CCPA
CANADIAN CENTRE
for POLICY ALTERNATIVES
BC Office

# Revisiting the Economic Case for Site C

SUBMISSION TO THE BC UTILITIES COMMISSION INQUIRY RESPECTING SITE C

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## Key findings

This submission argues that the Site C dam is not necessary, and that moving forward to completion is likely to have adverse impacts on BC Hydro and ratepayers of all classes.

- The economic case for Site C rests on projections of growing industrial demand for electricity, in particular from natural gas extraction and processing, including liquefied natural gas (LNG).
- BC Hydro has consistently overestimated demand for electricity, and appears to have inflated demand projections during the time frame when Site C was being considered for approval.
- Updated baseline projections of electricity demand show that in the absence of Site C, BC Hydro will have an electricity surplus until at least the early 2030s.
- This surplus could be extended much further in time if more aggressive conservation measures are taken and if fossil fuel sectors (and their electricity demand) are steadily wound down in a manner consistent with climate action.
- One area where BC Hydro may have underestimated demand is for the transition to electric vehicles. The additional demand from vehicle electrification, however, can be met through the potential surplus we identify.
- If BC chooses lesser conservation efforts, then additional electricity demand can be met through: upgrades to existing dams, smaller renewable generation sources, and community-level energy alternatives. These options would better meet BC's incremental needs at less risk and comparable cost to Site C. In addition, BC Hydro could avail itself of the Canadian Entitlement under the Columbia River Treaty.
- Completing Site C will lead to higher debt for BC Hydro and higher rates for all BC Hydro customers. This will increase energy poverty among BC's low-income households.
- Rather than move ahead with Site C, a more fulsome process of evaluation of future supply and demand—which must include conservation, alternative supply options and BC Hydro's role in facilitating greenhouse gas (GHG) emission reductions—should be undertaken through the 2018 Integrated Resource Plan exercise.

## Introduction

This brief focuses on the narrow economic questions about Site C posed by the BC government to the BC Utilities Commission. We do not address the economic costs associated with the "significant adverse environmental effects" (as acknowledged by the Government of Canada), nor do we speak to implications for First Nations in northeastern BC, although we believe that a final determination by the BC government should also include these important aspects of the project.

Our analysis is also informed by the economics of energy transition—the need to dramatically reduce GHG emissions in line with Canada's commitments to the Paris Agreement, BC's Greenhouse Gas Reduction Targets Act and Clean Energy Act. Too often, governments commit to only modest climate action measures, while continuing to promote and rely on fossil fuel resources.

With its abundant clean electricity supply, BC Hydro has long been viewed as a central player in BC's climate action planning, a role we believe should be expanded. The CCPA's Climate Justice Project has reviewed mitigation policies in BC spanning a wide range of policy areas.[1] What follows updates and builds upon a 2012 CCPA report for the Project, authored by John Calvert and Marc Lee, *Electricity, Conservation and Climate Justice in BC: Meeting Our Energy Needs in a Zero-Carbon Future*.[2]

## Misleading demand forecasts

BC Hydro has consistently overestimated future electricity demand. This is somewhat to be expected, as it is better to plan to have an excess of supply rather than an insufficient supply in the future. However, a recent study from the University of British Columbia found that 85 per cent of 36 load forecasts prepared by BC Hydro since Site C was first proposed in the early 1980s have been overestimates, with the average overestimation almost 10 per cent above actuals, or 5,443 GWh per year,[3] a figure larger than the average annual generation from Site C, estimated at 5,100 GWh per year.

Specifically, BC Hydro forecasts do not include the possibility of recessions nor other factors that would slow demand growth. Electricity demand in BC grew steadily from the early 1980s up to 2007, but at rates lower than anticipated in annual forecasts. Demand dropped

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[1] See https://www.policyalternatives.ca/publications/reports/climate-justice-project

[2] https://www.policyalternatives.ca/electricity-justice

[3] R Hendricks, P Raphals and K Bakker, *Reassessing the Need for Site C*, University of British Columbia Water Governance Program, April 2017: https://watergovernance.ca/wp-content/uploads/2017/03/1-Site-C-Economics-Report-19042017.pdf

after 2007, and as of 2016 had yet to recover its 2007 peak. Indeed, actual demand in 2016 was 55,674 GWh per year, some 6,500 GWh per year less than was projected for that year in BC Hydro's 2012 forecast.[4]

Moreover, analysis of demand forecasts indicates a substantial ramp-up in BC Hydro's expectations timed around decision-making for the Site C dam. BC Hydro's 2009 forecasted demand for the fiscal year 2025—when Site C is anticipated to come into service—was 61,281 GWh, only somewhat higher than the 57,715 GWh actual demand in 2009. However, demand forecasts in 2010, 2011, 2012 and 2013 successively raised projected 2025 demand, reaching 78,555 GWh in the 2013 forecast.[5]

After the BC government's final investment decision on Site C in 2014, those demand forecasts dropped back down; the 2016 demand forecast for 2025 is 64,710 GWh per year. However, this more modest projection still represents a 16 per cent growth above 2016 actual demand.

