

David Ince. Information Request Number 4

BC Hydro F2020 - F2021 Revenue Requirements Application

Topic: Load Resource Balance and IPP deliveries

Gjoshe Unredacted Information Request: 2.9.2

1. The response to Gjoshe 2.9.2 highlights that the highest period of IPP energy deliveries is during the freshet, and the lowest period being that of highest BC Hydro demand: the winter months. The RRA Evidentiary Update indicates that the expected pattern of deliveries (for F2021) has further shifted from the winter deliveries to the freshet. Please explain why the annual pattern of IPP deliveries are changing over time, and what can be done to mitigate this mismatch between IPP deliveries and seasonal BC Hydro customer demands.

Reference: Twenty-Year Load Forecast October 3, 2019 – Appendix D

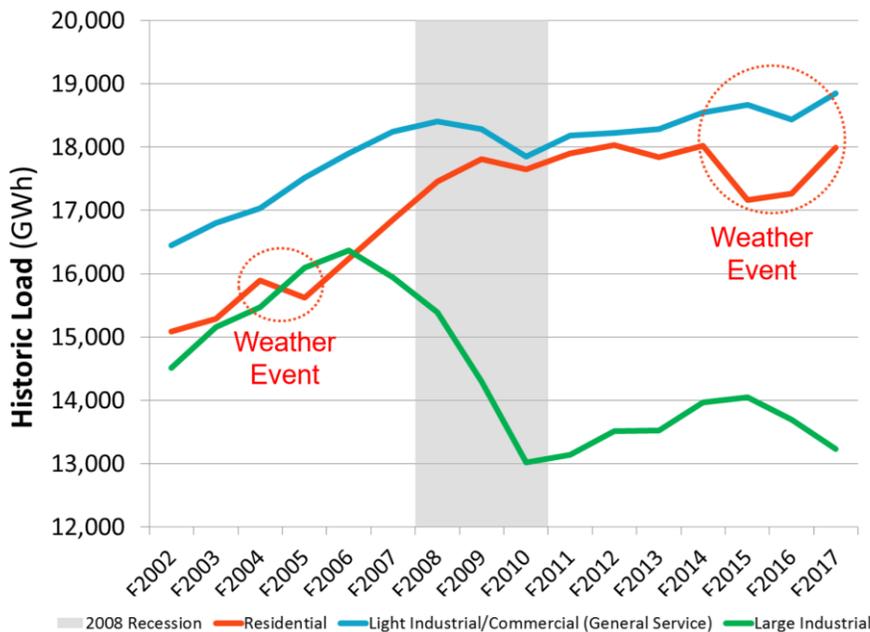
2. Tables D-1 to D-4 inclusive provide forecast energy and peak demand for the years F2021 forward. Please provide a version of each of these tables that includes 10 years of historical energy and peak actuals. At a minimum, please provide annual heritage energy production, IPP energy production, actual energy and peak demands, and the energy and peak Surplus/Deficit.
3. Please confirm that the length of the Forecast document is 35 pages, in contrast to the previously published BC Hydro long-term forecast which was in excess of 100 pages, and contained more methodological detail and sector-specific commentary. Is the 2019 Forecast document a summary of a more detailed document?

Reference:

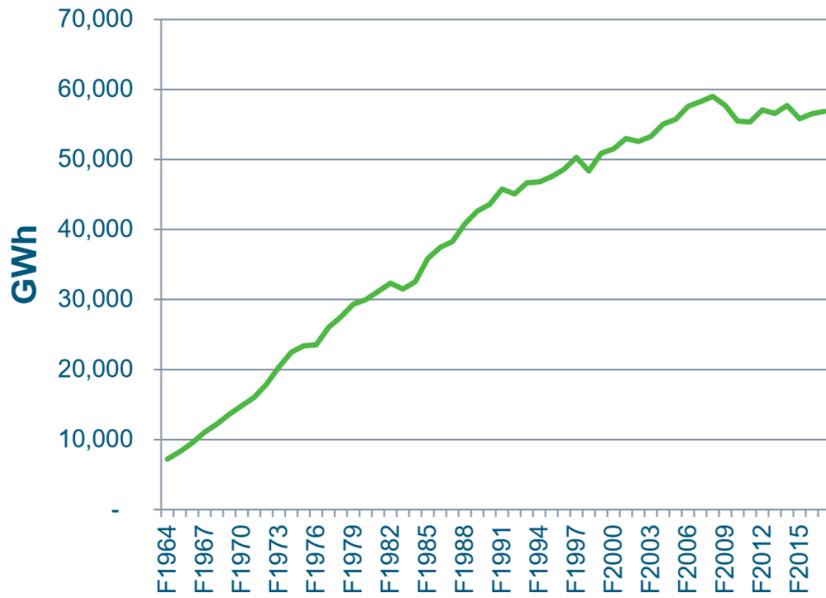
October 14, 2017 October 14, 2017 Technical Presentation to BCUC Panel on Site C – Load Forecast

