My original submission was very brief (only two pages) with 6 pages of references and excerpts from websites showing the widespread adoption of **time-of-use** pricing in other jurisdictions, including Canada.

I have read and searched the preliminary report very carefully and found no mention of "**time of use**" nor "**Time-Based Rates**" in the main body of the report.

I found only one instance of "**time of use**" on page 39 of Appendix A, which was repeated in question 7 on page 15 of Appendix C. It is good that the BCUC will ask this direct question of BC Hydro: "The Panel therefore seeks input from BC Hydro and other parties regarding what level of incremental capacity curtailment would be reasonable to expect from industrial, residential and commercial customers through capacity focused DSM programs… Please include consideration of **time of use** and interruptible rate structures."

The Deloitte Report is quoted on page 38 of Appendix A as follows:

> "In the 2013 IRP, BC Hydro states that "since then, in accordance with government policy, BC Hydro has no plans to implement **Time-Based Rates** to address capacity requirements for residential and commercial customers." Nonetheless, 76% of the utilities surveyed in the ACEEE 2017 benchmarking report use **Time-Based Rates**."

I am asking why BC Hydro has no plans to implement such a policy. It is obvious, relatively easy and very cheap, due to the fact that smart meters were installed in BC between 2011 and 2015 (for the main reason of electricity theft reduction) at a cost of perhaps $800 million – see report at: (https://www.bchydro.com/news/press_centre/news_releases/2016/smart-meter-fact-sheet.html)

Their business case (https://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/projects/smart-metering/smi-program-business-case.pdf) stated:

> "Several utilities have chosen to implement **time-of-use** rates at the same time as smart meter installation, resulting in higher bills for customers. BC Hydro will maintain existing rate structures at the same time as meter installation. BC Hydro will engage customers in the design of any new rate structures and any new or modified rates will be subject to review and approval by the BC Utilities Commission."

There is no justification for the statement that "**time-of-use** rates will result in higher bills for customers". In fact, **time of use** rates give customers the freedom to lower their own bills by choosing to use electrical appliances in off-peak hours, such as doing laundry or charging household rechargeable items, INCLUDING ELECTRIC CARS! Electric cars are often cited as a reason for increased load but if they are charged overnight, this concern about peak load will be much reduced! When customers have the option of using power at a lower rate at low-peak times of the day (thus lowering their energy bills), a huge benefit of smart

meters will finally be realized.

Because sections 3(c)(i) and (ii) provide flexibility for the Panel to identify factors that may cause the load forecast to deviate from the mid-level load forecast (the expected case), I request that **time of use** rates be recommended as a key demand-side management initiative, as mandated under the Terms of Reference section 3(b)(iv).

A careful reading of the preliminary report reveals that "BC Hydro's motivation for promoting Site C was based on government policy decisions to stimulate growth in the oil and gas industry, including LNG". This has been stated elsewhere, but it was interesting to see it validated in the report. In addition, the statements:

> "BC Hydro's load forecasting has consistently overestimated electricity demand and appears to have inflated demand projections during the time-frame when Site C was being considered for approval."

and

> "BC Hydro has failed to adjust for over-estimation bias."

demonstrate that the numbers that were used to justify this big-budget project are not reliable. I fear that the job of the BCUC to evaluate the questions at hand may be impossible to achieve. It is difficult to show that the cost of stopping Site C dam is a sensible decision because there is not enough good information and so much work has been done with bad data and poor assumptions which were a means to the end of getting this project approved under the previous government's policies.

The preliminary report, citing important inconsistencies identified by several participants' submissions, raises very serious questions that should not be glossed over because of lack of time. On the basis of cost-effectiveness alone, this project should be scrapped. It has never been clear that it would lead to a reduction of energy costs to BC citizens, but rather to cost increases. It has never been clear that Site C would deliver security of energy to BC but rather that it was meant to facilitate export of our natural gas. It is time to plan better for conservation and alternative solutions.

