

Meeting Future Electricity Needs

Submitted to the British Columbia Utilities Commission's Inquiry into BC
Hydro's Site C Project

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Table of Contents

Foreward	2
Executive Summary	3
Purpose	3
Opportunity Costs and the Energy Technology Revolution	3
The Problem With Peak Demand Forecasts	5
Community Net Metering – A new technology example	7
Conclusion	8

Foreward

The analysis and opinion in this report was independently prepared by Mr. Kjell Liem, Certified Community Energy Manager (CCEM,) of Saltspring Island, BC. Mr. Liem is the owner of Saltspring Solar Ltd. a solar design/build/consultancy, interim spokesperson for the BC Community Solar group, and a member and former Chair of the Salt Spring Community Energy Group. It is based on consultations with BC Hydro's Energy Planning and Economic Development Department, public documents from proceedings at the BCUC, and his work with the Salt Spring Community Energy Group.

In 2014 the Salt Spring Community Energy Group built what was the 7th largest grid-tied solar photovoltaic system on the BC Hydro distribution grid¹. The energy bill savings funds an annual climate change and renewable energy scholarship for students at the local high school. The project was funded built and commissioned in less than 12 months. CEG also produced impactful renewable energy/community solar conferences in 2014 and 2016 leading to the formation of the BC Community Solar group.

¹ <https://www.bchydro.com/news/conservation/2015/gulf-islands-secondary-solar.html>

Executive Summary

This submission is about how the current technological revolution creates a significant opportunity cost related to Site C and dramatically affects demand forecasts. It speaks specifically to the term of reference “what portfolio of generating projects and demand-side management initiatives could provide similar benefits.” Other commentators have ably addressed the economic, social, and environmental costs attendant on proceeding with the project.

The inquiry takes place in an environment in which the terms of the Clean Energy Act have distorted BC’s long-term energy planning. Emerging energy technologies create opportunities to meet BC’s energy needs in a decentralized coordinated framework that will, if allowed, replace the centralized mega-generator approach. For example, Community Net Metering is an emerging trend in the energy systems of the 21st C in which customer groups contribute to the resource mix.

If Site C proceeds, the resulting over capacity and related debt load will create pressures on Hydro and the government to maintain Hydro’s generation market share and resist the innovations other jurisdictions are implementing that enable coordinated dispersed local green generation.

As significant beneficial opportunities are lost if construction of the dam proceeds the Site C project should be cancelled now.

Purpose

This submission focuses on two issues

1. the opportunity costs associated with completion of Site C, and
2. factors that Hydro should be required to address in its report on future demand.

The first issue relates to section 3(a)(i) of the Commission’s mandate as set out in OC 244 – the direction to advise on the implications of completing the Site C project by 2024, as currently planned.

The second issue addresses s. 3(c) of the mandate, which directs the Commission to require a BC Hydro report on

- (i) developments since that forecast was prepared that will impact demand in the short, medium and longer terms, and
- (ii) other factors that could reasonably be expected to influence demand from the expected case toward the high load or the low load case

Opportunity Costs and the Energy Technology Revolution

Pick up any electrical utility trade publication of the last several years and you’ll find – cover to cover - articles about managing the rapid developments of distributed energy resources (DER). BC Hydro’s vision statement refers to this new world stating:

Our vision is to be the most trusted, innovative utility company in North America by being smart about power in all we do.²

A technological tsunami is changing the world of electrical energy access. Much as microchips and interconnected personal computers have changed the world of data access over the past 30 years new technologies are making it possible for individuals and groups to produce, share and coordinate energy resources. If allowed to develop, that will change the nature of energy supply.

The question setting the context for this inquiry is “What is the best way to meet our future electric energy needs?” The answer is more than demand side management (DSM) and centralized generation. The question is being answered by a host of technological and regulatory initiatives that deal with the whole system as complex interconnected “energy web”, ensuring demand can be reliably met from a diverse set of supplies. The issue isn't energy creation; it's energy coordination. A new perspective is needed that recognizes the energy technology revolution -- software and hardware that makes it possible to manage a grid of diverse suppliers and consumers.

