

# McCULLOUGH RESEARCH

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PRINCIPAL

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To: PVLA and PVEA  
From: Robert McCullough  
Subject: Site C Inquiry Update

British Columbia Hydro's proposed Site C dam is now in its final week of regulatory review. We expect that the report will be publicly released on November 1<sup>st</sup>. We will be preparing an analysis of the report.

The vast majority of materials filed have supported termination of the project in favor of solutions that are less expensive, more deployable in response to actual requirements, and less environmentally destructive. We have filed extensive materials and testified twice at the Technical Presentation Sessions on October 13 and 14, 2017.

The basic economics indicate savings of Can\$2.6 to Can\$4.2 billion if the project is terminated and replaced with a portfolio of primarily wind power:

| <b>Comparison of Alternatives:</b> |               | <b>Commission Scenarios</b> |                  |                |
|------------------------------------|---------------|-----------------------------|------------------|----------------|
|                                    | <b>Site C</b> | <b>Low LF</b>               | <b>Medium LF</b> | <b>High LF</b> |
| <b>Original Cost</b>               | \$ 8,775      |                             |                  |                |
| <b>Plus, Cost Overrun</b>          | \$ 610        |                             |                  |                |
| <b>Minus, Sunk Costs</b>           | \$ (2,100)    |                             |                  |                |
| <b>Cost of Continuation</b>        | \$ 7,285      | \$ 1,851                    | \$ 2,889         | \$ 3,441       |
| <b>Termination Cost</b>            |               | \$ 1,200                    | \$ 1,200         | \$ 1,200       |
| <b>Actual Cost</b>                 | \$ 7,285      | \$ 3,051                    | \$ 4,089         | \$ 4,641       |
| <b>Termination Advantage</b>       |               | \$ 4,234                    | \$ 3,196         | \$ 2,644       |

**This is close to a Can\$1,000 savings for every adult in British Columbia.**

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Importantly, the savings from termination still exceed the costs of completing Site C even if assumptions are adopted that are not supported by the evidence or standard economics. Site C should still be terminated even if:

- The BC Hydro high load forecast is used,
- Sunk costs are included,
- Existing storage is reserved for export markets.

That said, cancellation of Site C is still opposed by BC Hydro on several economic grounds.

For example, replacing a 1,100 MW hydroelectric project with wind or solar is difficult in jurisdictions that do not have an extensive ability to store and shape intermittent resources.

BC Hydro submits that without Site C, British Columbia does not have sufficient capacity and has run out of hydroelectric storage.

This is an interesting hypothesis since some of the largest reservoirs in North America are in British Columbia. And even more curious, British Columbia Hydro's own submissions have made clear that Site C's storage – only 4/10ths of 1% of Williston -- is incapable of supporting seasonal operations.

Leaving aside CANGEA's persuasive submission that there is sufficient cost effective and viable geothermal to provide any requisite firming capability for wind and solar – there is another ready solution.

A vast amount of storage will be available in the next seven years as the Non-Treaty Storage Agreement becomes available. This provides 2.5 million-acre feet of storage incremental to British Columbia Hydro's current capability. The storage has been rented to the Bonneville Power Administration for the past fifty years for a nominal amount. The opportunity cost to British Columbia to access this storage for the next 70 years is estimated at \$125 million - a tiny fraction of the cost of Site C.

The opposition to terminating Site C goes beyond energy planning; it is the cognitive bias through which economics affects policy. The next recipient of the Nobel Prize in Economics, Richard Thaler, has described this as the Sunk Cost Fallacy:

This fallacy, which is related to status quo bias, can also be viewed as bias resulting from an ongoing commitment. For example, individuals sometimes order too much food and then over-eat 'just to get their money's worth'. Similarly, a person may have a \$20 ticket to a concert and then drive for hours through a blizzard, just because s/he feels that s/he has to attend due to having made the initial investment. If the costs outweigh the benefits, the extra costs

incurred (inconvenience, time or even money) are held in a different mental account than the one associated with the ticket transaction.<sup>1</sup>

The technological revolution in renewable energy generation was foreseen by very few when Site C was first planned thirty years ago. Now that it is here, it is time to re-evaluate our energy choices while resisting the temptation to consider sunk costs. The argument that if we cancel Site C it will mean that we have abandoned Can\$3 billion misses the point. Even if we build Site C, the \$3 billion has effectively been spent. The alternative is less expensive even when these costs are considered.

British Columbia Hydro's arguments in favor of the more expensive option of completing Site C include arguments that wind, solar, and geothermal projects will not work effectively north of the U.S. border. They also cite a lack of a mandate to build and use more cost-effective technologies, a lack of hydro-electric storage, and a plan to sell the Can\$100/MWh surplus from Site C at a profit. These points have been effectively rebutted by extensive expert testimony.

Our extensive testimony in the proceeding in front of the British Columbia Utilities Commission is available at [http://www.siteinquiry.com/submissions-and-comments/?sorts\[id-Number\]=1](http://www.siteinquiry.com/submissions-and-comments/?sorts[id-Number]=1) as party submissions entitled F35. These documents are also available on our own website [here](#), [here](#), [here](#), [here](#), and [here](#).

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<sup>1</sup>Thaler, R. H. (1999). Mental accounting matters. *Journal of Behavioral Decision Making*. 12, 183-206.