Load Forecast context

Historic load (not weather adjusted)



4. Please update the above chart.



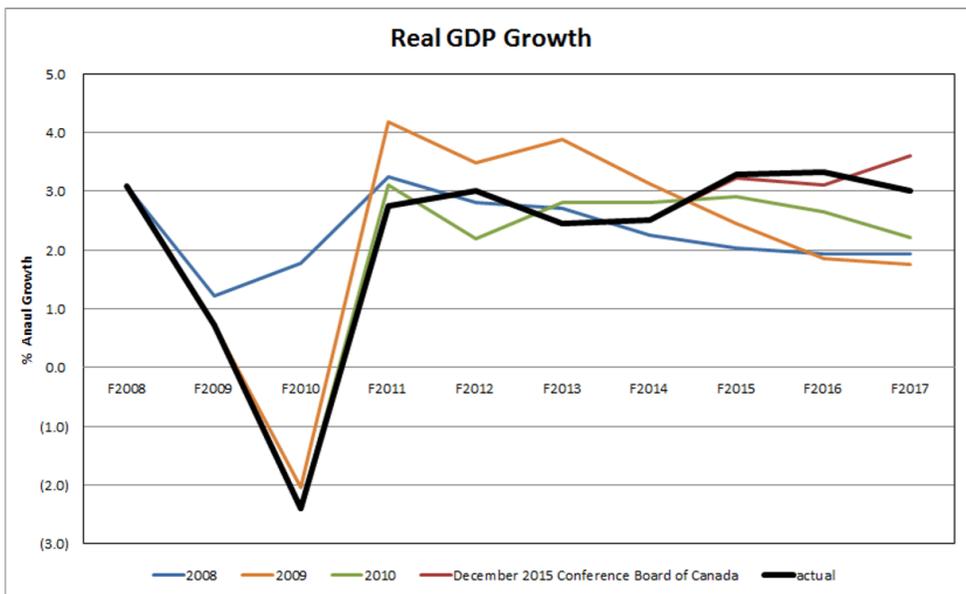
### Total Gross Requirements

5. Please update the above chart.

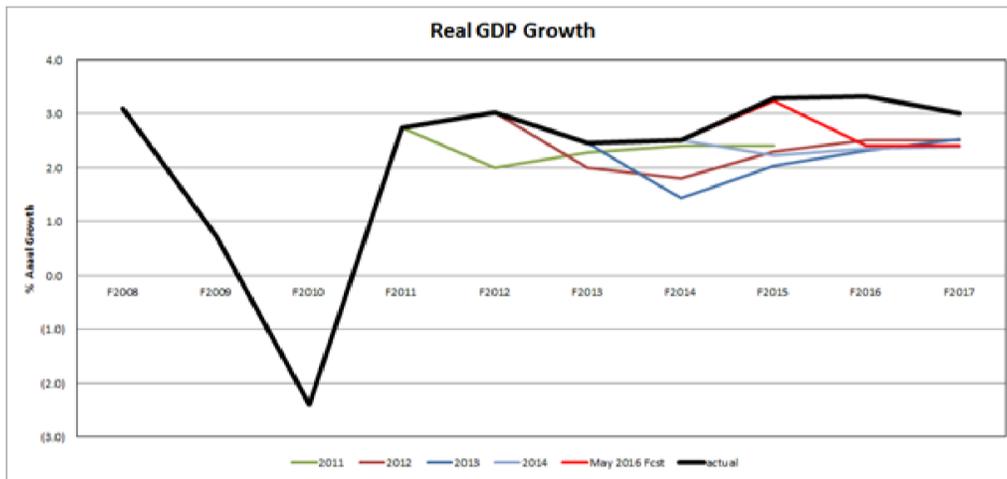
Reference: British Columbia Utilities Commission Information Request No. 2.18.4 Dated: September 20, 2017 British Columbia Hydro & Power Authority - Site C Inquiry – Load Forecast

