Response to NW Energy Coalition's "Bright Future"

(Updated May 13, 2009)

This response to the Northwest Energy Coalition's publication, "Bright Future," comes from a group of energy analysts with decades of experience and technical expertise in the electric power industry in the Pacific Northwest. These comments provide corrections and further insight into the NWEC document so that policy makers can realistically evaluate this view of the future.

Overview

The old adage: "If it sounds too good to be true, it probably is," applies to Bright Future. Bright Future is a well-intentioned but overly simplistic approach to regional energy planning that is oblivious to the needs of the region for a reliable power system. A key aspect, the cost of achieving the vision described in this paper, is seriously understated. The paper's premise is also highly unrealistic. To suggest that the region can reduce carbon emissions while meeting over 4,000 aMW of new Northwest load by 2020 through energy efficiency and renewable/wind development, plus replace 4,283 MW of existing resources while retaining power system reliability – all at two-thirds of a cent per kilowatt hour – is a pie-in-the-sky dream. In fact our estimate of the cost of Bright Future is more than double the Bright Future author's estimates.

The claims made in Bright Future should be cross-checked with those who have real responsibility to plan for, and operate, a power system: the Northwest Power and Conservation Council, the Pacific Northwest Utilities Conference Committee, the Bonneville Power Administration as well as other regional utilities and planners. None of these organizations have identified a realistic path to meeting all load growth with conservation and renewables alone, nor have they found that replacement of existing hydro and coal-fired resources can be done cheaply or without adverse environmental and economic effects. In fact, the Bright Future sponsors' previous attempt to evaluate the region's power system economics with a goal of promoting Lower Snake River dam removal (in a publication called "Revenue Stream") was shown to be in error by the region's Independent Economic Advisory Board, among others.

The Northwest is facing significant challenges. We must meet the region's rising demand for energy, achieve environmental goals and meet even more stringent regulatory requirements. Bright Future does not acknowledge this reality.

Recommendation

Our time would be better spent working to refine a vision for the future by developing a thorough plan for the region through the Council's power planning and BPA resource planning processes. These processes are designed to consider the financial and reliability impacts of all resources – existing and planned.

Planning to meet the energy needs of the region requires a thorough approach informed by integrated resource planning (much like the Power Plan now being developed by the Council) which takes into account the energy, capacity and reliability needs of the region. Bright Future is largely an energy-based superficial analysis that fails to take the capacity needs of the region into account. Capacity is the ability of the power system to meet instantaneous and sustained peak loads. Many of the recommendations in Bright Future are based on unrealistic assumptions, and fail to acknowledge what we know about the Northwest's power system. For example – the four lower Snake River dams produce almost as many annual average megawatts as BPA's conservation programs have achieved in 27 years.

Here are some other examples:

Inaccurate Claims Made in Bright Future

"The four Lower Snake River Dams can be removed and their output substituted by conservation and renewables."

- Suggesting that the Snake River dams, which together provide 1,191 average megawatts of energy and up to 3,033 megawatts of capacity[1] could be removed, while simultaneously reducing carbon emissions and bringing more wind resources on line, is downright disingenuous. One thousand megawatts of energy is approximately the amount of power needed to serve a city the size of Seattle.

- Seventy-one percent of Northwest voters agree that removing the Lower Snake River Dams would be an extreme solution according to a recent poll conducted by Tim Hibbitts. 66 percent are unwilling to further reduce the electricity generated by hydro power to help salmon if it means fossil fuels replace the lost hydropower.

- Power from the dams is needed to meet the Northwest's peak energy and reliability needs and currently is necessary to back up the 3,098 megawatts of renewable wind projects already on-line in the region with an additional 473 MW under construction[2].

- The region could not have brought so much wind on-line without the region's existing hydropower dams (including the four Lower Snake River dams). To achieve the region's goal of bringing on 6,000 megawatts of new wind we need the federal hydro system more than ever. However, to maintain a reliable power system and achieve the region's renewable goals will require even more additional back-up resources, most likely natural-gas fired combustion turbines.

[1] Northwest Power and Conservation Council, Existing Resource Database, updated April 2009.

[2] Northwest Power and Conservation Council, Power Plant Development Activity in the Pacific Northwest, updated April 2009.

