PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY

INTEGRATED RESOURCE PLAN PROGRESS REPORT 2010

2010 Integrated Resource Plan Progress Report

August 2010

PUD No. 1 of Chelan County
327 N. Wenatchee Avenue
P.O. Box 1231
Wenatchee, WA 98807-1231
www.chelanpud.org/IRP.html
(509) 663-8121

Table of Contents

List of Charts

List of Figures

List of Tables

2010 Progress Report

Summary of Determinations

The District has completed an update to its 2008 Integrated Resource Plan (IRP). This update or "progress report" is required by the Revised Code of Washington (RCW) 19.280: Electric Utility Resource Plans passed by the legislature in 2006. According to the statute, "it is the intent of the legislature to encourage the development of new safe, clean and reliable energy resources to meet demand in Washington for affordable and reliable electricity. To achieve this end, the legislature finds it essential that electric utilities in Washington develop comprehensive resource plans that explain the mix of generation and demand-side resources they plan to use to meet their customers' electricity needs in both the short-term and the long-term." The enacted legislation requires investor-owned and consumer-owned utilities with more than 25,000 retail customers to produce a progress report every two years and a fully updated 10-year plan every four years. Consumer-owned utilities shall encourage participation of their consumers in development of their IRPs and progress reports after providing public notice and hearing.

Based upon the updated analysis over the 2010-2020 planning period, the Board of Commissioners of Chelan County Public Utility District (Chelan PUD or District) has approved this 2010 progress report. Chelan PUD is committed to continuing the determinations made in 2008 that it would

- Retain its current mix of generating resources

And additionally:

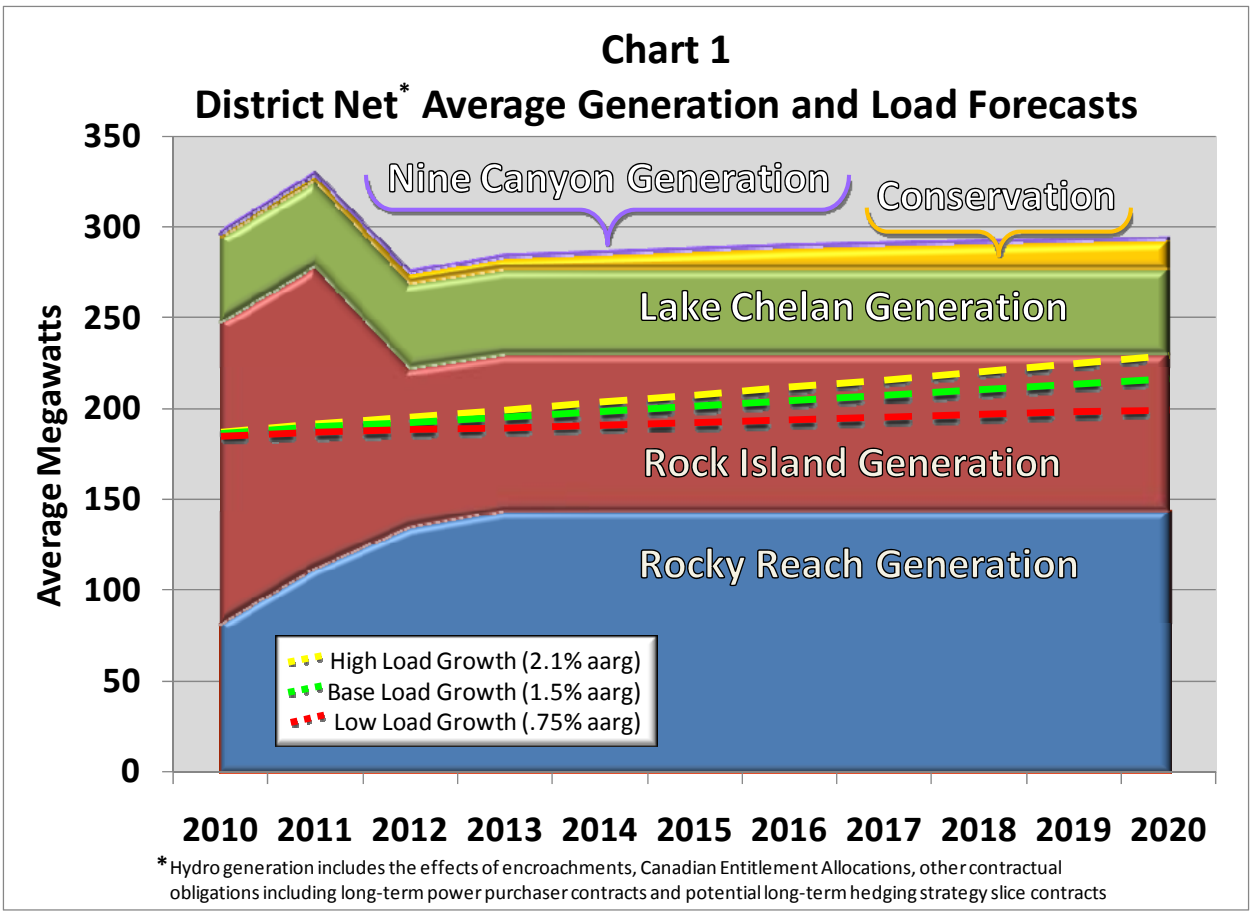
- Continue to refine its conservation assumptions and analysis in conjunction with a new conservation potential assessment (CPA) for the next biennium reporting in 2012 for compliance with the Washington State renewable portfolio standard (RPS)
- Carry on the evaluation and implementation of strategies for additional power sales contracts consistent with financial policies and the hedging strategy

These determinations continue to provide the platform for the District to serve its customer/owners with reliable, low-cost, renewable energy resources for the foreseeable future. Chart 1 represents the District's mix of generating resources in relation to the updated low, base and high load growth forecasts. The resources are not shown in any particular order and do not represent the order in which resources are used to serve load.

Progress Report Overview

To meet the requirements of RCW 19.280, the development of Chelan PUD's 2010 progress report includes the following:

- An update of the long-term forecasts of retail electric customer demand
- New long-term forecasts of market prices for wholesale power
- Revised costs and operational information for Chelan PUD's existing generating resources
- Updated data in regards to the District's existing operational and power sales contracts
- Amended conservation inputs to align with Chelan PUD's January 2010 10-year conservation plan submittal to the Washington State Department of Commerce (Commerce) as required
- Refreshed data on long-term interest rates and other financial assumptions
- A reaffirmation of Chelan PUD's resource adequacy measures
- Replicated scenario modeling runs from the 2008 IRP (with the District's existing portfolio of resources) with the aforementioned input changes, evaluating results against the key criteria of cost, risk,



reliability and environmental impacts and communicating with customers and the public

- The addition of one new scenario modeling run incorporating the effects of potential plug-in hybrid electric vehicle (PHEV) load

The District's 2008 IRP provides further discussion on certain topics in this progress report and may be used as a reference.

Planning & Regulatory Environment

Resource Planning Situation

Chelan PUD's resource planning situation remains quite different than that of most utilities. Most utilities need to develop or acquire new electric resources to deal with: 1) forecasted growth in customer loads, 2) declining future output from the utility's existing generating resources and 3) mandates for development of renewable resources and conservation. The District's generation resources will actually increase during the current planning period (2010-2020) due to the expiration of long-term hydroelectric power purchaser contracts, and the District is forecasted to be surplus to its own retail load needs throughout this period.

The Washington State RPS (Energy Independence Act of 2006) requires utilities to serve a certain percentage of their retail load with renewable resources and acquire all cost-effective conservation. While the RPS has implications for the District's future resource mix (discussed in further detail below), it also magnifies the impact and importance of uncertainties regarding wholesale power supply markets and prices. This legislation has the net effect of increasing the amount of power available for sale in the wholesale power markets, which may have a significant impact on hydropower generators like Chelan PUD.

National Climate and Energy Legislation

The term "climate change" refers to any significant change in measures of climate, such as temperature, which lasts for decades or longer. Climate change may result from natural causes or human activities. The extent and cause of climate change is a topic of great debate and controversy. The National Academy of Sciences, the Inter-Governmental Panel on Climate Change and the Unites States' Climate Change Science Program have concluded that human activities, such as greenhouse gas (GHG) production, are the likely cause of climate change during the last several decades.

Federal action on climate change has been highly anticipated for the last several years. Congress has not acted yet and is dealing with competing climate proposals. In September 2009, the Environmental Protection Agency (EPA), using existing authority under the Clean Air Act, published an endangerment finding, required annual reporting and proposed regulations for regulating GHG emissions from vehicles and stationary sources. Regulations and a time table for implementation are still in progress. Several legal challenges to the EPA's endangerment finding have been filed in court, and there is congressional opposition to this GHG regulation, with some members of Congress seeking a two-year deferral of EPA regulation.

In June 2009, the House passed a bill known as the American Clean Energy and Security Act (ACES/HR 2454). ACES would require utilities to obtain 20% of their electricity from renewable sources by 2020. Up to 5% can come from conservation and energy efficiency. Importantly, this proposed federal renewable electricity standard (RES) would exempt existing hydropower from a retail electric supplier's base amount of electric energy upon which the RES is measured. In addition, certain hydropower also qualifies to meet the RES. Qualifying renewable resources are wind, solar, geothermal, biomass, marine and hydrokinetic energy, biogas and biofuels derived exclusively from eligible biomass, landfill gas, wastewater-treatment gas, coal-mine methane, certain hydropower built after January 1, 1988 (including incremental from efficiency improvements and capacity additions) and some waste-to-energy projects. ACES would also create a national cap and trade program – 17% reduction in emissions by 2020 and 83% reduction by 2050 from 2005 levels. The bill has not passed the Senate.

The Senate has several pending climate and energy bills, and Senate leadership and the Obama Administration are urging passage of a comprehensive bill this year. The American Clean Energy Leadership Act (S 1462), passed by the Senate Energy and Natural Resources Committee in June 2009, resembles the energy provisions of the ACES but does not contain the cap and trade provisions. Like ACES, the bill would impose a federal RES (15% by 2021), provide funding incentives for deployment of clean energy technologies, establish energy efficiency programs and promote smart grid technologies. In addition, it would further provide more support for nuclear power and provisions for oil and gas development. As in the House bill, Senate bill 1462 would also exempt existing hydropower from a retail electric supplier's base amount of electric energy upon which the RES is measured. Qualifying renewable resources are essentially the same as the ACES, including hydropower built after January 1, 1992 (including incremental hydropower from efficiency improvements and capacity additions).

The Clean Energy Jobs and American Power Act (CEJAPA/S 1733) was passed by the Senate Environment and Public Works Committee in November 2009. CEJAPA promotes clean energy and energy efficiency technologies with a firm cap on GHG emissions by targeting a reduction of 20% by 2020 and 80% by 2050 from 2005 levels.

Another Senate bill, known as the American Power Act (APA), is expected to be on the Senate floor sometime in the summer of 2010 as of the time of this writing. This bill was released by John Kerry (D-Mass.) and Joseph Lieberman (I-Conn.) in May 2010. It would establish a system of tradable allowances to limit GHG emissions from capped resources at 4.75% below 2005 levels in 2013, 17% by 2020 and 83% by 2050. Caps would be phased in, starting in 2013 with fossil fuel-fired power plants and expanding in 2016 to gas distribution utilities and industry sources emitting at least 25,000 metric tons of carbon dioxide (CO2) annually. The bill would auction 25% of allowances during the first three

years of a cap with revenues earmarked for a variety of purposes, including low-income electric bill relief and debt reduction. By 2035, 100% of allowances would be auctioned. During the first three years of a cap, 75% of allowances would be given away, including 51% to the electric sector (with a majority of those allowances going to local electric distribution companies). Free allowances for these companies would phase out completely by 2030. To protect consumers from higher energy prices, the Senate bill requires the value of free allowances to be earmarked solely to benefit retail ratepayers, through rebates or other means. This bill would allocate 75% of allowances based on CO2 emissions and 25% based on kilowatt-hour sales. In contrast, the ACES bill employs a 50-50 formula for allowance allocation to local distribution companies. The APA 75-25 formula is less favorable for utilities that have cleaner generation such as hydro, gas and nuclear power. The bill would pre-empt state and EPA GHG emissions limits, as long as its emissions reduction targets are met. It would also pre-empt state cap and trade programs.

Recently, the Carbon Limits and Energy for America's Renewal Act (S 2877), a proposal by Maria Cantwell (D-Wash.) and co-author Susan Collins (R-Maine) has received significant attention by Congressional leaders. This "cap-and-dividend" climate legislation would mandate a reduction in CO2 emissions to 9% below 2005 levels by 2020 and to 83% below 2005 levels by 2050. The bill would require producers and importers of fossil fuels to buy emissions permits. 75% of permit sales proceeds would be sent to taxpayers via dividend checks, with the remainder funding emissions reduction programs and industry assistance.

Most recently, Richard Lugar (R-Ind.) and Lindsey Graham (R-S.C.) introduced legislation that would not specifically cap GHG emissions. They estimate, however, that the bill would reduce GHG emissions 20% by 2030. The bill would direct the Department of Energy (DOE) to strengthen model building codes every three years, starting with a 30% improvement by 2012, followed by a 50% improvement by 2015 for residential buildings and by 2017 for commercial square footage. The bill would also set a "diverse energy standard" requiring utilities to include a steadily increasing percentage of resources that emit 80% fewer GHG than "average emissions of freely emitting sources." The target would start at 15% by 2015 and move to 50% by 2050. Renewables, nuclear power and carbon-sequestered coal would qualify under the diversity standard.

It is unknown whether sufficient support exists in the Senate to pass economy-wide, cap-and-trade legislation. One option being discussed is whether a "utility-only" bill targeting GHG reductions in the electric sector would achieve enough consensus to pass.

Of particular interest to Chelan PUD is the increasing support in Congress and with the Obama Administration for hydropower. Senators Lisa Murkowski (R-AK), Patty Murray (D-WA) and Maria Cantwell (D-WA) have announced they will introduce the Hydropower Improvement Act of 2010. The bill would support hydropower development by authorizing: competitive grants; research, development, demonstration and deployment programs; an inquiry into the federal licensing process for minimal impact projects; streamlined federal review of conduit hydropower projects; studies on pumped storage and non-federal hydropower development at Bureau of Reclamation projects and a worker training program.

In addition, the hydropower industry has been seeking an extension of the production tax credit for incremental hydropower, along with comparable incentives for hydropower developed by public power utilities.

Whether the Hydropower Improvement Act of 2010 or financial incentives for hydropower would be included in a comprehensive energy and climate bill is still unclear. In the meantime, hydropower projects throughout the nation have benefitted from increased appropriations ($40 million in 2009 and $50 million in 2010) for hydropower research and development through the DOE's Water Power Programs.

Regulatory & Statutory Requirements

In addition to the integrated resource planning requirements of RCW 19.280, the District is directly affected by other regulatory and legislative actions that relate to resource planning. Some of those

actions are stated below and persist as focal points for Chelan PUD and the region. These requirements were specifically evaluated in the preparation and adoption of this progress report.

Renewable Portfolio Standard (RPS)

As discussed in the 2008 IRP, RCW 19.285, The Energy Independence Act, requires utilities with a retail load of more than 25,000 customers to use eligible renewable resources (excluding most existing hydroelectric power) or acquire equivalent renewable energy credits (REC), or a combination of both, to meet 3% of retail load by January 1, 2012, 9% by January 1, 2016 and 15% by January 1, 2020. Under the law, the District can count recent efficiency gains (i.e., those made after March 31, 1999) at its existing hydropower projects toward meeting the RPS. Additionally, the District's entire share of the Nine Canyon Wind Project qualifies as an eligible renewable resource for meeting the requirement of the RPS. The law also required that by January 1, 2010, utilities evaluate conservation resources, submit their initial 10-year conservation plans and begin pursuing all conservation that is cost-effective, reliable and feasible. This 2010 progress report includes updates to the evaluations of both the renewable and conservation portions of the RPS which are discussed further below.

Hydroelectric Licensing

Since publication of the 2008 IRP, a new 43-year Federal Energy Regulatory Commission (FERC) license to continue to operate the Rocky Reach Project was received in 2009. The license outlines approximately $425 million in costs to the District over the 43 years, including continuation of the habitat conservation plan (HCP) for salmon and steelhead, maintaining existing parks on the Rocky Reach reservoir, providing renovation of Entiat Park and enhancements to Lincoln Rock and Daroga State Park. All the District's hydroelectric projects are subject to licensing by the FERC. Licenses contain the conditions under which the licensee must comply. Numerous federal and state environmental laws and regulations, most notably the Endangered Species Act and the Clean Water Act, affect the mandatory conditions in the license. In 2006, FERC issued a new 50-year license for the Lake Chelan Project. The new license contains requirements for operating the hydro project that are expected to cost Chelan PUD $65 million to $70 million over the 50 years. The license for the Rock Island Project expires in 2028. The anticipated costs and expected operational impacts in the new licenses are continually monitored and were revised for the resource portfolio modeling for the progress report.

Resource Adequacy

Pacific Northwest Resource Adequacy Forum

As discussed in the 2008 IRP, in April, 2008 the Northwest Power and Conservation Council (NWPCC or the Council) adopted a voluntary resource adequacy standard for the Northwest (Council document 2008-07) which was developed by the Pacific Northwest Resource Adequacy Forum (Forum). Although this is currently a voluntary standard, such standards may become mandatory in the future.

The standard is intended to be an early warning for the region should resource development fall dangerously short, in a physical sense rather than an economic sense. It is not intended to be a resource planning target. The standard includes both energy and capacity metrics and targets. The regional standards feature a minimum threshold for energy of a zero average annual load/resource balance. The minimum capacity threshold is for a 23% planning reserve margin in the winter and a 24% planning reserve margin in the summer (based on consideration of the highest average demand for a three-day 18-hour sustained peak period).

