

factsheet

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Checking for gaps in BPA's future power supply: A Preliminary Needs Assessment

Bonneville Power Administration and 135 Northwest utilities signed new power sales contracts in 2008 under which power deliveries will begin in 2012. The agency is now getting ready to supply power under these contracts. Accordingly, BPA is preparing a Resource Program to identify any gaps in its power supply and suggest types and amounts of resources to fill those gaps, as guided by the Northwest Power and Conservation Council's Northwest Power Plan.



The first step is to assess the ability of BPA's federal power system supply to meet its expected obligations. This is the role of the needs assessment.

This is the first time BPA has done a Resource Program since 1992, and a lot has changed in 17 years. BPA's obligations are different. The system is different. The changes are great enough that BPA has developed new analyses to examine its resource needs. We are sharing the first draft results in a Preliminary Needs Assessment.

The Preliminary Needs Assessment looks at BPA's power supply needs from several perspectives:

- The condition of BPA's existing load/resource balance,
- Potential effects of customers' load placement choices beginning in 2012, and
- Requirements to support the growing fleet of wind projects connected to BPA's transmission grid.

These preliminary results show that BPA's annual energy needs in 2013 could range from 280 average megawatts to about 750 aMW, depending in large part on how much power BPA's customers choose to buy from BPA at Tier 2 rates. Tier 2 rates will reflect the cost of resources BPA acquires to provide that service.

*The draft assessment analyzes
BPA's power supply
and expected power needs.*

BPA is making its Preliminary Needs Assessment publicly available through April 14 for interested parties to review. We welcome and will consider any feedback as we refine the tools, assumptions and inputs for the needs assessment in our Draft Resource Program. This draft will be issued this summer



following release of the Council's Draft Sixth Northwest Power Plan.

Even when final, the 2009 Resource Program will not be the end of the story. The Resource Program is a periodic study, to be refreshed as the agency's needs change and the Council's Power Plan evolves. We also expect to continue to develop our needs assessment tools and assumptions.

We're looking forward to working with you to refine and improve our needs assessment this spring and in years to come.

A smaller, less flexible federal power supply

Much has changed since the last time BPA did a Resource Program.

BPA markets power from the Federal Columbia River Power System, including Northwest federal dams, the Columbia Generating Station nuclear plant and several small nonfederal power plants. Because Columbia River streamflows vary widely from month to month and year to year, BPA has always assessed its resource supply against critical water – the historical stretch of snowpack and runoff least able to refill federal reservoirs. This is still true.

The amount of power the federal dams can produce under critical water to serve customers' loads has changed significantly.

However, the amount of power the federal dams can produce under critical water to serve customers' loads has changed significantly, because the operating requirements and obligations of the system have changed. The net result of these incremental changes is that the federal power supply is smaller and less flexible today. For example:

Canadian Entitlement Returns: BPA now delivers about 500 average megawatts with a peak delivery

Resource Program built in synch with Council's Sixth Power Plan

BPA is building its 2009 Resource Program in coordination with the Northwest Power and Conservation Council as it develops its Sixth Power Plan. The Council's Power Plan examines power load growth and resource supply curves for the Northwest as a whole. Within this regional direction, BPA's Resource Program examines how the Federal Columbia River Power System can be expected to meet BPA's projected power supply obligations. BPA is working closely with the Council and Council staff throughout development of the 2009 Resource Program. If and when BPA actually acquires resources, it intends to act consistent with the Council's Plan.

rate of roughly 1,300 MW to Canada under the Canadian Entitlement Return provisions of the Columbia River Treaty. This obligation comes off the top before considering resources available to serve BPA customer loads. The Canadian Entitlement Return represents the Canadian half of additional generation made possible in the United States by storage dams built in Canada under the Treaty. Canada previously had sold this energy to the United States, but those sales expired between 1996 and 2003.

Biological Opinion Requirements: In the last 15 years, operation of the federal dams on the Columbia and Snake rivers has fundamentally changed to improve conditions for migrating salmon and steelhead listed under the Endangered Species Act. Over the years, these changes have diminished the amount of firm power the federal system can reliably generate by more than the annual average output of Bonneville Dam.

In winter, BPA holds additional water in reservoirs to assure optimal water supplies to augment streamflows for migrating fish in spring and summer. From mid-April through August, required spill and flow, plus operation of Snake River reservoirs at their minimum

pools, significantly reduce the operating flexibility of the system. From November through April, operators maintain Columbia River streamflows at specified levels at the Vernita Bar above McNary Dam for wild (not ESA-listed) chinook and below Bonneville Dam for listed chum. These requirements reduce the operating flexibility of the hydro system. They reduce the system's ability to meet sustained peak power loads or to respond to variations in loads or variable generation such as wind power.

