SIX GOING ON SEVEN

Data Aggregation and Analysis

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TODAY’S AGENDA

☐ Project Overview
☐ Data Analysis Process
☐ The Results
☐ Next Steps
☐ Q&A
Thank You

9 DATA PROVIDERS
- Avista
- BPA
- Chelan PUD
- Energy Trust of Oregon
- Grant County PUD
- Idaho Power
- NEEA
- PacifiCorp
- Puget Sound Energy

5 STAKEHOLDER REVIEW GROUPS
- Council Staff
- Many Public Utilities
- NEEA
- NW Energy Coalition 7th Plan Working Group
- PPC 7th Plan Working Group
We want your feedback!

Comments go to dngidding@bpa.gov
PROJECT OVERVIEW
BONNEVILLE POWER ADMINISTRATION

BACKGROUND

- BPA uses Power Plan as our Conservation Potential Assessment (CPA) to set EE goals
  - We must ensure BPA and public power utilities understand and are confident in the results
- During the 6th Plan review process
  - many questions arose that we didn't have time, scope or resources to fully explore
- Therefore, for the 7th Plan process, we have developed a project to conduct technical analysis
Goal of this project is to:

- Conduct a technical review of regional savings achievements toward the 6th Power Plan
- Conduct research on questions posed by BPA, its customer utilities, and other stakeholders
- Supplement Council staff analytics, providing unbiased data on where savings occurred

Outputs of the project provide the region with information to support effective CRAC participation by BPA, customer utilities and regional stakeholders
This project has answered technical questions like:

- What were achievements since 6th Plan?
- Where are the gaps?

And conduct market research on questions like:

- What are barriers to adoption of specific technologies?
- What is the experience in other regions?

This project doesn’t answer fundamental policy questions like:

- What are the correct ramp rates?
- What should the target be?
Technical Analytics

- Publics
- BPA
- Council Staff
- Contract

Policy Decisions

- IOUs
- Regional Stakeholders
- Public Utilities
- BPA
- Council Staff
- CRAC
- Council Members
ACTIVITIES

PROJECT TIMELINE

6 COLLECT DATA
Q2/2013

ANALYZE DATA
Q3/2013

REPORT FINDINGS
Q4/2013

7 ASSESS 7TH PLAN SUPPLY CURVES
2014

LITERATURE REVIEW

MARKET RESEARCH

DATA COLLECTION

DATA ANALYSIS
LITERATURE REVIEW

6th Power Plan Literature Review

- Document that summarizes and organizes main themes
- Provides links to 6th Plan literature
- Will be available online at Conduit website

32 DOCUMENTS
900 PUBLIC COMMENTS
Our Plan: Conduct 20 Interviews of Utility Program Representatives

- Understand why the data look the way they do
- Identify successes and challenges
- Compile a list of other emerging technologies that utilities are offering that are not included in the 6th Plan supply curves
DATA COLLECTION

What Was Requested

- Measure specific savings data on achievements from 2010-2012
- Non-programmatic and market transformation savings

Participating Utilities Provided

- Sector, end-use and some and measure specific savings data

But Utilities Reported Data Differently

- Wide range in granularity
- Variance in sector types
- Different measure classifications
DATA ANALYSIS PROCESS

- DATA CLEANING
- DATA MAPPING
- DATABASE DEVELOPMENT
- DATA ANALYSIS
YELLOW POWER ADMINISTRATION

DATA CLEANING

Process Included

- Reviewing the data
- Removing fuel switching measures
- Removing NEEA savings from utility data to avoid double counting
- Extracting relevant data
- No adjustments to savings were made
DATA MAPPING

Purpose
- Data are mapped to common **end-uses** & some specific measure categories
- Mapping allows utility data to be summarized in one data set
- After mapping, utility end-uses & measures align with the 6th Plan and can be compared

Measure Naming
- **Sector** → Residential
- **End-Use** → Lighting
- **Category** → CFLs
DATA MAPPING

1. BPA Measure Naming
   Similar to how most utilities report data

2. 6th Power Plan Measure Naming
   Useful in comparing utility data directly to the 6th Power Plan

Mapping Challenges

- Wide range of granularity
- No common naming across the region
- Measures not included in the 6th Power Plan
- Custom measures, in many cases, could not be defined
### DATA MAPPING: Example Difference in Measure Naming

1. **BPA**
   Categorizes **end-uses** by building system.

2. **6th Power Plan**
   Categorizes **end-uses** by a mix of building system and technology.