The most recent regional assessment, published in the Council's Sixth Power Plan (February 2010), states that over the next five-year period, the region's existing resources (and those under construction), in aggregate, exceed the standard's minimum threshold for annual energy needs and for winter hourly needs. However, existing resources appear to just barely fall short of meeting the summer hourly adequacy requirement by 2015, which places the region in a yellow-alert status. Under the implementation plan agreed to by Forum members, a yellow alert status calls for an adequacy report to be released and for the

Forum to convene to discuss appropriate actions to take. The Forum has met and decided that since the summer capacity shortfall is minimal and because regional utilities are already in a resource acquisition mode, no additional resource actions should be recommended. However, the Forum did recommend that all load and resource data be reevaluated and that the methodology used to define the adequacy standard be peer reviewed. These actions are currently underway.

Reliability Standards

This regional resource adequacy endeavor is directly linked to broader efforts to ensure an adequate power supply. The North American Electric Reliability Corporation, in its capacity as the Electric Reliability Organization, under the purview of the FERC as mandated by the Energy Policy Act of 2005, was expected to pick up its previously delayed work on the development of a resource adequacy assessment standard in 2009. The assessment standard is expected to require the Western Electricity Coordinating Council (WECC) to develop an adequacy assessment framework, but the standard development has since slipped. The WECC has spent the past several years developing a framework for the West's power supply, which is currently in place. The WECC's framework is not intended to override any state or regional assessments, including regional adequacy measures or their thresholds. In fact, the WECC has solicited help from regional entities to aid in its assessment of West-wide resource adequacy. The Council and the Forum will continue to participate in the WECC's efforts.

The District analyzed its resource adequacy in the preparation and adoption of this 2010 progress report.

Load Forecast

The three different load forecasts, low, base and high, from the District's 2008 IRP were reevaluated for the latest uncertainty about future power consumption for Chelan PUD's retail load. An updated 11-year forecast for this progress report's 2010-2020 planning period resulted. Demographic trends and economic conditions are still the primary drivers used to arrive at the forecasted retail electricity sales by sector. In addition, the resulting forecasts are an integration of economic evaluations and inputs from the District's own customer service planning areas. In particular, the District is watching trends in end uses of the residential sector driven by recent substantial increases in home electronics. The NWPCC has labeled this new category of home electronics as the ICE category which stands for information, communication and entertainment. It includes all portable devices that must be charged, such as laptop computers and cell phones, as well as larger, more energy-intensive televisions and gaming devices.

The growth percentages from the sum of the sector energy sales forecasts, with system losses added, were applied to the 2009 weather-normalized load to arrive at total projected megawatt-hours through the planning period. **The low, base and high average annual composite retail energy sales forecast growth rates, including system losses** (changed to 2.2% from 2.5% used in 2008)**, otherwise known as the forecasted annual energy load growth rates, are .75%, 1.5% and 2.1%, respectively.** These percentages are decreased from those in the 2008 IRP and are trending closer to historical growth rates experienced by the District. The weather-normalized average annual rate of growth (aarg) at the District was approximately 1.0% for the 10-year period from 1999-2009 and approximately 1.3% for the 19-year period from 1990-2009. These historical growth averages have decreased slightly from those presented in the 2008 IRP due to very low load growth in 2008 and 2009. The three forecasts for 2010-2020 as well as the actual weather-normalized total District energy load for 2000-2009 are presented in Chart 2. The NWPCC's Sixth Power Plan region-wide low, medium and high energy forecasts for the same time period (2010-2020) are .8%, 1.2% and 1.5%, respectively.

Sector Energy Sales

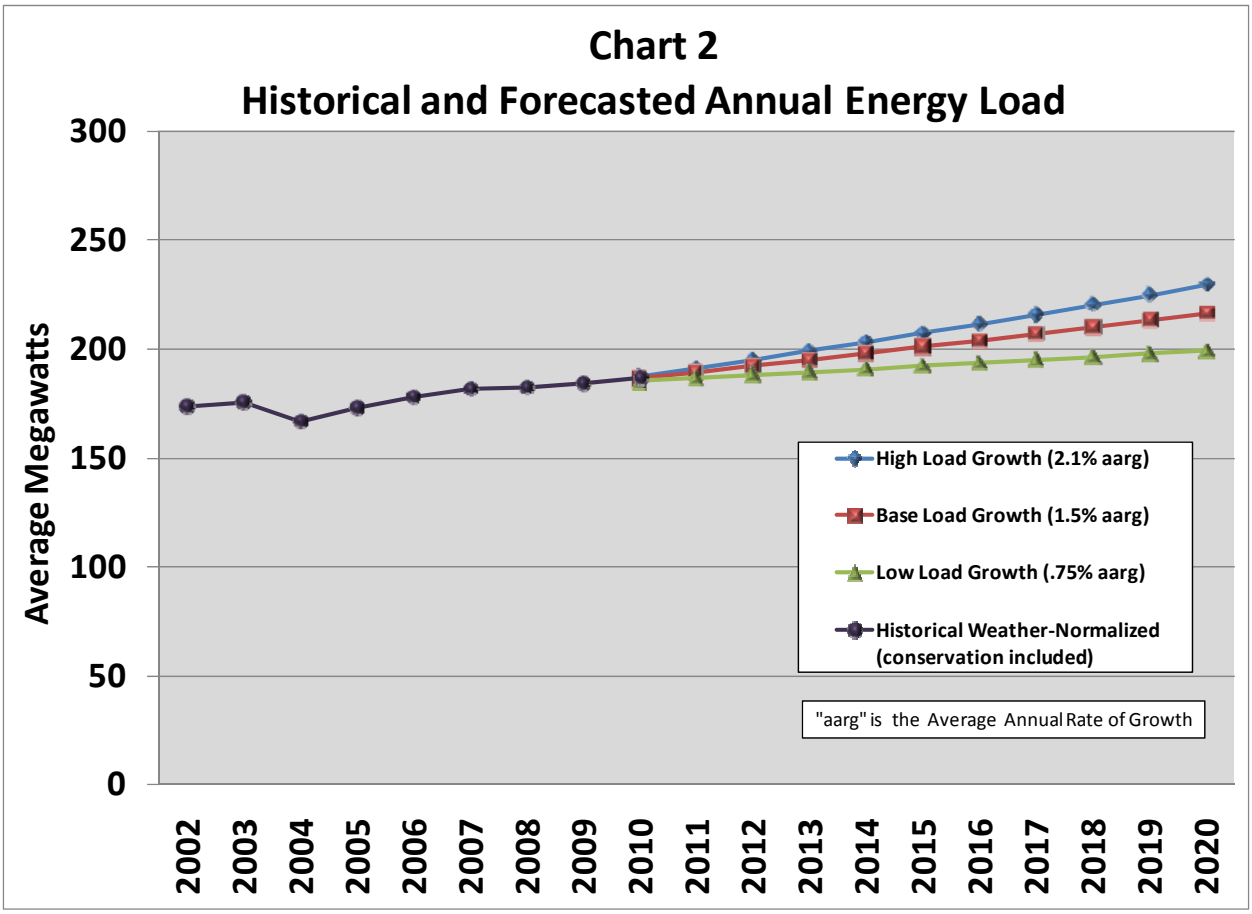
Demographic and economic data used for the load forecast from the 2008 IRP was revisited and updated to the extent possible. Although the Washington State Office of Financial Management (OFM) has not released any new Chelan County population projections since 2007, the average annual rates of

growth from those projections (low, base, high) were retained and applied to the OFM actual population estimate for Chelan County for 2009 to arrive at updated population estimates. Additional actual Chelan County population data from the OFM (through 2009) was used to update the various sector regression analyses. Recent actual sales revenue data was obtained from the Washington State Department of Revenue for the same purpose. The same internally generated Chelan County sales revenue growth projections were retained.

The 2008 IRP noted that the District was in the process of negotiating with the City of Cashmere to purchase their electrical distribution system. The District did purchase Cashmere's system, effective November 1, 2008. These energy sales are now part of the residential, commercial, industrial and "other" sectors for the entire county, and the projections for those sectors have integrated the former Cashmere load.

Residential load continues to be projected based upon population. Per capita income was again studied with statistically significant results, but an additional two years of data was available for population that was not available for income, so only population was used. The forecast low, base and high average annual growth rates for the residential sector have decreased with the recent slowing of population growth and building.

The commercial sales forecast continues to be a function of population and total sales revenues for Chelan County. The low, base and high average annual growth rate projections for the commercial sector have also decreased with the recent slowing of population growth and building as well as recent slowing of sales revenue growth.



The industrial sector remains the most challenging segment to forecast. Industrial loads can be very large and can come and go very quickly depending upon the industry, the local economy and much broader regional, national and global economic conditions. Industrial sales were again manually estimated based upon ranges of use per customer amounts and ranges of customer counts with some larger load additions. The District still has few actual known changes coming to the sector. Also, this forecast still assumes no changes to the District's rate structure for industrial customers. The low, base and high average annual growth rates for the industrial sector have decreased only the slightest amount since the 2008 IRP and still represent a broad range of growth rates due to increased uncertainty in relationship to the other sectors. Industrial sales are still estimated to increase slightly as a percentage of the District's total load through the planning period as commercial sales and those falling into the "other" sector decrease slightly.

The aggregate of "other" energy sales (street lights, interdepartmental use, frost protection and irrigation) growth projections remains at 0% for all three load cases. This sector was again manually projected based on ranges of use per customer and ranges of customer counts after looking at the subcomponents of this sector.

For additional details regarding seasonal, monthly and hourly load variability, including volatility due to temperature fluctuations, see the 2008 IRP. The methodologies for modeling these characteristics did not change; however, the monthly weather-normalized 2009 load (rather than 2007) was used to allocate each year's annual load forecast to each month as well as to develop the percentage deviations around expected, or weather-normalized load due to temperature uncertainty.

Expected future conservation measures have not been included in the District's load forecast. Future cost-effective conservation is considered as a resource for integrated resource planning purposes, so it can be evaluated on the same basis as other resources.

Peak Load Forecast

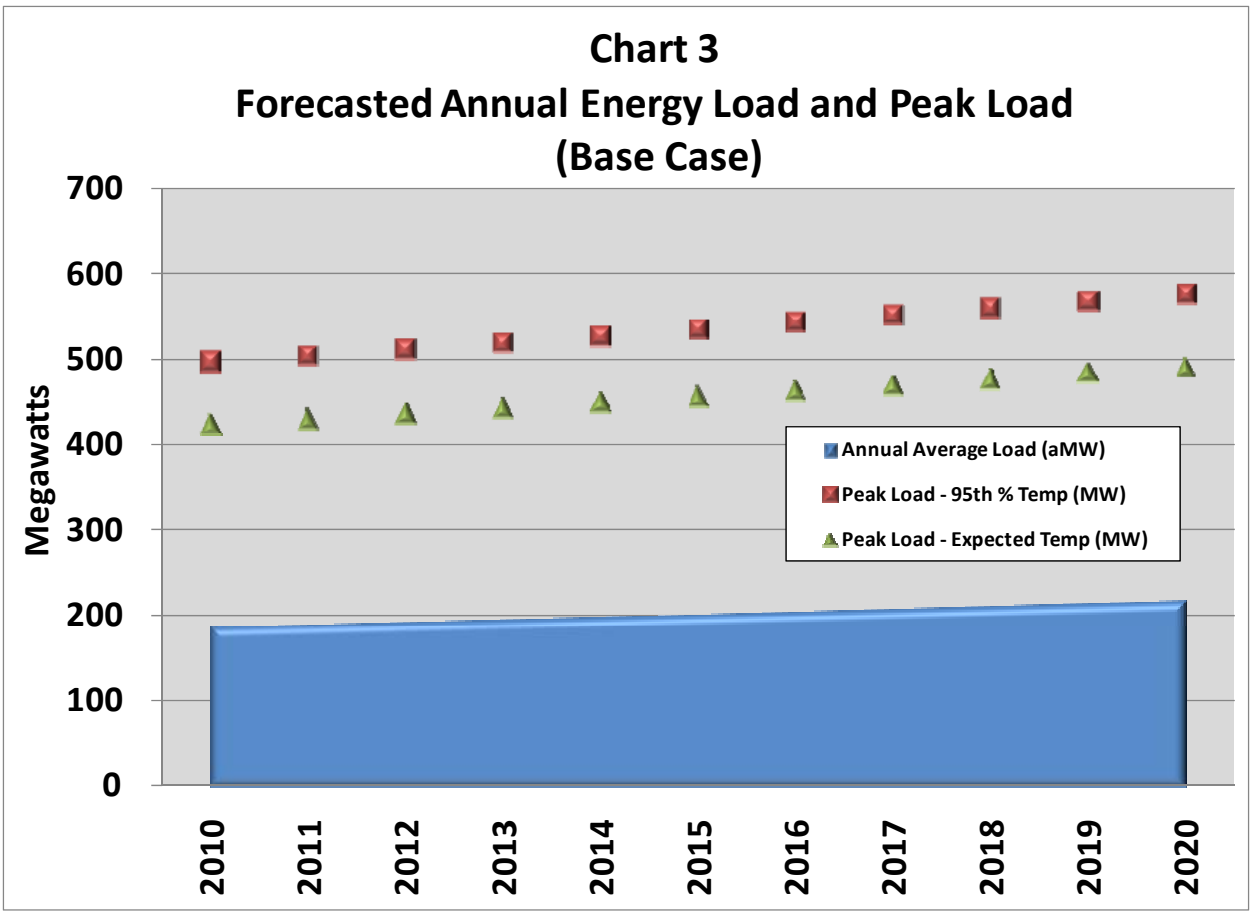
The peak load forecast has been updated to ensure the District has enough resources to meet peak demand, or the maximum load on the system in any hourly period. The District's peak retail load occurs in the winter, and contrary to historical trends, the latest all time retail load peak occurred in December rather than January. The new peak of 442 MW was established on December 20, 2008. The temperature at the time was approximately -5 degrees Fahrenheit. This was a Saturday morning, and almost certainly, the peak would have been higher at this same temperature on a weekday.

Monthly regression equations with temperature at time of peak as the independent variable were updated as necessary to arrive at a load factor, that when applied to the monthly energy forecast, is used to project the peak load at a given temperature. This methodology assumes that the relationship between energy load and peak load will remain constant over the forecasting period. Chart 3 illustrates both the base case annual energy load forecast with the base case peak load forecast at both an average, or expected, peak temperature and at a 95^{th} percentile extreme peak temperature for 2010-2020.

Plug-In Hybrid Electric Vehicles (PHEVs)

As listed in the short-term plan in the 2008 IRP, Chelan PUD planned to evaluate the potential effects that PHEVs and/or all-electric vehicles may have on the District's future retail load. The District has performed some initial analysis and has created a new load/resource portfolio scenario for this progress report that includes the addition of the middle case, or base, projections for this potential new load.

As a result of efforts by the Port of Chelan County and their Advanced Vehicle Innovations program, Chelan County already has four PHEV passenger vehicles and one PHEV school bus in the city of Chelan.



Link Transit is also in the process of purchasing five all-electric buses for local public transportation routes. Because of Chelan PUD's low electric rates from a clean source, Chelan County has the potential to end up having more electric vehicles per capita than most areas of the United States.

Most of the major automakers plan to introduce new mass-market PHEVs or all-electric vehicles over the next several years. PHEVs have a battery and a gas engine. The Chevy Volt (PHEV) and the Nissan Leaf (all-electric) are scheduled to come to the U.S. market in 2010. Traditional hybrids currently on the road (available in the U.S. since 2000) make use of an electric engine along with a gas engine. The electric engine creates fuel economy by kicking into use during idling, backing up, slow traffic and to maintain speed after the gas engine has been employed for acceleration. These cars do not need to be plugged in because the on-board electric battery is constantly being charged by the gas engine and by the motion of the wheels and the brakes. PHEVs take this technology a step further. By adding the ability to charge from a standard household outlet, typically overnight, such cars relegate the gas engine to back-up status and instead let the electric motor do most of the work. If a trip isn't long, the electric motor can be relied on entirely. PHEVs can be twice as fuel efficient as traditional hybrids.

Additionally, PHEV proponents say that powering PHEVs with electricity results in far less pollution (from power plants providing the electricity) than an equivalent gas-powered vehicle releases in tailpipe emissions. Because Chelan County and the Pacific Northwest rely heavily on hydropower, which does not generate carbon emissions, the overall carbon footprint of electric vehicles in Chelan County and the region is much lower than other areas of the country. Because the District is expected to be able to serve its retail load, including PHEV load, throughout the planning period without any new resource additions (including those that would produce emissions), the introduction of PHEVs in

Chelan County should serve to reduce vehicle emissions in the county. According to the Council's Sixth Power Plan, emissions from generating plants in the entire region are expected to increase slightly by 2030 due to PHEV loads in the region. However, the increase in carbon emissions from power plants is more than offset by the decrease in emissions from vehicles.

The District relied on the Council's Sixth Power Plan for several assumptions used in the computation of the potential new electric vehicle load. Because the Council's analysis focused on PHEVs, Chelan PUD followed suit. Three PHEV load forecasts were developed. The forecasts are based on three growth rates for new light vehicles, a portion of which is assumed to be PHEVs. The Council's forecast of new vehicles was provided by Global Insight's October 2008 regional forecast. Three growth rates in market share for PHEVs were estimated by the Council and will depend on consumer consideration of PHEV purchase price and reliability, available incentives, cost of gasoline and the price of alternative vehicles. These market share, or penetration rates, are very low for the first five years as it is assumed that market share will be slow to start as with most new technologies. The lowest case starts with a .2% market share in 2010 and the highest case includes a 27% rate in 2020. The District took the Council's estimated regional counts of PHEVs and calculated a number for Chelan County based on the county's pro rata share of total vehicles in the region.