The central mega-generator approach to energy supply is dying. Because of “market activity”, amongst other things, US utility Duke Energy is cancelling its proposed 2,234MW Lee Nuclear Station³. New power plant investment needs to consider the “opportunity cost” of proceeding. The definition of opportunity cost (according to the Oxford English Dictionary) is “the loss of potential gain from other alternatives when one alternative is chosen”. As mentioned above opportunity costs were never evaluated in the government's energy policies.

The Site C Inquiry is tasked to investigate solutions that meet our future energy needs. Much has been made about large hydro dam's power being dispatchable, and its value for balancing variable generators like wind and solar. But BC is awash in large hydropower, we can integrate modern renewables by orders of magnitude with what we have already. How much are we willing to pay for an attribute we don't, and won't use if we invest any further in the Site C project? Without a business case to capitalize on hydro's dispatchability this attribute will remain a theoretical – or “pie in the sky and a unicorn in everyone's back yard” to paraphrase one of our provincial party's leader.

It is broadly understood that the 21st Century utility model will have a focus on efficiency, flexible loads, and modern renewables including solar and batteries. Along with Tesla Energy's solar roofing tiles British Columbians are keenly interested in home-based battery storage for solar arrays, which is now available in Canada. Solar installations in BC are being wired for Tesla's Powerwall battery. Grid defection will likely become economical in BC generations before the capital cost of the Site C project is paid for and possibly decades

² https://www.bchydro.com/about/who_we_are/strategy___plans.html

³ <http://www.utilitydive.com/news/duke-proposes-to-pull-plug-on-lee-nuclear-project-raise-rates-to-cover-coa/503664/>

before the power is ever required by the rate-payers. This could be the start of the dreaded “utility death spiral” that old school utilities will try diligently to prevent.

How to prevent this? According to the renowned Rocky Mountain Institute, “utilities, regulators, and other electricity system stakeholders urgently pursue reform on three fronts—rate structures, utility business models, and regulatory frameworks—to embrace solar, batteries, and other DERs as an integral, optimized part of the future grid.”⁴

An example of the power of modern technologies the National Renewable Energy Laboratory (NREL) has “develop[ed] an innovative method for controlling inverters that will keep the grid stable even when *all* of the power is coming from solar, wind, and other forms of generation that connect to the grid via an inverter”. In fact Hawaiian Electric Company (HECO) and the Hawaiian Utility Commission more than doubled the limit of solar interconnections after reprogramming 800,000 micro inverters to the new Underwriters Laboratory UL1741SA standard⁵. The commission should be aware of the new Rule 21 being phased in by the California Public Utilities Commission since it gives the grid operators control of thousands of distributed generators for voltage and frequency support along with other essential grid parameters.

Flexibility like the UL1721SA standard can save expensive transmission and distribution upgrades. It can gradually build more resiliencies into the electricity grid at a time when the effects of climate change are creating serious infrastructure challenges. This summer BC’s transmission grid came under threat when the Kelly Lake substation was in the vicinity of the massive wildfires⁶. Expectations are that events like these are on the rise.

None of these technological advantages, and the jobs that they bring, can be realized if the utility gets itself locked into selling ever more power from a centralized generator like the Site C Project. BC Hydro will have no choice, no opportunities, as it will need to pay for the project’s massive sunk development costs. This equation does not put the customer at the heart of the system. As BC Hydro is owned by its customers, by virtue of being a crown corporation, it should remain at the service of the customer not at the service of an unaffordable debt.

The Problem With Peak Demand Forecasts

The Commission is charged with requiring a report from Hydro that considers “other factors that could reasonably be expected to influence demand”. In requiring the report, the Commission should insist that the report consider the potential effect of new technologies.

