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January 15, 2021

Ms. Marija Tresoglavic
Acting Commission Secretary and Manager
Regulatory Support
British Columbia Utilities Commission
Suite 410, 900 Howe Street
Vancouver, BC V6Z 2N3

Dear Ms. Tresoglavic:

RE: Project No. 1599117
British Columbia Utilities Commission (BCUC or Commission)
British Columbia Hydro and Power Authority (BC Hydro)
Long-Term Resource Plan Filing Date

In accordance with the commitment in our supplementary submission in response to BCUC Order No. G-260-20, BC Hydro writes to provide an interim filing of BC Hydro's current planning context.

For further information, please contact Chris Sandve at 604-974-4641 or by email at bchydroregulatorygroup@bchydro.com.

Yours sincerely,

Fred James
Chief Regulatory Officer

cs/rh

Enclosure

BC Hydro
Power smart

BC Hydro Long-Term Resource Plan Filing Date

Planning Context Information

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1 Current Planning Context Information

This filing provides a summary of the default inputs that BC Hydro is using to conduct consultation on the 2021 Integrated Resource Plan (**IRP**). This information is provided in the sections below, as follows:

- Section 1.1 – Load Forecast and scenarios;
- Section 1.2 – Existing and Committed Resources;
- Section 1.3 – Load Resource Balances (**LRBs**); and
- Section 1.4 – Assumptions for evaluating resource options.

1.1 Load Forecast and scenarios

BC Hydro's Executive Team approved the March 2020 Load Forecast on March 17, 2020. In the days surrounding that approval, the World Health Organization declared a global pandemic for COVID-19, and the province of British Columbia entered into various public health restrictions. Overall energy consumption decreased and consumption patterns for all customer sectors shifted as a result of the pandemic.

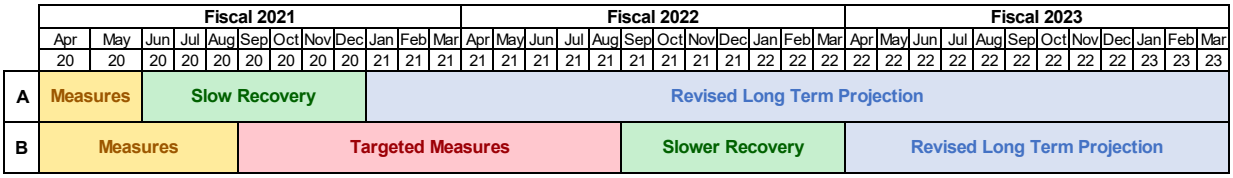
In response, BC Hydro created two scenarios (Scenario A and Scenario B) to inform decision-making during this time. The pandemic was in its early stages during the development of these scenarios, so BC Hydro used a wide range of information to assess the potential impacts. This included online research of news articles and third-party reports, attending webinars, consulting with load forecast departments of utilities in other Canadian provinces, using smart meter infrastructure (**SMI**) and billing data to observe actual trends, and communicating directly with our large industrial customers to understand potential impacts. The resulting scenarios fell within the broader bookends of predictions by third-party experts at the time.

The LRBs in section 1.3 below are based on the March 2020 Load Forecast, adjusted by Scenario B to account for the potential impact of the COVID-19 pandemic. Further information on Scenarios A and B are provided below.

COVID Scenarios

The timeline of assumptions regarding public health measures and recovery for the scenarios is shown in Figure 1 below.

Figure 1 Timeline and Key Assumptions for COVID 19 Scenarios A and B



Key assumptions under Scenario A included:

- Three months of closure of non-essential businesses (March to May);
- Gradual return within fiscal 2021 to pre-pandemic conditions for the residential and commercial sectors;
- B.C. GDP projections were based on the BC Business Council's March 27 Scenario 1 (2020/fiscal 2021: minus 7.3 per cent, 2021/fiscal 2022: plus 2 per cent, 2022/fiscal 2023: plus 2 per cent) for the light industrial sector;
- Permanent closure of one forestry mill and some delays for other customer start-ups or expansions in the large industrial sector; and
- A global recession either imminent or already underway.

