EUGENE WATER AND ELECTRIC BOARD

2011 INTEGRATED ELECTRIC RESOURCE PLAN

January 3, 2012

Acknowledgements

EWEB's 2011 Integrated Electric Resource Plan was developed through a team effort including input from EWEB customers and staff, as well as Northwest Power and Conservation Council staff. EWEB would like to express its appreciation to everyone who contributed to this effort.

IERP Community Advisory Panel

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Executive Summary

Overview

EWEB's Integrated Electric Resource Plan (IERP) serves as a roadmap to guide decisions for how the utility will meet the energy needs of our customers over the next two decades, and to identify specific actions to take over the next five years. The primary purpose of the IERP is to set a strategic path that will meet forecast demand for power while minimizing risks. The 2011 IERP uses a Triple Bottom Line (TBL) framework to consider the economic, social, and environmental aspects of alternative strategies. The TBL includes both quantitative and qualitative information to encourage a more comprehensive and holistic consideration of benefits and impacts of different alternatives.

In 2011, EWEB celebrated its 100th anniversary as a publicly owned and operated water and electric utility. One of the utility's celebrated achievements is a power portfolio almost unique in the country given its large composition of renewable resources. Hydroelectric generation (hydro) makes up the majority of EWEB's portfolio. Other resources include conservation, biomass, wind, and solar photovoltaic (PV) energy. The biggest resource addition to EWEB's portfolio over the last thirty years has been conservation (energy efficiency).

Two key questions addressed in an IERP are:

- "*Will existing power resources be sufficient to meet future customer needs?*"
- "*If we need to add resources, what type should EWEB invest in?*"

This year, two important nuances were added to the power adequacy questions:

- *"Will existing power resources be sufficient to meet future customer needs during the time of peak usage across the system?"*
- *"Does EWEB's existing power portfolio have sufficient flexibility to respond to the emerging issue of variable resource integration?"*

The need to consider resource flexibility and peak time demand added new dimensions to the planning process. Prior resource plans focused on evaluating resource needs on a month-average or annual-average basis. Customer demand can look very different at the "peak hour" than it does on average over a month (think about all those water heaters kicking on at 7a.m.). Historically, peak system needs have been less of a concern than average needs due to the large proportion of hydro generation in the region. However, operating constraints and continued growth in energy use have begun to change this picture across the Northwest. In addition to these regional shifts, EWEB lost about 100 megawatts (MW) of peak capacity and 44 MW of firm average energy under the new Bonneville Power Administration (BPA) power purchase contract. As a result, it was important that this plan evaluate whether or not the utility has sufficient hourly peaking resources, in addition to average monthly resources.

Flexibility considerations stem largely from the addition of thousands of megawatts of wind generation across the region. Since wind is an intermittent resource, planning to backfill power supplies when the wind isn't available adds a level of complexity to regional planning and operations that did not previously exist.

Customer Demand and Scenario Analysis

The 20-year, base case forecasts of both average and peak customer demand show that under most circumstances, EWEB's existing power portfolio is surplus to customer load until the 2020s. Only during an extreme cold snap, which occurs roughly one in ten years, would existing resources be unable to meet forecast peak hourly customer demand. Other scenarios which could prompt the need for new resources sooner would be the addition of a new large customer load to the EWEB system or the loss of a large generating facility used to serve EWEB customers.

In addition to the load variability and weather-related risks noted above, other key elements of forecast uncertainty were reflected in the planning process, namely wind and hydroelectric power availability, natural gas price risk, and carbon tax policies. Each element of uncertainty must be separately forecast and modeled since each significantly impacts both the generating cost and market value of EWEB power. To conduct these analyses, EWEB staff licensed the 'Aurora' planning software tool used to model generation availability, customer loads, and a range of uncertainties over the 20-year planning horizon. Using the model, each potential resource was evaluated with 540 unique combinations of the uncertainties listed above to assess performance under multiple potential futures and help select alternatives with both the lowest cost and risk.

As in the past, staff has relied heavily on the Northwest Power Planning Council's 'Sixth Power Plan' for resource cost and operating characteristics data. In its sixth iteration, the regional power plan once again found that conservation is forecast to be the least-cost, least-risk resource when compared to generating resources. EWEB has repeatedly found similar results. However, to ensure a robust EWEB-centric evaluation, the following additional resource options were evaluated for this IERP:

- Wholesale Market Purchases (short-term and market options)
- Wind
- Utility-scale PV (local)
- Concentrating Solar Thermal (remote)
- Natural Gas Peaker Plant
- Biomass (combined heat/power)

Only commercially available technologies that were deemed viable for the region were analyzed.

Triple Bottom Line Analysis and Public Process

In addition to the extensive modeling conducted to generate facts and figures for use in this IERP, two other critical efforts were undertaken to help ensure EWEB has comprehensive and balanced information when making its final Board recommendations. These included both the use of a Triple Bottom Line (TBL) framework and a robust public engagement process to help inform the analysis.

TBL is an approach to decision evaluation that takes into account more than just financial costs and benefits. In particular, it serves to additionally recognize and frame the relevant environmental and societal costs and benefits associated with a particular course of action. In 2010, the EWEB Board adopted a Sustainability Policy to use the TBL framework in decisions such as these, which have broad implications to more than just the 'bottom line'.

EWEB also sponsored a six-month long public process, within which a group of customers were selected to learn a great deal about the electricity resource planning and weigh in with their priorities, values, and concerns. This information and dialogue provided valuable insight into the plan's development and greatly influenced its outcome. In addition, EWEB conducted an online survey, held two topical public meetings, and made the draft report available online to help enable even wider participation in the process.

Key Findings and Strategies

Energy Efficiency

EWEB is a nationally recognized leader in energy conservation, acquiring about 65 average megawatts (aMW), or 14 percent of EWEB's current load requirements, of conservation since its program began. EWEB has a longstanding policy that prioritizes cost-effective conservation as its preferred resource strategy. The 2011 modeling and TBL assessment not only confirmed this premise, but helped shape the adoption of an unprecedented target for EWEB in the 2011 IERP: to meet all projected load growth for the next 20 years through conservation. This recommendation was taken forward in August of this year and the EWEB Board of Commissioners concurred with the strategy.

Demand Management

The recommended strategy also included another new milestone: that EWEB begin building its capabilities to deliver demand management and peak reduction programs over the next five years. As most renewable generating resources are unable to meet the region's growing need for flexibility and peak hourly demand, programs to encourage customers to shifts their usage to off-peak times, i.e. demand management, may prove to have lower cost and lower environmental impacts than pursuing new 'peaking' generating resources. One of the goals for this IERP is to assess technologies and participate in pilot programs to test customers' willingness to partner with EWEB to manage peak loads.

New Large Load or Loss of Resource Scenario

In the event a new, very large load locates in Eugene, EWEB surplus power and conservation acquisition could be insufficient to meet demand. The analysis of potential new resources found that market purchases would be the most prudent strategy to serve that need over the next five years. Overall, no generating resources were found to be cost-effective over the long-term and economic performance was highly dependent on whether a carbon tax (or "cap-and-trade" policy) is ultimately levied.

Going Forward

Because EWEB is surplus power and a carbon tax does not appear likely in the near term, the recommended strategy under this IERP is to extend the ability of EWEB's existing resources to serve both peak and average customer demand by: 1) meeting new load growth with conservation and 2) deploying demand management programs to address new peak and flexibility requirements. This strategy requires no long-term commitments for new generating resources over the next five years, thereby minimizing the financial risk to the utility associated with having more power at times of the year when the region is already surplus, especially given the backdrop of a soft economy.

Recognizing the tremendous change and uncertainty facing utilities today, part of EWEB's internal implementation plan will be to continue to monitor key assumptions and risks, update load and price forecasts, and stay current on regional affairs that will impact future demand and supply realities. This recommended strategy best serves to create and enhance customer value, while also preserving EWEB's ability to make prudent resource investments if and when market and other conditions change.

For more information on EWEB's 2011 IERP, please see www.eweb.org/2011ierp.

Introduction

What is the purpose of an Integrated Electric Resource Plan?

An Integrated Electric Resource Plan (IERP) serves as a roadmap to guide decisions for how the utility will meet the energy needs of customers over the next two decades and to identify specific actions to take over the next five years. The primary purpose of the planning effort is to set a strategic path for meeting projected demand for power while minimizing the risks associated with resource acquisition and delivery of power.

The IERP is about the future, but starts with the present by first assessing EWEB's current power supply portfolio and customers' need for power. Next, 20 year forecasts of power generation and customer usage are developed to predict when additional resources may be needed. Last, if more power will be needed, alternative strategies for meeting that need are evaluated.

An IERP is not a stand-alone document. It must logically tie to other planning and implementation plans throughout the organization. One of EWEB's adopted goals in its 2011 Strategic Plan is to "Deliver Value for Generations". The IERP, which reflects long term strategy decisions and contemplates financial commitments for new power resources, is a fundamental component to achieving this goal. However, delivering value has broader meaning than simple economics. As with past IERPs, EWEB considered a range of other important values during the planning process, such as potential environmental impacts and social implications. In the 2011 IERP, EWEB formalized the inclusion of such considerations through a Triple Bottom Line (TBL) framework, which documents how the economic, social, and environmental aspects of alternative strategies were evaluated.

The utility's previous IERP was adopted in 2004. EWEB is not required to prepare an IERP by any state of federal law and the utility did not necessarily *need* to develop a new power resource plan because the utility has surplus generation sufficient to last over a decade. However, several key conditions have changed since the last IERP and looking forward more challenges to EWEB, and the electric industry in general, loom on the horizon.

Technology-driven changes such as the next generation of electric vehicles and more customer-owned, distributed generation could lead to our customers purchasing significantly more or less energy from EWEB in the future. Local and national economic conditions drive both EWEB customers' need for power, as well as the market value of that power. The emergence of renewable portfolio standards and tax incentives across the country as well as the potential for carbon regulations are examples of regulatory impacts to the utility. The dramatic build up of wind generation has created a large surplus in the region, new challenges to integrate the intermittent power supply into the regional portfolio, and greater market price volatility. Climate change models are predicting greater variability of hydro generation as well - wet years will get wetter and dry years will get dryer. All of this creates more uncertainty in forecasting.

In short, the changes over the next 20 years could exceed the changes experienced by EWEB over its first century of service. By developing a new IERP, the utility has the opportunity to assess such uncertainties and risks and analyze how these may change customer need for power over the coming decades.

It is important to recognize that an IERP is not a recipe that lays out the exact ingredients to achieve a desired result. To be an effective planning document, it must allow EWEB to be responsive when forecasts change and adaptive when new risks appear. In this way, the IERP analysis is intended to help set overall goals and outcomes for the power supply portfolio and to select preferred strategies to help EWEB to meet those goals. By focusing on the desired outcomes, EWEB maintains the flexibility to choose between investing in resources available today or holding off in order to consider emerging technologies that may appear in the future.

As a matter of practice, EWEB does not rely on the forecasts and strategies developed in any IERP for the full 20-year planning horizon. Instead, plans have been updated roughly every five years to ensure that forecasts and strategies reflect changing conditions. The focus of the 2011 IERP thus became developing strategies and actions that EWEB can take for the next five years to support its commitment to our customers' energy future, while maintaining the path toward longer term objectives.

Road map to the 2011 Integrated Electric Resource Plan

In this plan you will find the presentation of key assumptions, scenarios alternatives, and general planning approach and findings used to develop staff's recommendation. You will also find a review of the public engagement process EWEB used to help shape the plan findings, along with an overview of the TBL framework used in the evaluation. The plan provides some history of EWEB loads and resources to help provide context for forecasts and the major uncertainties EWEB faces. The results are summarized in a simplified TBL table. Finally, this plan ends with an overview of next steps to provide guidance for how staff will use and continue to develop this plan going forward.

Public Involvement in the IERP

As a publicly-owned utility, EWEB's Board and management are committed to engaging its community in energy planning. Community involvement was formalized with the first IERP process in 1990. The last 20 years of power resource acquisitions have been made based on planning efforts influenced by EWEB customers. Community engagement doesn't just imply that our customers support the direction of the resulting resource plan; it means that customers help shape the thinking that creates the plan. In 2011, staff sought to continue this tradition of encouraging interested community members to participate in the planning effort and offer informed input to the EWEB Board.

To help achieve this objective, a community advisory panel was selected as one of the main components of our engagement efforts. The intent was not to establish a technical committee that would delve into the modeling assumptions and analysis work, but rather to have representative group of EWEB customers act as a sounding board on key elements of the plan and help staff identify the issues that matter most to customers. To ensure a well-rounded applicant pool, staff sent out a press release seeking applicants to serve on the IERP community panel and canvassed for participants among relevant partner agencies and community organizations. Over 50 responses to the solicitation were received. In evaluating the applications, staff considered the following criteria:

- Relevant background/experience
- Community connection/public involvement
- Representation of diverse perspectives/customer types
- Potential for perceived conflict of interest

The applicant pool was rich in highly educated and experienced candidates. The goal was a group of 11 to 13 participants who represent different customer groups (residential, commercial, industrial), agency partners (City of Eugene), and stakeholder interests (social justice, environment, climate change, low income, economic development, green technology). Staff also sought to introduce some new voices to the discussion and to make sure the average customer had a seat at the table. Distribution across age, gender, and geographic location was also considered.

Ultimately, 12 people were invited to participate on the panel. Non-selected applicants were added to the interested parties (IP) list and were sent materials developed for the panel meetings. During the process, the IP list grew to about 100 people who received email notifications of all meetings and were invited to related events.

