

Northwest Regional Forecast of Power Loads and Resources

2011 through 2020

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PNVCC
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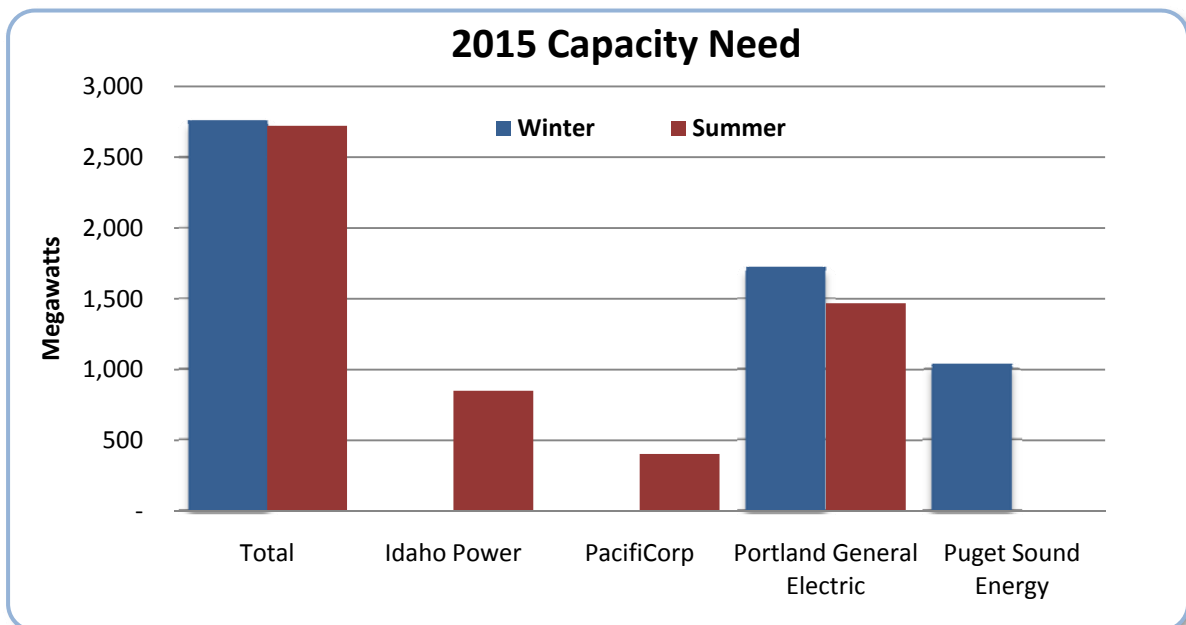
Executive Summary

Northwest electric utilities see the region’s need for power continuing to grow and the system the region has depended on for decades is reaching the bounds of its capability. Utilities are rising to the challenge of maintaining a reliable, affordable flow of electricity to meet customer’s needs while adhering to changing state and federal regulations regarding renewable power generation. They are seeking out new resources, like wind and solar, and energy conservation programs to meet the region’s need for power ensuring our future power system retains the dependability we expect.

The *2010 Northwest Regional Forecast* provides an annual update on the region’s electric loads and resource needs over the next decade to give readers a sense of the Northwest’s long-term electric situation. The forecast is based on information submitted by individual utilities and this year’s information highlights their commitment to energy efficiency and investments in wind and natural gas generation to meet growing demand.

Need for Capacity Front and Center

This year’s *Forecast* show a need for power to meet the region’s energy demand, and it also indicates that utilities are specifically acquiring new resources, developing demand response programs and purchasing power to meet growing peak demand. To compile the picture of needed capacity individual utilities, using their own methodologies, estimated their peak needs for winter and summer months. Four utilities have determined they need additional peaking capability either in the winter, summer or both. The chart below is a snapshot five years out for those utilities reporting a deficit. Their need for capacity grows to around 2,800 by 2015 for both winter and summer peaks and will continue to rise without the addition of new resources and additional energy efficiency savings.



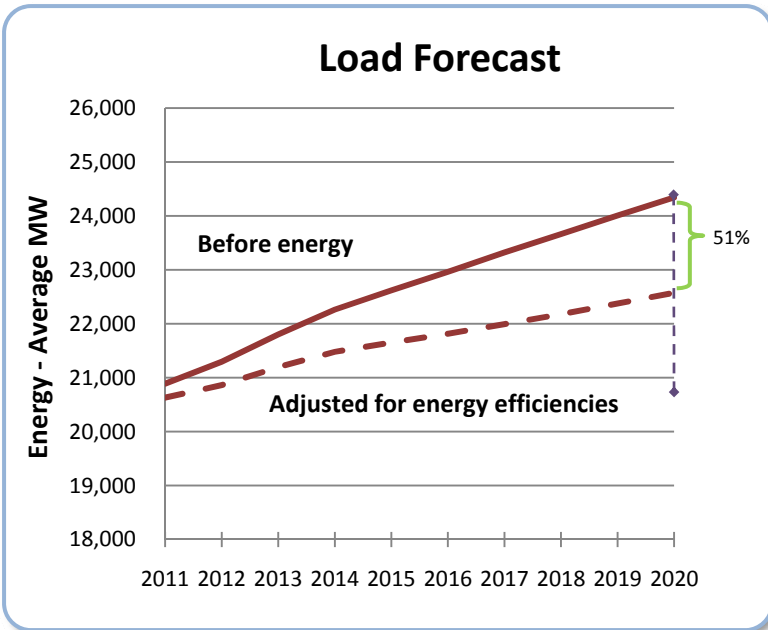
Energy Efficiency Plays a Lead Role

Energy efficiency programs are a vital part of Northwest utilities' integrated resource plans and often their first choice in meeting new power needs. These programs – also referred to as demand-side resources and energy conservation – are expected to be lower in cost and risk compared to generating resources. For many utilities, the acquired energy efficiency savings also help meet their state requirements.

Dampens Growth

Utilities' projected savings from conservation programs have a significant impact on the regional demand forecast. The utilities' programs will cut the expected load growth for the region by about half over the next 10 years. The forecasted savings are from utility-initiated programs.

The utilities' savings projections can not be directly compared to other regional estimates. Assumptions about types of programs to include, how savings are accrued over time, how to reflect savings from third-party efforts and new codes and standards are concepts that must be aligned before making a comparison.

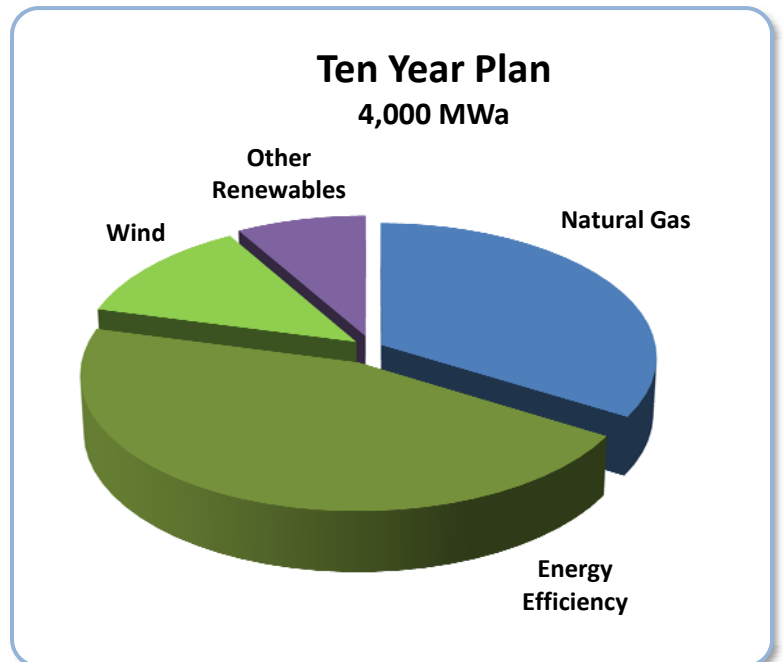


Big Piece of New Resource Pie

Energy efficiency programs add up to over 40 percent of what utilities are relying on to meet the region's growing power needs.

These demand-side resources include new and accelerated programs, such as weatherization, better lighting technologies, new appliances and converting electric load to natural gas.

This will build on the nearly 4,000 MWa of savings the Northwest Power and Conservation Council reports the region has attained since 1980.