While longer-term projections are subject to greater uncertainty, even BC Hydro's shorter-term projections represent overestimates. BCUC's recent response to BC Hydro's 2016 load forecast shows that projected demand in Revenue Requirements Applications was overestimated by an average of 1,773 GWh, or 3.3 per cent per year, going back to 2009.[6] This is largely due to overestimation of demand from the industrial sector.

This misleading and "strategically optimistic" (according to the UBC study) process of estimating demand merits further investigation by the BCUC and new BC government.

## Supplying fossil fuel industries

Looking forward, one major driver of demand that has yet to materialize is a liquefied natural gas (LNG) industry and the associated upstream extraction and processing of gas. Petronas' recent decision to cancel its Pacific NorthWest LNG project is indicative of the abysmal economics of LNG worldwide.[7] A wave of optimism arose between 2011 and 2014 due to high LNG prices in Asia, prompting of flurry of interest for LNG export projects in BC

[4] This brief follows BC Hydro's numbering convention, so that 2024 is BC Hydro's F2024, the fiscal year April 1, 2023 to March 31, 2024.

[5] BC Hydro, response to information request CEC 2.135.1 on RRA F2017-F2019, January 23, 2017, http://www.bcuc.com/Documents/Proceedings/2017/DOC_48632_B-15_BCH-Response-Intervener-IR-No2.pdf

[6] BCUC response to BC Hydro's 2016 load forecast, Decision 2017-08-25-_BCH_RRA_Key Findings-Load-Forecast, August 25, 2017.

[7] See M Lee, "The Abysmal Economics of LNG" in Policy Note blog, September 2016: http://www.policynote.ca/the-abysmal-economics-of-lng/

and elsewhere. However, current and projected future prices in Asia do not justify the multi-billion dollar investments needed for companies to proceed to a final investment decision.[8]

BC Hydro's most recent Revenue Requirements Application (F2017 to F2019) projects 2,848 GWh per year in LNG demand by 2024, even though only the small Woodfibre LNG plant (with expected demand of 1,200 GWh per year) has received a final investment decision, although there is no actual timetable for its construction.[9] Increased upstream gas extraction and processing predicated on LNG exports adds another 2,500 GWh per year in electricity demand by 2027.[10]

Thus, a major expansion of BC's fossil fuel export sector is needed to justify the incremental electricity supply from Site C. But supplying relatively clean electricity to fossil fuel export projects ignores the full climate implications of all of the extracted carbon removed from BC and put into the atmosphere. While Woodfibre is touted as an example of "clean LNG," the total extracted carbon from the project (going into the atmosphere wherever final combustion takes place) would still amount to 186 million tonnes of carbon dioxide over a 30-year period—equivalent to three years of BC's reported GHG emissions.[11]

If fossil fuel industries pay less than the cost of new power supplied, this is tantamount to a subsidy to those industries at a time when BC needs to shift incentives towards climate action. In the case of Woodfibre LNG, which received a guarantee of the standard industrial rate for use of electric drives to power its LNG plant (instead of using gas), the resulting subsidy is estimated at approximately $34 million per year.[12]

The BC government published a schedule of electricity pricing for LNG at prices lower ($86.55 per MWh in 2023)[13] than the cost of Site C power ($88 to $110 per MWh). If LNG projects go forward as forecast, Site C would effectively be losing tens of millions of dollars

[8] For more on this, see M Lee, "Australia's LNG catastrophe: Why Petronas' LNG cancellation is a blessing for BC" in Policy Note blog, July 2017: http://www.policynote.ca/goodbye-petronas/

[9] In its 2013 Integrated Resource Plan, built on the basis of its 2012 demand forecast, an LNG industry would require 3,000 GWh per year, although the IRP also considered a "No LNG" scenario.

[10] BC Hydro, Revenue Requirements Application F2017 to F2019, Table 3.3, https://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/corporate/regulatory-planning-documents/revenue-requirements/f17-f19-rra-20160728.pdf.

[11] M Lee, *Extracted Carbon: Re-examining Canada's Contribution to Climate Change through Fossil Fuel Exports*, CCPA, January 2017: https://www.policyalternatives.ca/publications/reports/extracted-carbon

[12] M Shaffer, "British Columbians will pay the LNG industry's power bills" in Policy Note blog, November 2016: http://www.policynote.ca/british-columbians-will-pay-the-lng-industrys-power-bills/

[13] Domestic Long-Term Sales Contracts Regulation, under Clean Energy Act: http://www.bclaws.ca/civix/document/id/complete/statreg/201_2014

per year (in addition to losses from Woodfibre LNG).[14] Expanded gas fracking and processing operations are also likely to receive subsidized rates.

