EIA Energy Headlines for WA

The Grand Coulee Dam on Washington's Columbia River is the largest hydroelectric power producer in the United States, with a total generating capacity of 6,809 megawatts.

In 2013, Washington was the leading producer of electricity from hydroelectric sources and produced 29% of the nation's net hydroelectric energy generation.

Although not a crude oil-producing state, Washington ranked fifth in the nation in crude oil-refining capacity as of January 2014.

Washington ranked 10th in the nation in net generation of electricity from wind energy in 2013.

In 2013, Washington had the lowest residential electricity prices in the nation and the lowest combined electricity price across all sectors.

Millions of 2005 Dollars

Source: EIA SEDS
Total Primary Energy Consumption by Source
(1970-2012)

Source: EIA SEDS
Figure 2: Washington State Electric Utilities Aggregate Fuel Mix 2000-2013 (Megawatt-hours)

- **Hydropower**
- **Coal**
- **Natural Gas**
- **Nuclear**
- **Biomass**
- **Petroleum**
- **Wind**
- **Misc. Other**
- **Renewables Other**
Carbon Dioxide Emissions from Energy Use by Fuel Source (1960-2012)

State Target (1990 emission level)

Source: EIA SEDS, EPA, Kyoto Protocol
Greenhouse Gas Emissions Limits

• WA State greenhouse gas emissions reduction limits in law.
  • *(RCW 70.235.020)*
    • Return to 1990 levels by 2020
    • By 2035, reduce emissions to 25% below 1990 levels
    • By 2050, reduce emissions to 50% below 1990 levels.
Figure 2-2: Greenhouse gas sources: Washington compared to national average. The average Washingtonian is responsible for a total of 15.2 MTCO$_2$e, the average American for 21.4 MTCO$_2$e. MTCO$_2$e means metric tons of carbon dioxide equivalent. (W0002)

2012 WA ST Energy Strategy
Figure 3-1: Effect of the July 2011 CAFE agreement on Washington transportation sector energy consumption. The blue reference case reflects the prorated Energy Information Administration projections offered in the Annual Energy Outlook 2011 as used elsewhere in this Energy Strategy. The red line reflects the projected consumption with the new agreement applied. (W0011)
Fuel Cost of Driving and Miles Driven per Capita (1970-2010)

Source: WA DOT, FHWA, OFM, EIA SEDS, CEA
### 3.4 Near-Term Recommendations

<table>
<thead>
<tr>
<th>Vehicles and Fuels</th>
<th>Travel Efficiency</th>
<th>Pricing</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.4.1 Electric Vehicle Support</td>
<td>3.4.4 Commute Trip Reduction Program Expansion</td>
<td>3.4.8 Electric Vehicle Mileage Pricing Pilot</td>
</tr>
<tr>
<td>3.4.2 RFS</td>
<td>3.4.5 Smart Growth and Transportation Planning</td>
<td>3.4.9 Car Sharing and Mileage Based Insurance</td>
</tr>
<tr>
<td>3.4.3 Diesel Engine Fuel Efficiency Improvements</td>
<td>3.4.6 Transportation Systems Management</td>
<td></td>
</tr>
<tr>
<td>3.4.7 Regional Mobility Grants</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 3.5 Long-Term Policy Options

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5.1 Revenue Neutral Feebate</td>
<td>3.5.5 Comprehensive Trip Reduction Program</td>
<td>3.5.7 Emerging Pricing Methods</td>
</tr>
<tr>
<td>3.5.2 Low Carbon Fuel Standard</td>
<td>3.5.6 Energy Efficient Transportation Choices</td>
<td>- Congestion Pricing</td>
</tr>
<tr>
<td>3.5.3 Advanced Aviation Fuels</td>
<td></td>
<td>- Mileage Pricing</td>
</tr>
<tr>
<td>3.5.4 Improvements to Railroads</td>
<td></td>
<td>- Cordon Pricing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6 Carbon Pricing</td>
</tr>
</tbody>
</table>

These are candidates for long-term policy and require piloting or additional analysis before deployment.
Residential / Commercial /

Energy Consumption by Sector 2012
Billion Btu
Two Leading Existing Policies

- Energy Independence Act (Initiative 937) sets energy conservation and renewable energy targets. Large utilities must acquire renewable resources like wind and solar to meet part of their electricity needs and must implement all cost-effective energy-efficiency measures. (RCW 19.285)

- The State Energy Codes adopted from 2013 through 2031 must incrementally move towards achieving seventy percent reduction in annual net energy consumption for new residential and commercial buildings by 2031. (RCW 19.27A.160)
1937 – Renewables

15% of load by 2020
Since 1980, over half of the region’s growth in demand for electricity has been met with energy efficiency. Major accomplishments include:

