Northwest **Power** and **Conservation** Council

April 29, 2014

MEMORANDUM

TO: Power Committee

FROM: Charlie Black, Power Planning Division Director

SUBJECT: PNUCC Northwest Regional Forecast

On March 31, 2014, the Pacific Northwest Utilities Conference Committee released its 2014 Northwest Regional Forecast. The NRF is a compilation of the region's utilities' forecasts of electric power loads and resources for the 10-year period 2015 through 2024. PNUCC prepares the NRF on an annual basis.

Compared with prior years' reports, the 2014 NRF shows slower projections of growth in electricity loads. In part, this reflects the effects of energy efficiency achievements. Meanwhile, the NRF also states that utilities are seeing the need to add new resources to meet future peak loads and to provide additional flexibility to meet fluctuations in loads and balance variable generation.

Dick Adams, PNUCC Executive Director and Shauna McReynolds, PNUCC Deputy Director, will brief the Power Committee on the 2014 NRF at the meeting in Boise on May 6, 2014.

851 S.W. Sixth Avenue, Suite 1100
Portland, Oregon 97204-1348
www.nwcouncil.org

Steve Crow
Executive Director

503-222-5161
800-452-5161
Fax: 503-820-2370

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Contact: Shauna McReynolds
503-294-1264

Northwest Utilities Focus on Peak Need

Portland, Ore. —PNUCC's *2014 Northwest Regional Forecast* released this week, provides an on-the-ground view of the Pacific Northwest's electric power landscape. This collection of utility information on loads and resources frames our energy future picture. It is one of escalating complexity with increasing intermittent power supply, growing constraints on the hydropower system and the closure of Boardman coal plant in our planning horizon. Utilities are focusing more attention on how to ensure there's enough power for everyone during the highest energy use hours.

The majority of utilities experience their peak usage in winter with heavier heating and lighting loads and that is the case for the regional view. In fact, the report indicates a need for additional firm supply to meet winter peak demand. "This is about planning, not keeping the lights on today." Shauna McReynolds, PNUCC said. "Utilities rely on the power market to ensure they meet customers' needs in the near term when loads and generating resources perform differently than projected." In the longer term, utilities are looking at their forecasted loads, anticipated conservation savings, as well as expected power supply to establish future needs.

New to this year's report is the estimate of how energy efficiency programs are helping reduce peak hour need. In the next five years utilities are expecting their programs will dampen peaks by as much as 1,300 MW. "These load reductions are similar in magnitude as a good-sized hydro project on the Columbia River, without the flexibility to turn it on and off, however." McReynolds noted.

The bottom line is that the sum-of-utilities energy load forecasts add up to a modest annual growth rate of 0.9 percent for the 10 year report timeframe. This is much slower expected growth in load than what planners were anticipating a decade ago. Conservation is contributing to this trend and utilities are attentive to other factors playing into this change.

In addition, utilities are piloting and implementing new demand-side initiatives, shaving load in peak periods by engaging customers in programs to reduce load. This year's report shows utilities have the ability to reduce load during peak hours by as much 90 MW in the winter for a short time and almost 600 MW during the summer.

Looking at the power supply, the Columbia Basin hydropower remains the backbone and pride of the Northwest's low carbon electric power system for meeting customers' demands. We've seen a huge influx of wind power (5,000 MW for Northwest utilities' use alone) and more than that of natural gas-fired generation in the last decade. Looking ahead the region is on a familiar path – more conservation, wind and natural gas-fired generation to meet future needs.

Read the full report at www.pnucc.org/system-planning/northwest-regional-forecast.

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2014 Northwest Regional Forecast
Executive Summary

