

# 2010 Resource Program

## EXECUTIVE SUMMARY

---

September 2010

---



*Cover photo of Klamath Cogeneration combustion turbines courtesy of Iberdrola Renewables.*

**2010 Resource Program  
Executive Summary  
September 2010**

BPA has prepared a Resource Program to evaluate whether and what resources it may need to acquire to meet its power supply obligations, primarily to customers under Regional Dialogue contracts beginning in fiscal year 2012. The planning horizon extends through 2019. During preparation of the Resource Program, BPA coordinated closely with the Northwest Power and Conservation Council as it developed its draft and final Sixth Power Plan.

Recent events, including the current economic recession, have decreased BPA's near-term resource need. BPA expects to be able to meet most of its anticipated needs over the next few years through conservation—as called for by the Council's Sixth Power Plan—and short- and mid-term power purchases from the market. BPA, in partnership with public power, is committed to meeting public power's share of the Council's final conservation targets.

How much more power supply, if any, BPA will need to secure after achieving conservation targets will depend in large part on the outcome of a number of uncertainties about loads placed on BPA:

- Preference customer choices of power supplier(s) for their above-High Water Mark load beyond the initial election period
- Potential formation of new public utilities or tribal utilities that can place load on BPA
- Increased load service to DOE-Richland
- Long-term service to the region's direct-service industrial customers
- Wind power integration needs in the BPA balancing authority area

Other uncertainties that could affect BPA's need for additional resources include timing and strength of economic recovery, the rate of long-term load growth, fish requirements that impact hydro generation, success of conservation efforts, and others.

Depending on the outcomes of these uncertainties, BPA's largest and likeliest power needs after conservation are for:

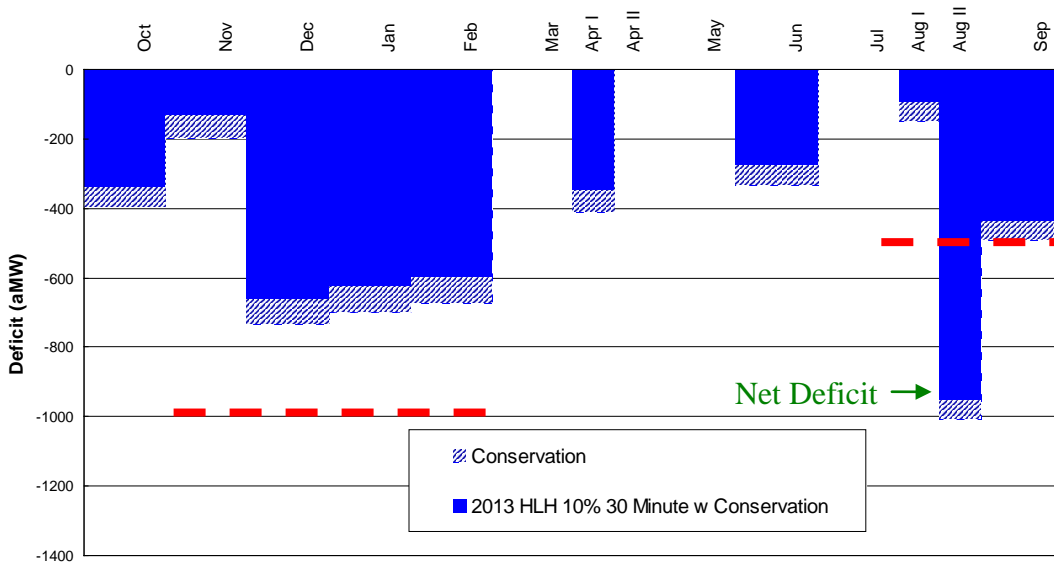
- Energy for seasonal and monthly Heavy Load Hour power demands in winter and late summer
- Balancing reserves to replace flexibility that has been lost in the system and to help support variable energy resources, such as wind power
- Annual energy, which may be met largely by short- to mid-term market purchases for seasonal needs

It appears that aggressive implementation of measures to meet public power’s share of the conservation targets in the Council’s Sixth Power Plan will address a significant portion of BPA’s need for annual and seasonal Heavy Load Hour energy through 2013. Continued aggressive conservation efforts also are projected to meet a considerable portion of BPA’s projected needs through 2019.