The main charge of the IERP Community Advisory Panel was to provide feedback to staff, and ultimately the Board, on three questions:

1. *What conservation strategy should EWEB adopt for the next five and 20 years?*

2. *What economic, environmental and social attributes are most important when considering new resource acquisitions?*

3. *What goals or benchmarks should be established in the IERP and what metrics should be used to measure progress towards these goals?*

A professional facilitator managed the meetings and helped maintain independence between the work of the panel and staff. The group's decision-making process was advisory in nature, with each panelist contributing his/her own opinion and perspective rather than voting on any given topic. Six meetings were held between March and September of 2011; all were publicly noticed and included an opportunity for public input. A content-rich webpage was created containing all meeting agendas, minutes, background material and presentations.

Key findings from IERP online survey

• 85 percent supported conservation at current or higher levels; a majority preferred more conservation as a future strategy.

• 50 percent thought conservation was the best way to address a new large load. Fewer than five percent wanted EWEB to use power purchases as the only way to meet new loads, but 30 percent said to "do what's most cost-effective". A number of respondents offered other strategies including a combination of conservation and power purchases, requiring new customers to use most efficient building techniques, and/or including on-site renewables.

• 81 percent said they would be willing to pay more to facilitate conservation. Of these, a majority favored a $5 monthly bill increase over a $10 increase.

• When asked which characteristics are most important for choosing new resources, environmental impacts and contribution to climate change were valued the highest, with cost and local power as lower priorities.

In addition to the Community Advisory Panel, a brief electronic survey was created to enable more customers to weigh in on the topic. In all, two-hundred and six people completed the online survey, which was available for about three weeks and advertised in numerous venues, including the *Register Guard*. As survey participants were self-selecting, the results were not intended to be statistically valid, but rather provide another way to gather feedback from interested community members and to share those perspectives with the panel.

Two public education events were held during the plan's development. In July, panelist Julie Daniel and EWEB Power Resource Division Director, Clay Norris, were invited to speak at the City Club of Eugene on this topic. Later in October, EWEB hosted a public event titled, "Our Energy Future: Together We're Powerful." This event, attended by about 60 community members, featured three regional energy experts who discussed major paradigm shifts in the utility industry and how customers can get to play a part in meeting energy needs in the future. A world café process followed the panel presentation, allowing participants to share their ideas on priority issues, including what role customers can play to make wiser use of our energy resources.

Triple Bottom Line Framework

In 2010, the Board adopted a sustainability policy that called for using a Triple Bottom Line (TBL) framework when making significant decisions. A TBL analysis considers the economic, social, and environmental aspects of alternative strategies, which helps to identify benefits and risks of those strategies. Sometimes there is one strategy that is preferable in all three aspects of the TBL. More often, however, a strategy has a mix of positive and negative impacts. A TBL approach helps clarify the trade-offs faced when choosing among alternatives and facilitates identification of mitigation opportunities to reduce potentially harmful impacts of otherwise desirable strategies. This report presents both the TBL analysis and the context that help support staff's recommended strategies.

Staff developed a list of the key issues to consider when comparing potential energy resources, ensuring that all three aspects of the TBL (social, environmental and economic) were represented and reviewed that list with the Community Advisory Panel. A summary of the issues is presented below in alphabetical order.

Affordability, Equity and Access - New resources typically cost more than legacy resources, but they should not be so expensive as to cause a large rate increase. Conservation and distributed generation programs generally require participants to have money to invest in projects.

Construction Risk - A preferred new resource would have a clear path to construction including land availability, permitting, and a relatively short construction lead time. Lead times can be impacted by public approval and permitting processes, as well as actual construction time. Newer technologies may have a higher hurdle to receive approvals, although location can also be an important variable.

Flexibility - Because EWEB's purpose is to serve the electricity needs of its customers, new resources are required which can generate at times when existing resources cannot adequately meet customer demand. A preferred new resource could be controlled to only generate when needed or economic to do so. Currently, EWEB relies on the wholesale power market to balance supply and demand. A flexible resource would reduce supply deficits that require market purchases to augment and not add resources in times when EWEB is already surplus.

Local - Local generation and conservation can provide jobs and keep money in the local economy. It can also improve reliability by reducing dependence on the regional transmission grid.

Peaking - Because EWEB foresees a potential deficit of resources to meet extreme winter peaks, a preferred resource would be able to produce power at times of system peak. Not all flexible resources can promise this outcome.

Portfolio Diversity - A diverse power portfolio helps to reduce EWEB's financial risk. Currently, EWEB gets the majority of its power from the regional hydro system, which has maximum output in winter and spring. EWEB's second biggest resource is wind located in the Columbia River Gorge, which yields maximum output in spring and summer, predominately at night. A preferred new resource would produce power at other seasons and times. EWEB's customer demand is actually highest in winter months, during the mornings and evenings..

Reduced Environmental Impacts - All generation, including renewable generation, has environmental impacts, so analysis of energy resources requires comparing resources to each other. Conservation is the best resource for reducing environmental impacts as no generation or transmission is required. Carbon reduction benefits are a quantifiable aspect of environmental impacts that are included in the TBL results.

Reliability - A reliable resource has few outages due to either breakdowns or lack of fuel, including renewable fuels like wind and solar radiation. Additionally, resources that require lengthy transmission lines to connect to the regional transmission grid or to EWEB's system have lower reliability than resources with short lines for interconnection.

Scalable - Scalable means that EWEB can acquire as little or as much power as it needs. Most of the strategies evaluated for the IERP included scalable resources.

Where possible, metrics were developed to help quantify the costs and benefits of alternative approaches. Certain metrics required complex quantitative analysis, such as cost-benefit ratios, expected rate increases, and carbon emission reductions. Other metrics relied on spreadsheet calculations using simplified assumptions, such as the local job creation estimates. Finally, some metrics are purely qualitative evaluations, such as whether a project aligns with community values or has local aesthetic impacts.

To evaluate the complex quantitative metrics, staff licensed the AURORAxmp® (Aurora) power planning software to evaluate resource portfolios using scenario analysis. Aurora simulates the operation of the regional power system as well as EWEB's power resource portfolio as part of the regional grid. Aurora tracks total generation, costs and emissions associated with EWEB's power portfolio (values which are important to six out of nine of the above listed attributes).

EWEB Power Portfolio

EWEB celebrated its 100th anniversary as a public water and electric utility in 2011. Starting with the Walterville hydro-electric facility in 1911, EWEB has been acquiring resources for the last century to meet the needs of its customers. Those early hydro resources and an ongoing contract with the Bonneville Power Administration (BPA) have provided a legacy of low-cost, low-carbon power that has benefited our community for decades. Over the last 20 years, EWEB has diversified its power portfolio by acquiring wind, biomass, and solar resources, but the largest addition has come from energy efficiency programs. Figure 1 provides a chronology of EWEB resource additions by decade.

Figure 1. EWEB Resource Acquisition Chronology

Time Period	EWEB Resource Acquisition by Decade
1910s	Walterville Hydro
1930s	Leaburg Hydro, Steam Plant
1940s	First BPA contract
1950s	Priest Rapids and Wanapum Hydro
1960s	Carmen-Smith and Trailbridge Hydro
1970s	Weyerhaeuser (International Paper) Co-generation
1980s	Energy Conservation, Smith Falls Hydro
1990s	Energy Conservation, Stone Creek Hydro, Foote Creek Wind
2000s	Energy Conservation; State Line, Klondike-III and Harvest Wind; Solar PV
2010s	Energy Conservation, Solar PV, Metro Wastewater Biogas, Seneca Biomass

Figure 2 below shows the 2012 forecast generation for EWEB's power portfolio as measured by annual firm aMW, expected aMW and peak MW capacity. Firm represents a reliable level of generation that EWEB can depend upon receiving, a criterion historically used for planning purposes. For hydro generation resources, firm represents the amount of energy forecast to be produced during the worst droughts. Other power generating technologies have firm generation levels that depend on different factors, such as the average wind speed over a year or rated capacity less planned and unplanned outages. Actual generation almost always exceeds planned firm.

Expected generation represents average annual generation, which means that half of the time EWEB receives less than the expected amount and half of the time it receives more. Expected generation is not as reliable as firm generation. The difference between firm and expected generation is shown in Figure 3 below as "surplus energy". Peak capacity reflects the maximum amount of energy a facility is capable of generating. Some generating resources have the ability to ramp up to peak capacity when needed, while others have performance profiles that are weather dependent.

It is important to note that Figure 2 does not include EWEB's accumulated energy conservation resources, which now totals about 65 aMW of resources that EWEB has not had to add over the last 30 years. Figure 3 below shows EWEB's current power supply portfolio by technology, including accumulated conservation savings and surplus energy. For more information please see EWEB's electric resource portfolio at www.eweb.org/resources/portfolio.

Figure 2. EWEB Generating Resources Today

Existing EWEB Resource Capabilities				
EWEB Resource	**Type**	**Firm aMW**	**Expected aMW**	**Peak MW**
BPA	90% hydro	248.9	291.4	440
Carmen-Trail Bridge	hydro	19.8	29.8	92
Leaburg-Walterville	hydro	14.4	19.6	25
Smith Falls	hydro	5.4	8.9	38[1]
Stone Creek	hydro	5.4	7.2	12
Grant County Hydro	hydro	1.4	1.8	2
Foote Creek	wind	1.9	2.3	9[1]
State Line	wind	5.3	6.2	25[1]
Klondike-III	wind	7.0	8.1	25[1]
Harvest Wind	wind	5.0	6.0	20[1]
Seneca CHP	CHP[2] biomass	16.3	16.7	19
International Paper	CHP 60% biomass/ 40% NG	7.3	7.3	13
Metro Wastewater	CHP biomass	0.6	0.6	0.8
Wauna[3]	CHP biomass	0	0	0
Distributed Generation	mostly Solar PV	0.3	0.3	3.0[1]
Total Resources			406.2	721
Total *Reliable* Resources		338.9		606

Even with past conservation savings and recent wind and biomass additions, the portfolio is still dominated by hydro because of EWEB's large power purchase contract with BPA, combined with EWEB's own hydro resources. The output of EWEB's share of four wind projects and three cogeneration projects total 10 percent of EWEB's portfolio, while conservation represents 14 percent. Surplus energy presently makes up an additional 15 percent of the portfolio.

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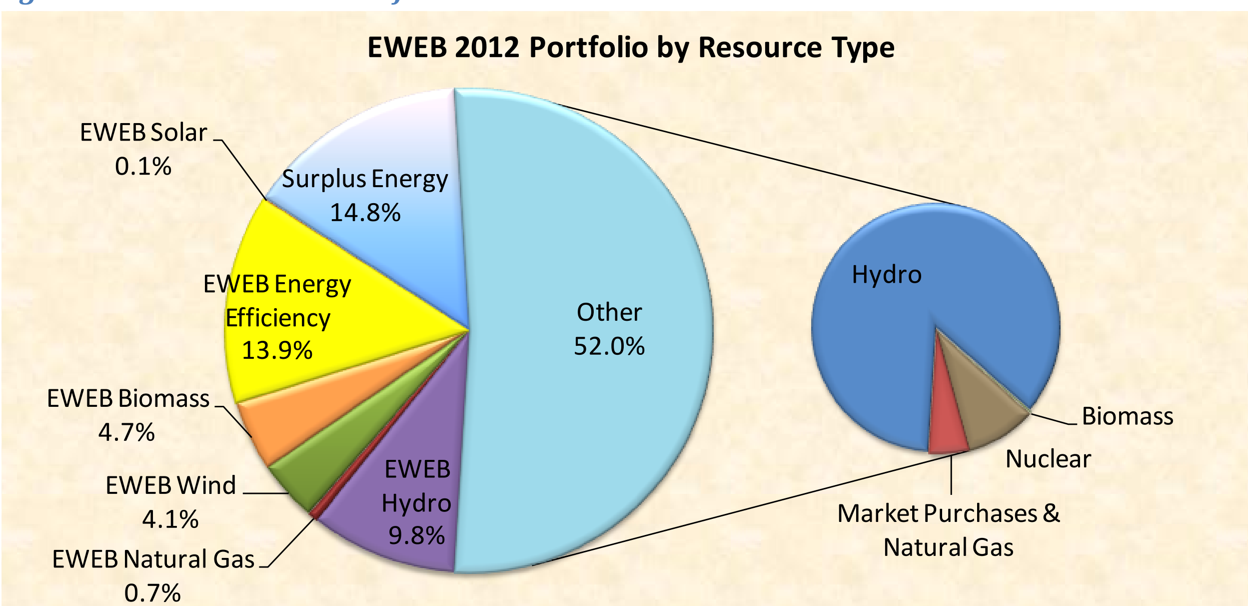
[1] These resources typically do not generate at the time of EWEB's peak load, and are excluded from the Reliable Capacity calculation used to assess EWEB's ability to serve its peak load.

[2] CHP, or combined heat and power, is an efficient technique to generate electricity because it reuses waste heat from industrial processes to run a turbine. CHP is also known as cogeneration, or *cogen* for short.

[3] The Wauna cogen is a 20 aMW biomass CHP project located at the Georgia-Pacific paper mill near Clatskanie, Oregon that was completed in 1996. EWEB and the Clatskanie PUD own it jointly. Steam for the mill comes from burning biomass byproduct produced at the mill supplemented with natural gas. Wauna's generation was sold to BPA under a 20 year contract until 2016. EWEB and Clatskanie will each receive half the output from 2016 through 2021, when our lease contract with Georgia-Pacific expires.

Over 50 percent of EWEB's power is delivered through its contract with the BPA. This contract was recently renewed and is effective until 2028. Compared to the previous contract, EWEB lost both peaking capacity and firm energy (about 100 MW and 44 MW respectively). The new BPA contract has two main components: 'Slice' and 'Block'. The Block represents a fixed quantity of power within a given month which BPA is obligated to deliver. The block of energy provided varies month-by-month based on EWEBs historic monthly load shape. Under the Slice part of the contract, EWEB receives a percentage of what the system produces which provides flexibility over when power is generated. Because the Slice and EWEB-owned hydro fluctuates depending on availability of water, EWEB plans resource acquisitions based on meeting needs even in a drought. This means that in all but the driest years, additional energy is available. This additional energy is often referred to as "surplus energy" since the total amount varies from year to year. A more detailed description is available at www.eweb.org/public/documents/ierp/BPA_contract.pdf.

