BC Hydro Integrated Resource Plan

Technical Advisory Committee Meeting #8 Summary Notes January 27, 2021

Meeting	Technical Advisory Committee – Meeting #8 December 2020 Load Forecast & Climate Change Adaptation
Date	January 27, 2021 – 9:00 a.m. to 12:00 p.m.
Location	Webex Virtual Meeting
Committee attendees (participants and alternates)	BC Hydro – Committee Chair – Kathy Lee BC Hydro – Committee Moderator & Presenter – Basil Stumborg BC Hydro – Load Forecast Presenters – Amanda Young, Hootan Jarollahi, John Rich BC Hydro – Climate Change Adaptation Presenters – Magdalena Rucker, Stephanie Smith, Doug Robinson, Jim Papadoulis Association of Major Power Consumers (AMPC) – Melissa Davies BC First Nations Energy & Mining Council (BCFNEMC) – Cam Osler BC Public Interest Advisory Council (BCPIAC) – Leigha Worth BC Public Interest Advisory Council (BCPIAC) – Irina Mis (alternate) BC Sustainable Energy Association (BCSEA) – Thomas Hackney BC Utilities Commission (BCUC) – Nicola Simon* Canadian Association of Petroleum Producers (CAPP) – Geoff Morrison Clean Energy Association of BC (CEABC) – Stephen Cheeseman Clean Energy Association of BC (CEABC) – Peter Zell (alternate) Climate Action Secretariat – Chris Gilmore Commercial Energy Consumers (CEC) – David Craig Commercial Energy Consumers (CEC) – Janet Rhodes (alternate) City of Vancouver – Matt Horne FortisBC (Electric) – Mike Hopkins FortisBC (Gas) – Ken Ross Ministry of Energy, Mines & Petroleum Resources (MEMPR) – Paul Wieringa* Movement of United Professionals (MoveUP) – Jim Quail Pembina Institute – Tom Pierre Frappé-Sénéclauze Pembina Institute – Hoda Talebian (alternate) * *MEMPR and BCUC members attend as observers*
BC Hydro attendees	Bill Clendinning Sanjaya De Zoysa Dale Flood Ioan Nichifor Alex Tu Anne Wilson Jinhuang Yin
Meeting materials	Presentation slides

Welcome and agenda overview
Presented by Basil Stumborg (slides 1-6)

Basil & Kathy welcomed participants and outlined the meeting objectives and agenda for the day. BC Hydro provided Technical Advisory Committee (TAC) members with a reminder to respond to the Integrated Resource Plan (IRP) public survey by January 31, 2021, and notified TAC that the next meeting will be moved from February to just after March break.

TAC Participants inquired about how BC Hydro will be using the responses to the survey. BC Hydro responded that it goes directly to the project team and will help inform our draft actions coming later in the spring and that it will also form part of the public record. TAC participants also inquired about the prospective IRP filing date. BC Hydro noted we had filed with the BCUC a recommendation of a December filing date and the various other schedule milestones in that filing.

December 2020 Load Forecast
Presented by Amanda Young, John Rich, Hootan Jarollahi (slides 7-29)

Summary of Discussion

BC Hydro presented slides summarizing our latest load forecast. Presenters emphasized how this load forecast is relatively unchanged from the March 2020 Scenario A load forecast, underpinning the IRP modeling. The load forecast predicts the need for new energy resources has shifted from fiscal 2028 to fiscal 2030, while the need for new capacity resources is unchanged at fiscal 2032. TAC participants had several questions about electric vehicle load forecasts, uncertainty bands in various sectors, and the long-term impacts of the COVID pandemic.

Q&A Notes

Q: When you are looking at B.C., have you determined certain industries may be more slow to recover?

A: The hospitality and services sector are heavily impacted, but the translation to electricity consumption is not precise. The significant advantage BC Hydro has that others don't is our smart meter infrastructure. For example, retail sales have recovered much more quickly than people thought, the same as the housing market. We did not see any reduction in residential growth.

Q: Are there any comparisons between B.C. and other provinces regarding load consumption during the pandemic?

A: BC Hydro has an informal working group with utilities across the country. COVID load impacts were larger in Alberta and Saskatchewan than others because they have a higher industrial base. We focus on Quebec and

Ontario, and they have more restrictive measures in place. We are looking forward to scheduling an update again with them soon. However, the impacts in B.C. is consistent with Quebec.

Q: What does the load forecast predict regarding residential behavior pattern change? For example, how did you decide on your reference case estimate that 10% of people will continue to work from home post-pandemic?

