Innovation for Future Utility Business Model

University of North Dakota

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Avista Utilities Director of Avista Innovation Lab & Chief R&D Engineer
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Incorporated in 1889

Investor-Owned Utility with headquarters in Spokane, Washington

Over 1,700 employees

Electric and natural gas service
  - 379,000 electric customers
  - 342,000 natural gas customers
Avista’s Regulator Climate

Washington’s Legislative Agenda

- Energy Independence Act (EIA) I-937
- Clean Energy Transformation Act (CETA)
- Utility CETA Plan Submittal & NG Building Code
- CETA – Eliminate all Coal Resources
- GHG Neutral Electric Retail Sales
- 100% Renewable or non-emitting

2006
- EIA 9% Renewable

2016
- Climate Commitment Act (CCA) & Clean Fuel Standards

2019
- CCA – Emission Allowance Auction

2021
- Built Environment - Energy Performance Standards – 200,000 sqft

2022
- Built Environment - Energy Performance Standards – 20,000 sqft

2023

2026

2027

2030

2031

2045
Avista’s Strategic Investments
Avista’s Customer Adoption

Solar and EV

Solar Adoption Continues to Grow

WA installed capacity 23.18 MW (cap: 48.1 MW)
ID installed capacity 3.41 MW (cap: 593 MW)

2023 Forecast – 1800 installs

Registered Light-Duty Passenger EVs and Trucks in Washington Counties Served by Avista Electricity

Figure 49: Light-duty Registered EVs and Trucks in Washington Counties Served by Avista, 2017-2021

<table>
<thead>
<tr>
<th>Year</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Passenger Vehicles</td>
<td>408,710</td>
<td>417,567</td>
<td>416,749</td>
<td>417,245</td>
<td>418,481</td>
</tr>
<tr>
<td>Total Truck Vehicles</td>
<td>146,074</td>
<td>147,845</td>
<td>149,724</td>
<td>149,698</td>
<td>150,583</td>
</tr>
<tr>
<td>Total All Vehicles</td>
<td>554,784</td>
<td>565,412</td>
<td>566,473</td>
<td>566,943</td>
<td>568,939</td>
</tr>
<tr>
<td>Total EVs</td>
<td>867</td>
<td>1,245</td>
<td>1,558</td>
<td>2,134</td>
<td>2,837</td>
</tr>
<tr>
<td>% EVs of Total</td>
<td>0.2%</td>
<td>0.2%</td>
<td>0.3%</td>
<td>0.4%</td>
<td>0.5%</td>
</tr>
<tr>
<td>% EV Growth</td>
<td>37%</td>
<td>44%</td>
<td>25%</td>
<td>37%</td>
<td>33%</td>
</tr>
</tbody>
</table>
Avista’s Business to Invent

Avista’s Projects of Grid Edge Journey of Discovery

- 2013: Smart Grid Automation
- 2014: Community Solar Project
- 2015: Electric Vehicle Charging Pilot
- 2016: Battery Storage Project in Pullman Clean Energy Fund I
- 2017: Shared Energy Economy Pilot Clean Energy Fund II
- 2018: WA Advanced Metering Infrastructure
- 2019: Connected Communities
- 2020: Clean Energy Strategy Projects
- 2021: Innovation Engine
- 2023: Named Communities Investment Fund
Mission
Leverage Industry Expertise with a State-of-the-Art Innovation Lab to Deliver a Better Energy Future for all Customers

Vision
Build Bridges to a New Energy Future with a Clear Purpose
• Create New Pathways to Engage and Involve
• Operationalize First Iteration Grid Solutions
• Discover New Opportunities Through Data Insights
• Inform and Develop Best Practices
• Examine Assumptions and Influence Strategy

Values
Energy Innovation Lab Accomplishes its Work by Attracting and Developing Self-motivated, Entrepreneurial, and Collaborative Individuals
Avista’s Innovation does not conduct research. We operationalize the good ideas from industry, universities and national labs.

Partner Collaboration Model

Partner Research
- Multiple methods
- Multiple research Universities
- Concept validation
- Determine optimal approach

Avista Energy Innovation Lab
- Modeling/simulation
- Interface testing
- Hardware in the Loop
- Standard settings development
- Commissioning plan development
- Work practices

Avista Field Crews
- Settings deployment
- Site acceptance testing
- Commissioning
- Operational validation and data collection
$11.2M program (6.5M DOE grant + partner contributions).

The project will unlock demand flexibility up to 2.25 MW using flexible loads in the buildings augmented by DERs.

EE measures will save up to 900 MWh/yr.

Emissions reductions will be up to 650,000 lb CO₂e/yr.

Improve resiliency of grid in face of changing climate.
Solar PV
- 2 rooftops
- 100 kW each
- Smart Inverters

Building Load Controls
- 2 buildings
- Load Flexibility while Grid Connected
- Load Management while Islanded

Battery Energy Storage
- 500 KW / 1500 KWH
- 167 KW / 337 KWH
- Grid Forming Inverters

Microgrid Control System

Utility DMS

DER Optimization
A **Digital Substation** utilizes digital secondary systems, where CT/PT and control signals are digitized in the yard near the measurement point, and a fiber optic network communicates those signals back to the relays in a time-synchronized manner at high speed.

**IEC-61850**
- MMS (SCADA)
- GOOSE (Control wires)
- Sampled Values (CT/PT)

**Digital Substation Pilot – Capital Efficiency**
ADMS Phase Zero – Capital Efficiency

How do we move a legacy operational technology to the demands on the grid transformation?
What is an NSF Engines Program?

- **Robust partnerships**
  Deep collaborations across a wide range of partners, including industry, academia, government, nonprofits, civil society and communities of practice.

- **Accountable leadership**
  Strong, CEO-led organization with accountability to a governance board, regional stakeholders and NSF.

- **Regional economic impact**
  Co-design and co-creation of R&D and translation activities with direct impact on the end users in the Engine's region of service.

- **Culture of innovation**
  A nimble organization that engages in user-inspired R&D that adapts to changing societal and economic needs.

- **Inclusion at all levels**
  Diversity, equity, inclusion, and accessibility, or DEI, are intentionally and meaningfully embedded at all levels in leadership, R&D, and workforce development activities.

- **Comprehensive workforce development**
  Workforce development initiatives to train and educate technicians, researchers, practitioners, and entrepreneurs to meet regional workforce needs.
INTENT – Ecosystem

Regional Ecosystem
Regional Energy Platform – Ecosystem

What value proposition exists in DER’s participating in balancing services?
NSF Training Program

MIT REAP
Regional Entrepreneurship Acceleration Program

Accelerating Inclusive Economic Growth and Social Progress

MIT REAP is a dynamic global initiative with two programs – Global and Focus – that engages with communities around the world to strengthen innovation-driven entrepreneurial ecosystems and transform economies.

- You have a terrific opportunity to turbocharge your game with the help of MIT Regional Entrepreneurship Acceleration Program (REAP)
  - World leaders in helping communities around the world strengthen innovation-driven entrepreneurial ecosystems and transform economies
  - Thought leaders in understanding what it takes to “bootstrap” innovation ecosystems