

# Northwest Regional Forecast of Power Loads and Resources

2015 through 2024

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**PNCC**

March 2014

Special thanks to PNUCC System Planning Committee members and utility staff that provided us with this information.

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# 2014 Northwest Regional Forecast

## Executive Summary

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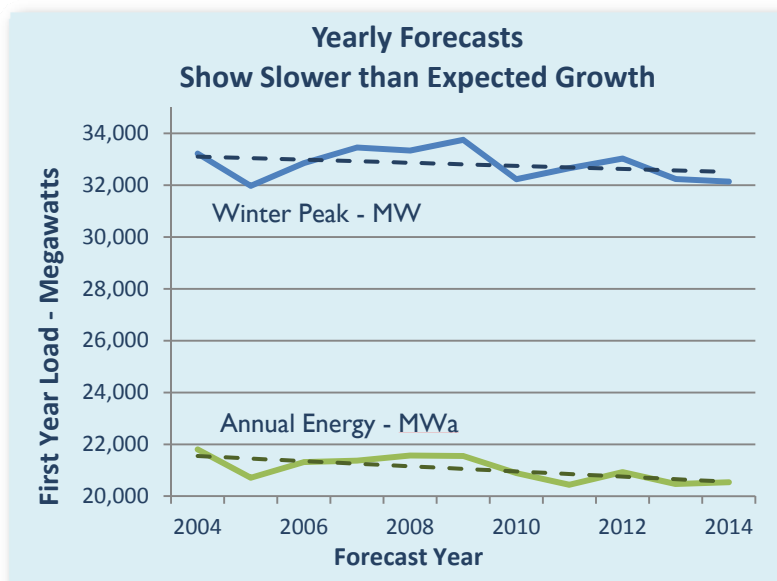
The *Northwest Regional Forecast (Forecast)* through 2024 is a compilation of all regional entities' load forecasts and the plans to meet them. It is PNUCC's annual snapshot that shows where things are trending and how they stack up against past projections. Every utility has unique circumstances, and this year, there's substantial variation among the projections.

The *Forecast* tells an on-the-ground story about the state of the power system across the Northwest. While the forecasted loads reflect expected conservation savings, the resources include generating facilities and purchases currently on the books, as well as new plants that will be built and purchases that will be made to keep the lights burning and commerce humming. These load forecasts and resource plans have been made amidst uncertainty about the future. Weather and water conditions are always an unknown, now changing state and federal policies regarding carbon and renewable portfolio standards are adding a new and significant element to utility planning, not to mention the potential impact of California's changing resource landscape.

### Load Growth Slower than Anticipated

In this year's report most utilities have again lowered the starting point for their load projections or held them steady compared to last year. In fact, for much of the last decade the newest load forecasts start about the same or lower than was projected the year before.

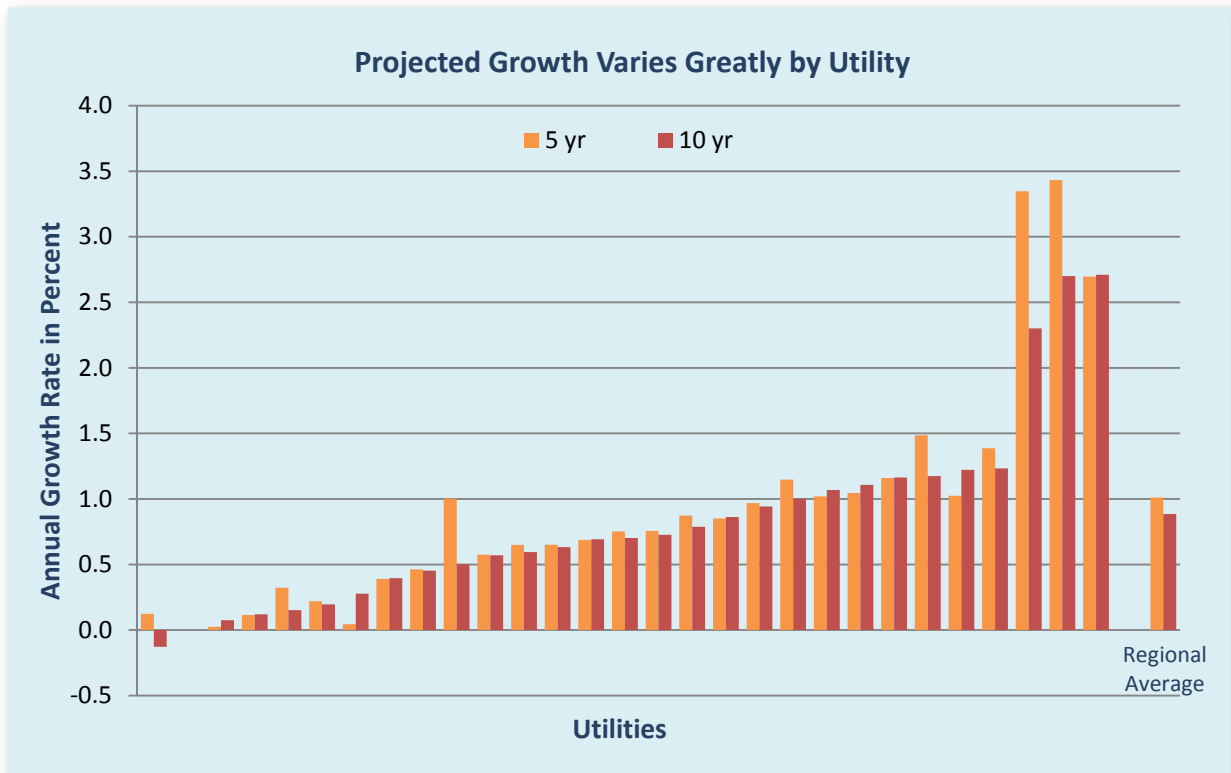
The overall change in the first year of our forecasts is not easily explained. There are several likely reasons, including the economy. In addition, the region's aggressive conservation efforts are purposely dampening loads. Utilities are considering new technological advancements in and consumer use of electronic devices such as televisions, computer hardware, and household appliances, and they are evaluating efficiency improvements in transmission and



distribution systems as they forecast future demand. Combined, these factors appear to be having a significant impact on load. Utilities are exploring these and other possibilities to verify the factors driving the changes in the size and characteristics of Northwest electricity demand.

Looking ahead, loads are forecast to grow, but at a more modest pace. Some utilities are expecting more notable growth, and for the most part experiencing an uptick in their industrial loads. For example, the addition of a data center in the service territory of a moderate-sized utility accounts for a significant jump in its total load.

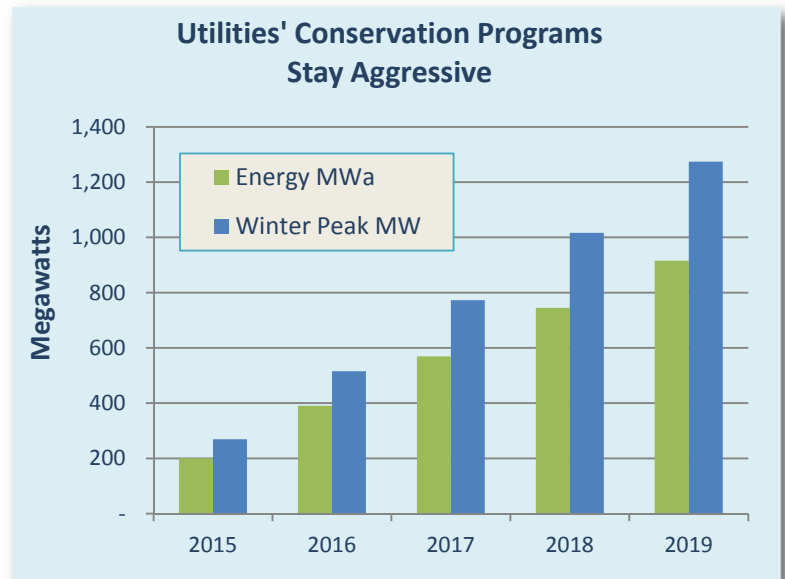
The following chart illustrates the differences in individual utilities' projected annual load growth over a 5 year and 10 year time period. The projected growth runs from zero to almost 3.5 percent per year looking at the first five years and from slightly negative to 2.7 percent annually for the entire ten year period, depending on the utility. In several cases, which include some large utilities, the annual growth rate for both time periods is well below 1 percent. Regionally, the annual growth rate is 1 percent in the near term and just 0.89 percent for the full 10 years.



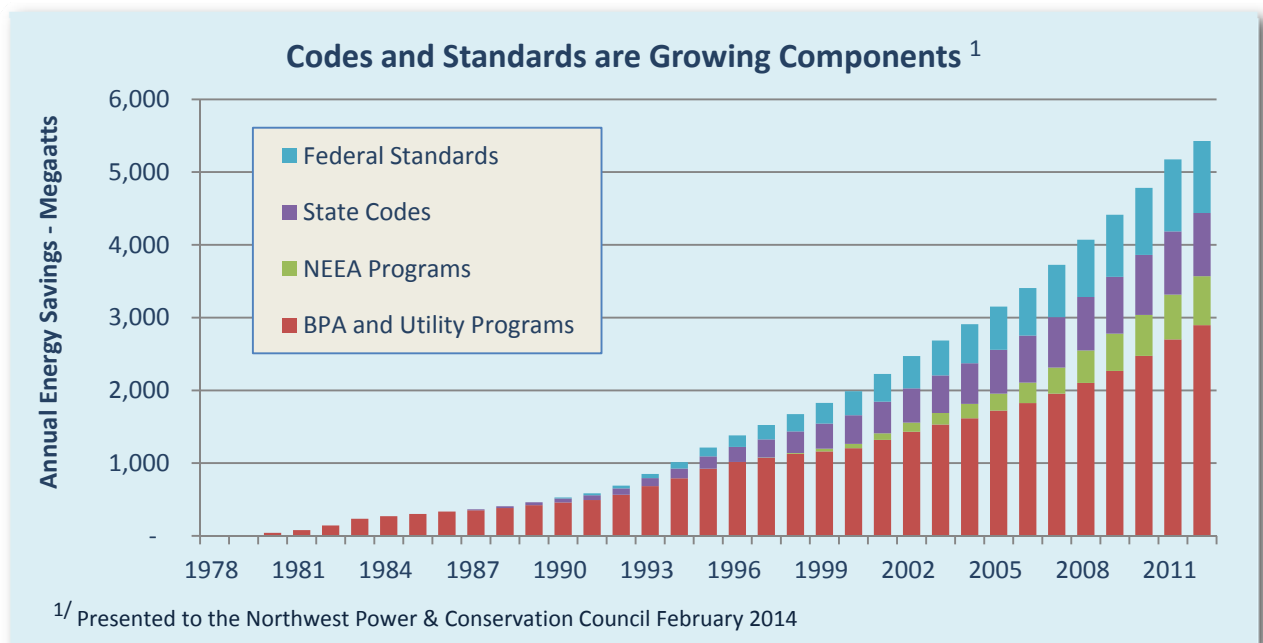
## Conservation Savings Stack Up

Conservation remains a high priority for Northwest utilities. Over the next five years utilities expect to achieve from their utility programs alone a cumulative annual energy savings of 900 MWa that will also contribute to a 1,300 MW reduction in winter peak demand.

In addition to the savings utilities expect to achieve through their own programs as reported here, the region will reap the benefits of the market transformation programs funded through the Northwest Energy Efficiency Alliance (NEEA), as well as the savings from the expanding reach of the most recent state building codes and federal energy efficiency standards.



The Northwest Power & Conservation Council pegs the region's total savings since 1978 at 5,300 MWa. The 2012 results show that while utility and NEEA programs continue to make up a significant share of the savings, a growing percentage is attributable to changes in state codes and federal energy efficiency standards over the past two decades. Utilities are studying how the increasing role of codes and standards could affect their program offerings in the future.

