Energy Storage Valuation Methodology and Supporting Tool

Ben Kaun
Sr. Project Engineer
Electricity Advisory Committee: Storage Valuation Panel
6-6-13
Electric Power Research Institute (EPRI)

- **Independent, non-profit, collaborative** research institute, with full spectrum electric industry coverage

- EPRI members represent ~90% of energy delivered in the U.S.

- Energy Storage Research Program has over 30 funding utility members
Energy storage defies characterization as a generation, transmission, distribution, or customer asset.
Fundamental Question: What Services is Energy Storage Providing to the Grid?

Cost of Storage exceeds benefits from single service

Focus should be on stacking benefits.
Stacking Benefits: Understanding Storage Valuation is a Journey of Multiple Phases

Later phases involve increasing detail, complexity, resources.

Validated tools for storage valuation are needed.
EPRI Proposed Methodology for Clarifying the Phases of Storage Valuation

1. Grid Services
   - Defined Grid Services
   - Technical and Benefit Calculation

2. Use Cases
   - Direct benefits of combined grid services
   - Approximate storage lifetime cost-effectiveness

3. Grid Impacts
   - Indirect impacts of storage deployment
   - Environmental impacts

4. Business Cases
   - Real world value to decision-makers
EPRI Energy Storage Valuation Tool (ESVT) Supports this Methodology

INPUTS
- Time-Varying Prices/Loads
- Financial Assumptions
- Storage Cost / Performance

MODEL
- Optimization of Storage Operation

OUTPUTS
- Cost / Benefit
- Detailed Financials
- Storage Operation
ESVT Applied to Inform CPUC Energy Storage Proceeding

Example Result (Draft): 2020 Bulk Battery Storage Peaker Substitution Base Case

- Benefit/Cost Ratio = 1.17
- Breakeven Storage Capital Cost: $831/kWh ($1662/kW)

CPUC Input Summary

Year 2020
50MW, 2hr (battery)
CapEx = $1056/kW, $528/kWh
1 Batt Replacement @ $250/kWh
11.5% discount rate
83% RT Efficiency
Energy & A/S prices escalated 3%/yr from CAISO 2011

2020 Base Case

EPRI is Informing Regulators of Storage Value;
>30 Scenarios with Inputs Defined by CPUC stakeholders;

Public Report: June 30
Together…Shaping the Future of Electricity