_____Notes from BCUC Preliminary Report_____

page 45

. The Panel notes a number of the participants' submissions express concern that the OIC is 'overly prescriptive' in that it mandates that BC Hydro's Current Load Forecast be utilized for comparing the alternatives. However, as a number of submissions point out, sections 3(c)(i) and (ii) provide flexibility for the Panel to

identify factors that may cause the load forecast to deviate from the mid-level load forecast (the expected case). The Panel also agrees with BCSEA's submission that the requirement to have BC Hydro report on adjustments and the factors that may move demand higher or lower than the mid-level forecast does not preclude us from receiving and taking into account information from participants on these topics.

5.1.2 Overview of BC Hydro's Current Load Forecast

BC Hydro states its Current Load Forecast is "a key input into BC Hydro's short-term operational and financial planning and revenue projections, and its long-term resource planning processes." [219] BC Hydro prepares its load forecast prior to taking demand-side management (DSM) plan savings into account using models that align the relationship between demand and drivers of future demand. BC Hydro explains the drivers its uses include projections of economic variables such as Gross Domestic Product (GDP), efficiency of residential and commercial appliances, temperature, commodity prices and electricity rate increases. BC Hydro notes load forecasting is inherently an uncertain undertaking with volatile drivers of future requirements and as a result its load forecast consists of a high and low band and includes a mid-level projection. [220]

p 46-47

. System peak forecast BC Hydro describes how it arrives at its total system peak requirements as follows:

The distribution peak forecast is prepared from individual substation forecasts of non-coincident peak demand and then aggregated into regions and adjusted by coincidence factors to develop a total distribution peak forecast. The large industrial peak demand forecast is developed for existing and future new customers, also on a non-coincident basis, and then aggregated into regions and a total system using coincidence factors. The total system peak requirements is then a projection of a total distribution system peak, total system large

industrial (i.e., transmission voltage connected) peak, peak demand projections for other utilities supplied by BC Hydro and system losses based on historical real time data of the transmission system losses. The distribution peak is most sensitive to temperature and weather conditions such as snow, wind and cloud cover. As such the distribution peak demand is prepared on a temperature normalized basis which is defined as a rolling 30-year period of the annual coldest daily average temperature. This temperature coincides with cold spells and when the system peaks during the winter months typically in December or January.[227]

p 53

Historical forecasting accuracy

BC Hydro's load forecasting has consistently overestimated electricity demand[255] and appears to have inflated demand projections during the time-frame when Site C was being considered for approval.[256]

BC Hydro has failed to adjust for over-estimation bias. [257]

Reasonableness of Current Load Forecast assumptions

The forestry segment will be impacted by trade difficulties, wild fires and BC Hydro rates not just price commodity price changes [258]

With respect to BC Hydro' identification of population growth being a key driver of residential demand, BC population has grown in the last 10 years and expected demand from this growth is offset by falling per capital demand[259]

The need for Site C was based on government policy decisions to stimulate growth in the oil and gas industry, including LNG. 260

. [257] F13-1 Submission, p. 16; F82-1, pp. 25-26.

. [258] Ibid., p. 16.

. [259] Ibid., p. 16.

. [260] Ibid., pp. 17-18.

The price elasticity used by BC Hydro appears low.[261]

p 54

The Panel recognizes it is in the face of uncertainty that BC Hydro must ensure that there are adequate resources so that the lights go on when ratepayers turn the switch on. At the same time, **if BC Hydro acquires or builds more resources than it needs there is a potential for unnecessarily higher rates for customers.** The ultimate cost and economic risk of resource development decisions made today are impacted by factors that are largely out of the control of decision makers but nevertheless the decisions must be made today. To assess the cost and economic risk of different resource strategies, it is necessary to identify those future uncertainties that have the potential to significantly affect the cost or economic risk of a resource strategy, such as building Site C, and to bracket the range of those uncertainties so that an optimal decision can be made.

p 57

> □□In Tables J-8 and J-9, BC Hydro shows Tilbury and LNG Canada loads. In Table K-2, BC Hydro shows total LNG load. Please explain where the remaining load is coming from. Is it all from the Woodfibre LNG project? Please elaborate.

p 60

The Panel is also concerned that over-estimating industrial load growth could have a compounding impact on the GDP estimates used by BC Hydro, resulting in possible accuracy issues for load growth in other customer classes.

