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07-21-11
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Beacon POWER™

June 28, 2011

Beacon Power Corporation Comments to California Public Utilities Commission

CPUC Electric Energy Storage Proceeding
Rulemaking 10-12-007

Judith Judson

R.10-12-007 AYK/jt2

Beacon Power Overview

- Manufacturer and merchant developer of flywheel storage
  - Frequency Regulation
- Successful grid demonstration project in CA in 2006
- Operating up to 3 MW in ISO-NE since November 2008
  - 2011: Operating first commercial-scale 20 MW plant in NYISO
  - Developing second 20 MW plant in PJM

Flywheels in ISO-NE

20 MW plant in Stephentown, NY

Increased Regulation is necessary to meet CA Renewable Goals

Does this make sense?

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- Regulation provided by generators varying output
  - Decreases efficiency
  - Increases fuel consumption
  - Requires more maintenance
  - Increases emissions

Smarter Solution: Storage

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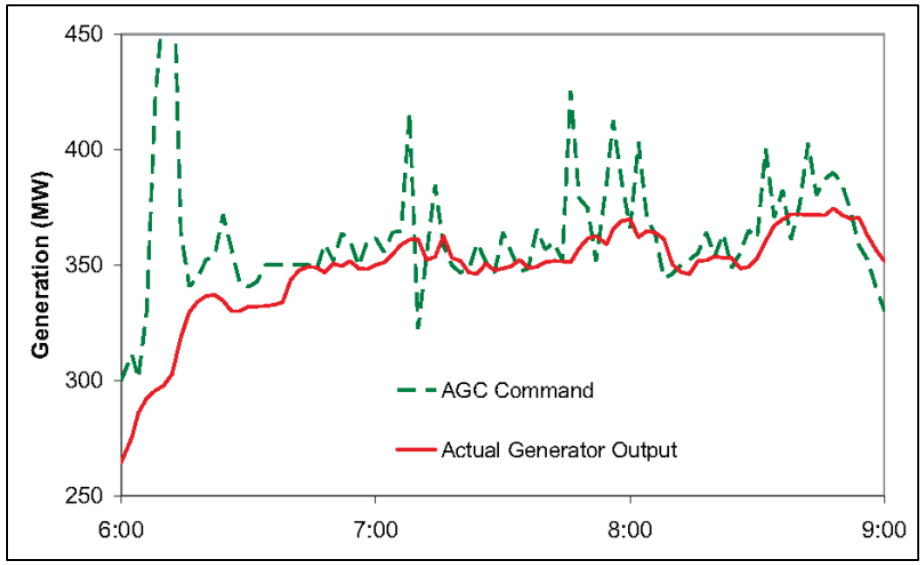
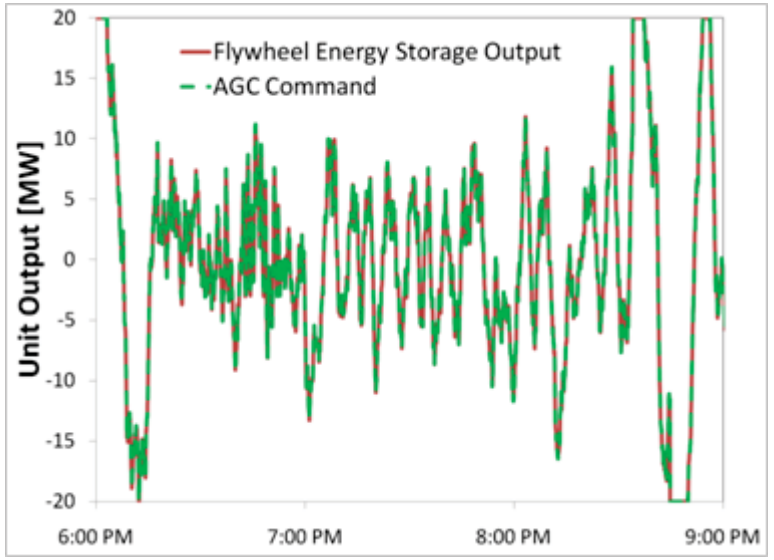
- Store energy when supply exceeds load; inject energy when load exceeds supply
  - High round trip efficiency
  - Low operating cost
  - **Zero direct emissions**
  - **Fast accurate response**

