resources	Ice Storage Plant (10,000 cooling tons of ice)	Jul-13	Goal is to reduce peak load by approximately 1000kW.
Allegheny Power	West Virginia Super Circuit	24kW/50 kWh Li-ion batteries (3 units @ 8 kW each) with target discharge duration of 2 hrs	Oct-13	On a microgrid that includes 40kW of solar and 160kW natural gas backup generator
Illinois Institute of Technology	IIT Perfect Power Demonstration	250kW/500kWh ZBB zinc bromine flow battery	Jan-13	Unit was installed at Illinois Institute of Technology (IIT) Galvin Institute's "Perfect Power" campus micro grid project.