p 59

The Panel finds that the historical instances of over-forecasts are greater than under-forecasts, especially in the industrial load and that the accuracy of BC Hydro's historical industrial forecasts looking out

three and six years have been considerably below industry benchmarks. However, the Panel finds that we cannot yet assess the reasonableness of BC Hydro's industrial load forecast due to insufficient information.

p 60

In Deloitte's view, BC Hydro's inputs for GDP and disposable income growth appear higher than the alternative forecast after the first 5 years. Deloitte notes in the Current Load Forecast, BC Hydro uses an average of 2.3 percent real GDP growth in the first five years, based on the BC Ministry of Finance's forecast. Deloitte also notes this input increases to 3.5 percent over the next five years, based on RFEC projections. Deloitte compares this input to the 2016 Conference Board of Canada forecast which projects that real GDP will grow by 2.6 percent on average between 2016 and 2020 and then dropping to an average of 2.3 percent between 2021 and 2025. Deloitte notes that by 2025 the RFEC forecast projects the BC economy will be 6 percent larger in real terms.

Deloitte also notes BC Hydro's mid-forecast model does not explicitly incorporate recessionary periods, even though it is likely that such periods will occur over a 21-year horizon, based on the historical record.[277]

p 61

> Please explain what impact, if any, the recently announced halt to the Aurora LNG Project will have on GDP projections developed by RFEC. For the purposes of this response, please assume that the Aurora LNG Project will not proceed.

p 62

BC Hydro outlines its assumption about rate increases in its Base Case analysis. BC Hydro assumes rate increases of 3.5 percent in F2018, 3.0 percent in F2019, and by 2.6 percent each year from F2020 to F2024, consistent with the 10 Year Rates Plan. For years after F2024, BC Hydro has assumed annual rate increases equal to inflation of 2.0

percent.[279]

In Deloitte's view, BC Hydro's assumed price elasticity may be an "oversimplification" in three respects:

p 63

BC Hydro did note the following factors that could positively or negatively impact it ability to achieve the 10- Year Rates Plan: weather, industrial load, LNG load, interest rates, and energy markets.[282]

p 65

. Deloitte also identified trends that could have a downward effect on the load forecast – in particular the use of solar photovoltaic (PV) panels by residential customers. While Deloitte considered that this would not be a significant issue over the 20 year time horizon of the load forecast as solar PV penetration is low (equivalent to 0.02 percent of residential load in 2016), Deloitte noted that projections regarding solar PVs are sensitive to electricity rates, policy, and the costs of solar PV equipment.[293]

p 66

BC Hydro's rates - BC Hydro assumes no increase in its rates (other than for inflation) after the end of the 10 Year Rates Plan in 2024. Mr. Dauncey considers that future BC Hydro rate increases could make a solar PV investment very enticing to customers.[296]

The Panel is concerned that, given the long-life of the Site C asset, BC Hydro has only identified a potential upside risks to the load forecast from electrification, and has not identified any potential downside risks. The Panel requests that BC Hydro (and any other parties) specifically address:

- The downside risk of a lower load forecast over a 70 year time horizon;

- How this risk could be mitigated (for example, **policy changes to encourage electrification**, sale of surplus energy to other markets); and

- To what extent the risk of a lower load forecast over a 70 year time horizon should result in a preference (all else equal) for a portfolio with smaller sized generation/demand components.

CCPA submits that conservation is clearly the most cost-effective way of meeting new demand.[501]

Dauncey submits the BC Hydro's investments in DSM have been successful at a cost of 5 cents/kWh, which Dauncey submits is cheaper than any known method of developing new power.[502] Dauncey further states:

- In California, all new residential construction is required to be net-zero energy by 2020, and all new commercial construction by 2030. In BC, the equivalent goal for residential construction has been pushed back to 2032 because of foot-dragging by the housing industry.

- The US Department of Energy has projected that LED lighting, as one of many energy-saving technologies, will achieve a market share of 84 percent of the general illumination market by 2030, reducing lighting energy by 40 percent for a savings of 261,000 GWh, equivalent to the energy consumed by nearly 24 million homes. The equivalent projection for BC's smaller population would see an energy saving of 3,740 GWh a year, equivalent to 73 percent of the energy from Site C. Switching all of BC's 360,000 streetlights to LEDs, for instance, would save 105 GWh a year, with financial payback in eight years.

