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February 1, 2020

Replacing "Needed" Lower Snake River Dam Energy Cheaper Than Operating the Dams.

Executive Summary:

For the past 11 years the average cost of replacing enough power to keep BPA's interchange power levels above 2,000 aMW, had the Lower Snake River Dams not existed, by purchasing the same amount of energy the LSRD produced in those years at NP15 wholesale market prices, would have only been about $11 million per year, $38 million per year cheaper than current LSRD Maintenance and Operations cost!

Background:

BPA and others have criticized Rocky Mountain Econometrics (RME) for claiming that the Lower Snake River Dams (LSRD) are not needed at all, and for claiming that BPA has sufficient reserves and other alternatives to reliably service its load without production from the LSRD. BPA and others have also criticized RME for claiming that power from the dams costs $36 / MWh (BPA system average firm power rate), or more. BPA often claims power from the LSRD only amounts to about $11 / MWh, the M&O costs for the dams.[1]

In essence, BPA and others claim that, not only are the LSRD needed to meet load, but it would be almost impossible to replace them with other power sources without causing rates to increase because they claim power from the LSRD is very inexpensive at about $11 / MWh.

[1] The numbers calculated by RME and others are the result of a attempts to do that witch BPA either has not done, refuses to do, or refuses to publish, namely, calculate and publish a fully allocated cost of production on an asset by asset basis. Absent that, it is impossible to know whose numbers are "right", it is impossible for BPA to operate in a least cost manner, and it is more difficult to calculate the benefit versus the cost of the LSRD.

As a result of those criticisms RME proposed a test of the need for the LSRD and what it would cost to cover that need in a pragmatic, economic fashion. The parameters of that test are as follows:

First, assume the dams are "needed" for critical, non-arbitrary, moments of high load / low production.

Second, assume some level of "secondary sales" as presented in BPA BA[2] is necessary to cover BPA's "high load / low production" moments. For this test the non-arbitrary minimum amount of power available on the BPA Balancing Authority (BA) interchange was set at 2,000 aMW, noting that BPA routinely operates with as little as 1,000 aMW, or lower, on the interchange.

Third, recognize that the LSRD do a poor job of supplying power when it is needed for BPA's peak load in December and January and do a much better job of providing power when it is not needed, limited as they are to producing power coincident with stream flow timing that peaks between March and June.

Fourth, recognize that the NW peak load is Dec - Jan. and that the SW peak load is late summer.

Fifth, note that the record for peak production from the LSRD in the last nine years is less than 3,000 / aMW.

Sixth, note that the Pacific DC intertie is rated at a little over 3,000 / aMW.

Seventh, approach the issue the same way most industries, even most other energy providers do: Go to the spot market, or sub-contractors, or low cost peakers, to cover short term shortages rather than investing in high cost production equipment that will sit idle or be under-utilized most of the year.

Eighth, assume the cost of the dams is no higher than the numbers published in the COE's IPR. That puts the annual cost of power from the dams at about $49 million at the M&O level and $107 million if depreciation is included.

Ninth, recognize that, per the BPA IPR table[3], these two numbers do not include BPA overhead of about $200 million[4], Lower Snake Comp Plan

[2] BPA Balancing Authority (BA), https://transmission.bpa.gov/Business/Operations/Wind/baltwg3.aspx

[3] Federal Columbia River Power System, 2017-2030 HYDRO ASSET STRATEGY, June 2016, pp. 23.

Hatcheries at about $32 Million, Columbia River Fish Mitigation Program for Systems Improvements on LSRD's which have averaged about $45 million per year for the last 20 years. Nor does this IPR table include any Fish and Wildlife costs, some of which are surely attributed to the LSRDs and could be saved with decommissioning.

Based on those assumptions and observations RME looked at BPA interchange volumes going back to 2009 and subtracted LSRD generation, on an hour-by-hour basis. Then, for every instance in which the interchange volume minus LSRD generation dipped below 2,000 aMW the model purchased the same amount of power at NP15[5] prices that the LSRD produced that hour, thus making BPA interchange levels whole at the 2,000 aMW level.

Discussion:

For the hours that required replacement purchases, the cost on the NP15 market was often (but not always) higher than the LSRD average hourly $/MWh M&O costs.

It was also true that occasionally the model acquired power when the NP15 price was below zero and thus got paid to replace the LSRD power.