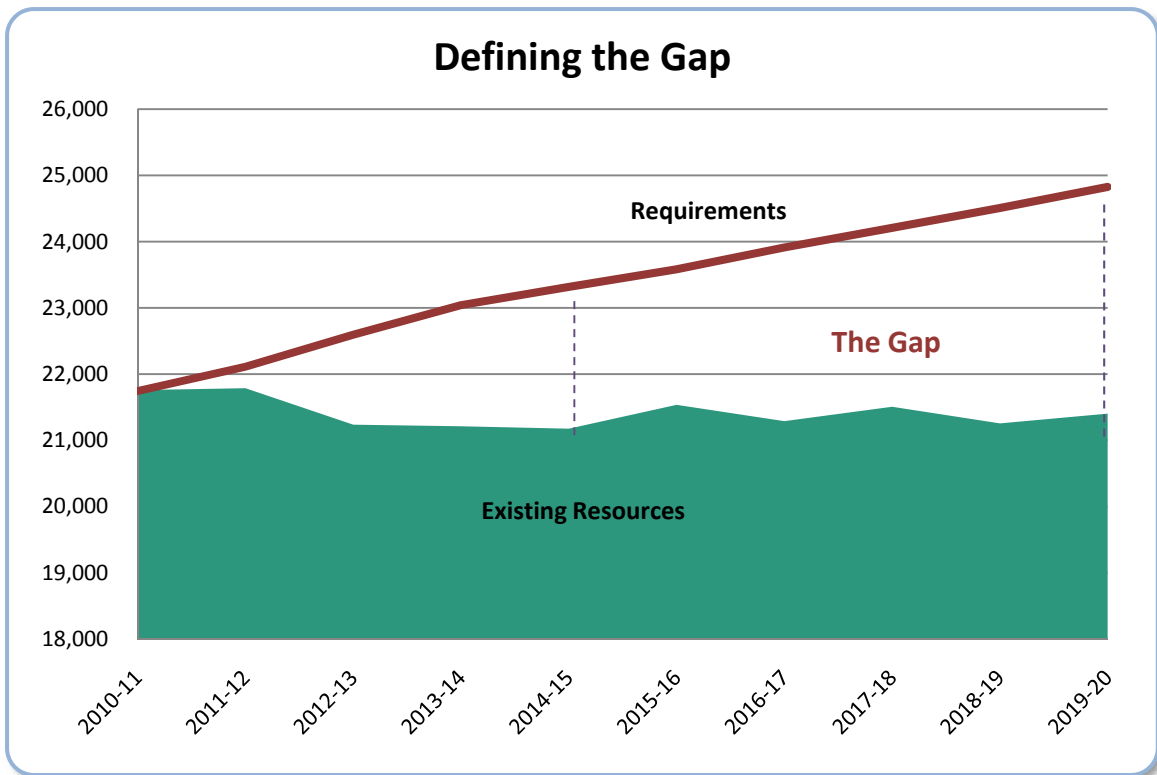


Need for Power Has its Ups and Downs

The region's current need for power is down from past years, yet is expected to grow over time. More emphasis on energy efficiency programs in recent years, new generating resources being built and a near-term dip in the load projections all contribute to a smaller need for power compared to last year.

The need for power out five years is expected to be 2,100 MWa, and grows to 3,400 by the end of the study. This estimate assumes low water conditions for generating hydropower, and that existing power projects, such as coal plants, remain in place for the next 10 years. This need-for-power picture is a snapshot of how utility owned and contracted supplies stack up to the utilities' requirements prior to what they anticipate their need will be once energy conservation and other energy efficiency savings are achieved.

While the increasing Northwest population and our mushrooming dependence on high-tech devices continue to push electricity use up, it is worth noting that many utilities lowered their forecast of demand again this year.

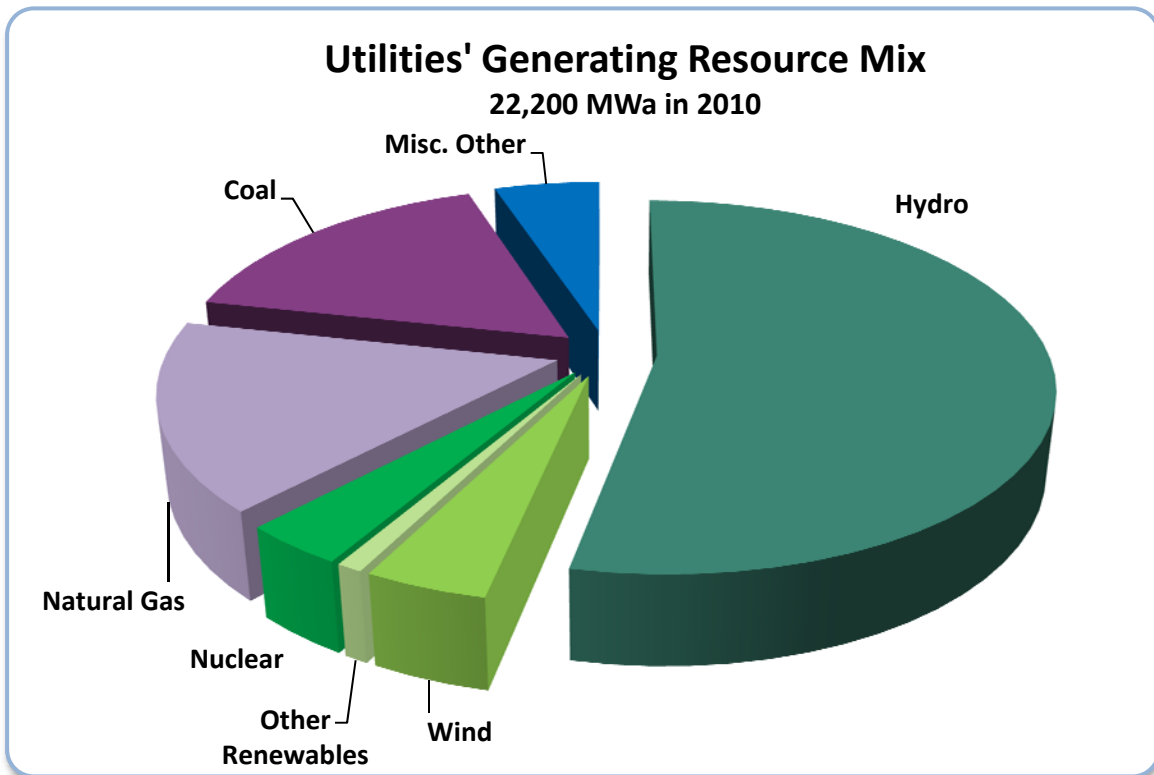


The almost 800 MWa drop in the forecast for the first year of the report compared to last year's report is in part due to the continued economic situation. Utilities have seen the closure of small businesses around the region and their load forecasts reflect that fact. However, they also expect that as the economy recovers other small businesses will take their place and result in the evaporation of decline over time to bring the regional demand almost back to last year's estimates by the end of the study.

This adjustment in demand is different from what the region experienced back in 2000. A decade ago the significant drop in regional load was due to several industries closing their doors, creating an unrecoverable drop in demand.

Hydro is the Heart of Northwest Supply

The hydropower system is the foundation of the Northwest's electric supply providing 55 percent of today's firm energy. Wind power is the most rapidly developing power source in the region, now providing slightly more energy than the one nuclear plant in the region.



Natural gas and coal-fired plants along with a chunk of imported power and other renewable resources make up the remaining 37 percent of our generating resources.

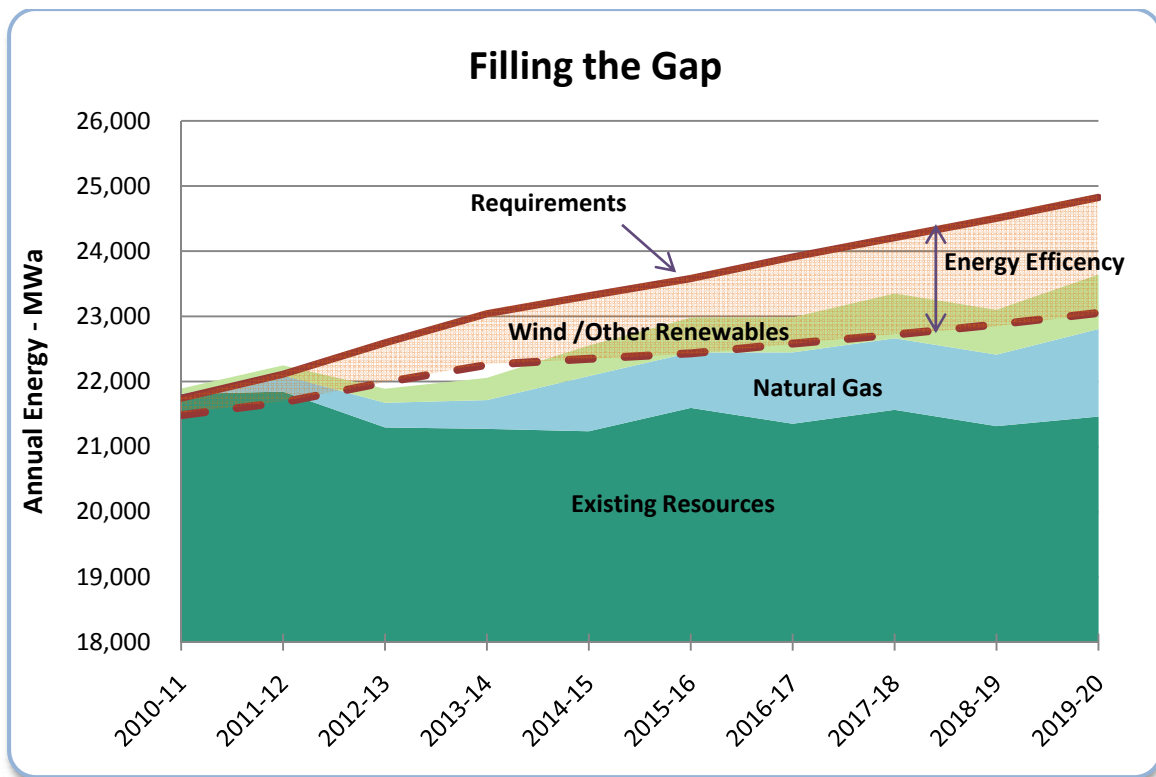
The newest resources in this mix total almost 900 MW that will provide over 400 MWa of annual energy. This includes a combined cycle combustion turbine and 13 different wind projects ranging in size from 2 to 150 MW of nameplate capacity. These resources are the total of all utility-owned and contracted resources and do not include those generating resources dedicated to meeting loads outside the Northwest.

