CONSERVATION POTENTIAL ASSESSMENT RESULTS

SEPTEMBER 16, 2021

CADMUS
Agenda

Project Overview
Overall CPA Results
Sector-Level CPA Results
Next Steps
Questions
PROJECT OVERVIEW
CPA Project Goals

Develop **22-year estimates** of technical and achievable conservation potential in BPA’s service territory (2022 – 2043)

Produce conservation supply curves for use in BPA’s Resource Program modeling
CPA Timeframe

- **2021 Power Plan**: 2022-2041
- **Targets 2022-2027**:
- **BPA Resource Program**: 2024-2043
- **CPA**: 2022-2043
2021 CPA and Types of Potential

Technical Potential

Achievable Technical Potential

Achievable Economic Potential
Overall Goal: Used the best available data to customize Council supply curve files for use in BPA's Resource Program process.
OVERALL CPA RESULTS
### Cumulative Potential

<table>
<thead>
<tr>
<th>BPA Sector</th>
<th>Cumulative Achievable Technical Potential (aMW)</th>
<th>6-Year (2024 to 2029)</th>
<th>20-Year (2024 to 2043)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td></td>
<td>345</td>
<td>1,155</td>
</tr>
<tr>
<td>Commercial</td>
<td></td>
<td>231</td>
<td>654</td>
</tr>
<tr>
<td>Agricultural</td>
<td></td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>Industrial</td>
<td></td>
<td>117</td>
<td>288</td>
</tr>
<tr>
<td>Utility System Efficiency</td>
<td></td>
<td>15</td>
<td>80</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>717</strong></td>
<td><strong>2,207</strong></td>
<td></td>
</tr>
</tbody>
</table>

20-Year potential is approximately 20% more than BPA’s 2019 CPA, but there are important differences in the cost and timing.
Share of Potential by Sector

6-Year
- Utility System Efficiency: 2%
- Agricultural: 2%
- Industrial: 16%
- Commercial: 32%
- Residential: 48%

Total = 717 aMW

20-Year
- Utility System Efficiency: 4%
- Agricultural: 1%
- Industrial: 13%
- Commercial: 30%
- Residential: 52%

Total = 2,207 aMW
Supply Curve

![Bar chart showing the levelized cost of different energy sectors across various price ranges. The chart includes residential, commercial, agricultural, industrial, and utility system efficiency sectors, with each sector represented by a color-coded bar. The price ranges are labeled as Under $5, Under $10, Under $15, Under $20, Under $25, Under $30, Under $35, Under $40, Under $45, Under $50, Under $55, Under $60, Under $65, Under $70, Under $80, Under $85, Under $90, Under $100, Under $110, Under $120, Under $130, Under $140, Under $150, and Over $160. The total capacity is shown at the top right corner as 2,207 aMW.]
Past Achievement vs. All Potential

Note: Historical savings are based on the NW Power Council’s 2019 Regional Conservation Progress Report and includes BPA-funded and utility self-funded program savings only.
Past Achievement vs. Screened Potential

Potential Screened for < $50 per MWh

Note: Historical savings are based on the NW Power Council's 2019 Regional Conservation Progress Report and includes BPA-funded and utility self-funded program savings only.
Comparison of 6-Year (2022-2027) Potential

<table>
<thead>
<tr>
<th>Sector</th>
<th>6-Year Cumulative Achievable Technical Potential - aMW</th>
<th>BPA CPA</th>
<th>Council BPA 2021P</th>
<th>Council 2021 Power Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td></td>
<td>230</td>
<td>200</td>
<td>475</td>
</tr>
<tr>
<td>Commercial</td>
<td></td>
<td>199</td>
<td>197</td>
<td>520</td>
</tr>
<tr>
<td>Agricultural</td>
<td></td>
<td>9</td>
<td>7</td>
<td>18</td>
</tr>
<tr>
<td>Industrial</td>
<td></td>
<td>105</td>
<td>97</td>
<td>302</td>
</tr>
<tr>
<td>Utility System Efficiency</td>
<td></td>
<td>7</td>
<td>7</td>
<td>20</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>550</td>
<td>508</td>
<td>1,336</td>
</tr>
</tbody>
</table>
## Comparison of 20-Year (2022-2041) Potential

