Transactive Energy in the Northwest – An Avista Utility Perspective

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Who is Avista Utilities?

- Founded in 1889 as Washington Water Power Company
- Changed name in 1999
- Celebrated 125th Anniversary in 2014
- Investor-owned, regulated gas and electric utility
- Headquarters in Spokane, WA
- 1,680 employees
- 369,000 Electric customers
- 329,000 Natural Gas customers
- Serves Washington, Idaho and Oregon
Avista’s 126 Year History of Innovation

1903 Longest transmission line in the world
1910 Automatic control for electric range
1911 Automatic electric water heater
1915 Largest dam in the world with largest generator
1977 Established Itron
1983 First bio-mass plant in the world
1991 Developed first client-server CIS
1995 Established Ecova (sold to GDF Suez)
1996 Established Reli-On fuel cell company (sold to Plug Power)
2001 Developed the first GIS based OMS
2009-2013 Three ARRA smart grid grants
2015 Largest vanadium flow battery in north America and Europe
2015 Largest community solar in WA state
Pacific Northwest Smart Grid Demonstration Project

Smart Grid Investment Grant

- Replacement of older (higher loss) transformers
- Installing larger wire
- Installation of switched capacitors
- Redesign of secondary districts.

Smart Grid Workforce Training Grant

Smart Grid Demonstration Project
Smart Grid Infrastructure

**HAN (Home Area Network)**
- AMI Network (900Mhz)
- Demand Response/IHD
  - Homeowner Wi-fi
  - Internet using Cell or WiFi

**Neighborhood Area Network**
- AMI Network
- Tstat Cloud
  - Itron
  - Distribute Data to Tstat Cloud

**Distribution Area Network**
- Distribution Automation
- Power Quality Sensors
- Smart Transformers
- Capacitor Banks
- Smart Fault Indication
- Voltage Regulation
- Field Data Applications

**Core Network**
- Data Analytics
- CIS/WMS
- DR
- GIS/OMS
- DMS
- PI
- MDM/CE
- Blue Fin Transactive Signal System
- Utility Core Systems
- IA Apps

**Utility Core Systems**
- Battelle Ops Center

**Customer Mobile Device**
- Internet using Cell or WiFi
Localized Marginal Value (LMV)
Localized Marginal Cost (LMC)
Four Quadrant Valuation

- Five WSU Tiers
- Multiple Thermostat Tiers
- Leverages Forward Prediction, Real-Time Adjustment of Prediction
- Achieved Automated Prediction of Quantity and Value
- Achieved Manual Scheduling, with Full Automation Desired (5 minute intervals)
Avista’s Energy Storage Project

Explore how energy storage can help deliver stacked values for the electrical grid and customers; more flexible, reliable and resilient

- 1MW, 3.2MWh battery storage system
- $7M project
  - $3.2M Clean Energy Fund
  - $3.8M Avista matching
- Operating since April 2015 in Pullman, WA
Stacked Values in $/Year

- Resiliency
- Reliability
- Energy Risk
- Energy
- O&M Operations
- Negative Pricing
- Flex Market
- CVR Off-Peak
- CVR On-Peak
- Ancillary Services
- Avoided Cost Capacity
MicroGrids Enable the Shared Economy

Shared DER’s

DMS  
MTG Optimization Engine

Centralized Assets
Distributed Assets

Feeder #1

ATS

MGC/RTU

Feeder #2

ATS

ATS

1 MM Locations 4,100 Hotels 260,000 Listings
190 Countries 79 Countries 200+ Countries
$0.9B Revenue $13.8B Revenue $5.8B Revenue

Valuation: $25 Billion
Valuation: $21 Billion
Valuation: $12 Billion

Founded In: 2008
Founded In: 1927
Founded In: 1996

Airbnb  Marriott  Expedia
The Vision: A Micro Transactive Grid

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

Economies of Scope
- Ancillary Services

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

Productization
- OEM Model

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
Economic & Grid Use Cases Optimized for Maximum Value Transactions

Prediction

Intelligence at the Edge
Taking the Vision to the Edge

- Intelligent Grid Edge Agents
- Peer-to-Peer Transactions
- Peer-to-Peer Control
- Resiliency Services
- Electrical Locational Awareness
- Power Quality Assessment
- Forecasting & Optimization
Questions?