Response issued October 3, 2017

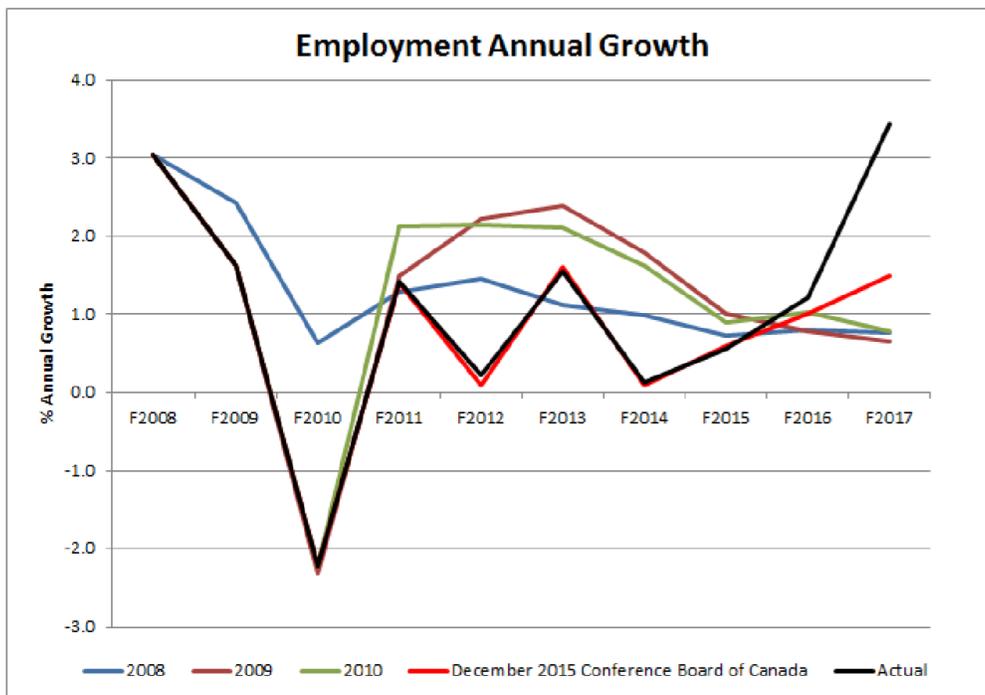
**Figure 1 BC Real GDP Growth Comparison: Actuals Compared Against the Ministry of Finance and CBoC Projections used in the 2008-2010 Load Forecast Vintages and the Conference Board of Canada's December 2015 BC Provincial Forecast**



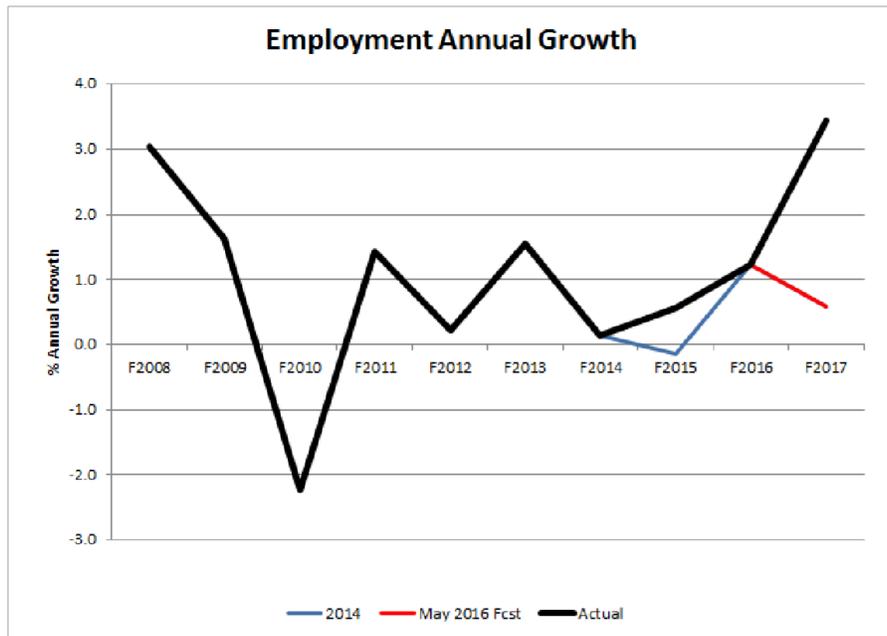
**Figure 2 BC Real GDP Growth Comparison: Actuals Compared against BC Ministry of Finance Projections used the 2011- May 2016 Load Forecast Vintages**



