Avista’s Smart Grid Technology

Platform for Innovation

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Who Is Avista?

- Founded in 1889 as Washington Water Power

- Investor-owned, regulated gas and electric utility, headquarters in Spokane, Washington USA

- 1,554 employees serving 359,000 electric and 319,000 natural gas customers in the states of Washington, Idaho and Oregon
American Recovery and Reinvestment Act

Smart Grid Investment Project
- Fifty Nine Distribution Feeders

Smart Grid Demonstration Project
- Thirteen Distribution Feeders
Smart Grid Enabling Technologies

Communication
• Tropos Radios
• Fiber Backhaul

Control Software
• Distribution Management System (DMS)
• Fault Detection Interruption Restoration (FDIR)
• Integrated Volt Var Compensation (IVVC)

Distribution Equipment
• Switches (S&C) Scada-Mate
• Reclosers (G&W)
• Switch Capacitor Banks (Cooper)
• Individual Phase Regulator (Cooper)
Big Wins
Automated Reliability and Switching

Fault Detection Isolation and Restoration: 4/1/2013 to 6/23/2015

• 16 automated restorations
• 9 Dispatcher remote restorations
* 1.75 million avoided customer outage minutes


• Avoided Truck Rolls: 3,583 miles
Big Wins
Conservation Voltage Reduction

IVVC on 72 Distribution Feeders

• Sensors constantly monitor voltage levels
• DMS system adjusts voltage levels
• Reduction in load from conservation voltage reduction

* Biennium 2012-2013 year energy savings: 42,292 MWhr
Lesson Learned

• Measurement – Know what you are trying to measure
  – Accurate Transducers (pt/ct)
  – Controller – Issues with dead banding and scaling

• Scada Front End - Product Scalability
  – Volume and Rate of Data
  – Real time Database inter-node synchronization

• Commissioning Process – Well-Defined
  – Validate Results

• Field Test the System – Beyond Simulation
  – By passing devices
  – Account real time state of system

• Operational Transition
  – Phase Implementation
  – Crew Participation

• Factory Acceptance Test
  – Include controller integration
DERMS Grid

• Leveraging Smart Grid Infrastructure for the Modern Grid Platform
Disruption to the Utility Industry

Vicious Cycle from Disruptive Forces

- Technology Innovation (DER)
- Energy Efficiency (EE/DR)
- Lost Revenues
- Rate Increase Required
- Customer Assessment

- Credit Downgrade
- Reduced Leverage
- Behavior Change

DER
Evolving the Solution Partnership

- Formulative Influence
- Shared Value and Risk Proposition
  - Joint Development Opportunity
- Best of Breed
  - Enterprise and Operational Collaboration
- Agile Operational Architecture
  - Modular Design with Points of Integration
  - Forecasting and Prediction
Advanced Distribution Management System

Common Platform

Outage Management

Grid Operations

Advanced Applications

SCADA

Switching Tagging

Grid Management
Enterprise Architecture

From Grid Operations to Customer Experience

Distribution/Transmission, Generation

Operations

emPower

Customer

Utility Enterprise

Consumer of Energy & Energy Services
Supplier of Energy & Energy Services (Future)

Energy Supplier
Energy Services Provider
Energy Services Broker (Future)
Grid Modernization
emPower Platform

- The customer value proposition
- The grid as a platform for distributed renewable assets
- New partnerships with third-party owners
- Utility managed smart inverters
Grid Modernization
Grid Storage – 1 MW Vanadium Flow Battery

- **Phase I – Physical Asset**
  - Requirements
  - Design
  - Install
  - Local Control

- **Phase II – DMS Integration**
  - Remote Testing and Commissioning
  - Operational Limits

- **Phase III – Use Case Validation**
  - UC1: Energy Shifting
  - UC2: Provide Grid Flexibility
  - UC3: Distribution System Efficiency
  - UC4: Outage Management of Critical Loads
  - UC5: Enhanced Voltage Support
  - UC6: Grid-Connected – Island Micro-Grid Operations

- **Phase IV – Optimization Engine**
# Avista’s Grid Modernization Road Map

<table>
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Organizational Processes
The Future of the Dispatch Center

Diagram showing the flow of processes involving Balancing Authority, DSO, DMS EMS Optimizer Inverter Controller, and other related components like EOP Mode, Operational Mode, Micro-Grid, Predictive Regulation and Restoration.
In Summary

• Big Wins – With Reliability and Load Reduction
• Lessons Learned
• Grid Modernization Road Map
• Distribution Management System – Platform for Innovation
Grid Storage
Distribution Management System Integration