Ice Harbor Dam, completed in 1961, has a generating capacity of 603 megawatts.

Power benefits of the lower Snake River Dams

In the 1960s and early 1970s, the federal government built four large dams on the Snake River. This is the last set of major dams to have been built in the Federal Columbia River Power System. The FCRPS is the largest source of electricity in the Pacific Northwest and the largest source of renewable electricity in the nation.

The U.S. Army Corps of Engineers owns and operates the lower Snake River dams, while the Bonneville Power Administration markets the power from these dams. All four dams are multiple-use facilities that provide navigation, hydropower, recreation, and fish and wildlife conservation benefits. These dams were not built to control floods.

The useful output of a power station is measured in two ways – capacity and energy. The four lower Snake River dams are major power plants by either measure.

Peak capacity typically refers to a power plant's value in meeting peak power loads. It is the largest amount of power a plant can generate operating at full capacity. Each of the four lower Snake River dams provides significantly more power capacity than a typical coal plant. The nameplate capacity of the four lower Snake River dams is as follows:

Ice Harbor Dam	603 MW
Lower Monumental Dam	810 MW
Little Goose Dam	810 MW
Lower Granite Dam	810 MW
Total	3,033 MW

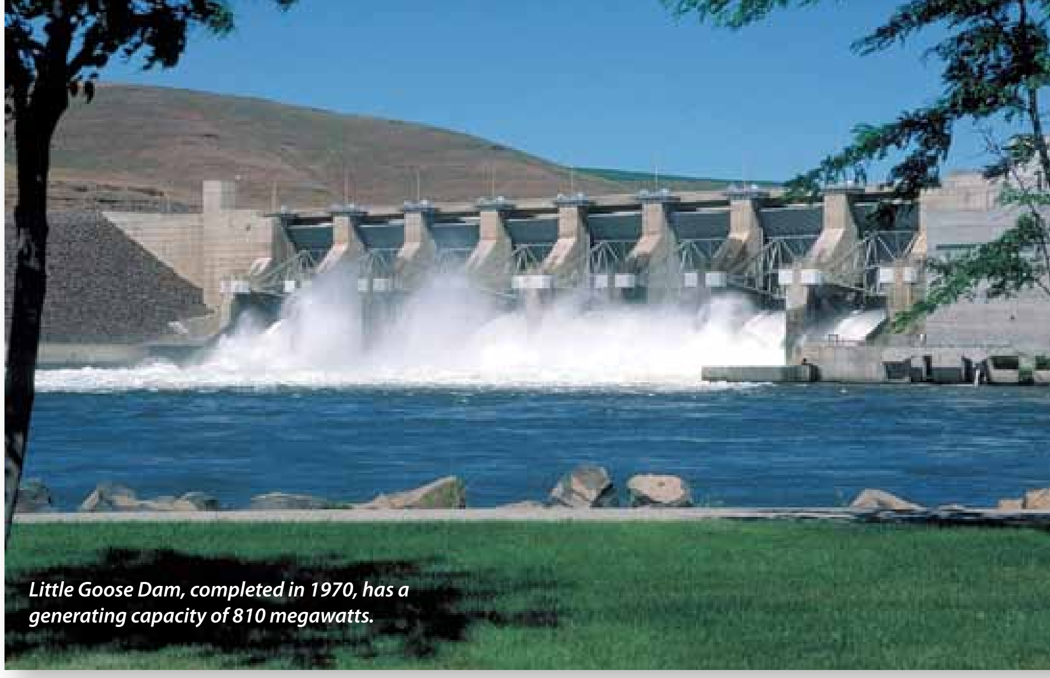
In comparison, the Boardman coal plant owned by Portland General Electric has a capacity of 530 MW, less than the smallest of the four Snake River dams. And the combined capacity of the seven dams owned by PacifiCorp on the Klamath River in Oregon is just 183 MW.

The four lower Snake River dams can operate above their rated capacity to produce up to 3,483 MW for several hours. In an extended cold-snap or other power emergency, such as another power plant shutting down unexpectedly, these four dams can produce in excess of 2,650 MW over a sustained period of 10 hours per day for five consecutive days.

According to the Northwest Power and Conservation Council, capacity is becoming increasingly important to the Pacific Northwest to meet peak loads in the summer as well as the winter.

Much of the year, BPA relies on the four lower Snake River dams specifically to help meet peak loads. This ability to produce

[Editor's Note: This article is adapted from a Bonneville Power Association Fact Sheet on the power benefits of the Snake River dams. For more on agricultural, commercial transportation and recreational value of the Snake River dams, go to www.nwriverpartners.org.]



Little Goose Dam, completed in 1970, has a generating capacity of 810 megawatts.

power when the system needs it most is crucial to maintaining a reliable power supply. Without these dams, the region would either have to build extremely costly generation to meet peak needs – generation that could be idle much of the time – or it would have to rely on the market purchases. Market prices are likely to be highest when demand is high.

Average energy is the annual output of a power plant divided by the 8,760 hours of the year. The four lower Snake River dams produce almost as much annual average megawatts (1,022 MW) as BPA's conservation programs have achieved in 27 years 1,190 MW).

Together, the four Snake River dams supply 12 percent of the average energy production of the entire federal Columbia River system and 5 percent of the Pacific Northwest's power generation. This is enough energy to serve a city about the size of Seattle.

Hydropower is also a renewable resource and produces virtually no greenhouse gas emissions.

Power production from the lower Snake River dams saves 4.4 million metric tons of carbon dioxide from reaching the atmosphere each year, according to a 2007 Northwest Power Council study on the Northwest's carbon footprint.