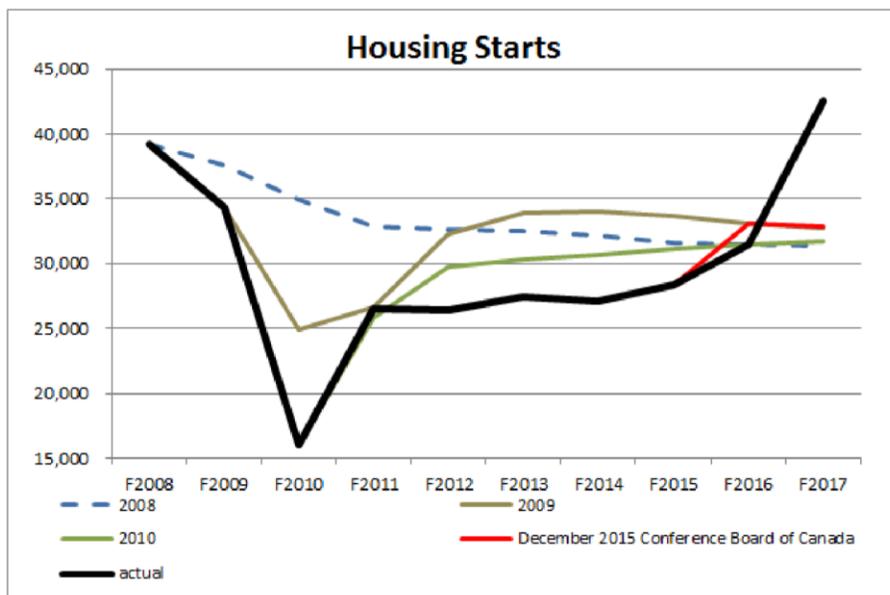
**Figure 3 Employment Growth Projection Comparison: Actuals Compared against and CBoC Projections used in the 2008-2010 Load Forecast Vintages and their December 2015 B.C. Provincial Forecast**



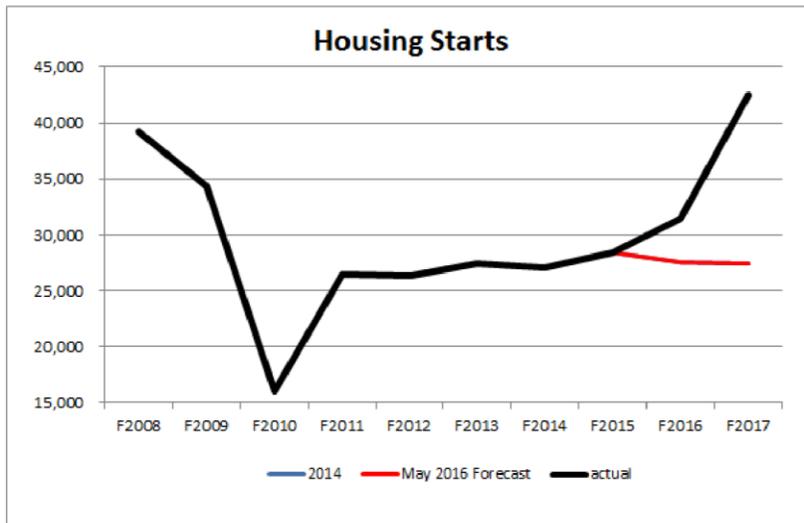
**Figure 4** Employment Growth Projection Comparison: Actuals Compared against Robert Fairholm Economic Consulting Projections used in the 2014 and May 2016 Load Forecast Vintages



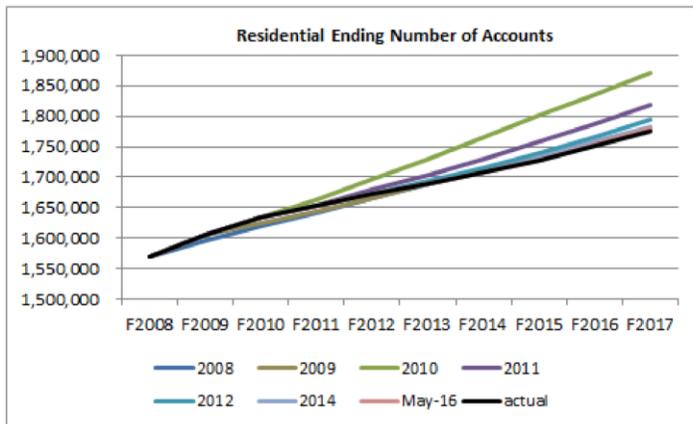
**Figure 5** Housing Starts Projection Comparison: Actuals Compared against CBoC Projections used in the 2008-2010 Load Forecast Vintages and their 2015 B.C. Provincial Forecast