⁴ <https://www.rmi.org/our-work/electricity/>

⁵ <http://industries.ul.com/wp-content/uploads/sites/2/2016/08/UL-1741-SA-Advanced-Inverters.pdf>

⁶ <http://www.cbc.ca/news/canada/british-columbia/clinton-b-c-councillor-sounds-alarm-over-major-bc-hydro-substation-jeopardized-by-wildfire-1.4233702>

Emerging technologies enable grids integrating a multitude of energy sources including a host of behind the meter clean and green energy generators. In this new world, the concept of "peak demand" is becoming increasingly difficult to define. What is the meaning of a 10 year peak demand forecast if it has not taken into account the effects of new technologies to foster consumer participation in localized generation, load shifting, efficiency and storage? Those measures may play a significant role in reducing system "demand" in the traditional sense of reliance on large scale generation -even though the sum of the demand parts of the system are growing.

Historically, part of the forecasting problem is the Clean Energy Act. The Act is prescriptive in how we source electricity generation in BC even though it appears that there has been no legitimate business plan for any aspect of the Act – not the smart meters program, the Standing Offer program for the Independent Power Producers (IPP's), or the Site C project. Opening up power purchasing contracts to private industry, while leaving BCH out of any new generators other than Site C, has biased and distorted BC's ability to meet its electricity requirements. It has also impaired the financial health of BC Hydro and burdened its ratepayers, as will be noted in many other submissions to the commission. Had a proper business model been prepared this could have been a better outcome for BC. It appears that the Site C project is following the same faulty business logic as the other aspects of government energy policy.

Though the Clean Energy Act opened generation projects to the market through the BC Hydro's Standing Offer Program the benefit of local electricity generation has not been geographically or economically dispersed throughout BC Hydro's customers. Government policy that ties distributed generation to the Standing Offer Program has shut out policy opportunities that provide social/economic benefit. For example, in the US many solar programs address low-income populations in order to give financially strapped customers access to the benefits of distributed generation.

Concurrent with the government exempting the BCUC from reviewing major aspects of utility practice in recent years has been a notable absence of expert witnesses in the commission's proceedings with respect to the solar resource and technology. Much misinformation has been allowed to stand at the proceedings without being challenged by anyone with any practical authority on the subject. This regrettable situation needs to change. It goes without saying that expertise is a critical piece of the regulatory puzzle.

Perhaps the single thing that the BC's Clean Energy Act got right was the "clean" part. A recent study by the Lawrence Berkeley National Laboratory in the journal Nature Energy found that clean wind and solar helped avoid between 3,000 and 12,700 premature deaths in the US between 2007 and 2015.⁷ Low carbon sources of energy are vital to society. Other participants will no doubt address the greenhouse gas (GHG) footprint of a dam like Site C.

⁷ <https://qz.com/1054992/renewable-subsidies-are-already-paying-for-themselves/>

Community Net Metering – A new technology example

But what is it that BC Hydro's customer's want: reliability, affordability, a chance to contribute to the fight against global warming? Many of those who know about BC Hydro's excellent Net Metering program think Net Metering the best thing that the corporation offers. Customers who own rooftop or ground mounted solar count their solar array amongst their most satisfying consumer purchase. All of a sudden they are a producer, not just a consumer. And they feel happy that they are advancing what is arguably the cleanest of all electricity generating technologies.

Solar also helps you control energy costs – studies show every kilowatt of solar you produce cuts your electric bill by 13%. Sunshine is free, meaning solar offers reliable energy at a predictable rate for decades. Every kilowatt you produce is a kilowatt you don't have to buy from the utility at ever increasing rates.

But the Net Metering RS1289 has some unfortunate regulatory barriers. To qualify customers must own the appropriate real estate –a huge barrier in the age of inequality. With home solar you need to win the solar lottery – the roof with excellent sun. Owning any real estate –shaded or not – is a big hurdle in today's unequal real estate market. Renters can't go solar⁸. Condo owners are out. But expanding the Net Metering Program to all ratepayers by allocating kWh credits from a shared, managed, local solar array allows all ratepayers the option to control their energy costs. This is Community Net Metering, sometimes referred to as "Solar Gardens" or "Virtual Net Metering".