A: Deciding on the percentage of people working from home is not a hard science, we used professional judgement and worked with the Conference Board.

In the low-band reference case, we are assuming that up to 30% of people will continue to work from home, which increases residential loads but lowers commercial loads. This offset is almost 1:1 symmetrical. BC Hydro is continuing to monitor data from our smart metering system to understand this behavior shift further, and this data will continue to inform future load forecasts.

Q: Does this range you have, the high and low, inform the IRP and associated actions?

A: Yes, that is correct. For our low, we have a line that does not grow which could occur for a variety of reasons. We need to make sure we look at both sides (high and low cases). What we are going to do with end of life, and our asset management practices also need to look at both sides.

Q: Comment. Covid impacts will extend through 2021 because vaccines will take longer to get into people and work from home will become more prevalent. The global impact will continue to impact the global economy. Longer term impacts on utility revenues from continuous development of solar energy will slowly cause more pressure on utility demand growth. Lots of reasons for cautions as BC Hydro looks out over 20 plus years. Good to see BC Hydro adjusting to lower expectations.

A: Thanks for this comment.

Q: Comment. FortisBC has been generating its own electrification scenarios and analyzing potential impacts on the energy sector broadly, particularly respective trajectories for electricity and gas loads over the term of their IRP. It will be important for the BCUC and intervenors to understand the relationship between these analyses and the reasons for divergences.

A: Thanks, we'll take this away for consideration.

Q: Please discuss electric vehicle sales and load utilization in this load forecast, as your results seem different from news articles we've seen recently which shows an uptake in electric vehicle (EV) sales.

A: This load forecast has lowered projections of electric vehicle sales, and there are many reasons why vehicle sales could decline (all vehicles). We have access to anonymized ICBC data to assist with the load forecast, so the load forecast is anchored by accurate and recent information.

There has been an increase in EV sales, but it is starting from a low starting point, so when BC Hydro predicts it is a lower load forecast, it is not reflective of lower EV sales. At the very least, it follows legislated targets, and B.C. is currently exceeding these targets. So lower load is driven by structural changes that drive lower vehicle sales overall. Also, with COVID, cars are being driven less, so they are being charged less often.

Q: Comment. It is unlikely that the rate of adoption of EVs will progress incrementally over a prolonged period. I think it is far more likely that the adoption rate will be incremental until suddenly it is not (compare the adoption rate of smart phones, for example). After a certain point, various forces will suddenly accelerate the rate of transformation of the vehicle fleet, including the disappearance of infrastructure for a dwindling stock of internal combustion vehicles (who will use valuable urban land to operate gas stations when 60% of the market is EV, for instance?). When the tipping point will occur is uncertain, but the shape of the curve is likely to hit a fairly sharp inflexion point.

A: Thanks for this comment.

Climate Change Adaption
Presented by Magdalena Rucker, Stephanie Smith, Doug Robinson, and Jim Papadoulis (Slides 30-54)

Summary of Discussion

BC Hydro provided a summary of our research and analysis into the forecast impacts of climate change on our electricity demand, load profile, system capability, and transmission infrastructure. BC Hydro provided a summary of this research and presented associated anticipated impacts on our long-term resource planning. TAC participants had questions about how climate change will impact summer peaking, such as a new load shape caused by increased cooling loads, and how BC Hydro plans to quantify the risks of climate change in this or future resource plans. BC Hydro clarified that this analysis will be used as a 'check' in this IRP analysis to ensure we are not missing something major and resulting actions will still be reasonable. Studies and analysis are ongoing and will be incorporated into long-term planning on a regular basis.

Q&A Notes

Q: What assumptions driving the climate scenarios you have used for your models?

A: We know that all of the scenarios perform well in the British Columbia context, and will take this comment as a signal to dig into the assumptions.

Q: What have we learned from this study in regard to increase in load due to air conditioner adoption?

A: This study suggests a change in customer end-use indeed, especially in summer. We do look at long-term shifts in demand for our regular forecasting processes, including upticks in cooling loads.

Q: Is there a slide that shows long-term temperature change for summer months?

A: Yes, we have that and can follow up for you.

Q: In terms of transmission infrastructure risk, how can we evaluate the value of distributed resources versus resources that are far away. Are there ways in this IRP that we can look at different portfolios of distributed energy resources (DER) in how they are resilient to different stress tests (for example – just musing – take a line out of service for a period). There was a comment that distributed technologies will be more resilient than a centralized delivery service.

A: Our next IRP will be able to incorporate some of the real data we are generating in terms of asset risks. For this IRP, we will take this away to consider and look at how it can be incorporated in the framework we have.