The federal dams of the Columbia River system are 30 to 70 years old and require significant maintenance to sustain their output.

Maintaining an aging system: The federal dams of the Columbia River system are 30 to 70 years old and require significant maintenance to sustain their output. For example, the six large turbines at Grand Coulee Dam that produce about 700 MW to 800 MW each are scheduled for overhaul in the coming decade. Taking these units out of service, even one at a time, will leave a noticeable hole in BPA's power supply and diminish system flexibility.

Different customer choices would create different needs

The Preliminary Needs Assessment analyzes BPA's expected power supply needs. These needs are driven by the sorts of demand BPA is being asked to meet, which vary significantly from previous expectations.

Regional Dialogue Contract Choices: Under its 2012 Regional Dialogue Contract, each BPA customer utility will choose how much load it wishes to place on BPA above its purchases from the existing federal system.

If BPA customers purchase only firm power at Tier 1¹ rates from BPA and do not request Resource Support Services, the agency would need to acquire only about 200 aMW or 300 aMW of power for 2013.

On the other hand, if customers ask BPA to meet all the load that would be served at the Tier 2 rates, then BPA would need to acquire up to about 500 aMW of additional power by 2013. These figures assume critical water conditions and economic forecasts made in mid-2008.

Ancillary Services: One of the key efforts in the Preliminary Needs Assessment is its analysis of hourly power supply needs, which, in turn, allows assessment of BPA's capacity needs. The study also explores the limits to the FCRPS' ability to supply ancillary services – services that maintain system reliability within a given hour.

BPA Transmission Services provides within-hour ancillary services needed to assure reliable transmission service. Ancillary services maintain the necessary constant balance of energy entering and leaving the transmission system moment-to-moment. BPA Transmission now buys power needed for its ancillary services from BPA Power Services, that is, from the Federal Columbia River Power System. All users of BPA's transmission grid consume these services: BPA's power arm, other utilities and independent power producers that own resources such as natural gas and wind power plants.

The Preliminary Needs Assessment results suggest that there is a limit to the FCRPS' ability to supply ancillary services. If BPA were to continue to meet this need solely from the FCRPS, the resources of the FCRPS would be increasingly devoted to providing ancillary services, significantly reducing secondary power sales and quickly leading to increased likelihood of violating mandatory transmission reliability standards. The FCRPS alone cannot meet projected ancillary service needs when federal hydro flexibility is limited by water conditions or other constraints. BPA needs capacity. When BPA acquires

¹ Under the Regional Dialogue contracts, BPA publicly owned utility customers will buy power at Tier 1 rates reflecting the cost of the existing system. If they wish to place further load growth on BPA, they will pay Tier 2 rates for that additional power. Tier 2 rates reflect the costs of acquiring additional resources to serve those loads, including costs of shaping power sold at Tier 2 rates into flat monthly blocks of power.