<table>
<thead>
<tr>
<th>Sector</th>
<th>End-Use</th>
<th>Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>Water Heating</td>
<td>Clothes Washer</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential</td>
<td>Appliance</td>
<td>Clothes Washer</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
OUR DATA MAPPING SOLUTION

UNIFY ALL UTILITY DATA
with the BPA measure naming scheme

MAP SIMILAR MEASURES
Map unified data to the 6th Plan measure naming scheme where possible

OVERCOME NAMING DIFFERENCES
Utilities name their measures differently. Not all measures are included in the 6th Plan supply curves
DATABASE DEVELOPMENT

Function
- Compile all utility data into one file
- Maps utility data to the 6th Plan by end-use

Features
- Database linked to Excel workbook
- Allows data to be easily added or updated over time
How We Analyzed the Data

- Summarized savings achievements by:
  - Year
  - Sector
  - End-Use
  - Some Technologies

- Compared savings achievements to the 6th Plan by year, sector, end-use
ASSUMPTIONS & CAVEATS

1. We are assuming the data are correct
2. We did the best we could with the mapping
3. We had to make a few judgment calls
4. No adjustments were made to the savings
THE RESULTS
THE RESULTS

REGIONAL ACHIEVEMENTS

6TH PLAN COMPARISONS

SPECIFIC TECHNOLOGIES
REGIONAL ACHIEVEMENTS 2010-2012

![Bar chart showing Regional Achievements and 6th Plan Forecast]

- Regional Achievements: 758
- 6th Plan Forecast: 660

*MW*
REGIONAL ACHIEVEMENTS BY SECTOR

Agricultural
Industrial
Commercial
Residential

2010
2011
2012

aMW
REGIONAL COMPARISON TO 6TH PLAN

We expect this number to go up

Regional Achievements
- 2010: 235 MW
- 2011: 289 MW
- 2012: 233 MW

6th Plan Forecast
- 2010: 200 MW
- 2011: 220 MW
- 2012: 240 MW
REGIONAL COMPARISON TO 6TH PLAN

Regional Achievements 2010-2012
- Agricultural: 4%
- Industrial: 18%
- Commercial: 38%
- Residential: 40%
- DEI: < 1%

6th Plan Forecast 2010-2012
- Agricultural: 4%
- Industrial: 15%
- Commercial: 23%
- Residential: 54%
- DEI: 4%
END-USE COMPARISON TO 6TH PLAN

SUMMARY OF ALL END USES

- Lighting: 297, 213
- HVAC: 180, 214
- Electronics and Plug Loads: 112, 54
- Other: 71, 39
- Refrigeration: 34, 44
- Irrigation: 28, 26
- Water heat: 17, 63
- Compressed Air: 14, 12
- Dairy: 3, 3
- Food Service: 1, 4

Bar chart comparing regional achievements (dark bars) to 6th plan forecast (light bars) for each end use category.
RESIDENTIAL ACHIEVEMENTS

- Lighting: 49%
- HVAC: 14%
- Electronics: 18%
- Water Heating: 9%
- Refrigeration: 5%
- Whole Bldg/Meter Level: 3%
- Other: 2%
- Codes & Standards: <1%

304 aMW SAVED (2010-2012)
COMMERCIAL ACHIEVEMENTS

- Lighting: 43%
- HVAC: 19%
- Refrigeration: 10%
- Electronics: 9%
- Whole Bldg/Meter Level: 7%
- Other: 8%
- Motors/Drives: 2%
- Codes & Standards: 1%
- Water Heating: 1%
- Process Loads: <1%
- Compressed Air: <1%
- Food Preparation: <1%

285 aMW SAVED (2010-2012)
INDUSTRIAL ACHIEVEMENTS

134
aMW SAVED
(2010-2012)
AGRICULTURAL ACHIEVEMENTS

- Irrigation: 83%
- Motors/Drives: 12%
- Other: 2%
- Utility Distribution System: 2%
- HVAC: <1%
- Refrigeration: <1%
- Process Loads: <1%
- Compressed Air: <1%

34 aMW SAVED (2010-2012)
SECTOR COMPARISON TO 6\textsuperscript{TH} PLAN

### aMW (2010-2012)

- **Residential**: 304, 360
- **Commercial**: 285, 150
- **Industrial**: 134, 101
- **Agricultural**: 34, 24
- **DEI**: 1, 25

- **Regional Achievements**
- **6th Plan Forecast**
END-USE COMPARISON TO 6TH PLAN

RESIDENTIAL

<table>
<thead>
<tr>
<th>Category</th>
<th>Regional Achievements</th>
<th>6th Plan Forecast</th>
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<tr>
<td>Lighting</td>
<td>148</td>
<td>150</td>
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<tr>
<td>Consumer Electronics</td>
<td>56</td>
<td>30</td>
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<tr>
<td>Appliances</td>
<td>30</td>
<td>11</td>
</tr>
<tr>
<td>HP / DHP</td>
<td>23</td>
<td>59</td>
</tr>
<tr>
<td>Envelope Retro</td>
<td>21</td>
<td>55</td>
</tr>
<tr>
<td>Water Heat</td>
<td>15</td>
<td>63</td>
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END-USE COMPARISON TO 6TH PLAN