Figure 3. EWEB Resource Portfolio



Over the past decade, BPA costs have increased due to the replacement of aging infrastructure and expenses related to protecting endangered fish populations. EWEB has reduced its dependence on BPA through the acquisition of conservation and new renewable resources over the last 30 years. Still, BPA is expected to remain very cost competitive compared to alternatives, especially when considering the potential for future taxes on carbon.

Impact of Oregon's Renewable Portfolio Standard (RPS)

In 2007, the Oregon Legislature passed SB 838, the Renewable Portfolio Standard, which requires Oregon utilities to increase the amount of new renewable resources used to serve their customers. These requirements mandate that a minimum percentage of the power utilities use to serve retail customers come from qualifying renewable generation.

Since EWEB's power resource portfolio is already overwhelmingly renewable, this law is expected to have little impact in the near term. To date, EWEB has acquired over 30 aMW of new renewable resources that qualify under the RPS requirements and continues to add new conservation to off-set load growth. Therefore, EWEB is well positioned to meet the Oregon RPS obligations for the next 20 years.

Customer Load and Peak Demand Forecasts

After reviewing the current power portfolio, the next fundamental question for the IERP is whether existing resources are sufficient to meet future customer needs. EWEB is charged with meeting customer demand for electricity, or "load", within its service territory at all times. Forecasting EWEB's load for every hour of the day for the next 20 years would be an unwieldy task. Instead, staff developed three forecasts that contain the most important aspects of future load. The first is a forecast of annual average load that represents the customers' total energy usage. The second forecast is the peak hour load customers will need in a typical year.[4] The third is a forecast of the peak hour load customers will use in an *extreme* winter peak.[5]

Customer demand can look very different at the peak than it does on average. Historically, EWEB's peak needs have been amply met from the large capacity of hydro generation in the region and therefore have not been a focus of prior resource plans. However, regional load growth in addition to increasing restrictions on regional hydro operations to help endangered fish populations is reducing system flexibility just as more flexibility is needed to balance the rapidly

[4] A typical winter results from a winter with "average" cold temperatures. Half of winters have peak loads above the typical peak and half have peak loads below this forecast.

[5] An extreme winter happens when an arctic air mass reaches the southern Willamette Valley on a day when schools and businesses are operating. Over the past 20 years it has happened only twice, so we expect peaks of these magnitudes only about once every ten years.

growing number of wind projects locating in the Pacific Northwest. As a result, it is important that this plan evaluate whether or not the utility has sufficient peaking resources, in addition to average monthly resources.

Figure 4. EWEB Load - Past and Future

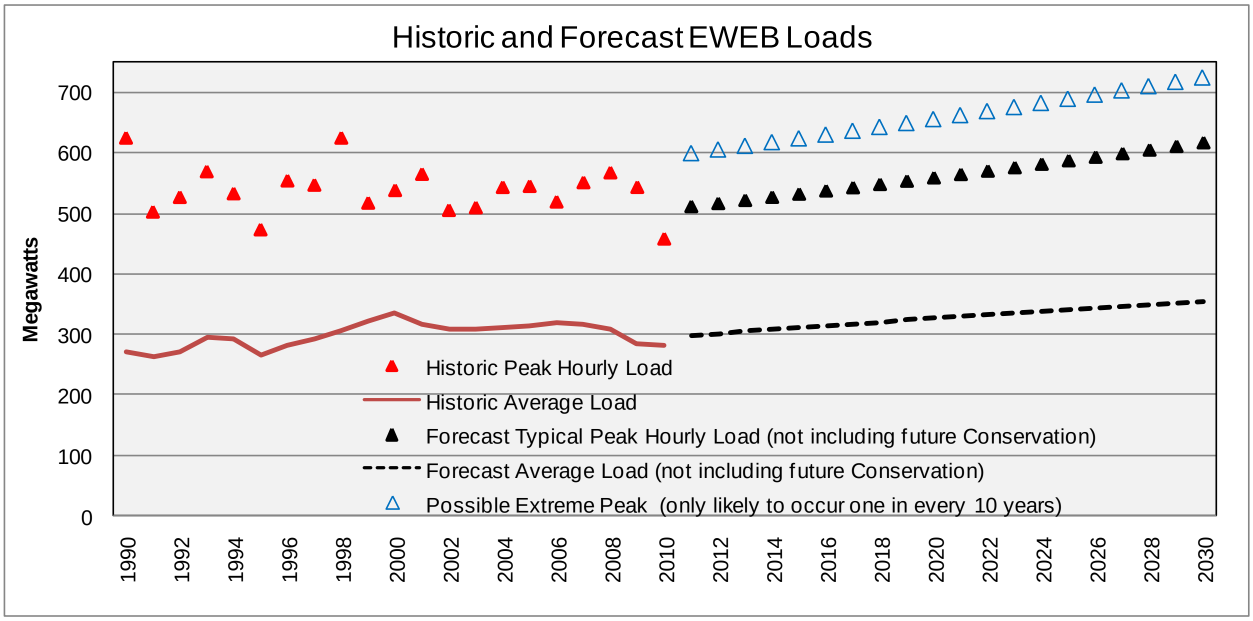


Figure 4 above shows EWEB's actual historic average and peak loads from 1990 through 2010 and compares the Base Case forecast for average load, typical peak hour load, and extreme winter peak hour load. Because peak loads are highly dependent on short term weather conditions that vary year to year, they are more volatile than average loads; an important consideration not reflected in the typical peak forecast presented here. Since it is impossible to forecast winter temperatures years in advance, typical winter low temperatures are used in the forecast. Actual peak loads in a given year can be about 15 percent higher or lower than shown in the chart.

What Makes Up a Load Forecast?

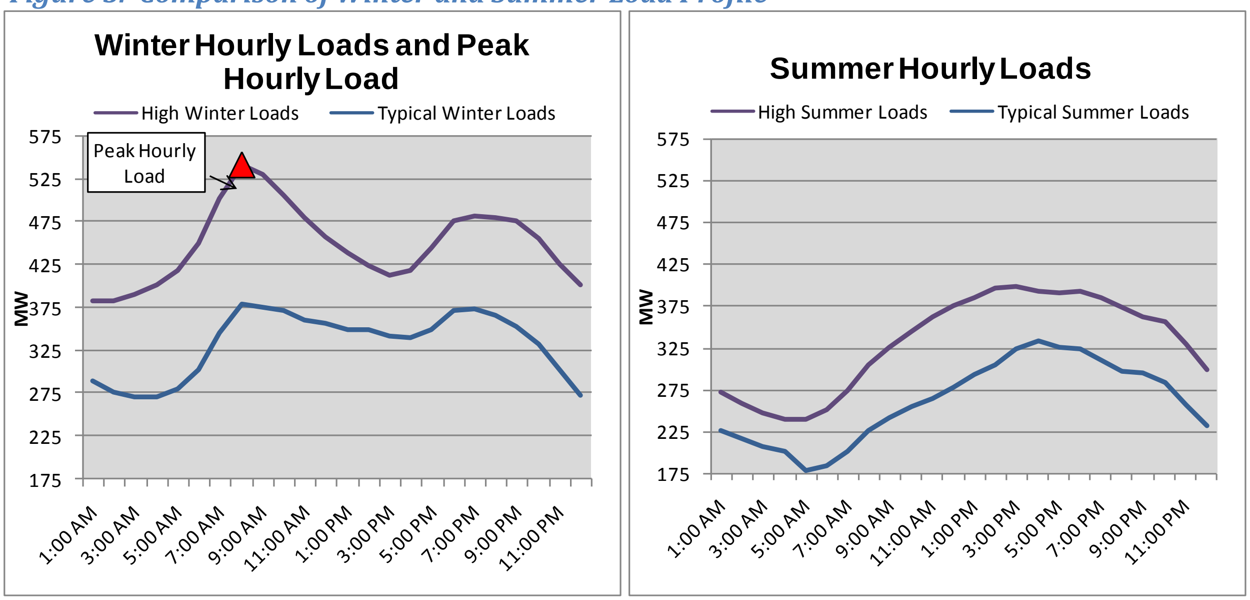
EWEB's load forecasts are based on a number of variables, including heating and cooling degree days, actual and expected population growth, Lane County's unemployment rate, and EWEB's retail price of power. Most forecasted load growth is driven by forecast growth in total population. While industrial customers make up a significant portion of EWEB's total load, the timing and magnitude of changes in industrial loads are rarely predicable so large deviations are seldom modeled. As a new refinement to the forecast, this year EWEB added a projected electric vehicle (EV) adoption rate, which resulted in a small additional to the forecast (about 3 aMW). It should also be noted that the load forecast does not assume future conservation rates higher than those seen to date. However, the impact of past conservation is reflected in historical usage, which is used as the baseline for future growth.

Could EWEB Become a Summer Peaking Utility?

EWEB and the other Northwest utilities have always experienced the highest peak hour loads during cold winter months. The mild Northwest summers have resulted in a relatively small penetration of residential air conditioners. However, many new homes are being built with central air conditioning and there is a trend towards adding air conditioning in older homes.

Seasonal models prepared for the IERP indicate that EWEB could perhaps become a summer peaking utility, but not in the next 20 years. EWEB's winter loads, while growing less rapidly than summer loads, still exceed the summer peak by 100 MW. Figure 5 compares 24-hour load shapes for winter and summer, both for an average day as well as for a typical peak days.

Figure 5. Comparison of Winter and Summer Load Profile



As part of EWEB's overall strategy for meeting customer needs in the future, EWEB is exploring new technologies that can help enable the utility to serve the community in the future. One of these efforts includes studying the potential for new metering technology to enable customers and EWEB's to partner in the ability to serve future peak time constraints.

What is AMI?

Advanced Metering Infrastructure (AMI) is a way to track energy consumption more frequently than traditional meters currently do and to enable two-way digital communications between EWEB and its customers. EWEB is reviewing the potential for an AMI system to provide new capabilities to work with customers to manage and reduce peak loads. In addition to helping reduce customer demand during times of extreme peak, this technology can provide timely information to encourage customers to shift load to off-peak times when wind generation is more likely to be available, thereby better utilizing the renewable resources being added to the grid.

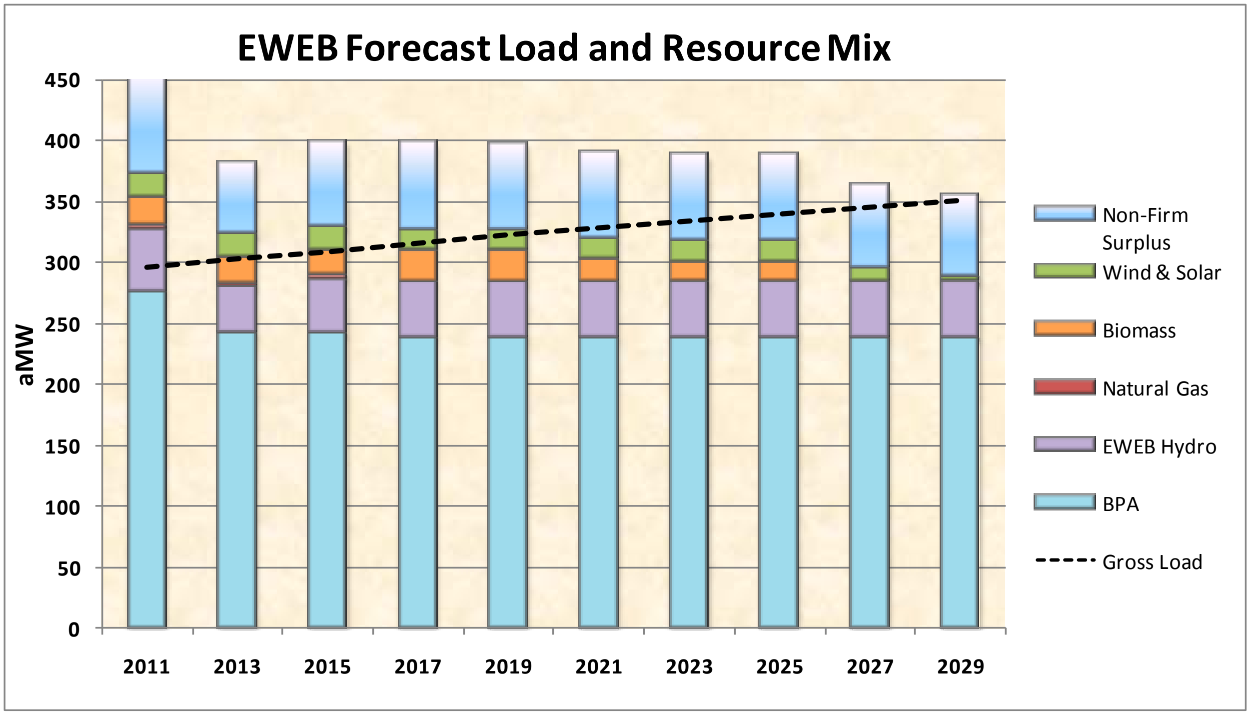
Customer awareness of demand response will be an important next step in the evolution of energy efficiency programs and help evolve the customer/utility relationship to more of a partnership. AMI could help enable increased cost-savings for EWEB and the provision of new services to customers. AMI could also reduce carbon emissions associated with meter reading site visits, which that will no longer be required with the new meters.

Assessing Need for New Resources

Understanding the need for resource acquisitions requires an exploration of how much longer the existing portfolio is able to meet peak and average loads. This can be accomplished with an evaluation of how the portfolio's future expected firm and average energy and peak capacity aligns with forecast average and peak hour demand for the next 20 years.