Conservation, Renewables & Natural Gas Fill the Gap

Utilities are supplementing the existing resource base to meet the region's future needs. The resource gap identified here will be reduced by about 1,800 MWa of expected energy savings from conservation programs and energy efficiency improvements over the next 10 years. And the utilities have many generating projects in their plans to fill the remaining gap.

A handful of natural gas-fired power plants will provide about two-thirds of the energy to meet future power needs. Utilities also have natural gas plants on the drawing board to address peak demand. The chart below shows the expected firm energy needed and how it will be met.

The greatest number of planned future resources are small wind projects along with other renewable technologies – hydro, geothermal, biomass and solar. These projects – about 2,300 MW of capability – will provide over 800 MWa in 10 years. Wind makes up more than half of these renewable resources because of its scale and availability.



Overview

Each year the *Northwest Regional Forecast* reports the sum of individual utilities' ten-year projections of electric loads and resources indicating the region's need to acquire new power supply. It is a comprehensive look at the capability of existing and new electric generation resources, long-term firm contracts, expected savings from energy efficiency programs and other components of electric demand for the Northwest.

Table 1 Northwest Region Requirements and Resources, 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 regional requirements. The load component has not been adjusted for savings from conservation and/or energy efficiencies.

The utilities' existing generating resources are shown by resource type. Existing resources include those resources listed in tables 2 and 3. *Table 2 Recently Installed Resources* highlights those projects that have most recently come on line and *Table 3 Under Construction Resources* lists those generating projects where construction has started and that utilities are counting on to meet need.

In addition to those resources and energy conservation programs that are currently in place, utilities continue to acquire resources and implement conservation programs to meet future demand. *Table 4 Planned Resources* captures resources utilities have identified to meet their own needs. The table shows the expected savings from utilities' conservation/energy efficiency programs and planned generating projects that are being counted on to meet the growing demand. This information is compilation of what utilities have reported in their individual integrated resources plans.

Table 5 Northwest Generating Resources is a comprehensive list of generating resources that make up the electric power supply for the Pacific Northwest. These resources are utility-owned, utility contracted, and owned by independent power producers.

Table 1
Northwest Region
Requirements and Resources

Annual Energy (MWa)	<u>2010-11</u>	<u>2011-12</u>	<u>2012-13</u>	<u>2013-14</u>	<u>2014-15</u>
Requirements					
Load ^{1/}	20,891	21,296	21,804	22,265	22,621
Exports	853	816	789	776	694
Total	21,743	22,112	22,593	23,041	23,315
Resources					
Hydro	11,584	11,563	11,565	11,564	11,564
Small Thermal & Miscellaneous	21	21	21	21	21
Combustion Turbines	2,474	2,483	2,468	2,447	2,487
Renewables-Other	196	188	180	180	171
Wind	927	958	955	955	955
Cogeneration	1,078	866	599	564	591
Imports	1,096	1,016	954	876	882
Nuclear	784	1,030	878	1,030	878
Coal	3,598	3,663	3,618	3,577	3,628
Total	21,759	21,787	21,237	21,214	21,177
Surplus (Deficit)	15	(325)	(1,356)	(1,827)	(2,138)

1/ Loads do not include future conservation savings

Table 1
Northwest Region
Requirements and Resources

Annual Energy (MWa)	<u>2015-16</u>	<u>2016-17</u>	<u>2017-18</u>	<u>2018-19</u>	<u>2019-20</u>
Requirements					
Load ^{1/}	22,965	23,322	23,665	24,009	24,344
Exports	616	587	543	498	480
Total	23,581	23,909	24,208	24,506	24,825
Resources					
Hydro	11,564	11,564	11,564	11,560	11,560
Small Thermal & Miscellaneous	21	21	21	21	21
Combustion Turbines	2,605	2,648	2,668	2,668	2,680
Renewables-Other	221	221	221	221	221
Wind	955	955	955	955	955
Cogeneration	661	676	682	655	655
Imports	860	755	705	679	682
Nuclear	1,030	878	1,030	878	1,030
Coal	3,619	3,574	3,661	3,620	3,599
Total	21,536	21,292	21,507	21,256	21,403
Surplus (Deficit)	(2,045)	(2,618)	(2,701)	(3,250)	(3,421)

1/ Loads do not include future conservation

**Table 2
Recently Installed Resources**

Project	Date	Fuel/Tech	Nameplate (MW)	Capacity (MW)	Energy (MWa)	Utility
Big Top (QF)	Jan 2009	Wind	2	-	1	PacifiCorp
Biglow Canyon - Phase 2	Q4 2009	Wind	150	8	54	Portland General Elec.
Buttes Creek Power	Jan 2009	Wind	5	-	2	PacifiCorp
Combine Hills II	Jan 2010	Wind	63	-	20	Clark Public Utilities
Flathead Co. Solid Waste	2009	Biomass	2	1	1	Flathead Electric Cooperative
Four Corners Wind Farm	Jun 2009	Wind	10	1	3	PacifiCorp
Four Mile Canyon Wind Farm	Jun 2009	Wind	10	1	3	PacifiCorp
Harvest Wind	Dec 2009	Wind	99	-	30	Cowlitz PUD, Eugene Water & Electric Board, Peninsula Light, Lakeview Light & Power
Hay Canyon Wind Project	2009	Wind	101	5	17	Snohomish PUD
Lancaster Power Project	2010	CCCT	270	281	260	Avista Corp.
Noxon Rapids - Unit 1	2009	Hydro Eff.	8		2	Avista Corp.
Oregon Trail Wind Farm	Jan 2009	Wind	10	-	3	PacifiCorp
Pacific Canyon Wind Farm	Jan 2009	Wind	8	-	3	PacifiCorp
Sand Ranch Wind Farm	Jan 2009	Wind	10	-	3	PacifiCorp
Wagon Trail	Jan 2009	Wind	3	-	1	PacifiCorp
Wanapum Turbine Replacement	2009	Hydro	18	18	-	Grant PUD
Ward Butte Wind Farm	Jan 2009	Wind	7	-	2	PacifiCorp
Wheat Field Wind Project	Spring 2009	Wind	97	-	16	Snohomish PUD
Wild Horse Expansion	Dec 2009	Wind	44	-	12	Puget Sound Energy
Total			872	314	419	

Table 3
Under Construction Resources

Project	Schedule	Fuel/Tech	Nameplate (MW)	Capacity (MW)	Energy (MWa)	Utility
Arrowrock Dam	Mar 2010	Hydro	18		9	Clatskanie PUD
Biglow Canyon - phase 3	Q4 2010	Wind	174	9	61	Portland General Elec.
Dorena Hydro	Q3 2010	Hydro	8.5	8.5	1.7	Emerald PUD
Landfill Gas	2009 - 2021	Biomass			6	Seattle City Light
Wanapum Turbine Replacement	2010	Hydro	18	18	-	Grant PUD
Young's Creek	Mar 2011	Hydro	7.5	-	2	Snohomish PUD
Total			226	35	80	