Not counted here are related infrastructure costs of new transmission lines, such as the $300 million, 230 kilovolt Dawson Creek-Chetwynd Area Transmission (DCAT) line built in 2016, which was constructed specifically to meet the time-limited needs of the region's natural gas industry.[15] At least two other lengthy and similarly costly new transmission lines are contemplated in the same sparsely populated region, specifically to supply power to the gas industry.[16]

The next section considers the possibility that Site C power would all be surplus, a worse situation. But the key point is that even if demand materializes in the way BC Hydro projected in 2012 or 2013, providing that power to an expanded natural gas industry would inevitably mean rate hikes for all customer classes.

## Revisiting demand projections

In this section we reconsider demand projections arising since BC Hydro's July 2016 F2017-F2019 Revenue Requirements Application (supply and demand projections in Table 3-8). In BC Hydro's own analysis—which includes Site C coming on-line in 2024—the utility would have a surplus of supply over demand up to 2031, ranging from almost 5,000 GWh per year from 2017 to 2020 then declining and becoming a deficit in 2032.

Starting with those data, we update numbers in the RRA and make the following changes to test the need for Site C:

- Anticipated power from Site C on the supply side is removed;
- Residential and commercial demand (before demand-side management or DSM)), is estimated in line with near-term growth rates in the RRA;
- For LNG, we include only the incremental demand from Woodfibre LNG while excluding other LNG demand; and
- We use BC Hydro's additional projections for certain industrial categories for years up to 2036 to interpolate demand. Other demand growth from oil and gas extraction and processing remains the same.

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[14] This depends on the final cost of Site C power. If Site C comes in at $100 per MWh and sold at $86 per MWh, the projected additional LNG demand of 1,648 GWh per year yields $23 million in losses per year.

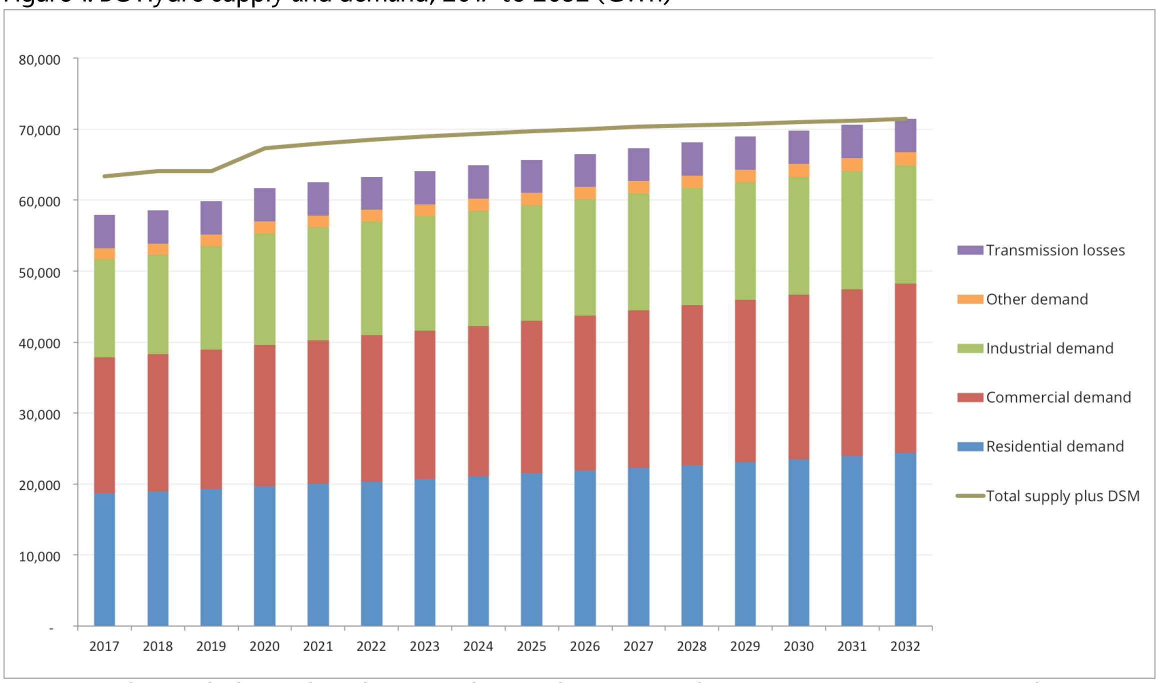
[15] BC Hydro 2016. "New transmission line to power development in the south Peace." News Release. Jan 20, 2016.