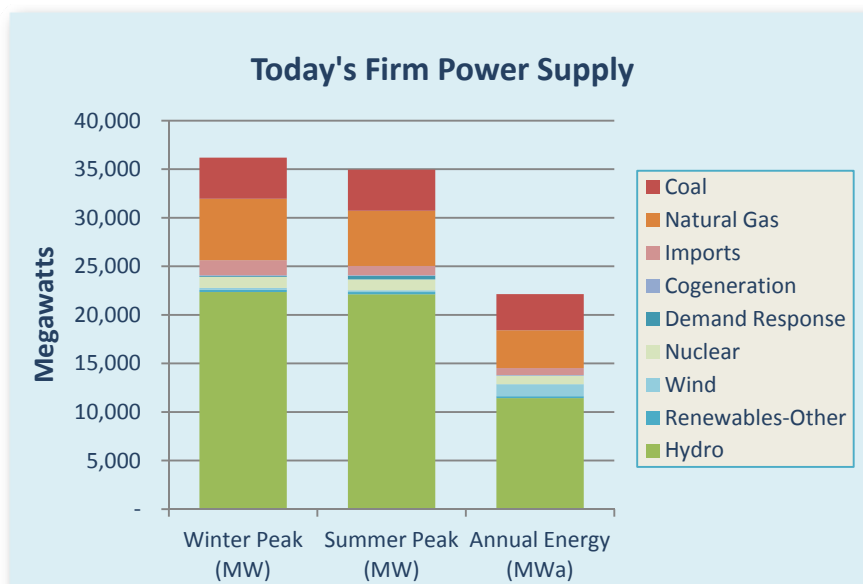


Utilities are continuing to investigate how and whether different energy efficiency programs help reduce peak loads. Utility forecasts for summer and winter peak loads have moderated in recent years, but they still indicate a need for additional peaking resources in the future.

**Demand Response is playing a role.** Utilities are also exploring additional opportunities for reducing peak load. This is referred to as demand response and is a form of load management contractually set with utility customers to reduce load during peak events. This year’s report identifies agreements available to reduce peak demand by 90 MW in winter and almost 600 MW in summer by the end of the study period. Some are exploratory pilot programs, while others are proven programs, such as agreements with irrigation customers in Idaho and Eastern Oregon.

## Hydropower Remains the Foundation

Over the past two decades, the power supply in the Northwest has grown. The hydropower system remains the region’s dominant resource, providing over 22,300 megawatts of peak generation under poor water conditions. The region’s clean, carbon-free hydropower is accompanied by other carbon-free generation including other renewables, wind and nuclear power. Natural gas and coal-fired generation and imports provide the remaining third of the region’s firm power supply.



Utilities have added, in terms of nameplate, about 5,000 megawatts of wind generation and are relying on another almost 7,000 MW of natural gas generation. Gas-fired combustion turbines have been built or acquired for meeting base load as well as peak needs. Other resources that have been added to the mix include other renewables such as biomass and small hydro. The result is a resource stack that provides a total winter peak capability in low water conditions of more than 36,000 MW and more than 22,000 MWa of annual energy.



## Utilities Focus on Peak Needs

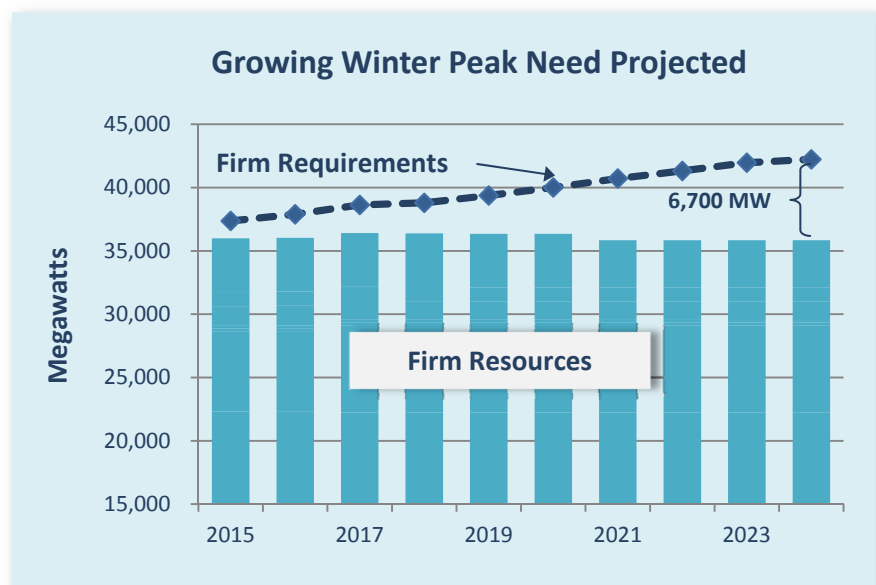
Growing winter peak requirements, increasing constraints on the hydro system, the addition of new resources with minimal peaking capability and the scheduled closure of the Boardman coal plant all contribute to utilities' attention to planning for meeting future peak needs. Utilities are seeing the need to add resources to serve peak demand and introduce additional flexibility to meet fluctuations in load and to balance variable generation going forward.

The capability of the region's hydropower resource is becoming more constrained. The day-to-day, hour-to-hour, minute-to-minute flexibility of hydropower is critically important for meeting peak needs and a major consideration as we plan ahead. The expected peaking capability of the hydropower system has been reduced by approximately 5,400 MW in the last 15 years according to a recent Council estimate.<sup>1</sup> River operations required under various directives to protect Columbia River Basin fish and wildlife have diminished generation. In addition, the hydro system is subject to increasingly restrictive operating parameters to provide backup generation and balancing services for wind generation. These changes account for a significant portion of the lost capability.

For planning purposes utilities remain cautious about intermittent resources for meeting peak need. Most utilities plan on five percent or less of the capability of their wind fleet being available to meet peak demand. A few utilities plan on a greater percent available during the peak.

The result is a winter planning gap that is forecast to grow over time without additional action from utilities. The gap represents the difference between firm requirements – loads reduced by conservation, exports, and planning margin<sup>2</sup> – and firm resources. The winter need for additional firm resources starts at 1,200 MW in 2015 and grows to 6,700 MW in 10 years.

This gap is based on several assumptions, including the water supply. For planning purposes the *Forecast* looks at the 8<sup>th</sup> percentile lowest water condition for the Columbia River hydrosystem to estimate the peak hydro power available. Average



<sup>1</sup> Presentation to NW Power & Conservation Council Power Committee February 11, 2014

<sup>2</sup> Forced outages, unanticipated load growth, load variation due to temperatures, and operating reserves

water conditions would boost firm hydro generation by another several thousand megawatts. This requirements and resources comparison also counts on minimal wind generation, normal winter weather conditions, and no additional short-term market purchases.

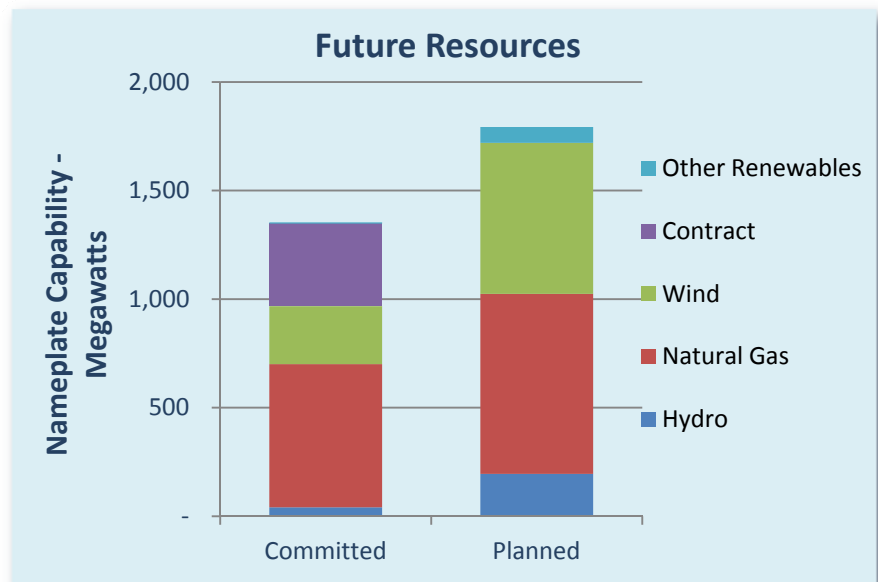
## After Conservation, the Choice is Natural Gas & Wind

Looking beyond utilities’ conservation programs, utilities are turning to natural gas-fired generation and wind turbines to fulfill most of their future needs. Utilities have a 380 megawatt power contract and another 267 megawatts of wind “committed” as new supply. Along with wind, which remains the resource of choice to meet renewable mandates in the region, utilities report additions of 660 megawatts of committed new natural-gas fired generation too. These firm commitments are reflected in the comparisons of requirements and resources.

Natural gas plants remain the best option for utilities to meet peak needs and to provide firm backup for wind. Nearly 50 percent of the almost 1,800 megawatts of additional generation planned over the next ten years is natural gas fired and much of the rest is wind.

Most of the large-scale natural gas generation, 70 percent, is planned for late in the ten-year period;

however, a significant 221 megawatt addition is on the drawing board for 2017.



The Northwest brought over 1,300 MW of new generation on line in 2012. Following this addition of resources, there has been a lull in large-scale acquisition activity. Utilities recently added 61 megawatts of generation in the form of hydro upgrades, most of which bolsters capacity.

# Overview

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Each year the *Northwest Regional Forecast* compiles utilities' 10-year projections of electric loads and resources which provide information about the region's need to acquire new power supply. The Forecast is a comprehensive look at the capability of existing and new electric generation resources, long-term firm contracts, expected savings from demand side management programs and other components of electric demand for the Northwest.

This report presents estimates of annual average energy, seasonal energy and winter and summer peak capability in Tables 1 through 4 of the Northwest Region Requirements and Resources section. These metrics provide a multi-dimensional look at the Northwest's need for power and underscore the growing complexity of the power system.

Northwest generating resources are shown by fuel type. Existing resources include those resources listed in Tables 5, 6a, 8a and 8b. Table 5, Recently Acquired Resources, highlights projects and supply that became available most recently. And Table 6a, Committed New Supply, lists those generating projects where construction has started, as well as contractual arrangements that have been made for providing power at a future time. Table 8a, Northwest Generating Resources, is a comprehensive list of generating resources that make up the electric power supply for the Pacific Northwest that are utility-owned or utility contracted. Table 8b lists Northwest generating resources owned by independent power producers.

In addition, utilities have demand side management programs in place to reduce the need for generating resources. Table 6b, Demand Side Management Programs, provides a snapshot of utilities' expected savings from these programs for the next ten years. Table 7, Planned Resources, is a compilation of what utilities have reported in their individual integrated resource plans to meet future need.

## Planning Area

The Northwest Regional Planning Area is the area defined by the Pacific Northwest Electric Power Planning and Conservation Act. It includes: the states of Oregon, Washington and Idaho; Montana west of the Continental Divide; portions of Nevada, Utah, and Wyoming that lie within the Columbia River drainage basin; and any rural electric cooperative customer not in the geographic area described above, but served by BPA on the effective date of the Act.





# Northwest Region

## Requirements and Resources

**Table 1: Northwest Region Requirements and Resources – Annual Energy** shows the sum of the individual utilities’ requirements and resources for each of the next 10 years. Expected firm load and exports make up the total firm regional requirements.