- According to the Northwest Power and Conservation Council's analysis of the Region's Carbon Footprint[3] 4.4 million tons (8.8 billion lbs) per year of additional CO2 would be added to the atmosphere if the dams were removed, due to the need for fossil fuel-based replacement generation. This figure does not include higher emissions that would result from shifting to truck/rail transport of goods downriver versus barging that is now made possible by the dams. One barge is equivalent to 134 trucks on the road[4]. For comparison purposes the Council estimates that 4.4 million tons of CO2 per year is equal to the CO2 released by 587 MW of coal-fired electric power, or to 1,467 MW of electricity produced by gas-fired combined cycle power plants.

"Energy efficiency can be used to meet 340 aMW of energy needs a year."

- Based on a recent Council presentation, since 2001 the region has added 1600 aMW of energy efficiency savings for both utility and building and appliance efficiency code programs.

- Utilities recognize that energy efficiency will also be the resource of choice in the future. Under its most aggressive conservation plan, the Council is suggesting that energy efficiency be increased from just over 300 aMW of energy efficiency achieved in 2007 to 366 aMW of energy efficiency savings per year by 2019[5]. This aggressive path is not much different from the Bright Future recommendation. When the Council's Draft Sixth Power Plan is released later this year, the region will have the opportunity to consider the feasibility of this level of planned conservation.

- Energy efficiency targets are achieved through such means as BPA programs, utility programs, state and federal building and appliance codes and individual consumer purchases and lifestyle choices. Energy efficiency targets are comprised of a large array of measures. Attaining energy efficiency can be done by the end-use consumer, with or without incentives from their utility; by the utility; by collaborative efforts of utilities, regional entities, etc. Other measures come from changes made upstream by the manufacturer or by state or national codes and standards. It is important to take into consideration the variety of ways energy efficiency measures can be implemented when forecasting the amount of potential energy efficiency savings. Measure implementation can be hard to predict and influence and hinges on a number of variables, such as economic impact and lifestyle impact. Individual utilities, energy policy makers and planners have limited control over many of the ways in which energy efficiency can be

[3] "Carbon Dioxide Footprint of the Northwest Power System", November 2007, Northwest Power and Conservation Council, 2007-15.

[4] www.pnwa.net, Columbia Snake River System Facts

[5] Draft Sixth Power Plan presentation to the Northwest Power and Conservation Council, April 2009. http://www.nwcouncil.org/news/2009/04/p5.pdf

achieved, particularly when actions are required far upstream (at the manufacturing or national level) or far downstream (at the end-use consumer level).

"Renewables can be used to meet all of the region's energy needs after the four Lower Snake dams are removed and all of the coal plants are phased out."

- Bright Future assumes that there is a one-for-one equivalence of hydro and wind energy. This is not the way power systems operate.

- Bright Future assumes that by 2020 we can obtain an additional 2,500 aMW of new renewables (mostly wind) at 10 cents per kWh compared to "business as usual." Because the wind doesn't blow all the time, about 8,000 MW of new wind capacity will be needed to generate that 2,500 aMW. Assuming ten-cents per kilowatt-hour power for such a massive build-out of the region's wind resource ignores the fact that as more and more wind power plants are sited in the region the cost will increase, power output will decline and transmission costs will increase. Using the current estimate for the cost of wind power today is an extreme underestimation of what it would actually cost if the region chose to follow the path recommended by Bright Future.

- Bright Future neglects to adequately consider the transmission costs to get the power to consumers. Typically these costs add 30 to 40 percent more to the cost of wind resources[6]. The transmission lines that bring power from Montana and other areas with wind resources are already fully committed to existing uses. Thus, more wind will require new transmission capacity. The first transmission additions are generally the least expensive because existing facilities can be upgraded, but as greater quantities of generation are built, the additional new transmission facilities become more expensive. The extent of new transmission facilities required for Bright Future is unknown but cannot be assumed equivalent in cost to today's transmission. Bright Future also neglects to address the problem of siting new transmission. Until it is certain that sufficient transmission will be built, it would be risky to assume that power needs will be met with remote generation.