**Table 4
Planned Resources**

Project	Schedule	Fuel/Tech	Nameplate (MW)	Capacity (MW)	Energy (MWa)	Utility
Biomass	2018	Biomass			40	Seattle City Light
Biomass	2020	Biomass			20	Puget Sound Energy
Box Canyon Upgrade	Mar 2013	Hydro	18			Pend Oreille PUD
Burley Butte Wind Farm	Oct 2010	Wind	11		3	Idaho Power
CCCT	2015	Gas	441	441	406	Portland General Elec.
CHP	By 2015	Unknown	2	2	2	Portland General Elec.
CHP - Biomass - PPA	2010-2020	Biomass	2	2	0	PacifiCorp
CHP - Biomass - PPA	2011-2015	Biomass	1	1	0	PacifiCorp
Combined Cycle CT	2012	CCCT	275	275	248	Puget Sound Energy
Combined Cycle CT	2017	CCCT	275	275	248	Puget Sound Energy
Combined Cycle CT	2020	CCCT	275	275	248	Puget Sound Energy
Conservation Programs	By 2020	Energy Eff.			1,770	Northwest Utilities
Cowlitz Landfill Gas	Oct 2010	Landfill gas	1	1	1	Cowlitz PUD
Demand Response	By 2015		60	60		Portland General Elec.
DSG	By 2015	Diesel	52	52		Portland General Elec.
Fall Creek Hydro	In process	Hydro	10	8	2	Emerald PUD
Geothermal	2014	Geothermal		10 to 90	90	Snohomish PUD
Geothermal 1	2013	Geothermal			45	Seattle City Light
Geothermal 2	2020	Geothermal			80	Seattle City Light
Golden Valley Wind Farm	Oct 2010	Wind	11	1	3	Idaho Power
Gorge Tunnel II	2015	Hydro			5	Seattle City Light
Landfill Gas	2011 - 2021	Biomass			15	Seattle City Light
Landfill Gas	Oct 2010	Landfill gas	1	1	1	Cowlitz PUD
Langley Gulch	Dec 2012	Natural gas	300	330	195	Idaho Power
Large Aero	2020	SCCT	100	100		Idaho Power
Lava Beds Wind Farm	Oct 2010	Wind	18	1	6	Idaho Power
Mill Creek Generating Station	July 2010	Natural gas	200	200		NorthWestern Energy
Milner Dam Wind Farm	Oct 2010	Wind	18	1	6	Idaho Power
Notch Butte Wind Farm	Oct 2010	Wind	18	1	6	Idaho Power
Noxon Rapids	2010 - 2012	Hydro Eff.	30		6	Avista Corp.
Oregon Trails Wind Farm	Oct 2010	Wind	11	-	3	Idaho Power
Pilgrim Stage Wind Farm	Oct 2010	Wind	11	-	3	Idaho Power
Priest Rapids Turbine/Generator Replacement	2015 - 2020	Hydro	150	150		Grant PUD

**Table 4
Planned Resources**

Project	Schedule	Fuel/Tech	Nameplate (MW)	Capacity (MW)	Energy (MWa)	Utility
Raft River 2	2013	Geothermal	15	13	12	Eugene Water & Electric Board
RPS Renewables	2015	Wind, Solar	370	18	122	Portland General Elec.
Salmon Falls Wind Farm	Oct 2010	Wind	21	1	7	Idaho Power
SCCT or Similar	2013	Gas	200	200		Portland General Elec.
Seasonal Capacity	2015	Gas	280	280		Portland General Elec.
Shoshone Falls Upgrade	2015	Hydro		49		Idaho Power
Single Cycle CT	2010	SCCT	160	160		Puget Sound Energy
Single Cycle CT	2017	SCCT	160	160		Puget Sound Energy
Single Cycle CT	2020	SCCT	160	160		Puget Sound Energy
Solar PVU	2011-2015	Solar	2	2	1	PacifiCorp
S. Montana Electric G&T	Nov 2011	Coal	268	268		NorthWestern Energy
Thermal upgrades	2010 - 2017	Coal	48	48	39	PacifiCorp
Thousand Springs Wind Farm	Oct 2010	Wind	11	1	3	Idaho Power
Tuana Gulch Wind Farm	Oct 2010	Wind	11	1	4	Idaho Power
Wanapum Generator Replacement	2014 - 2018	Hydro	90	90		Grant PUD
Wanapum Turbine/Generator Replacement	2011	Hydro	54	54		Grant PUD
Wind Generation	2024	Wind			85	Seattle City Light
Wind Generation	2011	Wind	100		33	Puget Sound Energy
Wind Generation	2012	Wind	200		67	Puget Sound Energy
Wind Generation	2014	Wind	100		33	Puget Sound Energy
Wind Generation	2016	Wind	200		67	Puget Sound Energy
Wind Generation	2018	Wind	200		67	Puget Sound Energy
Wind Generation	2020	Wind	200		67	Puget Sound Energy
Winter Only RFP	2010	Contract	210	210	-	Portland General Elec.
Total			5,348	3,890	4,059	

Table 5
Northwest Generating Resources

Name	Fuel	Owner	NW Utility	Nameplate Rating - MW
HYDRO				33,794
Albany	Hydro	City of Albany		1
Albeni Falls	Hydro	US Army Corps of Engineers	Federal System - BPA	43
Alder	Hydro	Tacoma Power		50
American Falls	Hydro	Idaho Power		92
Anderson Ranch	Hydro	US Bureau of Reclamation	Federal System - BPA	40
Arrowrock Dam	Hydro	Clatskanie PUD/Idaho & Oregon irrigation districts	Clatskanie PUD	18
Barber Dam	Hydro	Non-utility	Idaho Power	4
Bend	Hydro	PacifiCorp		1
Big Cliff	Hydro	US Corps of Engineers	Federal System - BPA	18
Big Creek	Hydro	Flathead Irrigation Project (FIP)		0
Big Fork	Hydro	PacifiCorp		4
Billings Generation, Inc.	Hydro	Non-utility	NorthWestern Energy, partially dedicated to PacifiCorp	64
Birch Creek	Hydro	Non-utility	PacifiCorp	3
Black Canyon	Hydro	US Bureau of Reclamation	Federal System - BPA	10
Black Creek Hydro	Hydro	Puget Sound Energy		4
Black Eagle	Hydro	PP&L - Montana		17
Blind Canyon	Hydro	Non-utility	Idaho Power	2
Bliss	Hydro	Idaho Power		75
Boise Diversion	Hydro	US Bureau of Reclamation	Federal System - BPA	2
Bonneville	Hydro	US Corps of Engineers	Federal System - BPA	1,102
Bonneville Pacific	Hydro	Non-utility	PacifiCorp	6
Boulder Creek	Hydro		Federal System - BPA	0
Boundary	Hydro	Seattle City Light		1,040
Box Canyon	Hydro	Pend Oreille County PUD		60
Broadwater Dam	Hydro	Non-utility	NorthWestern Energy	10
Brownlee	Hydro	Idaho Power		585
Burnside Hydro	Hydro	Non-utility	Other Publics	0
Bypass	Hydro	Non-utility	Idaho Power	10
C.J. Strike	Hydro	Idaho Power		83
Cabinet Gorge	Hydro	Avista Corp.		265
Calispel Creek	Hydro	Pend Oreille County PUD #2		1
Carmen	Hydro	Eugene Water & Electric Board		80
Cascade	Hydro	Idaho Power		12
CDM Hydro	Hydro	Non-utility	PacifiCorp	-
Cedar Draw Creek	Hydro	Non-utility	Idaho Power	2
Cedar Falls	Hydro	Seattle City Light		20
Chandler	Hydro	US Bureau of Reclamation	Federal System - BPA	12
Chelan	Hydro	Chelan County PUD		48
Chief Joseph	Hydro	Corps of Engineers	Federal System - BPA	2,457
City of Idaho Falls	Hydro	City of Idaho Falls		8
Clear Lake	Hydro	Idaho Power		3
Clearwater	Hydro	Non-utility	Federal System - BPA	1

Table 5
Northwest Generating Resources

Name	Fuel	Owner	NW Utility	Nameplate Rating - MW
Clearwater No. 1	Hydro	PacifiCorp		15
Clearwater No. 2	Hydro	PacifiCorp		26
Cline Falls	Hydro	PacifiCorp		1
Cochrane	Hydro	PP&L - Montana	Partially dedicated to region	48
COID	Hydro	Non-utility	PacifiCorp	7
Condit	Hydro	PacifiCorp		10
Copco No. 2	Hydro	PacifiCorp		27
Copco No.1	Hydro	PacifiCorp		20
Cougar	Hydro	US Corps of Engineers	Federal System - BPA	25
Cove Hydro	Hydro	Non-utility	Other Publics	0
Cowlitz Falls	Hydro	Lewis County PUD		70
Crystal Springs	Hydro	Non-utility	Idaho Power	2
Cushman 1	Hydro	Tacoma Power		43
Cushman 2	Hydro	Tacoma Power		81
Deep Creek	Hydro	Non-utility	Avista Corp.	1
Derr Creek	Hydro	Non-utility	Avista Corp.	0
Detroit	Hydro	US Corps of Engineers	Federal System - BPA	100
Dexter	Hydro	US Corps of Engineers	Federal System - BPA	15
Diablo Canyon	Hydro	Seattle City Light		153
Dietrich Drop	Hydro	Non-utility	Idaho Power	5
Dworshak	Hydro	US Corps of Engineers	Federal System - BPA	400
Dworshak/Clearwater	Hydro	Idaho		3
Eagle Point	Hydro	PacifiCorp		3
East Side	Hydro	PacifiCorp		3
Electron	Hydro	Puget Sound Energy		26
Elk Creek	Hydro	Non-utility	Idaho Power	2
Eltopia Branch Canal	Hydro	Non-utility	Seattle City Light, Tacoma Power	2
Elwha	Hydro	US Bureau of Reclamation	Federal System - BPA	11
Falls Creek	Hydro	Non-utility	PacifiCorp	-
Falls River	Hydro	Non-utility	Idaho Power	9
Faraday	Hydro	Portland General Electric		37
Farmers Irrigation	Hydro	Non-utility	PacifiCorp	3
Felt	Hydro	PacifiCorp		1
Fish Creek	Hydro	PacifiCorp		11
Foster	Hydro	US Corps of Engineers	Federal System - BPA	20
Frontier Technologies	Hydro	Non-utility	PacifiCorp	4
Galesville Dam	Hydro	Non-utility	PacifiCorp	2
GEM State Hydro	Hydro	City of Idaho Falls		15
Geobon 2	Hydro	Non-utility	Idaho Power	1
Glines Canyon	Hydro	US Bureau of Reclamation	Federal System - BPA	13
Glines Hydro	Hydro		Federal System - BPA	16
Gorge	Hydro	Seattle City Light		207
Grand Coulee	Hydro	US Bureau of Reclamation	Federal System - BPA	6,494
Green Peter	Hydro	US Corps of Engineers	Federal System - BPA	80