Current EWEB annual load, approximately 300 aMW, is forecast to grow at about one percent per year before conservation. Figure 6 compares the load forecast, without future conservation efforts, to the firm generation of EWEB's existing and contract resources. Surplus energy is primarily hydro generation that is above firm generation. The chart reflects the loss of BPA resources starting October 1, 2011. Even with the loss of BPA power, EWEB has sufficient resources to meet forecast loads, without counting on conservation or surplus energy, until approximately 2021.

Figure 6. Comparison of Average Loads and Resources



Often, EWEB's projects generate more energy than our customers require, resulting in surplus generation. This surplus is sold to the wholesale power market, mostly as short-term contracts. The revenue associated with the sale of EWEB surplus power has historically been helpful in maintaining stable and affordable rates. As wholesale power markets have continued to drop, this contribution has declined.

Peak Requirements

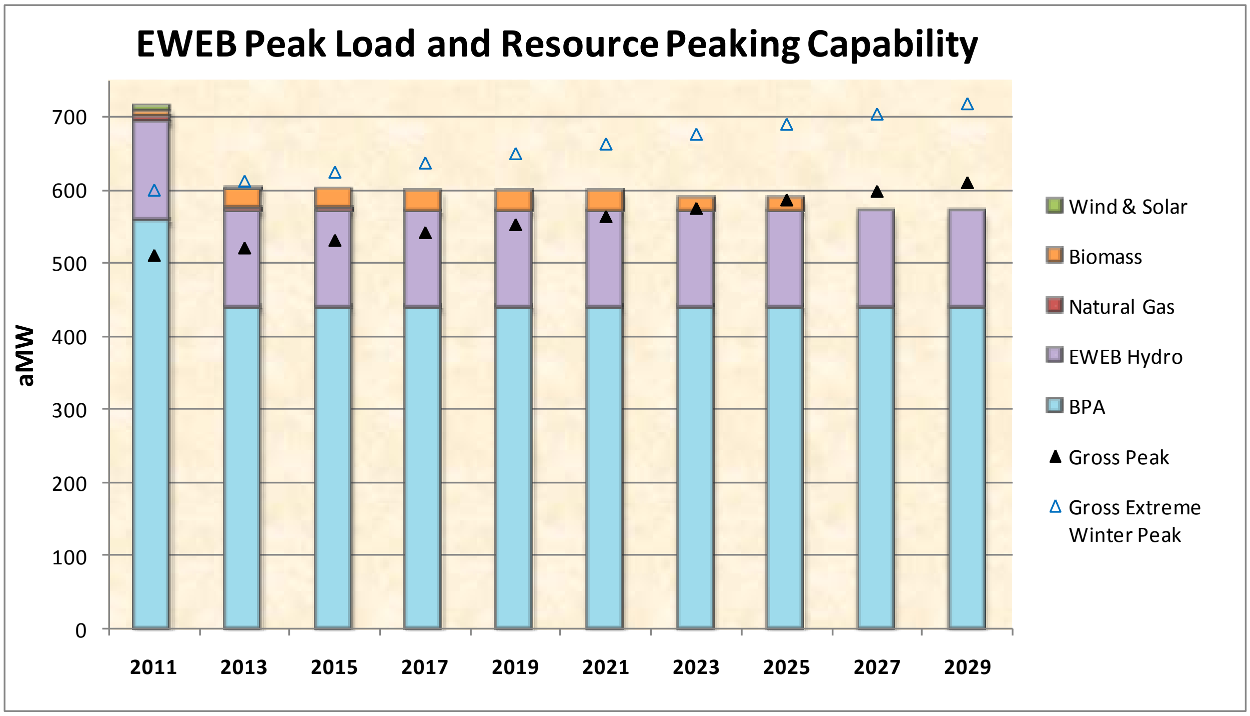
To meet peak demand when its own resources are insufficient, EWEB purchases power from the wholesale market, so periodic, short-term supply deficits are not necessarily a concern. Accordingly, as shown in Figure 7, there are adequate resources to meet typical winter peak load until 2027. However, when the region experiences an extreme weather event, there is a very real risk that market power will be much more expensive to purchase and even potentially unavailable.

Based on current load growth patterns, during an extremely cold winter day the utility could be slightly deficit in available power to meet an extreme peak as soon as 2013.[6] Should EWEB

[6] Note that wind and solar do not appear in Figure 7 because these resources are not expected to produce power at the time of EWEB's winter peak.

acquire new power resources in the next few years to serve a peak load that is only projected to occur in about one of every 10 years? If so, what kind of new power resource should it acquire to meet that rare need? These are some of the questions explored through the development and consideration of this plan.

Figure 7. Comparison of Peak Forecast Loads and Resources



New Power Resource Alternatives

The list of potential power resource technologies that could be evaluated in the IERP is fairly lengthy. Figure 8 breaks the technology options into two main categories: 1) whether the technology is commercially available, or 2) emerging. Staff only analyzed commercially available technologies that had data available for actual cost and operating characteristics. Emerging technologies will be monitored for possible inclusion in future plan updates.

Staff also did not evaluate nuclear (fission) power plants or coal power plants. First, these technologies do not align with past EWEB resource plan priorities or policy direction. In fact, under Oregon law, a decision to participate in a nuclear power resource requires a public vote. Second, it is impractical for EWEB. Coal and nuclear plants often exceed 1,000 MW of installed capacity. This is roughly 2x EWEB's peak load. EWEB could be a small partner in another utility's project of this size, but no regional utilities are proposing to build either a coal or nuclear power plant. In fact, the two largest coal plants in Oregon and Washington are slated for retirement.

Figure 8. Potential Resource Categories for Evaluation

Categories of Potential Resource Technologies*		
	Commercially Available and Mainstream	**Not Commercially Available or Emerging**
Conservation	Weatherization Ductless Heat Pumps High Efficiency Appliances	Residential LED lighting Heat Pump Water Heaters
Renewable Generation	Hydro Wind Solar PV (large and small) Solar Thermal Biomass Biogas Landfill Gas Pumped Storage	Ocean Wave Ocean Tidal Geothermal (in NW)
Fossil Fuel Generation	Natural Gas Combustion Turbines (both single and combined cycles) Coal	Natural Gas Fuel Cells Coal with/ Carbon Sequestration
Nuclear Generation	Nuclear (Fission)	Small Nuclear (Fission) Fusion

* Shaded areas were not considered in this plan.

The following technologies were included in the final analysis of potential new resources:

- Wind
- Utility-scale PV (local)
- Concentrating Solar Thermal (remote)
- Natural Gas Peaker Plant
- Biomass (combined heat/power)
- Market Purchases

EWEB is an active participant in wholesale power markets, both buying and selling power when it is most financially advantageous to customers to do so. Therefore, staff included purchases from the wholesale power market as another viable resource option. For more information on the technologies/strategies modeled, including basic operating characteristics and 2017 cost estimates, please see www.eweb.org/public/documents/ierp/New_Resource_Options.pdf.

EWEB relied heavily upon data from the Northwest Power Planning Council's (Council's) Sixth Power Plan for information on the forecast cost and operating characteristics of new resources[7], as well as costs associated with transmission lines. In a few instances, staff had access to more

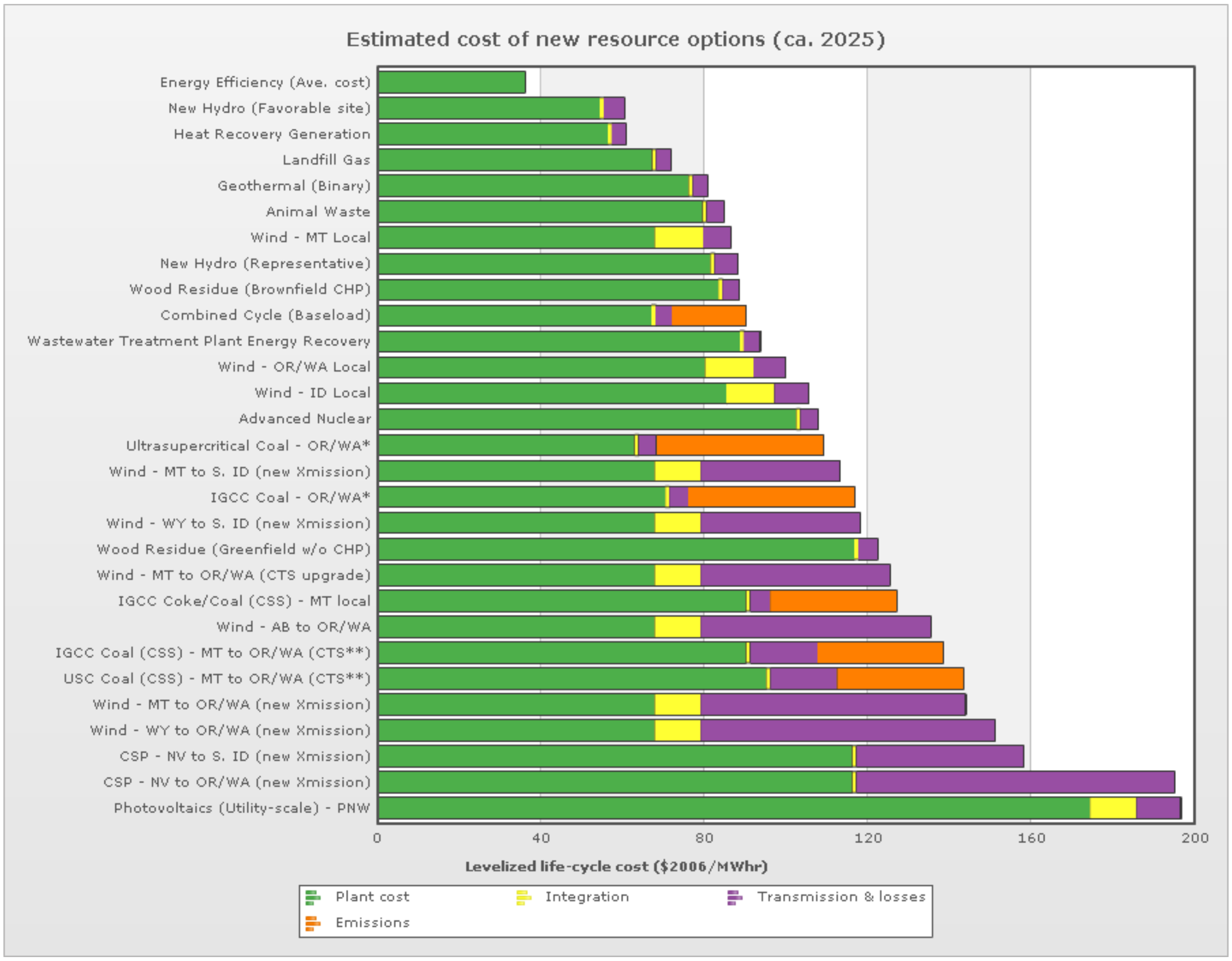
[7] For more on generating resources visit http://www.nwcouncil.org/energy/powerplan/6/default.htm. See Chapter 6, "Generating Resources and Energy Storage Technologies" and Appendix I, "Generating Resources."

recent information than was available in the Council's Sixth Plan. The most significant changes include the following:

- **Updated natural gas price forecast:** Prices have fallen significantly since the Council finalized the Sixth Plan.
- **Adjusted the start date for potential carbon taxes:** The Plan originally estimated the potential for carbon taxes to start as early as 2009. The Council's forecasts were adjusted to show carbon taxes starting no sooner than 2013.
- **Reduced the cost of solar photovoltaic (PV) and woody biomass CHP:** Staff reduced costs for these two resources by 50 and 25 percent, respectively, to reflect the cost of technology demonstrated by recently announced contracts for solar PV and EWEB's power purchase contract with the Seneca Biomass facility.

Figure 9 compares the projected costs of numerous alternative power resources, including conservation. Notably, the Sixth Plan found that energy efficiency/conservation is the lowest cost, lowest risk power resource when compared to generating resource alternatives. EWEB's previous resource plans have come to very similar conclusions on resource preferences. The first choice has always been conservation, followed by new renewables, and then high efficiency natural gas generation. Not only does conservation cost less than acquiring generating facilities, it provides local jobs, builds consumer awareness about energy consumption, and avoids the environmental tradeoffs associated with new generating technologies.

Figure 9. Council's Evaluation of Comparative Resource Cost[8]



Future Uncertainty and Scenarios

The load and resource data presented thus far shows only average and peak or extreme peak values. But planning for the electric power industry is much more complex. Long-term planning must incorporate the significant uncertainty over the future value of key forecasts. For instance, the timing and amount of power EWEB will need in the future is directly related to load growth projections.

This IERP analysis focuses on five key variables that impact EWEB's need for power and the regional power market, including:

[8] See http://www.nwcouncil.org/energy/powerplan/6/newresourcecosts.htm for a larger version of this chart.

- Hydro generation
- Wind generation
- Natural gas prices
- Customer load
- Carbon tax policies

How these future uncertainties are modeled can significantly impact the relative cost-effectiveness of alternative power resources. Staff used an analytical approach called Monte Carlo analysis to develop 540 unique combinations of these five key uncertainties. Each potential resource is evaluated in Aurora under the same 540 futures to ensure consistent treatment. This approach is similar to the method used by the Council in both the Fifth and Sixth Power Plans and is sometimes referred to as “scenarios on steroids”. The results presented later in this report represent the average of all 540 futures. This approach is essential to understanding not only which strategies are lowest cost, but also which strategies have the lowest risk.