**Figure 6 Housing Starts Projection Comparison: Actuals Compared against Robert Fairholm Economic Consultant Projections used in the 2014 and May 2016 Load Forecast Vintages**



**Figure 7 Residential Account Forecast: Comparison of Actuals against BC Hydro Forecasts**

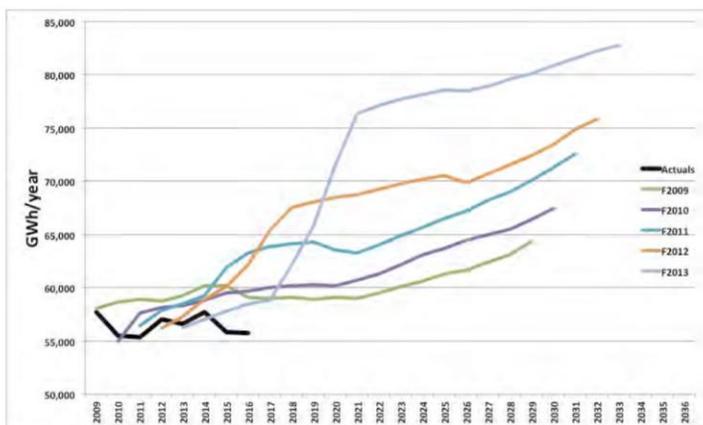


6. Please update the above Figures 1-7 inclusive to include recent actuals and to include the forecast (20 year) econometric assumptions built into BC Hydro's current load forecast.

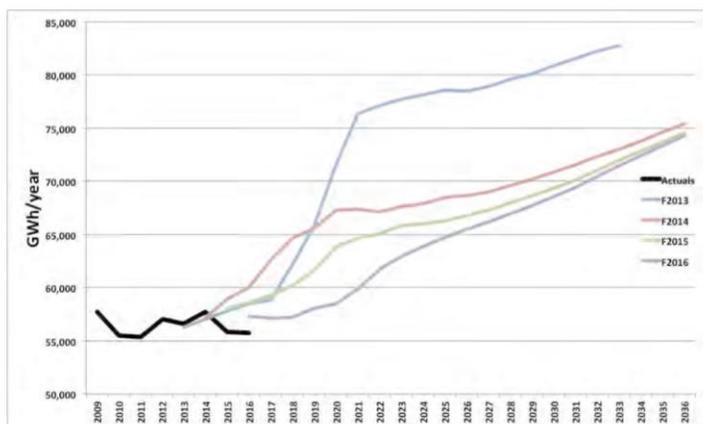
**Reference: Site C Inquiry- Submissions of Prophet River First Nation and West Moberly First Nations Dated August 30, 2017 – Load Forecast**

Figure 5: BC Hydro forecasts of total gross requirements after DSM

a) F2009 to F2013



b) F2013 to F2016



7. Please provide equivalent charts that includes BC Hydro’s published long-term load forecasts for the last 10 years, and the most recent load forecast – specific to integrated system total gross requirements after DSM.
8. Please provide equivalent charts for integrated system peak demand - including reserves after DSM.

**Topic: Electric Vehicles**

**Reference: Section 3.1.2: Twenty-Year Load Forecast October 3, 2019**

“The June 2019 Load Forecast uses a new methodology for EVs, to align with the CleanBC Plan for light duty electric vehicles. Specifically, the Zero-Emission Vehicles Act (ZEV Act) was enacted on May 30, 2019. The ZEV Act stipulates the percentage of new light duty car and truck sales in B.C. that must be zero emission vehicles, as follows: 10 per cent of sales by 2025; 30 per cent of sales by 2030; and 100 per cent of sales by 2040.

Accordingly, the low EV forecast in the June 2019 Load Forecast is based on these requirements and the associated incentives because, at a minimum, EV sales would be expected to reach the levels required by legislation. The high-EV scenario assumes EV models are more available, the purchase cost declines, consumers’ preferences change, and more infrastructure becomes available. In other words, the high EV forecast assumes that the natural uptake of EVs is greater than the requirements set out in the ZEV Act, resulting in a higher total EV forecast. Due to the significant level of uncertainty when developing a long-term EV forecast, BC Hydro developed its mid-EV forecast by taking the average between the high and low EV forecasts.”