However, the most significant point is that no replacement power purchases were necessary the vast majority of the time. In the vast majority of the observed hours there was more than sufficient power being produced to keep the level of power available on the BPA BA interchange above 2,000 aMW even when LSRD production was subtracted from the total.

Result:

Averaged over the past 11 years the cost of replacing enough power to keep BPA's interchange power levels above 2,000 aMW, to the full capability of the LSRD, by purchasing the equivalent amount of LSRD energy at NP15 prices, is only about $11 million per year, $38 million per year cheaper than the current LSRD M&O cost!

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[4] It is assumed that whatever this portion is, is part of the $200 million in overhead attributable to the LSRDs.

[5] NP15 is the northern California trading hub, often thought of as the California-Oregon Border (COB) hub, and a mirror for Mid-Columbia (MID-C) trading hub prices.
http://oasis.caiso.com/mrioasis/logon.do

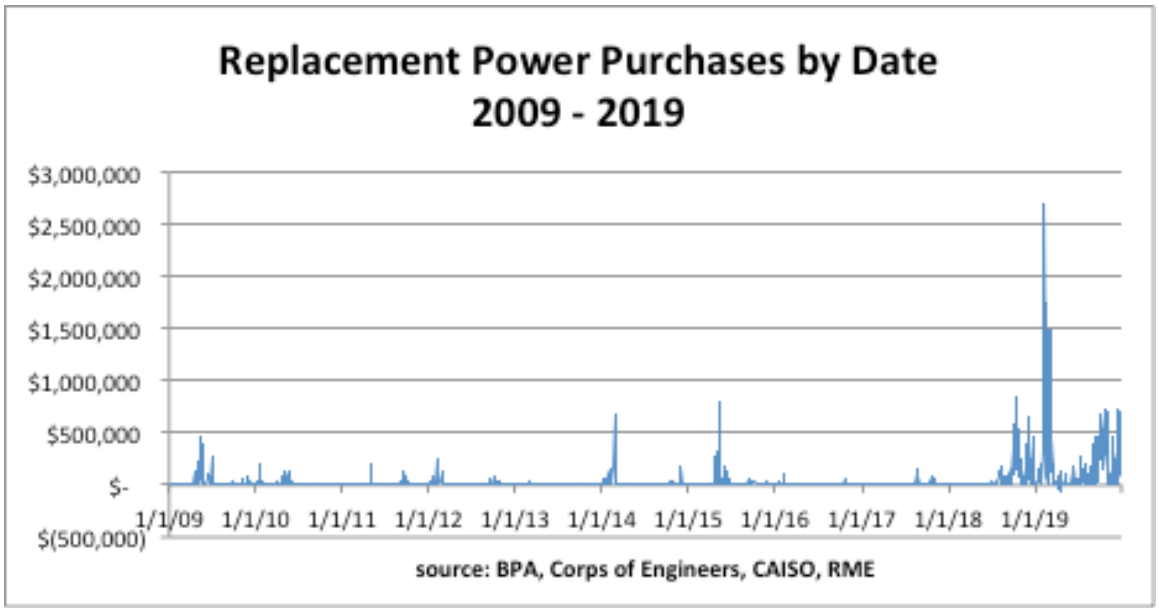
Observations:

1. Given that the replacement power would be coming primarily from the southwest, and given the vastly larger amount of power production in the SW, it does not appear this solution would require any new construction. Also, given that there would be a net reduction in total power production, this solution is probably about as close to carbon neutral as possible.