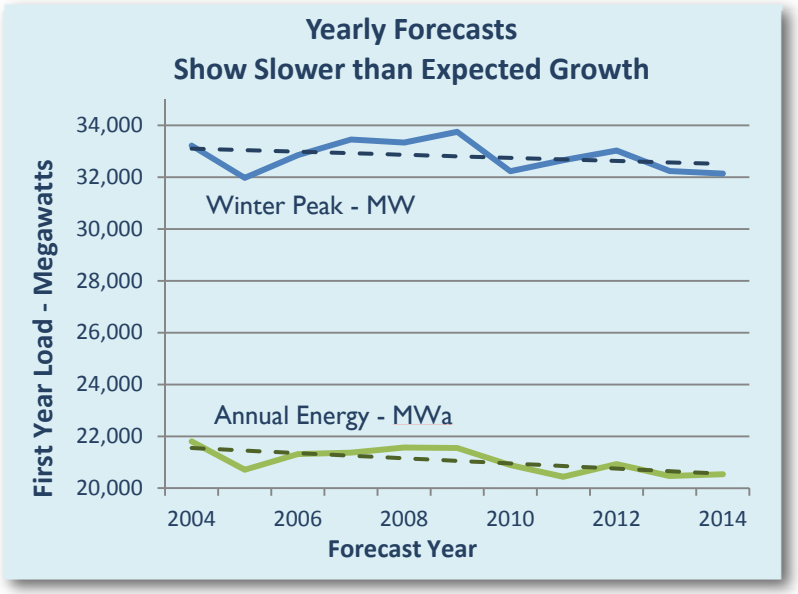
The *Northwest Regional Forecast (Forecast)* through 2024 is a compilation of all regional entities' load forecasts and the plans to meet them. It is PNUCC's annual snapshot that shows where things are trending and how they stack up against past projections. Every utility has unique circumstances, and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

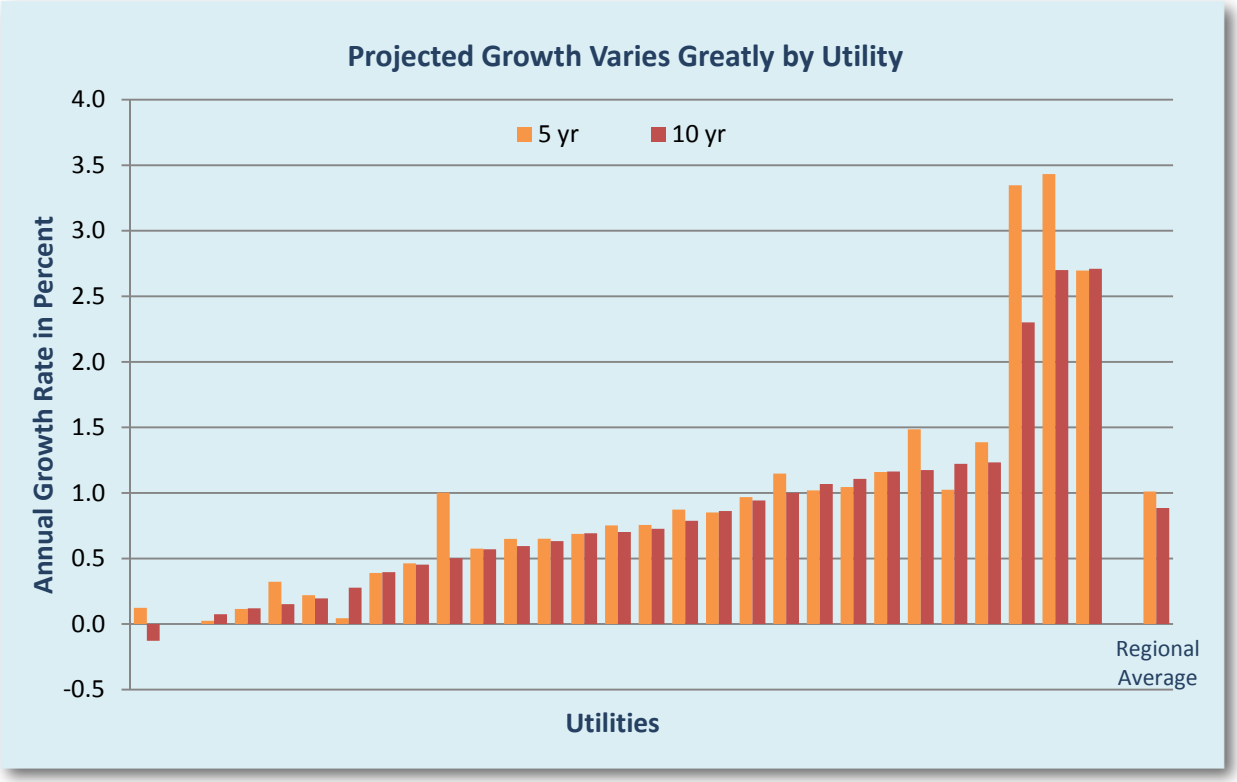
The overall change in the first year of our forecasts is not easily explained. There are several likely reasons, including the economy. In addition, the region's aggressive conservation efforts are purposely dampening loads. Utilities are considering new technological advancements in and consumer use 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.