Annual Energy (MWa)	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
<b>Firm Requirements</b>										
Load 1/	20,536	20,756	20,976	21,189	21,379	21,572	21,733	21,909	22,067	22,232
Exports	<u>700</u>	<u>650</u>	<u>615</u>	<u>600</u>	<u>590</u>	<u>584</u>	<u>579</u>	<u>527</u>	<u>523</u>	<u>523</u>
<b>Total</b>	21,236	21,406	21,591	21,789	21,969	22,156	22,311	22,436	22,590	22,754
<b>Firm Resources</b>										
Hydro	11,435	11,443	11,402	11,402	11,398	11,398	11,398	11,398	11,398	11,398
Small Therm & Misc.	-	-	-	-	-	-	-	-	-	-
Natural Gas	3,885	4,253	4,272	4,296	4,311	4,347	4,457	4,467	4,420	4,368
Renewables-Other	194	194	194	194	195	194	193	187	185	184
Wind	1,232	1,280	1,280	1,280	1,280	1,280	1,279	1,279	1,232	1,228
Cogeneration	70	70	55	55	41	38	34	17	17	17
Imports	721	822	811	810	813	816	819	821	824	827
Nuclear	878	1,030	878	1,030	878	1,030	878	1,030	878	1,030
Coal	<u>3,730</u>	<u>3,677</u>	<u>3,620</u>	<u>3,712</u>	<u>3,703</u>	<u>3,681</u>	<u>3,500</u>	<u>3,216</u>	<u>3,213</u>	<u>3,221</u>
<b>Total</b>	22,145	22,770	22,513	22,779	22,619	22,784	22,557	22,415	22,167	22,273
<b>Surplus (Need)</b>	<b>909</b>	<b>1,364</b>	<b>922</b>	<b>990</b>	<b>650</b>	<b>628</b>	<b>246</b>	<b>(21)</b>	<b>(423)</b>	<b>(481)</b>

<sup>1/</sup> Loads net of conservation.

**Table 2: Northwest Region Requirements and Resources 2014-15 Monthly Energy** shows the sum of individual utilities' requirements and resources for monthly energy values for the 2014-15 operating year. Expected firm load and exports make up the total firm regional requirements.

Monthly Energy (MWa)	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Ave
<b>Firm Requirements</b>													
Load <sup>1/</sup>	20,015	18,696	18,790	21,063	23,456	23,269	22,192	20,548	19,502	18,967	19,412	20,686	20,536
Exports	<u>1,057</u>	<u>849</u>	<u>881</u>	<u>603</u>	<u>637</u>	<u>512</u>	<u>637</u>	<u>626</u>	<u>520</u>	<u>592</u>	<u>679</u>	<u>801</u>	<u>700</u>
<b>Total</b>	21,072	19,545	19,671	21,666	24,092	23,781	22,829	21,174	20,022	19,559	20,090	21,487	21,236
<b>Firm Resources</b>													
Hydro	11,485	8,920	10,220	11,474	13,271	10,706	8,837	10,070	9,799	11,572	17,661	13,017	11,435
Small Therm. & Misc.	-	-	-	-	-	-	-	-	-	-	-	-	-
Natural Gas	4,037	3,820	3,817	3,896	4,211	4,215	3,915	3,882	3,771	3,284	3,864	4,036	3,885
Renewables-Other	199	200	202	202	200	186	196	200	195	186	163	197	194
Wind	1,207	1,140	1,144	1,057	1,074	1,087	1,143	1,414	1,357	1,356	1,450	1,346	1,232
Cogeneration	68	64	73	74	79	79	76	80	67	60	53	68	70
Imports	581	437	469	762	1,290	953	879	741	631	607	621	673	721
Nuclear	1,030	1,030	1,030	1,030	1,030	1,030	1,030	1,030	1,030	498	-	764	878
Coal	<u>3,851</u>	<u>3,851</u>	<u>3,851</u>	<u>3,851</u>	<u>3,851</u>	<u>3,851</u>	<u>3,851</u>	<u>3,543</u>	<u>3,542</u>	<u>3,421</u>	<u>3,452</u>	<u>3,851</u>	<u>3,730</u>
<b>Total</b>	22,458	19,462	20,805	22,345	25,006	22,107	19,926	20,958	20,391	20,984	27,265	23,953	22,145
<b>Surplus (Need)</b>	<b>1,385</b>	<b>(83)</b>	<b>1,134</b>	<b>679</b>	<b>913</b>	<b>(1,674)</b>	<b>(2,903)</b>	<b>(216)</b>	<b>369</b>	<b>1,425</b>	<b>7,174</b>	<b>2,466</b>	<b>909</b>

<sup>1/</sup> Loads net of conservation.

**Table 3: Northwest Region Requirements and Resources – Winter Peak**

The sum of the individual utilities' firm requirements and resources for the peak hour in January for each of the next 10 years are shown in this table. Firm peak requirements include a planning margin to account for planning uncertainties.

Winter Peak (MW)	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
<b>Firm Requirements</b>										
Load 1/	32,135	32,350	32,726	32,961	33,228	33,501	33,726	33,975	34,206	34,434
Exports	1,395	1,359	1,344	1,361	1,355	1,355	1,355	1,355	1,355	1,355
Planning Margin 2/	<u>3,856</u>	<u>4,205</u>	<u>4,582</u>	<u>4,944</u>	<u>5,316</u>	<u>5,695</u>	<u>6,071</u>	<u>6,455</u>	<u>6,841</u>	<u>6,887</u>
<b>Total</b>	<b>37,387</b>	<b>37,915</b>	<b>38,651</b>	<b>39,266</b>	<b>39,900</b>	<b>40,552</b>	<b>41,152</b>	<b>41,786</b>	<b>42,402</b>	<b>42,676</b>
<b>Firm Resources</b>										
Hydro	22,349	22,368	22,275	22,275	22,275	22,274	22,274	22,274	22,274	22,274
Demand Response	76	87	89	90	92	93	88	89	90	90
Small Therm & Misc.	3	3	3	3	3	3	3	3	3	3
Natural Gas	6,330	6,330	6,880	6,880	6,880	6,880	6,880	6,880	6,880	6,880
Renewables-Other	232	232	232	232	232	230	228	222	222	222
Wind	205	205	205	205	205	205	205	204	195	195
Cogeneration	86	86	67	67	67	46	46	17	17	17
Imports	1,546	1,565	1,480	1,466	1,425	1,430	1,435	1,441	1,446	1,453
Nuclear	1,130	1,130	1,130	1,130	1,130	1,130	1,130	1,130	1,130	1,130
Coal	<u>4,238</u>	<u>4,238</u>	<u>4,237</u>	<u>4,236</u>	<u>4,236</u>	<u>4,236</u>	<u>3,723</u>	<u>3,723</u>	<u>3,722</u>	<u>3,722</u>
<b>Total</b>	<b>36,194</b>	<b>36,244</b>	<b>36,597</b>	<b>36,583</b>	<b>36,543</b>	<b>36,527</b>	<b>36,012</b>	<b>35,982</b>	<b>35,978</b>	<b>35,986</b>
<b>Surplus (Need)</b>	<b>(1,193)</b>	<b>(1,671)</b>	<b>(2,054)</b>	<b>(2,683)</b>	<b>(3,356)</b>	<b>(4,025)</b>	<b>(5,141)</b>	<b>(5,804)</b>	<b>(6,424)</b>	<b>(6,690)</b>

<sup>1/</sup> Loads net of conservation.

<sup>2/</sup> Planning Margin accounts for forced outages, unanticipated load growth, load variation due to temperatures, and operating reserves.

**Table 4: Northwest Region Requirements and Resources – Summer Peak**

This table shows the sum of the individual utilities' firm requirements and resources for a peak hour in August for each of the next 10 years. Firm peak requirements include a planning margin to account for planning uncertainties.

Summer Peak (MW)	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
<b>Firm Requirements</b>										
Load 1/	27,077	27,362	27,570	27,903	28,208	28,487	28,751	29,015	29,274	29,533
Exports	2,176	1,976	1,865	1,882	1,822	1,817	1,817	1,517	1,517	1,517
Planning Margin 2/	<u>3,249</u>	<u>3,557</u>	<u>3,860</u>	<u>4,186</u>	<u>4,513</u>	<u>4,843</u>	<u>5,175</u>	<u>5,513</u>	<u>5,855</u>	<u>5,907</u>
<b>Total</b>	32,502	32,895	33,295	33,971	34,544	35,147	35,743	36,044	36,646	36,956
<b>Firm Resources</b>										
Hydro	20,983	21,000	20,907	20,907	20,907	20,907	20,907	20,907	20,907	20,907
Demand Response	359	367	378	380	381	484	543	565	566	566
Small Therm & Misc.	3	3	3	3	3	3	3	3	3	3
Natural Gas	5,692	5,692	6,342	6,342	6,342	6,342	6,342	6,342	6,342	6,342
Renewables-Other	233	231	233	233	233	233	231	230	223	223
Wind	178	191	191	191	191	191	191	191	186	186
Cogeneration	68	68	54	50	50	50	32	8	8	8
Imports	946	1,130	1,181	1,178	1,182	1,186	1,190	1,194	1,198	1,203
Nuclear	1,130	1,130	1,130	1,130	1,130	1,130	1,130	1,130	1,130	1,130
Coal	<u>4,237</u>	<u>4,238</u>	<u>4,237</u>	<u>4,236</u>	<u>4,236</u>	<u>4,236</u>	<u>4,236</u>	<u>3,723</u>	<u>3,722</u>	<u>3,723</u>
<b>Total</b>	33,830	34,050	34,657	34,650	34,655	34,761	34,803	34,291	34,285	34,289
<b>Surplus (Need)</b>	1,327	1,155	1,362	678	111	(386)	(940)	(1,753)	(2,361)	(2,667)

<sup>1/</sup> Loads net of conservation.

<sup>2/</sup> Planning Margin accounts for forced outages, unanticipated load growth, load variation due to temperatures, and operating reserves.



# Northwest New and Existing Resources

The following tables provide details about new and existing generating resources and demand side programs.

**Table 5: *Recently Acquired Resources*** highlights projects that have most recently become available.

Project	Date	Fuel/Tech	Nameplate (MW)	Winter Peak (MW)	Energy (MWa)	Utility
Box Canyon Upgrade (Unit 2)	Nov-13	Hydro	5.8	1.0		Pend Oreille County PUD
Cushman North Fork Powerhouse	Feb-13	Hydro	3.6	3.6		Tacoma Power
Deep Creek		Hydro	0.4			Avista Corp.
Fargo Drop Hydroelectric	Apr-13	Hydro	1.3	1.3		Idaho Power
Lower Baker 4	Sep-13	Hydro	30.0	30.0		Puget Sound Energy
W01 Turbine/Generator Replacement	Oct-13	Hydro	23.0	23.0		Grant County PUD
Total			64	59		

**Table 6a: *Committed New Supply*** lists contracts and generating projects where construction has started and that utilities are counting on to meet need. All supply listed in these tables are included in the regional analysis of power needs.

Project	Date	Fuel/Tech	Nameplate (MW)	Winter Peak (MW)	Energy (MWa)	Utility
Box Canyon Upgrade (Unit 1)	Dec-14	Hydro	6	1		Pend Oreille County PUD
Calligan Creek	Jan-17	Hydro	6	6	2	Snohomish County PUD
Carty CCCT	Jun-16	Natural Gas	440	430	360	Portland General Electric
Coal Transition PPA	Dec-14	Contract	380	380	380	Puget Sound Energy
Hancock Creek	Nov-17	Hydro	6	6	2	Snohomish County PUD
Plum Creek NLSL	Jul-14	Biomass	6	6		Flathead Electric Cooperative
Port Westward 2	Jan-15	Natural Gas	220	220		Portland General Electric
Tucannon River Wind	Jan-15	Wind	267	13	102	Portland General Electric
W10 Generator Replacement	May-14	Hydro	23	23		Grant County PUD
Total			1,354	1,085	846	

**Table 6b: Demand Side Management Programs** is a snapshot of the regional utilities' efforts to manage demand. The majority of the reported conservation savings are from energy efficiency and distribution efficiency. Some utilities also include some savings from market transformation, fuel switching, fuel conversion or energy storage. This table also shows reported demand response programs.

	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
<b>Conservation</b>										
<b>Annual Energy (MWa)</b>										
Incremental	201	192	181	177	173	166	179	163	155	146
Cumulative	201	393	574	751	924	1,090	1,269	1,432	1,588	1,734
<b>Winter Peak (MW)</b>										
Incremental	270	248	259	246	260	209	277	221	228	213
Cumulative	270	518	777	1,023	1,283	1,492	1,769	1,990	2,218	2,432
<b>Demand Response (MW)</b>										
Winter	76	87	89	90	92	93	88	89	90	90
Summer	366	377	379	380	483	493	565	566	567	567

<sup>1/</sup> Utility programs only.