Over 5,600 average megawatts saved—enough to power the state of Oregon and western Montana.
Savings from Energy Efficiency Since 1978 Exceeds the Annual Firm Energy Output of the Six Largest Hydro Projects in the Region

- McNary: 503 aMW
- Rocky Reach: 536 aMW
- The Dalles: 610 aMW
- John Day: 802 aMW
- Chief Joseph: 1,105 aMW
- Grand Coulee: 1,869 aMW

Conservation: 5,570 aMW

Northwest Power and Conservation Council
While the “All Resource Energy Supply Curve” tells us what to acquire, it doesn’t tell us **how much, when or the costs and risks** of acquisition!
RPM Scenarios

- Scenarios:
  - 1B – Current policy with no penalty for CO2 emissions
  - 2C – Current policy plus an uncertain penalty for CO2 emissions
Energy Management
Energy Management

Designed for Off
Energy Management

Not Designed for OFF
Energy Management

INFRA RED SENSOR

AV RECEIVER

GAME CONSOLE

DVD PLAYER

SUB WOOFER

SET TOP BOX

DVR

EXAMPLE OF PRODUCTS THAT CAN BE PLUGGED IN HERE

TV MUST BE PLUGGED IN HERE

TV
Energy Management

- Obtain management support for long-term energy reduction goals
- Dedicate staff, including an energy champion, to oversee and monitor energy management planning and implementation
- Develop and regularly update energy management plans
- Implement a system for tracking energy use
- Quantify energy savings from energy-efficient equipment upgrades
- Quantify energy savings from O&M process improvements
- Participate in structured network groups
Energy Management

<table>
<thead>
<tr>
<th>Energy Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>150 HP</td>
</tr>
<tr>
<td>Standard</td>
</tr>
<tr>
<td>Premium</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Energy Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>150 HP</td>
</tr>
<tr>
<td>Premium</td>
</tr>
<tr>
<td>Premium</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
When can we turn it off? No one knows for sure.
Energy Management

- Obtain management support for long-term energy reduction goals
- Dedicate staff, including an energy champion, to oversee and monitor energy management planning and implementation
- Develop and regularly update energy management plans
- Implement a system for tracking energy use
- Quantify energy savings from energy-efficient equipment upgrades
- Quantify energy savings from O&M process improvements
- Participate in structured network groups
Energy Management

- AKA
  - Strategic Energy Management (SEM)
  - Retro-commissioning
  - Track and tune
  - Resource Conservation Manager (RCM)

- Take advantage of utility staff and programs – you already paid for it.
- Get ready for “pay for performance” incentives
Building or Process Energy Trends

Navigant
Benchmarking

Building Type

Warehouse
Multifamily Housing
House of Worship
K-12 School
Residence Hall
Office
Other
Senior Care Facility
Hotel/Motel
Retail
Medical Office
Hospital
Supermarket

Site EUI (kBtu/sf)

Key to Seattle EUI Range

Individual Building Site EUI

Lowest EUI

Percentile 90th

50th

10th

Highest EUI

Department of Commerce
Innovation is in our nature.
What’s your yardstick?

- Commercial Office – Energy/SF, Energy Star Score
- Wastewater – Energy / MGD
- Food processing – Energy / lb of potatoes
- Plastic extrusion – Energy / lb of raw materials
- Data Center – Power Usage Effectiveness (PUE)
Winter Peaking Capacity of New Resources - Least Risk Strategy Scenario 2C

- Demand Response
- Renewable Generation
- Thermal Generation
- Conservation

Cumulative Capacity (MW)

Winter Year

2016 Q1, 2017 Q1, 2018 Q1, 2019 Q1, 2020 Q1, 2021 Q1, 2022 Q1, 2023 Q1, 2024 Q1, 2025 Q1, 2026 Q1, 2027 Q1, 2028 Q1, 2029 Q1, 2030 Q1, 2031 Q1, 2032 Q1, 2033 Q1, 2034 Q1, 2035 Q1
Transactive Network DOE / BPA Transactive Campus Resource and Research Project

- IBM iCS Nodes
- Region / BPA
- WA CEF Storage
- City of Richland
- Seattle City Light
- Avista / Pullman
- Bldg. Nodes
- Campus Node
- PNNL
- UW
- WSU
- Peak/demand charge mgmt.
- Microgrids as a resilience resource/smart city w/ Avista
- Solar PV & CEF battery in WSU microgrid ops
- Curricula development

- Multi-campus network operations
- Transactive campus/bldg. responsive applications
- Transactive / advanced bldg. controls testbed (SEL bldg.)
- Energy efficiency applications, leveraging transactive network
- Smart inverter integration w/ Seattle City Light’s distribution
- Curricula development