

Chelan PUD's EIA Average Water Calculation

Summary

For average water, the District uses the best available flow data to develop a long-term average water year. Hourly water volatility is incorporated by applying an hourly shape developed from 2007 flow and discharge data which accounts for current system constraints during a near average water year.

Average Water Data	Years (consecutive years)	Long-term Average Flow (cfs)	2007 Hourly Shape Data	2007 Average Flow (cfs)
Re-regulated average monthly Wells outflows	1929-1997 (69 years)	112,000	Wells hourly discharge data	110,000
Entiat River average monthly flows	1997-2009 (13 years)	470	Entiat daily flows	560
Lake Chelan average monthly inflow	1980-2010 (31 years)	2,000	Lake Chelan daily inflows	2,400
Wenatchee River average monthly flows	1963-2010 (48 years)	3,200	Wenatchee River hourly flows	3,300

The District uses a Hydro Optimization Model (Model) to calculate its qualified incremental hydropower under average water. The Model is run to determine “average water generation” before March 31, 1999 (Baseline) and then after incremental hydro improvements (Current). The net difference between the Baseline and Current scenarios determines the District’s qualified incremental hydropower. All other factors that may have caused an increase in electricity production are eliminated by modeling both the Baseline and Current scenarios and using the same average water input.

Below is an excerpt from the SAO’s Letter to Management (dated 11/25/13) with regards to this approach:

The District’s calculation of incremental hydropower used a sophisticated methodology that, while it did not strictly adhere to WAC 194-37-040 (3) & (15), did meet the intent of the Energy Independence Act. Based on our examination, we determined strict adherence to the WAC would have resulted in unnecessary costs to the District and could have overstated the amount of incremental electricity generated.

As background, when a utility calculates the incremental generation associated with its hydroelectric efficiency improvements, the calculations are based in part on WAC 194-37-040 (3) & (15), which requires utilities to use “average water generation” over a period of 10 or more consecutive years. Stated differently, the referenced WAC’s require utilities to use multiple years of historical river flow data to calculate, for each year, the amount of incremental hydropower that same river flow would have generated had the water flowed through the dam as it is currently modified. The sum of the annual incremental generation calculations is then averaged to obtain the average megawatt hours (MWh’s) of incremental generation.

The above WAC requires utilities to calculate incremental generation based on at least 10 consecutive years of river flow data. In the case of Public Utility District No. 1 of Chelan County, the District used 69 years of river flow data. Had the District used the method noted above, it would have had 69 estimates of annual incremental generation – one for each year of water flow. The District would have then added all 69 generation estimates together and then divided by 69 to determine its average incremental generation.

Instead, and for valid reasons as noted below, the District used a similar, but different, approach. Specifically, it first calculated monthly average water flow using 69 years of monthly river flow data. For example, across the 69 years, all January river flows were added together and then averaged. The result was one calculation of historical water flows for each month of the year. Note that “average water flow” is not the same as “average water generation.” The movement of water, that is, “water flow per hour” determines the power output of the dam and its hourly energy production, that is, “generation.”

To calculate the incremental generation, the District needed hourly flow values. To obtain the hourly flow data, the District selected a year with an average water flow that was comparable to their 69-year calculations of average water flow. For comparability purposes, the District first modified (i.e., “normalized”) the 2007 hourly water flows and applied it to the 69-year calculations of average water flows and then used the normalized hourly data in its model to calculate the incremental generation. This calculation results in one estimate of incremental generation instead of 10 or more estimates of incremental generation that would then be averaged to obtain a final incremental generation value.

This method was considered acceptable because of the complexity of the calculation, which is unique to the District, and the large hydraulic capacity of its Columbia River powerhouses. Specifically, the District’s calculation of incremental electrical generation provides results that are close to those that would be obtained had all 69 water years been individually run through the model. In fact, if the District were required to strictly adhere to the language in the WAC, the result could be overstated incremental electrical generation. Strictly adhering to the language in the WAC would also result in excessive calculation costs in comparison to benefits because river data from not only the Columbia River but also the Chelan, Entiat and Wenatchee rivers must be factored into the calculation.