9. Please provide the Electric Vehicle assumptions in Zero Emission Vehicles Act (ZEV) which forms the basis of BC Hydro’s updated Electric Vehicle forecast. Specifically please provide the following:
  - a. The forecast of assumed work intensity for electric vehicles as expressed as kWh/km driven for each of the vehicle types in the EV model. Directionally, please indicate how this is expected to change in the future;
  - b. A distribution of BC driving distances assumed in the forecast model;

- c. Provide the assumed minimum economic threshold distance driven per year, below which customers are assumed not to purchase an EV;
  - d. Provide assumed vehicle availability constraints, due to manufacturing or distribution constraints, expressed as the maximum number of EVs that can be delivered to the BC market, regardless of customer demand or economic viability. Provide background support as to the reason for this assumed constraint;
  - e. Provide the electricity price forecast used in the electric vehicle model;
  - f. Provide assumptions with respect to potential discounting of electricity rates for electric vehicle charging. This could include Time of Use or Off-Peak price discounts;
  - g. Provide the gasoline price forecast used in the electric vehicle model.
  - h. Provide the initial purchase price assumptions for electricity and gasoline vehicles.
  - i. Please provide a description of the class of proxy vehicle(s) assumed in the model;
  - j. Provide the assumed threshold in the model, in terms of maximum vehicle range expressed as daily and yearly travel distance;
  - k. Provide the conversion efficiency assumed for electric vehicles and associated charging hardware, as the ratio of electrical energy delivered to the vehicle wheels divided by metered electricity;
  - l. Provide assumptions with respect to purchase price rebates or incentives from the provincial or federal government. These rebates could take the form of lowering the purchase price of EVs, or lowering the installation cost of charging infrastructure or both;
  - m. Provide assumptions into the EV peak load forecast as to the breakdown between EV customers who have 110V vs. 220v vs. faster charging options;
  - n. Provide assumptions with respect to the installed cost of EV charging hardware for an average installation, by charging level;
  - o. Provide assumptions with respect to the charging profile (by time of day) for each charging level above. That is, kW by hour for an average customer;
  - p. Provide a generic charging profile used in the peak load forecast, that shows current (kW) from time zero (initial connection of EV charger) until full charge is achieved, by each charging level;
  - q. Please provide coincidence assumptions in the EV peak forecast. That is, what percent of vehicles are assumed to be charging per hour of the day, and what is the aggregate charging profile (MW of EV demand with hourly resolution) during the system peak day; and
  - r. Please provide specifics on the incentives or programs (rate, capital cost or technology) that BC Hydro is undertaking in order to minimize potential negative local and system effects of on-peak period EV charging.
10. Is BC Hydro contemplating Time of Use rates to encourage the off-peak charging of EVs? If not, why not?
  11. Is BC Hydro contemplating an electric vehicle-specific rates to optimize the pattern of EV charging? If not, why not?

**Topic: Oil and Gas Load Forecast**

**Reference: Appendix C: Twenty Year Load Forecast October 3, 2019 - Figure C-1. South Peace assumptions.**

12. Please comment on the continuing delays in realizing South Peace electrification loads, as evidenced in the most recent (June 2019) forecast relative to the previous forecast (December 2017), relative to the May 2016 Forecast and relative to the 2012 (IRP) forecast. Please indicate the drivers of these delays, including the business climate in the region and the province, environmental and First Nations issues, carbon taxes, challenges in getting pipelines constructed, the cost of electrification and low (oil and gas) commodity prices.
13. Please provide a modified version of Figure C-1 that provides the Mid-level load forecasts prepared in June, 2019 (current) and as well the abovementioned forecasts.

**British Columbia Hydro & Power Authority Fiscal 2017 – Fiscal 2019 Revenue Requirements Application**

**Association of Major Power Customers of BC Information Request No. 2.7.5 Dated: December 16, 2016 British Columbia Hydro & Power Authority Response issued January 23, 2017**

14. Please indicate the assumption(s) used by BC Hydro with respect to initial gas well productivities.

15. Please confirm that improved hydraulic fracturing technologies may improve initial well productivities above the current assumptions.

**British Columbia Hydro & Power Authority Fiscal 2017 – Fiscal 2019 Revenue Requirements Application**

**Association of Major Power Customers of BC Information Request No. 2.7.6 Dated: December 16, 2016 British Columbia Hydro & Power Authority Response issued January 23, 2017**

In its response to this question on the field servicing of natural gas industry hydraulic fracturing loads, BC Hydro responded that it: "...expects that we will be investigating potential opportunities for providing such service as part of our broader low-carbon electrification efforts."

