Avista Distribution and Transmission Planning

March 10, 2017
Docket UE 161024
Agenda

• Distributed Energy Resource Planning in the IRP
• Optimizing Distributed Energy Resource (DER) Value
  – Enabling Systems
  – Pilots to Learn
• Distribution Planning
  – Overview
  – Current & Future State Analysis Capabilities
• Transmission Planning
  – Overview
  – Evolving Standards Requirements
  – Solution Alternatives Analysis
Distribution Planning from a IRP Perspective

James Gall, Integrated Resource Plan Manager
DER Planning in the IRP

Solar  Storage  Conservation
C&I Backup Generation  C&I Demand Response

Capital recovery
Taxes
O&M
TRC (conservation)
Energy consumption (storage)

Benefits
Energy
Peak reduction
Deferred T&D capital
Reduced line losses
Reduced portfolio risk
Ancillary services (storage)
Improved reliability (storage)

Costs

PRiSM Economics

Economics
5 MW Solar in Othello, WA (summer peaking feeder) ($/MWh Levelized)

- Energy: $34.17
- Ancillary services: $0
- Line losses: $1.62
- System peak reduction: $0
- Power supply risk reduction: $1.1
- Distribution/transmission Investment avoidance: $0.9
- Reliability: $0
- Power quality: $0
- Externalities: TBD

Total Value: $37.79 per MWh

- Total costs for utility scale solar with energy integration is expected to be $55 to $65 per MWh for a long term PPA
- Assumes utility scale project developed by a 3rd party, utility ownership will derive different cost due to ITC accounting
- Renewable Energy Credit value is not considered

Current Valuation:
- PV value: $3.3 million
- PV costs: $5.3 million
- NPV: -$2.0 million

Energy value uses 2017 IRP draft price forecast
Distribution & Transmission Planning

Heather Rosentrater, VP Energy Delivery
Optimizing DER Value

Foundational Enabling Systems

Smart Grid Demonstration & Investment Projects

- American Recovery and Reinvestment Act Grants
- Smart Line Devices and Distribution Management System
- Fault Detection, Isolation and Restoration – Reliability
- Integrated Volt/Var Control - Energy Efficiency
- Advanced Metering Infrastructure Pilot Project

Future Enabling Systems

Washington Advanced Metering Infrastructure Project

- Communication Network

Supervisory Control And Data Acquisition Expansion Project

- Three Phase Measurement at Substation Feeders
Optimizing DER Value
Pilots to Learn

- Community Microgrid
- Building Fleet Efficiencies
- Optimize DER Utilization
- Flexible Grid
- Resiliency

Economies of Scope
- Ancillary Services

Centralized Assets
Distributed Assets

Economies of Location
- T&D and G Offsets
- Reactive Support
- Power Quality

Digital Grid
- SmartGrid
- AMI

Shared Economy
- Community Microgrid
- Building Fleet Efficiencies
- Optimize DER Utilization
- Flexible Grid
- Resiliency

Transactive Economy
- Transactions to Optimize Utilization of Assets
- To Meet all Stakeholders Needs

DMS – Distribution Management System
MTG – Micro-Transactive Grid
ATS – Automatic Transfer Switch
MGC – Microgrid Controller
RTU – Remote Terminal Unit
BEMS – Building Energy Management System
BMS – Battery Management System
DER – Distributed Energy Resource
Optimizing DER Value
Pilots to Learn

Turner Energy Storage Project – Washington Department of Commerce

Clean Energy Fund I

- 1MW – 3.5 MWhr Vanadium Flow Battery
- Located Adjacent to SEL Manufacturing
- Use Case Valuation

