University of Victoria

Institute for Integrated Energy Systems
University of Victoria
PO Box 1700 STN CSC
Victoria BC V8W 2Y2
Telephone: 250-721-6295
email: arowe@uvic.ca pwild@uvic.ca

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Site C Inquiry Commission
SiteCSubmission@bcuc.com

Dear Members of the Commission,

The challenges facing electrical system planners are many, but uncertainty about future policy, costs, and technology uptake is perhaps greater than at any other time. Strategic positioning to address carbon emissions is a critical area of uncertainty which has a significant impact on future electrical systems. It is this key force which we weight heavily in our analyses. We invite members to review some of the issues we have commented on in our blog found at https://onlineacademiccommunity.uvic.ca/2060project/.

The discussion regarding Site C is typically framed around energy, which is one aspect of electrical system service. Uncertainty regarding future electrical energy needs is increasing due to efficiency and technology change, cost reductions with renewables, and changes in population and economic activity. In the past, energy cost provided a clear means to organize electricity markets and to screen options for the system. This is one reason that the *levelized cost of energy* for a generation technology dominates value discussions. Some see the continuing decrease in solar and wind capital costs leading to a future where "energy is free," which is obviously not true. What this statement describes is a situation where the energy component no longer dominates the cost of providing electrical service. This is a simple way to explain why some technologies are provided subsidies or preferred rates, otherwise they may not recover capital costs when participating in an energy market. Unfortunately, the focus on "energy" overlooks other important characteristics of electrical systems.

Besides energy, the technical services provided by an electricity system consist of two other general categories: capacity and flexibility. Capacity describes the ability of a generator to meet demand at a given time. Flexibility is a generic phrase to describe the ability to start, stop, ramp up or down, or be relied on to respond to planned and unforeseen changes in supply, transmission, or demand. Conventional fossil fuel technologies often provide all of these services with some variation in weighting. A peaking plant might participate in a system as a capacity and flexibility resource, more than an energy supply. A baseload plant might be utilized mostly as an energy and capacity resource. Prior to the natural gas boom, the cost of gas was high enough to make wholesale electricity prices sufficient that market participants recovered capital costs and variable costs. The desire to use low-variable cost, low-carbon generators is creating a need for new types of electricity markets. We are now seeing new capacity markets as well as shorter term energy imbalance markets as ways to manage low energy costs and variability.

As we look forward to a decarbonized future, the importance of capacity and flexibility in the electrical system grows. While solar and wind are excellent energy supply technologies they typically provide little capacity and, at high penetrations, create demand for additional system flexibility. If traditional fossil fuel technologies are not available, capacity and flexibility requirements can be provided by storage technologies or by interconnection to regions which can provide these services. A recent example of a jurisdiction relying on neighbors for capacity and flexibility is California where imports and hydro were called on to replace decreased solar production during the

eclipse and to manage the rapid increase in solar output occurring after the eclipse peak. Even with strong transmission linkages, nearly 1 GW of solar was curtailed in the hour after the eclipse peak.

Both external and internal forces will impact the future electrical system of BC. Internal changes due to electrification of vehicles and heating will introduce increased capacity and flexibility needs. External factors such as the expected decommissioning of coal and addition of variable renewables in Alberta will impact the value of BC's large-scale storage hydro system. Similar changes occurring in the Western regions of the United States will also increase demand for flexible resources. In a recent study, we modeled a coupled BC-Alberta electrical system out to 2060, assuming that current carbon policies persist. Our results show significant decarbonisation of the Alberta electrical system as high penetrations of wind energy are developed, but the flexibility provided by BC via an expanded intertie plays a significant role in managing variability.

In the current discussion of Site C, we should be mindful that the (levelized) cost of energy, today and in the decades to come, does not and will not provide a complete measure of the value of a given generation asset. The need for capacity and flexibility will continue to grow as the interconnected regions of Western North America pursue decarbonisation of their energy systems. Tremendous uncertainty exists; however, the future need for resources which provide flexibility appears certain and this characteristic should be carefully considered in the broader context of a low-carbon future.

Yours sincerely,

Andrew Rowe
Professor and Director
2060 Project

Peter Wild
Professor
2060 Project