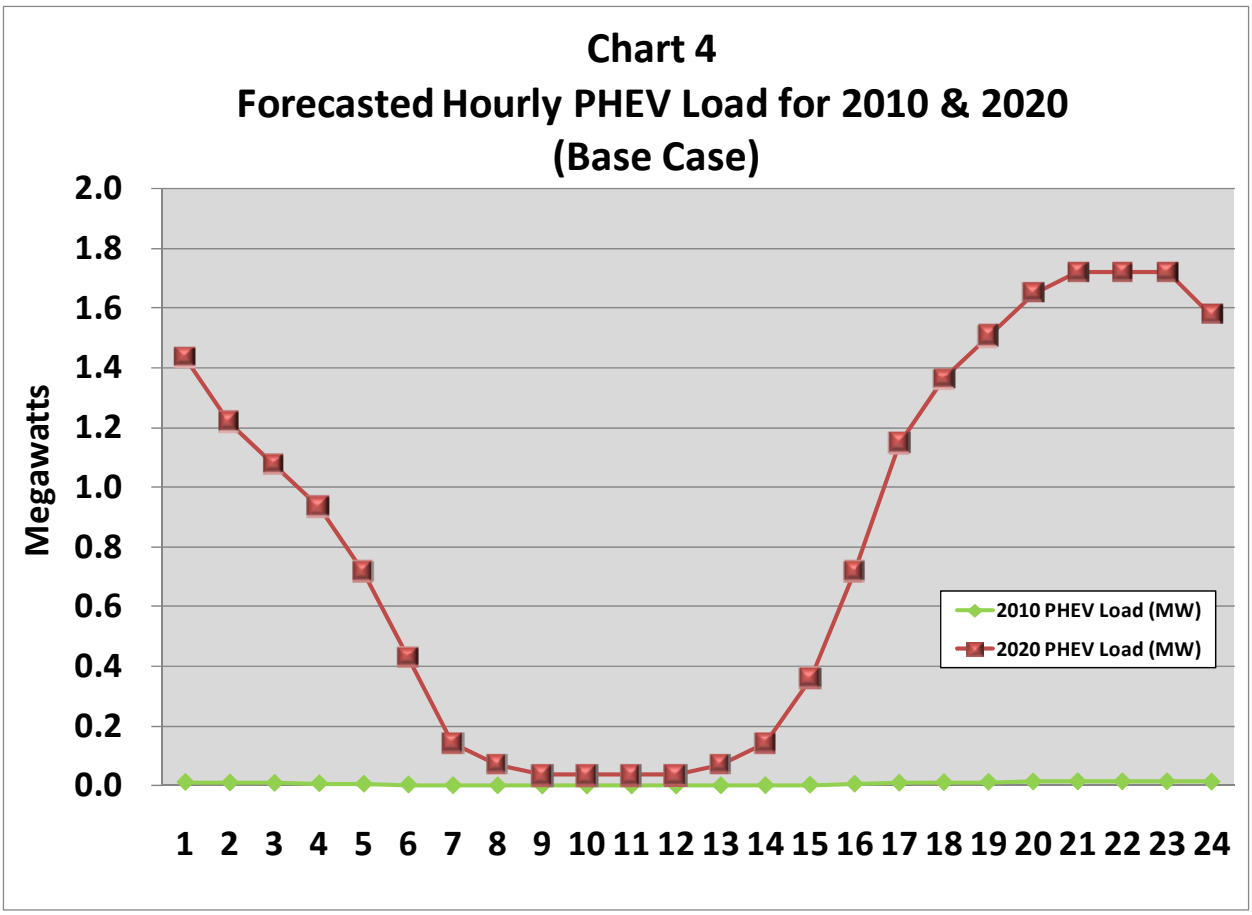
The District further utilized the following assumptions from the Sixth Power Plan. PHEVs were assumed to have an initial average energy requirement of .3 kWh per mile. This was based on a "composite vehicle" made up of a compact sedan, a midsize sedan and a midsize SUV that ranged from .26 to .46 kWh per mile. For this composite vehicle, a 10 kW lithium-ion battery is assumed to power the vehicle. It was also assumed that the energy efficiency of the vehicle would improve by 5% each year. These vehicles are assumed to travel 33 miles per day, the current average.

Based on these inputs, Chelan PUD estimates that by the end of the planning period in 2020, Chelan County could have between approximately 900 and 4,500 PHEVs (net of vehicle retirements) out of approximately 35,000 to 38,000 total new vehicles. Some of these vehicles would replace existing vehicles and some would meet new transportation requirements of a growing population. Chelan County currently has approximately 63,000 registered vehicles. This translates into an additional electric load of between 0.25 and 1.27 aMW by 2020.

A major part of analyzing PHEV load centers around the assumptions made with regard to the timing of recharging of the PHEV batteries. A January 2010 study by Pacific Northwest National Laboratory was used to help develop a daily "shape" to the PHEV load. The actual load shape of electrifying our transportation system is subject to many variables that are not fully known. For example, the charging behavior of vehicle owners and the impact that fast chargers may have are not known at this time. The shape employed by Chelan PUD at this time assumes that a majority of the charging will take place overnight at standard 110 volt outlets in residential homes as opposed to charging during the day at work or other locations. Chart 4 shows the forecasted hourly PHEV load for 2010 and 2020. The chart indicates that charging is expected to pick up late in the afternoon and largely take place throughout the evening and night. As mentioned previously, the District's annual peak demand generally occurs in the winter, usually between 7 am and 8 am. The PHEV load is expected to have very little impact on this peak. A summertime afternoon peak (which is only about half as much as a winter morning peak) would be affected a little more, however, the amount projected here is less than 2 MW in 2020. Because the Districts' peak load demand occurs during the day, recharging at night when the District has additional capacity to generate without having to acquire additional generating resources is desirable from the District's prospective.

Chelan PUD's Resource Portfolio

Chelan PUD's resource mix remains the same as it was in 2008. The District owns and operates three hydroelectric projects, all located in Chelan County,



and is a participant in the Nine Canyon Wind Project, located in Benton County, Washington. The three hydroelectric projects, Rocky Reach, Rock Island and Lake Chelan, together, have capacity to generate nearly 2,000 MW of power. The District continues to invest in modernization and relicensing at the projects to ensure reliable, locally-controlled operation of resources for future generations.

Currently, 28.5% of the electricity is available to benefit Chelan PUD retail customers and meet local electric load. The balance is sold to the following long-term wholesale power purchasers throughout the Pacific Northwest: Alcoa, Puget Sound Energy, Avista Corp., PacifiCorp, Douglas County PUD and Portland General Electric. All of these contracts (except the contract with Douglas County PUD) will expire in 2011 and 2012. New long-term wholesale contracts have been executed with two of the current power purchasers and are set to begin when the current contracts expire. District power contracts are more fully discussed in the Portfolio Analysis section.

Hydropower has many characteristics that make it highly desirable. It is free of the emissions associated with fossil fuel-fired generating resources. Operational flexibility allows hydropower to quickly follow load changes and provide reserves to the electric grid in a timely manner, which contributes to overall system reliability. In addition, hydropower provides backup for intermittent resources such as wind. The District avoids transmission availability issues, in relation to serving retail load, by using its own hydropower generation, which is located in Chelan County, near the District's retail load. The amount of hydropower the District is able to generate depends on water availability, which is variable and hinges on a number of factors, primarily snow pack in the mountains upstream of its hydroelectric facilities, precipitation in its watershed, the

operations of upstream storage reservoirs and certain operating agreements.

Wind energy is more variable than hydro and also somewhat seasonal in nature. Both hydro and wind reduce carbon emissions by replacing generators such as gas and coal that produce emissions and offer a low, stable fuel price. However, the level of variability and supply uncertainty between the two resources is significant. Hydro can be stored in limited reservoirs, while wind cannot be stored. Hydro's variability is measured in years, months and weeks while wind's variability is measured in days, hours and minutes. The intermittency of wind power increases the need for reserve power on the system. Bonneville Power Administration (BPA) now has 2,700 MW of wind capacity and rising on its 10,500 MW peak load balancing area. The Columbia River hydro system now serves multiple purposes: serving load, meeting non-power requirements (e.g., fish flows, irrigation, flood control and recreation) and supporting intermittent generation such as wind. BPA estimates that the federal hydro power system can support 3,000 to 3,500 MW of wind generation. The District's share of Nine Canyon wind is a relatively small portion of its overall resource portfolio (less than 2%), so in most cases, the District is able to integrate this wind without issue. Regional wind capacity is expected to soar in the next 10 to 20 years, possibly doubling or tripling its current capacity. Wind is a valuable addition to the Pacific Northwest renewable generation mix, however, integration of wind presents new challenges. BPA has and is continuing to develop extensive new operating protocols to deal with integrating the intermittent resource. Improved wind forecasting, new technology, demand response and new intra-hour energy market products are expected to play increased roles in this challenge in the future.

Renewables

The District must comply with Washington State RPS renewable requirements beginning in 2012. The renewable energy section of the initiative requires utilities to serve percentages of retail load, which increase over time, with eligible renewable energy, RECS or a combination of both. Most hydropower is not an eligible renewable resource under the Washington RPS statute, though certain efficiency gains resulting in incremental hydropower are eligible.

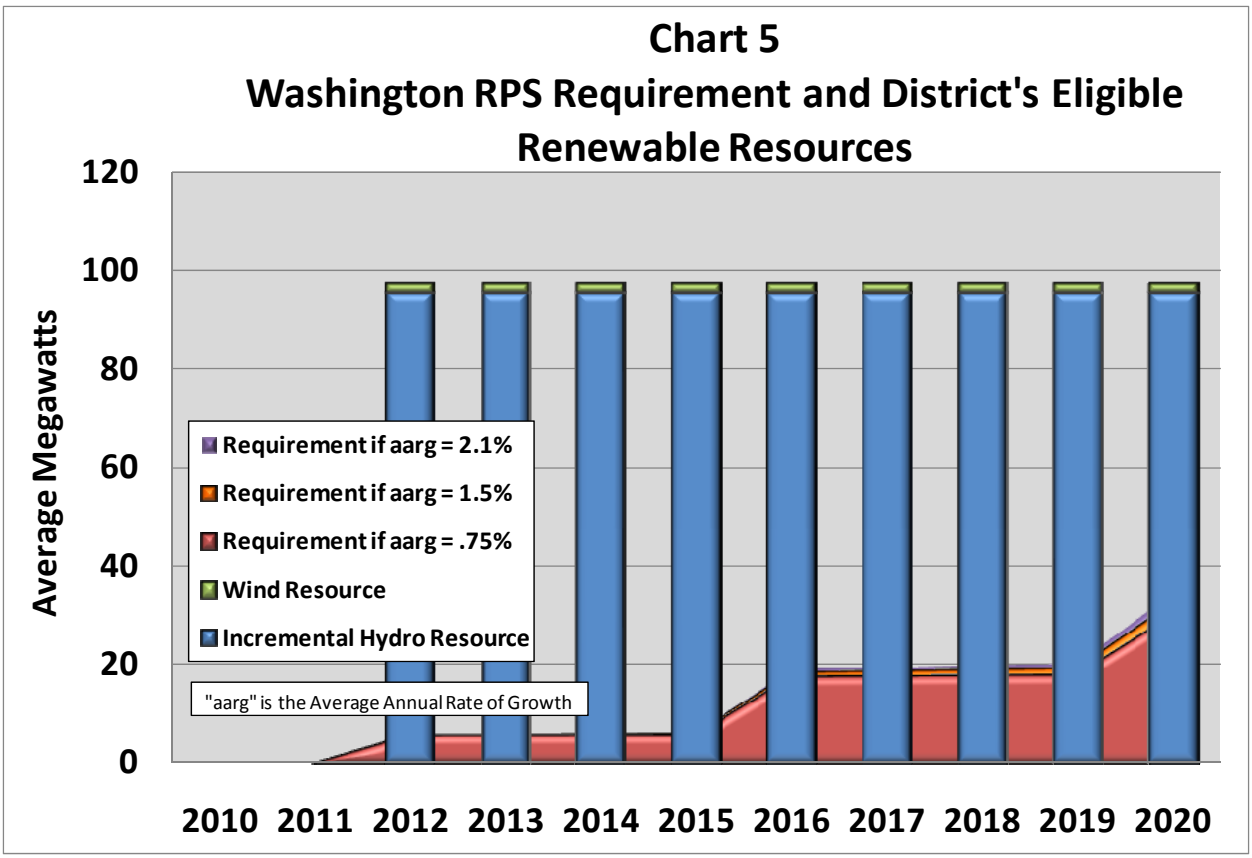
Chelan PUD's existing mix of generating resources complies with the District's understanding of the renewable requirement of the RPS throughout the planning period. The District plans on meeting these renewable requirements with incremental hydropower and wind power from the Nine Canyon Wind Project. Incremental hydropower is derived from efficiency gains at the District's existing hydropower projects resulting from equipment and operational upgrades, or increased power generation with the same amount of water.

The District has made significant investments in equipment upgrades such as generator and turbine rehabilitations, new transformers and trash rack installations. In addition, the District has installed systems designed to optimize generation which have resulted in operational efficiency gains. Only those equipment and operational improvements placed in-service after March 31, 1999 qualify under Washington State RPS rules.

Based upon the current base load forecast, the amount of renewable resources required will be approximately 6 aMW in 2012-2015, approximately 19 aMW in 2016-2019 and approximately 32 aMW in 2020. Chart 5 shows the amount of District eligible renewable resources and the potential target requirements based on the District's three primary load forecasts (not including PHEV load discussed previously). Chart 5 does not necessarily represent the order in which eligible resources will be used to meet the RPS requirements.

The District continues to evaluate options to meet compliance requirements. For the purpose of evaluating the financial impact of the RPS, the District will analyze the cost of renewables as compared to its existing hydro resources. Because Chelan PUD is long resources relative to its retail load, the District's existing hydro resources are considered its "substitute resource" as defined by the Washington Administrative Code (WAC) rules that pertain to the RPS.

There have been attempts to make legislative changes to the RPS over the last two years. Legislative



changes have generally focused on additional qualifying renewables with a corresponding increase in renewable targets. To date, no changes have been implemented primarily due to the varying positions and viewpoints of the many parties affected by the RPS. The District is monitoring and evaluating the impact of these potential changes as appropriate.

The western renewable markets continue to evolve as compliance rules change and renewable targets become a reality for utilities. Chelan PUD is monitoring these renewable compliance markets and evaluating the potential impacts. The District continues to look for opportunities in both the voluntary and compliance renewable markets.

Conservation

Energy efficiency makes the most of national energy resources, reduces energy shortages, lessens our reliance on energy imports and minimizes pollution from fossil fuel-fired generating resources.

Improved efficiency reduced demand for electricity in the Northwest in 2008 by an amount equal to the power use of about 148,000 homes, the highest annual accomplishment since record keeping began 30 years ago. Northwest utilities are pursuing new conservation acquisitions to meet their individual needs, to satisfy state-mandated RPS requirements and to minimize dependence on electric wholesale market supplies.

The Energy Independence Act, or RPS, requires that "each qualifying utility pursue all available conservation that is cost-effective, reliable and feasible." The RPS defines conservation as any reduction in electric power consumption resulting from an increase in the efficiency of energy use, production or distribution. The timeline for initial conservation requirements of the RPS are detailed below:

- By January 1, 2010, identify achievable, cost-effective conservation potential through 2019

using methodologies consistent with the NWPCC's latest Power Plan.

- Beginning January 2010, each utility shall establish a biennial acquisition target for cost-effective conservation that is no lower than the utility's pro rata share for the two-year period of the cost-effective conservation potential for the subsequent 10 years. Every succeeding two years, utilities must review and update their 10-year assessment.
- By June 2012, each utility shall submit an annual conservation report to Commerce. The report shall document the utility's progress in meeting the targets established to comply with the RPS.

There are two primary components of the RPS as it relates to conservation:

1. Documenting the development of conservation targets (i.e., setting the targets) and
2. Documenting the savings (i.e., demonstrating how the targets are being met).

Background

In 2008, EES Consulting (EESC) developed a conservation potential assessment (CPA) for the District. EESC evaluated the amount of conservation potential for Chelan County and provided initial conservation target estimates consistent with the RPS.

In the 2008 IRP, the District's chosen conservation target was 0.82 aMW. This was characterized as the Conservation Foundation level outlined in the CPA as opposed to the Phase 1 Utility Analysis level conservation target of 1.26 aMW or the Accelerated Conservation of 2.11 aMW (in the first 10 years rather than 20 years). The District recognized the .82 aMW was below the NWPCC's conservation target but concluded this was a pragmatic and conservative first step in establishing a foundation for conservation targets for Chelan County. The District's reasons for selecting this target for use in modeling for the 2008 IRP were:

- The Energy Independence and Security Act of 2007 was signed into law by the President in December 2007, years after publication of the NWPCC's Fifth Power Plan conservation goals, which are the basis for Washington State's RPS. This legislation created new federal standards that will essentially make compact fluorescent lamps (CFL) the standard for area lighting beginning in 2012. In the CPA, 48% of the residential conservation potential and 49% of the commercial conservation potential were in lighting upgrades, which rely heavily on CFL lighting. There was no other lighting technology available, including light-emitting diodes (LED), which met or exceeded these standards in a cost-effective manner. This conservation potential will be eliminated beginning in the second year of the 10-year target, substantially reducing the conservation potential available in Chelan County.
- Final rules for the RPS had just recently been published and were not available at the time the CPA was developed.
- At the time Chelan PUD conducted its CPA, the most recent wholesale price forecasts from the NWPCC were draft interim forecasts. The final interim forecasts were not published until April 2008. The initial draft forecast from 2007, the basis for the District's CPA, reduced the District's conservation potential when compared to the then current wholesale prices. The draft forecast had a levelized value of $35.50 per megawatt-hour, while the April 2008 final interim forecast was valued at $39.90, approximately 11 % higher. The District recognized that higher wholesale rates would slightly raise the benefit/cost ratios found in the CPA but reiterated that the chosen target for the initial IRP was seen as a foundation for additional study and that the Council issues cautions about using the interim forecasts for calculating avoided costs.
- Much of the data used in the Phase 1 Utility Analysis of the CPA was regional data from the Fifth Power Plan and not specific to Chelan County. The targets for the RPS were not required until 2010, a year and half after the due date for the 2008 IRP. During this period, the District planned to refine its conservation

potential data to be more specific to Chelan County, including penetration rates for retrofit and lost opportunity conservation.

