



BPA and Fish Passage Center study effects of changing total dissolved gas standards April 2011

As renewable energy expands in the Northwest, BPA and its fellow operators of the Columbia River hydroelectric system – the Bureau of Reclamation and the U.S. Army Corps of Engineers – are working with regional parties to avoid temporary imbalances in power supply and demand that could affect endangered fish.

An overabundance of springtime runoff is not new for the Pacific Northwest. Historically, the region faces a one in three chance each spring that the supply of hydroelectric power generation will exceed regional power demands.

Federal power operators have managed these situations by maximizing out-of-region exports (within transmission limits), powering down thermal generation and spilling water to keep the power grid in balance. While some spill helps young fish migrate to the ocean, too much can cause high levels of dissolved gas in the water, which can be fatal to fish. So far, operators have managed high runoff to comply with total dissolved gas (TDG) limits set by the states of Oregon and Washington under the Clean Water Act.

In February 2011, BPA issued a Draft Record of Decision detailing additional proposed actions that could be employed during overgeneration events to avoid exceeding TDG limits. These included environmental redispatch, a measure where as a last resort BPA would limit generation of wind power and replace it with free federal hydropower. BPA received 41 comments on the its proposed Environmental Redispatch and Negative Pricing policies both in support of and against BPA's proposals.

Several commenters noted that Oregon and Washington have different TDG standards. They suggested BPA should seek to change Washington's standard to conform with Oregon's. This would allow river operators to spill more water.

Before considering such a change, it is appropriate to analyze whether a shift to Oregon's standard would reduce the frequency and severity of environmental redispatch events.

BPA and the Fish Passage Center each recently studied the issue. The BPA study examined the extent of environmental redispatch that would be necessary under different TDG standards. The Fish Passage Center analysis addresses the frequency of spill that exceeded either Oregon or Washington TDG standards. Due to the very short turnaround and limited data sets available for analysis, both studies should be viewed as preliminary.

Results of Studies

BPA's study analyzed four typical water years representing one high, one low and two near average water years. In low water years, the likelihood of overgeneration is very low. In high water years, all hydro turbines would generate at or near maximum capacity, so increasing the TDG standard wouldn't allow much if any additional spill.

During average water years, a higher standard appeared to moderately reduce the need to displace wind generation with federal hydropower to protect fish by between 25 and 100 megawatt months. This corresponds to roughly 6 to 17 percent less displacement of wind energy than under the lower TDG standard under these specific conditions. This would reduce wind generators' financial loss by \$400,000 to \$1.6 million for those years, based on the value of lost Production Tax Credits and Renewable Energy Credits of about \$22/MWh

The FPC analysis responded to a request from Save Our Wild Salmon. FPC looked at how many days the two different TDG standards had been exceeded in past years. Under Washington's standard, TDG levels exceeded the limits 11 to 40 percent of all days during the fish passage season at one or more dams in the federal system. Under Oregon's standard, TDG levels exceeded the cap 1 to 23 percent of all days. The FPC suggests that increased spill could be accommodated at times using the Oregon standard, which is consistent with the BPA analysis.

The FPC analysis did not attempt to quantify the extent to which additional spill could reduce the need for environmental redispatch. The FPC indicated that it does not have the information necessary to distinguish overgeneration spill from other spill. As the FPC analysis relies on historical data, it does not consider the potential likelihood of future events as the installed capacity of wind grows. BPA currently expects to host 6,000 megawatts of wind integrated on its transmission system by 2017.

BPA concluded from these studies that a change in the dissolved gas standard would produce a modest reduction in overgeneration spill. In addition, it is important to note that the current TDG standards are a part of court-ordered hydro operations, as well as the federal agencies' Biological Opinion actions required to avoid harm to ESA-protected salmon and steelhead.

BPA's Environmental Redispatch proposal

Between April and August, voluntary spill occurs at Columbia and Snake River dams to improve passage conditions for juvenile salmon and steelhead migrating to the Pacific Ocean. Additional spill sometimes occurs when river flows exceed hydro turbine capacity at the dams. This is often referred to as lack-of-turbine spill, forced spill or involuntary spill. A third type of spill, which can also occur even when some hydro turbine capacity is available, is frequently referred to as overgeneration or lack-of-market spill. It is considered involuntary because all possible options - including giving away free energy -- have already been employed.

Today, the increased power generation from the addition of 3,400 average megawatts of wind power in the Columbia Basin and reduced demand for power due to the recession, has increased the likelihood of supply-demand imbalance. The result is a significant increase in the likelihood and amount of overgeneration spill.

Thermal power plants such as coal and natural gas will typically use federal hydropower offered at low or no cost and reduce their generation to a minimum during high water periods. This helps reduce excess spill. Wind project operators have been reticent to reduce their energy generation and have it replaced with free hydroelectric generation, since they may receive state and federal tax credits that are based on how much electricity is generated.

Environmental Redispatch would temporarily substitute free, renewable, carbon-free federal hydropower for other generation in BPA's Balancing Authority Area when necessary to meet Clean Water Act standards and fish protection requirements. BPA would use Environmental Redispatch only as a last resort to mitigate the generation/load imbalance. During Environmental Redispatch, utilities and consumers that purchase other energy would continue to receive the full energy deliveries associated with their transmission schedules, but the energy would originate from the FCRPS instead of other resources.