Q: To summarize the findings: there is nothing surprising here that suggests a change in course of the IRP – would you characterize that as correct?

A: In general, yes, we are treating these studies as a check – is climate change something that will surprise us in the IRP timeframe? Our assessment suggests we will not be surprised, and we will continue to update our plans as new information becomes available.

Tracking follow-up items

Previous Meetings

1. Can you provide information regarding how BC Hydro calculates load factor for EVs?

   Response: The EV peak model is a distinct simulation model that has several inputs including the total annual number of EVs, daily distance travelled, EV efficiency, power of the charging equipment in kW, and assumptions about location of charging and customer charging behavior. These inputs are used in the simulation model to determine an EV daily peak shape, which is used to estimate the EV impact on BC Hydro's system coincident peak demand.

2. How would BC Hydro ensure that it does not pay far more for energy delivered through solar net metering than the value of the energy at the time when it is delivered?

   Response: The Net Metering program is purposefully designed to enable customers to offset their own load, and energy generated at the premises of net-metering customers is primarily consumed on site rather than delivered to BC Hydro. While some energy generated is surplus to customer consumption and is delivered to the grid, the volume of that energy is small at the current time. BC Hydro will continue to monitor the Net Metering Program and is prepared to respond to significant growth in customer cross-subsidization.

3. As we start to electrify (e.g. space heating), does this increase the potential for DSM savings – for example, other peak load shifting opportunities?

   Response: Please see the response to item #9 as these items are connected.

4. What are the differences between the NAVIUS work and BC Hydro's results? The NAVIUS draft modeling shows possible doubling (100% increase) of electricity demand (see Table 1, in the report). However, slide 15 (Incremental Load Impacts of Electrification Scenarios) shows approximately 50% possible increase?

   Response: See the electrification information sheet. The NAVIUS results in Table 1 of the British Columbia Electrification Impacts Study includes both BC Hydro's load forecast and electrification impacts. BC Hydro's electrification scenarios (slide 15 from presentation slides for TAC Meeting #4 present the estimated incremental load impacts due to electrification activities over and above the load forecast. This is why the load starts at 0 GWh in 2020 and increases over time. Note: BC Hydro's load forecast includes projected electrification activities from announced policies, such as B.C.'s Zero-Emission Vehicles Act. See the electrification information sheet for additional details.

5. Can BC Hydro show (like the Conservation Potential Review) what percent of existing GHG emissions are reduced across the different emission sources?

   Response: Yes, the modelling identifies potential decrease in emissions across different industry sectors that make up the reductions necessary to achieve the provincial GHG targets. This result is based on a very simplistic assumption of an economy-wide carbon cap. Where the emissions ultimately come from in reality will depend upon the specific incentives and policies that various levels of government and other entities put in place to achieve the reductions. In response to this request, we are developing a table which shows the reductions across the different sectors and will provide it as an addendum when it is available. The table is expected to be available mid-May.

6. Is the pursuit of electrification load growth something that gets addressed in the IRP, similar to DSM?

   Response: This question was followed up with in Meeting #6 and is included in the electrification information sheet. Currently, BC Hydro is moving ahead on electrification activities that are short term and at a more granular scale. Building on the Comprehensive Review, the initial activities will consider:

   - Rate design to support electrification
   - Low carbon electrification programs
   - Tariff changes to make it easier for our customers to connect to the grid
   - Transmission and charging infrastructure

   BC Hydro is developing an engagement plan with respect to these activities that will be open to interested TAC members.

7. Will there be a geographic component to the assessment of distributed generation, i.e. will distributed generation be more valuable in some places?

   Response: Location-specific value of distributed generation is accounted for only in terms of the contribution to the bulk system i.e., distributed generation located within the Lower Mainland / Vancouver Island (LMVI) region can reduce overall system losses. However, any value from distributed generation due to the distribution system context is not accounted for in this IRP.

8. Can you provide the costs for resource options outlined on slide 11?

   Response: Resource options information, including costs was provided during TAC Meeting #3 (demand-side management options) and TAC Meeting #5 (generation supply options). Finalized energy costs and unit capacity costs will be summarized and be part of the June interim filing.

9. Explain if and how additional DSM opportunities associated with new electrification loads are considered.

   Response: When new electrification loads are being considered, we generally assume that they will be energy efficient. That said, there could be additional demand response opportunities to shift the new

electrification load away from peak times. The amount of peak shifting potential would depend on the type of electrification load being considered. We will continue to monitor the market and as the electrification load materializes, we will incorporate the demand response potential into our DSM activities.

