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BEFORE THE IDAHO PUBLIC UTILITIES COMMISSION

IN THE MATTER OF IDAHO POWER COMPANY'S 2021 INTEGRATED RESOURCE PLAN (IRP)	**IPC-E-21-43** **COMMENTS**

Clean Energy Opportunities for Idaho

June 2, 2022

Reference: Case No. IPC-E-21-43 – In the matter of Idaho Power Company's 2021 Integrated Resource Plan

Subject: Comments of Clean Energy Opportunities for Idaho

Recent iterations of Idaho Power's Integrated Resource Plans have incorporated multiple substantive improvements in process and analysis. CEO also recognizes and appreciates the open and constructive communication the Company IRP team provided with IRPAC members and other interested parties in the IRP development process.

As active participants in the development of several of the recent IRP documents, CEO congratulates the Company on the improvements recently introduced, yet is concerned about remaining limitations in the software and analytical processes employed to produce the IRP plans. In the hope that the recent pattern of process improvement continues in the next IRP iteration, CEO respectfully suggests that Idaho Power consider the following two areas for careful review before developing the 2023 IRP:

1. Improve the ability of the software used (whether Aurora or some other product) to analyze effects of battery storage on diurnal market price patterns, and
2. Improve the method for estimating the present value of various portfolios to remove an existing bias that minimizes out-year costs of inputs that rise in cost over the 20-year forecast period (such as those associated with natural gas prices or carbon emissions charges).

Regarding the 2021 IRP, CEO appreciates the opportunity to share these two concerns:

1. **Software system limitations produced questionable data: forecast Mid-C hourly price spreads seem unreasonably large. The benefit associated with increased access to Mid-C market may have been overvalued.**

A review of the Mid-C hourly prices used when analyzing the preferred portfolio in the 2021 IRP suggests that the current version of Aurora might not do an adequate job of accounting for the potential to use batteries to exploit variability in market prices.

In commodity markets, an opportunity for arbitrage will attract investment among players in the market. With regard to Mid-C prices, the opportunity to buy low and sell high will drive resource decisions across the region which will ultimately affect those market prices and reduce the magnitude of the differences in hourly prices.

If an opportunity for arbitrage looks too good to be true, it's not destined to last. And in this IRP CEO believes the opportunities to arbitrage in the Mid-C market do look too good to be true. Specifically, CEO refers to the opportunity for using batteries to exploit those forecasted market prices by purchasing energy and charging the batteries during hours with low prices and discharging the batteries and selling that energy at times in the day with higher hourly prices.

The first two figures (below) show the arbitrage opportunity the 2021 IRP preferred portfolio analysis assumed to be present at the Mid-C market. The daily arbitrage value was calculated assuming that the arbitrager would purchase energy in each of the four lowest priced hours[1] each day, store that energy for a few hours in a battery and then sell that energy during the four highest priced hours in that same day. In both figures the blue line represents the $/MWh value of the arbitraged "buy low / sell high" opportunities in each day of the year. The orange line represents the annual average of those 365 daily arbitrage opportunity values.

The first figure shows data based on the Aurora estimated Mid-C hourly prices during 2023. The second figure shows comparable data based on price forecasts for 2033.