COMMERCIAL

<table>
<thead>
<tr>
<th>Component</th>
<th>Regional Achievements</th>
<th>6th Plan Forecast</th>
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<tbody>
<tr>
<td>Lighting</td>
<td>121</td>
<td>43</td>
</tr>
<tr>
<td>HVAC Controls</td>
<td>38</td>
<td>18</td>
</tr>
<tr>
<td>Refrigeration</td>
<td>26</td>
<td>16</td>
</tr>
<tr>
<td>PC Network/Supply</td>
<td>25</td>
<td>12</td>
</tr>
<tr>
<td>Integrated Design</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>Waste Water</td>
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<td>7</td>
</tr>
</tbody>
</table>
END-USE COMPARISON TO 6TH PLAN

INDUSTRIAL

- **Regional Achievements**
- **6th Plan Forecast**

<table>
<thead>
<tr>
<th>Category</th>
<th>6th Plan Forecast</th>
<th>Regional Achievements</th>
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<tbody>
<tr>
<td>Process</td>
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<td>52</td>
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<tr>
<td>Lighting</td>
<td>9</td>
<td>28</td>
</tr>
<tr>
<td>Fans, Pumps, and Motors</td>
<td>25</td>
<td>23</td>
</tr>
<tr>
<td>Compressed Air</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>Refrigerated Storage</td>
<td>28</td>
<td>7</td>
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END-USE COMPARISON TO 6TH PLAN

AGRICULTURAL

<table>
<thead>
<tr>
<th>Category</th>
<th>Regional Achievements</th>
<th>6th Plan Forecast</th>
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<tbody>
<tr>
<td>Irrigation Scheduling</td>
<td>19</td>
<td>5</td>
</tr>
<tr>
<td>Irrigation Hardware</td>
<td>9</td>
<td>21</td>
</tr>
<tr>
<td>Dairy</td>
<td>3</td>
<td>3</td>
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</tbody>
</table>
LOST OPPORTUNITY & RETROFIT

2010-2012 aMW

Residential: 208
Commercial: 237
Industrial: 134
Agricultural: 34
DEI: 1

Lost Opportunity
Retrofit
ACQUISITION RATES

HEAT PUMP WATER HEATER

- Regional Achievements
- 6th Plan Forecast

<table>
<thead>
<tr>
<th>Year</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
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<tbody>
<tr>
<td>aMW</td>
<td>0.02</td>
<td>0.05</td>
<td>0.21</td>
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</table>

Graph showing the acquisition rates for heat pump water heaters from 2010 to 2012.
ACQUISITION RATES

INDUSTRIAL ENERGY MANAGEMENT

- Regional Achievements
- 6th Plan Forecast

- 2010: 6.9 aMW
- 2011: 6.0 aMW
- 2012: 5.7 aMW

- 2010: 2.8 aMW
- 2011: 5.6 aMW
- 2012: 8.4 aMW
CONSUMER ELECTRONICS

ACQUISITION RATES

Units: aMW

Regional Achievements:
- 2010: 11.4
- 2011: 18.6
- 2012: 25.6

6th Plan Forecast:
- 2010: 5.5
- 2011: 10.5
- 2012: 15.5
ACQUISITION RATES

RESIDENTIAL SHOWER HEADS

- Regional Achievements
- 6th Plan Forecast

<table>
<thead>
<tr>
<th>Year</th>
<th>Forecast (aMW)</th>
<th>Achieved (aMW)</th>
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</thead>
<tbody>
<tr>
<td>2010</td>
<td>1.28</td>
<td>16.9</td>
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<tr>
<td>2011</td>
<td>3.31</td>
<td>16.9</td>
</tr>
<tr>
<td>2012</td>
<td>4.98</td>
<td>16.9</td>
</tr>
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</table>
PROJECT RECAP

MERGED REGIONAL DATA AT A DETAILED LEVEL BECAUSE NEARLY ALL UTILITIES PROVIDED DATA

ABLE TO SEE 6TH PLAN VS IMPLEMENTATION

WE CAN LOOK AT ACQUISITION RATES AT A REGIONAL LEVEL
NEXT STEPS
NEXT STEPS

1. Cost and Incentive Data
2. Address follow up questions from CRAC
3. Launch of the database tool for public use
4. Provide Literature Review that includes links to 6th Power Plan planning documents & comments
5. Complete market research – will share results through public document
6. Update database with 2013 data
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