**Table 7: Planned Resources** captures resources utilities have identified to meet their own needs. The table shows planned generating projects that are being counted on to meet the growing demand. This information is a compilation of what utilities have reported in their individual integrated resources plans. These resources are not included in the regional analysis of power needs.

Project	Schedule	Fuel/Tech	Nameplate (MW)	Winter Peak (MW)	Energy (MWa)	Utility
Benson Creek Wind	Dec-16	Wind	10	10		Idaho Power
Biomass	Dec-23	Wood waste	44		40	Seattle City Light
Clark Canyon Dam	Mar-14	Hydro	5	0		Idaho Power
Combined Heat and Power 2019	Dec-19	CHP	4		4	PacifiCorp
Combined Heat and Power 2024	Dec-24	CHP	3		3	PacifiCorp
Durbin Creek Wind	Dec-16	Wind	10	10		Idaho Power
Gas peaker	Dec-17	Natural Gas	221	221		Puget Sound Energy
Gas peaker	Dec-19	Natural Gas	83	76		Avista Corp.
Gas peaker	Dec-23	Natural Gas	221	221		Puget Sound Energy
Gas peaker	Dec-23	Natural Gas	83	76		Avista Corp.
Gas peaker	Dec-24	Natural Gas	221	221		Puget Sound Energy
Jett Creek Wind	Dec-16	Wind	10	10		Idaho Power
Landfill Gas	Dec-14	Methane gas	5		2	Seattle City Light
Landfill Gas	Dec-20	Methane gas	9		8	Seattle City Light
Nine Mile 1 & 2	Dec-15	Hydro		16		Avista Corp.
Prospector Wind	Dec-16	Wind	10	10		Idaho Power
Shoshone Falls Upgrade	Jul-19	Hydro	49	2		Idaho Power
Small Hydro	Jan-24	Hydro	30			Snohomish County PUD
Solar	Dec-15	Solar	8		2	PacifiCorp
W03 Generator Replacement	Apr-18	Hydro	9	9		Grant County PUD
W03 Transformer B Replacement	Oct-15	Hydro	12	12		Grant County PUD
W04 Generator Replacement	Mar-16	Hydro	9	9		Grant County PUD
W04 Transformer B Replacement	Oct-15	Hydro	12	12		Grant County PUD
W06 Generator Replacement	Apr-19	Hydro	9	9		Grant County PUD
W07 Transformer D Replacement	Oct-14	Hydro	21	21		Grant County PUD
W08 Generator Replacement	Apr-15	Hydro	21	21		Grant County PUD
W08 Transformer D Replacement	Oct-14	Hydro				Grant County PUD
W09 Generator Replacement	Apr-17	Hydro	9	9		Grant County PUD
W09 Transformer E Replacement	Mar-14	Hydro	12	12		Grant County PUD
W10 Transformer E Replacement	Mar-14	Hydro				Grant County PUD
White Creek Wind	Variable	Wind	3		1	Mason County PUD # 3
Wind	Dec-22	Wind	300	12	90	Puget Sound Energy
Wind	Dec-23	Wind	63		20	Seattle City Light
Wind	Dec-24	Wind	220		70	Seattle City Light
Wind	Dec-24	Wind	70			Seattle City Light
<b>Total</b>			<b>1,793</b>	<b>996</b>	<b>240</b>	

**Table 8a: Northwest Utility Generating Resources** is a comprehensive list of utility-owned and utility contracted generating resources that make up those utilities electric power supply.

Project	Owner	NW Utility	Nameplate (MW)
<b>HYDRO</b>			<b>33,275</b>
Albeni Falls	US Corps of Engineers	Federal System (BPA)	43
Alder	Tacoma Power	Tacoma Power	50
American Falls	Idaho Power	Idaho Power	92
Anderson Ranch	US Bureau of Reclamation	Federal System (BPA)	40
Arrowrock Dam	Clatskanie PUD/Irr Dist	Clatskanie PUD	18
Ashton	PacifiCorp	PacifiCorp	6
B. Smith	PacifiCorp	PacifiCorp	0
Barber Dam	Enel North America	Idaho Power	4
Bell Mountain	PacifiCorp	PacifiCorp	1
Bend Power Dam	PacifiCorp	PacifiCorp	-
Big Cliff	US Corps of Engineers	Federal System (BPA)	18
Big Creek (Hellroaring)		Multiple Utilities	-
Big Fork	PacificCorp	PacifiCorp	4
Big Sheep Creek	Everand Jensen	Avista Corp.	0
Birch Creek	Everand Jensen	Idaho Power	0
Birch Creek	PacifiCorp	PacifiCorp	3
Black Canyon	US Bureau of Reclamation	Federal System (BPA)	10
Black Canyon # 3	Big Wood Canal Co.	Idaho Power	0
Black Creek Hydro		Puget Sound Energy	4
Blind Canyon	Blind Canyon Hydro	Idaho Power	2
Bliss	Idaho Power	Idaho Power	75
Boise River Diversion	US Bureau of Reclamation	Federal System (BPA)	2
Bonneville	US Corps of Engineers	Federal System (BPA)	1,102
Boston Power		PacifiCorp	-
Boundary	Seattle City Light	Seattle City Light	1,040
Box Canyon	Pend Oreille County PUD	Pend Oreille County PUD	70
Box Canyon-Idaho	Richard Kaster	Idaho Power	0
Briggs Creek	Richard Kaster	Idaho Power	1
Brownlee	Idaho Power	Idaho Power	585
Burnside Hydro		Other Public (BPA)	-
Bypass	Bypass, Ltd.	Idaho Power	10
Cabinet Gorge	Avista Corp.	Avista Corp.	265
Calligan Creek	Snohomish County PUD	Snohomish County PUD	6
Calispel Creek	Pend Oreille PUD	Pend Oreille PUD	1
Canyon Springs	J.D. McCollum	Idaho Power	0

Project	Owner	NW Utility	Nameplate (MW)
Carmen-Smith	Eugene Water & Electric Board	Eugene Water & Electric Board	105
Cascade	US Bureau of Reclamation	Idaho Power	12
CDM Hydro	PacifiCorp	PacifiCorp	6
Cedar Draw Creek	Crys. Sprgs. Hydro	Idaho Power	2
Cedar Falls, Newhalem	Seattle City Light	Seattle City Light	20
Central Oregon Siphon		PacifiCorp	5
Chandler	US Bureau of Reclamation	Federal System (BPA)	12
Chelan	Chelan County PUD	Chelan County PUD	59
Chief Joseph	US Corps of Engineers	Federal System (BPA)	2,457
C. J. Strike	Idaho Power	Idaho Power	83
Clear Lake	Idaho Power	Idaho Power	3
Clear Springs Trout	Clear Sprgs. Trout	Idaho Power	1
Clearwater	Non - Utility	Federal (BPA)	1
Clearwater #1	PacifiCorp	PacifiCorp	15
Clearwater #2	PacifiCorp	PacifiCorp	26
Cline Falls	COID	PacifiCorp	1
COID	PacifiCorp	PacifiCorp	7
Copco #1	PacifiCorp	PacifiCorp	20
Copco #2	PacifiCorp	PacifiCorp	27
Cougar	US Corps of Engineers	Federal System (BPA)	25
Cove Hydro		Other Public (BPA)	-
Cowlitz Falls	Lewis County PUD	Federal (BPA)	70
Crystal Springs	Crystal Springs Hydro	Idaho Power	2
Curry Cattle Company	Curry Cattle Co.	Idaho Power	0
Curtis Livestock	PacifiCorp	PacifiCorp	0
Cushman 1	Tacoma Power	Tacoma Power	43
Cushman 2	Tacoma Power	Tacoma Power	81
Deep Creek	Gordon Foster	Avista Corp.	0
Derr Creek	Jim White	Avista Corp.	0
Detroit	US Corps of Engineers	Federal System (BPA)	100
Dexter	US Corps of Engineers	Federal System (BPA)	15
Diablo Canyon	Seattle City Light	Seattle City Light	182
Dietrich Drop	Enel North America	Idaho Power	5
Dry Creek		PacifiCorp	4
D. Wiggins		PacifiCorp	-
Dworshak	US Corps of Engineers	Federal System (BPA)	400
Dworshak/ Clearwater		Federal System (BPA)	-
Eagle Point	PacifiCorp	PacifiCorp	3
East Side	PacifiCorp	PacifiCorp	3
Electron	Puget Sound Energy	Puget Sound Energy	23

Project	Owner	NW Utility	Nameplate (MW)
Elk Creek	El Dorado Hydro	Idaho Power	2
Eltopia Branch Canal	SEQCBID	Muliple Utilities	2
Fall Creek	PacifiCorp	PacifiCorp	3
Falls Creek		Other Public (BPA)	-
Falls River	Marysville Hydro Partner	Idaho Power	9
Faraday-Clackamas	Portland General Electric	Portland General Electric	37
Fargo Drop Hydro	Riverside Investments, LLC	Idaho Power	1
Farmers Irrigation	PacifiCorp	PacifiCorp	3
Faulkner Ranch	Faulkner Brothers Hydro Inc.	Idaho Power	1
Felt	PacifiCorp	PacifiCorp	-
Fish Creek	PacifiCorp	PacifiCorp	11
Fisheries Development Co.	Fisheries Devel.	Idaho Power	0
Foster	US Corps of Engineers	Federal System (BPA)	20
Frontier Technologies	PacifiCorp	PacifiCorp	4
Galesville Dam	PacifiCorp	PacifiCorp	2
Gem State Hydro		Other Publics (BPA)	23
Geo-Bon No 2	Enel North America, Inc.	Idaho Power	1
Georgetown Power	PacifiCorp	PacifiCorp	0
Gorge	Seattle City Light	Seattle City Light	207
Grace	PacifiCorp	PacifiCorp	33
Grand Coulee	US Bureau of Reclamation	Federal System (BPA)	6,494
Green Peter	US Corps of Engineers	Federal System(BPA)	80
Green Springs	US Bureau of Reclamation	Federal System (BPA)	16
Hailey CSPP	City of Hailey	Idaho Power	0
Hancock Creek		Snohomish County PUD	6
Hazelton A	SE Hazelton ALP	Idaho Power	8
Hazelton B	Hazelton Power Co.	Idaho Power	8
Hells Canyon	Idaho Power	Idaho Power	392
Hills Creek	US Corps of Engineers	Federal System (BPA)	30
Hood Street Reservoir	Tacoma Power	Tacoma Power	1
Horseshoe Bend	Horseshoe Bend Hydro	Idaho Power	10
Hungry Horse	US Bureau of Reclamation	Federal System (BPA)	428
Hutchinson Creek	STS Hydro	Puget Sound Energy	1
Ice Harbor	US Corps of Engineers	Federal System(BPA)	603
Idaho Falls - City Plant		Federal System (BPA)	-
Idaho Falls - Lower Plant		Federal System (BPA)	-
Idaho Falls - Upper Plant		Federal System (BPA)	-
Ingram Warm Springs	PacifiCorp	PacifiCorp	1
Iron Gate	PacifiCorp	PacifiCorp	18
Island Park		Fall River Rural Electric Cooperative	5