The council concluded:

"Removal of the lower Snake River dams will not make additional CO^2-free energy resources available to meet future load growth or retire any existing coal plants. More than 1,000 MW of emission-free generation eventually will have to be replaced unless the supplies of renewables and conservation are considered unlimited. Given the difficulty of reducing CO^2 emissions, discarding existing CO^2-free power sources has to be considered counterproductive."

Inside the powerhouse at Lower Granite Dam.

Because of their location, size and ability to help meet peak power loads, the lower Snake River dams signifiantly support grid stability and the system's ability to meet multiple system uses.

While BPA markets power from 31 federal dams, only the 10 largest dams keep the federal power system operating reliably through Automatic Generation Control (AGC). Four of these 10 dams are lower Snake River projects.

Under AGC, when total generation in the power system differs from total load being consumed, automatic signals go to these few dams to increase or decrease generation. This maintains the constant balance of generation and loads necessary for power system reliability.

Of the other dams on AGC, Grand Coulee Dam and Chief Joseph Dam are on the Columbia River above its confluence with the Snake River. The other four are on the lower river, below the Snake River confluence.

Stream flows in the Snake and upper Columbia River often differ. When one river's use is particularly constrained, the other may be used more to help meet the total fish, power, flood control and other needs. (During spring and summer, the AGC capability of the lower Snake River dams is limited by the requirements of fish operations at these dams.)

The lower Snake River dams are integrated into the transmission grid by a long 500-kilovolt transmission line that runs from western Montana to eastern Washington. Other generators are also connected on this transmission path.

The lower Snake River dams provide necessary voltage regulation on this long transmission path, keeping the system reliable.

Similarly, because the Snake River dams lie east of the other federal generators, they provide a significant technical contribution to transmission grid reliability. Absent generation at these projects, the carrying capability of certain major transmission lines would have to be reduced.

In addition, the Snake River dams provide flexibility in integrating wind power into the system.

Wind is booming in the BPA transmission grid. The agency expects to see 3,000 MW on line by the end of 2009, which is expected to give BPA the highest ratio of wind power to load of any power system in the United States.

Because wind power is variable, it must be complemented with other generation that can be increased when wind unexpectedly dies down or decreased when the wind blows harder. This backup for wind is needed for reliability because the amount of generation entering the grid must equal the amount consumed at all times, or the grid can destabilize.

Hydropower is an exceptionally valuable resource in providing this capability. Dam operators can start, stop, increase or decrease generation by hundreds of megawatts in

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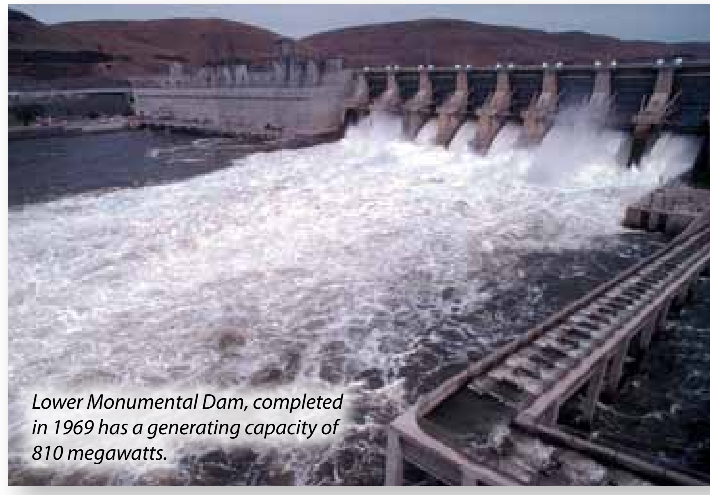
seconds to minutes (if water is available). Natural gas-fired combustion turbines are next fastest in their ability to quickly increase or decrease output, while thermal plants such as nuclear and coal-fired generation take many minutes or even hours to achieve similar support.

To maintain system reliability with more than 1,600 MW of wind power in its grid, BPA now adjusts hydro generation up or down by as much as hundreds of megawatts within individual hours to counterbalance unexpected increases or decreases in wind generation. BPA generally makes these within-hour adjustments at mainstem Columbia River dams while using the lower Snake River dams to help meet loads.

Under the Northwest Power Council's Fifth Power Plan, the region already plans to achieve all cost-effective conservation (estimated at 2,500 aMW), plus 5,100 MW of new wind power. (The council plans to issue its Sixth Power Plan this fall.)

In addition to conservation and renewables, the council estimates the region could need additional coal, coal gasification and natural gas resources to meet expected load growth. Therefore, replacing the power from the four lower Snake River dams likely would increase the amount of thermal resources (coal or natural gas) in the region's power mix.



Lower Monumental Dam, completed in 1969 has a generating capacity of 810 megawatts.

Because the Snake River dams are primarily used to meet peak power loads, it would be necessary to replace not only the energy, but the peak capacity (3,100 MW) power they now provide. Natural gas-fired combustion turbines likely would be the most cost-effective resource to replace energy from the lower Snake River dams. They would likely be required in all alternatives to replace the 3,100 MW *capacity* value of the dams.

Based on wholesale power price forecasts, replacing power from the four lower Snake River dams would cost the Northwest $444 million to $501 million a year if the dams were replaced with natural gas-fired generation; $759 million to $837 million a year if the dams were replaced with a combination of wind, natural gas and energy efficiency.

The obvious conclusion is that the four lower Snake River dams are important to the Northwest's power needs, provide important support for the transmission system and help keep our system low in carbon emissions. C