<table>
<thead>
<tr>
<th>Sector</th>
<th>20-Year Cumulative Achievable Technical Potential - aMW</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BPA CPA</td>
</tr>
<tr>
<td>Residential</td>
<td>1,106</td>
</tr>
<tr>
<td>Commercial</td>
<td>659</td>
</tr>
<tr>
<td>Agricultural</td>
<td>30</td>
</tr>
<tr>
<td>Industrial</td>
<td>299</td>
</tr>
<tr>
<td>Utility System Efficiency</td>
<td>74</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,167</strong></td>
</tr>
</tbody>
</table>
Key Findings

- Less lighting potential
- Lighting is key resource
- Less irrigation potential
- Motor-driven systems add potential
- New methodology: higher potential
- No showerheads
- Motor-driven systems add potential
- TMY/FMY differences
SECTOR-LEVEL CPA RESULTS
RESIDENTIAL SECTOR
Residential Technical Achievable Potential by End Use

- HVAC: 45%
- Water Heating: 32%
- Electronics: 14%
- Refrigeration: 3%
- Lighting: 4%
- Whole Bldg/Meter Level: 1%
- Food Preparation: 1%

Total = 1,155 aMW
Residential 20-Year Supply Curve

Cumulative aMW

Under $5: 192
Under $10: 192
Under $15: 193
Under $20: 194
Under $25: 213
Under $30: 231
Under $35: 234
Under $40: 243
Under $45: 421
Under $50: 533
Under $55: 558
Under $60: 568
Under $65: 624
Under $70: 624
Under $75: 699
Under $80: 723
Under $85: 791
Under $90: 813
Under $95: 830
Under $100: 852
Under $105: 1,155

- Electronics
- Food Preparation
- HVAC
- Refrigeration
- Water Heating
- Lighting
- Other
- Whole Bldg/Meter Level
Top Residential Measures Under $50/MWh

Cumulative 6-Year Achievable Technical Potential

- Water Heaters ($43/MWh)
- Envelope ($32/MWh)
- Water Using Devices (-$77/MWh)
- Lamps/Fixtures (-$20/MWh)
- Entertainment (-$1/MWh)
- HVAC System ($42/MWh)
- Freezers ($5/MWh)
- Plug Load ($6/MWh)
- Computer Technologies ($/MWh)
- Other ($3/MWh)
- Cooking (-$115/MWh)
Commercial Technical Achievable Potential by End Use

- Lighting: 26%
- HVAC: 24%
- Motors/Drives: 15%
- Refrigeration: 17%
- Process Loads: 2%
- Water Heating: 3%
  - Whole Building/Meter Level: 4%
- Compressed Air: 1%
- Electronics: 4%
- Food Preparation: 4%

Total = 654 aMW
Commercial 20-Year Supply Curve

Cumulative aMW

- Under $5
- Under $10
- Under $15
- Under $20
- Under $25
- Under $30
- Under $35
- Under $40
- Under $45
- Under $50
- Under $55
- Under $60
- Under $65
- Under $70
- Under $85
- Under $100
- Under $115
- Under $130
- Under $145
- Under $160
- Over $160

- Compressed Air
- Electronics
- Food Preparation
- HVAC
- Lighting
- Motors/Drives
- Process Loads
- Refrigeration
- Water Heating
- Whole Bldg/Meter Level

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Top Commercial Measures Under $50/MWh

Lamps/Ballasts/Fixtures ($19/MWh)
Refrigeration System Controls ($28/MWh)
Computer Technologies ($9/MWh)
Pumps and Fans ($16/MWh)
Signs and Signals (-$59/MWh)
HVAC System Improvements ($31/MWh)
Cooking (-$16/MWh)
HVAC System Controls ($35/MWh)
Process Loads System Improvements ($15/MWh)
Water Heaters ($22/MWh)
Envelope ($9/MWh)
Water Using Devices (-$134/MWh)
Water Heating Controls ($/MWh)
Packaged Refrigeration (-$41/MWh)
Whole Bldg/Meter Level System Improvements ($23/MWh)
Compressed Air System Improvements ($45/MWh)
INDUSTRIAL SECTOR
Industrial Technical Achievable Potential by End Use