16. Please provide an update on this progress, and how this initiative is supported within the CleanBC policy framework.

**Reference Twenty Year Load Forecast October 3, 2019**

17. Please comment on the effect of the Oct. 24, 2019 Declaration on the Rights of Indigenous Peoples Act introduced in the BC Legislature in terms of its effect on the industrial sector load forecast, specifically whether this Act constitutes a 'veto' on all future public and private sector resource projects, including BC Hydro capital projects.

**Reference: British Columbia Hydro & Power Authority Fiscal 2017 – Fiscal 2019 Revenue Requirements Application Commercial Energy Consumers Association of British Columbia Information Request No. 2.130 Dated: December 16, 2016 British Columbia Hydro & Power Authority Response issued January 23, 2017**

18. In the response to this request, BC Hydro indicated that it has not adjusted its then current (2016) load forecast to reflect the City of Vancouver's Renewable City Strategy, or the Province's Climate Leadership Plan. Please comment if adjustments have been made to the current load forecast to incorporate these strategies.
19. As indicated in BC Hydro's response to CEC IR 2.130.2, BC Hydro was not aware of any other local governments that have adopted policies beyond the City of Vancouver and the City of Victoria with respect to reduction of natural gas or other policies that could influence the electricity load requirements. Please comment if this statement is still true, and whether BC Hydro has incorporated the effects of policy statements of BC municipalities in its current load forecast.
20. Since the beginning of 2019, the municipalities of Burnaby, Vancouver, Richmond, New Westminster, Port Moody, West Vancouver and both the city and district of North Vancouver have declared climate emergencies. Please comment on how these actions have influenced BC Hydro's long-term load forecast.

**Reference: Twenty-Year Load Forecast October 3, 2019 Section 1.1. Peak load forecast**

21. Please provide the most recent monthly-resolution forecast of DSM Savings for both in energy and peak. Please calculate the monthly capacity factor of the savings.
22. Please provide historical monthly-resolution DSM Savings, if possible for the last 5 years, and broken down to the major DSM categories including Rates, Codes & Standards, programs, etc.
23. Please refer to the spreadsheet attached, which is a reconstruction of the Twenty-Year Load Forecast: Tables D-1 to D-4 inclusive. Please confirm a calculated forecast load factor of approximately 65% over the near term of the Forecast. Why does this load factor decrease somewhat over the forecast horizon? Please comment on why this should not degrade (decrease) more with influx of significant on-peak electrification loads such as residential space heating and EVs.
24. Please note that the calculated load factor after DSM is somewhat worse (lower) than as calculated before-DSM. Does this imply that BC Hydro's DSM programs are primarily focused on energy savings, whereas BC Hydro's provided load-resource balance indicates that new capacity is the more immediate need?
25. Within the attached spreadsheet, please check and comment on the calculated capacity factors of IPP generation and IPP renewals (rows 123 and 125). The high numbers imply that the seasonal energy production

from these resources is a mismatch to BC Hydro's load shape – i.e. cumulatively that IPP deliveries are energy rich and capacity poor.

**Reference: Twenty-Year Load Forecast October 3, 2019: Table 1**

26. Please confirm that the econometric forecast(s) used in the current Residential and Commercial customer sector forecasts was not updated from the October, 2018 Forecast.

**Reference: Twenty-Year Load Forecast October 3, 2019: Section 3.3 Light Industrial**

27. Please confirm that the GDP forecast was updated for the Light Industrial forecast. Please provide a table comparing the econometric inputs in the Evidentiary Update (BC Ministry of Finance September 2018 Q1 Report for fiscal 2019 to fiscal 2023), to the new October 3<sup>rd</sup> Forecast (BC Ministry of Finance February 2019 Budget for fiscal 2019 to fiscal 2023). Please provide GDP, exchange (\$US/Cdn) and interest rate projections from both forecasts.

**Reference: Twenty-Year Load Forecast October 3, 2019: Section 3.3.1: Codes and Standards: DSM-Load Forecast Overlaps**

28. Please provide the 2019 Navigant Report on DSM-Load Forecast overlaps.
29. Please confirm the reason for an upwards adjustment to the Evidentiary Update load forecast is that DSM savings formerly attributed by BC Hydro were already embedded in the base load forecast – before DSM savings.
30. Please provide a high-level summary of the categories of end-use overlaps identified in the Navigant Report.