[16] B Parfitt. "Ever Wondered Why Site C Rhymes with LNG?" *DeSmog Canada*. February 4, 2016, https://www.desmog.ca/2016/02/04/ever-wondered-why-site-c-rhymes-lng

Updated projections go out to 2032 and results can be seen in Figure 1: total demand categories are the stacked bars while supply (generation plus DSM policies) is the top line. In the next section, we consider greater efforts at conservation and reducing demand from fossil fuel industries in line with climate change mitigation objectives. Thus, Figure 1 merely updates BC Hydro's own framework, and accepts steadily growing demand, when in reality demand may be flat (as in recent years) or grow at a slower rate due to policy changes and higher electricity prices.

This demand update finds 8.3 per cent lower total demand in 2032 than presented by BC Hydro (2016 May mid-load forecast before DSM plus Expected LNG Load). The resulting surplus (the gap in Figure 1) is in the 5,000 GWh per year range up to 2023, after which it steadily declines to a near-balance in 2032.

Figure 1: BC Hydro supply and demand, 2017 to 2032 (GWh)




Sources: Author's calculations based on BC Hydro, Fiscal 2017 to Fiscal 2019 Revenue Requirements Application, Chapter 3.

Thus, based on BC Hydro's own information, we can conclude that there is no immediate need for Site C. Even if Site C were delayed to come on-line in 2032, that would lead to a 5,100 GWh surplus in that year, and it would be at least another five years before demand would catch up. Enhanced DSM or conservation measures could extend that surplus further into the future.

Where new supply exceeds domestic demand, electricity from Site C would likely be sold to customers in the United States. BC Hydro's own estimate of the price it would receive in the US around the time of Site C's completion is around $37 per MWh (in 2016 Canadian dollars),[17] much lower than the estimated cost ($88–110 per MWh) of Site C power. Alberta is another possible export market, but including the cost of new transmission line ($15–20 per MWh), purchasing Site C power would represent a substantial premium relative to Alberta's other supply options.

While a radical increase in market prices several decades ahead is not out of the question, it seems most likely that BC Hydro would be selling new Site C electricity at a loss. For example, between 2024 and 2032 the surplus energy from Site C would total 45,900 GWh. If sold at $37 per MWh, this represents a total loss in the range of $2.3 billion (at a Site C cost of $88 per MWh) to $3.3 billion (at $110 per MWh).[18] The cost of Site C power is determined by the upfront capital costs, financed by debt, while sales come after completion, so these losses are indicative only.

These numbers also do not consider cost overruns common to hydro mega-projects like Site C. Evidence of cost overruns in the Canadian context and in other parts of the world has been summarized in the submission to the BCUC made by former BC Hydro CEO Marc Eliesen.[19] If the true cost of Site C ends up much higher than projected, the implicit cost of that power rises as well.

Put another way, there is a clear danger that completing the Site C dam would have significant adverse financial impacts for BC Hydro customers (exacerbating an already poor financial situation at BC Hydro). A particular concern is that higher rates could deepen energy poverty—a situation in which energy costs adversely affect a household's quality of life, typically measured as the share of population spending more than 10 per cent of their after-tax income on household energy. The CCPA has previously analyzed energy poverty in BC, and how steep residential rate increases disproportionately impact lower-income households that are already facing major affordability challenges.[20]

Figure 2 is based on data from the *Survey of Household Spending* that show lower-income households (the bottom quintile or lowest 20 per cent of households ranked by income) pay a much larger share of their income in electricity costs. This regressive pattern means

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[17] BC Hydro response to information request BCUC 2.310.1 RRA F2017-F2019, cited in Hendricks et al Table 13.

[18] BC Hydro has estimated the cost of Site C power at $104 per MWh in its 2010 Resource Options Report; $110 in its 2013 Environmental Impact Statement (to the CEAA); and $88 in the 2013 Resource Options Report update.