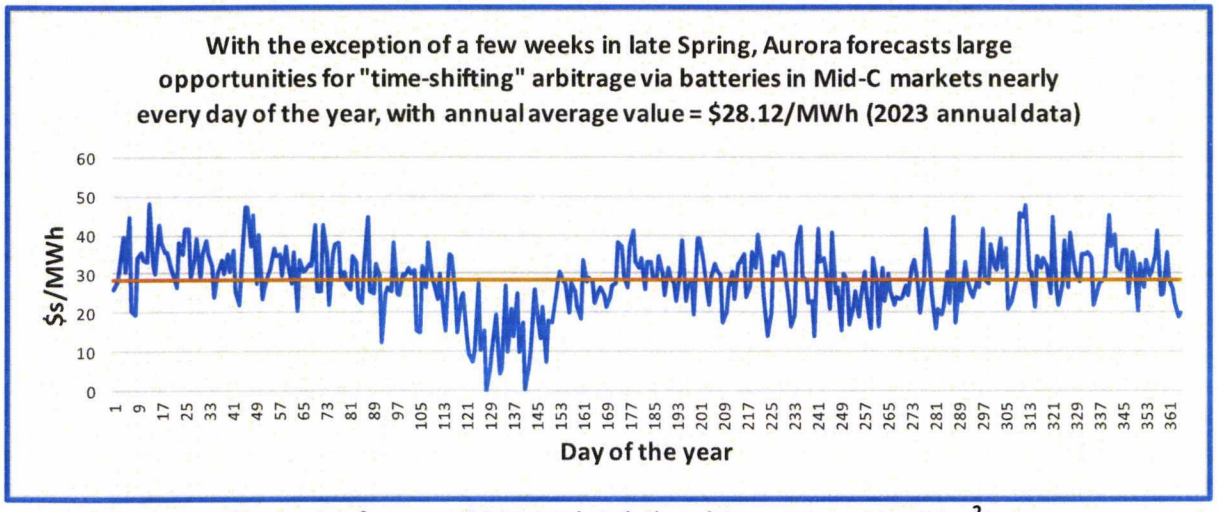

Figure 1 – forecast 2023 Mid-C daily arbitrage opportunities[2]

Both the 2023 and 2033 data show a distinct seasonal pattern. For a few days in the late spring Aurora forecasts so much hydro being available that during most all hours of the day hourly market prices remain low, thereby offering limited arbitrage opportunities.

[1] The four-hour period is based on an assumption that the arbitrager would use batteries with an energy capacity equal to four hours of charge or discharge at its nameplate power capacity.
[2] Data source for Figures 1 & 2: CEO Production request #4 – Mid-C prices 2021-2040

But during the remainder of the year, energy could be sold during the four highest price hours for about $30/MWh more than the price paid to purchase that same amount of energy during that day's four low-priced hours.

Based on this simplified illustrative analysis, averaged over all 365 days of the year, the arbitrager could expect earnings based on a differential of $28.12/MWh between the average price it paid for energy during the four lowest price hours each day and the price it would receive when selling during the four highest priced hours of that same day.

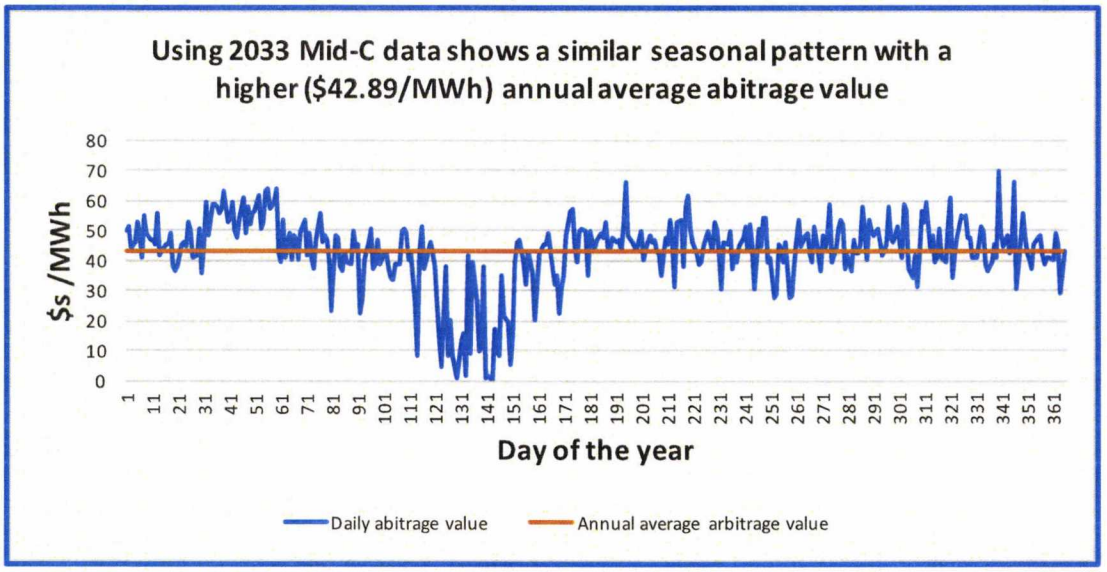

Figure 2 – forecast 2033 Mid-C arbitrage opportunities

As shown in Figure 2, the same seasonal pattern appears, but with an even larger difference between low and high priced hours each day, when reviewing the comparable forecast of Mid-C 2033 hourly prices.

The daily price spreads during both years seem unrealistically high. There would, of course, be conversion losses in using batteries to perform such time-shift arbitrage purchases and sales (some of the energy purchased to charge the batteries would not be released upon discharge), but the magnitude of the daily trading opportunities seems unreasonably high.