Table 5
Northwest Generating Resources

Name	Fuel	Owner	NW Utility	Nameplate Rating - MW
Green Springs	Hydro	US Bureau of Reclamation	Federal System - US Bureau of Reclamation	16
Hauser Lake	Hydro	PP&L - Montana	Partially dedicated to region	17
Hazelton A	Hydro	Non-utility	Idaho Power	8
Hazelton B	Hydro	Non-utility	Idaho Power	7
Hells Canyon	Hydro	Idaho Power		392
Henry M. Jackson (Sultan)	Hydro	Snohomish County PUD #1		112
Hills Creek	Hydro	US Corps of Engineers	Federal System - BPA	30
Holter	Hydro	PP&L - Montana	Partially dedicated to region	38
Hood Street Reservoir	Hydro	Tacoma Power		1
Horseshoe Bend	Hydro	Non-utility	Idaho Power	10
Hungry Horse	Hydro	US Bureau of Reclamation	Federal System - BPA	428
Hutchinson Creek	Hydro	Non-utility	Puget Sound Energy	1
Ice Harbor	Hydro	US Corps of Engineers	Federal System - BPA	603
Iron Gate	Hydro	PacifiCorp		18
Island Park (2)	Hydro		Federal System - BPA	5
Jim Ford Creek	Hydro	Non-utility	Avista Corp.	2
John C. Boyle	Hydro	PacifiCorp		80
John Day	Hydro	US Corps of Engineers	Federal System - BPA	2,160
John Day Creek	Hydro	Non-utility	Avista Corp.	1
Joseph Hydro	Hydro	Non-utility	PacifiCorp	8
Kasel-Witherspoon	Hydro	Non-utility	Idaho Power	1
Kerr	Hydro	PP&L - Montana	Partially dedicated to region	171
Klamath	Hydro	Non-utility	PacifiCorp	92
Koma Kulshan	Hydro	Non-utility	Puget Sound Energy	14
Koyle	Hydro	Non-utility	Idaho Power	1
La Grande	Hydro	Tacoma Power		64
Lake Oswego Corporation	Hydro	Non-utility	Portland General Electric	1
Lateral #10	Hydro	Non-utility	Idaho Power	2
Leaburg	Hydro	Eugene Water & Electric Board		14
Lemolo No. 1	Hydro	PacifiCorp		29
Lemolo No. 2	Hydro	PacifiCorp		33
Libby	Hydro	US Corps of Engineers	Federal System - BPA	525
Lilliwaup Falls	Hydro	Other Publics		1
Little Falls	Hydro	Avista Corp.		32
Little Goose	Hydro	US Corps of Engineers	Federal System - BPA	810
Little Wood	Hydro	Non-utility	Idaho Power	2
LittleWood-Arkoosh	Hydro	Non-utility	Idaho Power	1
Long Lake	Hydro	Avista Corp.		70
Lookout Point	Hydro	US Corps of Engineers	Federal System - BPA	120
Lost Creek	Hydro	US Corps of Engineers	Federal System - BPA	49
Lower	Hydro	City of Idaho Falls		11
Lower Baker	Hydro	Puget Sound Energy		85
Lower Granite	Hydro	US Corps of Engineers	Federal System - BPA	810
Lower Malad	Hydro	Idaho Power		14
Lower Monumental	Hydro	US Corps of Engineers	Federal System - BPA	810

Table 5
Northwest Generating Resources

Name	Fuel	Owner	NW Utility	Nameplate Rating - MW
Lower Salmon	Hydro	Idaho Power		60
Lowline #2	Hydro	Non-utility	Idaho Power	3
Lowline Canal	Hydro	Non-utility	Idaho Power	8
Lucky Peak	Hydro	IID	Seattle City Light	113
Madison	Hydro	PP&L - Montana	Partially dedicated to region	7
Magic Reservoir	Hydro	Non-utility	Idaho Power	9
Main Canal Headworks	Hydro	Non-utility	Seattle City Light, Tacoma Power	26
Marcos Ranches	Hydro	Non-utility	Idaho Power	1
Mayfield	Hydro	Tacoma Power		162
McNary	Hydro	US Corps of Engineers	Federal System - BPA	980
McNary Fishway	Hydro	Public Utility		8
Merwin	Hydro	PacifiCorp		136
Meyers Falls	Hydro	Avista Corp.		1
Middlefork Irrigation	Hydro	Non-utility	PacifiCorp	3
Mile 28	Hydro	Non-utility	Idaho Power	2
Mill Creek	Hydro		Federal System - BPA	1
Milner	Hydro	Idaho Power		59
Minidoka	Hydro	US Bureau of Reclamation	Federal System - BPA	28
Mink Creek	Hydro	Non-utility	PacifiCorp	3
Mitchell Butte	Hydro	Non-utility	Idaho Power	2
Monroe Street	Hydro	Avista Corp.		15
Morony	Hydro	PP&L - Montana	Partially dedicated to region	45
Morse Creek	Hydro	City of Port Angeles		1
Mossyrock	Hydro	Tacoma Power		300
Moyie Springs	Hydro	City of Bonners Ferry		4
Mystic Lake	Hydro	PP&L - Montana		10
Naches	Hydro	PacifiCorp		6
Naches Drop	Hydro	PacifiCorp		1
Newhalem	Hydro	Seattle City Light		2
Nine Mile	Hydro	Avista Corp.		26
Nooksack	Hydro	Puget Sound Energy		2
North Fork	Hydro	Portland General Electric		41
North Fork Sprague	Hydro	Non-utility	PacifiCorp	1
North Umpqua	Hydro	PacifiCorp		175
Noxon Rapids	Hydro	Avista Corp.		466
Oak Grove	Hydro	Portland General Electric		51
Opal Springs	Hydro	Non-utility	PacifiCorp	5
Owyhee Dam	Hydro	Non-utility	Idaho Power	5
Oxbow	Hydro	Idaho Power		190
P.E.C. Headworks	Hydro	Non-utility	Grant PUD	7
Packwood	Hydro	Energy Northwest		28
Palisades	Hydro	US Bureau of Reclamation	Federal System - BPA	177
Pelton	Hydro	Portland General Electric		110
Pelton Reregulating	Hydro	Warm Springs Tribe	Portland General Electric	19
Phillips Ranch	Hydro	Non-utility	Avista Corp.	0

Table 5
Northwest Generating Resources

Name	Fuel	Owner	NW Utility	Nameplate Rating - MW
Pigeon Cove	Hydro	Non-utility	Idaho Power	2
Portland Hydro Project	Hydro	Non-utility	Portland General Electric	36
Post Falls	Hydro	Avista Corp.		15
Potholes East Canal 66	Hydro	Non-utility	Seattle City Light, Tacoma Power	2
Powerdale	Hydro	PacifiCorp		6
Priest Rapids	Hydro	Grant PUD		956
Prospect No. 1	Hydro	PacifiCorp		4
Prospect No. 2	Hydro	PacifiCorp		32
Prospect No. 3	Hydro	PacifiCorp		7
Prospect No. 4	Hydro	PacifiCorp		1
Quincy Chute	Hydro	Non-utility	Grant PUD	9
R. D. Smith	Hydro	Non-utility	Seattle City Light, Tacoma Power	6
Rainbow	Hydro	PP&L - Montana	Partially dedicated to region	36
Reeder Gulch	Hydro	Other Publics		1
River Mill	Hydro	Portland General Electric		19
Rock Creek #1	Hydro	Non-utility	Idaho Power	2
Rock Creek #2	Hydro	Non-utility	Idaho Power	2
Rock Island	Hydro	Chelan County PUD		628
Rocky Reach	Hydro	Chelan County PUD		1,300
Rogue	Hydro	PacifiCorp		25
Ross	Hydro	Seattle City Light		360
Round Butte	Hydro	Portland General Electric		247
Roza-Pump	Hydro	US Bureau of Reclamation	Federal System - BPA	13
Ryan	Hydro	PP&L - Montana	Partially dedicated to region	48
Sheep Creek	Hydro	Non-utility	Avista Corp.	2
Shoshone Falls	Hydro	Idaho Power		13
Slide Creek	Hydro	PacifiCorp		18
Smith Creek	Hydro	Eugene Water & Electric Board		38
Snoqualmie Fall	Hydro	Puget Sound Energy		42
Soda Creek	Hydro	Other Publics		1
Soda Springs	Hydro	PacifiCorp		11
South Fork Tolt	Hydro	Seattle City Light		17
Spokane Upriver	Hydro	Non-utility	Avista Corp.	16
Stauffer Dry Creek	Hydro	Non-utility	PacifiCorp	4
Stayton	Hydro	PacifiCorp		1
Stone Creek	Hydro	Eugene Water & Electric Board		12
Strawberry Creek	Hydro	Lower Valley Power & Light Inc.	S. Idaho-Public Agy.	2
Sullivan Lake	Hydro	Pend Oreille County PUD		-
Summer Falls	Hydro	Non-utility	Seattle City Light, Tacoma Power	92
Swan Falls	Hydro	Idaho Power		25
Swift 1	Hydro	PacifiCorp	PacifiCorp, Cowlitz Co. PUD	204
Swift 2	Hydro	Cowlitz Co. PUD	PacifiCorp, Cowlitz Co. PUD	70
T.W. Sullivan	Hydro	Portland General Electric		15