- Also Bright Future fails to consider the cost of integrating an intermittent resource with the existing power system to meet load. The shape of the overall loads doesn't match the shape of how wind resources produce power. These costs are under study in the region at this time but initial estimates are that integration of wind resources can add another 20 percent or more to the cost of wind.

[6] Northwest Power and Conservation Council, Review of Generating Resource Options for the Sixth Power Plan. http://www.nwcouncil.org/news/2009/01/4.pdf

Bright Future will keep the lights on

- The most important function of the power grid is reliability. The power system needs to provide electricity on a continuous basis and meet peak power use when consumers demand it. When a consumer turns on a light or a factory turns on a motor, electricity must be there, reliably. The consequences of not having a reliable electric power system would have severe health and safety implications and would be disastrous for the economy. Even momentary reliability lapses can lead to substantial national reliability standard violations with significant monetary consequences.

- Bright Future relies on wind generation to fulfill the energy needs of the system. While renewables are a very important part of meeting load growth in the region they do not bring reliable power that can meet consumer demands. Wind resources are not available at the push of a button. The region's experience is that when power is needed most, the wind is not blowing. For example, we have observed that when it very hot or very cold wind generation is simply not there. During the cold days of January 5 to 28, 2009 wind generation in the region was almost non-existent[7].

- Capacity has to be provided by backup hydro and thermal (typically fossil fuel) resources. These are the very resources that Bright Future is asking to be removed. It is unrealistic to assume that we can continue to bring on new wind resources without making major investments in new reliability resources to shape the wind output to meet load based on consumer demand.

- Energy Efficiency met 50 percent of the Northwest's electricity load growth between 1980 and 2006 (based on BPA numbers). However, maintaining a reliable power supply requires control; conservation measures cannot be turned on when consumers demand more energy. As a result, energy efficiency cannot provide backup for intermittent generation such as wind nor can it be used to maintain system reliability. For example, wind energy is generated when the wind blows – this rarely occurs when the system faces peak demand for electric energy. Plus, on average, the wind only produces approximately 30 percent of maximum power the turbines can technically produce. To maintain system reliability electric generation must instantaneously match customer demand for electric energy. This physical requirement leaves electric utilities no choice, but to acquire additional generating resources that can be used to increase power output when the wind generation is less than what customers demand for electric energy – or decrease output when the wind generation exceeds customer demand for electric energy.

[7] http://www.transmission.bpa.gov/business/operations/wind/WindGen_VeryLow_Jan08Jan09x.xls

- Failure to consider the impact of removing the Snake River dams and coal plants on peaking, load following and reliability is a serious shortcoming of Bright Future. Reliability is essential to consumers, so any power plan pursued by the region must be far more than just a plan for meeting the average energy needs as was done in Bright Future.

Bottom line

Bright Future is only an additional 0.67 cents/kWh over business as usual.

- The costs of Bright Future are extremely underestimated. To take a few glaring examples, the report assumes that 2000 MW of capacity will be lost if the dams are removed (the full capacity of the lower four Snake River dams is 3033 MW) and that this loss of capacity can be replaced at a very low cost estimate of $83 million per year. In addition, there are no assumed costs of replacing the assumed loss of 1000 MWa of coal-fired capacity in 2020.

- The Public Power Council (PPC) estimates that the real cost of Bright Future are more than twice as expensive as the cost estimated by the Bright Future authors[8].

- Key problem areas with Bright Future:
    - Capacity replacement costs for coal and Lower Snake resources are seriously underestimated.
    - The cost of dam removal is not considered.
    - Wind integration costs are ignored.
    - The capital needed to finance the conservation, wind and coal replacement resources included in Bright Future in 2020 will be more than $100 billion. The up-front costs of conservation will cause a significant rate impact. Use of lifecycle cost of conservation understates that impact. For example it will require almost $7,000 per installed kW of energy efficiency to finance conservation that has a lifecycle cost of 4 cents/kWh.
    - The Council's regional power plan already relies on achieving all cost effective conservation and renewables. You can't just assume more conservation and renewables to replace dams and coal plants out of thin air.
    - Overstatement of availability of wind resources.
    - Transmission availability and cost are not adequately considered.
    - The Bright Future vision fails to provide for a reliable power system.

[8] See Examining Bright Future, PPC, May 13, 2009