There are other uncertainties that would have significant impacts to EWEB but do not impact the relative cost-effectiveness of future choices. These uncertainties are not as important to model in the IERP. For instance, there is no need to model the risk that the Snake River dams will be breached or that the Columbia Generating Station nuclear power plant will close early. If either of these future events were to occur, then EWEB will need to acquire resources to replace its share of the lost generation from BPA. Instead of modeling a significant loss of resources, staff tested the uncertainty that a very new large customer locates in the EWEB service territory. Both loss of generation and a new load addition would have the same end result - EWEB would need new resources - such that the new large load scenario serves as a proxy for both possible futures.

Hydro Generation

As EWEB’s primary power resource, the availability of hydro generation is critical to serving customer load. In addition, surplus hydro power is sold to wholesale markets in all but the driest years and is an important revenue source. Because hydro generation can vary greatly from month to month and year to year, it is important to test new resource strategies over a variety of generating conditions.

Drought years pose the biggest risk to EWEB’s power supply and tend to generally align with high power prices. Climate change research indicates that the severity of droughts is expected to worsen. To account for this risk, the hydro generation forecast was modified to include expected impacts from climate change. Additional information on how that analysis was adapted to address these risks can be found at www.eweb.org/public/documents/ierp/climatechange.pdf.

Because of the growth in wind energy in the region, wet years present the opposite problem - too much power. Production tax credits and other renewable energy credits granted to wind producers are dependent on generation, so wind producers have a financial incentive to continue generating even when demand for power is low, or even negative. This means that high hydro output in the spring months has to compete with negatively priced wind in the regional marketplace. During these markets, EWEB may need to pay buyers to take its surplus generation in the wholesale market.

Figure 10. Hydro Generation Variability

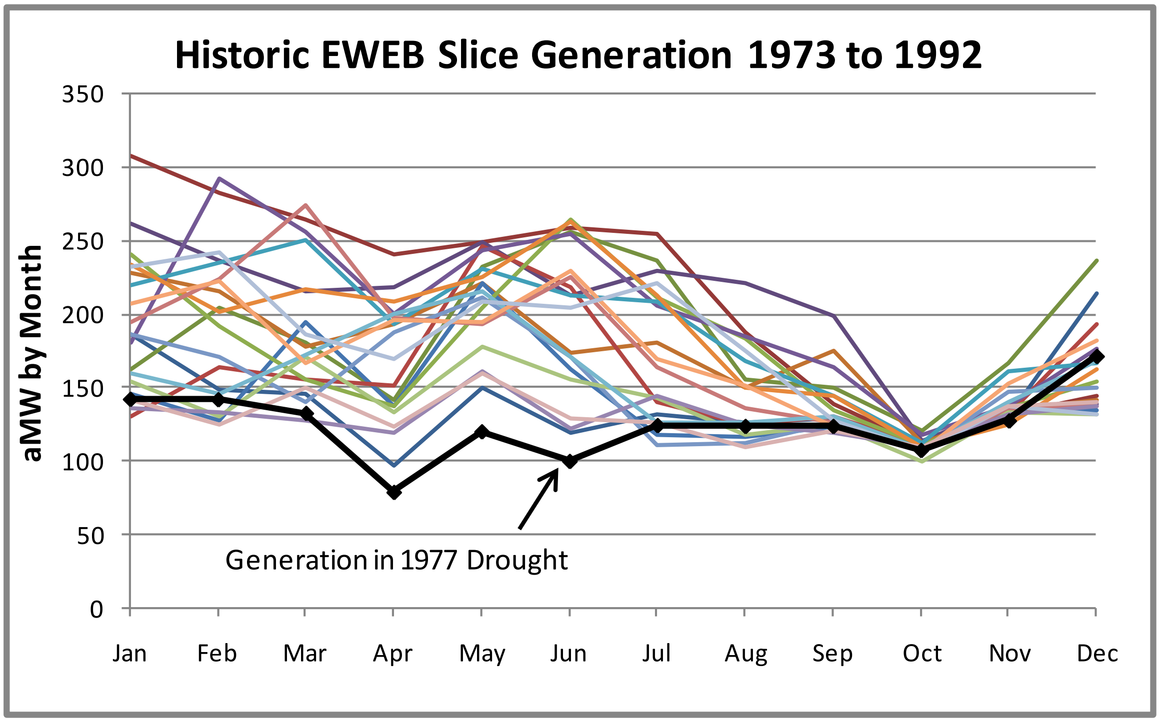


Figure 10 shows the expected generation from the BPA slice contract over 20 different hydro years, demonstrating the extreme variability in hydro generation that must be accounted for in resource planning. The 1977 drought shown in black represents the firm energy that EWEB counts on for planning purposes. Note that in some years, the spring and winter generation is almost double the firm hydro amount.

Wind Generation

Relative to other renewable resources, wind is one of the lower cost power supply options. As a result, nearly 6,000 MW of new wind generation has been built in the Northwest over the last decade, up from just 110 MW. Much of this wind was built and sold to California utilities to meet their RPS obligations. However, no additional transmission to California was built during this time. Therefore, much of the generation is effectively trapped in the Northwest, while its renewable attributes are stripped and sold in the form of Renewable Energy Certificates (RECs).

What is a REC Anyway?

A Renewable Energy Certificate (REC) is the mechanism utilities use to track and demonstrate compliance with state Renewable Portfolio Standards (RPS). One REC is created in a tracking database for every megawatt hour (MWh) of qualifying renewable generation.

A REC is ‘bundled’ if the utility procures both the renewable energy and the associated RECs from a given resource. An ‘unbundled’ REC can be bought and sold independent of the actual renewable energy that was generated. Most states, including Oregon, place a limit on the use of ‘unbundled’ RECs a utility can count towards the RPS.

REC trading is a more flexible, market-based approach to achieving environmental aims at lower cost compared to requiring each utility to meet its RPS obligations only with its own resources. The use of RECs in meeting RPS compliance obligations is modeled after other successful market-based approaches to reducing nitrogen oxide (NOx) and sulfur oxide (SOx) emissions in the U.S.

In the Northwest, maximum wind generation often occurs during off-peak (low load) hours in the spring and summer. While the summer generation is often needed, spring is when the hydro generation system swells and regional loads are low. Adding so much wind generation during off-peak hours has had significant impacts on wholesale power markets, creating more pricing volatility and even periods of time when utilities are *paying* buyers to take their excess generation. Hydro-dominated utilities such as EWEB have seen their wholesale revenues from surplus sales plunge during this time period.

Beyond impacting regional power prices, the variability of wind can cause reliability concerns for grid operators. Power grids must be balanced every second, by adjusting generation up or down to meet demand. Since it is difficult to predict precisely when the wind will begin or stop blowing, other resources must stand ready to accommodate fluctuations when they occur. Historically, the hydro system has served in this capacity. However, there are limits to the hydro system’s flexibility and operational constraints to protect endangered fish species further limit the hydro system’s responsiveness to variable wind generation.

A final consideration is that wind is often unavailable during extreme weather events such as heat waves or cold snaps, when seasonal loads are highest in the Northwest. This is because a high pressure weather front covers the entire region at these times. Therefore, wind generation cannot be relied upon to meet peak loads.

EWEB is actively engaged in regional discussions around how to best integrate wind and optimize the availability of this renewable resource. As owners of both hydro and wind resources, and participants in wholesale markets, the outcome of these discussions is particularly important. While EWEB cannot directly influence the resource investment decisions of others, it can work to prepare EWEB's own portfolio to meet the expected challenges ahead. As a result, flexibility has become a key desirable attribute of any potential new resource.

Transmission and Reliability

The Western electric power grid is a vast, interconnected network that covers the western United States, plus two Canadian provinces and portions of two Mexican states. Closer to home, BPA operates a large network of high voltage transmission lines that connect generation in the Northwest, including EWEB's, to customers throughout the region.

This interconnected system provides many benefits besides simply bringing power from remote generation projects to EWEB's service territory. The system improves reliability by providing EWEB with back-up generation when the utility's own resources are insufficient to meet customer demand and further allows sales of EWEB surplus power to other suppliers outside the region.

Concerns over aging transmission infrastructure impacting reliability, along with capacity constraints, have prompted renewed interest in upgrading the transmission grid. While transmission investment had been stagnant for many years, BPA has plans in place to make upgrades . EWEB actively engages in the regional planning processes through which access and cost attribution to regional transmission is established.

Natural Gas Prices

During most of the year, wholesale power prices are closely related to wholesale natural gas prices. Prior to 2000, the price of natural gas was fairly stable. However, in subsequent years gas prices increased dramatically and became more unpredictable. High gas prices raised wholesale power prices, which increased the value of surplus power EWEB sold into the market. Then in 2008 the price of natural gas began to retreat in response to economic conditions and additional supplies now being accessed through hydraulic fracturing, or 'fracking' techniques. This has led to the lower gas and wholesale power prices being experienced today.

However, growing concerns around the impacts of fracking on the environment may lead to legislative restrictions that could slow production of natural gas and drive prices up again. For these reasons, the analysis incorporates a wide distribution of potential natural gas prices.

Customer Loads

EWEB loads vary from month to month and year to year based on a variety of drivers, including weather patterns, adoption of new technologies, the economy, population growth, and retail prices. Regional loads vary for similar reasons, driving market prices up if demand is high and depressing prices if regional demand is low, as it is now during the slow economy. Monthly and hourly variations in load, especially during peak demand periods, are important to consider in the analysis because they spotlight a new resource's ability to compliment and add value to the existing portfolio.

Climate change has the potential to impact loads by changing the number and severity of heating and cooling events. Staff investigated modifying the forecast loads to account for climate change, but found the changes small compared to historic volatility of loads. The historic volatility includes the impact not just of weather and climate changes to date, but also economic and technological changes. For the analysis, variability in load was based on historic volatility.

Carbon Taxes

Carbon taxes are a mechanism to place a monetary penalty on the negative impacts associated with carbon dioxide (CO2) emissions, the primary greenhouse gas contributing to climate change. While there is no legislation currently, draft proposals indicate that carbon taxes may eventually be levied on fossil-fuel generation based on the associated amount of CO2 emissions. If a carbon tax were enacted, it would make fossil fuel generation more expensive to operate and increase the overall market price of power. More expensive pricing tends to level the playing field for renewable resources, improving their cost-effectiveness. For the purposes of this analysis, three carbon tax futures were combined with the other variables:

- No carbon tax (still includes current RPS policy)
- A medium-priced carbon tax starting in 2014
- A high carbon tax starting in 2014.

Base Case Analysis

Under the Base Case forecast for both average and peak customer load, EWEB's existing power portfolio is surplus until the 2020s. Existing resources are sufficient to meet forecast peak hourly customer loads except during an extreme cold snap, which occurs roughly one in ten years and during extreme drought conditions, which occurs about once every twenty years. Adding more generating resources to meet such a sporadic need is generally not a cost-effective strategy.

Beyond serving to meet an extreme peak demand, additional resources would simply increase EWEB's already surplus generation, which exposes the utility to more financial risks in a soft and potentially volatile power market. Therefore the focus of the base case analysis is how to meet future average load growth. Consistent with Council's Sixth Power Plan, past IERPs, and as re-affirmed by the EWEB Board, staff turned to conservation as its preferred resource strategy.

Meet Load Growth with Increased Conservation

For three decades EWEB has been a leader in conservation programs that have effectively improved building energy efficiency and reduced customer bills. In fact, EWEB customer load is 14 percent lower than it would have been without these programs in place. Additional background is included in the white paper titled “Energy Efficiency as a Resource”, located at www.eweb.org/public/documents/ierp/042811energyEfficiency.pdf.

In 2011, staff conducted a Conservation Potential Assessment to help confirm the utility’s ability to achieve higher conservation levels and validate whether the Council’s Plan findings are applicable to EWEB. The assessment indicated that increased conservation acquisition is achievable with the addition of new technologies and new approaches to reach traditionally under-served customers, such as renters.

As part of the IERP, staff conducted a TBL analysis of varying levels of conservation acquisition and presented the results to the Community Advisory Panel. Three of the five strategies evaluated represent significant increases in acquisition over current annual targets. Another strategy had a slight uptick in conservation over current targets in order to meet all projected load growth, while the last represented a significant reduction in conservation acquisition.

The three higher levels of conservation acquisition evaluated all increased the cost of conservation programs, some dramatically. Because EWEB already has long-established programs in place and relatively aggressive annual targets, raising the bar would require the development of more expensive energy efficiency programs, including higher customer incentive payments to incent participation, and consequently higher customer rates.

The analysis also determined that higher levels of conservation reduced EWEB’s need for low-cost BPA power. While this power would then be available to others in the region and arguably have climate change benefits, displacing low-cost BPA power with higher cost conservation would result in higher future rates and bills for EWEB customers, especially for those who choose not to participate in conservation programs.

Another key learning from this analysis was that more conservation does not significantly lower the carbon intensity of EWEB’s power portfolio. BPA power comes primarily from the system of federal dams in the region, plus one nuclear power plant. Trending EWEB load in a negative direction through more aggressive conservation simply reduced EWEB’s use of already low-carbon BPA power. This strategy would have a regional carbon reduction benefit as other utilities accessed BPA power, but at a higher cost and little net carbon benefit to EWEB customers.

