Digitizing Utilities at BPA

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BPA Investment in Digitizing Utilities

• SynchroPhasor technology
  – Situational awareness and real time control
  – Long term archiving and data analytics
  – Parallel computing environment for running “big data” analytics

• Load testing and modeling
  – Air conditioners and heat pumps, LED lighting
  – Regional modeling of end use loads for planning studies
  – End use metering at residential and commercial buildings

• Network infrastructure
  – CIP-compliant multicasting, physical and electronic security
  – 24/7 monitoring

• BPA-wide data science user group

• Technology Innovation (TI) funding internal and external research projects
Challenges in Getting Value out of Data

Organizational

- Lack of technical expertise
- Engineers solving data science problems
- Limited time and availability
- Executive support and funding
- Overcoming “traditional” methods of operation

Technical

- Volume of measurement data
- Detecting and addressing “bad” data
- Improving infrastructure to support increased use
- Integrating data sets from multiple sources
- Generating actionable information
- Inherent variability in data
Digitizing Utilities Challenge Proposal

- Four primary tasks under BPA track
  - Temperature sensitivity of loads
  - Estimating electrification from measurement data
  - Impact of future electrification
  - Projection for regional-specific results
- Partnership with Clark PUD in Vancouver, WA
Task 1: Weather Sensitivity

- Perform weather sensitivity analysis and develop models correlating weather conditions and end use loads

Increased Residential Load Primarily Due to AC During Heatwave

81°F Day

112°F Day
Task 2: Electrification Estimation

- Use historical measurement data to estimate electrification (% AC, % heating, etc.) at unique substations/feeders.

![Graph showing load versus heat index for Substation 1 and Substation 2.](image)

Difference in load on hot days caused by difference in AC saturation.
Task 3: Impact of Future Electrification

- Increase in electric vehicles, heat pumps, etc.
- Changes in building codes, retrofitting
- Incentive programs at state and federal level

- Generate *realistic* electrification scenarios and address the impact on future demand
Task 4: Regional Projection

- Regional variability in weather sensitivity, electrification, incentive programs
  - Extreme hot/cold climate zones
  - Natural gas vs. electric saturation
  - State by state future electrification efforts
- Address impact of regional variability on end use load shapes, weather sensitivity models, and electrification estimates
Benefits of BPA's Participation

- Results will improve load modeling at WECC and NERC level
- Collaboration with local utilities to generate models at distribution level
- Best and brightest working on substantive and relevant problems
- Allows engineers to be engineers
- Long term partnerships beyond scope of prize period
- Potential high reward for minimal investment
Contact Info

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