Table 5
Northwest Generating Resources

Name	Fuel	Owner	NW Utility	Nameplate Rating - MW
The Dalles	Hydro	US Corps of Engineers	Federal System - BPA	1,807
The Dalles Fishway	Hydro	Northern Wasco PUD		0
Thompson Falls	Hydro	PP&L - Montana	Partially dedicated to region	80
Thompson Falls Add.	Hydro	PP&L - Montana	Partially dedicated to region	-
Thousand Springs	Hydro	Idaho Power		9
Toketee	Hydro	PacifiCorp		43
Trail Bridge	Hydro	Eugene Water & Electric Board		10
Tunnel #1	Hydro	Non-utility	Idaho Power	7
Twin Falls	Hydro	Idaho Power		52
Twin Falls	Hydro	Non-utility	Puget Sound Energy	20
Upper	Hydro	City of Idaho Falls		8
Upper Baker	Hydro	Puget Sound Energy		106
Upper Falls	Hydro	Avista Corp.		10
Upper Malad	Hydro	Idaho Power		8
Upper Salmon 1 & 2	Hydro	Idaho Power		18
Upper Salmon 3 & 4	Hydro	Idaho Power		17
Walla Walla	Hydro	Non-utility	PacifiCorp	2
Wallowa Falls	Hydro	PacifiCorp		1
Walterville	Hydro	Eugene Water & Electric Board		8
Wanapum	Hydro	Grant PUD		1,038
Weeks Falls	Hydro	Non-utility	Puget Sound Energy	5
Wells	Hydro	Douglas County PUD		774
West Side	Hydro	PacifiCorp		1
Wilson Lake	Hydro	Non-utility	Idaho Power	8
Wynoochee Dam	Hydro	Tacoma Power		13
Yakima-Trenton	Hydro	Non-utility	PacifiCorp	3
Yale	Hydro	PacifiCorp		134
Yelm	Hydro	City of Centralia		10
Young's Creek	Hydro	Snohomish PUD		8
COAL				5,641
Boardman	Coal	Portland General Electric		642
Centralia #1	Coal	TransAlta		670
Centralia #2	Coal	TransAlta		670
Colstrip #1	Coal	PP&L Montana, LLC	Puget Sound Energy	330
Colstrip #2	Coal	PP&L Montana, LLC	Puget Sound Energy	330
Colstrip #3	Coal	PP&L Montana, LLC	Avista Corp., PacifiCorp, Portland General Electric, Puget Sound Energy	740
Colstrip #4	Coal	NorthWestern Energy		805
Corette	Coal	PP&L Montana, LLC		163
Jim Bridger #1	Coal	PacifiCorp		530
Jim Bridger #2	Coal	PacifiCorp		530
Jim Bridger #3	Coal	PacifiCorp		520

Table 5
Northwest Generating Resources

Name	Fuel	Owner	NW Utility	Nameplate Rating - MW
Jim Bridger #4	Coal	PacifiCorp		530
Valmy #1	Coal	Idaho Power		254
Valmy #2	Coal	Idaho Power		267
NUCLEAR				
Columbia Generating	Uranium	Energy Northwest	Federal System - BPA	1,230
COMBUSTION TURBINES				4,778
Alden Bailey	Natural gas	Clatskanie PUD		11
Beaver	Natural gas	Portland General Electric		586
Beaver 8	Natural gas	Portland General Electric		25
Bennett Mountain	Natural gas	Idaho Power		162
Big Hanaford	Natural gas	TransAlta		248
Chehalis Generating	Natural gas	PacifiCorp		517
Coyote Springs II	Natural gas	Avista Corp.		287
Danskin	Natural gas	Idaho Power		90
Danskin 1	Natural gas	Idaho Power		170
Encogen	Natural gas	Puget Sound Energy		159
Frederickson Generation	Natural gas	EPCOR Power L.P./PSE	Benton PUD	258
Fredonia 1 & 2	Natural gas	Puget Sound Energy		208
Fredonia 3 & 4	Natural gas	Puget Sound Energy		108
Fredrickson 1 & 2	Natural gas	Puget Sound Energy		149
Goldendale	Natural gas	Puget Sound Energy		261
Hermiston Power Project	Natural gas	Hermiston Power Partners		689
Kettle Falls CT	Natural gas	Avista Corp.		7
Klamath Peaking Units 1-4	Natural gas	Iberdrola Renewables		100
Lancaster Power Project	Natural gas	Avista Corp.		270
Mint Farm Energy Center	Natural gas	Wayzata Investment Partners	Puget Sound Energy	305
Northeast 1 & 2	Natural gas	Avista Corp.		62
Pasco Generation Station	Natural gas	Franklin PUD, Grays Harbor PUD		44
Port Westward	Natural gas	Portland General Electric		415
Rathdrum 1 & 2	Natural gas	Avista Corp.		167
River Road Generating	Natural gas	Clark Public Utilities		248
Sumas Energy	Natural gas	Puget Sound Energy		121
Whitehorn #2 & 3	Natural gas	Puget Sound Energy		149
COGENERATION				1,432
Afton Energy (Wood)	cogen	Non-Utility	Idaho Power	8
Billings Cogeneration	coke	Billings Generation, Inc.	NorthWestern Energy	64
Boise Cascade	Wood	PacifiCorp		9

Table 5
Northwest Generating Resources

Name	Fuel	Owner	NW Utility	Nameplate Rating - MW
Coyote Springs I	Natural gas	Portland General Electric		266
DAW		PacifiCorp		-
Glenns Ferry (Magic		Idaho Power		10
Grays Harbor Paper	Wood waste	Grays Harbor PUD		16
Hermiston	Natural gas	PacifiCorp		469
James River - Camas		PacifiCorp		52
Kimberly Clark		Snohomish County PUD		52
Klamath Cogen Plant	Natural gas	Iberdrola Renewables		502
March Point 1	Natural gas	Puget Sound Energy		80
March Point 2	Natural gas	Puget Sound Energy		60
PERC	Methane	Pyallup Energy Recovery Co.		3
Rough & Ready Lumber	Wood	Rough & Ready	PacifiCorp	1
Rupert (Magic Valley)		Idaho Power		10
Scott Cogeneration	Cogen	Non-Utility	Snohomish County PUD	43
Simplot		Idaho Power		12
Tasco 1		Idaho Power		2
Tasco 2		Idaho Power		3
Tenaska	Natural gas	Tenaska	Puget Sound Energy	245
Thompson River	Coal	NorthWestern Energy		12
Warm Springs Forest Products	Wood	PacifiCorp		8
Wauna (James River)	99% Biomass, 1% Natural gas	Western Generation Agency	Eugene Water & Electric Board	36
Weyco Energy Center	Wood	Eugene Water & Electric Board		51
RENEWABLES - OTHER				355
Ashland Solar Project	Solar		Federal System - BPA	-
Biomass One	Wood	PacifiCorp		25
Coffin Butte Resource Project	Landfill gas	Power Resources Cooperative	PNGC Power	6
Cogen Company			Other Publics (BPA)	8
Co-Gen II - DR Johnson Lumber	Wood	PacifiCorp		8
Columbia Ridge Landfill Gas	Landfill gas	Waste Management	Seattle City Light	-
Convanta Marion		Portland General Electric		16
Dry Creek Landfill	Gas	Dry Creek Landfill Inc.	PacifiCorp	3
Flathead County Landfill	Landfill gas	Flathead Electric Cooperative		2
Four Mile Hill Geothermal	Geothermal	Calpine	Federal - BPA	50
Hidden Hollow Landfill	Landfill gas	G2 Energy	Idaho Power	3
H. W. Hill Landfill Gas Power Plant	Landfill gas	Allied Waste Companies		11
Kettle Falls	Wood	Avista Corp.		51