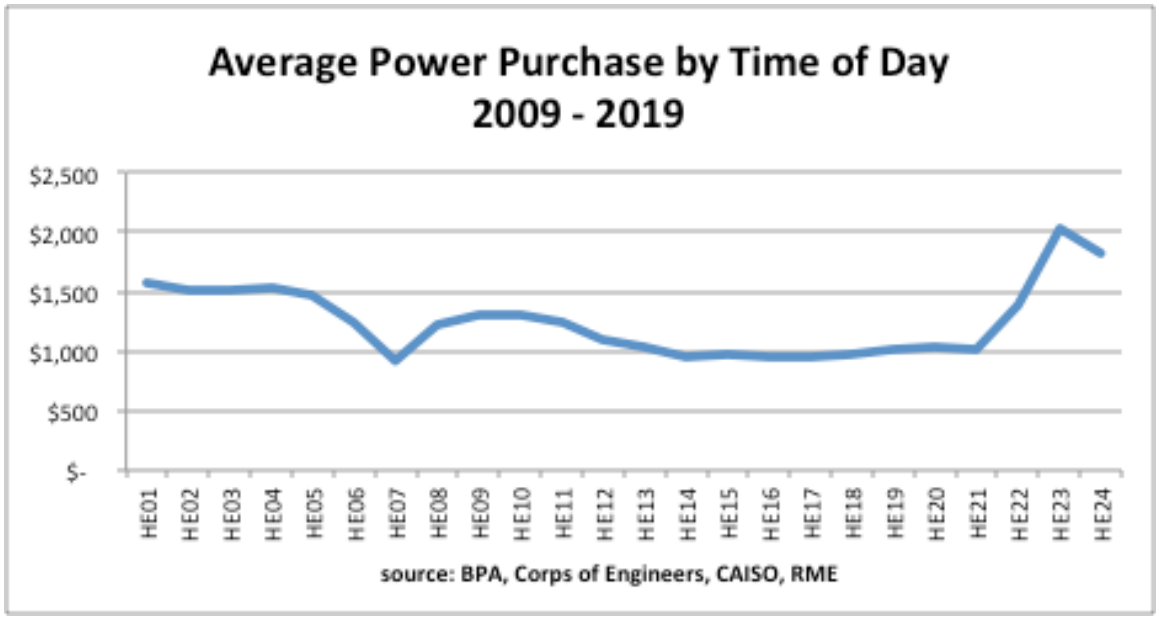
2. Currently BPA sells between 25% and 50% of its power on the surplus market for which it receives about $19/MWh (Marcus Harris, BPA, Fall 2019) In the model discussed here, some portion of the LSRD power would be part of that surplus and eliminating LSRD production would thus mean a reduction in BPA revenue by as much as $64 million.

3. On the other side of the ledger from the previous note, removing the LSRD would eliminate the need to rehab the turbines ($50 million per year at the interest payment level) and hopefully eliminate perhaps $100 million per year or more in F&W costs. In other words, there would be net savings in addition to the reduction of M&O costs but they were not factored into this analysis.

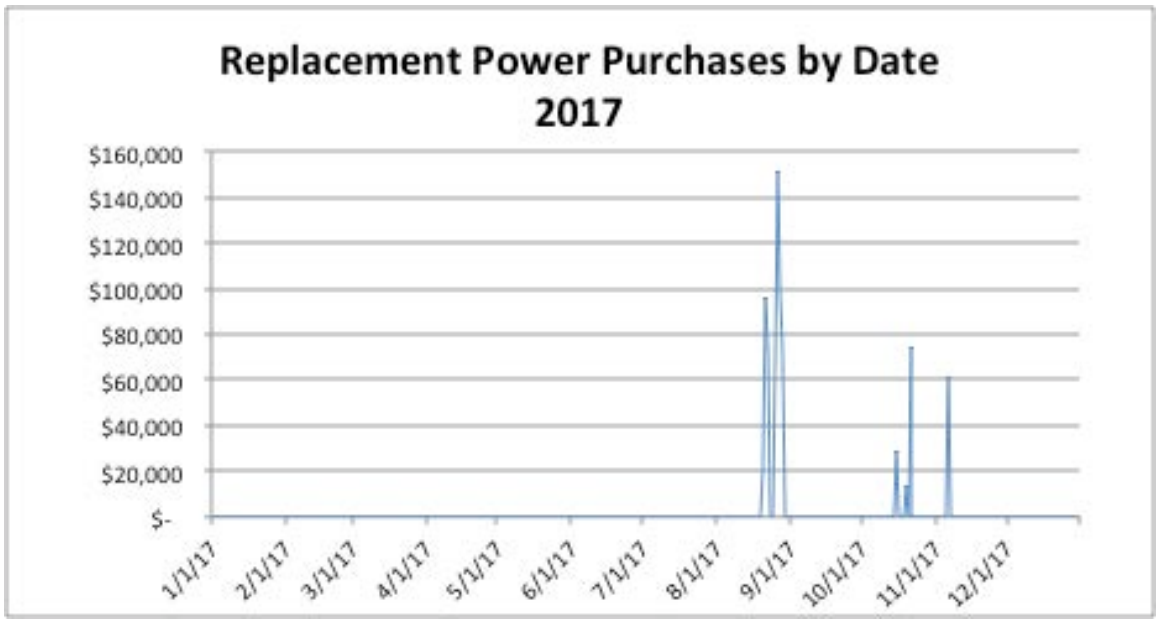
4. The prices used here are NP15 DAM. DAM stands for Day Ahead Market. They are firm prices and as such tend to be about $3 - $5 higher than NP15 spot market and the same amount or more above MID-C, the node where replacement power would most likely be acquired. The point being that the cost to acquire the necessary replacement power is overstated.