Fast Regulation: Speed Matters…



Slow ramping
Generator



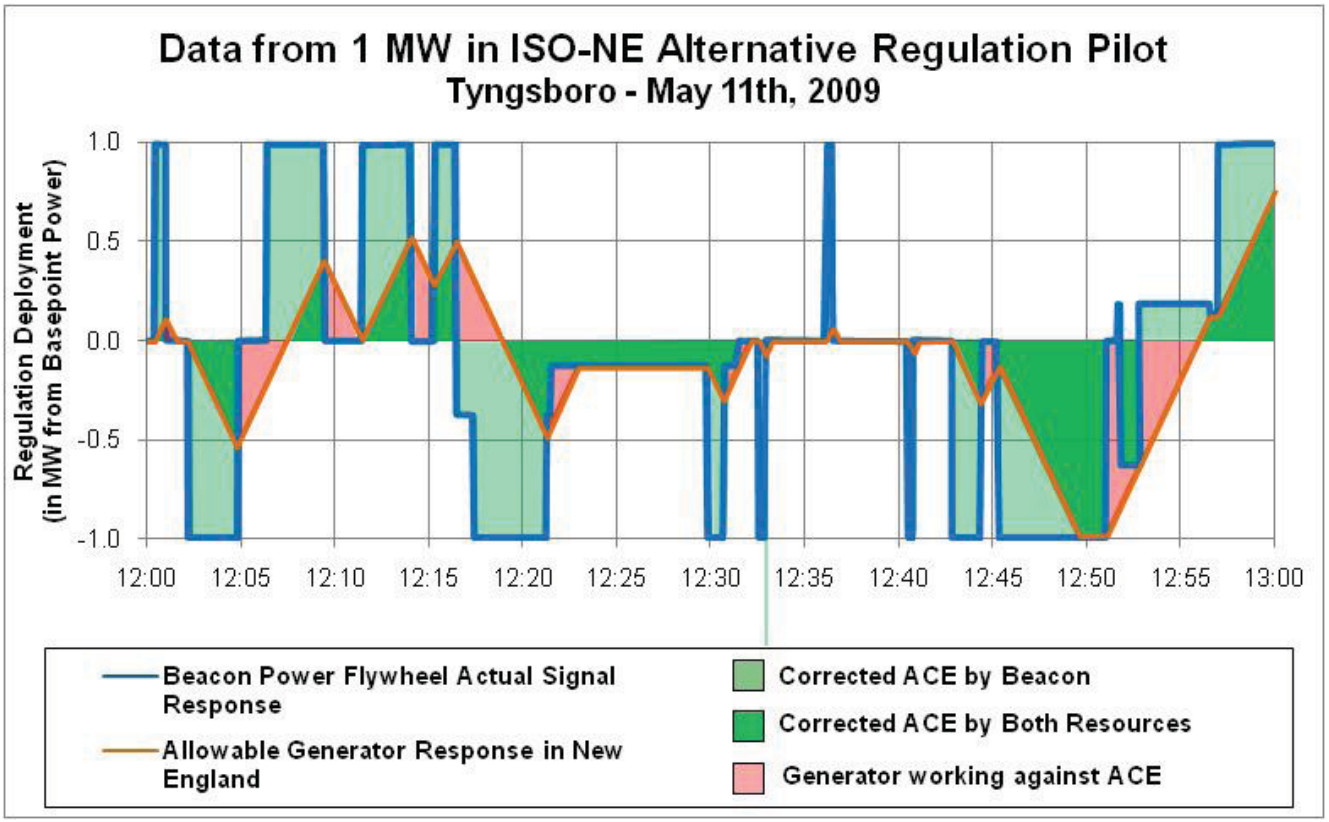
Fast response
Flywheel Energy Storage

Advanced Storage provides fast accurate response to the frequent and unpredictable changes in renewable output

Sources:
- Kirby, B. "Ancillary Services: Technical and Commercial Insights." Wartsilla, July, 2007. pg. 13

Fast response resources can control the grid with less MWs

- **Fast responding flywheels provided 4x more Regulation Service per MW**



	1 MW of Regulation	
	Flywheel	Generator
ACE Corrected	0.48 MWh	0.18 MWh
Against ACE	0 MWh	-0.07 MWh
Net ACE Correction	0.48 MWh	0.11 MWh
Mileage	25 MW miles	8 MW miles

Flywheels provide more Regulation Service per MW;
Enabling less total procurement and cost

