

National, Regional Policy Update Infocast Storage Week 2011

Coalition to Advance Renewable
Energy through Bulk Storage (CAREBS)

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CAREB's Mission

- Promote the benefits of bulk energy storage to enhance electricity grid operations, including integration of renewable energy, improved reliability and security, advanced market development, and cost efficiencies throughout the production and delivery value chain
- Shape and support federal policies affecting bulk energy storage, work with key state-level and storage organizations to advance energy storage generally, and **act as a conduit between federal, state, and regional policy**
- Distinguish bulk energy storage from distributed storage options - CAES, Pumped Storage Hydroelectric, large-scale batteries and flywheels

Why Talk About Bulk Storage?

- Electricity supply industry has precious little ability to “store” its product – just in time inventory
- Electricity has to be consumed as soon as it is produced!
- Renewable energy is variable – at expected penetration levels, will change the way the grid has to operate
- The U.S. has less grid energy storage (~2%) than other developed countries (4-10%)

CAES Technology Status

- 50 plant years of commercial operation – 270 MW facility, Huntorf, Germany (1977), 110 MW facility, McIntosh, Alabama (1994) operated by Power South
- System Improvements for 20% performance gain over McIntosh available from the marketplace today with full warranties
- Advanced systems teed up - Adiabatic CAES and Next-Generation CAES systems slated for demonstration through ARRA Stimulus funding
- U.S. based supplier (Dresser Rand) with U.S. manufacturing base! Others could bid as well. Performance guarantees available
- More than a dozen commercial and demonstration projects currently being considered
- Above-ground (power plant) piece – today’s commercial offerings pose little to no technology risk
- Below-ground (storage medium) piece – cavern storage proven, aquifer storage needs demonstration but natural gas storage in similar geologies operating for decades

Pumped Storage Technology Status

- Represents 21,000 + MW of storage currently serving the U.S. electricity grid and 127,000 MW worldwide.
- 2.5% of U.S. generation capacity, 5% of Europe's, and 10% of Japan's.
- New variable speed machine designs substantially add operating flexibility and shorten response times.
- More than three dozen projects in development around the country, many in the Western U.S., with preliminary FERC permits issued
- Environmentally manageable closed-loop water system
- No aquatic habitat issues, e.g., no fish

An Emerging Policy Framework

Layers of Legislation/Policy Supporting Storage

Federal Layer	FERC				DOE	EPA	CONGRESS	
	NOPR Frequency Regulation Compensation in the Organized Wholesale Power Markets; (February 17, 2011) NOI Promoting Transmission Investment through Pricing Reforms (May 19, 2011) Electric Storage Technologies Request for Comments (June 11, 2010)				- ARRA Demo Funds ~ \$200 M ARPA - E Funding (12% devoted to storage or \$49 M)	- Carbon Reduction laws - Emissions Rules on Peaking GTs?	- Storage Investment Tax Credit (ITC) being re-introduced - Potential Clean Energy Standard Legislation - Clean Energy Development Bank (under discussion)	
National Layer	NERC				Eastern Interconnect Planning Collaborative			
	- Issued Report from Variable Generation Task Force - Annual Long-term Reliability Assessment				Modeling Studies Include Bulk Storage			
ISO/RTO Layer	NY-ISO	PJM	MISO	CAISO	ERCOT	WECC	SPP	
	FERC Approved Energy Storage Tariffs for Day-ahead and Real-Time Regulation Service Markets (15 min. intervals)	- Ancillary Service Regulation - Frequency Regulation	- Ancillary Services Tariffs - Developing Ramping Product	- Approved Tariffs for Ancillary Services from Non-generators Developing Ramping Product - Modeling Storage in Production & Forecasts	- Day-ahead Ancillary Services Tariffs and Market - Texas Nodal Market Beginning 2011	- Modeling Storage	Variable Energy Generation Policy Initiatives	
State Layer	NEW YORK	OHIO	CALIFORNIA	TEXAS	UTAH	KANSAS	OTHERS	
	- Storage R&D Program	- Storage Included in the PUCs Alternative Energy Portfolio Standard	- AB2514 Possible Storage Procurement Mandates - Storage Included in Integrated Resource Plan - SDGE Storage Rate Case	- Bill 1421 Utilities Code Amendment Energy Storage Equipment or Facilities - Proposed PUC Rulemaking on Legislative Target of 500 MW of Non-wind Renewable Energy	- Storage RPS - Proposed Renewable Energy Zones Include Storage	- Regulations to implement legislation supporting CAES	-24 states currently have RPS policies --Colorado PUC public hearing on CAES	