<table>
<thead>
<tr>
<th>Use Case and application as described in PNNL Catalog</th>
<th>Avista</th>
</tr>
</thead>
<tbody>
<tr>
<td>UC1: Energy Shifting</td>
<td></td>
</tr>
<tr>
<td>Energy shifting from peak to off-peak on a daily basis</td>
<td>Y</td>
</tr>
<tr>
<td>System capacity to meet adequacy requirements</td>
<td>Y</td>
</tr>
<tr>
<td>UC2: Provide Grid Flexibility</td>
<td></td>
</tr>
<tr>
<td>Regulation services</td>
<td>Y</td>
</tr>
<tr>
<td>Load following services</td>
<td>Y</td>
</tr>
<tr>
<td>Real-world flexibility operation</td>
<td>Y</td>
</tr>
<tr>
<td>UC3: Improving Distribution Systems Efficiency</td>
<td></td>
</tr>
<tr>
<td>Volt/Var control with local and/or remote information</td>
<td>Y</td>
</tr>
<tr>
<td>Load-shaping service</td>
<td>Y</td>
</tr>
<tr>
<td>Deferment of distribution system upgrade</td>
<td>Y</td>
</tr>
<tr>
<td>UC4: Outage Management of Critical Loads</td>
<td></td>
</tr>
<tr>
<td>UC5: Enhanced Voltage Control</td>
<td></td>
</tr>
<tr>
<td>Volt/Var control with local and/or remote information and during enhanced CVR events</td>
<td>Y</td>
</tr>
<tr>
<td>UC6: Grid-connected and islanded micro-grid operations</td>
<td></td>
</tr>
<tr>
<td>Black Start operation</td>
<td>Y</td>
</tr>
<tr>
<td>Micro-grid operation while grid-connected</td>
<td>Y</td>
</tr>
<tr>
<td>Micro-grid operation in islanded mode</td>
<td>Y</td>
</tr>
<tr>
<td>UC7: Optimal Utilization of Energy Storage</td>
<td>Y</td>
</tr>
</tbody>
</table>
Optimizing DER Value
Pilots to Learn

Shared Energy Economy – Washington Department of Commerce

Clean Energy Fund II
- Solar, Storage and Building Management Systems
- Located in the University District – Spokane, Washington
- Use Case Valuation

Distribution Planning
Overview

• Primary goal – Safe and reliable service to all customers, efficiently at lowest life cycle cost

• Annually analyze entire system and identify constraints
  – Drivers: Capacity and Level of Service/Reliability

• Analyze alternative solutions, identify course of action, input to 5 year budget

• Requires continuously analyzing all available solutions and technologies
Distribution Planning
Current State Analysis Capabilities

• Varied data available per circuit
• 346 Circuits
  – 94 Circuits with Distribution Management System Control
  – 101 Circuits with 3-Phase Supervisory Control and Data Acquisition (SCADA)
  – 83 Circuits with 1-Phase SCADA
  – 68 Circuits without SCADA
Distribution Planning
Future Considerations

• Data needs depend on analytics, efficiency, and operational flexibility required
• Current project under consideration to upgrade to 3 phase SCADA on all circuits, $115M
• Evolution towards more data
  – Benefits to utility and customers under evaluation
  – Advanced Distribution Resource Planning may require additional employees and significantly more data than currently available
Transmission Planning
Overview

• Annual study of our transmission system
  – Required & Governed by NERC Standard TPL-001-4
  – Seasonal simulations analyzed out to 20 years
  – Requires reliable performance during outages
    • Performance requirements grow with each standard revision

• Drivers for Transmission Planning projects:
  – Reliability violations found during annual assessment
  – Generation Resource requests:
    • External developers
    • Internal IRP requests
Transmission Planning
Revised Standards Requirements Driving Infrastructure Needs

2003 Northeast Blackout
- Worst blackout to date in U.S.
- Task force is put together to investigate outage
- Final report concludes that to prevent future blackouts, govt. needs mandatory reliability standards.

2004
- Version 0 Reliability Standards
- In 2004, NERC begins translating it’s operating policies into 90 measurable standards

Energy Policy Act of 2005
- Authorizes the creation of an Electric Reliability Organization w/ oversight from NERC

2007
- NERC has been certified by FERC and reliability standards become mandatory for all Utilities

2016 Standards 2.0
- FERC & NERC improving
- Tighter standards
- New Transmission Planning modeling requirements
Transmission Planning
Typical Study - *Saddle Mountain Project*

- New 230/115 kV station south of Othello
- Process of the study:
  - TPL studies determine system violations
  - Former studies help establish context
  - Other projects are analyzed for potential overlap
  - Alternative projects are developed and vetted
  - Complete study performed for primary alternative
- Regional study completed at Columbia Grid
- Results documented in annual assessment
Transmission Planning
Considerations During Project Selection

- Impact on the TPL requirements
  - Does it solve some violations but create others?
  - Does it improve reliability more than other projects?
- Short-term and long-term cost
- Commercial viability
- Time to construct
- Synergy with other TPL or Avista projects
- New technology possibilities
- Discoveries made during regional process