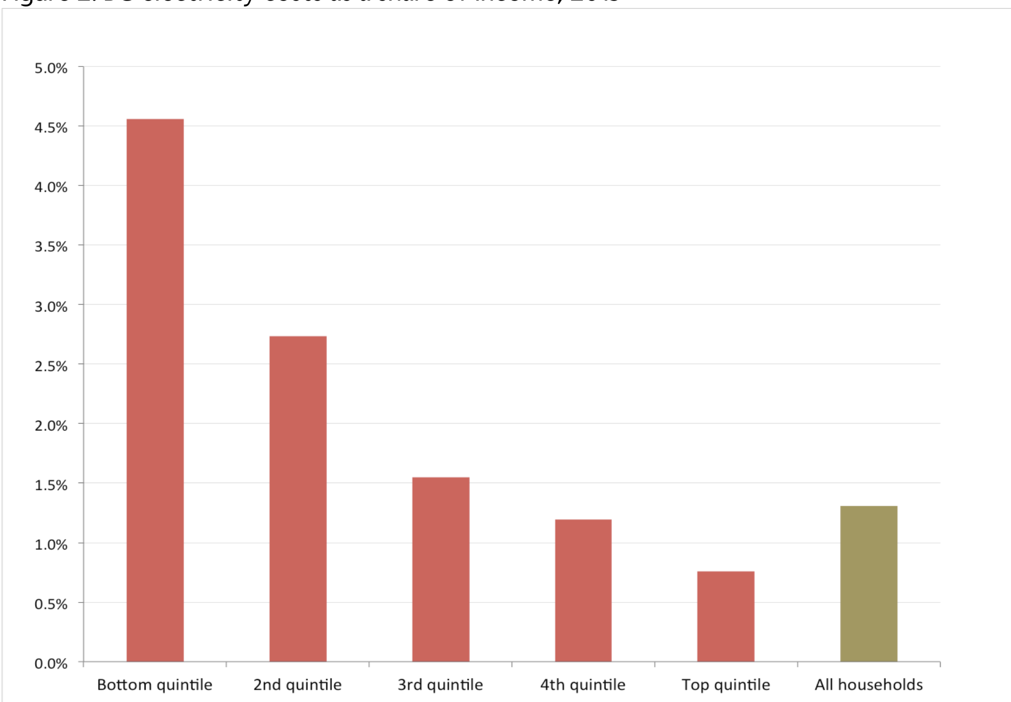
[19] M Eliesen, An Evaluation of the Need for the Site C Project, August 16, 2017, http://www.bcuc.com/Documents/Proceedings/2017/DOC_90015_F13-1_Eliesen,M._Site-C-Submission.pdf

[20] For more on this topic, see CJP publication by M Lee, E Kung and J Owen, *Fighting Energy Poverty in the Transition to Zero-Emission Housing*, Sept 2011: https://www.policyalternatives.ca/energy-poverty; and also Seth Klein's expert testimony in 2016 to the BCUC's rate design, available at: http://www.bcuc.com/Documents/Proceedings/2016/DOC_46279_C2-12_BCOAPO-Intervener-Evidence.pdf (pp. 255-300)

that higher BC Hydro bills do not affect everyone equally. BC Hydro and the BCUC's recent rejection of a lifeline rate for low-income households means that additional residential price increases stemming from Site C would have a disproportionate effect on already marginalized groups in BC.

While demand may eventually catch up to this new supply, it could be more than a decade after Site C is scheduled to go into service before this happens, and likely much longer if BC Hydro pursues some of the policies we describe in the next section.

Figure 2: BC electricity costs as a share of income, 2013




Source: Author's calculations based on Statistics Canada Survey of Household Spending.

## Getting serious about conservation

Conservation and energy efficiency (i.e. demand-side management) are generally accepted as the least expensive, lowest-impact form of meeting new energy demand. BC Hydro's 2013 *Resource Options Report Update* models five DSM options, the most aggressive of which is Option 5, which calls for "a comprehensive effort to change market parameters and societal norms and patterns in order to save electricity" and contains "strong codes and standards and conservation rate structures."

BC Hydro's *Integrated Resource Plan 2013* uses the much less aggressive DSM Option 2, a policy choice to forgo more conservation, which would increase its electricity surplus. BC could easily commit to ramping up to DSM Options 3 or 4. Option 5 points to deeper and longer-term structural changes, but is informative about the underlying potential of conservation in light of climate action needs. It includes:

> ...a future where buildings are net-zero consumers of electricity with some buildings being net contributors of electricity back to the grid. Energy efficiency and conservation activities are pervasive throughout society and ingrained in a business decision-making culture. This shift is reflected through widespread district energy systems and micro-distributed generation, smaller more efficient housing and building footprints, community densification, distributed workforce and hotelling (shared workspace), best practices in construction and renovation, efficient technology choices and behaviour, and an integrated community perspective (land-use, zoning, multi-use areas). ... For the industrial sector, a market transformation to certified plants occurs, supported with expanded regulation.[21]

Ramping up DSM would also entail expenditures, but at much lower cost than Site C. BC Hydro's estimate of the cost of DSM Option 3 is $22 per MWh for the utility itself and a total resource cost (society-wide) of $35 per MWh. Even the very aggressive Option 5 has costs of $29 per MWh for the utility and a total resource cost of $49 per MWh. Conservation is clearly the most cost-effective way of meeting new demand (and the *Resource Options Report Update* also discusses how DSM options can reduce peak capacity).

Not considered in these DSM options is the existing demand from industrial sectors that are GHG-intensive and need to be wound down in the transition to a zero-carbon economy. Clearly some fossil fuel consumption will inevitably be part of BC's energy mix for the next few decades of transition. But rejecting the growth of these industries in the near-term and aiming for a wind-down should inform planning for electricity supply and demand.