Alternately, the one strategy considered that *reduced* conservation acquisition rates did prove cost-effective, but did not generate as much benefit to customers as current conservation levels because it “left money on the table.” Further, this strategy did not ultimately acquire all cost-effective conservation, which is contrary to EWEB Board policy directives. A strategy with a slight uptick in conservation from current levels, sufficient to meet projected load growth over the next twenty years, was ultimately deemed the greatest benefit to EWEB customers. As a result, staff proposed this strategy in the 2011 Five-Year Conservation Action Plan since it:

- Maximizes economic benefits to the community
- Minimizes participants' bills while not increasing non-participants' bills
- Retains EWEB's low cost, low carbon BPA power

Figure 11. Base Case Load and Resource Mix with Recommended Strategy

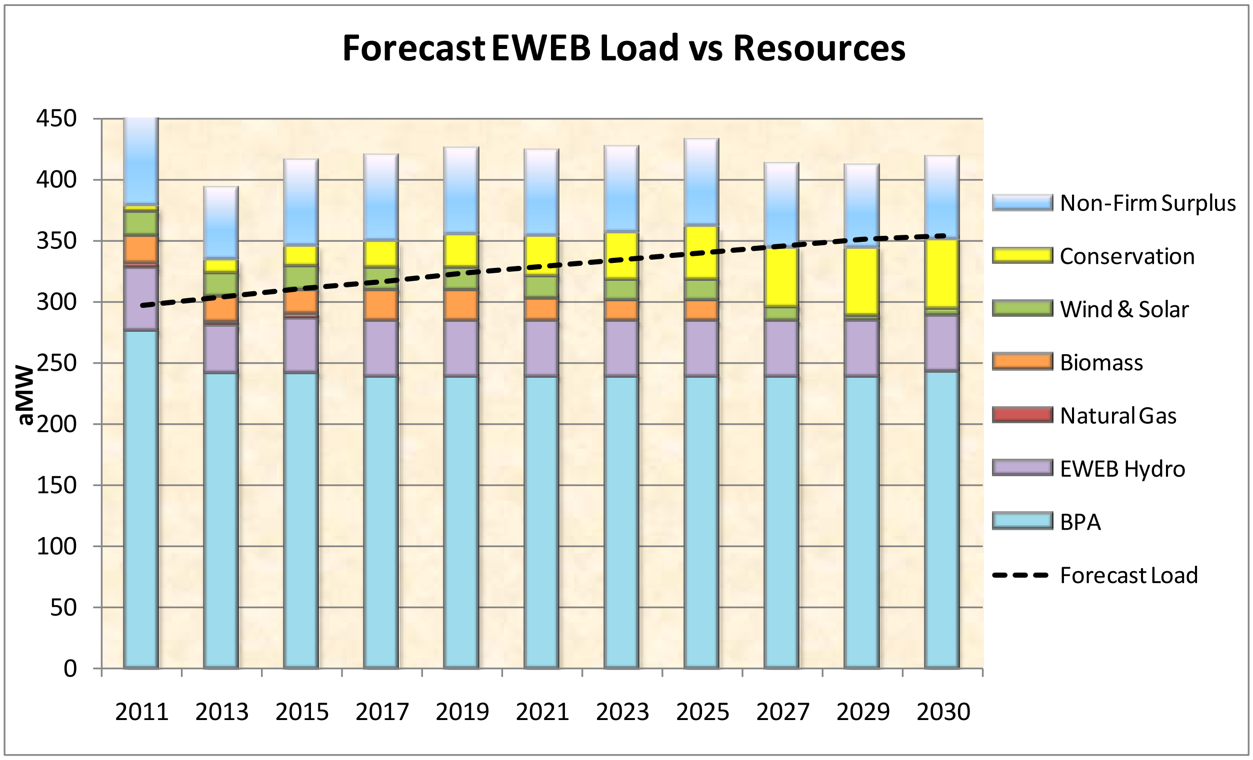


Figure 11 provides a picture of EWEB's load and resources after adding the recommended conservation levels. Since conservation acts as a resource for both participants and non-participants by reducing the need for supply-side investment, and because maximum results can only be achieved when all customers participate, it is imperative to fund conservation measures through rates. This approach serves as an industry model of what can be achieved through long-term commitment and stable program funding. The recommendation to acquire sufficient conservation to offset load growth over the next twenty years was taken to the Board in August of 2011, and the EWEB Commissioners concurred with the strategy.

TBL Assessment of Conservation Strategies

Figure 12 below shows a summary of the TBL analysis comparing the five conservation strategies. The analysis found that adding conservation is still cost-effective as well as environmentally and socially preferable. Even with EWEB surplus power for the next decade, this remains true up to the point that loads do not increase over time. Acquiring either more or less conservation reduced the economic benefits. Analysis of other key attributes, including affordability, local job creation, carbon emissions, feasibility of acquisition, and financial cost of strategies, helped to differentiate the strategies and lend clarity to the decision making process.

Figure 12. Conservation Strategy TBL Summary (Green=Good, Yellow=Neutral, Red=Caution)

TBL Criteria	**Recover BPA Payment**	**Meet All Load Growth**	**"Break Even" Zero NPV**	**Regional Target**	**Accelerated Regional Target**
Affordability, Equity and Access	No rate impacts	Bill reductions for participants, no rate impact on non-participants	Some rate impacts, bill impacts mostly for non-participants. Program benefits may not reach customers equally	Significant rate impacts, bill impacts for participants and non- participants. Program benefits may not reach customers equally	Significant rate impacts, bill impacts for participants and non- participants. Program benefits may not reach customers equally
Affordability: Base Case 20 yr Net Present Value (NPV)	NPV≈$50 Million	NPV≈$65 Million maximizes value	NPV≈$0, break even	NPV≈($45 Million) loss over 20 years	NPV≈($90 Million) loss over 20 years
Construction Risk	No additional land or transmission needed, short lead time	No additional land or transmission needed, short lead time	No additional land or transmission needed, short lead time	No additional land or transmission needed, short lead time	No additional land or transmission needed, short lead time
Flexibility	Reduces need for additional flexibility, potential added flexibility with Demand Response	Reduces need for additional flexibility, potential added flexibility with Demand Response	Reduces need for additional flexibility	Reduces need for additional flexibility	Reduces need for additional flexibility
Local Jobs	Job loss as programs scale back	Maintains current job level, 100 jobs/year over 20 years	Steady increase in jobs. 169 jobs/year over 20 years	Steady increase in jobs. 238 jobs/year over 20 years	More jobs initially, job loss after 10 years
Peaking	Can help to reduce peaks, Demand Response could increase this ability	Can help to reduce peaks, Demand Response could increase this ability	Can help to reduce peaks	Can help to reduce peaks	Can help to reduce peaks

Portfolio Diversity/Need	Leads to resource need sooner than other strategies, balances resource position in near term	Maintains reasonable cushion of surplus and eliminates need for new resources until 2027	Displaces BPA but economic benefit and loss net out	Exacerbates existing surpluses, displaces BPA hydro	Exacerbates existing surpluses, displaces BPA hydro
Reduced Environmental Impacts: Carbon Emissions	Less emission reductions than current program	Reduces EWEB carbon from market purchases	Reduces EWEB carbon from market purchases, displaces regional carbon	Reduces EWEB carbon from market purchases, displaces regional carbon	Reduces EWEB carbon from market purchases, displaces regional carbon
Reliability	Reduces the need to rely on supply side resources that could have outages	Reduces the need to rely on supply side resources that could have outages	Requires increased investment in unproven technologies which may be less reliable	Requires increased investment in unproven technologies which may be less reliable	Requires increased investment in unproven technologies which may be less reliable
Scalability	Ability to ramp up if desired, easy target	Ability to ramp up if needed to meet additional growth	Some risk of not being able to sustain increased acquisition levels over time	Some risk of not being able to sustain increased acquisition levels over time	May not be sufficient local work-force to accomplish near term goals

Partnering with Customers to Manage Peak Demand

EWEB's recommended strategy in this IERP includes another new milestone: that EWEB begin building its capabilities to deliver demand response and peak reduction programs over the next five years. Demand response (DR) refers to programs through which customers can actively participate in the utility's ability to meet load, often with compensation. DR has been increasingly deployed by utilities to help meet short-term needs, as it is more cost effective overall to incent a few customers to change behavior than it is to build a new power plant when needed only part of the time. More information can be found in the white paper titled "IERP Backgrounder-Demand Response", located at www.eweb.org/public/documents/ierp/042811demandResponse.pdf.

Beyond meeting average load growth through conservation, demand response and peak reduction strategies provide better economic and environmental value than any other strategy. As most renewable generating resources are unable to meet the region's growing needs for flexibility and peak-time demand, customer programs to encourage demand response are likely to have lower cost and environmental impacts than pursuing new peaker plants.

Demand Response Potential

Demand response (DR) refers to a set of programs that aim to shift or curtail customer load at specific times of need. The classic example of DR is to cycle air conditioning units through utility controlled switches during times of utility peak demand. These types of programs have been in effect in various locations across the country for decades.

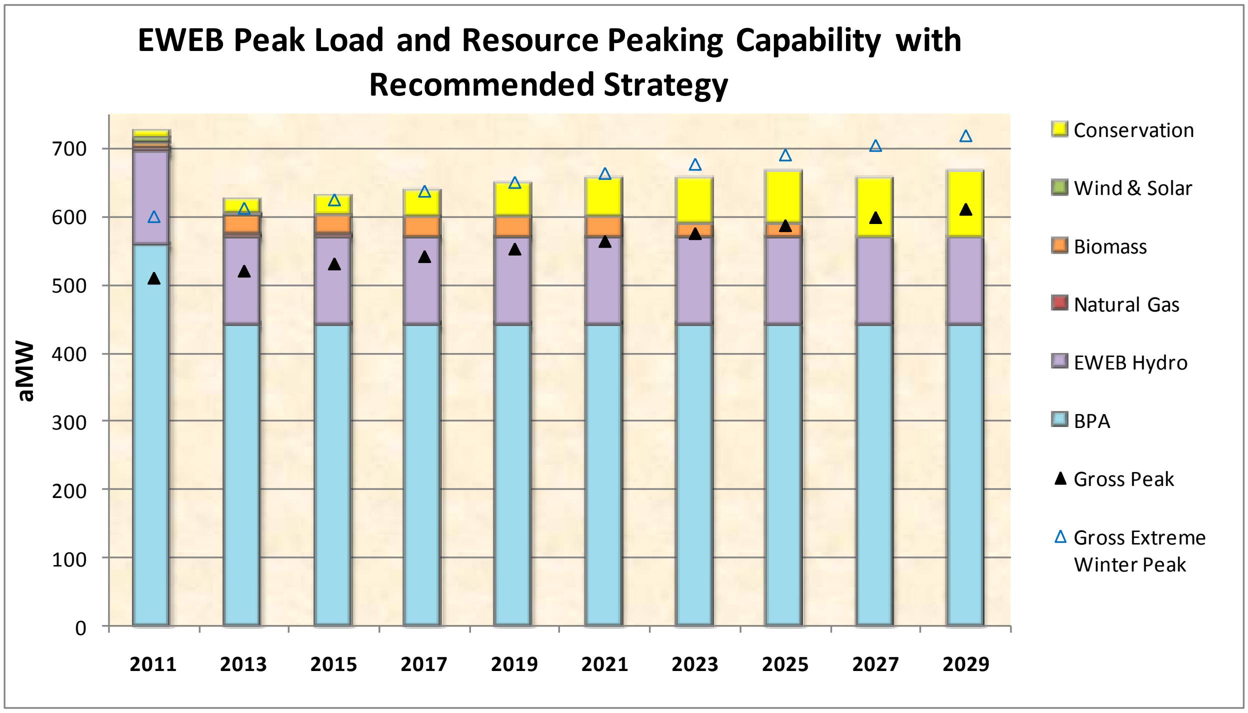
In the Northwest, since peak demand has not historically been as much of a concern, these types of programs are less common. However, with the new concerns about wind energy integration with the electric grid, a new form of DR is emerging. This class of programs aims to partner with customers to manage loads within an hour since load can rapidly respond to unexpected changes in generation supply.

Enabling technology is required for this type of high response program. Metering and communication infrastructure, such as that employed in many AMI configurations, can facilitate such programs through the communications network it establishes between customer and utility.

EWEB is currently piloting this type of technology in residential applications through the deployment and testing of super-insulated water heaters that can either charge or stop charging in response to BPA wind signals (i.e. act as an energy storage device). Future pilots include testing the ability of commercial and utility water pumping stations or commercial cold storage facilities to respond in a similar way. The hope is that a program set can emerge which will help the utility meet future demand constraints economically while providing a financial incentive to participating customers.

Figure 13 shows that after including the peak savings from EWEB's recommended conservation programs, total resources are adequate to meet typical winter peak loads for the entire twenty years. Total resources will be adequate to meet an extreme peak until about 2021. These forecasts do not include any peak reduction benefits associated with demand response programs because those programs are not yet developed. But by 2021 demand response programs could be ready to fill that gap.

Figure 13. Peak Resources vs. Load with Recommended Conservation Strategy[9]



New Large Load Scenario Analysis

While conservation and DR are likely the only resources EWEB will need to add over the next 20 years, there are scenarios where the need for additional resources exceeds available cost-effective conservation. To plan for this possibility, the IERP team evaluated strategies in the event a new 50 aMW load were to locate in Eugene in the next few years. This 'new large load' analysis can also be used to consider what EWEB would do if a generating resource is unexpectedly lost in the next few years.

Eight different potential resource strategies reflecting a mix of additional conservation, new generating resources, and market purchases were evaluated, including:

[9] Note that Wind and Solar do not appear in Figure 13 because those two resources are not expected to produce any power at the time of EWEB's winter peak.

- Short-term Market
- Wind
- Local Utility Scale PV
- Concentrating Solar Thermal
- Natural Gas Peaker
- CHP Biomass
- Market Options (Recommended Strategy)
- Additional Conservation

This is not an exhaustive list of resource technologies, but rather represents the most feasible options given EWEB's previously stated priorities and objectives.

All strategies were modeled as 20 MW acquisitions. For wind, natural gas peakers, and concentrating solar thermal plants, 20 MW represents just a portion of a larger project. Biomass and local utility scale solar PV were modeled as 20 MW facilities, with EWEB taking the entire output of the project. Market options, which can be purchased in any amount, were also modeled at 20 MW for comparison purposes.