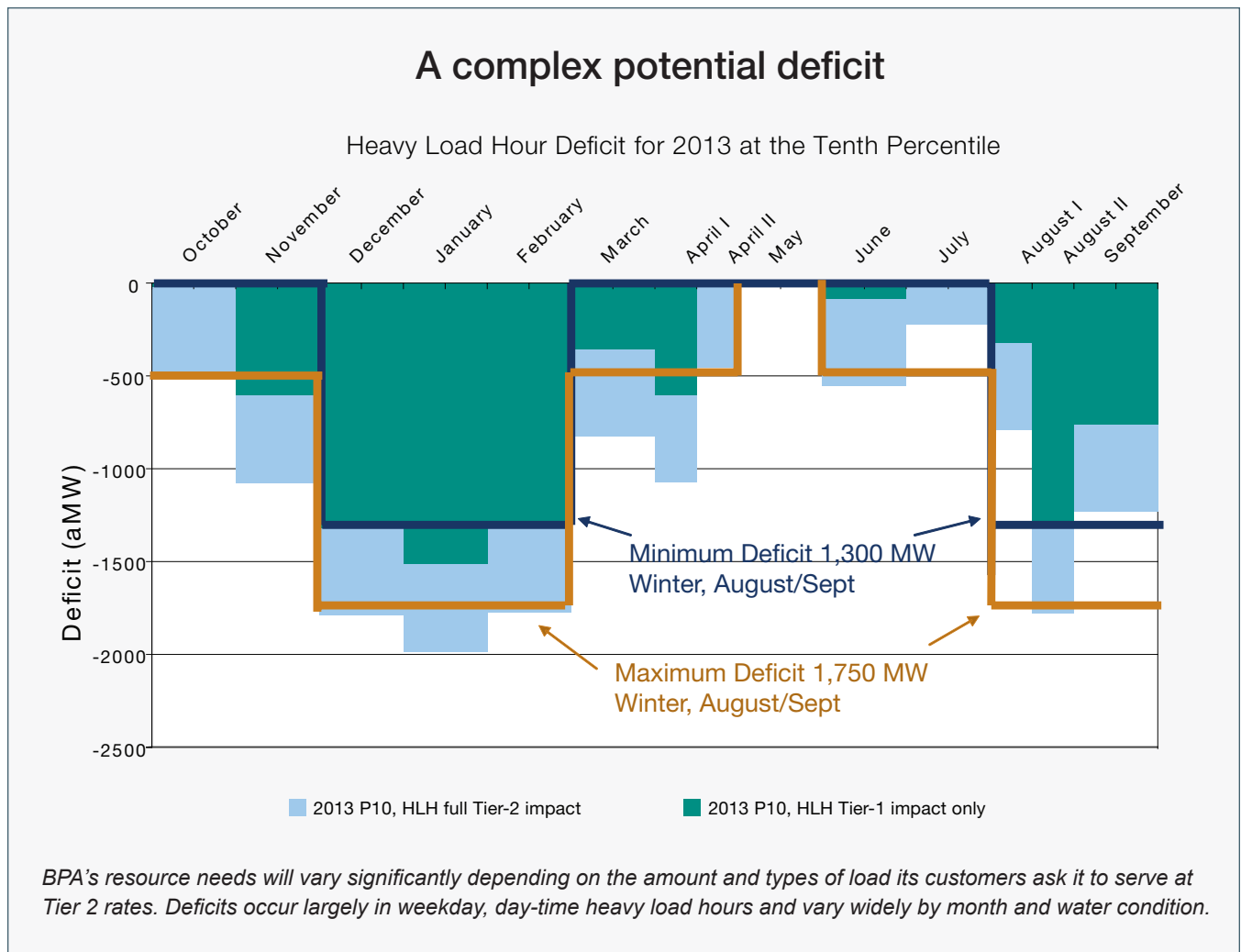
hourly capacity to meet its peak loads, some of that capacity will need to be capable of being deployed rapidly to supply within-hour ancillary services.

Resource Support Services: Under the Regional Dialogue Contracts, BPA will offer Resource Support Services to shape customers’ non-federal generation into flat blocks of energy to serve their loads. For example, by buying RSS, a customer could purchase power from a wind power project, and BPA would reshape the wind generation into flat blocks of energy. Since customers are adding significant amounts of wind power to meet state renewable resource standards, the RSS could increase BPA’s obligation to supply wind integration services. This potential demand is not addressed in the Preliminary Needs Assessment.

Snapshots of the system

The Preliminary Needs Assessment includes several computer analyses to show how today’s federal power system might meet BPA’s expected power needs. These amount to snapshots of the system taken from different perspectives.

2009: BPA analyzed its existing resource supply in 2009 to confirm its current state of load/resource balance and as a baseline for comparing relative supplies in later years. The 2009 analysis shows BPA has about enough resources to meet its loads over the course of an average water year. But the same analysis shows BPA short of resources in a dry 2009 during Heavy Load Hours (HLH) in winter and late summer months. In fact, BPA has bought power during



dry months this winter. In a year with roughly a one-in-10 probability of occurrence (with a one-in-10 probability counting water supply, load variability, and potential outage of the nuclear plant), the highest HLH deficits are 1,100 average megawatts to 1,600 aMW in December to February and late August.

2013: In 2013, serving loads under the new power sales contracts, the analysis shows BPA would be deficit between 280 and 750 aMW in annual average energy to meet its customers' firm power loads, depending on how much load BPA's customers choose to place on BPA at Tier 2 rates.

Again, the picture changes when one looks more closely at hourly and seasonal capacity needs. Summer and winter Heavy Load Hour deficits are up to 2,000 MW at the tenth percentile (with a one-in-10 probability), assuming customers place all their power loads on BPA. With these loads, BPA would need to acquire about 1,750 MW of targeted power supply to meet Heavy Load Hour and peak loads in winter and late summer of low-water years. The study also shows that the flexibility of the hydro system has reached the limits of its ability to meet sustained peak loads, such as a 3-day cold snap or heat wave in a dry year.

What's most instructive about these results is the way they break down over the course of a year. BPA has enough energy to meet its loads under all water conditions in May. But it is 1,700 MW deficit in December 2013 under poor water conditions.