- Conservation requirements in the RPS were and are significantly increasing conservation efforts throughout the state. Many utilities impacted by this legislation are expanding their conservation efforts which include ramping up their programs while relying on an energy conservation infrastructure not yet developed for the scope of work required by the legislation. Many utilities are expanding their programs by three to four times their previous levels. There was and may still be a shortage of experienced conservation professionals to meet new staffing requirements and a shortage of energy conservation service providers to accomplish the work. In 2008, the District believed this situation would be remedied but would initially impact achievable conservation potential.
- The District supported (and still does) establishing sound and realistic conservation targets that comply with the intent and spirit of the RPS. The decision to choose 0.82 aMW for an initial conservation target was viewed as the foundation for a long-term focus on energy conservation as a resource in addition to putting the District in compliance with the RPS.

The Current Plan

During the two-year period following the release of the 2008 IRP, the District continued to review and evaluate the conservation potential for Chelan County for all customer classes. Using an economic model specific to the Chelan PUD business case, the District conducted economic analyses of a wide variety of conservation measures available throughout the region. Customer surveys were used in an effort to establish potential participation rates as was a billing analysis of all commercial customers. Meetings were held with industrial customers. It was determined that the achievable conservation potential for the first biennium reporting for the RPS exceeded the .82 aMW cited in the 2008 IRP and likely approached the targets presented in the NWPCC's Fifth Power Plan Conservation Calculator, v. 1.7.

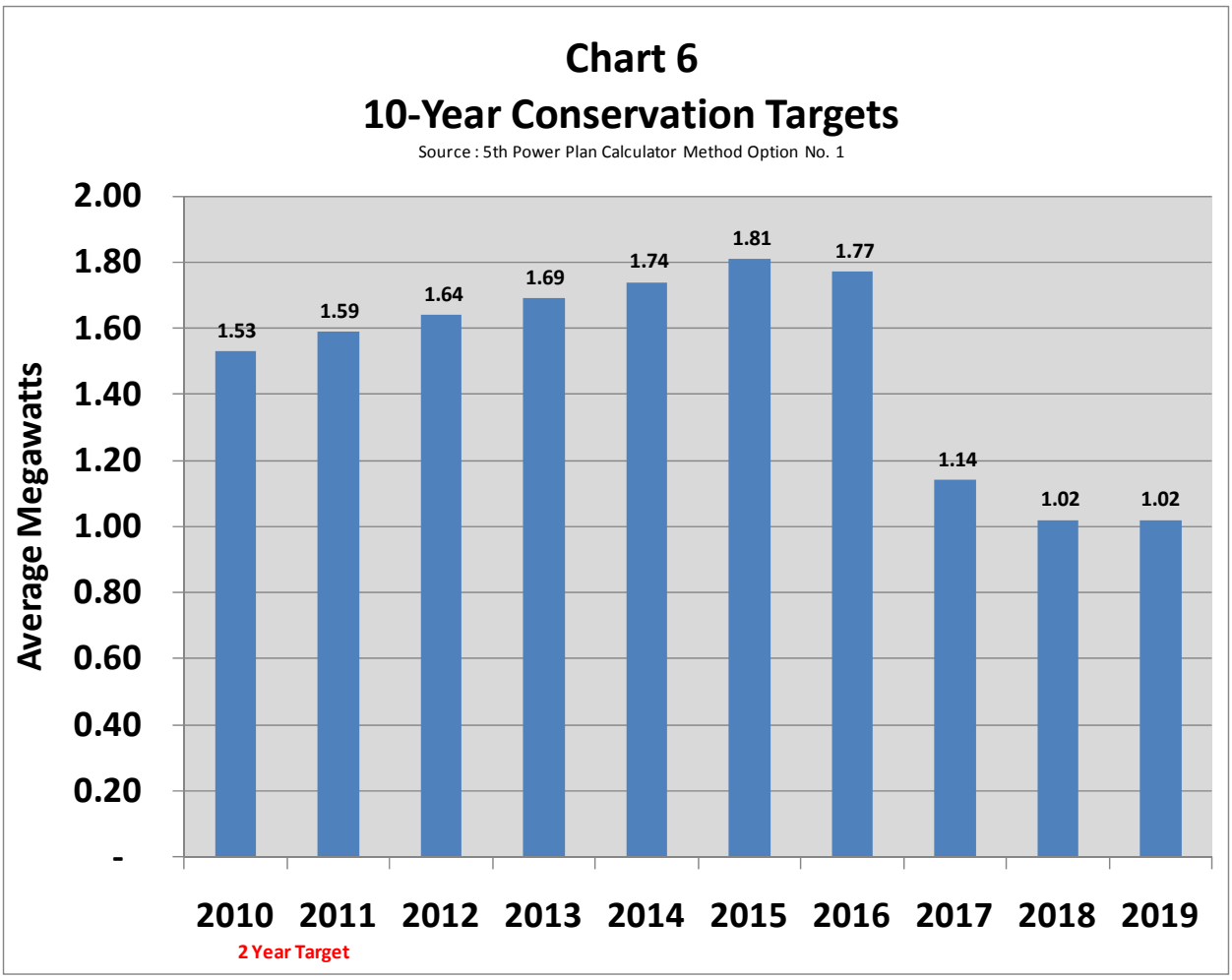
Since achieving the conservation targets contained in the calculator complies with the requirements of the RPS, this option contained less risk than the more costly option of completing a utility-specific analysis. The District decided to develop a 10-year plan and two-year conservation target based on the Fifth Power Plan Conservation Calculator for RPS compliance and reporting. The District is using software and spreadsheets that were developed and are maintained by the Council to approximate utilities' 10-year potential.

During a public hearing on November, 16, 2009, Chelan PUD's Board of Commissioners established 10-year and two-year conservation targets as required under the RPS. Chart 6 illustrates these targets. The District is committed to saving 3.12 (1.53 plus 1.59) aMW of energy in 2010 and 2011, the first two years of the program. Over the next 10 years, Chelan PUD has set a cumulative target of 15 aMW, or about 8% of the current electric retail load in the county.

The average conservation savings achieved by the District in recent years totals 0.4 aMW per year. The District's plan calls for nearly four times the historical annual savings to be achieved. Approximately $1.4 million is budgeted for conservation programs in 2010. For an estimate of conservation costs modeled through the planning period, the aggregated measure costs were escalated at a rate of 10% per year to not only account for inflation in measure costs but also the additional costs that will likely be incurred to gain the incremental conservation savings throughout time as the lowest-cost measures are captured in earlier years.

Energy Conservation Incentive Policy

In conjunction with setting conservation goals, Chelan PUD adopted an Energy Conservation Incentive Policy. This policy is part of the District's effort to assure compliance with the RPS. The policy set up a consistent process for establishing energy conservation measures and incentives and ensuring proper levels of authorization and controls. The policy established a Conservation Incentive Review Committee to provide oversight of conservation programs. The committee ensures adherence to



guiding principles, which were also established in the policy, used for setting conservation program incentives. The policy ensures proper reporting, documentation and compliance with the RPS. Guiding principles for establishing conservation measures and incentives are as follows:

- *Positive Return on Investment* - All proposed conservation measures and incentives must meet or exceed the internal rate of return established by the District's chief financial officer.
- *Achievable* - Any and all potential conservation measures and incentives must be appropriate for implementation within the District's service territory.
- *Risk-Adjusted* - Risk adjustments will be factored in as part of the process of establishing all conservation measures and incentives.
- *Diversified* – Collectively, conservation measures and incentives should be consistently focused on reaching a broad spectrum of customers across all customer classes.
- *Documented* - Conservation measures and incentives will be measured and verified for effectiveness.

The goal of Chelan PUD conservation programs is to offer diversified, cost-effective conservation programs that maximize the value to District ratepayers while striving to meet the RPS conservation targets.

Strategies for success are as follows:

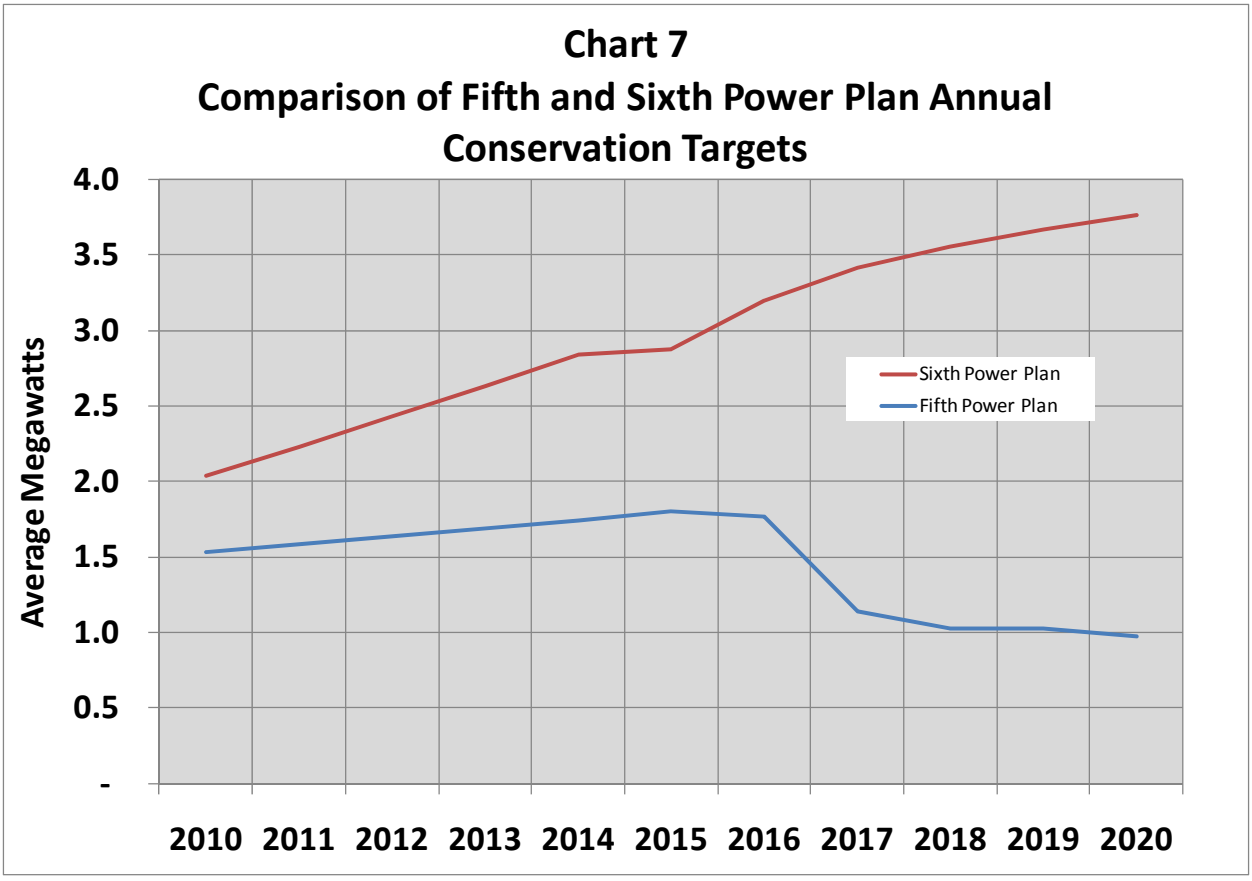
- Diversify the portfolio of programs
- Build maximum flexibility into programs
- Benchmark year 1 and adjust in year 2
- Develop strong reporting with performance measures
- Seek interpretation when possible and collaborate with others

- Develop a sustainable economic justification tool and team to evaluate options

Conservation is good for customers, the District and the region. During certain hours of the year, Chelan PUD must purchase power on the wholesale market to meet peak demand, particularly during the winter heating season. Energy saved in homes and businesses reduces the need to purchase higher-cost power on the wholesale market. Also, conservation provides additional resources that can be sold into the wholesale electric market when the District is already surplus to its own local retail load. Both cases, in turn, help keep local electric rates low.

The NWPCC recently completed its Sixth Power Plan for the region, which addresses conservation and other issues. The new Power Plan calls for a significant ratcheting-up of conservation goals, and Chelan PUD will be evaluating the plan and its potential effects for the District. Chart 7 illustrates the increased targets between the current Fifth Plan and the Sixth Plan. The Sixth Plan does mention that neither the RPS nor the Council's Power Plan "requires utilities to choose any of the plan's particular measures in particular amounts. The utilities may make that judgment based on their own loads (composition, amounts and growth rates) and their own determination of avoided cost and the measures available to them." The most recently published Sixth Power Plan can be viewed by navigating to the web link: www.nwcouncil.org.

Throughout the current planning period (2010-2020), the District is expected to be a net surplus generator (to local retail energy needs) of electricity. Chelan PUD utilizes a forecast of wholesale market power prices (see Market Price Forecast under Portfolio Modeling below) as its avoided cost for future energy acquisitions, including the funding levels for potential conservation measures. Forecasted power prices less current retail rates equals a delta that is used for funding conservation incentives. As noted



previously, utilities must review and update their 10-year assessment every two years. The District will be updating its avoided costs as well as potential conservation measures with each update.

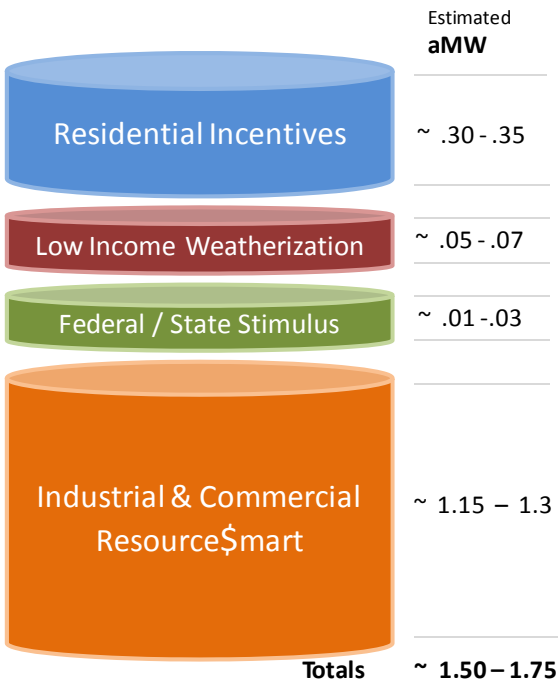
Current Demand-Side Offerings

The District is offering a wide array of programs – a "stack" – to help customers across the residential, commercial and industrial sectors, with an emphasis on industrial savings in 2010. The stack is represented in Figure 1. These measures, determined using the guiding principles previously discussed, are detailed below.

Weatherization Incentives

Incentives are available to residential customers who replace older inefficient windows and glass doors with qualifying products or add insulation to existing attics, walls and floors. Qualifying windows must have a U-value certified by the National Fenestration Rating Council of .30 or lower. Insulation R-values must be improved by R-10 or greater. In 2010, savings are estimated at .08 aMW.

Figure 1
2010 Conservation Program "Stack"



Compact Fluorescent Lamp (CFL) Distribution

In early 2010, the District distributed 41,000 13-watt, T-2, mini-spiral CFLs to residential customers in the District's service area. Estimated energy savings of .15 aMW are expected.

Change a Light

The Change a Light program is designed to reduce the retail price of specialty CFLs such as candelabra, dimmable, 3-way and parabolic aluminized reflector (PAR). The District pays an incentive at the wholesale level and retailers agree to pass the savings on to customers in Chelan PUD's service area. This program is expected to save .07 aMW in 2010.

Low-income Weatherization

The District has partnered with the Chelan-Douglas Community Action Council (CDCAC) to weatherize income-eligible electrically heated residences. Income eligibility is based on 200% of federal poverty guidelines. Chelan PUD offers an annual grant of $65,000, which is matched by the Washington State Energy Matchmaker program administered by Commerce. CDCAC crews complete the weatherization measures which are inspected by Commerce and District staff. In addition to the weatherization funding, in 2010, the District provided CFLs valued at $2,200 that CDCAC supplied to their clients. Estimated savings are .05 aMW in 2010.

Resource Conservation Manager Partnership

The District is anticipating joining with other public entities to share the cost of a resource conservation manager and required software purchase. Resource conservation managers use a variety of educational and analytical techniques to promote low-cost behavioral and building control system changes that result in substantial energy savings. The District anticipates implementation of the RCM to begin in late 2010 with the bulk of conservation savings being realized beginning in 2011.

Energy Star® Appliance Rebate

The District is supporting Commerce's Energy Policy Division which is administering $5.6 million in American Recovery and Reinvestment Act rebate funds for the Washington State Cash for Appliances Program. Rebates will be paid to Chelan County and other state residential consumers who purchase eligible ENERGY STAR® refrigerators and clothes washers and recycle their resource-wasting appliance. Rebates are offered for qualified products on a first-come, first-served basis until funds run out. The rebates are $100 for a qualifying clothes washer and $75 for a refrigerator. Estimated savings in Chelan County are .01 aMW in 2010 and 2011.

Resource$mart

Resource$mart is the District's program for helping commercial and industrial customers install energy efficiency measures that would otherwise not be cost-effective. Depending on the predicted amount of electrical energy savings, the District may pay up to 75% of the customer's cost to install energy efficiency measures. Any measure that reduces the consumption of electrical energy use is eligible for funding under the Resource$mart program. Measures include lighting projects, fast-acting doors on large refrigerated spaces, energy efficient fruit warehouse controlled atmosphere equipment and improved heating and cooling equipment. In 2010, estimated savings are 1.15 aMW.