Cost–Effectiveness of Alternative Strategies

Figure 14 below presents the levelized cost and benefit-cost ratio for all of the strategies evaluated for this scenario. Levelized cost represents the "average" cost over the life of the resource, taking into account the time value of money. Conservation programs are levelized over 20 years, while all other resources strategies, including market options, are levelized over 30 years. These time frames are consistent with the expected life of investment. The market strategies do not require a 30-year commitment, which provides additional flexibility that is not captured in the analysis. Cost information was based on an assumed 2017 on-line date, which is the first year EWEB would need more power under this scenario.

The benefit-cost ratio is the metric used to compare the cost-effectiveness of alternative strategies. The benefit-cost ratio (B/C) divides total benefits by total cost. A new resource is considered cost-effective if its B/C ratio is above 1.0, not cost-effective it its B/C ratio is below 1.0, and break-even (or cost neutral) if its B/C ratio is exactly 1.0.

This analysis found that pursuing the maximum available conservation was the only cost-effective strategy of those considered, although market options were close to break-even. New generating resources have high up-front costs and generate power at times when EWEB already has sufficient resources, thereby reducing overall cost-effectiveness. Renewable resources such as solar and wind had further negative B/C ratios because these resources tend to have limited performance when EWEB needs power the most.

Figure 14. Level Cost and Cost-effectiveness of New Load strategies

	No Carbon Tax Scenario		Medium Carbon Tax Scenario	
Resource strategies	Levelized Cost ($/MWh)10	Benefit- Cost Ratio	Levelized Cost ($/MWh)	Benefit- Cost Ratio
Short Term Market	$95	Not Defined[11]	$135	Not Defined
Recommended Conservation (2.75 aMW/yr)	$70	Not Defined	$70	Not Defined
Maximum Conservation Strategy (1.79 aMW/yr additional)	$110	0.72	$110	1.49
Market Options	$115	0.96	$165	0.70
Natural Gas Peaker	$490	0.04	$1,025	0.04
Biomass	$190	0.30	$165	0.67
Wind	$170	0.37	$170	0.57
Concentrating Solar Thermal	$255	0.33	$255	0.46
Local Utility Scale Solar PV	$580	0.10	$580	0.16

The New Large Load scenario was assessed both with and without a carbon tax assumption. A carbon tax increased the overall cost of power, which in turn improved the cost-effectiveness of the renewable resources, but not to a break-even point.

In the event that a very large new load locates in Eugene, EWEB's peak loads would increase above the capability of existing resources to meet that demand. Neither wind nor the solar resources would be able to meet the resulting winter peak needs. The natural gas peaker and biomass projects could meet EWEB's peak load reliably, but both are very expensive. For these reasons, a combination conservation and market options strategy has been recommended (lowest cost, lowest risk).

Carbon Considerations

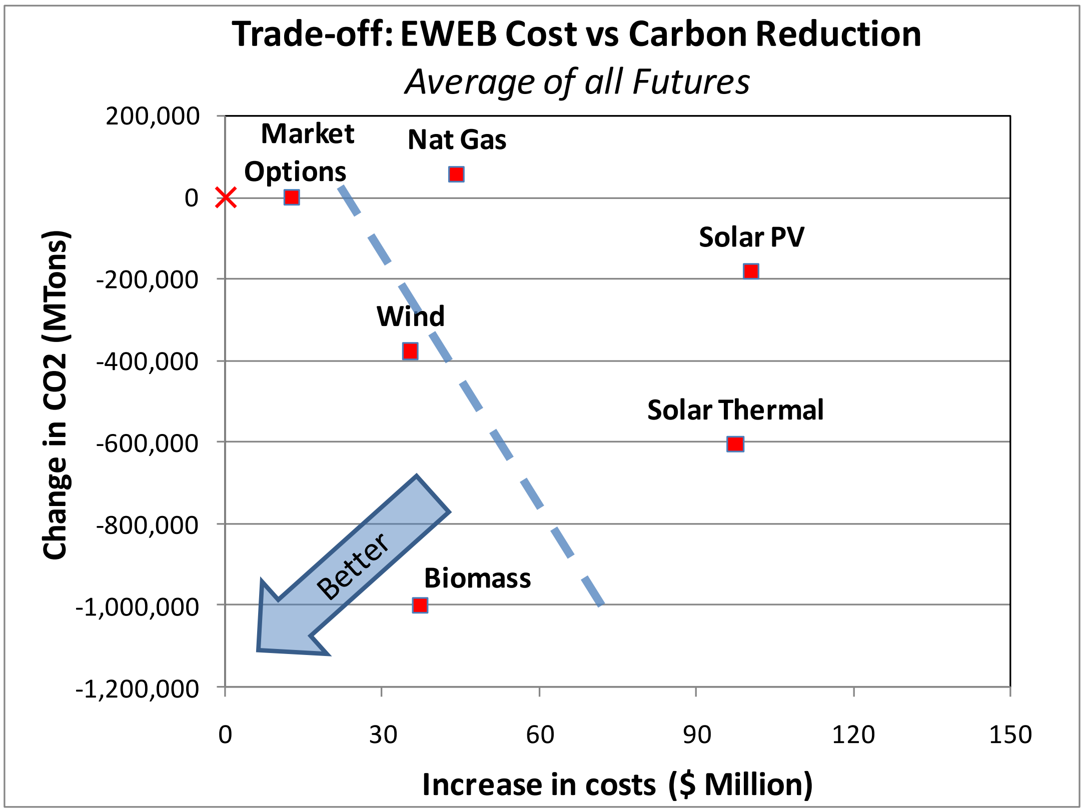
The carbon intensity of EWEB's power portfolio is low compared to almost any other utility in America. Still, community values and EWEB's commitment to resource stewardship means that EWEB places a priority on considering the environmental impact of its operations, including the carbon impacts of its decisions. For this planning process, staff used a carbon tax adder to energy costs as a means to incorporate the cost of carbon emissions into the IERP analysis. Although not yet in existence, including scenarios with a carbon tax enabled EWEB to consider

[10] The Levelized costs shown include investor financing costs and are reflected in 2017 dollars.
[11] The Benefit/Cost ratio requires comparing an investment cost to the benefits. Both recommended conservation and short term market purchases were included in all New Load analyses, so there is no change in benefits to measure.

the potential risk that a tax would be enacted over the life of the plan, as well as to provide a proxy value for internalizing the climate change related externalities associated with of energy consumption.

Another approach to including carbon in the analysis would be to adopt a discrete reduction target for the power portfolio overall. However, this approach could have unintended consequences. For instance, strategies that support the adoption of electric vehicles would likely reduce community carbon emissions, but increase EWEB's load and therefore potentially its own carbon footprint. A carbon tax allowed for the comparison of a broader range of community-wide mitigation strategies and was thus the preferred approach.

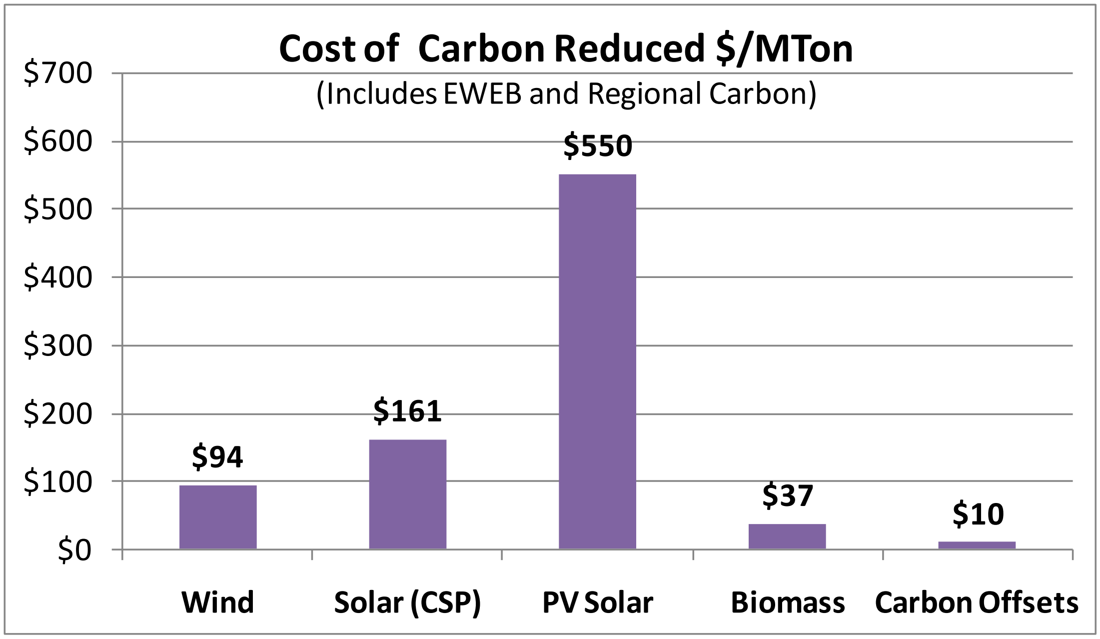
Figure 15. Cost of Carbon Reduction



The trade-off between carbon reduction and cost was evaluated for each of the resource strategies. Findings based on Aurora analysis are shown in Figure 15. New wind generation causes about the same increase in total cost as biomass, but provides less carbon-reducing benefit because wind has lower annual generation (output). Wind produces carbon reductions greater than solar PV, but less than solar thermal, however both solar resource options come at a much higher unit cost. Biomass produces greater carbon reduction than both solar options and is available at a lower cost. The advantage of biomass is that it has the capability of running more hours, thereby offsetting more carbon emissions from other higher-emitting thermal-based resources.

Figure 16 translates the tradeoff chart shown in Figure 15 into a cost per ton of carbon reduced over the life of the generating assets. Also shown is the comparative cost of carbon offsets, which is currently about $10 per metric ton (MTon)[12]. This chart illustrates that there are much less expensive ways to reduce carbon associated with EWEB's power portfolio than building new renewable generation, notably carbon offsets. Despite reductions in technology costs, local solar PV continues to be the most expensive resource, as it has a relatively high cost and low power factor (output) when compared to the other alternatives.[13]

Figure 16. Carbon Cost in $/MTon



[12] "Carbon offsets" is a term generally applied to market based strategies for reducing carbon emissions across industries. In Europe and other parts of the world where there are carbon regulations in place, utilities and other industries are allowed to look outside their industry for more cost effective carbon reducing investment opportunities. Often these are found through investment in industrial processes in countries with emerging economies, where regulation may not be as stringent as it is in more fully developed economies.

[13] The EPA recently announced that it will defer for three years the ruling on the need for air emission permitting for biomass plants and other biogenic C02 emissions. The deferral is to give EPA time to further study the science associated with biogenic emissions and to consider the technical issues that need to be resolved to account for biogenic C02 emissions in ways that are scientifically sound and also manageable in practice.

Key Findings

The key findings from the New Load analysis include the following:

- Only the additional conservation measures prove cost-effective.

- Cost-effectiveness of renewable resources improves under future carbon tax scenarios, but none were cost-effective without a carbon tax.

- Under a future without a carbon tax, the market options strategy was almost break-even. Due to the higher carbon content of market power, however, market options were not very cost-effective with a carbon tax in place.

- The majority of the generation from renewable resources occurs at times when EWEB is already surplus. This additional power would be sold into the market and the utility would remain deficit power at certain times of the year. Market purchases to meet deficits limits the potential to reduce EWEB's carbon emissions and exposes the utility to higher financial risks.

- There are a number of ways to reduce carbon emissions, including purchasing carbon offsets, which may be more cost-effective than additional investments in renewable resources.

Figure 17 below provides a summary of the TBL analysis undertaken to compare the potential new energy resources modeled to serve a new large load. This TBL included additional criteria to those assessed in the base case scenario specifically associated with building a new facility such as landscape impacts and water requirements.

New Load Recommended Strategy

Given the results of the new load analysis, the recommended resource strategy is to maximize cost-effective conservation and rely on a market strategy to meet remaining demand, rather than acquire any new long term purchase contracts or build any new resources over the next five years. Additional assessment will be required in the next IERP to determine the best path forward for a new load beyond that time frame. This approach would best leverage EWEB's existing surplus while helping to limit the price risk from low power prices in the region. This approach also helps manage regulatory risk by waiting to see how the future develops for many of the key variables analyzed, especially carbon tax legislation.

Committing to long-term investments today will limit our ability to adapt to new regulation and adopt new technologies that could emerge in the future. The recommended strategy would shift EWEB's power portfolio from almost always selling surplus power to a more balanced position where sometimes the utility purchases and sometimes sells. This is a more stable risk position in the face of volatile power prices.