Project	Owner	NW Utility	Nameplate (MW)
Jackson (Sultan)	Snohomish County PUD	Snohomish County PUD	112
James Boyd		PacifiCorp	-
Jim Ford Creek	Ford Hydro	Avista Corp.	2
Jim Knight	Big Wood Canal Co.	Idaho Power	0
John C. Boyle	PacifiCorp	PacifiCorp	90
John Day	US Corps of Engineers	Federal System(BPA)	2,160
John Day Creek	Dave Cereghino	Avista Corp.	1
John H Koyle	John H Koyle	Idaho Power	1
Joseph Hydro		PacifiCorp	-
Kasel-Witherspoon	Kasel & Witherspoon	Idaho Power	1
Kerr	PPL Montana		194
Koma Kulshan	Koma Kulshan Associates	Puget Sound Energy	11
La Grande	Tacoma Power	Tacoma Power	64
Lacomb Irrigation	PacifiCorp	PacifiCorp	1
Lake Creek		Other Publics (BPA)	-
Lake Oswego Corp.		Portland General Electric	1
Lateral No. 10	Lateral 10 Ventures	Idaho Power	2
Leaburg	Eugene Water & Electric Board	Eugene Water & Electric Board	16
Lemolo #1	PacifiCorp	PacifiCorp	32
Lemolo #2	PacifiCorp	PacifiCorp	33
Lemoyne	John Lemoyne	Idaho Power	0
Libby	US Corps of Engineers	Federal System(BPA)	525
Lilliwaup Falls		Other Public (BPA)	1
Little Falls	Avista Corp.	Avista Corp.	32
Little Goose	US Corps of Engineers	Federal System(BPA)	810
Little Wood	Little Wood Irr District	Idaho Power	3
Little Wood/Arkoosh	William Arkoosh	Idaho Power	1
Lloyd Fery	PacifiCorp	PacifiCorp	0
Long Lake	Avista Corp.	Avista Corp.	70
Lookout Point	US Corps of Engineers	Federal System (BPA)	120
Lost Creek	US Corps of Engineers	Federal System (BPA)	49
Lower Baker	Puget Sound Energy	Puget Sound Energy	115
Lower Granite	US Corps of Engineers	Federal System(BPA)	810
Lower Malad	Idaho Power	Idaho Power	14
Lower Monumental	US Corps of Engineers	Federal System(BPA)	810
Lower Salmon	Idaho Power	Idaho Power	60
Lowline #2	Enel North America, Inc.	Idaho Power	3
Lowline Canal	S. Forks	Idaho Power	3
Lowline Midway	Idaho Power	Idaho Power	8
Lucky Peak	US Corps of Engineers	Seattle City Light	113

Project	Owner	NW Utility	Nameplate (MW)
Magic Reservoir	Magic Reservoir Hydro	Idaho Power	9
Main Canal Headworks	SEQCBID	Multiple Utilities	26
Milady River	V. Ravenscroft	Idaho Power	1
Mayfield	Tacoma Power	Tacoma Power	162
McNary	US Corps of Engineers	Federal System(BPA)	980
McNary Fishway	US Corps of Engineers	Other Publics (BPA)	-
Merwin	PacifiCorp	PacifiCorp	136
Meyers Falls	Michael Johnson	Avista Corp.	1
Middlefork Irrigation	PacifiCorp	PacifiCorp	3
Mile 28	Contractors Power Group Inc.	Idaho Power	2
Mill Creek		Other Publics (BPA)	1
Milner	Idaho Power	Idaho Power	59
Minidoka	US Bureau of Reclamation	Federal System (BPA)	28
Mink Creek	PacifiCorp	PacifiCorp	3
Mitchell Butte	Owyhee Irrigation District	Idaho Power	2
Monroe Street	Avista	Avista Corp.	15
Mora Drop	Riverside LLC	Idaho Power	2
Morse Creek		Port Angeles	1
Mossyrock	Tacoma Power	Tacoma Power	300
Mountain Energy	PacifiCorp	PacifiCorp	0
Mount Tabor	City of Portland	Portland General Electric	0
Moyie Springs		Other Publics (BPA)	-
Mud Creek/S&S	H.K.Hydro	Idaho Power	1
Mud Creek/White	Mud Creek Hydro	Idaho Power	0
N-32 Canal (Marco Ranches)	Ranchers Irrig., Inc.	Idaho Power	1
Nicols Gap	PacifiCorp	PacifiCorp	1
Nicolson Sunny Bar	PacifiCorp	PacifiCorp	0
Nine Mile	Avista	Avista Corp.	26
Nooksack	Puget Sound Hydro, LLC	Puget Sound Energy	3
North Fork-Clackamas	Portland General Electric	Portland General Electric	41
North Fork Sprague	PacifiCorp	PacifiCorp	1
Noxon Rapids	Avista Corp.	Avista Corp.	466
N.R. Rousch	PacifiCorp	PacifiCorp	0
Oak Grove-Clackamas	Portland General Electric	Portland General Electric	51
Odell Creek	PacifiCorp	PacifiCorp	0
O.J. Power	PacifiCorp	PacifiCorp	0
Oneida	PacifiCorp	PacifiCorp	30
Opal Springs	PacifiCorp	PacifiCorp	5
Ormsby		PacifiCorp	-
Owyhee Dam	Owyhee Irrigation District	Idaho Power	5



Project	Owner	NW Utility	Nameplate (MW)
Owyhee Tunnel No.1	Owyhee Irrigation District		8
Oxbow	Idaho Power Company	Idaho Power	190
Packwood	Energy Northwest	Multiple Utilities	26
Palisades	US Bureau of Reclamation	Federal System (BPA)	177
Paris	PacifiCorp	PacifiCorp	1
PEC Headworks	SEQCBID	Grant County PUD	7
Pelton	Portland General Electric	Multiple Utilities	110
Pelton Reregulation	Warm Springs Tribe	Portland General Electric	19
Phillips Ranch	Glen Phillips	Avista Corp.	0
Pigeon Cove	Pigeon Cove Power	Idaho Power	2
Portland Hydro-Project	City of Portland	Portland General Electric	36
Portneuf River		PacifiCorp	1
Post Falls	Avista Corp.	Avista Corp.	15
Potholes East Canal 66 Headworks	SEQCBID	Multiple Utilities	5
Powerdale	PacifiCorp	PacifiCorp	6
Preston City	PacifiCorp	PacifiCorp	0
Priest Rapids	Grant County PUD	Multiple Utilities	956
Pristine Springs	Pristine Springs, Inc	Idaho Power	0
Pristine Springs #3	Pristine Springs, Inc	Idaho Power	0
Prospect #1	PacifiCorp	PacifiCorp	4
Prospect #2	PacifiCorp	PacifiCorp	32
Prospect #3	PacifiCorp	PacifiCorp	7
Prospect #4	PacifiCorp	PacifiCorp	1
Quincy Chute	SEQCBID	Grant County PUD	9
R.D. Smith	SEQCBID	Multiple Utilities	6
Reeder Gulch		Other Publics (BPA)	0
Reynolds Irrigation	Reynolds Irr.	Idaho Power	0
Rim View	Rim View Trout Co.	Idaho Power	0
River Mill-Clackamas	Portland General Electric	Portland General Electric	19
Rock Creek No. 1	Rock Creek Joint	Idaho Power	2
Rock Creek No. 2	Enel North America	Idaho Power	2
Rock Island	Chelan County PUD	Multiple Utilities	629
Rocky Reach	Chelan County PUD	Multiple Utilities	1,300
Ross	Seattle City Light	Seattle City Light	360
Round Butte	Portland General Electric	Multiple Utilities	247
Roza	US Bureau of Reclamation	Federal System (BPA)	13
Sagebrush	Big Wood Canal Co.	Idaho Power	0
Sahko	Sahko	Idaho Power	1
Santiam	PacifiCorp	PacifiCorp	0
Schaffner	Lemhi Hydro Co.	Idaho Power	1

Project	Owner	NW Utility	Nameplate (MW)
Sheep Creek	Glen Phillips	Avista Corp.	2
Shingle Creek	Willis D Deveny	Idaho Power	0
Shoshone II	Shorock Hydro	Idaho Power	1
Shoshone CSPP	Shorock Hydro, Inc.	Idaho Power	0
Shoshone Falls	Idaho Power	Idaho Power	13
Slide Creek	PacifiCorp	PacifiCorp	18
Smith Creek	Eugene Water & Electric Board	Eugene Water & Electric Board	38
Snake River Pottery	Snake River Pottery	Idaho Power	0
Snedigar Ranch	David Snedigar	Idaho Power	1
Snoqualmie Falls	Puget Sound Energy	Puget Sound Energy	54
Soda Creek		Other Publics (BPA)	-
Soda Point Project			-
Soda Springs	PacifiCorp	PacifiCorp	11
South Fork Tolt	Seattle City Light	Seattle City Light	17
Spokane Upriver	City of Spokane	Avista Corp.	16
Stauffer Dry Creek		PacifiCorp	-
Steffen Hydro		Snohomish County PUD	-
Stone Creek	Eugene Water & Electric Board	Eugene Water & Electric Board	12
Strawberry Creek	South Idaho Public Agency	Other Publics (BPA)	-
Summer Falls	SEQCBID	Multiple Utilities	92
Sunshine #2	McMillian		0
Swan Falls	Idaho Power	Idaho Power	25
Swift 1	PacifiCorp	Multiple Utilities	219
Swift 2	Cowlitz County PUD	Multiple Utilities	77
Sygitowicz	Cascade Clean Energy	Puget Sound Energy	0
TGS/Briggs		PacifiCorp	-
The Dalles	US Corps of Engineers	Federal System(BPA)	1,807
The Dalles Fishway	Northern Wasco Co. PUD	Northern Wasco Co. PUD	5
Thompson Falls	PPL Montana		94
Thousand Springs	Idaho Power	Idaho Power	9
Tiber Dam	Tiber Montana, LLC	Idaho Power	8
Toketee	PacifiCorp	PacifiCorp	43
Trail Bridge	Eugene Water & Electric Board	Eugene Water & Electric Board	10
Trout Company	Branch Flower Co.	Idaho Power	0
Tunnel #1	Owyhee Irrig. Dist.	Idaho Power	7
Twin Falls	Idaho Power	Idaho Power	53
Twin Falls	Twin Falls Hydro Assoc. LP	Puget Sound Energy	20
TW Sullivan	Portland General Electric	Portland General Electric	15
Upper Baker	Puget Sound Energy	Puget Sound Energy	106
Upper Falls	Avista Corp.	Avista Corp.	10

Project	Owner	NW Utility	Nameplate (MW)
Upper Malad	Idaho Power	Idaho Power	8
Upper Salmon 1 & 2	Idaho Power	Idaho Power	18
Upper Salmon 3 & 4	Idaho Power	Idaho Power	17
Walla Walla	PacifiCorp	PacifiCorp	2
Wallowa Falls	PacifiCorp	PacifiCorp	1
Walterville	Eugene Water & Electric Board	Eugene Water & Electric Board	8
Wanapum	Grant County PUD	Multiple Utilities	934
Weeks Falls	So. Fork II Inc.	Puget Sound Energy	5
Wells	Douglas County PUD	Multiple Utilities	774
West Side	PacifiCorp	PacifiCorp	1
White Water Ranch	White Water Ranch	Idaho Power	0
Wilson Lake Hydro	Wilson Pwr. Co.	Idaho Power	8
Woods Creek	Snohomish County PUD	Snohomish County PUD	1
Wynoochee	Tacoma Power	Tacoma Power	13
Yale	PacifiCorp	PacifiCorp	134
Yelm		Other Publics (BPA)	12
Yakima-Tieton	PacifiCorp	PacifiCorp	3
Young's Creek	Snohomish PUD	Snohomish County PUD	8

<b>COAL</b>			<b>5,496</b>
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Boardman	Portland General Electric	Multiple Utilities	642
Colstrip #1	PP&L Montana, LLC	Multiple Utilities	330
Colstrip #2	PP&L Montana, LLC	Multiple Utilities	330
Colstrip #3	PP&L Montana, LLC	Multiple Utilities	740
Colstrip #4	NorthWestern Energy	Multiple Utilities	805
Jim Bridger #1	PacifiCorp / Idaho Power	Multiple Utilities	540
Jim Bridger #2	PacifiCorp / Idaho Power	Multiple Utilities	540
Jim Bridger #3	PacifiCorp / Idaho Power	Multiple Utilities	540
Jim Bridger #4	PacifiCorp / IPC	Multiple Utilities	508
Valmy #1	NV Energy / Idaho Power	Multiple Utilities	254
Valmy #2	NV Energy / Idaho Power	Multiple Utilities	267