- If the 300,000 homes in BC that still use baseboard electrical heating all switched to air-source heat- pumps their owners or tenants would save 2,500 kWh a year, reducing

demand by 750 GWh a year.

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The Panel agrees with BC Hydro and other parties that one of the obvious ways for a utility to address load growth is to try to reduce and shift demand for electricity. However, what is important to the Panel is how much additional energy savings are available through DSM, and at what cost.

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One of the obvious ways for a utility to address load growth is to try to reduce and shift demand for electricity. Utilities all over the world, including BC Hydro, invest in initiatives to achieve this outcome, and that such initiatives are referred to as "demand-side management", or DSM.[560]

In the F17-F19 RRA, BC Hydro asked for acceptance of $38 million in funding to understand the dependability/reliability of capacity focused programs and technologies applicable to the BC market. This included funding for:

- Localized DSM pilots to test the ability of DSM to defer network investments
- Residential demand response trials of new technologies (e.g., heat pump water heaters, electric thermal storage, smart electric vehicle charging, and battery storage) and approaches (e.g., behavioural peak savings)
- Commercial and Industrial demand response investigations of new technologies (e.g., smart charging for fleets, commercial battery storage, and building automation).
- Connected home trials with large service and technology providers and retailers/manufacturers
- Industrial load curtailment pilot program

- Distributed energy resource management software system/service

BC Hydro states that it included industrial load curtailment is an available capacity resource in its portfolio analysis, but considered capacity focused DSM beyond this to be too uncertain to be counted on for planning decision at this time.[562]

BC Hydro states that a capacity-focused DSM resource would need to curtail for 16-hours for up to 36 days (totaling 576 hours) anytime over the winter and shoulder months (October through March) to give BC Hydro sufficient capacity reliability to defer generation capacity.[563] BC Hydro further states that the industrial load curtailment pilot has demonstrated that, while some uncertainties remain, about 85 MW of curtailment at the price point of $75/kW-yr could be available as generation capacity alternative.[564]

Deloitte states with regard to capacity focused DSM:

In the 2013 IRP, BC Hydro states that "since then, in accordance with government policy, BC Hydro has no plans to implement Time-Based Rates to address capacity requirements for residential and commercial customers." Nonetheless, 76% of the utilities surveyed in the ACEEE 2017 benchmarking report use Time- Based Rates.

. Bakker submits that as a result, the potential for capacity-focused DSM savings identified in the IRP totalled 575 MW, but that for planning purposes in its 2013 IRP BC Hydro entirely disallowed capacity-focused DSM as an available resource, assuming it would deliver zero MW over the next 20 years.[569]

Bakker further submits that, based on the identified capacity-focused

DSM potential and the results of pilot programs to date, it is anticipated that at least 500 MW of capacity-focused DSM is available to BC Hydro. Bakker submits that she has conservatively assumed that these savings would take longer to develop than the five-year period identified in the 2013 IRP, and that the savings could grow from 30 MW in F2018 to 570 MW by F2036.[572]

Prophet River and West Moberly First Nation (PRWMFN) submitted a 2014 report by the Helios Centre as an attachment to their submission. This report states that capacity-focused DSM is an extremely important and cost-effective component for alternative portfolios to be compared to those built around Site C. [573]

The Panel therefore seeks input from BC Hydro and other parties regarding what level of incremental capacity curtailment would be reasonable to expect from industrial, residential and commercial customers through capacity focused DSM programs at: (i) F2019, (ii) F2023 and (iii) F2027 at different cost levels (for example, $10/kW-year; $30/kW-year, etc..). **Please include consideration of time of use and interruptible rate structures.**

Questions for BC Hydro

73. Given this, the Panel requests BC Hydro to explain why it has only identified capacity DSM savings for the industrial sector.

The Panel therefore seeks input from BC Hydro and other parties regarding what level of incremental capacity curtailment would be reasonable to expect from industrial, residential and commercial customers through capacity focused DSM programs at: (i) F2019, (ii) F2023 and (iii) F2027 at different cost levels (for example, $10/kW-year; $30/kW-year, etc..). Please include consideration of time of use and interruptible rate structures.