5th ANNUAL SILICON VALLEY / SEEDZ ENERGY STORAGE SYMPOSIUM
The Emerging Market for Customer-Side Energy Storage

May 21, 2014
Microsoft, Mountain View

Event Partners

Exhibitors

Santa Clara Valley Chapter, IEEE
Energy Storage: Empowering the Grid or Driving Defection
Overview

• The evolving electricity grid is facing a number of challenges – a need for greater resiliency, increased and rapid deployment of renewables and a desire to reduce emissions.
• As the industry faces these challenges, distributed generation and energy storage are causing many to question the basis of a shared, centralized electrical grid.
• What is the role that energy storage plays in this new paradigm and how is it evolving?
ESA MEMBERS
The Challenges

- Increased deployment of renewables is creating challenges for grid operators.
- The need for greater resiliency is opening up markets for augmenting the T&D system and creating microgrids.
- Maximizing our current assets to reduce emissions and enabling wider renewable deployment requires a shift in thinking about the electrical grid.
SEPTEMBER 2012
PJM introduces a second, fast moving regulation signal (RegD)

PAY FOR PERFORMANCE IMPLEMENTED

$13.75 MWh
$38.75 MWh

MARKET CLEARING PRICES

OCTOBER 2012
Regulation requirements reduced

DYNAMIC FAST RESPONDING RESOURCES (REGD)

OCTOBER 2012
19
6

OCTOBER 2013

450 MW
OF DYNAMIC FAST, RESPONDING RESOURCES

REGULATION REQUIREMENTS (MW)

PJM coordinates frequency regulation through two different control signals:
RegD - fast moving dynamic regulation (e.g. batteries, flywheels)
RegA - Traditional regulation resources (e.g. single cycle gas turbines)
West Texas Wind

- 14 GW already deployed, and another 7 GW on the way
- Largest electricity storage system in the U.S. deployed there – 36 MW Notrees Facility – to meet need
- Intermittency is creating an inherent need for smoothing and load shifting
- Peak load does not line up with peak production
Estimated Demand Response in PJM: September 10, 2013

Notes:
- Registered Emergency DR Amounts adjusted for RPM Commitments (do not represent actual energy reductions).
- LMPs included to represent energy market conditions on the operating day and not a relationship between dispatched DR and prices.
- Emergency DR estimate adjusted by expected reductions for the period after the mandatory compliance period (Hours 21 and 22).
- Actual load reductions are not finalized until up to 3 months after event.
SEPTA Train System

- Regenerative braking combined with energy storage creates a microgrid able to participate in energy markets
- Stacking of benefits of storage making for a viable project
- Able to deliver ancillary services to the grid and use load modulation as a demand response asset
Key Lessons Learned

• The evolving grid will begin to function more and more as a platform for innovation
• Energy storage is enabling the deployment of more renewable energy and distributed assets on the grid
• Each of the examples explored today involved the collaboration of stakeholders from across the energy industry – we must work together
What Lies Ahead

• The electrical grid – in the short term – will inevitably be a collaboration of central and decentralized assets
• Changes will happen incrementally, at different speeds across the country
• New regulation and policy on the horizon will change the incentives and drivers for innovation on the grid
  • EPA to propose new rules for generator emissions June 2
  • Quadrennial Energy Review – focused on infrastructure
  • PJM and ERCOT overhauling ancillary and capacity markets
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