Conservation Accomplishments & Outlook

Conservation Resource Advisory Committee
November 19, 2012
6th Plan Called for A Doubling of Annual Energy Efficiency Savings Over Next Decade

With a goal of doubling the region’s energy saving in the next 20 years, Northwest businesses and homeowners are urged to find …

The power in CONSERVATION

Energy efficiency is cheapest source of energy

<table>
<thead>
<tr>
<th>New energy source</th>
<th>Monthly cost on the average homeowner’s utility bill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy efficiency</td>
<td>$32</td>
</tr>
<tr>
<td>Natural gas plant w/o. carbon charge</td>
<td>66</td>
</tr>
<tr>
<td>Advanced coal w/o. carbon charge</td>
<td>66</td>
</tr>
<tr>
<td>Geothermal</td>
<td>69</td>
</tr>
<tr>
<td>Columbia Basin wind</td>
<td>69</td>
</tr>
<tr>
<td>Wind</td>
<td>69</td>
</tr>
</tbody>
</table>

The big white house near Reed College was screaming for an energy upgrade: almost 100 years old, scanty insulation, nearly triple the drafts of a modern home.

Last month, it got one — with the help of two energy suits, federal
Sixth Plan Conservation

- Accelerated Acquisition of Cost-Effective Conservation Reduces System Cost & Risk
- Plan & Budget for 1200 MWa (Next 5 Years)
  - Expect 1100 to 1400 MWa – Depending
- Nearly 6000 MWa (Over 20 Years)
Results:
So Far, So Good
Annual Savings

2011 Regional Accomplishments

Target: 220 MWa
Actual: 277 MWa

Exceeded Council Plan Target by 26%
Accomplishments Have Exceeded Plan Targets Every Year Since 2005

![Bar chart showing annual savings (MWa) from 2005 to 2014. The chart compares target and actual savings.](chart.png)
2001-2011 Longest Sustained Period of PNW Utility Energy Efficiency Acquisitions in 30 Years
Commercial and Industrial Savings Continued to Grow the Most

Annual Savings (MWA)

- 2008
- 2009
- 2010
- 2011

Agriculture/Irrigation Commercial Industrial Residential

U.S. utility investment in efficiency in 2011 was just over $5.23 billion (2006$). Northwest investments represent about 8% of the total, but just under 5% of the U.S. population.
NEEA Continues to Contribute Significant Savings
Average Utility Cost of Conservation, While Increasing Remains Low

Utility Levelized Cost of Savings (2006$/MWH)

<table>
<thead>
<tr>
<th>Year</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>$16</td>
</tr>
<tr>
<td>2006</td>
<td>$14</td>
</tr>
<tr>
<td>2007</td>
<td>$12</td>
</tr>
<tr>
<td>2008</td>
<td>$12</td>
</tr>
<tr>
<td>2009</td>
<td>$14</td>
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<tr>
<td>2010</td>
<td>$16</td>
</tr>
<tr>
<td>2011</td>
<td>$20</td>
</tr>
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</table>
Projections for 2012 – 2014 Savings by RCP Reporting Utilities*

*Excludes savings from NEEA, BPA direct acquisitions and utilities not filing RCP Reports.
NEEA Savings Projections

![Chart showing annual savings projections from 2010 to 2014.](chart.png)
6th Plan’s Target of 1200 MWa Within Reach
If 2012-2014 Savings Average 225 MWa/yr*

*This is roughly 85% of the Plan’s Annual Targets for 2012-2014
Apparent High Retrofit Savings
Recession Limited Lost-Opportunity Savings

Overage Likely Due to High Retrofit Pace

Can Retrofit Savings Continue at Pace Above 160 MWa/Year?

Target Lost-Opportunity
Target Retrofit
Actual
Over Three Decades We Made Significant (If Uneven) Progress

(Giving the Region’s EE Industry Mr. Toad’s Wild Ride!)
Since 1978 Utility & BPA Programs, Energy Codes & Federal Efficiency Standards Have Produced Over 5000 MWa of Savings.
So What’s 5000 MWa?

- It’s enough electricity to serve the nearly entire state of Oregon
- It saved the region’s consumers nearly $3.1 billion in 2011
- It lowered 2011 PNW carbon emissions by an estimated 19.8 million MTE.
Energy Efficiency is Now the Region’s Third-Largest Resource

- Hydropower 46%
- Coal 18%
- Natural Gas 11%
- Geothermal <1%
- Nuclear 4%
- Wind 4%
- Biomass 1%
- Petroleum & Pet Coke <1%

Based on Estimate of 2010 Actual Resource Dispatch/Contribution
PNW Electricity Use Per Dollar Gross Domestic Product (GDP) Has Declined Substantially Faster Than the National Average
Efficiency Has Met Over 50% of PNW Load Growth Since 1980

Regional Load (GWa)

- Efficiency Resource
- Load Net of Efficiency
- 1980 Load

- Rocky Reach: 1,869 MWa
- The Dalles: 1,105 MWa
- John Day: 802 MWa
- Chief Joseph: 610 MWa
- Grand Coulee: 536 MWa

Conservation Savings 1978 - 2011: 5,050 MWa
The Task Ahead
Can We Cost-Effectively Meet Most or All Load Growth?

Caveat: Approximate impact only, since PNW Actual Loads are not weather adjusted.
Regional Savings Equaled Just Under 1.4% of Regional Electricity Sales in 2011 Almost Three Times the National Average
40% of the Region’s Utilities Reported 2011 Efficiency Savings Equivalent to At Least 1% of Their Retail Sales
Average Cost of Utility Acquired Savings Continues to Be Lower and Less Volatile Than Wholesale Market Electricity Prices
Will Reduced Avoided Cost Limit Cost-Effective Potential?