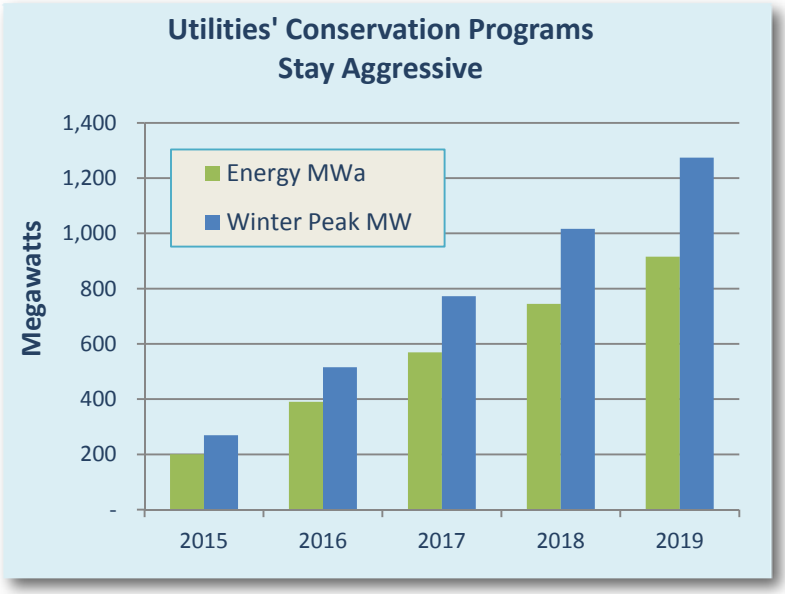
Looking ahead, loads are forecast to grow, but at a more modest pace. Some utilities are expecting more notable growth, and for the most part experiencing an uptick in their industrial loads. For example, the addition of a data center in the service territory of a moderate-sized utility accounts for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



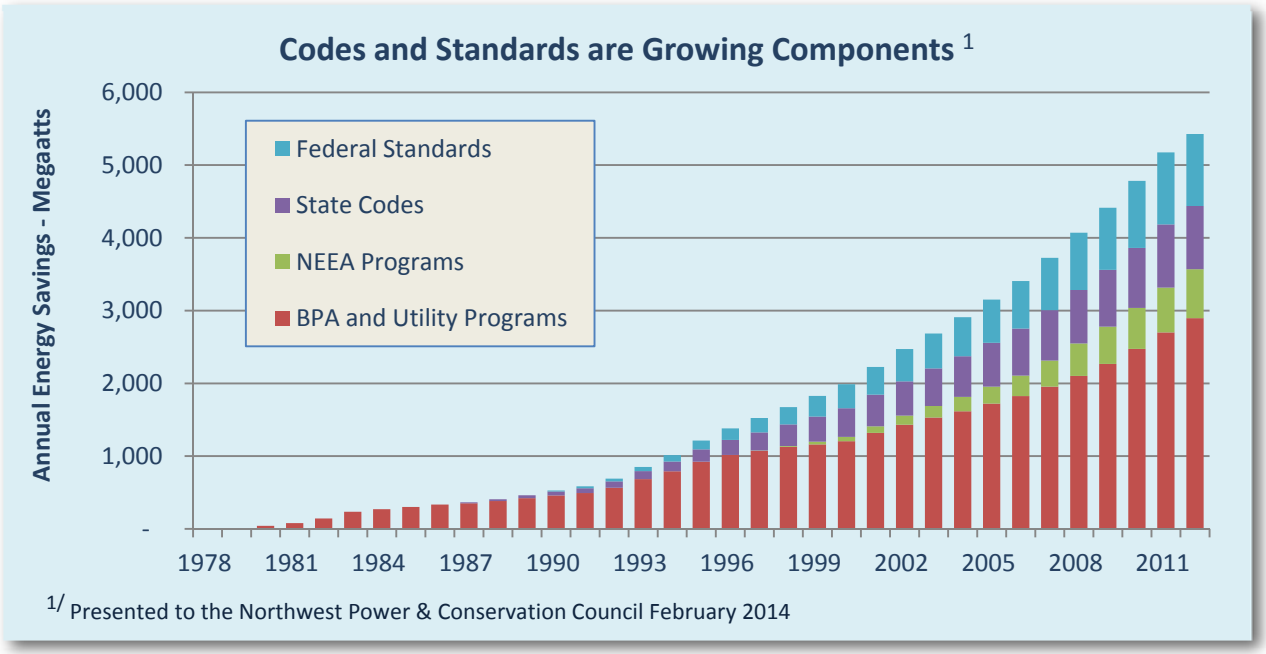
Conservation Savings Stack Up

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.