Short- and mid-term market purchases from the wholesale power market further diminish remaining seasonal energy needs to be served by long-term resource acquisitions. BPA expects to continue to rely on short- and mid-term market purchases for up to 500 megawatts of summer power supply and up to 1,000 megawatts of peak winter power supply.

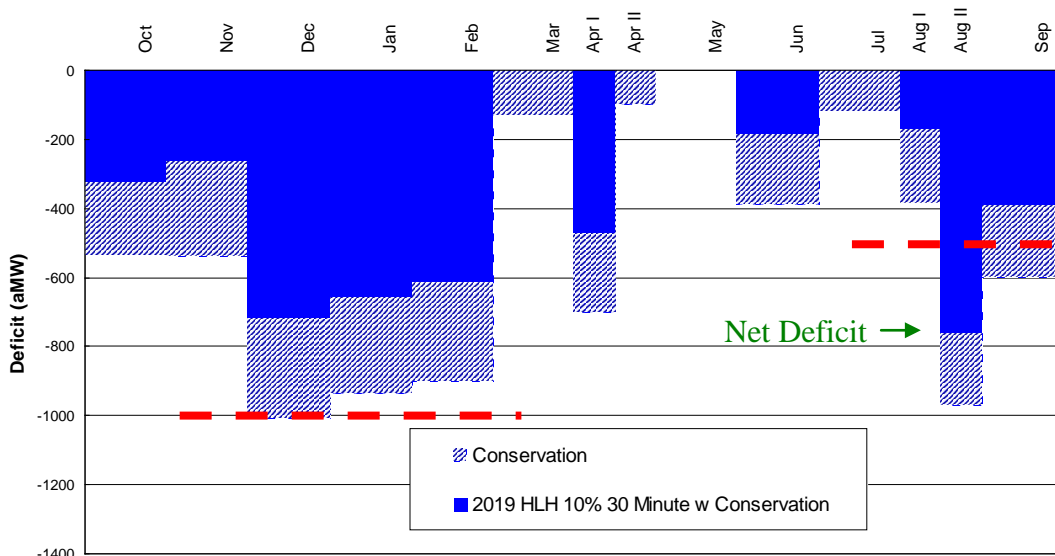
The figures below show that BPA would need additional Heavy Load Hour energy in late August in 2013, with or without factoring in additional conservation to meet the Council’s targets and purchasing short- and mid-term power on the wholesale market up to the 500-megawatt summer market purchase threshold. In the winter months, conservation and the 1000-megawatt market purchase threshold would largely fill deficits. (The cross-hatched blue conservation areas in these graphs show reductions in BPA loads due to conservation achievements to the level of the Council’s targets in its Sixth Power Plan, and the red dashed lines show the 500- and 1000-megawatt market purchase thresholds.)

**2013 BPA Heavy Load Hour energy need at the 10<sup>th</sup> percentile**



Similarly, in 2019, BPA will need additional Heavy Load Hour energy in late August beyond the 500-megawatt threshold amounts for short- and mid-term purchasing, whether or not the Council’s conservation targets are met. For the winter, even if only the low estimate of conservation is achieved, BPA should not need to make additional purchases beyond the short- and mid-term purchases assumed by the 1000-megawatt threshold.

## 2019 BPA Heavy Load Hour energy need at the 10<sup>th</sup> percentile



BPA is working with regional utilities to develop technologies and operating techniques that could help meet these potential power supply needs. This area includes efforts to:

- Increase the flexibility of transmission grid operation to accommodate wind and other variable energy resources, through efforts such as the projects outlined in BPA’s Wind Integration Team Work Plan
- Develop Smart Grid technologies, which also will increase transmission flexibility
- Directly involve electricity users through demand response programs

BPA is actively pursuing all these areas. The Resource Program analysis reinforces the importance of these efforts.

To support development of renewable and high-efficiency resources, BPA also will assess and identify cost-effective small-scale renewable and cogeneration resources in the Northwest considering customer interests and BPA’s resource need.