Key Assumptions under Scenario B included:

- Six months of closure of non-essential businesses (March to August);
- Twelve months of targeted closures to accommodate a potential second wave;

- Following the targeted measures phase, residential use per account was assumed to return to March 2020 Load Forecast levels while the number of residential accounts was assumed to be 90 per cent of the accounts in the March 2020 Load Forecast;
- Following the targeted measures phase, commercial load was assumed to return to 95 per cent of the amounts in the March 2020 Load Forecast;
- BC GDP projections were based on the BC Business Council's March 27 Scenario 2 (2020/fiscal 21: minus 11.4 per cent, 2021/fiscal 2022: plus 1 per cent, 2022/fiscal 23: plus 1 per cent) for the light industrial sector;
- Curtailments and closures due to health measures and poor market conditions with the same permanent closure of one forestry mill and some delays for other customer start-ups or expansions in the large industrial sector; and
- Deeper North American and global recessions with impacts beyond anything BC has seen in 70 years.

These scenarios were meant to represent two of the many possible outcomes of the pandemic based on the best information available when they were developed in April 2020. The pandemic remains fluid. As of November 2020, while the widespread closures of non-essential businesses have been relaxed, many businesses have not reopened or returned to their pre-pandemic capacity. Many people continue to work or study from home, and travel and tourism remains depressed. In addition, the forestry and oil and gas sub-sectors face ongoing market challenges which impact their electricity consumption.

Uncertainty Bands

Load forecasts are sensitive to many input variables, which have varying degrees of uncertainty associated with them. These uncertainties influence the risk that future loads will be lower or higher than forecast. They can exist at a customer-specific

level up through to sector-wide or economy-wide levels. To account for these uncertainties, BC Hydro develops low and high uncertainty bands around each reference forecast to capture a range of potential outcomes. High and low bands were developed for the March 2020 Load Forecast and are reflected in the LRBs provided in section 1.3 below.

Electrification Scenarios

Electrification is a term used to refer to switching from the use of fossil fuels to the use of electricity from clean energy sources. This reduces greenhouse gas (**GHG**) emissions. The Government of B.C.'s CleanBC Plan established GHG reduction goals for 2030 and includes actions to achieve the first 75 per cent of these reductions, with additional actions to come for the remaining 25 per cent.

The March 2020 Load Forecast reference case includes electrification activities that have a higher level of probability of materializing and uses uncertainty bands to help plan for higher and lower electricity demand projections.

In addition to the reference case and uncertainty bands in the March 2020 Load Forecast, the IRP also considers distinct electrification scenarios. As the CleanBC plan outlines how the first 75 per cent of targeted GHG reductions will be achieved, these electrification scenarios consider the potential incremental demand for clean electricity associated with fully meeting the CleanBC GHG reduction targets.

Table 1 below specifies the electrification measures included in the March 2020 Load Forecast as well as three illustrative electrification scenarios. These scenarios were derived from a report by NAVIUS entitled *British Columbia Electrification Impacts Study: Forecasting the Impact of Achieving British Columbia's Greenhouse Gas Emissions Targets on Provincial Electricity Consumption*. This report estimates the total demand from electrification if provincial GHG reduction targets are achieved.

Table 1 Electrification assumptions by 2040 (GWh) by major sector

Transportation (electric vehicles)	Built environment (space and water heating)	Industry
Load Forecast – Reference case		
Light duty electric vehicles (**EV**) growth is informed by the targets established in the Zero Electric Vehicle mandate as well as economic cost comparisons against internal combustion engine (**ICE**) vehicles. Light duty EV load is projected to grow by about 5,300 GWh with more than half ramping up after 2030.	BC Hydro funded, and government funded Low Carbon Electrification (**LCE**) activities that incentivize customers to switch from fossil fuel-based energy to clean electricity. This does not include specific oil and gas electrification projects that are already included in Industry forecast. LCE load is assumed to reach approximately 150 GWh, of which a portion will include space and water heating. (i.e., low carbon electrification).	The Oil and Gas industrial sub-sector encompasses various activities, including shale gas (i.e., production /processing plants, conventional gas processing plants), oil (and condensate) pipelines, oil refineries and oil producers, natural gas pipelines, propane terminals, and liquified natural gas (**LNG**) terminals. Most of the electricity is used to drive compressors for production and pipeline transportation. Load growth is driven by both low carbon electrification, as well as economic growth. However, it is difficult to allocate load growth between the two main drivers. Oil and Gas subsector load is projected to grow about 2,500 GWh by 2040, with most of that growth occurring before 2030.
Load Forecast – High uncertainty band		
Assumes higher light duty EV sales relative to the reference case. Light duty EV load is projected to grow by about 7,000 GWh with more than half ramping up after 2030.	No change relative to the reference forecast.	Assumes higher oil and gas production and higher percentage of industrial load growth is electrified than the reference forecast. Oil and Gas subsector load is projected to grow about 5,600 GWh by 2040, with most of that growth occurring before 2030.
Scenario – Electrification – strong policies [incremental to the Reference load forecast]		
Medium and heavy-duty vehicle electrification adds about 700 GWh, depending on battery costs, with the majority deployed after 2030.	Additional ~4000 GWh of load primarily on the South Coast, with more than half showing up before 2030.	Additional ~3000 GWh from electrification of the Oil and Gas subsector.

