Distributed Resource Integration
A Part of a Bigger Picture

Burbank Water and Power

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Burbank Water and Power

- Burbank Water and Power (BWP) is a full service, vertically integrated municipal utility, not part of the CA ISO, with typical daily peak of 170MW, and an annual peak of 300MW
- Power mix composed of coal, natural gas, nuclear, large hydro, biogas, small hydro, with geothermal and grid solar projects underway
- BWP responsible for generation-load balancing
- BWP operates 465MW of plants in Burbank and in the State of Washington, for itself and the Southern California Public Power Authority
- BWP customer solar growing rapidly, 2MW with 4MW planned by 2016
- Currently 25% renewable, achieved with rate increases less than the rate of inflation since 2007 when this goal was established
- IRP process underway
BWP Smart Grid Efforts

• THANK YOU DOE FOR YOUR GRANT
• Began the business planning, operational mechanics, and architecture in 2006
• Elements
  – High capacity, low latency IPv6 network that extends to each customer
  – Employs wireless mesh networks, and high speed fiber network fail over schemes
  – Security designed into the system from the beginning
  – Open standards employed
  – Integrated Automated Dispatch System developed
  – Full AMI deployment with Meter Data Management and Distributed Energy Resource
  – State of the art billing system
• Designed to handle 33% RPS
Integrated Automated Dispatch System

- Integrated ADS is the brain of the BWP system operations
- System unit commit with attention to DER and variable grid connected generation
- Day ahead scheduling with DER, solar/wind forecasted response, and variable generation
- Current day look ahead for load, DER, variable generation refinement
- Current hour adjustments at 5-minute intervals
Integrated Automated Dispatch System

• Computes the cost of:
  – Energy
  – Regulating
  – Spin and Non-Spin Contingency Reserves

• Computes volatility of load and variable resources

• Manages Demand Responses and confirms DR

• Can evaluate effects on distribution system
Integrated Automated Dispatch System

• Integrated ADS is composed of
  – SCADA system
  – Automated Generation Control
  – Dynamic schedule operations and management
  – Scheduling and Dispatch computer tools

• Open Access Technology International
• Schneider Electric-Telvent
• IPKeys
Business Planning and Operational Mechanics

• Electric utility role similar to that of telephone
• Flexibility is needed
• Security is needed
• Market issues are complex
• Regional solutions and cross regional solutions
• Change is the local space most noticed
• Rates vital
Going Beyond 33%

• Use Remote Bulk Energy Storage
  – Pumped Hydro
  – Compressed Air Energy Storage

• Collect grid connected RE and shape it into a high capacity factor flow of RE electricity that can flow to urban area

• Use Local Energy Storage with DER, DR, and urban generation to meet load requirement
Schulte Associates’ Study

• Leveraged the Iowa CAES study
• Found CAES could shape wind energy into a product that was very much like base load coal
• Used the wind basins in Utah and Wyoming
• Crude spreadsheet study-results hopeful
• Raised the hope that CAES might be cost-effective for shaping wind energy
• CAES could also provide other values that are more generally recognized ... those values were not taken into account in the Schulte study
Local Storage and DER Role

• Fitting a high capacity stream of high RE content electricity to load requires coordination

• Solar can reduce system loads in mid-day ... allowing for recharging local storage

• Demand response can locally balance generation and load

• Urban generation can be scheduled to meet needs

• Local storage investments can be kept to a minimum
Integrated ADS

• Integrated ADS solves this process through successive iterations
• Next step: need a bigger, better study of CAES that will fully evaluate its value
• Need the operational mechanics to capture those values
• By 2016, BWP is expecting to have a lot of solar in power supply at solar noon on a light load day
Beyond Storage and RE Integration

• Project Blackstart
  – Early recognition of BES breakup
  – Separation and successfully islanding of local grid
  – Failure to island
    • Generation microgrid to avoid Black Trip
    • Restart generation using local power plants
    • Restore island
  – Reconnect to BES
  – Reconnect to other microgrids
THANK YOU