Table 5
Northwest Generating Resources

Name	Fuel	Owner	NW Utility	Nameplate Rating - MW
Mead (Methane Energy Agricultural Development)	Methane		Other Publics - BPA	2
Olympic View 1&2	Gas	Mason County PUD 3		5
Pine Products		PacifiCorp		6
Pocatello Wastewater		Idaho Power		0
Potlatch		Avista Corp.		114
Qualco			Puget Sound Energy	0
Raft River 1		US Geothermal	Idaho Power	16
Short Mountain	Biomass (Landfill gas)		Other Publics - BPA	3
Spokane MSW	MSW	City of Spokane	Puget Sound Energy	23
Stimson Lumber	Wood waste	Avista Corp.		7
Tamarack	Wood	Idaho Power		5
Treasure Valley	Methane	Idaho Power		3
VanderHaak Dairy	Biogas		Puget Sound Energy	0
White Bluffs Solar Station	Solar	Energy Northwest		-
Wild Horse Solar Project	Solar PV	Puget Sound Energy		1
WIND				3,172
Bennet Creek	Wind	Bennet Creek	Idaho Power	21
Big Horn	Wind	Iberdrola Renewables		199
Big Top	Wind	Big Top LLC (QF)	PacifiCorp	2
Biglow Canyon - 1	Wind	Portland General Electric		125
Biglow Canyon - 2	Wind	Portland General Electric		150
Biglow Canyon - 3	Wind	Portland General Electric		174
Buttes Creek Power	Wind	Buttes Creek Power LLC	PacifiCorp	5
Cassia Farms	Wind	John Deere	Idaho Power	11
Cassia Gulch	Wind	John Deere	Idaho Power	21
Combine Hills I	Wind	Eurus Energy of America	PacifiCorp	41
Combine Hills II	Wind	Eurus Energy of America	Clark Public Utilities	63
Condon Wind	Wind	Goldman Sachs 75%, SeaWest NW 25%	Federal System - BPA	25
Elk Horn Wind	Wind	Horizon Wind	Idaho Power	100
Foote Creek Rim 1	Wind	PacifiCorp, Eugene Water & Electric Board		41
Foote Creek Rim 2	Wind	PPM Energy	Federal System - BPA	2
Foote Creek Rim 4	Wind	PPM Energy	Federal System - BPA	17
Fossil Gulch Wind	Wind	Idaho Power		11
Four Corners Wind Farm	Wind	Four Corners Wind Farm LLC	PacifiCorp	10
Four Mile Canyon Wind Farm	Wind	Four Mile Canyon Wind Farm LLC	PacifiCorp	10
Goodnoe Hills	Wind	PacifiCorp		94

Table 5
Northwest Generating Resources

Name	Fuel	Owner	NW Utility	Nameplate Rating - MW
Harvest Wind	Wind		Cowlitz Co. PUD, Eugene Water & Electric Board, Peninsula Light, Lakeview Water & Light	99
Hay Canyon Wind	Wind	Hay Canyon Wind Project LLC (Iberdrola)	Snohomish County PUD	101
Hopkins Ridge	Wind	Puget Sound Energy		157
Horseshoe Bend	Wind	Horseshoe Bend Wind Park LLC	Idaho Power	9
Hot Springs Wind	Wind	Hot Springs Wind	Idaho Power	21
Judith Gap	Wind	Invenergy Wind, LLC	NorthWestern Energy	135
Klondike I	Wind	PPM Energy	Federal System - BPA	24
Klondike II	Wind	PPM Energy	Portland General Electric	75
Klondike III	Wind	PPM Energy	Eugene Water & Electric Board	221
Leaning Juniper 1	Wind	PPM Energy	PacifiCorp	101
Lewandowski Farms	Wind	Idaho Power		0
Marengo	Wind	Renewable Energy America	PacifiCorp	140
Marengo II	Wind	PacifiCorp		70
Nine Canyon	Wind	Energy Northwest	Benton County PUD	96
Oregon Trail Wind Farm	Wind	Oregon Trail Wind Farm LLC	PacifiCorp	10
Pacific Canyon Wind Farm	Wind	Pacific Canyon Wind Farm LLC	PacifiCorp	8
Sand Ranch Wind Farm	Wind	Sand Ranch Wind Farm LLC	PacifiCorp	10
Stalene Wind	Wind	PPM Energy	Federal System - BPA	300
Vansycle Ridge	Wind	ESI Vansycle Partners	Portland General Electric	25
Wagon Trail Wind Farm	Wind	Wagon Trail Wind Farm LLC	PacifiCorp	3
Ward Butte Wind Farm	Wind	Ward Butte Wind Farm LLC	PacifiCorp	7
Wheat Field Wind Project	Wind	Wheat Field Wind LLC (Horizon Energy/EDP)	Snohomish PUD	97
White Creek	Wind	White Creek Wind I (investment firm)	Cowlitz Co. PUD	205
Wild Horse	Wind	Puget Sound Energy		273
Wolverine Creek	Wind	Invenergy	PacifiCorp	65
SMALL THERMAL AND MISCELLANEOUS				37
Boulder Park		Avista Corp.		25
Crystal Mountain		Puget Sound Energy		3
Springfield Generation		Springfield Utility Board		10

Assumptions and Procedures

This report is produced annually by PNUCC. The utilities, in most cases, prepared their own projections. Bonneville Power Administration provides much of the information for its smaller customers. Procedures employed in preparing the regional load-resource comparisons of capacity and energy are described here. A list of definitions follows this section.

Planning Area

The Northwest Regional Planning Area is that area defined by the Pacific Northwest Electric Power Planning and Conservation Act. It includes the states of Oregon; Washington; 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.

Load and resource information is included for the utilities listed in Table 7 at the end of this section.

Capacity Need Assessment

A different approach was taken for assessing the need for capacity resources in this year's report. Each utility was asked to report their expected need for capacity resources based on the assumptions and procedures they use for their individual integrated resources plans. The capacity need for those utilities reporting need, were totaled to provide a regional capacity needs picture.

Energy Load Estimate

The Northwest regional loads are the sum of firm loads estimated by the Northwest utilities and BPA. Estimates are reported for expected system monthly energy loads and reflect normal weather conditions. Annual average energy is for August through July of each year.

Load projections reflect reductions in demand due to rising electricity prices and savings from appliance efficiency standards and energy codes. However, savings from programmatic conservation are treated as demand-side resources and are not reflected in the load. Savings from energy efficiency/conservation programs are shown as planned resources.

Interruptible loads and non utility industrial load forecasts provided by those industries are presented in the report, and they are not included in the total regional load.

Federal System (BPA) Loads

Federal System (BPA) firm loads are the sum of firm transmission losses and federal agency loads (e.g., military bases). Federal System loads exclude Grand Coulee and Roza pumping loads and

US Bureau of Reclamation local use at Grand Coulee. These loads are accounted for by reducing Grand Coulee and Roza resources by equivalent amounts.

The Federal System load does not include obligations to public or private utilities under the Pacific Northwest Regional Power Act. Consequently, the Federal System (BPA) loads shown do not represent the BPA Administrator's entire obligation.

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.

Energy Efficiency Estimates

The energy efficiency estimates provide regional expected savings from Northwest utilities' programs and are similar to the energy efficiency programs reflected in each utility's integrated resource plans. Conservation/energy efficiency information is provided on a cumulative basis. These savings reflect line losses to be comparable to generation. They reflect savings from programs that utilities fund directly, or through a third-party, such as Northwest Energy Efficiency Alliance (NEEA). Conservation includes the residential, commercial, and industrial sectors and reflects savings from transmission and distribution efficiencies. It also includes investments utilities have made in market transformation efforts. Energy efficiency does not reflect estimated reductions in demand due to rising electricity prices or from appliance efficiency standards and energy codes.

Resource Estimates

This report considers existing resources, resources Under Construction and Future Resources. Only the existing resources and resources Under Construction are reflected in the regional tabulations. Only generating resources (or shares) that are committed to meeting Northwest loads are included in the regional analysis.

Hydro

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 70-year period from August 1928 through July 1998.

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.

Hydro energy capability was also estimated for each of the 70 historical water years. Reservoirs were operated in accordance with normal requirements for refilling. Other operational data

were in accordance with the Pacific Northwest Coordination Agreement. The 70-year model was run in continuous mode. This additional generation is not included in the regional load/resource balance.

Canadian Treaty

Energy resources include downstream generation in the United States resulting from storage regulation of three Canadian Treaty reservoirs Duncan, Arrow and Mica in coordination with Libby reservoir and other power facilities in the region as required by the Pacific Northwest Coordination Agreement and the Columbia River Treaty. Canadian Entitlement to these downstream power benefits reverted to Canada as of April 1, 2003. This year's report assumes that Canadian rights to divert water from the Kootenai River to the Columbia River upstream of Libby Dam have not been exercised within the planning horizon.

An agreement between B.C. Hydro and BPA in 1990 provides for increased United States-Canadian coordination of the Columbia River system. This agreement cooperatively managed 4.5 MAF of non-treaty storage through June 30, 2003. At this time, this non-treaty storage is used to increase operational flexibility of the hydro system and is not included as a firm resource in the hydro-regulation studies.

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 that are a part of operation for fish include: observing flow limits as measured at Columbia Falls (downstream of Hungry Horse Dam); and operating the Brownlee project as prescribed by its owner, Idaho Power Company.

During the spring and summer, an amount of water is deliberately spilled at all mid-Columbia projects based on negotiations and/or Federal Energy Regulatory Commission (FERC) orders. The amount of spill used for fish varies by project and generally occurs the second half of April through August.