The Saltspring Community Energy Group (CEG) has met with BC Hydro several times to discuss developing a Community Net Metering program or pilot of a Community Solar Garden. In 2016 CEG hosted a Community Solar Conference with Keynote speakers from BC Hydro and Nelson Hydro. Nelson Hydro developed Canada's first Community "Solar Garden"⁹. Energy Minister Michelle Mungall's constituents are able to invest in a local Community Solar Array and receive credits toward their bill for the energy their solar panels generate.

The Commission has already seen some examples of the Community Solar Garden approach. It is part of a current Fortis BC application before the BCUC, although the pricing there needs careful review since commercial BC solar firms are able to install significantly smaller systems at half the levelized cost of energy. Also, BCH completed a benchmarking analysis of NA jurisdictions with some form of Community Net Metering in the Net Metering Evaluation Report No. 4, April 27, 2017 to the BCUC¹⁰. References to these BC developments were overlooked strangely, though BC Hydro viewed Community Net Metering as a "growing trend".

⁸ <http://www.cbc.ca/news/technology/solar-power-rental-housing-1.3813835>

⁹ http://www.bcuc.com/Documents/Proceedings/2017/DOC_49508_A2-1_Nelson-Solar-Garden_S1-FAQ.pdf

¹⁰ <https://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/corporate/regulatory-planning-documents/integrated-resource-plans/current-plan/20170426-BCH-Rate-Schedule-1289-Net-Metering-Eval-RPT-4.pdf> Appendix D

How do the NDP and The Green Party of BC's policy statements compare to a model like Community Net Metering? In Platform 2017 the Green Party states the following policies¹¹:

13. Review the mandates and legislation of public sector agencies and Crown Corporations to ensure they promote innovation and support business development. For example, the mandate of BC Hydro will be revisited to optimize support for clean energy development.

16. Review existing programs to ensure they are effectively supporting innovation, and new business models in the emerging economy.

76. Review the environmental legislative framework and its application, to ensure the regulatory environment promotes adoption of green technologies and practices.

And from the NDP platform Power BC¹²:

Invest in clean energy: Nations around the world are moving forward quickly with renewable energy technology. Whether it's wind, solar, battery technology or electric vehicles, the costs of these are dropping and demand is surging. British Columbia has tremendous opportunity to produce renewable energy and export renewable energy technology. By providing investment and *leadership*, the Province of British Columbia can support our technology sector and foster the good-paying research, engineering and trades jobs of the future (emphasis added).

Given this as potential policy of a new BC government, the Commission should be careful not to enable a project that would make it difficult to turn these policies into practice.

A further benefit of Community Net Metering is that it encourages customers and communities to take the initiative in meeting their own electricity needs. By investing their own capital in local generation they also reduce the investment and associated risk that the utility has shouldered in the past. This can help control runaway costs. And, since BC Hydro is owned by its customers, there should be no conflict between customer owned generation and utility owned generation provided the costs and benefits to the electrical grid are factored into the rates and the business case.

Conclusion

Completing the Site C Project will create a financial commitment that will last for over 7 decades, be financed by multiple generations of ratepayers, and will preclude the adoption of any technological changes in how electricity energy needs are met. While legacy investments in centralized infrastructure were successful in a previous era they commit BC Hydro to a stagnant and obsolete business model in a rapidly changing world. An example of the new world is Community Net Metering – a customer facing business model that provides customer capital to increase the distributed and resilient capacity of a modern

¹¹ <http://www.bcgreens.ca/platform>

¹² <http://bcndpcaucus.ca/powerbc-2/>

electricity grid. Completing Site C will eclipse and preclude a myriad of innovative approaches like this.

There is a technological revolution happening in energy supply and system coordination. It opens the door for a new era of consumer contribution in a robust and diffuse energy supply network. Site C closes the door. The Commission's task is to ensure that door stays open.