An Emerging Policy Framework

FEDERAL

Federal Layer	FERC	DOE	EPA	CONGRESS
	<p>NOPR Frequency Regulation Compensation in the Organized Wholesale Power Markets; (February 17, 2011)</p> <p>NOI Promoting Transmission Investment through Pricing Reforms (May 19, 2011)</p>	<p>ARRA Demo Funds ~ \$200 M ARPA - E Funding (12% devoted to storage or \$49M- expires at the end of this year)</p>	<p>Carbon Reduction laws</p> <p>Emissions Rules on Peaking GTs?</p>	<p>Storage Investment Tax Credit (ITC) being re-introduced</p> <p>Potential Clean Energy Standard Legislation</p> <p>Clean Energy Development Bank (reintroduced by the Senate Energy & Natural Resources Committee)</p>
	<p>Electric Storage Technologies Request for Comments (June 11, 2010)</p>	<p>Variable Energy Resources Notice of Proposed Rule Making; NOI Third Party Provisions of Ancillary Services; Accounting and Financial Reporting for New Electric Storage Technologies (June 16, 2011)</p>		

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ISO/RTO Layer

NY-ISO	PJM	MISO	CAISO	ERCOT	WECC	SPP
FERC Approved Energy Storage Tariffs for Day-ahead and Real-Time Regulation Service Markets (15 min. intervals)	Ancillary Services rates Frequency Regulation	Ancillary Services Tariffs Developing Ramping Product	Approved Tariffs for Ancillary Services from Non-generators Developing Ramping Product Modeling Storage in Production & Forecasts	Day-ahead Ancillary Services Tariffs and Market Texas Nodal Market Beginning 2011	Modeling Storage	Variable Energy Policy Initiatives

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State layers

NEW YORK	OHIO	CALIFORNIA	TEXAS	UTAH	KANSAS	OTHERS
Sustained storage R&D Program	Storage Included in the PUC's Alternative Energy Portfolio Standard	AB2514 Storage Legislation	Bill 1421 Utilities Code Amendment	Storage RPS	Regulations to implement legislation supporting CAES	30 states currently have RPS policies Colorado PUC public hearing on CAES
Large Flywheel (20-MW) demonstration facility	Ground broke for huge CAES facility (Norton)	Storage Included in Integrated Resource Plan	Energy Storage Equipment or Facilities	Proposed Renewable Energy Zones Include Storage	CAES projects under development	
CAES DOE demonstration project		SDGE Storage Rate Case	Proposed PUC Rulemaking on Legislative Target of 500 MW of Non-wind Renewable Energy			
		CAES DOE demonstration project	Several PHS projects moving forward			
		Robust Storage R&D program	Several CAES projects under development			

Special topics, issues

- AWEA-ESA joint statement of principles and CAREBS-NHA response
- Will state RPS's hold under severe fiscal restraint?
- California clearly holds near-term opportunity
 - 33% RPS by 2020
 - AB2514
- California issues
 - Integrated Energy Policy Report
 - CEC Renewable Energy Credit (REC) Guidebook
- We're all competing against cheap gas “as far as the eye can see”

What CAREBS asks for...

- Re-introduction of the storage investment tax credit (ITC) – Senate bill. Bingaman (NM), Wyden (OR), Congressman Thompson (CA), others
- Appropriate subsidies and incentives that recognize storage as a cost-effective multiplier of renewable energy delivered through the grid
- Inclusion in the proposed Clean Energy Credit program
- FERC incentives similar to transmission assets
- Classification by FERC as a separate asset class with its own benefits to the grid
- Inducements to electric utilities and ISO/RTOs to evaluate bulk storage on a equal basis with generation and transmission assets

Marketplace Realities

- **Legislative/policy framework still evolving**
- Value to monetize still may not be transparent
 - Carbon credits
 - Costs of cycling fossil units
 - Modeling capabilities still evolving
- Underground CAES consistently exhibits lowest estimated capital costs of all storage options
- CAES and PHS equipment come with WRAP and performance guarantees
- CAES and PHS satisfy response time and duration requirements of most storage applications
- CAES and PHS pose the least technological risk for storage
- Severe fiscal constraints at all governmental levels, weak electricity demand forecasts and high reserve margins (ERCOT one exception), and the shale gas “revolution” challenges the marketplace

CAES and PHS can compete against today’s prevailing options - gas turbine and combined-cycle solutions and deeper cycling of fossil assets – in select locations

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