With battery prices forecast to decline over time, someone would likely exploit any such arbitrage opportunities. As a result, the opportunities to buy low or sell high in the Mid-C market probably won't be as extensive as Aurora has modeled. A further consequence affects the forecast benefits accruing to portfolios which have additional access to the Mid-C market. Portfolios (such as those with the B2H transmission line) with enhanced access to Mid-C markets may have been materially overvalued in the 2021 IRP analyses.

2. Using an inappropriately high discount rate to calculate present values of forecast costs for various portfolios inserts bias, which could produce "Regrets"

When comparing the forecast costs associated with various possible resource portfolios, some method must be used to summarize each portfolio's 20-year cost streams in a manner that allows a fair comparison of the various portfolio alternative. The IRP has traditionally used a "discount to present value" method for producing each portfolio's comparative cost summary.

CEO does not raise concerns related to using a present value based comparison, but does believe that the Company is using an inappropriately high discount rate which inherently introduces bias into its associated cost analysis process.

Some of the price forecasts used in the IRPs rise dramatically over time. Estimates of future carbon emission charges is one such example as shown in the figure to the right.

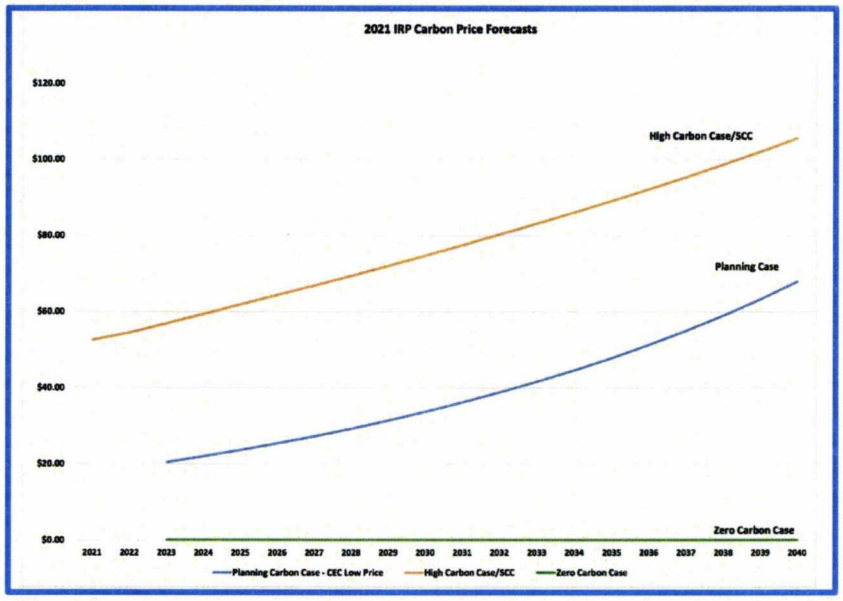

Figure 3 – 2021 IRP Carbon Price Forecasts

Some may argue that because the IRP is re-written every two years, effectively the scope of decisions made based upon each IRP is limited to only those that must be implemented in the relatively near future. By implication, cost estimates from later portions of the 20-year forecast are less important because they can be updated in the next IRP iteration.

The use of an overly high discount rate inherently understates the cost exposure in portfolios which are more exposed to those types of costs (such as future carbon emission charges) that rise dramatically over the 20-year forecast period. That inherent bias to understate the cost of some portfolios could produce decisions that we later "regret".

For each portfolio alternative, a variety of costs are forecast, including fixed costs, fuel costs, market and other power purchases/sales, emission costs, storage and start-up costs. These costs are summed up by year to estimate how much revenue would be required if that portfolio were built. Even the costs for adding new capital resources are estimated on a revenue requirement basis.

The fundamental point here is that those revenue requirements would eventually be collected from customers. CEO strongly believes that the appropriate base for converting future year cost estimates back to a present value requires using a discount rate that reflects the customer's cost of short-term funding and that these cost streams have nothing to do with the Company's long-term cost of capital.

The discount rate used for any present value calculation can dramatically influence the results of that comparative analysis. For example, using a relatively short-term rate (such as that year's forecast inflation rate - which some would refer to as adjusting to "real" costs) rather than a longer-term higher risk rate can produce dramatically different analytical outcomes.