Transportation (electric vehicles)	Built environment (space and water heating)	Industry
Scenario – North Coast LNG and Mining		
Not applicable.	Not applicable.	Assumes 100 per cent potential LNG and Mining customers electrify, for an estimated ~10,000 GWh, with most showing up before 2030.
Scenario – Electrification – strong policies with North Coast LNG and Mining		
This scenario is the GWh of the two previous scenarios added together.		

These three illustrative electrification scenarios are shown against system-wide LRBs in section 1.3 below.

1.2 Existing and Committed Resources

The LRBs in section 1.3 below include existing and committed resources only. Existing resources are resources and measures that are currently in place. Committed resources are those resources currently being advanced to meet BC Hydro's future load-serving obligations and have received authorization, if required, from the Board of Directors to proceed to implementation and/or have secured any required regulatory approvals.

The following existing resources are included in the LRBs in section 1.3 below:

- Existing BC Hydro generation facilities (except for Alouette, Elko, Spillimacheen and one unit at Shuswap, which are currently out of service);
- Electricity Purchase Agreements (**EPAs**) currently in commercial operation; and
- Forecasted savings from current codes and standards, current rate structures and approved DSM program expenditures up to, and including, fiscal 2021.

The following committed resources are included in the LRBs in section 1.3 below:

- Site C;
- Lake Buntzen Unit 1 generator replacement project;

- Future forecast codes and standards savings;
- Two biomass projects under the Biomass Energy Program, where 10-year renewal agreements are expected to be executed;
- Two Standing Offer Program (**SOP**) run-of-river projects with Indigenous Nations ownership/involvement excepted from the indefinite suspension of the SOP; and
- Five EPAs that include a seller's option to extend.

Including a resource as existing or committed does not prevent BC Hydro from deciding to decommission, terminate, or stop advancing that resource at some future date.

Planned resources are identified through the IRP process and are discussed further in section 1.4 below.

1.3 Load Resource Balances

LRBs show the difference between BC Hydro's load forecast and load forecast scenarios (refer to section 1.1 above) and the existing and committed resources (refer to section 1.2 above). The difference between them is used to determine the timing and volume of any additional resources required to meet customer demand. LRBs are developed for both energy and capacity so that both aspects of need are considered and met.

As the LRBs presented here are the starting point for the IRP analysis, they only include existing and committed resources. Planned resources are the additional resources identified in the IRP to meet customer demand.

The LRBs provided below are interim and will be updated in the draft 2021 IRP to be released for consultation so that they reflect BC Hydro's December 2020 Load Forecast and potentially, any other changes in assumptions.

Figure 2 provides BC Hydro's integrated system-wide energy LRB which shows a need for new energy resources starting in fiscal 2028.

Figure 2 Energy Load Resource Balance (Reference Case)