Project	Owner	NW Utility	Nameplate (MW)
<b>NUCLEAR</b>			<b>1,230</b>
Columbia Generating Station	Energy Northwest	Federal System (BPA)	1,230
<b>NATURAL GAS</b>			<b>6,972</b>
Alden Bailey	Clatskanie PUD	Clatskanie PUD	11
Beaver	Portland General Electric	Portland General Electric	516
Beaver 8	Portland General Electric	Portland General Electric	25
Bennett Mountain	Idaho Power	Idaho Power	173
Boulder Park	Avista Corp.	Avista Corp.	25
Carty	Portland General Electric	Portland General Electric	440
Chehalis Generating Facility	PacifiCorp	PacifiCorp	517
Coyote Springs I	Portland General Electric	Portland General Electric	266
Coyote Springs II	Avista Corp.	Avista Corp.	287
Danskin	Idaho Power	Idaho Power	92
Danskin 1	Idaho Power	Idaho Power	179
Dave Gates Generating Station	NorthWestern Energy	NorthWestern Energy	150
Encogen	Puget Sound Energy	Puget Sound Energy	159
Ferndale Cogen Station (Tenaska)	Puget Sound Energy	Puget Sound Energy	245
Frederickson Generation Station	EPCOR Power L.P./PSE	Multiple Utilities	258
Fredonia 1 & 2	Puget Sound Energy	Puget Sound Energy	208
Fredonia 3 & 4	Puget Sound Energy	Puget Sound Energy	108
Fredrickson 1 & 2	Puget Sound Energy	Puget Sound Energy	149
Goldendale Generating Station	Puget Sound Energy	Puget Sound Energy	261
Hermiston Generating Project	PacifiCorp/Hermiston Gen. Co.	PacifiCorp	469
Kettle Falls CT	Avista Corp.	Avista Corp.	7
Klamath Peaking Units 1-4	Iberdrola Renewables	Puget Sound Energy	100
Lancaster Power Project	Avista Corp.	Avista Corp.	270
Langley Gulch	Idaho Power	Idaho Power	319
Mint Farm Energy Center	Puget Sound Energy	Puget Sound Energy	305
Northeast A&B	Avista Corp.	Avista Corp.	62
Pasco Generation Station	Franklin PUD/Grays Harbor PUD	Multiple Utilities	44
Port Westward	Portland General Electric	Portland General Electric	415
Port Westward Unit 2	Portland General Electric	Portland General Electric	220
Rathdrum 1 & 2	Avista Corp.	Avista Corp.	167
River Road Generating Project	Clark Public Utilities	Clark Public Utilities	248
Rupert (Magic Valley)	Rupert Illinois Holdings	Idaho Power	10
Sumas Energy	Puget Sound Energy	Puget Sound Energy	121
Whitehorn #2 & 3	Puget Sound Energy	Puget Sound Energy	149

Project	Owner	NW Utility	Nameplate (MW)
<b>COGENERATION</b>			<b>223</b>
Billings Cogeneration	Billings Generation, Inc.	NorthWestern Energy	64
Boise Cascade	PacifiCorp	PacifiCorp	9
DAW	PacifiCorp	PacifiCorp	-
Freres Lumber	Evergreen BioPower	PacifiCorp	10
Glenns Ferry (Magic West)	PURPA	Idaho Power	10
Hampton Lumber		Snohomish County PUD	5
James River - Camas	PacifiCorp	PacifiCorp	52
Rough & Ready Lumber	Rough & Ready	PacifiCorp	1
Simplot-Pocatello	PURPA	Idaho Power	12
Tasco-Nampa	Tasco	Idaho Power	2
Tasco-Twin Falls	Tasco	Idaho Power	3
Thompson River	NorthWestern Energy	NorthWestern Energy	12
Warm Springs Forest Products	PacifiCorp	PacifiCorp	8
Wauna (James River)	Western Generation Agency	Mutiple Utilities	36
<b>RENEWABLES-OTHER</b>			<b>458</b>
Ashland Solar Project		Federal System (BPA)	-
Bellevue Solar	Bellevue Solar, LLC	Portland General Electric	1
Bettencourt B6	Cargill	Idaho Power	2
Bettencourt Dry Creek	Cargill	Idaho Power	2
Big Sky West Dairy	Dean Foods Co. & AgPower Partners LLC	Idaho Power	2
Bio Energy		Puget Sound Energy	1
Bio Fuels, WA		Puget Sound Energy	5
Biomass One	PacifiCorp	PacifiCorp	25
City of Spokane Waste to Energy	City of Spokane	Avista Corp.	26
Clearwater Paper	Avista Corp.	Avista Corp.	114
Coffin Butte Resource Project	Power Resources Cooperative	PNGC Power	6
Cogen Company	Prairie Wood Products Co-Gen Co.	Oregon Trail Coop	8
Co-Gen II - DR Johnson Lumber	PacifiCorp	PacifiCorp	8
Columbia Ridge Landfill Gas	Waste Management	Seattle City Light	6
Convanta Marion	Portland General Electric	Portland General Electric	16
Double A Digester	PURPA-Andgar Corp	Idaho Power	5
Dry Creek Landfill	Dry Creek Landfill Inc.	PacifiCorp	3
Edaleen Dairy		Puget Sound Energy	1
Farm Power Tillamook	Tillamook	Tillamook	1
Fighting Creek	Kootenai Electric Co-op	Idaho Power	3

Project	Owner	NW Utility	Nameplate (MW)
Finn Hill Solar (Lake Wash SD)		Puget Sound Energy	0
Flathead County Landfill	Flathead Electric Cooperative	Flathead Electric Cooperative	2
Four Mile Hill Geothermal	Calpine	Federal System (BPA)	50
Hidden Hollow Landfill	G2 Energy	Idaho Power	3
Hooley Digester	Tillamook PUD	Tillamook PUD	1
H. W. Hill Landfill	Allied Waste Companies	Multiple Utilities	10.5
Interfor Pacific-Gilchrist	Midstate Electric Co-op	Midstate Electric Co-op	
Island Solar		Puget Sound Energy	0
Kettle Falls	Avista Corp.	Avista Corp.	51
King Estate Solar	Lane County Electric Coop	Lane County Electric Coop	-
Lynden	Farm Power	Puget Sound Energy	1
Mill Creek (Cove)		Idaho Power	1
Neal Hot Springs	U.S Geothermal	Idaho Power	23
Olympic View 1&2	Mason County PUD #3	Mason County PUD #3	5
Pine Products	PacifiCorp	PacifiCorp	6
Plum Creek NLSL	Plum Creek MDF	Flathead Electric Cooperative	6
Pocatello Wastewater	Idaho Power	Idaho Power	0
Portland Wastewater	City of Portland	Portland General Electric	1.7
Qualco Dairy Digester		Puget Sound Energy	1
Raft River 1	US Geothermal	Idaho Power	16
Rainier Biogas		Puget Sound Energy	1
Rexville	Farm Power	Puget Sound Energy	1
River Bend Landfill	McMinnville Water & Light	McMinnville Water & Light	-
Rock Creek Dairy	PURPA	Idaho Power	4
Seneca	Seneca Sustainable Energy	Eugene Water & Electric Board	20
Short Mountain		Emerald PUD	3
Skookumchuck		Puget Sound Energy	1
Smith Creek		Puget Sound Energy	0
Stimson Lumber	Stimson Lumber	Avista Corp.	7
Stoltze Biomass	F.H. Stoltze Land & Lumber	Flathead Electric Coop	3
Tamarack	Idaho Power	Idaho Power	5
Van Dyk		Puget Sound Energy	0
VanderHaak Dairy	VanderHaak Dairy, LLC	Puget Sound Energy	0
Whitefish Hydro	City of Whitefish	Flathead Electric Coop	0
Wild Horse Solar Project	Puget Sound Energy	Puget Sound Energy	1
Yamhill Solar	Yamhill solar, LLC	Portland General Electric	1

Project	Owner	NW Utility	Nameplate (MW)
<b>WIND</b>			<b>4,928</b>
3Bar-G Wind		Puget Sound Energy	1
Bennet Creek	Bennet Creek	Idaho Power	21
Big Top	Big Top LLC (QF)	PacifiCorp	2
Biglow Canyon - 1	Portland General Electric	Portland General Electric	125
Biglow Canyon - 2	Portland General Electric	Portland General Electric	150
Biglow Canyon - 3	Portland General Electric	Portland General Electric	174
Burley Butte Wind Farm	PURPA	Idaho Power	21
Butter Creek Power	Butter Creek Power LLC	PacifiCorp	5
Camp Reed Wind Park	PURPA	Idaho Power	23
Cassia Wind Farm	Cassia Wind Farm	Idaho Power	11
Coastal Energy	CCAP	Grays Harbor PUD	6
Cold Springs	PURPA	Idaho Power	23
Combine Hills I	Eurus Energy of America	PacifiCorp	41
Combine Hills II	Eurus Energy of America	Clark Public Utilities	63
Condon Wind	Goldman Sachs (75%), SeaWest NW (25%)	Federal System (BPA)	25
Desert Meadow Windfarm	PURPA	Idaho Power	23
Elkhorn Wind	Telocaset Wind Power Partners	Idaho Power	101
Foote Creek Rim 1	PacifiCorp & EWEB	Multiple Utilities	41
Foote Creek Rim 2	PPM Energy	Federal System (BPA)	2
Foote Creek Rim 4	PPM Energy	Federal System (BPA)	17
Fossil Gulch Wind	Idaho Power Company	Idaho Power	11
Four Corners Windfarm	Four Corners Windfarm LLC	PacifiCorp	10
Four Mile Canyon Windfarm	Four Mile Canyon Windfarm	PacifiCorp	10
Golden Valley Wind Farm	PURPA	Idaho Power	12
Goodhoe Hills	PacifiCorp	PacifiCorp	94
Hammett Hill Windfarm	PURPA	Idaho Power	23
Harvest Wind		Multiple Utilities	99
Hay Canyon Wind	Hay Canyon Wind Project LLC	Snohomish County PUD	101
High Mesa Wind	PURPA	Idaho Power	40
High Plains	PacifiCorp	PacifiCorp	99
Hopkins Ridge	Puget Sound Energy	Puget Sound Energy	157
Horseshoe Bend	Horseshoe Bend Wind Park, LLC	Idaho Power	9
Hot Springs Wind	Hot Springs Wind	Idaho Power	21
Judith Gap	Invenergy Wind, LLC	NorthWestern Energy	135
Klondike I	PPM Energy	Federal System (BPA)	24
Klondike II	PPM Energy	Portland General Electric	75
Klondike III	PPM Energy	Multiple Utilities	221
Knudson Wind		Puget Sound Energy	0