Commercial Plan Review and Code Compliance

In 2006, the District reestablished a program originally operated in the mid 1990's to offer support to local building code jurisdictions by reviewing complex commercial building plans for energy code compliance and assisting, where requested by the code officials, with energy code-related construction compliance verification. This program has identified many potential noncompliance issues in plans and construction installation practices that have resulted in assuring achievement of lost opportunity energy savings. Estimated savings are .04 aMW in 2010.

Energy Star® Portfolio Manager Support

The Portfolio Manager is an on-line software program that allows facilities' managers to monitor the energy consumption of their buildings and rate how they compare with like buildings throughout the nation. Buildings receive an energy rating and can be certified as meeting Energy Star® standards if proven to be more energy efficient than 75% of comparable buildings in the portfolio manager database. Knowledge of a building's energy rating gives building operators the ability to concentrate their resources on the worst performing buildings and take steps to improve their facility's energy use rating. This program is now required (by RCW 19.27A) for public buildings in Washington State.

Next Steps

The District continues to evaluate and develop the conservation potential by refining the demographic data of all customer classes and survey participation rates for various conservation programs.

In addition, the District is reviewing options for achieving a more comprehensive CPA, which would be used as the basis for Chelan PUD's future utility-specific analysis.

Portfolio Analysis

The District utilized the same long-term resource portfolio/risk analysis model for this progress report as it did for the 2008 IRP. The model quantifies the risk and correlations between key variables – such as resource availability, load and market prices – using built-in Monte Carlo simulation and scenario analyses. A more detailed description of the model and an explanation of this type of analysis can be found in the 2008 IRP.

Chelan PUD is still long in terms of its resource position. The District is expected to be able to serve its retail load throughout the planning period (2010-2020) without adding new resources and is also expected to meet Washington State RPS renewable

requirements through this period as well. Additionally, Chelan PUD's resource portfolio is comprised primarily of base load, reliable, low-cost hydro resources and it performs well against the portfolio evaluation criteria established by the District (described below). For all these reasons, no new resources were added to the portfolio scenarios detailed below.

Although it is not adding new resources, the District remains focused on three major categories of risk which include uncertainties related to:

- Electricity usage by the utility's retail electric customers (loads)
- Stream flows that affect the availability of hydroelectric generation (volume and timing)
- Cost of production at the District's existing hydroelectric facilities

Both short-term and long-term risks were addressed, as follows:

- Short-term uncertainties (e.g., weather-induced fluctuations in retail loads) were represented by probability distributions
- Long-term uncertainties (e.g., trends in the overall level of hydropower costs) were represented by scenario forecasts

Portfolio Costs

The 2009 cost of production for the District's existing portfolio is shown in Table 1. These costs were calculated two ways. The second column, reading left to right, are the actual cost per megawatt hour based on actual costs and actual generation in 2009. Water runoff conditions were 79% of average in 2009. Wind conditions at Nine Canyon were also less than average. The column on the right was calculated using actual 2009 costs and average hydro and wind generation for any given year. This column illustrates what current costs are without the effects of runoff and wind variability. As seen in the table, cost per megawatt hour of generation can vary significantly depending upon actual generation. This is because almost all costs are fixed, that is, they don't vary with the amount of generation (e.g., debt service, taxes).

For Chelan PUD's hydroelectric facilities, these costs represent all costs incurred, including debt service, operations and maintenance (O&M), reserve fund requirements, contractual fees and certain costs for transmission integration facilities. The Nine Canyon cost of production includes the District's monthly power purchase contract payments to Energy Northwest and the BPA transmission costs to bring the Nine Canyon wind energy from Benton County to Chelan County.

Table 1
District's Existing Portfolio
Cost of Production
2009

Project	$/MWh w/actual generation	$/MWh w/average generation
Rocky Reach	$13.55	$11.66
Rock Island	$29.83	$26.51
Lake Chelan	$26.63	$21.50
Nine Canyon	$76.19	$67.68

Hydro

The District forecasts the future cost of production of the hydro projects by compiling long-term operating plans and capital replacement programs, which are then incorporated into the forecasted debt service requirements of each facility. This cost-based activity is then adjusted to include other long-term power contract requirements to determine the overall cost of production.

Examples of long-term power contract requirements include, but are not limited to:

- Capital Recovery Charge (base scenario-25% of average annual capital expenditures)
- Debt Reduction Charge (base scenario-2 1/2 % of outstanding project debt)

Examples of significant capital and/or operational requirements include, but are not limited to:

- Costs associated with license and HCP Implementation
    - Fish survival, hatchery programs, etc.
    - Plant rehabilitation and improvements

The forecasted hydro O&M costs for the base case scenario in this progress report consist of general cost growth rates for standard programs, while project-specific O&M such as licensing, fish, hatchery and major park maintenance are accounted for with specific forecasts for each project. The average project O&M growth rates are:

- Rocky Reach – 4.8 %
- Rock Island – 4.5%
- Lake Chelan – 4.5%

Debt service is driven by existing debt schedules and forecasted financing needs that are driven by specific project capital requirements. In addition, the anticipated use of other long-term power contract requirements such as the debt reduction charge account and capital recovery charge account are included as offsets to future debt service needs.

Nine Canyon Wind

The projected future costs of production at the Nine Canyon Wind Project are taken from an annually updated budget that includes the next year and projected future years. The budget is developed by Energy Northwest in conjunction with project participants. In addition, Chelan PUD makes an estimate of future BPA transmission costs that will be incurred to bring the wind energy from Benton County to the District's service territory in Chelan County.

In 2008, the cost of production rates increased approximately 70% due to higher than expected maintenance and repairs costs to the generating equipment as well as lower than anticipated federal Renewable Energy Production Incentive payments. At this new elevated level, annual cost of production is expected to remain fairly constant until the District's portion of project debt is paid off in 2022. Without debt payments, cost of production rates should then decrease significantly throughout the remainder of the purchase contract which expires in 2030.

Market Price Forecast

Wholesale spot-market prices for electricity are an additional risk factor for Chelan PUD and other utilities. For the 2008 IRP, the District used the "high capital cost case" from the NWPCC's Final Interim Wholesale Power Price Forecast for the Mid-C that was published in April, 2008. This case had a levelized wholesale power price of $41.30/MWh for 2007-2026 (2006 real dollars). The District chose to use the high capital cost case (one of eight price forecast scenarios) because it was reflective of what the Council expected would become their base case in the Sixth Power Plan due to the rising costs of construction. This forecast scenario was used in each resource portfolio scenario. This was due, in part, to the uncertainty in the electric industry surrounding the outcome of the Council's various forecast scenarios and how they may be appropriately used by utilities. Additionally, the District wanted to focus on uncertain variables in the IRP, including load and hydropower costs, about which the District has more internal expertise and the ability to develop and model with greater confidence. The District wanted to maintain focus on the significant uncertainty surrounding future costs at its hydroelectric projects.

For this progress report, the District used the "base case" market price forecast for the Mid-C from the NWPCC's Sixth Power Plan, adopted in February, 2010, in each resource portfolio scenario. **The "base case" has a wholesale power price of $55.50/MWh levelized for 2010-2029 (2006 real dollars).** Prices are projected to increase from $30/MWh in 2010 to $74/MWh in 2030. For comparison, Mid-C wholesale power prices averaged $56/MWh in 2008, dropping sharply to $29/MWh in 2009 (2006 real dollars) with the collapse of natural gas prices and the reduction of demand due to the economic turndown. The new base case forecast is significantly higher than the forecast used in 2008 due, in large part, to higher natural gas and CO2 price forecasts.

This base case, four sensitivity studies and two bounding scenarios were developed by the Council. These forecasts can be seen in Chart 8 in real dollars and in Chart 9 in nominal dollars. The base case

Chart 8

Mid-C Average Price Forecast

(2006 $ Values)

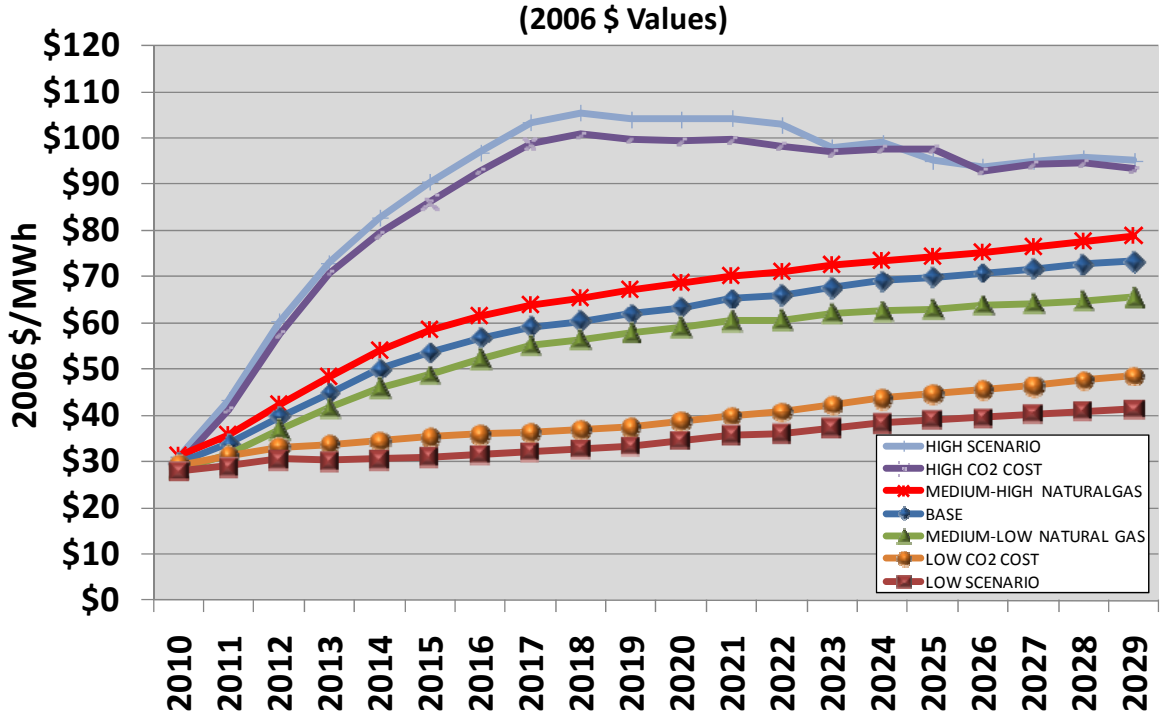
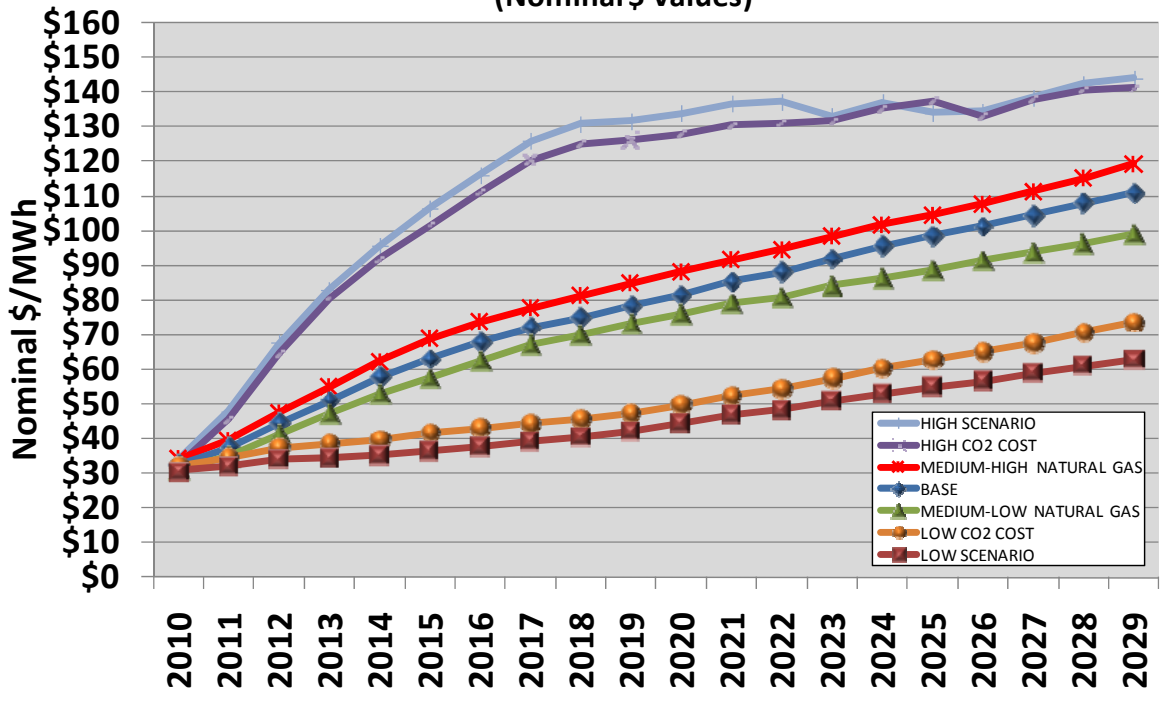


Chart 9

Mid-C Average Price Forecast

(Nominal $ Values)



assumes medium fuel prices and mean CO2 prices. All forecast cases assume 95% achievement of state RPS, average hydropower conditions, medium load growth and achievement of all cost-effective conservation.

Three factors are expected to significantly influence the future wholesale power market: the future price of natural gas, the future cost of CO2 production and renewable resource development associated with the state RPS. These factors will affect the variable cost of the hourly marginal resource and hence the wholesale power price. Because natural gas is a relatively expensive fuel, natural gas-fired plants are often the marginal generating unit and therefore, determine the wholesale price of electricity during most hours of the year. CO2 allowance prices or taxes will raise the variable cost of coal-fired units more than that of gas-fired units because of the greater carbon content of coal. Lower CO2 costs will raise the variable cost of both gas and coal units, but not enough to push coal above gas to the margin. High CO2 costs will move coal to the margin, above gas. In either case, the variable cost of the marginal unit will increase. State RPSs are expected to force the development of large amounts of wind, solar and other low-variable cost resources, in excess of the growth in demand. This will, at times, force lower variable cost fossil units, such as coal, to the margin, tending to reduce market prices. Further information regarding the Council's Wholesale Power Price Forecast from the Sixth Power Plan can be found at www.nwcouncil.org.

Going a step further, at times, hydro and wind, which are very low variable cost resources (i.e., free fuel), may even be forced to the margin during periods of low load and high hydro and/or wind production. This results in very low or even negative spot market prices. Negative spot market prices mean that a utility or other market participant has to pay another entity to take unwanted power (i.e., power for which no load exists). The negative pricing occurs for two primary reasons. Sometimes hydro generators are must-run due to operational constraints, thus adding additional energy to an over-supplied market. Additionally, many wind generators receive federal incentive credits and/or payments based upon their amount of wind generation. They can also sell the RECs for this generation. The value of these items combined is somewhere in excess of $20/Mwh today. These generators can afford to withstand some degree of negative pricing and still make a profit due to these other payments.

Hedging Strategy

As previously mentioned, the District is facing expiring long-term power sales contracts during the planning period. New long-term sales contracts will begin when the current contracts expire. Since completion of the 2008 IRP, Chelan PUD has worked on developing additional strategies for dealing with an increased amount of surplus energy that the District will have after the current long-term sales contracts expire in 2011 and 2012. The additional surplus also means additional wholesale power revenue risk.

A comprehensive forward hedging strategy has been developed that sets hedging targets for three time periods: up to five years, mid-term (one to three years) and short-term (less than one year). The minimum and maximum targets for both the mid and short-term are based on projected surplus energy at various confidence levels. Surplus energy projections are uncertain, primarily due to stream flow and retail load variability, but ranges are quantifiable using statistics as discussed more fully under Scenario Results.

In addition to the mid and short-term hedging strategies, the District is also pursuing the sale of market-based products such as slice contracts (i.e., a percentage share of project capacity and energy), block sales (i.e., a predetermined quantity of energy) and/or other products approved by the District's internal Power Risk Management Committee to help manage wholesale revenue risk and stabilize such revenue five years into the future. These contracts will have a maximum term of five years and will only be for periods up to five years into the future from when the transaction occurs. These five-year transactions may be sold using a laddered approach, meaning the total amount of slice or block contracts in any given year would have been executed at different points in time. It is anticipated that approximately two-thirds of the surplus power available after 2011 will be sold through these

longer-term contracts. All the portfolios modeled for this progress report include the same hypothetical laddered slice contracts from 2012 through 2020 totaling 23% of the capacity and energy at Rocky Reach and Rock Island. Because a request for proposal process is expected to be used for selling slice contracts, market pricing was assumed and the Council's base case wholesale market price forecast was used to value these contracts for modeling purposes. These slice contract assumptions were determined to be a reasonable baseline approach to modeling the affects of the longer-term portion of the hedging strategy and are further discussed under Scenario Results.

Scenario Results

The District uses reliability, cost, risk and environmental impacts as the four criteria in the evaluation of its resource portfolio. These criteria represent long-held philosophies of Chelan PUD and the measures for each are described below.