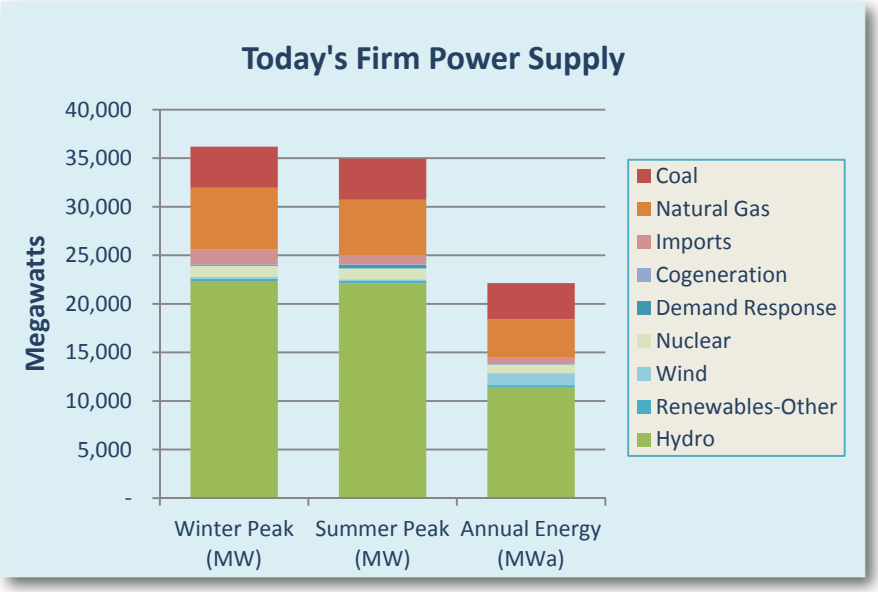


Utilities are continuing to investigate how and whether different energy efficiency programs help reduce peak loads. Utility forecasts for summer and winter peak loads have moderated in recent years, but they still indicate a need for additional peaking resources in the future.

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.[1] 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[2] – 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 8th percentile lowest water condition for the Columbia River hydrosystem to estimate the peak hydro power available. Average

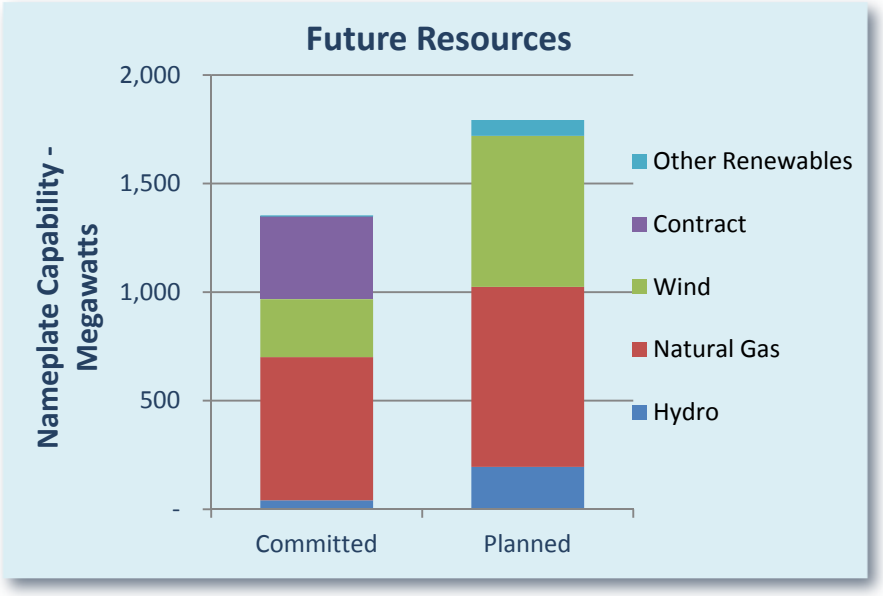
[1] Presentation to NW Power & Conservation Council Power Committee February 11, 2014
[2] Forced outages, unanticipated load growth, load variation due to temperatures, and operating reserves

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.