Estimated demand from fossil fuel industries amounts to about 6,000 GWh in 2032 (4,000 GWh for oil and gas; 1,200 for Woodfibre LNG; 800 for coal mining). We consider an alternative scenario for industrial demand that:

(a) Holds oil and gas demand at 2018 levels for the following three years, then ramps down electricity supplies to 500 GWh in 2032;
(b) Cancels the Woodfibre LNG project (1,200 GWh per year); and
(c) Ramps down electricity to coal mining by 80 per cent by 2032. Metal mining and other industrial areas are unaffected.

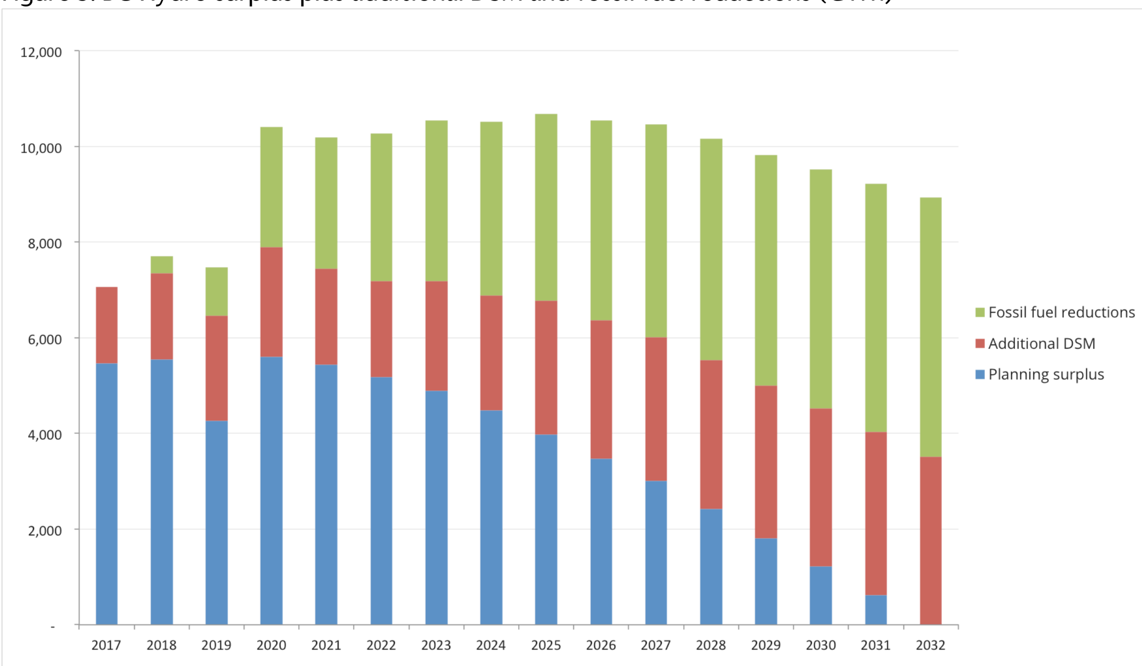
These assumptions would align BC's industrial activity with a stronger climate policy that is more consistent with our international obligations and domestic legislation. Altogether,

[21] BC Hydro, 2013 *Resource Options Report*, Chapter 4, https://www.bchydro.com/energy-in-bc/planning-for-our-future/irp/document_centre/reports/2013-ror-update.html#report

these measures plus the more aggressive DSM Option 5 lead to 6,000 GWh of reduced demand by 2024—and almost 9,000 GWh by 2032.

Figure 3 shows the combined effect of the planning surplus for BC Hydro (the gap in Figure 1) plus the incremental potential surplus arising from demand reductions from aggressive DSM measures and phasing out fossil fuel industries. The total represents power that could be available for green industrial production, household fuel switching and transitioning to electric cars (a small amount of the latter is already built into the BC Hydro baseline).

Figure 3: BC Hydro surplus plus additional DSM and fossil fuel reductions (GWh)




Sources: Author's calculations based on BC Hydro, Fiscal 2017 to Fiscal 2019 Revenue Requirements Application, Chapter 3, plus the assumptions outlined above.

**We conclude from the above analysis that aggressive conservation and reductions in fossil fuel industries, combined with BC Hydro's underlying electricity generation surplus, leave abundant available supply—on the order of two Site C dams for much of the forecast period.**

One area of demand that may well be underestimated, however, is the electrification of transportation. Much of this would occur beyond the planning horizon we have considered, but recent developments in electric vehicles suggest a more rapid penetration is possible, especially if encouraged by policy action.

BC Hydro already builds in some electric car demand into its baseline forecast, with an estimate of 480 GWh by 2027 and 1,760 GWh in 2036 for 164,000 and 580,000 vehicles respectively.[22] As of year-end 2015, there were 2.3 million cars in BC,[23] so if all of these were converted to electric it would require just less than 7,000 GWh in incremental electricity demand.

This represents a massive increase in demand but it is still within the realm of the potential electricity surplus we discuss above. A thorough evaluation would require more intensive research and modeling beyond what we do in this submission. This should be undertaken as part of the 2018 Integrated Resource Plan exercise.