- Reliability – a positive load/resource balance on an average annual basis
- Cost – 11-year net present value (NPV) of the net portfolio cost for the District's resource portfolio scenarios
- Risk – the variability in the NPV of the net portfolio cost
- Environmental impacts – qualitative analysis of air emissions

For this progress report, the District's existing mix of supply-side resources was stressed with the differing load forecasts, including the addition of PHEV load and varying hydroelectric costs. The differences between the scenarios are as follows:

Scenario 1 – Base Case

- Base Load Growth (1.5% average annual rate of growth)
- Base Hydro Costs

Scenario 2 - Low Bookend

- Low Load Growth (.75% average annual rate of growth)
- Low Hydro Costs (Base Hydro costs minus 5%)

Scenario 3 – High Bookend

- High Load Growth (2.1% average annual rate of growth)
- High Hydro Costs (Base Hydro costs plus 20%)

Scenario 4 – Base Case plus Base PHEV load

- Base Load Growth (1.5% average annual rate of growth) plus Base PHEV load
- Base Hydro Costs

As mentioned previously, modeling results continue to indicate that Chelan PUD is expected to be able to serve its retail load throughout the planning period without any new resource additions. Conversely, the amount of demand-side resources included in the modeled portfolios has increased from what was included in the 2008 IRP. The 2008 quantity of conservation of 0.82 aMW per year through the planning period has been increased to match Chelan PUD's January 2010 required 10-year conservation plan submittal to Commerce that is 1.50 aMW per year through the study period. Conservation has the effect of reducing the amount of renewable generation required under Washington's RPS because that requirement is based on a percentage of retail load. Because the District does not anticipate the need to acquire additional renewable resources through the planning period to meet the RPS, conservation primarily has the effect of increasing the amount of power sold into the wholesale market and further decreasing net portfolio costs.

Service Reliability

Chelan PUD's existing resource portfolio is not without risk, but it performs very well when compared against the evaluation criteria. Based on the voluntary regional resource adequacy standards discussed previously, the District has adequate capacity and energy to meet its retail customers' load through the planning period thus providing for service reliability.

Cost

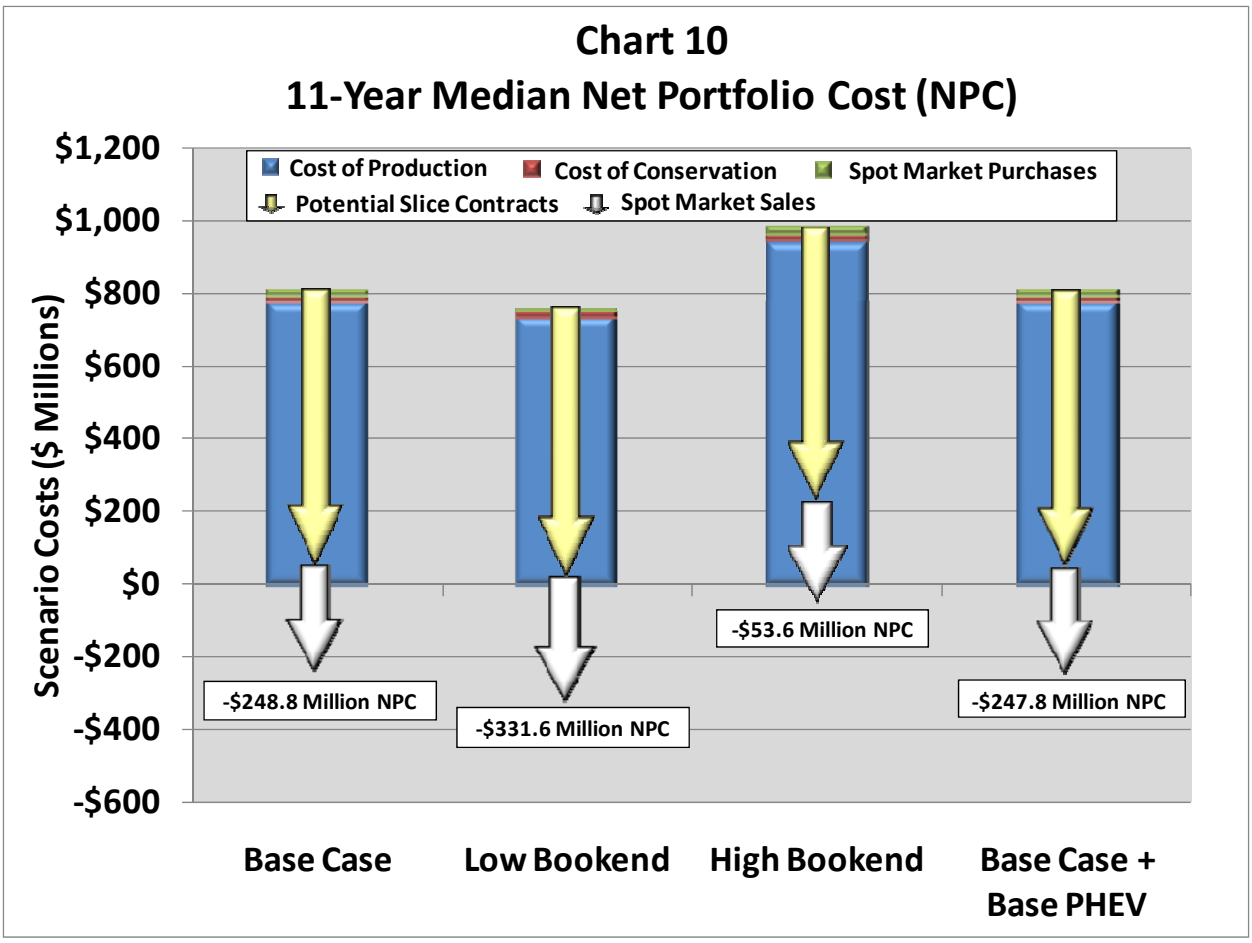
Net portfolio cost for the District is total costs for Chelan PUD's resources (including hydro, wind and conservation) plus the cost associated with purchasing power in the wholesale spot market, netted with revenues from any and all power sales, including those in the wholesale spot market. The District has resources in excess of its retail customers' load that it can sell into the wholesale market and because the resource portfolio is comprised of primarily low-cost hydroelectric resources, the net portfolio cost to the District is much lower than for many other utilities. In fact, the median net portfolio cost for all four scenarios is negative, meaning after paying the costs of all its resources and any wholesale market purchases then selling surplus power (after serving local load) under longer-term contracts and into the wholesale power spot market, the District has money left in its pocket.

Scenario 1 (Base Case) and Scenario 4 (Base Case plus Base PHEV load) result in the mid-range median net portfolio cost. Scenario 4 shows slightly higher net portfolio costs because the addition of the small projected PHEV load means there is less surplus energy to sell into the wholesale spot market. Scenario 2 (Low Bookend) results in the lowest median net portfolio cost due to the lowest long-term load growth forecast, allowing more energy to be sold into the wholesale spot market, as well as the lowest forecast for hydro production costs. Scenario 3 (High Bookend) results in the highest median net portfolio cost due to the highest long-term load growth forecast and a substantially higher hydro production cost forecast (+20% over the Base Case). Higher load growth leads to less surplus sales into the wholesale market. Because the wholesale electric spot market forecast is higher than the District's hydro production costs, higher load growth scenarios will increase the overall net portfolio cost of the District by reducing the revenues received from surplus sales. Higher hydro production costs obviously result in higher net portfolio costs, and it is the primary factor causing the majority of the differences between the four scenario results. Chart 10 shows the 11-year median net portfolio costs for the four portfolio scenarios that were modeled. In Chart 10, "cost of production" represents all costs associated with Chelan PUD's share of its hydro projects and Nine Canyon power costs netted with revenues from some additional power sold to Alcoa (discussed further below). Because of the slice sales, the amount of surplus power being sold into the wholesale spot market is much smaller than in 2008. The chart lists these as "spot market sales."

Of special note, when comparing the net portfolio costs of the scenarios from the 2008 IRP (2008-2018) to this progress report (2010-2020), the differences are very large. Median net portfolio costs all went from being positive in 2008, meaning that over the planning period, portfolio costs were greater than portfolio revenue, to all being negative now. This means that over the planning period, portfolio costs are less than portfolio revenue as previously mentioned. This shift is due to the fact that two more years of a much larger share of Rocky Reach for the District exists in the current portfolio scenarios that is sold at prices substantially above the hydro cost of production. Additionally, the current portfolio scenarios represent two less years of up to 42 MW of additional power (beyond their long-term power purchaser contract) being sold to Alcoa at industrial retail rates which are substantially below wholesale power prices. Both of these changes increase wholesale revenue, thus decreasing net portfolio costs.

Risk

To assess variability or risk, the District uses the 90% confidence interval, or the range of iterations that fall within the 5% and 95% tails of the probability distributions from the Monte Carlo simulations for each portfolio scenario. Several of the key factors affecting the District's portfolio are variable and it is the exposure to these variables where the District experiences the greatest risk. Hydroelectric production costs continue to be the primary variable creating the difference in net portfolio cost between the scenarios, with load growth being the other contributing factor. The volatility around the median net portfolio cost for each scenario is driven by underlying short-term uncertainties. Hydroelectric generation – subject to wide swings from year to year depending upon snow pack levels, precipitation and other factors – as well as wholesale market prices are the primary variables creating the uncertainty (i.e.,



range of possible outcomes) within each scenario. This, in turn, creates great variability in the amount of energy the District has to serve load and ultimately, the amount of surplus energy available to sell into the wholesale market. Wholesale sales revenue has a tremendous effect on reducing the net portfolio cost to the District.

As in the 2008 IRP, the difference between the median and 5% level of the confidence interval is greater than the difference between the median and 95% level of the confidence interval. This means that the District has a greater chance at lower net portfolio costs rather than higher. This is due primarily to more upside opportunity in electric wholesale spot market prices, meaning prices are assumed to have more room to go higher than to go lower. Based on additional historical evaluation, the variability around wholesale power spot prices was expanded for this progress report, increasing this upside opportunity in wholesale revenue.

Slice contracts are sold as a percentage of project energy and capacity, not as a fixed amount of megawatts, for a fixed amount of revenue. Selling slice contracts allows the District to reduce both hydro volatility risk as well as price risk. As anticipated, the addition of the slice contracts to the portfolio scenarios (as compared to a baseline portfolio, not presented here, that did not include the slice contracts) reduced the overall net portfolio cost variability. Net portfolio cost is higher to the District at the 95% level of the confidence interval than if slice contracts were not sold. This is a result of dampening "upside" wholesale revenue potential that could occur from taking this energy to the wholesale spot market when hydro production and market prices are higher than expected rather than selling it at a somewhat lower fixed price under the slice contract. Conversely, net portfolio cost is lower at the 5% level of the confidence interval than if slice contracts were not sold. Some "downside" risk

associated with wholesale revenue is mitigated. This mitigation is because when hydro production and market prices are lower than expected, this share of project output has been sold at a somewhat higher fixed price that was originally established based on a higher expected amount of hydro production by slice purchasers.

Table 2 tabulates the 11-year net portfolio cost for all four scenarios and illustrates the variability around the median net portfolio cost for each scenario.

Environmental Impacts

The District's hydropower and wind generation do not produce any air emissions, but during certain hours of the year, depending upon load and hydro conditions, the District is a purchaser in the wholesale power market. Those market purchases come from a "market mix" of different generating resources. Some of those resources produce air emissions. The cost of air emissions from CO2 remain an industry uncertainty as evidenced by the wide variety of potential federal climate change legislation discussed previously. As in the 2008 IRP, the District did not explicitly model costs associated with air emissions in its portfolio scenarios because of this uncertainty surrounding future regulations for air pollutants. As such, the net portfolio costs of the District's portfolio scenarios do not include any costs and/or benefits associated with air emissions. It is expected that any climate change legislation or other developments regarding climate change will affect the energy markets in which the District participates. Any proposed change to the District's mix of generating resources in the future would need to be evaluated for its environmental impacts.

Table 2
Net Portfolio Cost Uncertainty
Probabilistic Outcomes
($ Millions)

Scenarios	5% level of the Confidence Interval	Difference between 50% and 5% level of the Confidence Interval	50% level (median) of the Confidence Interval	Difference between 50% and 95% level of the Confidence Interval	95% level of the Confidence Interval
Low Bookend	**-$502.0**	$170.4	**-$331.6**	$137.1	**-$194.5**
Base	**-$420.6**	$171.8	**-$248.8**	$134.7	**-$114.1**
Base + Base PHEV load	**-$419.7**	$171.9	**-$247.8**	$134.6	**-$113.2**
High Bookend	**-$227.3**	$173.7	**-$53.6**	$135.1	**$81.5**

Short-Term Plan

In its 2008 IRP, the District completed a "short-term plan" as required by RCW 19.280. The following is an update to the items listed in the 2008 short-term plan.

Conservation Resources

- Continue to develop conservation potential by refining demographic data for customer classes UPDATE - Throughout 2008 and 2009, the District conducted reviews of available databases, in-house surveys and a preliminary CPA in order to better understand the conservation potential in Chelan PUD's service area. Analysis also included supply curves from the Council's Fifth Power Plan and draft Sixth Power Plan and publications and studies from the NW Energy Efficiency Alliance and BPA. Several presentations were made to Chelan PUD's Board to encourage public dialogue.
- Study available energy efficiency measures and programs UPDATE - The District developed an economic analysis tool to evaluate conservation measure cost-effectiveness specific to Chelan PUD's business requirements. This tool is now used to evaluate programs and measures. The District undertook a methodical process to research, review and analyze a wide variety of conservation programs available, both nationally and throughout the region. This included meeting with other utilities, attending workshops, sending requests for information to several vendors and energy services providers and reviewing publications, in particular information from the Council's Fifth Power Plan concerning conservation goals and "deemed measures."
- Evaluate conservation potential using automated metering technologies and rate design UPDATE - In 2008 and 2009, the District budgeted for and released a Request for Proposal for supply and installation of automated meters for its electrical distribution system. This project was cancelled during the final negotiation phase due to funding constraints.
- Look for economies of scale in conservation efforts with other utilities UPDATE - The District organized and held several meetings with other utilities planning conservation efforts under the Washington State RPS. Although no shared conservation efforts resulted from these discussions, the District gained additional insight on strategies, processes and program implementation as a result of the dialogue. One shared effort with economies of scale potential is a program developed for possible implementation in late 2010 that utilizes a single resource conservation manager, shared and funded by several public and municipal agencies in the county and American Recovery and Reinvestment Act funds.
- Develop a system for tracking goals and conservation achievements UPDATE - WAC 194-37, the administrative code for the RPS, requires utilities to report their conservation achievements using the BPA Planning, Tracking and Reporting System (PTR), or a comparable system approved by Commerce. Since Chelan PUD does not report to BPA, use of the PTR system was not feasible. As a result, the District developed its own reporting system, modeled in part after the PTR by using the same "deemed measures" and many of the field names found in the PTR system. The District's reporting system uses its customer information system and purchasing system to create records of energy savings and costs that are linked directly to customers' buildings. This reporting system came on-line during the fourth quarter of 2009.
- Produce a business plan for conservation, including conservation targets to meet Washington State RPS UPDATE - After extensive study of available conservation measures, the District evaluated the economic potential of the most promising

programs. Using the economic analysis tool mentioned previously, several measures rose to the surface as having the most economic potential. A two-year target was then developed using the NWPCC's Fifth Power Plan Conservation Calculator. A budget and a 10-year plan to meet the RPS standards were proposed. The budget and conservation targets were presented as the "stack" to the District's Board and public through a public hearing process. The stack contained a broad array of conservation measures in the residential, commercial and industrial sectors as well as a low-income component, distribution system efficiencies and federal stimulus programs. During a public hearing on November 16, 2009, Chelan PUD's Board established 10-year and two-year conservation targets as required under the RPS.

- Implement cost-effective conservation programs, which comply with requirements of the Washington State RPS UPDATE - The Board–approved plan from 2009 is part of the District's effort to assure compliance with the RPS. With approval of the 2010 budget on December 7, 2009, conservation staff began finalizing plans for 2010 programs and made final presentations to the Conservation Incentive Committee, a multi-disciplinary management advisory group formed to review conservation incentives and programs and advise the general manager. The programs approved and implemented in 2010 included residential weatherization, CFL distribution, a specialty CFL retail buy-down, low-income weatherization, Energy Star clothes washer and refrigerator incentives, commercial lighting incentives, commercial code review of new buildings and remodels, a resource conservation manager for municipal governments, industrial lighting, industrial evaporative fans (VFD) incentives, industrial fast-acting door incentives for cold storage warehouses and industrial controls at a fruit juice manufacturing plant. The conservation target for 2010 is 1.53 aMW with a two-year target of 3.12 aMW of savings.

Resource Planning

- Use 2008 IRP as a foundation to start internal evaluations of long and short-term contracts in the post 2011/2012 period when current long-term contracts expire UPDATE – The 2008 IRP gave the District a snapshot of the next 11 years (2008-2018) and an indication of the uncertainty around District resource positions and costs. This helped the District focus on robust strategies that would return favorable results given different uncertain outcomes. Additional modeling work has been done (outside of the IRP model) to evaluate strategies for additional power sales contracts consistent with financial policies and the hedging strategy.
- Track the development of the NWPCC's Sixth Power Plan including: UPDATE – The Sixth Power Plan was adopted in February 2010.
    - Conservation potential UPDATE – The District attended NWPCC conservation supply curve meetings throughout the draft period of the Sixth Power Plan. Statewide meetings with other utilities where Sixth Power Plan conservation measures were discussed were also attended. Current plans are to conduct a new CPA that will further address the conservation potential based upon the District's loads, the District's avoided cost and measures available to the District's service territory.
    - Wholesale electric market price forecasts UPDATE – The wholesale electric market price forecast for this progress report was updated to the base case forecast from the Sixth Power Plan. The District understands the

fundamentals behind the Council's forecast scenarios and continues to monitor the variables that impact these forecasts including, the price of natural gas, the cost of new generating resources, the potential cost associated with CO2 regulation, the development of RPS resources surplus to regional needs and regional energy and capacity reserve margin targets.

  - Potential new regional resources and costs UPDATE – Because the District has resources surplus to its retail load through the planning period, potential new resources and related costs have only been followed at a high level based on news of resource projects that other regional utilities are exploring. Resource information in the Sixth Power Plan will be more closely examined for the 2012 IRP.
  - Resource adequacy UPDATE – See next bullet.