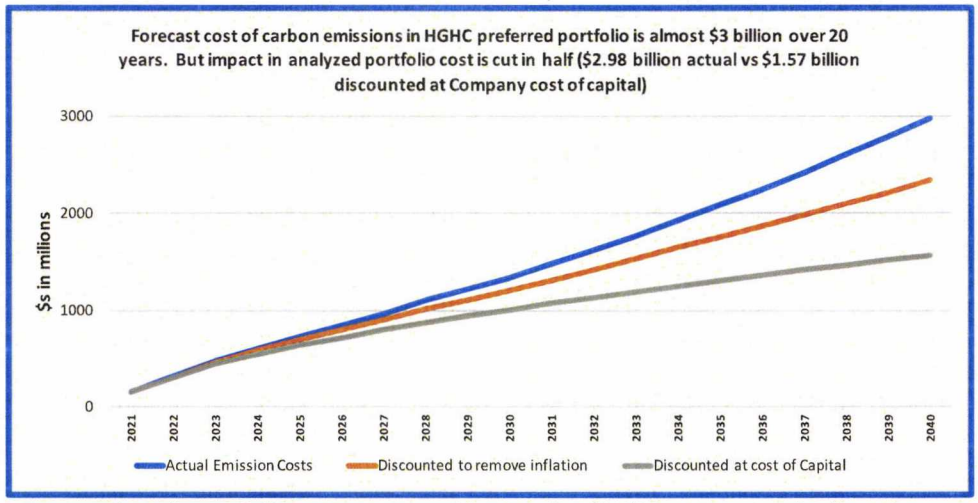

Figure 4 – Analyzed portfolio cost reduced by ¾ of a $billion by using higher discount rate

For example, as is shown in Figure 4 above, the actual forecast expenditures for carbon emissions for the preferred portfolio in the high gas, high carbon scenario, is $2,980 million. By discounting those expenditures back to a present value using the Company cost of capital as the discount rate, those costs were analyzed as being only $1,566 million.

If, however that $2,980 cost stream had been discounted to make each year's expenditures reflect a constant level of customer purchasing power (that is, if the cost stream were discounted to take out the effects of inflation) the cost stream would have been analyzed as having a present value of $2,337 million, nearly ¾ of a billion dollars more than it was analyzed as having cost.

The future cost streams being forecast for all portfolios are estimates of a portion of the revenue requirements that would have to be collected from customers if that portfolio were implemented. Those cost streams are NOT forecasts of future IPC capital requirements. The discount rate employed to be bring those future cost streams back to a present value should NOT be the Company's long-term cost of capital.

Within the IRP a comparison was made between the preferred portfolio both with and without B2H. Both portfolios included transmission upgrades: the "with" portfolio added transmission between the Treasure Valley and the Mid-C market, the "without" added transmission between the Treasure and Magic valleys. Absent the additional access to the Mid-C market, the "without" portfolio added much more clean energy resources within the IPC service territory (a total of about 1.5GWs of incremental resources in the "without" portfolio – 700MWs of wind, 400MWs of more solar and about 400MWs additional batteries).

The "without B2H" portfolio was evaluated as having higher costs over the 20-year period due to the additional wind, solar and storage purchases but was more resilient in the face of high carbon charges as shown in the table below.

	Planning gas, no carbon	**Planning gas, planning carbon**	**High gas, high carbon**
"Without B2H" portfolio cost compared to "With B2H" portfolio cost	Without is $597 million more expensive	Without is $277 million more expensive	Without is $357 million less expensive

Table 1 – Base portfolio without B2H more resilient to high carbon charges

CEO is not suggesting that the base portfolio without B2H should have been selected in the 2021 IRP.

However, when the bias in favor of B2H arising from what CEO sees as unrealistic arbitrage opportunities in the hourly Mid-C market price forecasts is combined with an up to $¾ billion understatement of carbon emission cost exposure associated with the B2H portfolio due to the use of an inappropriately high discount rate, we see opportunities for improvement in future IRP analyses and hope those improvements will be implemented.

Respectfully submitted,

Michael Heckler, Policy Director
Clean Energy Opportunities for Idaho

Dated this 2nd day of June, 2022.

Respectfully submitted,

Kelsey Jae

Kelsey Jae, Attorney for CEO

CERTIFICATE OF SERVICE

I hereby certify that on this 2nd day of June, 2022. I delivered true and correct copies of the foregoing COMMENTS to the following persons via the method of service noted:

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