10. Explain whether export opportunities are considered in the IRP?

    Response: The regulatory purpose of an IRP is to determine how we will meet domestic load. Building or acquiring for export is beyond the purview of this IRP. However, the value of trade is considered within our analysis in the following way. Electricity Market Price assumptions are used in modelling to reflect the economic value of any intra-year surplus (net export) or shortfall (net import) of energy. These values are an important input into the evaluation of any resource options because different resource options will lead to different amounts and timing of energy surplus or shortfall conditions.

11. What are the assumptions on rate structures being modeled (tiered or flat – if the latter, what's the timing assumed)?

    Response: The assumptions used do not include a specific default rate structure for any of the rate classes but rather consider price ratio between peak and off-peak periods which are intended to reduce consumption, leading to decreased system demand during peak periods.

On Peak to Off Peak Price Ratio Assumption by Rate Class	Time of Use	Critical Peak Pricing
Residential	2 to 1	10 to 1
Commercial	3 to 1	10 to 1
Industrial	3 to 1	10 to 1

12. How do we know the carbon content of the energy we are importing?

    Response: Emissions associated with electricity imports into B.C. are reported as part of the Industrial Facility Greenhouse Gas Emissions as per the British Columbia's *Greenhouse Gas Industrial Reporting Control Act* (GGIRCA). Electricity importers report emissions associated with electricity imports under GGIRCA Reporting Regulation Schedule D, "Electricity Import Operation Methodologies". This approach includes both the calculation of direct emissions associated with electricity imported from a specified source as measured at the first point of delivery into B.C., as well as a calculation of emissions from unspecified sources (an import where the importer does not know the ultimate generation source of electricity purchased). For imports from unspecified sources, the regulation prescribes multiplying the quantity of the unspecified import by the Western Climate Initiative (WCI) standard default emission factor corresponding to the balancing authority area from which the unspecified import is sourced.

Annual summary information of emissions associated with each importer is publicly reported at: https://www2.gov.bc.ca/gov/content/environment/climate-change/data/industrial-facility-ghg.

13. Can you provide more information about how this IRP will reflect recent green initiatives (carbon tax announcement) by the Government of Canada?

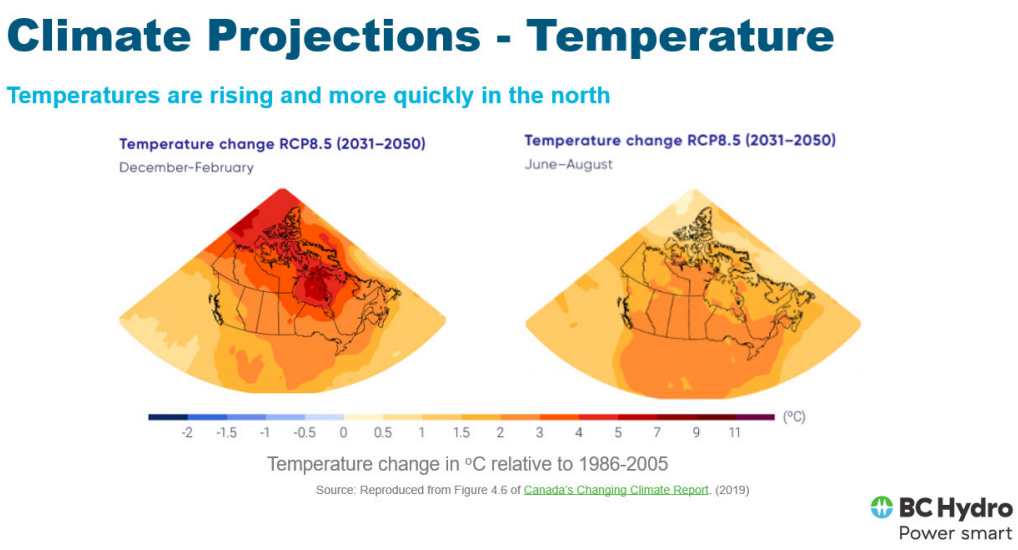
    Response: In February 2021, the federal government proposed to increase the carbon price to $170 per tonne by 2030. Details on implementation or interaction with provincial pricing systems have not yet been released. To the extent, a higher carbon price would drive increased electrification, the electrification scenarios in the IRP (intended to meet GHG targets) should capture the impacts.

    https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/climate-plan-overview/healthy-environment-healthy-economy/annex-pricing-carbon-pollution.html

Meeting #8

14. Is there a slide that shows long-term temperature change for summer months?

    Response: The slide below shows the change in summer temperature for the period 2031 to 2050.



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