## Alternative supply options

Ultimately, BC has a choice between more aggressive conservation on the one hand and seeking new electricity supply on the other. That is, lesser effort at DSM and/or reducing fossil fuel demand must be weighed against the alternative of adding new electricity supply. As noted previously, if Site C does not to go ahead, new alternative supply would not be needed until at least the early 2030s, and this could be extended further in time by pursuing the conservation measures described above.

Smaller-scale alternative supply options are likely a better fit for planning purposes than the Site C mega-project, as they can be phased in with less lead time and provide smaller increments of new power. These projects come with much less risk and at comparable costs to Site C's estimated $88–110 per MWh.[24]

Site C would provide high-quality, dispatchable power with a relatively low GHG impact, most of which would occur during construction and the immediate years after. But it is not the only source of such power. Existing dams in the BC Hydro system could be retrofitted with turbines to provide additional power at much lower cost. The Duncan Dam in the Kootenays, for example, is only used for flood control and does not currently generate any power. Other dams have additional generation potential that should be considered. Geothermal is another source of particular interest as it could provide baseload power.

BC Hydro's *2013 Resource Options Report Update* identifies a wide range of renewable supply options that could be developed to meet the province's demand for power, most of

[22] RRA F2017 to F2019.

[23] https://www.bcstats.gov.bc.ca/Files/627f5833-0a54-42eb-9758-05d72c53818f/LicensedMotorVehicles.pdf

[24] There are a range of numbers BC Hydro has put forward on the cost of Site C power: $104 per MWh in its 2010 Resource Options Report; $110 in its 2013 Environmental Impact Statement (to the Canadian Environmental Assessment Agency); and $88 in the 2013 Resource Options Report update. CEAA report at http://www.ceaa-acee.gc.ca/050/documents_staticpost/63919/85328/Executive_Summary.pdf

which BC Hydro claimed to be more expensive options than Site C.[25] However, there is good reason to believe that cost estimates put forward by BC Hydro for various alternatives are overstated given the improving economics of both small and large-scale renewable technologies. In addition, the submission to the BCUC from Harry Swain (a former federal deputy minister and the chair of the Joint Review Panel on Site C in 2013/14) argues that BC Hydro uses biased methods when comparing the cost of power from different sources, and that these biases favour Site C.[26]

Development of wind and solar resources are also options, although the intermittent character of the energy produced by these generation technologies means they need storage capacity in the form of BC Hydro's existing dams. A large fleet of battery-powered electric cars, as per the clean energy transition above, would also provide increased storage capacity for BC Hydro to handle new, intermittent renewable power sources.

The ongoing drop in costs for renewables has consistently exceeded the expectations of power utilities. Consider the trends as presented by the International Renewable Energy Association (IRENA):[27]

- The cost of utility scale solar PV fell by 58 per cent between 2010 and 2015 to $130 per MWh, but another 59 per cent drop to $60 per MWh is 2025 is anticipated due to continued technological improvements, economies of scale and greater competition.
- Concentrated solar power costs are anticipated to follow a similar trend, falling from $150 per MWh in 2015 to $90 per MWh in 2025.
- Onshore wind in 2015 was already $70 per MWh and is projected to drop to $50 by 2025, an offshore wind from $180 to $120 over the same period.

In an earlier (2014) report, IRENA notes that geothermal resources can range from $40–100 per MWh, and biomass between $50 and $150 per MWh.[28] In either case, BC is likely to be on the low end of the cost curve due to abundant geothermal potential and wood waste.

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[25] These include: wave ($453 to $820 per MWh), tidal ($264 to $581), and solar ($341 to $954) power. Some middle ground exists for geothermal ($90 to $593), run-of-river ($143 to $1,170), biomass ($132 to $306) and wind ($115 to $365 for onshore and $182 to $681 for offshore). See Table 2-2 in Chapter 2. https://www.bchydro.com/energy-in-bc/planning-for-our-future/irp/document_centre/reports/2013-ror-update.html#report

[26] H Swain, *Site C: Complete, Mothball or Abandon?*, posted at http://www.integritybc.ca/?page_id=6881

[27] Data in US dollars and based on the Levelized Cost of Energy. IRENA, *The Power to Change: Solar and Wind Cost Reduction Potential to 2025*: http://www.irena.org/DocumentDownloads/Publications/IRENA_Power_to_Change_2016.pdf

[28] IRENA, *Renewable Power Generation Costs 2014*: https://www.irena.org/DocumentDownloads/Publications/IRENA_RE_Power_Costs_2014_report.pdf

A proper apples-to-apples comparison of a wide range of renewable power options— situated in the BC context, addressing idiosyncratic factors like distance to the transmission network, and based on the most recent data—is needed to properly assess any cost differences with Site C. This should form part of the 2018 Integrated Resource Plan exercise.

