Demand Response for NorthWestern

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DR in the 7th Power Plan

- Major takeaway:

  *Regional Portfolio Model results indicated Demand Response and EE are less expensive ways to meet peak capacity adequacy needs than new power plants, especially in the next 5 to 10 years.*
Council’s Seventh Plan found EE & DR are prime resources to help meet region’s adequacy needs.
Demand Response Actions in 7th Plan

- Expand regional demand response infrastructure
  - At least 600 MW is cost-effective
- Form a Demand Response Advisory Committee (DRAC)
- Support regional market transformation for demand response
- Collaborate on demand response data collection
Council’s Analytical Process Flow

1. **Load Forecast Model**
   - Baseline Load Forecast (w/o new efficiency)
   - Units & Baseline Unit Use

2. **New Energy Efficiency Resource Potential Assessment**
   - Energy Efficiency “Supply Curves”
   - New Generating Resource Potential Assessment
   - New Demand Response Potential Assessment

3. **Regional Portfolio Model**
   - “Supply Side” Resource Cost & Availability

4. **Council Reviews Cost and Risk of Alternative Resource Portfolios**
Demand Response Resource Program Potential by Cost Bin
(2012 dollars per kW-year)
## Demand Response Resource Program Potential by Cost Bin
(2012\$ per kW-year)

<table>
<thead>
<tr>
<th>Demand Response Price Bin</th>
<th>Levelized Costs</th>
<th>2021 Winter MW</th>
<th>2026 Winter MW</th>
<th>2035 Winter MW</th>
<th>2021 Summer MW</th>
<th>2026 Summer MW</th>
<th>2035 Summer MW</th>
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<tbody>
<tr>
<td>Price Bin 1</td>
<td>$25 per kW-yr</td>
<td>1246</td>
<td>1337</td>
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<td>1294</td>
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<td>Price Bin 2</td>
<td>$57 per kW-yr</td>
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<td>899</td>
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<td>Price Bin 3</td>
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<td>368</td>
<td>402</td>
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<td>Price Bin 4</td>
<td>$144 per kW-yr</td>
<td>697</td>
<td>752</td>
<td>822</td>
<td>395</td>
<td>426</td>
<td>465</td>
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</table>
Factors Driving the Pace for Demand Response Development

- Need for seasonal capacity
- Assumptions about conservation development
- Assumptions about the availability and cost of external market resources in extreme weather and poor water conditions
- Assumptions about further CO2 emissions reduction policies
But most simply...

Resource Adequacy

Regional Loss of Load Probability (LOLP) in 2021
System Cost and Economic Risk of Alternative Resource Strategies

Present Value (billion 2012$)

- Average System Cost
  - Existing Policy: $82
  - Existing Policy - No Demand Response: $86
  - Existing Policy - Increased Market Reliance: $76

- System Risk
  - Existing Policy: $116
  - Existing Policy - No Demand Response: $121
  - Existing Policy - Increased Market Reliance: $111
Observations

- Without developing the 7th Power Plan recommended energy efficiency and at least 600 MW of demand response, the region may not meet adequacy standards and/or could have difficulty providing balancing reserves.
  - Instead pursuing demand response, the region could build additional new gas-fired generation.
  - However, this alternative resource strategy increases system cost by $4 billion and system risk by $5 billion.
Future of Demand Response

Demand Response Evolution

- Largely manual control
- Interruptible tariffs for large C&I
- 1-way Direct Load Control for Residential
- Used for Capacity Planning & Emergencies

- Introduced To Wholesale Markets
- Increased automation
- Increased Precision
- Eventually Ancillary Services
- Behavioral/voluntary Options
- Smarter Equipment
- 2-way communications
- Some Near Real-Time Visibility

- Provide Multiple Grid Services
- Respond to Controls and/or Price Signals
- Distribution & Transmission Relief
- Introduction of Storage
- Migration to DER

http://www.peakload.org/?page=DefiningEvolutionDR
DR Potential for NWE

- **Residential & Sm Com**
  - Year round - water heating controls
    - 26% SF, 50% MF/MH have electric WH; ~50% com
    - PGE & BPA study to quantify “plug & play” controllers for electric resistance & heat pump water heaters
  - Summer – central cooling “bring your own thermostat”
  - Time of use tariffs

- **Large Com & Ind**
  - Interruptible loads
  - Peak demand pricing
More on Industrial

- Some cohorts more willing than others, e.g. water/wastewater, aluminum smelters
- Industrial Customers of Northwest Utilities (ICNU) survey on DR barriers (presentation here)
  - Key findings: compensation #1 barrier, customers need long-term commitment
  - Many (but not all) would be willing to participate, if properly compensated and depending on program parameters
Questions?

- Council’s DR Webpage:
  http://www.nwcouncil.org/energy/dr/home/

- RPM Online:
  http://www.nwcouncil.org/energy/rpm/rpmonline

- 7th Power Plan Technical Data
  - DR supply curve derivation and potential study
    http://www.nwcouncil.org/energy/powerplan/7/technical