**Reference: British Columbia Utilities Commission Information Request No. 3.296.3 Dated: September 19, 2019 British Columbia Hydro & Power Authority Response issued October 10, 2019**

31. Please confirm that in Scenario H, as proposed in David Ince Information Request: 3.2, the forecast cumulative Five-Year Net Bill Impact is 4.4%, which is lower than the 6.2% cumulative rate impact proposed by BC Hydro.
32. Please provide the rate impact (annual \$/year) of adopting the BC Hydro cumulative rate proposal of 6.2% versus the 4.4% that would result from adopting Ince Scenario H.
33. Please provide the rate-induced elasticity effect of these two rate trajectories, in terms of energy and peak.
34. Please confirm that Scenario H produces the lowest cumulative five-year rate impact of all 14 of the scenarios investigated and summarized in the response to BCUC 3.296.3.

**Reference: Response to Ince Information Request 3.10.**

35. Please explain an almost 10% negative variance in July and August F2020 sales in the Large Industrial category relative to the Evidentiary Update load forecast. In BC Hydro's response to Ince Information Request 3.10, BC Hydro indicated that it was too early to establish a variance trend. Is a trend clearer now with September actuals?
36. Please provide September variances in a format similar to BC Hydro's response to Ince IR 3.10.

**Reference: Response to BCUC IR 3.288.1**

37. With respect to the declining use per residential account, what are the following assumptions made in the load forecast:
- People per residential account,
  - Breakdown (absolute numbers) of the residential housing fleet served by BC Hydro by housing type: including single family, duplex, townhome, condominiums and apartments.
  - The average yearly electricity usage (kWh) for each housing type.
  - The penetration of (primary) electric space heating for each housing type (percent).
  - The assumed average yearly electricity use (kWh/yr) for those residences with primary electric space heating – by housing type.

- f. The penetration of (primary) electric water heating for each housing type (percent).
- g. The assumed average yearly electricity use (kWh/yr) for those residences with primary electric water heating – by housing type.
- h. The forecast peak coincident demand for each housing type. That is, what is the kW per residence during the forecast BC Hydro system peak hour. By housing type please.

**Reference: Reference: 20 Year Load Forecast section 3.1.1**

- 38. Please confirm that BC Hydro's electricity conservation (DSM) forecast is essentially a (negative) load forecast.
- 39. Please confirm that BC Hydro has been making adjustments to its load forecast for a number of years due to overlaps between its forecast of DSM savings, and its forecast of electricity demand growth - without DSM.
- 40. Please quantify the absolute magnitude of the DSM-related adjustments made to BC Hydro's load forecast in the 2016 and current 20-year load forecasts. In MWh and MW.
- 41. Please confirm the need for close integration between the processes and approaches in preparing each of the load forecasts, to ensure that there is minimal double counting or undercounting of future DSM savings.
- 42. Please confirm that the adjustments made to the load forecast over the last several forecast issuances has been to increase the forecast electricity demand in the net forecast due to over-counting of DSM savings that would have naturally occurred (natural conservation).
- 43. Please provide examples of trends in natural conservation, particularly historical use rates for lighting, home electronics (televisions), home computers, home entertainment/gaming systems and electric space and water heating.
- 44. Please comment on the domestic trends in building shell efficiencies, particularly due to changing insulation standards.
- 45. Please provide examples of offsetting trends – in terms of increased electricity use due to either new end-uses, or end-uses with increased penetration in the household (such as the increasing numbers of electronic devices and chargers).
- 46. Please provide the 2019 Navigant report on the overlap in codes and standards savings.
- 47. As per the Navigant report, please provide a summary of the codes & standards categories that have been primarily responsible for BC Hydro's DSM double-counting.
- 48. Please comment on the internal forecasting processes in place to ensure that DSM over-counting is minimized.

**Reference: Reference: 20 Year Load Forecast Section 1.3 Distribution Peak methodology**

- 49. Please provide the peak load coincidence factors for the provincial geographical sub regions.
- 50. Please confirm that the coincident peak load for each of the provincial sub-regions occurs in December or January at approximately 6pm. Do any of the regions of the province peak during the morning?
- 51. Please provide the obligations of BC Hydro for servicing FortisBC Electric peak loads – in terms of seasonal obligations and magnitude (MW). Please comment on the advance notice required of and/or provided by FortisBC such that BC Hydro can plan for and then dispatch required peak-period electricity.
- 52. Are negotiations underway to increase the maximum peak allocation provided by BC Hydro to FortisBC Electric consistent with population and load growth in the BC Southern interior?