Imagining the Utility of the Future

Sharelynn Moore, Itron & Curtis Kirkeby, Avista
The Utility of the Future
SAFE, RELIABLE AND RESILIENT POWER DELIVERY

The grid is not going away

Optimize ROI on wires, pipes, communication/control infrastructure
DYNAMIC AND INTERACTIVE GRID

Real-time data and decision making at the edge drive operational excellence

Resource planning
System planning
System operations
DER integration
CONSUMERS BECOME PROSUMERS

Transactive energy at the distribution grid level requires a broker

- Market animation
- Localized transactions
- Pricing signals
- Settlement
- Compliance
NEW REVENUE OPPORTUNITIES

Rising customer expectations create opportunity

DER services *(renewables, EVs, storage, DR)*

Customized energy efficiency programs

“Experiential” service offerings: reliability, clean energy, time-based pricing, prepay

Infrastructure services to support public and government transportation, waste, safety offerings

Distributed apps, data-driven services
PATHWAY TO INDUSTRY TRANSFORMATION

» Meet today's operational needs while preparing for a transactive grid by deploying grid edge infrastructure that can be configured as simply as AMI today
» Improve business operational efficiencies through grid awareness
» Provide the ability to engage and equip consumers AND prosumers
» Invest in a platform that opens up new business models and revenue streams
WELCOME TO
THE ACTIVE GRID
Where the smart grid meets IoT
WHAT’S NEEDED FOR THE ACTIVE GRID?

A system designed to be easy to upgrade, from firmware to new devices to new applications

A mix of communications media to ensure low cost and assured connectivity

Machine learning to fine tune and optimize grid assets

An IoT designed network architected with open standards

Edge processing for near real time decision making (not just data collection)

Insight into the low voltage network at the edge and to the consumer

A platform that opens up applications to encourage new innovation that we haven’t even thought of yet

A grid partner with the expertise and strength to see a program through success and that recognizes the importance of multi-vendor monetization
A SOLID FOUNDATION

A scalable, secure, reliable communications network is critical to the success of every smart city.

» Platform for smart city applications
» Better manage energy and water resources
» Engage citizens in new ways
» Improve health and safety
THANK YOU
Imagining the Utility of the Future

Curtis Kirkeby
Avista Utilities
Avista – A mid-size northwest energy company
<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
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</thead>
<tbody>
<tr>
<td>1903</td>
<td>Longest transmission line in the world</td>
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<tr>
<td>1910</td>
<td>Automatic control for electric range</td>
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<tr>
<td>1911</td>
<td>Automatic electric water heater</td>
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<tr>
<td>1915</td>
<td>Largest dam in the world with largest generator</td>
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<tr>
<td>1977</td>
<td>Established Itron</td>
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<td>1983</td>
<td>First bio-mass plant in the world</td>
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<td>1991</td>
<td>Developed first client-server CIS</td>
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<td>1995</td>
<td>Established Ecova (sold to GDF Suez)</td>
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<tr>
<td>1996</td>
<td>Established Reli-On fuel cell company (sold to Plug Power)</td>
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<tr>
<td>2001</td>
<td>Developed the first GIS based OMS</td>
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<td>2009-2013</td>
<td>Three ARRA smart grid grants</td>
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<tr>
<td>2015</td>
<td>Largest vanadium flow battery in north America and Europe</td>
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<tr>
<td>2015</td>
<td>Largest community solar in WA state</td>
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Applying Design Thinking Methodology

“How Might We…” and WHY?
Technology is changing our lives… and transforming the energy industry

Rapidly emerging technologies are disrupting the way energy is generated, delivered and consumed.
Energy Industry is Undergoing a Digital Revolution

- Distributive Energy
- Data Analytics
- Internet of Things
- Changing Customer Expectations

_We must be deliberate and intentional if we are to shape how the future of energy evolves._
Investing in Grid Modernization

Three ARRA grants in 2009 helped Avista modernize our grid
We invested more than $80 Million of combined Avista and federal matching funds:
• **Spokane:** Smart Circuits
• **Pullman:** Smart Grid Demonstration Project
• **Workforce Training:** Next generation to build & maintain our system
Digitize our Distribution System & Modernize our Grid

- **Improve reliability:** sensors, switches & software detect and isolate outages
- **Power can be restored in minutes instead of hours**
- Customers experience **fewer and shorter outages**
  - 2 Million+ avoided outage minutes
- **Improve energy efficiency**
  - Save 42,000 MwH of energy annually
- **Automate activities** that were performed manually
Avista’s Community Solar Project

• 423 kW Community Solar Project
• 650 participants
  – More than tripled the number of Avista customers participating in solar
• Customer Web Tools to understand solar opportunity
• Customers engaged and satisfied
• Learn about building and operating large scale solar
• Participating in Washington State Congressional Solar Incentive
Customer Rooftop Solar
Avista’s EV Experience project

- Avista employees can test drive Electric Vehicle for one week
- 50+ employees tried it
- Survey showed on a scale of 0 to 5:
  - Perception and likelihood to buy was 2.5 before.
  - Increased to 4.7 after they drove the car for one week
Avista Energy Storage Project
Clean Energy Fund 1

• 1MW – 3.5 MWh Vanadium flow battery
  – Largest capacity vanadium-flow battery in North America and Europe
• Addressing industry challenge: how to integrate intermittent renewables into the electric grid
• Economies of Scope – use the battery every minute of every day
• Create a more reliable, resilient and flexible grid
Urbanova: Smart City living laboratory

- Collaborative effort with 6 founding partners:
  - Avista, City of Spokane, Itron, McKinstry, University District and WSU
- A living laboratory to design cities for the future
- Harness data to gain insights, empower people, solve urban challenges in new ways
Urbanova Goals

Our Goals:
• Healthier citizens
• Safer neighborhoods
• Smarter infrastructure
• More sustainable environment
• Stronger economy
Urbanova Initial Projects

- Smart and Connected Streetlight Pilot
- Shared Energy Economy Model Pilot
- Smart City Research Grant
  - WSU research health impacts of energy and air quality in urban setting
Smart and Connected Streetlight Pilot

- Helping define how to develop and design a living laboratory
- Intelligently manage and control streetlights to achieve Urbanova goals
- Human-scale urban air quality R&D component
- Establish data governance for shared information platform
- Central to Envision America participation
Creating a Shared Energy Economy Model

Clean Energy Fund 2

- Demonstrate how a Shared Energy Economy can benefit both consumer and utility
- Sharing energy assets (e.g. solar panels, battery storage)
- Sharing among consumers, buildings and utility
- Grid becomes more reliable, efficient, resilient and flexible
How is Urbanova unique?

• Data governance for shared information platform
• Who owns and controls data? How is data secured and shared?
• Platform allows users to explore, visualize and download location-based open data and drive innovation
• Create a proving ground that anyone can utilize and everyone will benefit from
• Possibilities are endless
IMAGINING THE UTILITY OF THE FUTURE
We will embrace change and...

Work with customers in new ways
to forge our energy future **together**
Thank You
QUESTIONS & COMMENTS