In addition to relying on conservation as its highest priority resource, as a matter of sound business practice and to ensure reliability, BPA will continue to:

- Rely on wholesale power market purchases
- Monitor the areas of uncertainty, noted above, in order to adapt resource acquisition strategies as necessary
- Track, evaluate, and appropriately pursue availability of pumped storage and natural-gas-fired resources, such as combustion turbines, simple cycle turbines,

and/or reciprocating engines, to provide seasonal Heavy Load Hour energy and/or balancing reserves

Currently BPA does not foresee the need to acquire any major resources. There is need to begin rebuilding BPA's ability to acquire resources so that BPA is ready to move quickly to acquire power resources in the event additional energy and/or capacity are needed as the current load and regulatory uncertainties are resolved.

## Action Plan

Most of BPA's incremental energy needs for the next several years can be reduced by meeting the conservation targets proposed in the Northwest Power and Conservation Council's Sixth Power Plan and through short- and mid-term market purchases. BPA may also face some additional needs for annual energy and likely will face additional needs for seasonal Heavy Load Hour energy and balancing reserves.

The scope of BPA's resource needs beyond those to be supplied from conservation and market purchases will depend in large part on the outcome of uncertainties in customer load placement and power supply preferences for FY 2015 and beyond, climate change legislation, economic recovery, and other unknowns.

This Action Plan presents actions BPA will undertake to help it prepare to meet a wide range of possible outcomes at lowest economic and environmental cost. This listing also indicates how BPA would propose to respond to actions called for in the Action Plan of the Council's Sixth Power Plan. This Action Plan primarily focuses on addressing outcomes presented by the Recovery and Modest Growth Scenario. However, as discussed throughout the Resource Program, there are a number of uncertainties or factors that could drive changes to the actions outlined here, and BPA needs to monitor those uncertainties. These factors are discussed in Resource Program section 9.8.

### Conservation

Work with customers and regional stakeholders to achieve all cost-effective conservation measures necessary to meet public power's share of the Council's Sixth Power Plan regional conservation targets. Continue to collaborate with customers to determine the most-effective approach to structuring BPA's conservation programs and financing under Regional Dialogue contracts that will foster successful attainment of conservation targets, and measure and verify progress toward those targets. Transition to new structure by October 2011 when Regional Dialogue power sales begin.<sup>1</sup>

Participate in and support conservation infrastructure development. The Council included new Model Conservation Standards in its Sixth Power Plan. It also calls for continued market transformation efforts and development of additional conservation measures, including personal computer monitors, commercial outdoor lighting, and distribution system efficiency. BPA will continue to actively support market transformation, adoption of energy-efficient construction, and expansion of the menu of cost-effective conservation and widespread adoption of these measures. This support will be offered through BPA's participation in the Northwest Energy Efficiency Alliance, participation in the Regional Technical Forum and other regional venues, and sponsorship of research and development and pilot projects. In addition, BPA will work

---

<sup>1</sup> The Regional Dialogue Policy directs that BPA conservation costs are allocated in rates to the Tier 1 rate pool. Conservation stretches the resources of the existing Federal Base System and reduces utilities' above-High Water Mark loads.

collaboratively with the region to implement Northwest Energy Efficiency Taskforce recommendations.

Conduct demand response pilot programs and technology demonstrations. In the Sixth Power Plan, the Council calls on utilities to engage in research pilot programs that explore areas that have not been tried before and development and demonstration programs that are designed to test acquisition strategies and facilitate full-scale deployment. BPA is actively pursuing research pilot programs in the commercial and residential sectors. The results will inform the expansion of these pilots into demonstration programs.

Support improved data acquisition techniques for conservation measure verification to ensure valid long-term measure verification at lowest cost and with least intrusion on the time and privacy of participants in conservation programs.

### **Market purchases**

Continue to consider the reliance on short- and mid-term market transactions to meet low-probability within-year seasonal needs as an alternative to committing to long-term resource acquisitions. BPA will continue to monitor and evaluate these guidelines in light of evolving wholesale market conditions. Reliance on the short- and mid-term markets will be closely considered in light of the significant uncertainty the agency faces in terms of future requirements.