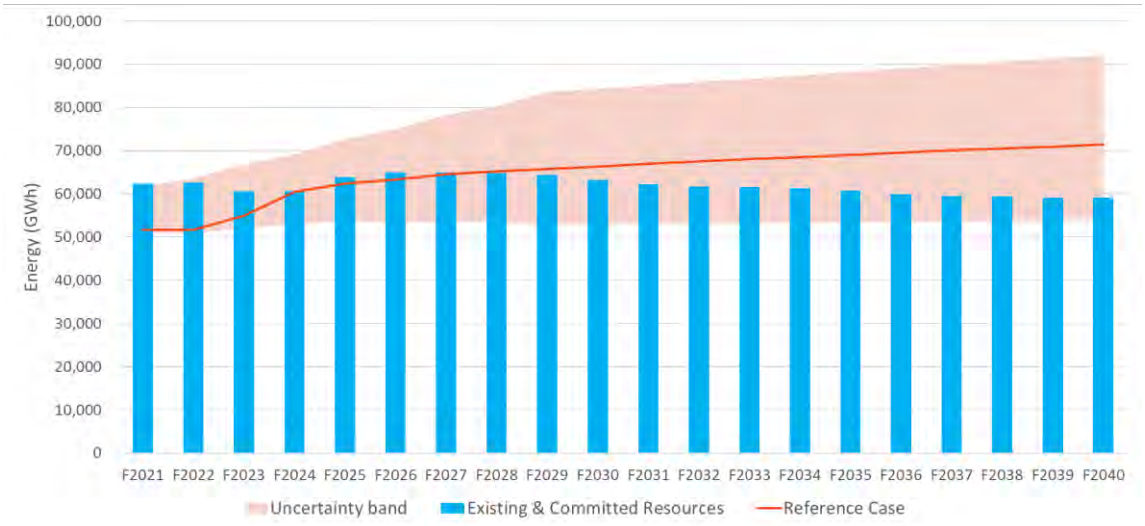
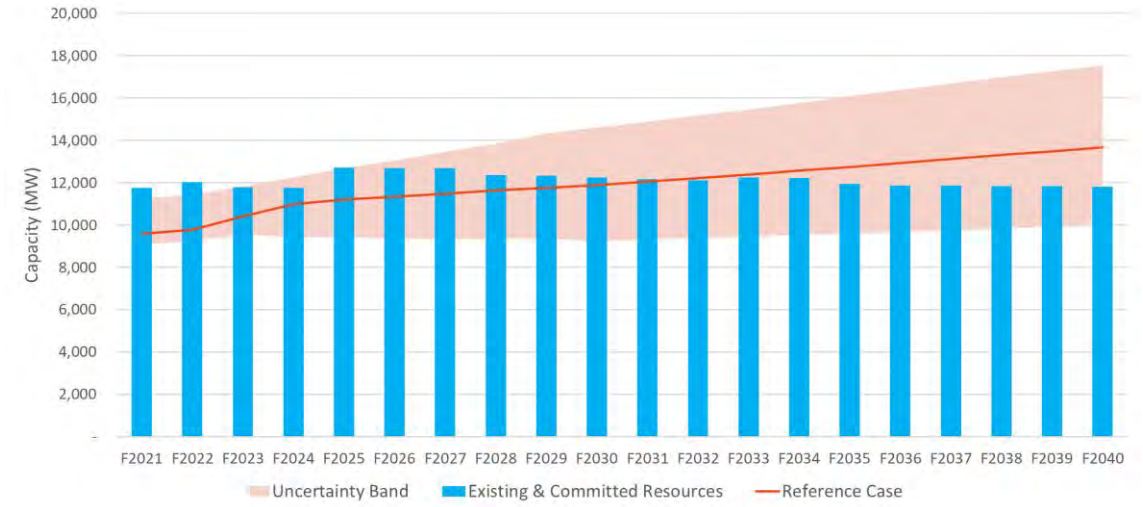


Figure 3 below provides BC Hydro's integrated system-wide capacity LRB and shows a need for new energy resources starting in fiscal 2032.

Figure 3 Capacity Load Resource Balance (Reference Case)



BC Hydro also produces regional capacity LRBs. The regional capacity LRBs include existing and committed resources in the region as well as existing transmission capability into the region. The regional LRBs provided below are based on a preliminary assessment of transmission capabilities which will be updated as the IRP is developed.

Figure 4 below provides the capacity LRB for the Lower Mainland/Vancouver Island region.

Figure 4 Capacity Load Resource Balance (Lower Mainland/Vancouver Island)