Similarly, fish passage spill programs during the spring and summer have been reflected for the Lower Snake River and Lower Columbia River dams operated by the Corps of Engineers. Scheduled spill for fish is in accordance with the Corps of Engineers data submitted for project operations. Augmented flows are simulated according to the National Marine Fisheries Service (NMFS) Biological Opinion for river operations. Augmentation for salmon occurs during the spring and summer months on both the Snake and Columbia rivers. The amount of water provided for flow augmentation varies depending on the water supply forecast for each year. Since low water conditions warrant the maximum amount of augmentation that is what is assumed for determining the firm power generation. For the 70-year analysis, the volumes of water provided vary by water condition.

Flow augmentation for sturgeon on the Kootenai River and for steelhead on the mid-Columbia occurs according to the US Fish and Wildlife and NMFS Biological Opinions and is the same every year regardless of the water supply.

Hydro Maintenance

Estimates of energy losses due to scheduled hydro maintenance are reflected in the annual average hydro capability. This maintenance is based on the mean (average) of the maintenance schedules submitted to the Northwest Power Pool. These schedules are published annually in the Pacific Northwest Coordination Agreement Data and Pool Operating Program.

Thermal and Renewable Resources

Thermal resources are reported in a variety of categories. Coal, nuclear, cogeneration and combustion turbine projects are each totaled and reported as individual categories. The Small Thermal and Miscellaneous category for the most part is a list of diesel generators that would be used in emergency situations.

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

All existing generating plants, regardless of size, are included in amounts submitted by each project operator. 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.

Non-Utility Generation

Non-utility generation is reflected in the tables along with utility-owned generation for each resource type (e.g. hydro, cogeneration, renewable). Only generation that has been committed to serve regional load is reflected in the regional analysis.

The report also shows the energy potentially available from projects owned by independent power producers that are not committed to meet regional loads. This additional generation is not included in the regional load/resource balance.

New and Planned Resources

The latest activity with new and future resource developments, including expected energy efficiencies are tabulated in this report. These resources are reported as *Recently Installed*, *Under Construction* and *Planned Resources* to reflect the different stages of development.

Recently Installed

These resources have been acquired in the past year and are serving utility loads as of December 31, 2009. They are reflected as part of the regional load-resource analysis.

Under Construction

Resources *Under Construction* include those projects not complete as of December 31, 2009, but currently are being built. 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. Uncommitted resources being developed by non-utility entities are reported but not included in the regional analysis.

Planned Resources

Planned Resources include future energy efficiency savings, 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, 2009, but a firm commitment to construct or acquire the power has been made and they are at some stage in the site certification process. For example, a utility or developer has obtained all licenses for construction or acquisition or is in the process of receiving their site certificate from the state. These resources are not part of the regional load-resource analysis.

Contracts

Imports and exports include firm arrangements for interchanges with systems outside 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.

"Intra-company transfers" apply to utilities whose service territories extend beyond the regional boundary. These transfers pertain to utilities with loads inside the region that will be served by resources that are outside the region. Transfers of other utilities do not consider any transmission bottlenecks that may occur in the future.

Table 6
Utilities included in the Northwest Regional Forecast

Albion, City of	Fall River Rural Electric.	Pacific County PUD #2
Alder Mutual	Farmers Electric Co-op	Pacific Power
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 Co-op	Peninsula Light Company
Bandon, City of	Forest Grove, City of	Plummer, City of
Benton County 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	Grays Harbor PUD	Puget Sound Energy
Blaine, City of	Harney Electric	Raft River Rural Electric
Bonnars 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, City of	Idaho County L & P	Rocky Mountain Power
Cascade Locks, City of	Idaho Falls Power	Rupert, City of
Central Electric	Idaho Power Company	Salem Electric Co-op
Central Lincoln PUD	Inland Power & Light	Salmon River Electric
Centralia, City of	Kittitas County PUD #1	Seattle City Light
Chelan County PUD	Klickitat County PUD #1	Skamania County PUD #1
Cheney, City of	Kootenai Electric Co-op	Snohomish County PUD
Chewelah, City of	Lakeview L & P (WA)	Soda Springs, City of
City of Port Angeles	Lane Electric	Southside Electric Lines
Clallam County PUD #1	Lewis County PUD #1	Springfield Utility Board
Clark Public Utilities	Lincoln Electric Co-op (MT)	Steilacoom, Town of
Clatskanie PUD	Lost River Electric	Sumas, Town of
Clearwater Power Co.	Lower Valley Energy	Surprise Valley Elec. Co-op
Columbia Basin Elec. Co-op	Mason County PUD #1	Tacoma Power
Columbia Power Co-op	Mason County PUD #3	Tanner Electric Co-op
Columbia REA	McCleary, City of	Tillamook PUD #1
Columbia River PUD	McMinnville, City of	Troy, City of
Consolidated Irrigation Dist. #19	Midstate Electric Co-op	Umatilla Electric Co-op
Consumers Power Inc.	Milton, Town of	Umpqua Indian Utility Co-op
Coos-Curry Electric	Milton-Freewater, City of	United Electric Co-op
Coulee Dam, City of	Minidoka, City of	U.S. Corps of Engineers
Cowlitz County PUD	Missoula Electric Co-op	U.S. Bureau of Reclamation
Declo, City of	Modern Electric Co-op	Vera Irrigation District
Douglas County PUD	Monmouth, City of	Vigilante Electric Co-op
Douglas Electric	Nespelem Valley Elec.Co-op	Wahkiakum County PUD #1
Drain, City of	Northern Lights Inc.	Wasco Electric Co-op
East End Mutual Electric	Northern Wasco Co. PUD	Weiser, City of
Eatonville, City of	NorthWestern Energy	Wells Rural Electric Co-op
Ellensburg, City of	Ohop Mutual Light Company	West Oregon Electric Co-op
Elmhurst Mutual P & L	Okanogan Co. Electric	Whatcom County PUD #1
Emerald County PUD	Okanogan County PUD #1	Yakama Power
Energy Northwest	Orcas Power & Light	
Eugene Water & Electric Bd	Oregon Trail Co-op	

Definitions

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 above contractually stipulated amounts are estimated by Bonneville Power Administration and in no way constitute endorsement or agreement by other utilities.

Capacity Factor

The ratio of the average load on a machine or equipment, for the period of time considered, to the capacity rating of the machine or equipment.

Coal Resources

This category of 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 gas-fired combustion turbine technology for producing electricity.

Columbia Storage Power Exchange (CSPE)

A non-profit corporation set up by a group of Northwest utilities to administer the purchase of Canada's rights to downstream power benefits defined by the Columbia River Treaty.

Conservation

Any reduction in electrical power consumption as a result of increases in the efficiency of energy use, production, or distribution.

Critical Period

That portion of the historical streamflow record during which recorded streamflows, combined with all available reservoir storage, produced the least amount of hydroelectric energy. For this report, the critical period is the 8-month period starting September 1936 and ending April 1937.

Demand-side Resources

Peak and energy savings from conservation measures, efficiencies, and load control programs that can be considered a resource in the sense that they serve increased demand without obtaining new supplies.

Direct Service Industries (DSI)

A group of industrial firms which purchase electric power directly from Bonneville Power Administration (BPA).

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

The same as conservation, any reduction in electrical power consumption as a result of increases in the efficiency of energy use, production, or distribution.

Exports

Firm interchange arrangements where power flows from regional utilities to utilities outside 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 hydroelectric projects owned by the city of Idaho Falls 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 Energy Load Carrying Capability (FELCC)

The amount of load the hydro system can serve on a firm basis, given a recurrence of critical period streamflows.

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.

Historical Streamflow Record

A database of unregulated streamflows for 70 years (July 1928 to June 1998). 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 reserve calculations.

Hydroregulation

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.

Independent Power Producers

Non-utility entities who own generation that may be partially contracted to meet regional load.

Interruptible Load

Loads that can be interrupted in the event of a power deficiency on the part of the supplying system.

Intra-Company Transfer

An interchange category that applies to utilities whose service territories extend beyond the regional boundary.

Nameplate Capacity

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

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).

Non-Utility Industry Loads

These are loads being served by the market rather than with firm contracts with a regional utility. These loads are not included in the regional load/resource balance.

Nuclear Resources

The 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 2009 is August 1, 2008 through July 31, 2009.

Other Publics (BPA)

Refers to the smaller, non-generating Public Utility Customers whose load requirements are estimated and served by Bonneville Power Administration.

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.

Private Utilities

Same as investor-owned utilities.

Renewables - Other Resources

A category of resources that includes projects that produce power from such fuel sources as solar, geothermal, and biomass (includes wood, municipal solid-waste facilities).

Requirements

For each year, a utility's projected loads, exports, and contracts out.

Reservoir Plant

A hydroelectric plant on a reservoir with storage capacity, installed machine capacity, head characteristics, and flow levels, which will permit seasonal drafts.

Resources Under Construction

These projects are under construction at the time of publication and are included in the resources for calculating the regional load/resource balance.

Restoration

Restoration is the obligation under terms of the Pacific Northwest Coordination Agreement of utilities, which gained generation from the addition of Canadian storage to restore those utilities, which lost generation.

Run of River Plant

A hydroelectric plant with limited storage capacity limiting the operation to daily or weekly shaping.

Surplus Firm Energy

The amount of FELCC in excess of the firm energy loads served by the power system.

Wind Resources

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