Data from Beacon Power's NYISO plant demonstrates storage benefits

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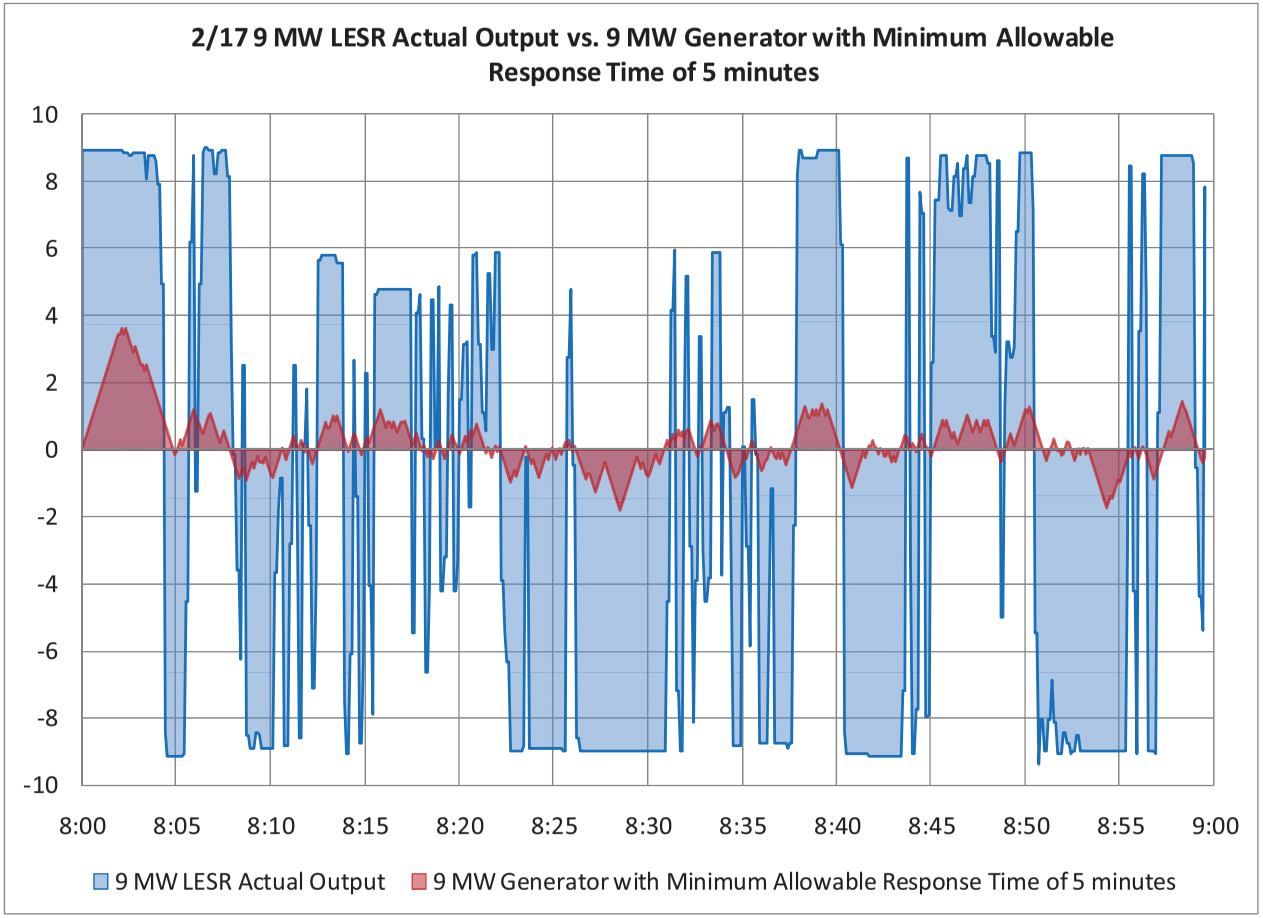
- **NYISO utilizing fast response storage as "first responders" to ACE**

Reliability Benefits:

- Respond near instantaneously to unpredictable changes in wind
- Improve control performance

Cost benefits:

- Reduce high-cost deployments on traditional providers
- Enables generators to operate closer to economic optimum
- Reduce wear and tear on generators



Fast response storage provides cost and reliability benefits for ratepayers

Policy Recommendations

- Remove barriers to advanced storage technologies in CAISO Regulation market
  - Support implementation of Regulation Energy Management (REM)
- Compensate the additional value provided to the grid by fast responding Regulation technologies in CAISO
  - FERC issued NOPR to reform Frequency Regulation Compensation (February 17, 2011)
  - Performance (“mileage”) payment based on quality, speed and accuracy
- Resource Adequacy and long-term procurement requirements for storage
  - Include storage resources that only provide ancillary services
- Allow storage to participate in RPS

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