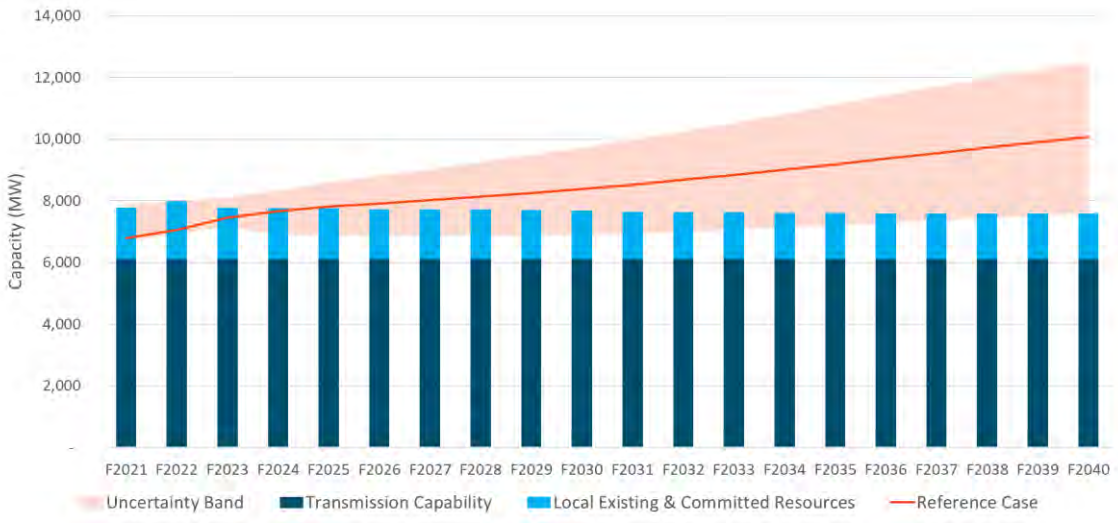


Figure 5 below provides the capacity LRB for the Vancouver Island sub-region.

Figure 5 Capacity Load Resource Balance (Vancouver Island)

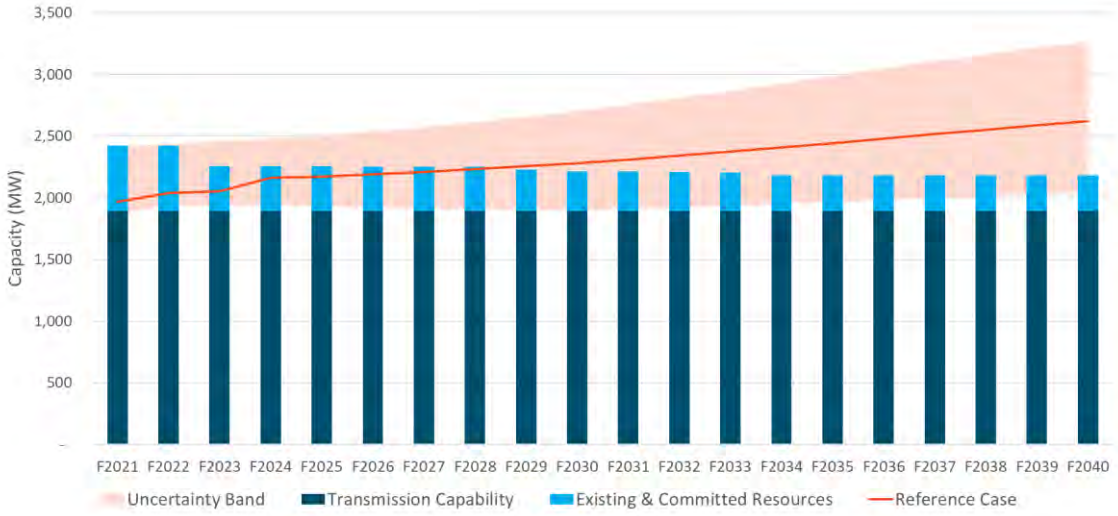


Figure 6 and Figure 7 below provide the capacity LRBs for the North Coast region (Prince George, Prince Rupert, Kitimat) and the Dawson Creek/Groundbirch region, respectively.

Figure 6 Capacity Load Resource Balance (North Coast)

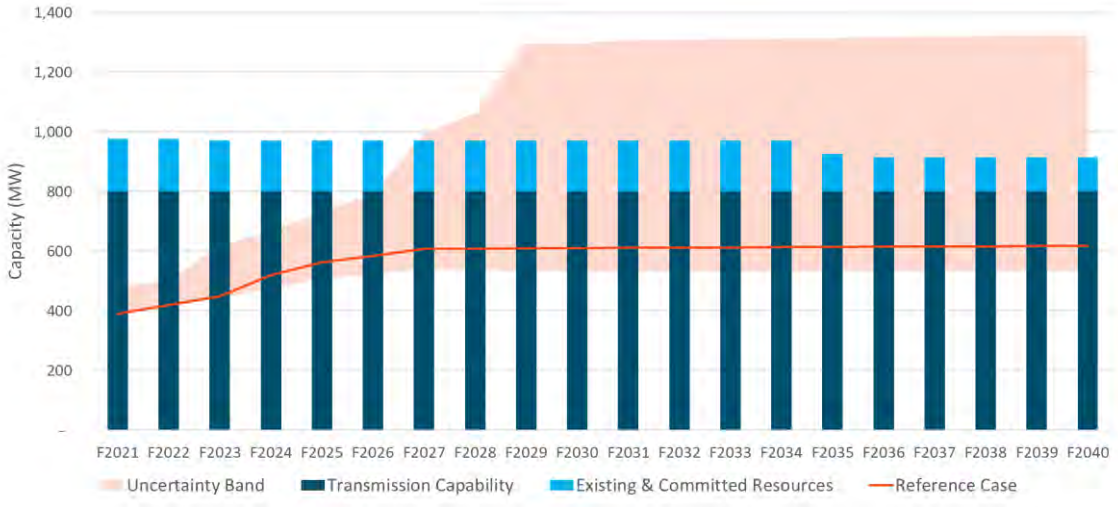


Figure 7 Capacity Load Resource Balance (Dawson Creek/Groundbirch)