Average cost per year = $11 million
Average cost per day = $30 thousand
Notice the $2.6 million spike in early March of 2019.



By virtue of BPA running its assets to follow a combination of load and surplus prices the likelihood of the interchange falling below 2,000 aMW is most likely to happen late at night or early morning. Those are the hours the model made most of its purchases.



The preceding and the following chart show two relatively extreme cases. In 2017, the model made very few purchases at all, almost none until nearly September, and the cost for the year was a scant $828,238, roughly $48 million less than BPA spent on M&O for the LSRD!

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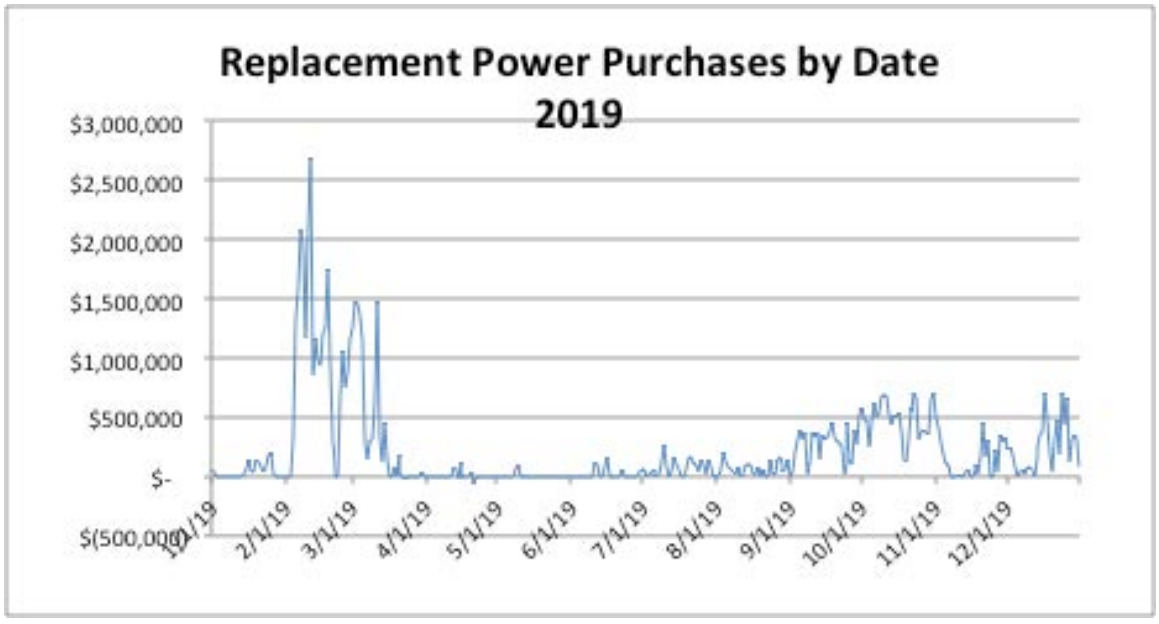

2019, on the other hand dealt with the infamous March pricing debacle and required a bit more in the way of purchases in August and September. As a result power purchases in 2019 would have come to about $80 million. This is

above the LSRD $49 million M&O cost, but still well below the $107 million cost number for the LSRD that includes depreciation.

Data Sources:

California ISO,
http://oasis.caiso.com/mrioasis/logon.do

BPA Balancing Authority,
https://transmission.bpa.gov/Business/Operations/Wind/baltwg3.aspx

USACE Northwestern Division,
http://www.nwd-wc.usace.army.mil/dd/common/dataquery/www/