Levelized Cost of Combined Cycle Combustion Turbine

Lifetime Natural Gas Price

- PNW Maximum CF (79%)
- PNW Average CF (51%)
- PNW Minimum CF (17%)
- Historical Utility Cost of Efficiency
Over 4000 MWa of Achievable Potential* Exists at Cost Below <$40 MWH

*Lost-Opportunity Potential is Cumulative Amount Available Potential by 2030
Will We Be Able to Sustain Regional Energy Efficiency Investments?

NW Efficiency Investments Per Person Are **Double** the National Average

![Chart showing investment per capita from 2005 to 2011 and average US investment. The investments are as follows:

- 2005: $15
- 2006: $14
- 2007: $14
- 2008: $17
- 2009: $21
- 2010: $27
- 2011: $32
- Average: $14](image)
While We Invest 2½ Times the National Average (As A Share of Total Revenues) It’s Less Than 4% of the Total

<table>
<thead>
<tr>
<th>Year</th>
<th>Share of Revenues for Non EE</th>
<th>Share of Revenues for EE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>1.8%</td>
<td>1.5%</td>
</tr>
<tr>
<td>2006</td>
<td>1.7%</td>
<td>1.5%</td>
</tr>
<tr>
<td>2007</td>
<td>1.7%</td>
<td>1.5%</td>
</tr>
<tr>
<td>2008</td>
<td>2.0%</td>
<td>1.5%</td>
</tr>
<tr>
<td>2009</td>
<td>2.5%</td>
<td>1.5%</td>
</tr>
<tr>
<td>2010</td>
<td>3.2%</td>
<td>1.5%</td>
</tr>
<tr>
<td>2011</td>
<td>3.6%</td>
<td>1.5%</td>
</tr>
</tbody>
</table>
Implementation Details

- 2010 & 2011 Exceed Expectations
  - Accelerated Retrofit Savings (+++)
  - New Construction Savings Recession (-)
- Federal Standards & State Codes (++)
  - Large Savings Long Term, Smaller Near Term
- Progress on New EE Initiatives from 6P (+)
  - New Measures Require New Methods
  - New Initiatives approx. 250 of 1200 MWa Target
  - Progress Mixed Bag - Mostly Good
20 New Federal Standards
In Effect by 2015

- Clothes Washers
- Clothes Dryers
- Central Air Conditioners and Heat Pumps
- Small Electric Motors
- Water Heaters
- Fluorescent Lamp Ballasts
- Room Air Conditioners
- Refrigerators and Freezers
- Commercial Central AC and Heat Pumps
- Dishwashers
- Furnaces
- Clothes Washers, Commercial
- Pool Heaters
- Direct Heating Equipment
- Incandescent Reflector Lamps
- General Service Fluorescent Lamps
- Vending Machines
- Refrigeration Equipment, Commercial
- Boilers, Commercial
- Ranges and Ovens

Year New Standard Takes Effect

Large Impact Over Long Term
Efficiency Standards Have a Transformative Effects
Sales Weighted Relative Use of Appliances 1980 - 2008

Energy Use of New Units Relative to 1980

- Dishwashers
- Clothes Washers
- Freezers
- Refrigerators
- Room AC

New Standards
State Building Codes

- All Four States Updated Energy Codes
  - Residential & Commercial
- Significant Improvements New & Remodel
- Limited Near-Term Impact: Recession
- Significant Impact Long-Term
  - Growing New and Remodel Building Stock
# New Initiative Progress
(Approx 250 of 1200 MWa 2010-2014)

<table>
<thead>
<tr>
<th>Category</th>
<th>Progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP Water Heaters</td>
<td>(+++)</td>
</tr>
<tr>
<td>Consumer Electronics (TVs)</td>
<td>(++++)</td>
</tr>
<tr>
<td>Ductless Heat Pumps</td>
<td>(+++)</td>
</tr>
<tr>
<td>Commercial Lighting Systems</td>
<td>(+)</td>
</tr>
<tr>
<td>Outdoor Lighting</td>
<td>(+)</td>
</tr>
<tr>
<td>Distribution System Efficiency</td>
<td>(?)</td>
</tr>
<tr>
<td>Industrial</td>
<td>(++++)</td>
</tr>
</tbody>
</table>
Heat Pump Water Heaters

- Lab & Field Testing
- New Products Available
- Specs for Cold Climate
- Unit Savings Lower than 6P
- Costs Falling
- Federal Standard 2015
Televisions

- NEEA & Utilities
- Major Retailers
- Media Campaign
- EE TVs 45% of Market
- +2x Plan Targets
- 24 MWa in 2011
Commercial Lighting Design

- Federal Standard Lamps & Ballasts
  - Efficiency Equipment Mandated 2012-2014
  - Forces Retrofit Program Changes
- Pilot Test Methods & Design Approaches
- 25-30% Savings Over Typical Retrofit
- Training & Infrastructure Needs
- Federal Standards Delayed 2 Years
  - Rare Earth Phosphor Shortage
Industrial

- Acceleration of Savings
  - 50% Increase Over 2009 Savings
- Strategic Energy Management
  - New Measure 6th Plan
  - Significant Uptake 2011 – BPA, ETO & NEEA
  - Coordinated Regional Rollout
  - Expect Significant Growth
50 Years to Develop the PNW Hydro-System
Energy Efficiency Can Extend That Legacy

![Graph showing annual firm energy output (MWe) from 1930 to 2029.](image)

- Firm Energy Hydro Development 1930 - 1979
- Planned Energy Efficiency Resource Development 2012 - 2029

**Year of Development**

- 0 5 10 15 20 25 30 35 40 45 50

**Annual Firm Energy Output (MWe)**

- 0 2000 4000 6000 8000 10000 12000

*Image credit: Northwest Power and Conservation Council*