- Continue to monitor the development of the Council's resource adequacy standards and utility-specific guidance that is developed and plan for changes in standards UPDATE – To date, no changes have been made to the voluntary adequacy standard for the Northwest that was adopted in 2008 nor has any further utility-specific guidance been released. The Pacific Northwest Resource Adequacy Forum, that developed the standard, has begun work on reevaluating the underlying methodology used to assess resource adequacy. Additionally, the Council and the Forum will continue to participate in WECC's efforts to develop a resource adequacy framework for the West when that effort resumes. The District continues to closely follow the Council and Forum efforts on this topic.
- Continue to track climate change and other environmental legislation, including cap and trade programs, and how they may impact the District's resource portfolio UPDATE – To date, the District is not subject to any cap and trade programs. The momentum around climate change and cap and trade programs has slowed to some degree as the debate continues and other issues have taken precedence. The District will continue to track climate change at the state, regional, and federal level and analyze the potential impacts to the District.
- Continue to update incremental hydro generation estimates in preparation for complying with Washington State RPS requirements beginning in 2012 UPDATE – Preparation for Washington's RPS requirements is ongoing as Chelan PUD continues to evaluate its eligible renewables and prepare the necessary documentation and analyses. The District continues to monitor discussions of legislative changes to Washington's RPS in order to evaluate any potential impacts on its renewable portfolio.
- Implement IRP model upgrades as they become available UPDATE – During the one-year period following the publication of the 2008 IRP, the District had a service agreement for its Resource Portfolio Strategist (IRP) model. No model upgrades were issued by the vendor during this period. The model is currently functioning satisfactorily for Chelan PUD for integrated resource planning purposes. The District may consider pursuing model upgrades with the vendor in the future.
- Research potential methods of performing IRP analyses in more granular time periods UPDATE – Work on preparing model inputs in more granular time periods was begun in 2009 but halted due to time and resource constraints. It is unclear whether more granular time periods would be beneficial to or enhance the results of the long-term modeling periods typical of integrated resource planning. It may, however, benefit the analysis of resource adequacy. This

topic may or may not be revisited in the future.

- Continue to revise and update model inputs as new information becomes available
  UPDATE – All model inputs were reexamined for preparation of the progress report. Essentially all inputs were updated, including loads, the wholesale electric market price forecast, hydro and wind costs and capabilities and conservation resources. Probability distributions and correlations for some of the variables were retained from 2008 that were determined not to have any new or better information that needed to be incorporated. The District will revisit model inputs before completing its 2012 IRP.
- Research and evaluate the potential effects that plug-in hybrid and/or electric cars may impose on the District's retail load
  UPDATE – For this progress report, an analysis was performed to examine the potential impact of PHEVs in Chelan County on the District's retail load. The analysis was based upon assumptions used by the Council in their Sixth Power Plan analysis of potential regional PHEV electric load as well as 2010 published work by Pacific Northwest National Laboratory. Based on the District's analysis, the potential impacts are very minimal during the planning period. Chelan PUD will continue to follow this topic.

Final Remarks

Just as in 2008, Chelan PUD's resource portfolio performed well against the evaluation criteria. The District intends to retain its existing supply-side resources while continuing the increase in conservation levels that is developing a solid foundation in 2010. Of significant focus will be complying with both the renewable resources and conservation portions of the Washington State RPS. Additionally, the District will concentrate on its new hedging strategy and the management of financial risk associated with the District's overall increasing share of its projects that will be happening in the next couple of years with changes in long-term power purchaser contracts.

Chelan PUD's next IRP will be published in 2012.

Appendix A – Modeling Assumptions

Modeling Assumptions and Parameters

The following elements were common to all modeled scenarios:

Resources

Hydro

- To represent the generation associated with stream flow uncertainty, capacity factors were calculated using historical re-regulated stream flow data, 1929-1997, supplied by PNUCC and actual hydro project data from 1998-2009. The capacity factors reflect the reduced generation due to fish spill operations
- Actual hourly hydro project data from 1987-2007 was used to shape the annual capacity factors into more granular time periods. This period was assumed to be most representative of current project operations. This annual shape is constant for every year of the planning period
- Generation is net of all project obligations (i.e., Canadian Entitlement Allocations (CEAs) and encroachments)
- All operational and equipment-related incremental hydro was included
- Rocky Reach – Chelan PUD's share (net of long-term purchaser contracts and proposed slice contracts)
    - 15.13% - through 10/2011
    - 41.96% - 11/2011 through 12/2011
    - 18.96% - 1/2012 through 6/2012
    - 20.46% - 7/2012 through end of planning period
- Rock Island – Chelan PUD's share (net of long-term purchaser contracts and proposed slice contracts)
    - 50% - through 12/2011
    - 27% - 1/2012 through 6/2012
    - 26% - 7/2012 through end of planning period
- Lake Chelan – Chelan PUD's share
    - 100% - through end of planning period
- Costs for O&M, debt service, reserve fund requirements, contractual fees and certain costs for transmission integration facilities were each represented by scenario forecasts

Wind

- To represent the generation associated with wind uncertainty, all available historical Nine Canyon hourly wind generation (2004-2009) was used to calculate capacity factors for the on-peak, shoulder and off-peak time periods
- Current operation of facility (i.e., historical turbine availability rates)
- Costs of O&M, debt service and transmission

Conservation

- Used the quantities from the 10-year plan established for RPS compliance in January 2010 totaling 15 aMW through the period and related costs that were escalated at 10% per year
- All scenarios were modeled with a 11-year ramp rate on all measures

Contracts

Portland General Electric Exchange

- Seasonal exchange contract that expires 2/28/2011
- Swap of summer capacity (June-mid October) for winter energy (November-February)

Alcoa Power Sales Agreement

- Agreement between Chelan PUD and Alcoa where Alcoa can use up to 42 MW of additional power above their project share in order to meet their power requirement that expires 10/31/2011
- The average industrial rate is used to price this additional power (assuming Alcoa remains at a 2 line operation)

Proposed Slices of Rocky Reach & Rock Island

- Potential "slice of the system" contracts as part of long-term hedging strategy
- Slice contracts represent 23% of the capacity and energy of Rocky Reach and Rock Island from 2012-2020
- Slice contracts are subtracted from Chelan PUD's shares of Rocky Reach and Rock Island listed under "Resources" above

Load

- The four load forecasts (low, base, high and base+basePHEV) were each represented by scenario forecasts
- Operating reserve requirements set at 6% of load (varied by scenario forecast)

Market Prices

- Electricity – The NWPCC's "base case" from their Sixth Power Plan published in February, 2010

Transmission

- All market purchase and sale transactions occurred at the Mid-C assuming a liquid market and no transmission constraints
- Costs associated with bringing Nine Canyon Wind generation to Chelan PUD's load servicing area were included in the total cost of the resource

Time-Dependent Variables (e.g., resources, contracts, load, market prices)

- Heavy Load Hours = 6:00 AM to 10:00 PM every day except in July, August and September
- Light Load Hours = all other hours
- Shoulder Hours = 6:00 AM to 12 Noon and 8:00 PM to 10:00 PM in July, August and September
- Peak Heavy Load Hours = 12 Noon to 8:00 PM in July, August & September

Financial Inputs

- All inputs were in nominal dollars
- A discount rate of 7% was used in the net present value calculations of net portfolio cost

Table 3 shows the District's average annual resources for the planning period. The generation is the amount available to serve load under normal hydro conditions and includes the effects of encroachments, fish and other spill, CEA's, the PGE exchange contract, the additional power available under the Alcoa Power Sales Agreement, the long-term power purchaser contracts and the proposed slice contracts.

Table 3 District's Average Annual Resources (aMW)											
	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Net Rocky Reach Gen	82	112	135	144	144	144	144	144	144	144	144
Net Rock Island Gen	166	166	88	86	86	86	86	86	86	86	86
Net Lake Chelan Gen	47	47	47	47	47	47	47	47	47	47	47
Net Nine Canyon Gen	2	2	2	2	2	2	2	2	2	2	2
Conservation	1.53	3.12	4.76	6.45	8.19	10.00	11.77	12.91	13.93	14.95	15.93

Random Variables and Correlations

Res*ource Portfolio Strategist*, the District's IRP model, captures uncertainty in key input variables by utilizing probability distributions and Monte Carlo simulation. Random samples or draws are made from the probability distributions associated with the random variables being modeled. For the District, many potential outcomes exist for each of the following variables:

- Load
- Hydro availability
- Wind availability
- Conservation availability/penetration
- Electric market prices
- Forced outages

During a given "run" of the model, a random time-path is simulated for each uncertain variable. The results of these simulations for each variable were then combined together to create a single iteration. Chelan PUD generated 500 of these iterations for each portfolio scenario so the overall result would encompass a wide range of possibilities thus giving a good representation of the uncertainty surrounding the portfolio. The resulting overall distribution of results reflects the underlying probability distributions and correlations for all the uncertain variables.

There are three components to uncertainty modeling in the model. First, the model uses a highly flexible probability distribution that can easily reflect expectations, variance and excessive skewness and kurtosis. Second, the model can incorporate mean reversion, a statistical property found in many economic variables that are fundamentally driven by some natural process (e.g., weather or stream flows). Finally, the model is able to correlate variables, thus accounting for the relationship among variables.

Table 4 lists the correlations and mean reversion factors used in the progress report modeling. A more detailed description of volatility, correlations and mean reversion for specific key variables is presented next.

Load

For the overall energy sales forecast, a distribution of average monthly temperatures was developed from historical data and a percentage change in load per degree of temperature change was developed. The resulting percentage deviations around the expected weather-normalized load were used to develop weather-related probability distributions for load. There is a slight positive relationship between loads and market prices, whereas when unexpected increases in loads occur, multiple parties enter the market to make system balancing purchases thus putting upward pressure on market prices.

Hydro Availability

Hydro generation variability was developed from historical generation. PNUCC supplied re-regulated project generation data for the time period 1929-1997 and District data was used for the 1998-2009 time period. Statistics were developed from this combined data set and a distribution function representing the annual variability of the historical data was created. Within a model iteration, a different annual generation amount for each project is used for every year of the planning period. This is more representative of historical patterns, rather than assuming one generation level for all years within the planning period. A mean reversion factor was applied to the annual hydro generation. This is reflective of precipitation and weather patterns that often develop over several years at a time. Since the three hydro projects are close in proximity and tend to have the same climatology and experience nearly the same hydrological conditions (e.g., precipitation, snow pack) the generation from all three hydro projects was highly correlated.

Wind Availability

The volatility and intermittency of wind was developed using six years (2004-2009) of hourly data. This volatility was applied to the heavy load, shoulder and light load time periods, differing each month. By applying volatility to the individual time periods, every period within each iteration can have a different generation output. The annual generation was also allowed to vary year to year.

Conservation Availability/Penetration

The volatility of conservation achieved was provided by the Cadmus Group in 2008 based on their extensive experience in the field of conservation. A fairly weak asymmetrical correlation was applied to load and conservation, where the amount of load influences the amount of conservation. A relatively high mean reversion factor was used for conservation, meaning it will deviate little from the average and return quickly when deviations do occur.

Electric Market Prices

The NWPCC's wholesale electric market price forecast was developed using fundamental economic drivers under expected conditions, including average loads based on normal temperatures. Because conditions are often not normal, market price

Table 4
Correlation Matrix and Mean Reversion Factors for Annualized Stochastic Simulations

Random Variable	Mean Reversion Factor	Load	Electric Market Prices	Conservation	Nine Canyon Wind	Rocky Reach	Rock Island	Lake Chelan
Load	-	1	.25	.35	-	-	-	-
Electric Market Prices	.50	.25	1	-	-	-	-	-
Conservation	.90	-	-	1	-	-	-	-
Nine Canyon Wind	.99	-	-	-	1	-	-	-
Rocky Reach	.55	-	-	-	-	1	.99	.99
Rock Island	.55	-	-	-	-	.99	1	.99
Lake Chelan	.55	-	-	-	-	.99	.99	1

volatility was built into *Resource Portfolio Strategist* to reflect what can happen when loads and/or other variables deviate from expected.

Due to changing market fundamentals, annual hydro availability is no longer correlated to annual electric market prices in the model as it was in the 2008 IRP. In recent years, the market has seen both low stream flows and higher market prices simultaneously. If the model allowed for more granular than annual correlations, a price/water correlation in the second quarter of each year (during snow pack runoff) would still generally be appropriate. Load is still correlated with electric market prices as mentioned previously. A mean reversion factor was applied to account for the fact that market prices may drift away from a long-term forecast, but over time, prices tend to revert back to the long-term forecast.

A random "price shock" was expected to take effect in 2.5% of the iterations for each portfolio. The median time from the start of the planning period for the price shock to begin was 36 months and the median duration of the shock was 18 months. The median price spike level was 2.5 times greater than prices under normal conditions. This "price shock" is meant to represent price excursions that can happen similar to that of the Western energy crisis of 2000-2001.

Forced Outages

Although the forced outage rates at the District's hydroelectric projects are very low, a relatively small probability distribution for forced outages was developed and used in the model.

Appendix A – Modeling Assumptions

Appendix B – Washington State Electric Utility Integrated Resource Plan Progress Report Cover Sheet 2010 "Long Form"

Utility Name	**PUD No. 1 Of Chelan County**								
Prepared By	Becky King								
Address	327 N. Wenatchee Ave.								
City	Wenatchee								
State	WA								
Zip	98801								
Phone	(509) 661-4544								
Email	becky.king@chelanpud.org								
Resource Plan Year	**Base Year**			**2015**			**2020**		
From	Jan-09								
To	Dec-09								
	Winter Peak (MW)	Summer Peak (MW)	Annual Energy (MWa)	Winter Peak (MW)	Summer Peak (MW)	Annual Energy (MWa)	Winter Peak (MW)	Summer Peak (MW)	Annual Energy (MWa)
Requirements									
Loads	407.31	219.28	184.53	455.00	243.00	200.90	490.00	261.00	216.50
Exports	-	50.00	2.08						
Total Requirements	407.31	269.28	186.61	455.00	243.00	200.90	490.00	261.00	216.50
Resources									
Conservation/Efficiency				16.33	14.82	10.00	26.12	23.70	15.93
Demand Response									
Cogeneration	-	-	-	-	-	-	-	-	-
Hydro (critical)	515	515	219	454	306	196	454	306	196
Wind	0.39	0.18	2.24	0.00	0.00	2.07	0.00	0.00	2.07
Other Renewables	-	-	-	-	-	-	-	-	-
Thermal - Gas	-	-	-	-	-	-	-	-	-
Thermal - Coal	-	-	-	-	-	-	-	-	-
Long Term: BPA Base Year or Tier 1	-	-	-	-	-	-	-	-	-
Net Long Term Contracts: Other	-18.00	-18.00	-28.00	-	-	-	-	-	-
Net Short Term Contracts	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Imports	-	-	3.33	-	-	-	-	-	-
Total Resources	497.39	497.18	196.57	470.33	320.82	208.07	480.12	329.70	214.00
Load Resource Balance	-90.08	-227.90	-9.96	-15.33	-77.82	-7.17	9.88	-68.70	2.50

The following notes help to describe the numbers in the table above.

- Requirements
  - Loads
    - Peak and annual energy loads are based on the District's Base Load Growth Forecast.
    - Peak and annual energy loads, including the base year (2009), are adjusted for normal weather (i.e. an expected or 1 in 2 peak).
    - Peak and annual energy loads, including the base year (2009), do not include conservation savings.
  - Exports
    - Portland General Electric Exchange

- Resources
  - Hydro
    - For all years, it was assumed that during a single hour winter peak demand period, all projects would be at full seasonal capability. For all years, it was assumed that during a single hour summer peak demand period, 1936-37 PNUCC critical period generation was available to all projects. Values reported are net of encroachments and CEAs.
    - For all years, annual energy was calculated by using 1936-37 PNUCC critical period generation data. Values reported are net of encroachments and CEAs.
    - For all years, hydro is reported net of long-term purchaser contracts and potential slice contracts.
  - Wind
    - Base year (2009) wind data reflects actual Nine Canyon experience in that year.
    - 2015 and 2020 projected peak wind capacity is based on low (95th percentile) hourly Nine Canyon historical generation (2004-2009).
    - 2015 and 2020 projected average annual wind energy is based on low (95^{th} percentile) average annual energy from Nine Canyon historical generation (2004-2009).
  - Net Long Term Contracts: Other
    - Alcoa Power Sales Agreement
  - Imports
    - Portland General Electric Exchange

Acronyms

aarg	Average Annual Rate of Growth
aMW	Average Megawatt
ACES	American Clean Energy and Security Act
APA	American Power Act
BPA	Bonneville Power Administration
CDCAC	Chelan-Douglas Community Action Council
CEA	Canadian Entitlement Allocation
CEJAPA	Clean Energy Jobs and American Power Act
CFL	Compact Fluorescent Lamp
CO2	Carbon Dioxide
CPA	Conservation Potential Assessment
DOE	Department of Energy
EESC	EES Consulting, Inc.
EPA	Environmental Protection Agency
FERC	Federal Energy Regulatory Commission
GHG	Greenhouse Gas
HCP	Habitat Conservation Plan
IRP	Integrated Resource Plan
kW, kWh	Kilowatt, Kilowatt-hour
LED	Light-Emitting Diode
Mid-C	Mid-Columbia
MW, MWh	Megawatt, Megawatt-hour
NPC	Net Portfolio Cost

NPV	Net Present Value
NWPCC	Northwest Power and Conservation Council
O&M	Operations and Maintenance
OFM	Office of Financial Management (Washington State)
PAR	Parabolic Aluminized Reflector
PHEV	Plug-in Hybrid Electric Vehicle
PTR	Planning, Tracking and Reporting (System)
PUD	Public Utility District
RCW	Revised Code of Washington
REC	Renewable Energy Credit
RES	Renewable Electricity Standard
RPS	Renewable Portfolio Standard
VFD	Variable Frequency Drive
WAC	Washington Administrative Code
WECC	Western Electricity Coordinating Council

Glossary

Asymmetric Correlation

See Correlation

Average Annual Rate of Growth (aarg)

The average percentage increase in value of a given item over the period of a year. The energy load forecast is referred to in terms of the average annual rate of growth.