Continue to consider longer-term market purchases to meet emerging seasonal and annual needs as an alternative to long-term resource acquisitions. BPA will continue to consider prudent use of longer-term market transactions to manage needs in advance of committing to long-term resource-based acquisitions. BPA will continue to evaluate the relative financial risks of longer-term market purchases compared to acquisition of output from specific resources. BPA will explore methods to enhance its ability to provide and obtain credit support for such transactions.

### **Variable energy resource integration and acquisition**

Preserve and enhance the performance of the hydroelectric generating capability of the FCRPS. Invest in maintenance and capital asset improvements, upgrades, and replacements for the existing federal hydropower resources. Specific actions are conceived and reviewed through the FCRPS Asset Management Strategy, which is vetted publicly through BPA's Integrated Program Review. Specific capital investment decisions are made collaboratively by representatives from all three FCRPS operating agencies and reviewed by BPA's agency-level asset management processes.

Complete existing Wind Integration Team Work Plan projects. These projects will allow BPA to continue to integrate expected wind power into its transmission system and will begin to move BPA and other Northwest balancing authorities toward more flexible power scheduling and joint provision of balancing services.



Develop a formula rate option that can provide a price signal to variable energy resources locating in the BPA balancing authority area. If BPA needs to augment the existing federal system to provide additional balancing reserves, passing the costs of such augmentation directly to the users of balancing services could encourage lower cost alternatives.

Continue to participate in the Northwest Wind Integration Forum and work with regional entities and stakeholders to develop a long-term wind integration strategy.

Pursue further evaluation of potential benefits associated with cooperative, collaborative, and/or joint balancing authority functions such as greater use of dynamic scheduling and voluntary markets for the sharing of balancing resources through the Joint Initiative of ColumbiaGrid, WestConnect, and the Northern Tier Transmission Group.

Actively participate in Western Electricity Coordinating Council west-wide transmission and power planning efforts and in development of national North American Electric Reliability Corporation adequacy standards for variable generation.

Explore and assess small-scale, cost-effective renewables such as waste heat and bioresidue energy recovery, biomass generation, cogeneration, geothermal, and new small hydro. Additionally, identify opportunities for incremental improvements in efficiency and generation of non-federal facilities, consistent with item GEN-11 of the Council's Sixth Power Plan Action Plan.

Be prepared to address customer interest in Renewable Portfolio Standards-qualifying resources such as wind, geothermal, and biomass, and stand ready to acquire such resources under the Tier 2 Vintage rate structure where doing so will fill a corresponding BPA resource need.

### **Natural gas fired generation**

Further evaluate natural gas fired flexible resources. Single-cycle combustion turbines and reciprocating engines perform well economically compared to other generating resource options as sources of flexibility, reserves, and seasonal Heavy Load Hour energy. However, they also produce carbon emissions. Continue to track and evaluate the economic and environmental tradeoffs associated with single-cycle combustion turbine and/or reciprocating engine capabilities to provide balancing reserves, seasonal energy, and, depending on siting, a reduction in transmission requirements.

Continue to track, evaluate, and appropriately pursue combined-cycle natural gas fired generation to supply future reserve requirements, seasonal/monthly energy, and annual energy. Should the high end of BPA's potential load obligations come to pass and BPA finds it requires resources beyond available cost-effective conservation, market purchases, and renewable energy supplies, combined cycle gas turbines would likely be one of BPA's top considerations. Combined-cycle gas turbines provide the lowest cost

and lowest emission profile of thermal baseload resources that are now widely available with large enough capacity to meet annual energy needs.

### **Sources of flexibility and energy storage**

Actively pursue limited pilot programs for augmentation of system flexibility. BPA believes that participation in limited third-party pilot programs for flexibility augmentation will provide valuable operational and economic knowledge to support possible long-term flexibility solutions.

Evaluate flexibility augmentation options. The Council calls for a regional assessment of the relative availability, reliability, and cost effectiveness of resources that can augment the balancing capability of the Northwest power system, including pumped storage, compressed air energy storage, battery, Smart Grid, and demand-side options. BPA concurs with the Council that the Northwest Wind Integration Forum is the appropriate venue for this regional assessment.