Project	Owner	NW Utility	Nameplate (MW)
Leaning Juniper 1	PPM Energy	PacifiCorp	101
Lime Wind Energy	PURPA	Idaho Power	3
Lower Snake River 1	Puget Sound Energy	Puget Sound Energy	342
Mainline Windfarm	PURPA	Idaho Power	23
Marengo	Renewable Energy America	PacifiCorp	140
Marengo II	PacifiCorp	PacifiCorp	70
Milner Dam Wind Farm	PURPA	Idaho Power	20
Moe Wind	Two Dot Wind	NorthWestern Energy	1
Mountain Wind	Edison Mission	PacifiCorp	61
Mountain Wind II	Edison Mission	PacifiCorp	80
Nine Canyon	Energy Northwest	Multiple Utilities	96
Oregon Trail Windfarm	Oregon Trail Windfarm LLC	PacifiCorp	10
Oregon Trails Wind Farm	PURPA	Idaho Power	14
Pa Tu Wind Farm	Pa Tu Wind Farm, LLC	Portland General Electric	9
Pacific Canyon Windfarm	Pacific Canyon Windfarm LLC	PacifiCorp	8
Palouse Wind	Palouse Wind, LLC	Avista Corp.	105
Paynes Ferry Wind Park	PURPA	Idaho Power	21
Pilgrim Stage Station Wind Farm	PURPA	Idaho Power	11
Rock River	SeaWest	PacifiCorp	50
Rockland Wind	PURPA	Idaho Power	80
Rogerson Flats Wind Park	PURPA	Idaho Power	20
Rolling Hills	PacifiCorp	PacifiCorp	99
Ryegrass Windfarm	PURPA	Idaho Power	23
Salmon Falls Wind Farm	PURPA	Idaho Power	22
Sand Ranch Windfarm	Sand Ranch Windfarm LLC	PacifiCorp	10
Sawtooth Wind	PURPA	Idaho Power	21
Seven Mile Hill	enXco	PacifiCorp	99
Seven Mile Hill II	enXco	PacifiCorp	20
Sheep Valley Ranch	Two Dot Wind	NorthWestern Energy	1
Stateline Wind	NextEra	Multiple Utilities	300
Swauk Wind		Puget Sound Energy	4
Thousand Springs Wind Farm	PURPA	Idaho Power	12
Three Mile Canyon	Momentum RE	PacifiCorp	10
Tuana Gulch Wind Farm	PURPA	Idaho Power	11
Tuana Springs Expansion Wind	Cassia Gulch Wind Park	Idaho Power	36
Tucannon	Portland General Electric	Portland General Electric	267
Two Ponds Windfarm	PURPA	Idaho Power	23
Vansycle Ridge	ESI Vansycle Partners	Portland General Electric	25
Wagon Trail Windfarm	Wagon Trail Windfarm LLC	PacifiCorp	3
Ward Butte Windfarm	Ward Butte Windfarm LLC	PacifiCorp	7



Project	Owner	NW Utility	Nameplate (MW)
Wheat Field Wind Project	Wheat Field Wind LLC	Snohomish County PUD	97
White Creek	White Creek Wind I LLC	Multiple Utilities	205
Wild Horse	Puget Sound Energy	Puget Sound Energy	273
Wolverine Creek	Invenergy	PacifiCorp	65
Yahoo Creek Wind Park	PURPA	Idaho Power	21
<b>SMALL THERMAL AND MISCELLANEOUS</b>			<b>3</b>
Crystal Mountain	Puget Sound Energy	Puget Sound Energy	3

**Table 8b: Independent Owned Generating Resources** is a comprehensive list of independently owned electric power supply located in the region and serving utilities outside the region or available for utility-owned to purchase or contract with.

Project	Owner	Nameplate (MW)
<b>COAL</b>		<b>1,503</b>
Centralia #1	TransAlta	670
Centralia #2	TransAlta	670
Corette	PP&L Montana, LLC	163
<b>NATURAL GAS</b>		<b>1,540</b>
Big Hanaford Plant	TransAlta	248
Grays Harbor (Satsop)	Invenergy	650
Klamath Cogen Plant	Iberdrola Renewables	502
March Point 1	March Point Cogen	80
March Point 2	March Point Cogen	60
<b>COGENERATION</b>		<b>103</b>
Harbor Paper	Harbor Paper LLC	16
International Paper Energy Center	Eugene Water & Electric Board	26
University of Oregon	University of Oregon	10
<b>RENEWABLES-OTHER</b>		<b>26</b>
Spokane MSW	City of Spokane	23
Treasure Valley		3

Project	Owner	Nameplate (MW)
<b>WIND</b>		<b>2,975</b>
Big Horn	Iberdrola Renewables	199
Big Horn-Phase 2	Iberdrola Renewables	50
Cassia Gulch	John Deere	21
Glacier Wind - Phase 1	Naturener	107
Glacier Wind - Phase 2	Naturener	104
Goshen North	Ridgeline Energy	125
Juniper Canyon - Phase 1	Iberdrola Renewables	151
Kittitas Valley	Horizon	101
Klondike IIIa	Iberdrola Renewables	77
Lava Beds Wind	PURPA	18
Leaning Juniper II-North	Iberdrola Renewables	90
Leaning Juniper II-South	Iberdrola Renewables	109
Linden Ranch	NW Wind Partners	50
Magic Wind Park	PURPA	20
Martinsdale Colony North	Two Dot Wind	1
Martinsdale Colony South	Two Dot Wind	2
Notch Butte Wind	PURPA	18
Pebble Springs Wind	Iberdrola Renewables	99
Rattlesnake Rd Wind (aka Arlington)	Horizon Wind	103
Shepards Flat Central	Caithness Energy	290
Shepards Flat North	Caithness Energy	265
Shepards Flat South	Caithness Energy	290
Vancycle II (Stateline III)	NextEra	99
Vantage Wind	Invenergy	90
Willow Creek	Invenergy	72
Vantage Wind	Invenergy	90
Willow Creek	Invenergy	72
Windy Flats	Cannon Power Group	262
Windy Point	Tuolumne Wind Project Authority	137
<b>SMALL THERMAL AND MISCELLANEOUS</b>		<b>44</b>
Colstrip Energy LP Coal	Colstrip Energy Limited Partnership	44

# Report Procedures

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This report provides an estimate of regional ‘need to acquire’ generating resources using annual energy (August through July), monthly energy, winter peak-hour and summer peak-hour metrics. The peak need reflects information for January and August, as they present the greatest need for their respective seasons. These metrics provide a multi-dimensional look at the Northwest’s need for power and underscore the growing complexity of the power system.

This regional report reflects the summation of individual utilities’ forecasts. The utilities, in most cases, prepared their own projections. BPA provides much of the information for its smaller customers. Load (i.e. electricity demand), and resource information is included for the utilities listed in Table 9 at the end of this section. Procedures employed in preparing the regional load-resource comparisons of winter and summer peak and energy are described here. A list of definitions is included at the end of this section.

## Load Estimate

Regional loads are the sum of loads estimated by the Northwest utilities and BPA for its federal agency customers, certain non-generating public utilities, and direct service industrial customers (DSI). Estimates are made for system peak and system energy loads. Load projections reflect network transmission and distribution losses, reductions in demand due to rising electricity prices, and the effects of appliance efficiency standards and energy building codes. Savings from demand-side management programs, such as energy efficiency and market transformation, are also reflected in the regional load forecasts.

## Energy Loads

A ten-year forecast of monthly firm energy loads is provided. This forecast reflects normal weather conditions. The tabulated information includes the annual average load for the year forecast period as well as the monthly load for the first year of the report.

## Peak Loads

Northwest regional peak loads are provided for each month of the ten year forecast period. The tabulated loads for winter and summer peak are the highest estimated 60-minute clock-hour average demand for that month, assuming normal weather conditions. The regional firm peak load is the sum of the individual utility peak loads, and does not account for the fact that each utility may experience its peak load at a different hour than other Northwest utilities. Hence the regional peak

load is considered non-coincident. The federal system (BPA) firm peak load is adjusted to reflect a federal coincident peak among its many utility customers.

## **Federal System Transmission Losses**

Federal System (BPA) transmission losses for both firm loads and contractual obligations are embedded in federal load. These losses represent the difference between energy generated by the federal system (or delivered to a system interchange point) and the amount of energy sold to customers. System transmission losses are calculated by BPA for firm loads utilizing the federal transmission system.

## **Planning Margin**

In the derivation of regional requirements, a planning margin has been added to the load. This regional planning margin is equal to 12 percent of the total peak load for the first year of the planning horizon, increasing one percent per year to 20 percent and remaining at 20 percent thereafter. They are intended to cover, for planning purposes, operating reserves and all elements of uncertainty not specifically accounted for in determining loads and resources. These include forced-outage reserves, unanticipated load growth, temperature variations, hydro maintenance and project construction delays. An increasing reserve requirement reflects greater uncertainty about load levels and of achieving construction schedules in the future.

## **Demand-Side Management Programs**

Savings from demand-side management efforts are reported in *Table 6b: Demand Side Management Programs*. These estimates are the savings for the ten year study period and include expected future energy savings from existing and new programs in the areas of energy efficiency, distribution efficiency, some market transformation, fuel conversion, fuel switching, energy storage and other efforts that reduce the demand for electricity. These estimates reflect savings from programs that utilities fund directly, or through a third-party, such as the Northwest Energy Efficiency Alliance and Energy Trust of Oregon.

Demand response activity is reported separately in *Table 6b*. The total load reduction reported is the sum of different utilities' agreements with their customers. Each program has its own characteristics and limitations.

## Generating Resources

This report considers existing resources, committed new supply (including resources under construction), as well as planned resources. For the assessment of need only the existing and committed resources are reflected in the regional tabulations. In addition, only those generating resources (or shares) that are firmly committed to meeting Northwest loads are included in the regional analysis.

### Hydro

Major hydro resource capabilities are estimated from a regional analysis using a computer model that simulates reservoir operation of past hydrologic conditions. The historical stream flow record used covers the 80-year period from August 1928 through July 2008.

### Energy

The firm energy capability of hydro plants is the amount of energy produced during the operating year with the lowest 12-month average generation. The lowest generation occurred in 1936-37 given today's river operating criteria. The firm energy capability is the average of 12 months, August 1936 to July 1937. Generation for projects that are influenced by downstream reservoirs reflects the reduction due to encroachment.

### Peak Capability

For this report the peak capability of the hydro system represents the maximum hourly generation available to meet peak demand during the period of heavy load.

The peaking capability of the hydro system maximizes available energy and capacity associated with the monthly distribution of streamflow. The peaking capability is the hydro system's ability to continuously produce power for a specific time period by utilizing the limited water supply while meeting power and non-power requirements, scheduled maintenance, and operating reserves (including wind reserves).

Computer models are used to estimate the operational hydro peaking capability of the major projects, based on their monthly average energy for 70 or 80 water conditions depending on the source of information. The peaking capability used for this report is the 8<sup>th</sup> percentile of the resulting hourly peak capabilities for January and August to indicate winter and summer peak capability respectively. These models shape the monthly hydro energy to maximize generation in the heavy load hours.

## **Columbia River Treaty**

Since 1961 the United States has had a treaty with Canada that outlines the operation of U.S. and Canadian storage projects to increase the total combined generation. Hydropower generation in this analysis reflects the firm power generated by coordinating operation of three Canadian reservoirs, Duncan, Arrow and Mica with the Libby reservoir and other power facilities in the region. Canada's share of the coordinated operation benefits is called Canadian Entitlement. BPA and each of the non-Federal mid-Columbia projects owners are obligated to return their share of the downstream power benefits owed to Canada. The delivery of the Entitlement is reflected in this analysis.

## **Downstream Fish Migration**

Another requirement incorporated in the computer simulations is modified river operations to provide for the downstream migration of anadromous fish. These modifications include adhering to specific flow limits at some projects, spilling water at several projects, and augmenting flows in the spring and summer on the Columbia, Snake and Kootenai rivers. Specific requirements are defined by various federal, regional and state mandates, such as project licenses, biological opinions and state regulations.

## **Thermal, Wind and Other Renewable Resources**

Thermal resources are reported in a variety of categories. Coal, cogeneration, nuclear, and natural gas projects are each totaled and reported as individual categories.

The category of Other Renewables includes energy from small hydropower, biomass, geothermal, solar, municipal solid waste projects and other miscellaneous projects. Wind projects are reported in their own category.

All existing generating plants, regardless of size, are included in amounts submitted by each utility that owns or is purchasing the generation. The energy capabilities of plants are computed on annual planning equivalent availability factors submitted by the sponsors of the projects. The factors include allowance for scheduled maintenance (including refueling), forced outages and other expected operating constraints. Some small fossil-fuel plants and combustion turbines are included as peaking resources and their reported energy capabilities are only the amounts necessary for peaking operations. Additional energy potentially may be available from these peaking resources for emergencies but is not included in the regional load/resource balance.

## New and Future Resources

The latest activity with new and future resource developments, including expected savings from demand-side management are tabulated in this report. These resources are reported as *Recently Acquired*, *Committed New Supply* and *Planned Resources* to reflect the different stages of development.