Study highlights value of new wind integration tools

The Preliminary Needs Assessment specifically examined the effects of providing reserves for the 6,670 MW of wind power BPA expects to see connected to its transmission grid by 2013, assuming hourly wind generation schedules maintain their current level of accuracy.

BPA is working with the wind community to help improve the accuracy of wind generation scheduling

and to find ways to augment federal hydro power with other sources of reserves for wind power. The list of solutions is long, and some are already in place. For example, BPA has updated its interconnection agreement for power plants connected to its grid to specify that generators must follow Dispatchers Standing Orders for reliability.

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Preliminary Needs Assessment results confirm the value of the work BPA, the Council, Northwest utilities and the wind power operators are doing to find new techniques to integrate large amounts of wind power in the Northwest grid. BPA's Wind Integration Team has produced improvements over the last few months that will offset some of the needs shown in the fall 2008 assumptions used in the Preliminary Needs Assessment, but the fundamental trend of the results remains instructive. The high proportion of variable wind power in BPA's grid is changing the shape of BPA's resource needs.

BPA strongly supports the fast growth of renewable wind power in its grid. More than 2,000 MW of wind power generation are already connected to BPA's balancing authority, representing about 20 percent of the balancing authority's peak load of 10,500 MW. BPA already has a higher proportion of wind power to load than any other balancing authority in the nation.

As a balancing authority, BPA Transmission is responsible for balancing the load in its balancing authority area with the power produced in that area. BPA analyzed hourly wind generation in its balancing authority area in FYs 2006-2007, and extrapolated these results for 2009-2013. This analysis reflects system operations current as of Sept. 10, 2008; this data was also used in BPA's 2010 Wholesale Power Rate Case Initial Proposal.

The results show that, under the operating procedures and real-time operations in place in 2008, BPA would need to reserve up to 2,494 MW of federal capacity so as to be ready to increase generation at dams (INC), should wind generation not meet its schedules. BPA would also need to have up to 3,300 MW of capacity operating but in a position to back down so as to decrease federal generation (DEC) without violating streamflow requirements, should wind generation exceed its schedules.

The analysis also showed the federal dams do not have the flexibility to provide such high levels of reserves without violating streamflow or fish protection requirements. Under 2008 operating protocols, the hydro system alone cannot provide sufficient reserves to serve more than about 3,000 MW to 3,500 MW of wind power. The forecast used in this study predicts that the BPA will have 3,155 MW of wind power in its balancing authority area by 2010.

This study is a starting point

It's taken BPA some time to expand its models and run the assumptions through them for the first time in the Preliminary Needs Assessment. The assumptions generally date from about September 2008, and they are generally consistent with assumptions in BPA's 2010 Wholesale Power Rate Initial Proposal. The most fundamental assumption, that load growth will average about 1.3 percent a year over the next 20 years, is similar to the Council's forecast of 1.6 percent per year for the same period.

The world is moving fast, and a number of assumptions will need to be updated for the draft Resource Program. For example, the Preliminary Needs Assessment does not reflect:

- Work this winter with BPA customers and the wind community on tools to provide reserves for wind power from sources other than the federal hydropower system.
- The impact of the economic crisis. Only a slight slowdown in growth was assumed.
- Final Slice power sales as a proportion of the FCRPS under Regional Dialogue Contracts (27percent, compared with the 25 percent assumed in the Preliminary Needs Assessment).
- Recent climate change impact information, such as a February 2008 report from the University of Washington.

BPA intends to revise the needs assessment before issuing its draft Resource Program this summer. We will consider feedback received through April 14 in preparing the revised needs assessment used in our Draft Resource Program.

The Resource Program is a study cycle, not a decision process. Our first attempt at this study in almost two decades has illuminated a whole new set of system needs, reflecting the changes in the power market and the power system. We are confident that your comments, observations and suggested data sources will improve our approach, so that we can prepare to meet BPA's future power supply obligations at the lowest economic and environmental cost.

For more information

Information on the Preliminary Needs Assessment is posted at www.bpa.gov/power/P/ResourceProgram/Index.shtml. Or, contact your BPA customer or constituent account executive, or call 1-800-622-4519.

BPA is holding a public workshop on the Preliminary Needs Assessment on Tuesday, March 17, from 9 a.m. to noon at BPA's Rate Hearing Room, 911 N.E. 11th Ave., Portland, Ore.

Comments and suggestions for the Preliminary Needs Assessment may be submitted to www.bpa.gov/corporate/public_affairs/ by April 14.

We look forward to your participation.