Figure 17. New Load Future TBL results (Green=Good, Yellow=Neutral, Red=Caution)

TBL Issue	Additional Conservation (extra 1.79 aMW/yr)	Wind	Local Utility Scale PV	Remote Solar Thermal	Natural Gas Peaker	Local Biomass CHP	Market Options
Affordability, Equity and Access	Program benefits may not reach customers equally	Lowest cost renewable if there is no carbon tax	High cost compared to other renewables	Highest cost renewable under all futures	Big investment for operating relatively few hours	Lowest cost renewable if there is a carbon tax	Reduces market risk while minimizing costs
Affordability: Benefit/Cost Ratio	1.49	0.57	0.17	0.46	0.05	0.78	0.71
Construction Risk	Avoids construction of new supply-side resource	High capital for development, potential regional transmission constraints	Could be difficult to find enough land locally, high capital for development	Requires new transmission, could have siting challenges with land footprint, high capital for development	Flexible siting, lowers regional transmission constraints	Could have local air quality control issues, lowers regional transmission constraints	Uses existing infrastructure
Flexibility and Availability	Reduces need for additional flexibility	Not flexible, only available when the wind blows, ~ 32% availability	Not flexible, only available when the sun shines in Eugene, ~12% availability	Not flexible, only available when the sun shines in Nevada, ~36% availability	Very flexible, ~90% availability, able to turn on/off to meet peaks	Flexible, ~80% availability, able to turn on/off to meet peaks	Flexible, can be used selectively as needed
Local Jobs, Local Power Supply	Steady increase in jobs, helps reduce need for non-local resources	Jobs would be remote, transmission needed for remote resource	Steady increase in jobs, adds to local power portfolio	Jobs would be remote, transmission needed for remote resource	Small number of jobs, could be local	Small number of local jobs, emergency power supply for essential services locally	Small number of local jobs, uses existing infrastructure

Peaking	May help to reduce peak demand	Often not available during peak demand	Generation seldom coincides with peak demand	Generation seldom coincides with peak demand	Able to turn on/off to meet peaks	Able to turn on/off to meet peaks	Can call upon to help meet peaks while limiting market exposure
Portfolio Diversity/Need	Helps to reduce market purchases or need for supply side resource, reduces carbon cost risk	Potential to exacerbate existing surpluses, reduces carbon cost risk	Low output, maximum output during spring surplus and summer deficit, reduces carbon cost risk	Maximum output during spring surplus and summer deficit, reduces carbon cost risk	Operates to meet peak needs, often more expensive than market, potential future carbon cost and natural gas price volatility risk	Hedge against hydro generation volatility, operates to meet need	Can be used selectively as needed
Reduced Environmental Impacts: ***Carbon Reduction***	Reduces EWEB market purchases, displaces regional carbon	Aligns with existing surpluses, leading to regional carbon reductions more than EWEB reductions	Low output if located in Eugene so smallest carbon reduction benefit of renewables	High output, displaces regional carbon during surpluses and reduces EWEB carbon by reducing market purchases	Increases regional and EWEB carbon, environmental concerns surrounding natural gas fuel recovery	High output, displaces regional carbon during surpluses and reduces EWEB carbon by reducing market purchases	Takes advantage of near term surpluses in renewables, no change from current conditions
Reliability	Reduces need for new supply side resources	Variable generation with integration challenges	Variable generation, potential integration challenges	Variable generation	Very reliable, has natural gas price volatility risk	Reliable, potential to provide emergency power supply for essential services locally	Can be used selectively as needed
Scalability	May not be sufficient local work-force to accomplish near term goals	May have transmission constraints	Large local land footprint might make it difficult to have a large project	May have transmission constraints	Would likely be a share in a larger project, easily scalable	Could have size restrictions	Only used as needed providing regional build continues

Guidelines and Strategies for the 2011 IERP

The successful implementation of the IERP relies on a foundation of overarching guidelines and short-term activities to guide Board and staff decisions. Many of the concepts are consistent with past findings, but are even more forward thinking about enabling the utility to address future challenges. The guidelines and recommended strategies provide a meaningful way to monitor progress toward intended outcomes and give early indications if a course correction is needed. At the same time, they are not meant to be the sole determinants of plan performance or decision-drivers and instead should work hand in hand with other organizational strategies.

Guidelines

- ***EWEB energy resource analyses and decisions will consider all benefits and costs associated with generation, using a Triple Bottom Line framework for a comprehensive assessment of social, environmental and financial implications.*** This commitment includes decisions regarding whether or not to renew existing power contracts to ensure that values around affordability, portfolio diversity, and preferences for local generation are evaluated as part of the resource analysis. The loss or addition of a new large load will also be a trigger for staff review of the resource mix beyond the five-year period.

- ***Power supply decisions will reflect EWEB's commitment to equitable, affordable and stable rates.*** There are numerous variables that impact customer rates, and power supply costs is the largest single cost component. Since the recommended strategy relies on short-term market purchases to address temporary deficits, it is important to track whether this and other actions are having unintended financial impacts. This guideline is a commitment to monitor whether the plan's assumptions around frequency of need for power and the cost to supply that power is causing pressure on rates and should be re-evaluated.

- ***Incorporate the potential future cost of greenhouse gas (GHG) emissions in resource acquisition decisions.*** While a carbon tax is unlikely under today's political and economic conditions, our community has a value around shrinking the carbon footprint of our energy use. Assessing a 'carbon tax' as part of our resource analyses is a way to monetize and create a level playing field when comparing different resource strategies. This assessment is not meant as a stand-alone evaluation, but would be included as one of a number of social, environmental and economic variables considered under the TBL framework.

- ***Provide for flexible and adaptable implementation.*** For the IERP to be an effective planning document, it must have the flexibility to adapt to new conditions and information. This guideline is a commitment to a more routine and on-going planning effort to monitor progress toward plan goals. This includes an annual update and review of key forecasts to continually refine analyses and ensure that strategies still make sense under current conditions. It also recognizes that the level of uncertainty and potential risks facing the utility in the future may necessitate strategy adjustments before the next formal IERP effort is underway.

Recommended Strategies

Pursue conservation to meet all forecast load growth

Conservation is the resource alternative with the least cost, lowest risk, and fewest environmental impacts. It provides local jobs and keeps more customer money in the community than any other resource alternative. These are some of the reasons the Sixth Power Plan calls for utilities to meet 85 percent of load growth with conservation. By working to keep EWEB's loads at current levels we maximize the value of conservation investments while maintaining all of the power we are entitled to purchase from BPA. The foundational strategy of this IERP is to meet all future load growth through conservation.

Partner with customers to avoid new peaking power plants

While EWEB has surplus power under most circumstances, there are some conditions under which the existing resources are insufficient, such as during extreme weather-driven peaks. Further, EWEB needs to better integrate wind resources into its portfolio to help serve customer loads. A natural gas peaking plant has the flexibility to meet these needs, but the analysis shows significant tradeoffs due to environmental and social impacts. In addition, a new power plant that is only needed to under rare circumstances would be a very expensive resource addition. Operating such a plant at a partial load simply to offset changes in wind generation would be even more expensive.

Rather than rely on new resources to address occasional power deficits, the IERP recommends that EWEB develop strategies to partner with customers to reduce consumption during these times. Specifically, EWEB will pursue the following:

- Target EWEB's conservation and energy efficiency programs toward measures with certain savings during EWEB's peak hours.
- Develop contracts with large customers that incentivize short-term load reductions (either via reduced power consumption or via on-site back-up power systems) to help protect EWEB from brief or extended price increases. A similar program was employed during the 2000-2001 power crisis and was very effective.
- Evaluate results of ongoing and future demand response pilot programs.
- Explore the ability of new and existing technology, such as AMI, to cost effectively augment DR program effectiveness.

By working with a range of customers to address peak loads, EWEB can avoid expensive resources and increase utilization of excess wind generation, which reduces exposure to price volatility from both buying and selling in the wholesale market.

Continue to rely on and expand regional partnerships

The Pacific Northwest has a long history of cooperation across the energy sector, especially in the public sector. As the many new challenges facing the industry require decisions and buy-in from a wide range of parties, leveraging this network has proven the most effective forum for EWEB to exert influence. Issues such as transmission expansion, wind integration strategy, regional conservation targets, BPA programs, emerging technologies, and the emergence of intra-hour wholesale power markets and resource scheduling requirements are all actively being debated across the region.

Since EWEB has a high stake in the outcome of many of these discussions, part of the implementation of this IERP is to stay engaged in the regional dialogue and keep an eye out for new and emerging issues and technologies. In addition, BPA has ongoing rate cases which impact EWEB's rates and resource operating requirements, particularly with regard to wind generation. EWEB staff partners with other utilities in the region with similar interests to help strengthen advocacy positions favorable to EWEB's overall best interest in such forums.

Pursue new large load strategy, if needed

The following specific actions are planned in the event that a new large single load exceeding EWEB's surplus power supplies locates in our service territory:

- Work with the new customer during design and construction to obtain maximum lost conservation / energy efficiency opportunities at the facility.
- Evaluate increasing conservation acquisition in rest of community.
- Acquire remaining required resources from one to five year market purchases.
- Consider contract language that incentivizes additional conservation and/or on-site generation to offset peak load impacts.

Review progress and key assumptions annually

Because the future is full of uncertainties that were not modeled in the analysis, staff proposes to review and report on the following information on an annual basis. This review will enable staff to make near-term course corrections if key assumptions are found to be askew and to ascertain when a new planning process is necessary. This on-going review process will help keep the data fresh and support continuous improvement to the analytical process. Specifically, though not exclusively, the following elements will be annually assessed:

- Comparison of actual EWEB customer load data to forecasts

- Whether conservation is able to meet load growth
- Refinement of EWEB's peak-hour forecast methodology
- Update of key forecasts and assumptions supporting the IERP strategies (i.e. EWEB's need for power, market prices, and the cost-effectiveness of new power resources)
- New regulations such as enactment of carbon policy, modifications to Oregon RPS, or changes to the court-ordered fish biological opinion that could have a profound impact on EWEB's resource portfolio

As the list above indicates, the work does not end once the plan in adopted. EWEB staff will continue to assess resource needs and load requirements, in addition to following technology and regulatory trends that will impact our future. Some of these include:

- Further research on the potential impact of climate change on hydro generation
- Following emerging technologies such as wave energy and energy storage techniques, as well as cost and adoption trends for electric vehicles and solar PV
- Reviewing and developing recommendations based on research gathered on customer willingness to participate in demand response programs

Lastly, as part of an ongoing due diligence to the plan, staff will conduct an annual review of key forecasts and assumptions and provide a summary update on progress of the plan to the Board. Staff will also conduct a mid-plan check-in three years hence, in addition to a full plan update no later than six years from plan adoption.

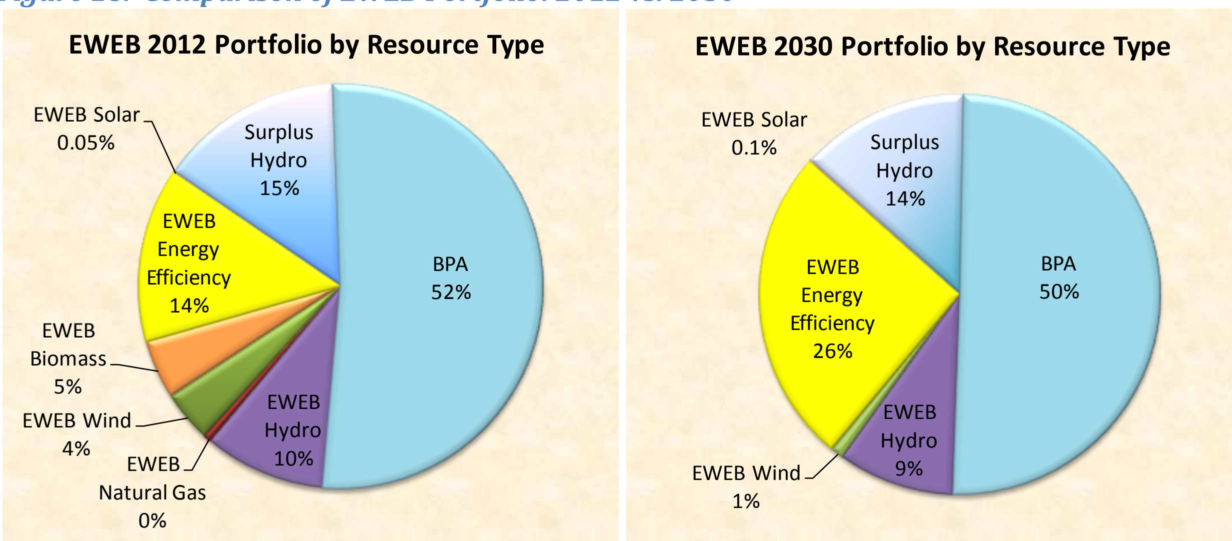
Conclusion

What will EWEB's Resource Portfolio Look Like in Twenty 20 Years?

Compared to other utilities in the nation and region, EWEB's power portfolio is rare in its abundance of renewable and carbon-free power. The utility is currently surplus and does not need additional resources under most conditions until the early 2020s. The combination of these attributes, in addition to the fact that EWEB is going into the next 20-year period with surplus energy, slower load growth projections, and elevated conservation acquisition targets, allows EWEB to take the unprecedented step of recommending a resource plan that requires no new generating resources. If the utility follows this strategy in its strictest sense, by 2030 over a quarter of EWEB's resource portfolio will be ascribed to local energy efficiency. Figure 18 compares EWEB's portfolio in 2012 to the proposed portfolio in 2030.

This strategy also assumes that as EWEB continues to acquire new conservation, the utility can allow other contracts to lapse without consequence to power supply needs, with the exception of the BPA power purchase contract. As a result, EWEB's 2030 power portfolio would have less wind and no biomass resources, and a slightly smaller percentage coming from BPA.

Figure 18. Comparison of EWEB Portfolio: 2012 vs. 2030



However, as stated in the guidelines described earlier, staff will evaluate each contract prior to expiration for highest value to customers using the TBL framework and updated forecast information. The first contract to expire is in 2014 for a small amount of power from the Metro Wastewater facility co-generation facility. So while the recommended strategy calls for no long-term resource commitments for the next five years, a flexible and adaptable planning process will facilitate a forward-looking view of how each contract supports EWEB's overall power supply portfolio and stated strategies.

From a power supply and delivery standpoint, EWEB is in a stable and secure position to meet the future energy needs of its customer-owners. The 2011 IERP builds on a foundation of past planning that prioritizes energy conservation as the preferred resource choice for the future. It also depends on new partnerships with customers to help address a number of pending challenges associated with peak loads and optimizing available renewable resources.

It is anticipated that the next 20 years will bring numerous changes to the utility industry, some identified as potential risks in this planning process and some completely unforeseen. Successful implementation will require on-going evaluation of new information to adapt to changing conditions. The utility should also be poised to take advantage of emerging technologies and business practices to respond to community values around affordability, risk mitigation and sustainability.