### Recently Acquired Resources

The *Recently Acquired Resources* reported in Table 5 have been acquired in the past year and are serving Northwest utility loads as of December 31, 2013. They are reflected as part of the regional firm needs assessment.

### Committed New Supply

*Committed New Supply* reported in Table 6a includes those projects under construction or committed resources and supply to meet Northwest load that are not delivering power as of December 31, 2013. In this report, resources being built by utilities or resources where their output is firmly committed to utilities are included in the regional load-resource analysis. Future savings from committed demand-side management programs are reported in Table 6b.

### Planned Resources

*Planned Resources* presented in Table 7 include specific resources and/or blocks of resources identified in utilities' most current integrated resource plans. Projects specifically named in *Planned Resources* are not yet under construction as of December 31, 2013, but a firm commitment to construct or acquire the power has been made. These resources are not part of the regional analysis.

## Contracts

Imports and exports include firm arrangements for interchanges with systems outside the region, as well as with third-party developers/owners within the region. These arrangements comprise firm contracts with utilities to the East, the Pacific Southwest and Canada. Contracts to and from these areas are amounts delivered at the area border and include any transmission losses associated with deliveries.

**Table 9: Utilities included in the Northwest Regional Forecast**

Albion, City of	Fall River Rural Electric Cooperative	Pacific County PUD #2
Alder Mutual	Farmers Electric Co-op	PacifiCorp
Ashland, City of	Ferry County PUD #1	Parkland Light & Water
Asotin County PUD #1	Fircrest, Town of	Pend Oreille County PUD
Avista Corp.	Flathead Electric Cooperative	Peninsula Light Company
Bandon, City of	Forest Grove Light & Power	Plummer, City of
Benton PUD	Franklin County PUD	PNGC Power
Benton REA	Glacier Electric	Port of Seattle – SEATAC
Big Bend Electric Co-op	Grant County PUD	Portland General Electric
Blachly-Lane Electric Cooperative	Grays Harbor PUD	Puget Sound Energy
Blaine, City of	Harney Electric	Raft River Rural Electric
Bonnors Ferry, City of	Hermiston, City of	Ravalli Co. Electric Co-op
Bonneville Power Administration	Heyburn, City of	Richland, City of
Burley, City of	Hood River Electric	Riverside Electric Co-op
Canby Utility	Idaho County L & P	Rupert, City of
Cascade Locks, City of	Idaho Falls Power	Salem Electric Co-op
Central Electric	Idaho Power	Salmon River Electric Cooperative
Central Lincoln PUD	Inland Power & Light	Seattle City Light
Centralia, City of	Kittitas County PUD	Skamania County PUD
Chelan County PUD	Klickitat County PUD	Snohomish County PUD
Cheney, City of	Kootenai Electric Co-op	Soda Springs, City of
Chewelah, City of	Lakeview L & P (WA)	Southside Electric Lines
City of Port Angeles	Lane Electric Cooperative	Springfield Utility Board
Clallam County PUD #1	Lewis County PUD	Steilacoom, Town of
Clark Public Utilities	Lincoln Electric Cooperative	Sumas, City of
Clatskanie PUD	Lost River Electric Cooperative	Surprise Valley Elec. Co-op
Clearwater Power Company	Lower Valley Energy	Tacoma Power
Columbia Basin Elec. Co-op	Mason County PUD #1	Tanner Electric Co-op
Columbia Power Co-op	Mason County PUD #3	Tillamook PUD
Columbia REA	McCleary, City of	Troy, City of
Columbia River PUD	McMinnville Water & Light	Umatilla Electric Cooperative
Consolidated Irrigation Dist. #19	Midstate Electric Co-op	Umpqua Indian Utility Co-op
Consumers Power Inc.	Milton, Town of	United Electric Cooperative
Coos-Curry Electric Cooperative	Milton-Freewater, City of	US Corps of Engineers
Coulee Dam, City of	Minidoka, City of	US Bureau of Reclamation
Cowlitz County PUD	Missoula Electric Co-op	Vera Water & Power
Declo, City of	Modern Electric Co-op	Vigilante Electric Co-op
Douglas County PUD	Monmouth, City of	Wahkiakum County PUD #1
Douglas Electric Cooperative	Nespelem Valley Elec.Co-op	Wasco Electric Co-op
Drain, City of	Northern Lights Inc.	Weiser, City of
East End Mutual Electric	Northern Wasco Co. PUD	Wells Rural Electric Co.
Eatonville, City of	NorthWestern Energy	West Oregon Electric Cooperative
Ellensburg, City of	Ohop Mutual Light Company	Whatcom County PUD
Elmhurst Mutual P & L	Okanogan Co. Electric Cooperative	Yakama Power
Emerald PUD	Okanogan County PUD #1	
Energy Northwest	Orcas Power & Light	
Eugene Water & Electric Board	Oregon Trail Co-op	



# Definitions

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## Annual Energy

Energy value in megawatts that represents the average of monthly values in a given year.

## Average Megawatts

(MWA) Unit of energy for either load or generation that is the ratio of energy (in megawatt-hours) expected to be consumed or generated during a period of time to the number of hours in the period.

## Biomass

Any organic matter which is available on a renewable basis, including forest residues, agricultural crops and waste, wood and wood wastes, animal wastes, livestock operation residue, aquatic plants, and municipal wastes.

## Canadian Entitlement

Canada is entitled to one-half the downstream power benefits resulting from Canadian storage as defined by the Columbia River Treaty. Canadian entitlement returns estimated by Bonneville Power Administration.

## Coal

This category of generating resources includes the region's coal-fired plants.

## Cogeneration

Cogeneration is the technology of producing electric energy and other forms of useful energy (thermal or mechanical) for industrial and commercial heating or cooling purposes through sequential use of an energy source.

## Combustion Turbines

These are plants with combined-cycle or simple-cycle natural gas-fired combustion turbine technology for producing electricity.

## Committed Resources

This includes under construction projects and long-term power supply agreements that are committed but not yet producing power to meet Northwest load at the time of publication. This generation is included in the resources for calculating the regional load/resource balance.

## Conservation

Any reduction in electrical power consumption as a result of increases in the efficiency of energy use, production, or distribution. For the purposes of this report used synonymously with energy efficiency.

## Demand Response

Control of load through customer/utility agreements that result in a temporary change in consumers' use of electricity in times of system stress.

## Demand-side Management

Peak and energy savings from conservation/energy efficiency measures, distribution efficiency, market transformation, demand response, fuel conversion, fuel switching, energy storage and other efforts that that serve to reduce electricity demand.

## Dispatchable Resource

A term referring to controllable generating resources that are able to be dispatched for a specific time and need.

## Distribution Efficiency

Infrastructure upgrades to utilities' transmission and distribution systems that save energy by minimizing losses.

## Encroachment

A term used to describe a situation where the operation of a hydroelectric project causes an increase in the level of the tailwater of the project that is directly upstream.

## Energy Efficiency

Any reduction in electrical power consumption as a result of increases in the efficiency of energy use, production, or distribution. For the purposes of this report used synonymously with conservation.

## Energy Load

The demand for power averaged over a specified period of time.

## Energy Storage

Technologies for storing energy in a form that is convenient for use at a later time when a specific energy demand is greater.

## Exports

Firm interchange arrangements where power flows from regional utilities to utilities outside the region or to non-specific, third-party purchasers within the region.

## Federal System (BPA)

The federal system is a combination of BPA's customer loads and contractual obligations, and resources from which BPA acquires the power it sells. The resources include plants operated by the U.S. Army Corps of Engineers (COE), U.S. Bureau of Reclamation (USBR) and Energy Northwest. BPA markets the thermal generation from Columbia Generating Station, operated by Energy Northwest.

## Federal Columbia River Power System (FCRPS)

Thirty federal hydroelectric projects constructed and operated by the Corps of Engineers and the Bureau of Reclamation, and the Bonneville Power Administration transmission facilities.

## Firm Energy

Electric energy intended to have assured availability to customers over a defined period.

## Firm Load

The sum of the estimated firm loads of private utility and public agency systems, federal agencies and BPA industrial customers.

## Firm Losses

Losses incurred on the transmission system of the Northwest region.

## Fuel Conversion

Consumers' efforts to make a permanent change from electricity to natural-gas or other fuel source to meet a specific energy need, such as heating.

## Fuel Switching

Consumers' efforts to make a temporary change from electricity to another fuel source to meet a specific energy need.

### Historical Streamflow Record

A database of unregulated streamflows for 80 years (July 1928 to June 2008). Data is modified to take into account adjustments due to irrigation depletions, evaporations, etc. for the particular operating year being studied.

### Hydro Maintenance

The amount of energy lost due to the estimated maintenance required during the critical period. Peak hydro maintenance is included in the peak planning margin calculations.

### Hydro Regulation

A study that utilizes a computer model to simulate the operation of the Pacific Northwest hydroelectric power system using the historical streamflows, monthly loads, thermal and other non-hydro resources, and other hydroelectric plant data for each project.

### Imports

Firm interchange arrangements where power flows to regional utilities from utilities outside the region or third-party developer/owners of generation within the region.

### Independent Power Producers (IPPs)

Non-utility entities owning generation that may be contracted (fully or partially) to meet regional load.

### Intermittent Resource

An electric generating source with output controlled by the natural variability of the energy resource rather than dispatched based on system requirements. Intermittent output usually results from the direct, non-stored conversion of naturally occurring energy fluxes such as solar and wind energy.

### Investor-Owned Utility (IOU)

A privately owned utility organized under state law as a corporation to provide electric power service and earn a profit for its stockholders.

### Market Transformation

A strategic process of intervening in a market to accelerate the adoption of cost-effective energy efficiency.

### Megawatt (MW)

A unit of electrical power equal to 1 million watts or 1,000 kilowatts.

## Nameplate Capacity

A measure of the approximate generating capability of a project or unit as designated by the manufacturer.

## Natural Gas-Fired Resources

This category of resources includes the region's natural gas-fired plants, mostly single-cycle and combined-cycle combustion turbines. It may include projects that are considered cogeneration plants.

## Non-Utility Generation

Facilities that generate power whose percent of ownership by a sponsoring utility is 50 percent or less. These include PURPA-qualified facilities (QFs) or non-qualified facilities of independent power producers (IPPs).

## Nuclear Resources

The region's only nuclear plant, the Columbia Generating Station, is included in this category.

## Operating Year

Twelve-month period beginning on August 1 of any year and ending on July 31 of the following year. For example, operating year 2015 is August 1, 2014 through July 31, 2015.

## Other Publics (BPA)

Refers to the smaller, non-generating public utility customers whose load requirements are estimated and served by Bonneville Power Administration.

## Peak Load

In this report the peak load is defined as one-hour maximum demand for power.

## Planned Resources

Planned resources include those projects, measures, and transactions that utilities have made some commitment to acquire and are in some stage of state site certification process. However, either not all licenses have been obtained, no commercial operation data has been specified, or the specifics of the transaction have not been finalized.

## Planning Margin

A component of regional requirements that is included in the peak needs assessment to account for various planning uncertainties.

## Private Utilities

Same as investor-owned utilities.

## Publicly-Owned Utilities

One of several types of not-for-profit utilities created by a group of voters and can be a municipal utility, a public utility district, or an electric cooperative.

## PURPA

Public Utility Regulatory Policies Act of 1978. The first federal legislation requiring utilities to buy power from qualifying independent power producers.

## Renewables - Other

A category of resources that includes projects that produce power from such fuel sources as small hydropower, solar, geothermal, biomass (includes wood, municipal solid-waste facilities), and pilot level projects including tidal and wave energy.

## Requirements

For each year, a utility's projected loads, exports, and contracts out. Peak requirements also include the planning margin.

## Small Thermal & Miscellaneous Resources

This category of resources includes small thermal generating resources such as diesel generators used to meet peak and/or emergency loads.

## Thermal Resources

Resources that burn coal, natural gas, oil, diesel or use nuclear fission to create heat which is converted into electricity.

## Wind Resources

This category of resources includes the region's wind powered projects.