Average Megawatt (aMW)

A 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 (total energy in megawatt-hours divided by the number of hours in the time period).

Avoided Cost

The marginal cost that a utility avoids by not having to acquire one more unit of power whether by producing the power from owned resources, building new resources or purchasing it from another entity.

For evaluating future energy acquisitions, including conservation, Chelan PUD uses a forecast of wholesale power market prices as its avoided cost measure due to its surplus energy resource position.

Base Load Generation Resource

Electric generation plants that run at all times, except in the case of repairs or scheduled maintenance, to at least cover a minimum level of demand on an electrical supply system that exists 24 hours a day through the year.

Benefit/Cost Ratio

The net present value of all of a given conservation measure's benefits divided by the net present value of all the measure's costs over the life of the measure.

Biomass Resource

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. Resulting biogas is recovered and burned for heat and energy production. These biofuels are considered to be short-term "CO2 neutral", meaning they typically remove CO2 from the atmosphere and give up the same amount when burnt.

Block Power Sales

A power sales contract that establishes a fixed amount of energy to be sold for a specific period of time at a fixed price.

Canadian Entitlement Allocations (CEAs)

Energy returned to Canada to fulfill the obligation under the Columbia River Treaty between Canada and the United States for additional water storage constructed in Canada to help regulate hydroelectric generation. Canada is entitled to one half the downstream power benefits resulting from Canadian storage under the treaty.

Cap and Trade

A specific type of emissions trading system where total emissions of a certain pollutant are limited or "capped". Permits are allocated or auctioned up to the set cap and a market allows those participants emitting less than their quota to sell their excess permits to emitters needing to buy extra to meet their cap.

Capacity

The maximum amount of power that a generator can physically produce.

Chelan PUD

In this progress report, all this reference means the legal entity of Public Utility District No. 1 of Chelan County. It is also referenced as the "District".

Climate Change

Any long-term significant change in the "average weather" that a given region experiences. It involves changes in the variability or average state of the atmosphere over durations ranging from decades to millions of years.

Coal-Mine Methane Resource

Methane gas naturally dissipates from coal mining operations both above and below ground. It is recovered and burned for heat and energy production. Burning methane converts it from a highly potent GHG (methane has 22 times the GHG impact of CO2) to CO2, which is much less potent.

Confidence Interval

An estimated range of values, calculated from sample data, which has a specified probability of containing a true value.

Conservation

Any reduction in electric power consumption that results from increases in the efficiency of energy use, production, transmission or distribution (from RCW 19.280: Electric Utility Resource Plans and RCW 19.285: The Energy Independence Act).

Conservation Potential Assessment (CPA)

A study designed to estimate the potential for electricity conservation in a given geographical area.

Correlation

In statistics, it is the indication of the strength and direction of a linear, symmetric relationship between two random variables. It refers to the departure of two variables from independence. Conversely, in asymmetric correlation, one variable is distinguished as being an explanatory or independent variable while the other variable has some level of dependency upon it.

Council

See Power Plan (Fifth, Sixth, etc.)

Demand

The rate at which electric energy is delivered to or by a system at a given instant; usually expressed in megawatts.

Demand Response

Changes in electric usage by end-use customers (e.g., residential, commercial, industrial) from their normal consumption patterns in response to changes in the price of electricity, or to incentive payments designed to induce lower electricity use at times of high wholesale market prices or when system reliability is jeopardized.

Demand-Side Resource

Peak and energy savings from conservation measures, efficiencies and load control programs that are considered a resource because they serve increased demand without obtaining new power supplies.

Dependent/Independent Variable

Dependent and independent variables refer to values that change in relationship to each other. Dependent variables are those that are observed to change in response to independent variables. Independent variables are those that are deliberately manipulated to invoke a change in dependent variables.

Dispatchable Resource

A resource whose electrical output can be controlled or regulated to match the instantaneous electrical energy requirements of the electric system.

Distribution System

The utility facilities and equipment that distribute electricity from convenient points on the transmission system to the end-use customer.

District

See Chelan PUD.

Econometric

The application of mathematical and statistical techniques to economics in the analysis of data and the development and testing of theories and models.

Eligible Renewable Resource

a) Electricity from a generation facility powered by a renewable resource other than fresh water that commences operation after March 31, 1999, where: (i) The facility is located in the Pacific Northwest; or (ii) the electricity from the facility is delivered into Washington state on a real-time basis without shaping, storage, or integration services; or b) Incremental electricity produced as a result of efficiency improvements completed after March 31, 1999, to hydroelectric generation projects owned by a qualifying utility and located in the Pacific Northwest or to hydroelectric generation in irrigation pipes and canals located in the Pacific Northwest, where the additional generation in either case does not result in new water diversions or impoundments (from RCW 19.285: The Energy Independence Act).

Encroachments

When a downstream hydro project is built and increases the tail water elevation of an upstream hydro project, capacity and energy of the upstream hydro project is reduced. To compensate for the loss of capacity and energy, the downstream project delivers energy to the upstream project.

Energy Independence Act

Refers to RCW 19.285, a ballot initiative passed in Washington State in November, 2006. It is otherwise known as the Washington State Renewable Portfolio Standard (RPS.) Under the initiative, utilities with a retail load of more than 25,000 customers are required to use eligible renewable resources or acquire equivalent RECs, or a combination of both, to meet 3% of load by January 1, 2012, 9% by January 1, 2016 and 15% by January 1, 2020. The initiative also required that by January 1, 2010, utilities evaluate conservation resources using methods consistent with those used by the NWPCC and pursue all conservation that is cost-effective, reliable and feasible. Each utility must establish and make publicly available a biennial acquisition target for cost-effective conservation.

Fifth Power Plan

See Power Plan (Fifth, Sixth, etc.)

Fossil Fuels

They are hydrocarbons found within the top layer of the Earth's crust.

Greenhouse Gas (GHG)

Gases that are present in the earth's atmosphere which reduce the loss of heat into space and therefore, contribute to global temperatures through the "greenhouse effect".

Geothermal Resource

Energy from rock and/or water that is heated by contact with molten rock deep in the earth's core. The heat can be extracted and used for space heating or to generate electricity.

Hedging

Establishing positions in the wholesale power markets with the intent of reducing financial risk resulting from uncertain fluctuations in all the variables that affect the District's net wholesale power revenue, of which stream flows, retail load and wholesale power market prices are primary drivers.

Hydro Resource

Facilities used to produce electricity from the energy contained in falling water (river, locks or irrigation systems).

Hydrokinetic (Marine) Resource

Facilities that generate electricity from waves or directly from the flow of water in ocean current, tides or inland waterways.

Incremental Generation

Electricity produced as a result of efficiency improvements completed after March 31, 1999, to hydroelectric generation projects owned by a qualifying utility and located in the Pacific Northwest or to hydroelectric generation in irrigation pipes and canals located in the Pacific Northwest, where the additional generation in either case does not result in new water diversions or impoundments (from RCW 19.285: The Energy Independence Act).

Integrated Resources Plan (IRP)

An analysis describing the mix of generating resources and conservation and efficiency resources that will meet current and projected needs a the lowest reasonable cost to the utility and it ratepayers (from RCW 19.280: Electric Utility Resource Plans).

Intermittent Resource

An electric generator that is not dispatchable and cannot store its fuel source, and therefore, cannot respond to changes in system demand.

Internal Rate of Return

In relation to a project or investment, it is the interest rate at which the net present value of the project costs (negative cash flows) equal the net present value of the benefits (positive cash flows) of the project. In general, the higher the rate of a project's internal rate of return, the more desirable it is to undertake the project.

Kilowatt (kW) and Kilowatt-Hour (kWh)

One thousand watts; the standard measure of electric power consumption of retail customers. A kilowatt-hour (kWh) is a measure of electric energy equal to one kilowatt of power supplied to or taken from an electric circuit for one hour.

Kurtosis

A measure of the "peakedness" of the probability distribution of a random variable. Higher kurtosis means more of the variance is due to infrequent extreme deviations, as opposed to frequent modestly-sized deviations.

Landfill Gas

Methane gas from landfills, created when organic waste decomposes, is recovered and burned for heat and energy production. Burning methane converts it from a highly potent GHG (methane has 22 times the GHG impact of CO2) to CO2, which is much less potent.

Levelized Cost

The constant stream of values that produces the same present value as the non-constant stream of values, using the same discount rate. In this progress report, levelized cost is used to refer to the cost for the NWPCC's 20-year wholesale electric market price forecasts. For the electric market price forecast, the cost is expressed in dollars per MWh. Costs are levelized in real dollars. For example, the amount borrowed from a bank is the present value of buying a house; the mortgage payment including interest on a house is the levelized cost of that house.

Load

The amount of electric power delivered or required at any specified point or points on a system. Load originates primarily at the power-consuming equipment of the customer.

The amount of kilowatt-hours of electricity delivered in the most recently completed year by a qualifying utility to its Washington retail customers (from RCW 19.285: The Energy Independence Act).

Load Forecasting

The procedures used to estimate future consumption of electricity. Load forecasts are developed either to provide the most likely estimate of future load or to determine what load would be under a set of specific conditions (e.g., extremely cold weather or changing demographics).

Mean Reversion

The tendency for a random variable to remain near, or tend to return over time to a long-term average. A variable can have a high or low mean reversion factor depending on how quickly the variable moves back to its average.

Median

In probability theory and statistics, a median is described as the numeric value separating the higher half of a sample, a population or probability distribution from the lower half.

Megawatt (MW) and Megawatt-Hour (MWh)

One thousand kilowatts, or 1 million watts; the standard measure of electric power plant generating capacity. A megawatt-hour (MWh) is a measure of electric energy equal to one megawatt of power supplied to or taken from an electric circuit for one hour.

Monte Carlo Simulation

In the 1940's, scientists at Los Alamos National Laboratory created a computer program to create random combinations of known, uncertain variables to simulate the range of possible nuclear-explosion results. They nicknamed the program Monte Carlo, after that city's famous casinos. The District's resource portfolio/risk analysis model, *Resource Portfolio Strategist*, uses Monte Carlo simulation to model the risk and correlations between key variables, such as hydro availability, conservation and load and market prices.

Net Portfolio Cost

Net portfolio cost for this progress report is total costs for Chelan PUD's resources (including hydro, wind and conservation) plus the cost associated with purchasing power in the wholesale spot market, netted with revenues from any and all power sales, including those in the wholesale spot market.

Net Present Value

The difference between the present value of a stream of benefits or income and that of a stream of costs. It calculates future value in today's dollars.

Nominal Dollars

Dollars that are paid for a product or service at the time of the transaction. Nominal dollars are those that have not been adjusted to remove the effect of changes in the purchasing power of the dollar (inflation); they reflect buying power in the year in which the transaction occurred.

Northwest Power and Conservation Council (NWPCC)

See Power Plan (Fifth, Sixth, etc.)

Peak Demand (Load)

The maximum demand imposed on a power system or system component during a specified time period.

Planning Reserve Margin

Capacity at a utility's disposal that exceeds its expected peak demand by a certain percentage.

Plug-In Hybrid Electric Vehicle (PHEV)

A vehicle with rechargeable batteries that can be restored to full charge by connecting a plug to an external electric power source. A PHEV shares the characteristics of both a conventional hybrid electric vehicle, having an electric motor and an internal combustion engine, and of an all-electric vehicle, also having a plug to connect to the electrical grid. The combustion engine in a PHEV works as a backup when the batteries are depleted.

Portfolio

A set of supply-side and demand-side resources currently or potentially available to a utility.

Power Plan (Fifth, Sixth, etc.)

A 20-year electric power plan that guarantees adequate and reliable energy at the lowest economic and environmental cost to the Northwest. A new plan is developed every five years as a result of the Northwest Power Act of 1980 that authorized the formation of the Northwest Power and Conservation Council (NWPCC or the Council.) The Sixth Power Plan, the most recent, was adopted in February 2010. The NWPCC is also mandated to develop a fish and wildlife program to protect and rebuild populations affected by hydropower development in the Columbia River Basin and conduct an extensive program to educate and involve the public in the their decision-making processes.

Probability

The likelihood or chance that something is will happen.

Probability Distribution

Describes the values and probabilities associated with a random event. The values must cover all the possible outcomes of the event, while the total probabilities must sum exactly 1, or 100%.

Progress Report

A requirement of RCW 19.280.030: Electric utility resource plans, which reads “At a minimum, progress reports reflecting changing conditions and the progress of the integrated resource plan must be produced every two years…”

Real Dollars

Dollars that have been adjusted to remove the effects of inflation. Real dollars are sometimes called uninflated dollars.

Regression Analysis

A technique used for the modeling and analysis of numerical data consisting of values of a dependent variable (response variable) and of one or more independent variables (explanatory variables).

Renewable Energy Credit (REC)

A tradable certificate of proof of at least one megawatt-hour of an eligible renewable resource where the generation facility is not powered by fresh water, the certificate includes all of the nonpower attributes associated with that one megawatt-hour of electricity, and the certificate is verified by a renewable energy credit tracking system selected by the department (from RCW 19.285: The Energy Independence Act).

Renewable Portfolio Standard (RPS)

A regulation that an electric power provider generate or purchase a specified percentage of the power it supplies/sells from renewable energy resources. Washington State's RPS is codified in RCW 19.285: The Energy Independence Act.

Renewable Resource

A resource whose energy source is not permanently used up in generating electricity.

Electricity generation facilities fueled by: (a) Water; (b) wind; (c) solar energy; (d) geothermal energy; (e) landfill gas; (f) biomass energy utilizing animal waste, solid organic fuels from wood, forest, or field residues or dedicated energy crops that do not include wood pieces that have been treated with chemical preservatives such as creosote, pentachlorophenol, or copper-chrome-arsenic; (g) byproducts of pulping or wood manufacturing processes, including but not limited to bark, wood chips, sawdust, and lignin in spent pulping liquors; (h) ocean thermal, wave, or tidal power; or (i) gas from sewage treatment facilities (from RCW 19.280: Electric Utility Resource Plans).

Means: (a) Water; (b) wind; (c) solar energy; (d) geothermal energy; (e) landfill gas; (f) wave, ocean, or tidal power; (g) gas from sewage treatment facilities; (h) biodiesel fuel as defined in RCW 82.29A.135 that is not derived from crops raised on land cleared from old growth or first-growth forests where the clearing occurred after December 7, 2006; and (i) biomass energy based on animal waste or solid organic fuels from wood, forest, or field residues, or dedicated energy crops that do not include (i) wood pieces that have been treated with chemical preservatives such as creosote, pentachlorophenol, or copper-chrome-arsenic; (ii) black liquor byproduct from paper production; (iii) wood from old growth forests; or (iv) municipal solid waste (from RCW 19.285: The Energy Independence Act).

Resource Adequacy

A measure defining when a utility has sufficient resources to meet customer needs under a range of conditions that affect supply and demand for electricity.

Resource Mix

The different types of resources that contribute to a utility's ability to generate power to meet its loads.

Scenario

A possible course of future events. In the progress report, scenarios are used to compare the District's existing portfolio of generating resources under a range of possible future conditions including: various load forecasts and various hydro production cost forecasts.

Seasonal Exchange

An agreement between two electricity suppliers to send each other electricity at different times, so they can shape their resources to fit customer demand. Such agreements work best between suppliers whose peak demands occur in different seasons. For example, Chelan PUD usually has surplus energy during the summer while its heaviest load is in the winter. Other utilities may be the reverse of that.

Shape

Refers to the nature of power generation capability and loads to change in quantity over time; changing from day to day and month to month.

Sixth Power Plan

See Power Plan (Fifth, Sixth, etc.)

Skewness

The degree to which a probability distribution departs from symmetry about its expected, or average, value.

Slice Power Sales

A power sales contract for a specific percentage share of a generation project's capacity and energy for a specific period of time at a fixed price (i.e., there is no guarantee of the amount of energy that will result from the contract for resources such as hydro and wind where the fuel is driven by nature).

Solar Resource

The generation of electricity from sunlight. This can be direct as with photovoltaics, or indirect as with concentrating solar power, where the sun's energy is focused to boil water which in then used to provide power.

Substitute Resource

Reasonably available electricity or generating facilities, of the same contract length or facility life as the eligible renewable resource the utility invested in to comply with chapter 19.285 RCW requirements, that otherwise would have been used to serve a utility's retail load in the absence of chapter 19.285 RCW requirements to serve that retail load with eligible renewable resources (from WAC 194-37: Energy Independence).

Supply-Side Resources

Those power resources that come from a power generating plant or facility.

Surplus Energy

Energy that is not needed to meet a utility's load or contractual commitments to supply firm or non-firm power.

Transmission System

Often referred to as the “grid”, it is the system of electrical lines that allows the bulk delivery of electricity to consumers typically between a power plant and a substation near a populated area. Due to the large amount of power involved, transmission normally takes place at high voltage (110 KV or above) and because of the long distances often involved, overhead transmission lines are usually used.

Waste-to-Energy Resource

Incineration process in which solid waste is converted into thermal energy to generate steam that drives turbines for electricity generators.

Wastewater-Treatment Gas Resource

Methane gas given off in the digestion of sewage, is recovered and burned for heat and energy production. Sewage gas consists of approximately 66% methane and 34% CO2. Burning methane converts it from a highly potent GHG (methane has 22 times the GHG impact of CO2) to CO2, which is much less potent.

Weather-Normalized Load

Actual energy load data that has been mathematically adjusted to represent an energy load that would have occurred in an average weather year.

Wind Resource

Energy generated when wind turns the blades of a wind turbine which drive a generator. The longer the blades and the faster the wind speed (up to a point), the more electricity that is generated.