The upshot is that much rigorous analysis supports the proposition that cost-effective alternatives to Site C exist, and could be more gradually implemented as demand grows. In addition, the economics of those alternatives are likely to become even more favourable if the costs associated with GHG emissions and other environmental factors (land disturbance and impact on agriculture) are included in the analysis.

Other alternatives to larger utility-scale generation include small and neighbourhood-scale energy projects. These options can reduce demand for electricity from BC Hydro. Installation of solar hot water heaters and rooftop solar photovoltaics (PV) are good examples. BC has millions of rooftops that could be put to work for such purposes, including desert regions that get plentiful sunshine. Small-scale wind generation could be similarly situated to displace the need for BC Hydro electricity.

Importantly, First Nations in BC are taking a leadership role in installing solar and other renewables that displace the need for BC Hydro electricity or diesel power. A recent survey from the University of Victoria notes that almost half (47 per cent) of 105 BC First Nations who responded were involved in clean energy generation to some degree.[29] If financing barriers were reduced, this penetration could be even higher. The report specifically flagged BC Hydro for not being more supportive in fostering more such opportunities.

District energy systems offer considerable potential for reducing electricity demand and for reducing GHG emissions if they use renewable sources. A 2016 survey of district energy systems in Canada identified 42 operational systems in British Columbia, with about 600 MW of capacity, and with most constructed since 2000.[30] Of particular note from a GHG reduction perspective is the City of Vancouver's Neighbourhood Energy Utility (NEU), a district energy system using waste heat from sewage (backed up by natural gas) that has

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[29] D Cook, E Fitzgerald, J Sayers and K Shaw, *First Nations and Renewable Energy Development in British Columbia*, April 2017: https://dspace.library.uvic.ca/handle/1828/7919

[30] J Nyboer and B Griffin, District Energy Inventory for Canada, 2014, prepared for: CanmetENERGY, Natural Resources Canada Environment Canada and Canadian Industrial Energy End-use Data and Analysis Centre, Simon Fraser University, March, 2016: http://www.sfu.ca/content/dam/sfu/cieedac/publications/facilities/District%20Energy%20Inventory%20Report%202016.pdf

reduced the fossil fuel energy required in its served buildings by 70 to 80 per cent.[31] The NEU has a utility structure with cost-effective rates ($97 per MWh in 2014).

In addition to the development of an expanded portfolio of renewable alternatives, another option to meet future needs is to make full use of the Canadian Entitlement or the "downstream benefits" as a result of the Columbia River Treaty with the United States. This is a significant block of electricity, amounting to about 4,300 GWh of firm energy, roughly eight per cent of what BC uses each year. BC is entitled to this energy in compensation for the construction of three large reservoirs on the Columbia River on the Canadian side of the border, built to store water from the spring run-off and release it later in the year, enabling both flood control and generation of additional electricity in the US, half of which is owned by the BC government but immediately sold back to the US.

[31] M Lee, *Innovative Approaches to Low-Carbon Urban Systems: A Case Study of Vancouver's Neighbourhood Energy Utility*, EcoTrust and CCPA: https://www.policyalternatives.ca/publications/reports/innovative-approaches-low-carbon-urban-systems

## Conclusions and recommendations

This submission concludes that Site C is not necessary due to: BC Hydro's flawed projections of future demand, the linkage of that demand with fossil fuel industries that need to be wound down, the large potential for conservation, and the availability of alternative supply options at comparable cost and less risk.

We recommend the following measures for a balanced supply and demand planning framework for BC, and refocusing efforts on meeting BC's GHG reduction targets.

1. *Rethink BC's economic and resource plans and the role of BC Hydro.* An integrated planning approach must look at all aspects of energy use in BC, in the context of a multi-decade shift to a zero-carbon BC. The government should direct BC Hydro to plan for the province's future electricity system based on the central role it must play in furthering BC's climate objectives. This should be reflected in more realistic estimates of future demand.

2. *Ramp up efficiency and conservation measures.* BC Hydro has modeled plans for next-generation DSM programs, and should commit to enacting the most aggressive options and developing a culture of conservation. In addition to incentive and retrofit programs, the government should make much more use of its regulatory powers to require commercial and residential buildings to meet high energy-efficiency standards.

3. *Wind down fossil fuel industries.* At a minimum, BC Hydro must stop plans that would provide new electricity to fossil fuel industries, the prime justification for Site C. This energy would likely be provided at rates lower than the cost of production, and would need to be paid for through higher rates for all customer classes.

4. *Develop a range of alternative supplies to meet any increases in demand.* To the extent that we need additional energy supply, future electricity generation should be 100 per cent renewable. Ideally, such new generation would be developed in the public sector. When combined with other land use and neighbourhood planning strategies, there is considerable potential for large and community-scale energy projects to bridge any foreseeable gap between supply and demand.

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