- Process Loads: 42%
- Lighting: 13%
- Motors/Drives: 8%
- HVAC: 1%
- Compressed Air: 10%
- Whole Bldg/Meter Level: 20%
- Refrigeration: 2%
- Water/Waste Water: 4%

Total = 288 aMW
Top Industrial Measures Under $50/MWh

Cumulative 6-Year Achievable Technical Potential

- Whole Bldg/Meter Level System Improvements ($20/MWh)
- Pumps and Fans ($13/MWh)
- Lamps/Ballasts/Fixtures ($31/MWh)
- Compressed Air System Improvements ($35/MWh)
- Refrigeration System Improvements ($44/MWh)
- Process Loads System Improvements ($15/MWh)
- HVAC System Improvements ($19/MWh)
- Motors ($38/MWh)
- Other ($41/MWh)
AGRICULTURAL SECTOR
Agricultural Technical Achievable Potential by End Use

- Irrigation: 77%
- Lighting: 8%
- Process Loads: 7%
- Refrigeration: 4%
- HVAC: 1%

Total = 30 aMW
Agricultural 20-Year Supply Curve

Cumulative aMW

Under $5: 5
Under $10: 8
Under $15: 10
Under $20: 15
Under $25: 18
Under $30: 18
Under $35: 19
Under $40: 19
Under $45: 19
Under $50: 20
Under $55: 21
Under $60: 22
Under $65: 23
Under $70: 24
Under $75: 24
Under $80: 25
Under $85: 26
Under $90: 30

HVAC  Irrigation  Lighting  Motors/Drives  Process Loads  Refrigeration

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Top Agricultural Measures Under $50/MWh

Cumulative 6-Year Achievable Technical Potential

- Pumps and Fans ($8/MWh)
- Hardware ($22/MWh)
- Lamps/Ballasts/Fixtures ($16/MWh)
- Irrigation System Improvements ($22/MWh)
- Motors ($40/MWh)
- Heat Recovery ($21/MWh)
- Other ($24/MWh)
- Process Loads System Improvements ($21/MWh)
- Dairy System Improvements ($10/MWh)
- Livestock Tanks ($29/MWh)

Cumulative aMW
UTILITY SECTOR
Utility Sector 20-Year Supply Curve

Cumulative aMW

- Under $5
- Under $10
- Under $15
- Under $20
- Under $25
- Under $30
- Under $35
- Under $40
- Under $45
- Under $50
- Under $55
- Under $60
- Under $65
- Under $70
- Under $85
- Under $100
- Under $115
- Under $130
- Under $145
- Under $160
- Over $160

Utility Transmission System
NEXT STEPS
Resource Program Modeling

The Council’s Draft 2021 Power Plan to be released in September 2021

Resource Program Results in January/February 2022

BPA-developed Power Plan resources, including this presentation and the CPA workbooks will be made available.
Utility Potential Calculator

Cadmus/Lighthouse currently developing a Utility Potential Calculator for BPA based on the 2021 Plan. This tool will enable utilities to determine potential in their territory.

BPA is looking for input on the features of the Utility Potential Calculator.

If you would like to provide feedback, please reach out to the BPA CPA team or your BPA Energy Efficiency Representative (EER).
CONTACTS

CONTACT INFO

Jessica Aiona, BPA
jlaiona@bpa.gov

Aquila Velonis, Cadmus
aquila.velonis@cadmusgroup.com

Andrew Grant, Cadmus
andrew.grant@cadmusgroup.com

Ted Light, Lighthouse
Ted@lighthouseenergynw.com

Masumi Izawa, Cadmus
masumi.izawa@cadmusgroup.com