Evaluate pumped storage and other energy storage options and pursue cost-effective alternatives. Pumped storage is widely used elsewhere to help accommodate variations in load. Pumped storage, compressed air energy storage, and other storage technologies could prove valuable for firming variable generation and/or providing diurnal reserves and/or Heavy Load Hour energy. BPA is conducting an evaluation of pumped storage potential; the initial evaluation is slated for completion in 2010. Initial studies indicate that reliability improvements to the Keys Pump-Generator Plant at the Grand Coulee complex will be beneficial for providing reserves for integrating variable generation. BPA will explore opportunities to test and evaluate the feasibility and cost-effectiveness of large-scale power storage technologies to increase system flexibility, improve reliability, and provide Heavy Load Hour energy and balancing reserves.

### **Emerging technologies**

Continue to support research, development, and demonstration projects to foster technologies that may improve FCRPS cost-effectiveness, including new conservation and demand response techniques and methods to encourage consumer participation. For example:

- Smart Grid. BPA is a participant in the Pacific Northwest Smart Grid Demonstration Project, which includes five project infrastructure technology partners, 11 utilities, and the University of Washington. The Demonstration Project is managed by Battelle Memorial Institute, Pacific Northwest Division. Funded through a 50 percent cost share by the Department of Energy, the project will implement a number of demand response programs through participating utilities.
- Demand response technologies. In addition to the proven Demand Response technologies described in Chapter 6, BPA is leading demand response pilot projects in the Northwest to test the ability of emerging technologies to automate demand response, provide ancillary services, and facilitate wind integration.

Continue to monitor progress in development of relevant technologies for potential application to future Resource Programs. Monitoring will include Demand Response and Smart Grid technologies, energy storage, and emerging generating resources such as tidal and wave energy, enhanced geothermal, and others.

### **Improving methodologies**

Continue to further develop tools and analytical methods to enhance BPA's capability to evaluate system needs and resource options. This is the first Resource Program BPA has produced since 1992. The nature of BPA's system needs has evolved considerably and continues to do so, necessitating development of new tools to analyze both the need and the effectiveness of various resources to meet it. BPA will:

- Work with its customers, the Council, and others to improve models and analytical techniques for load forecasting; needs assessment; resource adequacy assessment; comparative resource analysis, including economic analysis; and evaluation of technologies such as storage and demand management needed to integrate variable generation.
- Focus on improving techniques to discern the relative value of non-traditional means of meeting loads, such as demand response programs, Smart Grid technologies, and changes in transmission protocols.
- Continue to work with regional utilities, Northwest states, the Western Energy Renewable Zones initiative, and Western Electricity Coordinating Council to improve techniques for evaluating the relative merit of resources that require construction of new long-distance transmission compared to within-basin alternatives.
- With the Council, reestablish regular periodic assessments of resource availability, cost, and performance to support the Council's Power Plan and BPA's Resource Program.

### **Factors to monitor**

For BPA, as for many utilities and agencies, planning for the wide range of uncertainty, given the current status of the regional, national, and global economy, is challenging. Historically, BPA's business practices have been focused on managing a portfolio of resources that, even under very dry water years, provided enough surplus energy and capacity to meet reasonable ranges in uncertainty. However, the range of possible futures and potential impacts to BPA's load-resource balance is wide. BPA will monitor, at a minimum, the following:

- National and regional economic growth indicators and impacts on loads
- Natural gas supplies and market trends
- Power market liquidity and trends including increased volatility and frequency of negative prices

- Climate change legislation
- Regional capacity constraints
- Implementation of Renewable Portfolio Standards in the Pacific Northwest and California
- Emergence and cost effectiveness of new technology

In summary, the timing and amount of BPA's resource needs beyond those to be supplied from conservation and market purchases will depend in large part on the outcome of uncertainties in customer load placement and power supply preferences for FY 2015 and beyond, carbon regulation, economic recovery, and many other uncertain future outcomes. This uncertain situation motivates BPA to actions that can help better prepare to meet a wide range of possible outcomes at lowest economic and environmental cost. In this quickly evolving environment, traditional distinctions between transmission planning, conservation program development, resource planning, and load forecasting are also changing. BPA's Resource Program will evolve with these changes.

**This Page Intentionally Left Blank**