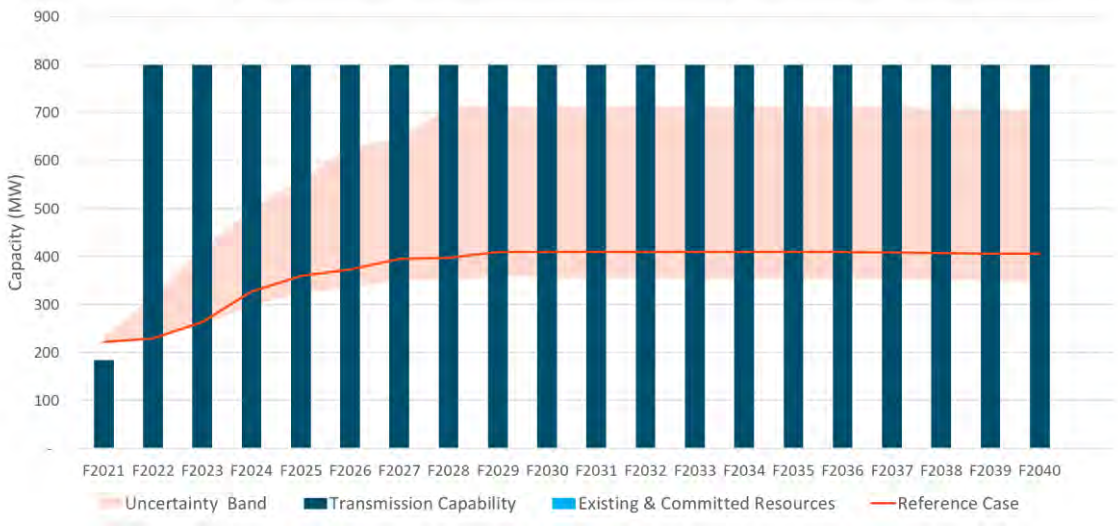


Figure 8 below provides BC Hydro's integrated system-wide energy LRB against the three illustrative electrification scenarios discussed in section 1.1 above.

Figure 8 Energy Load Resource Balance (Electrification Scenarios)

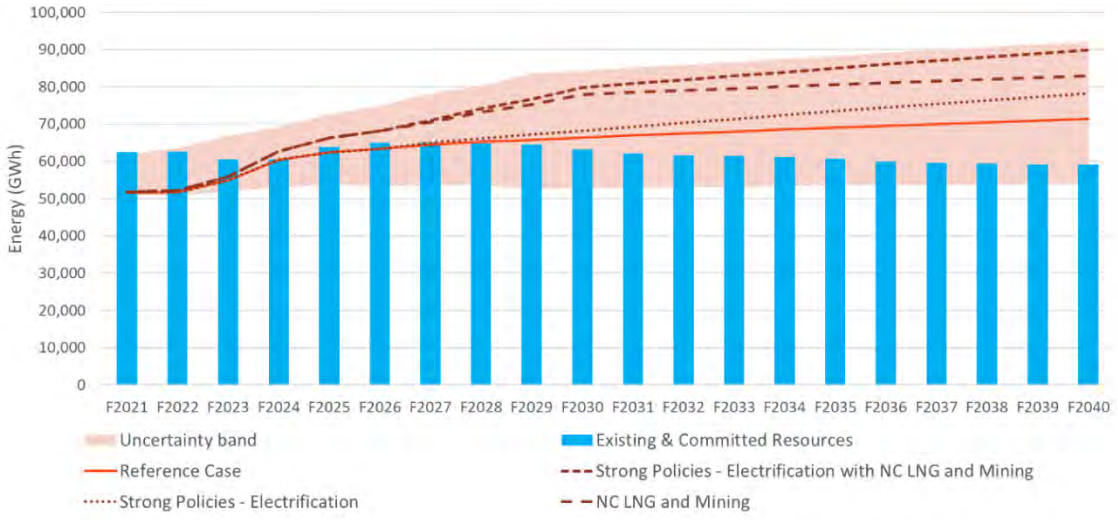
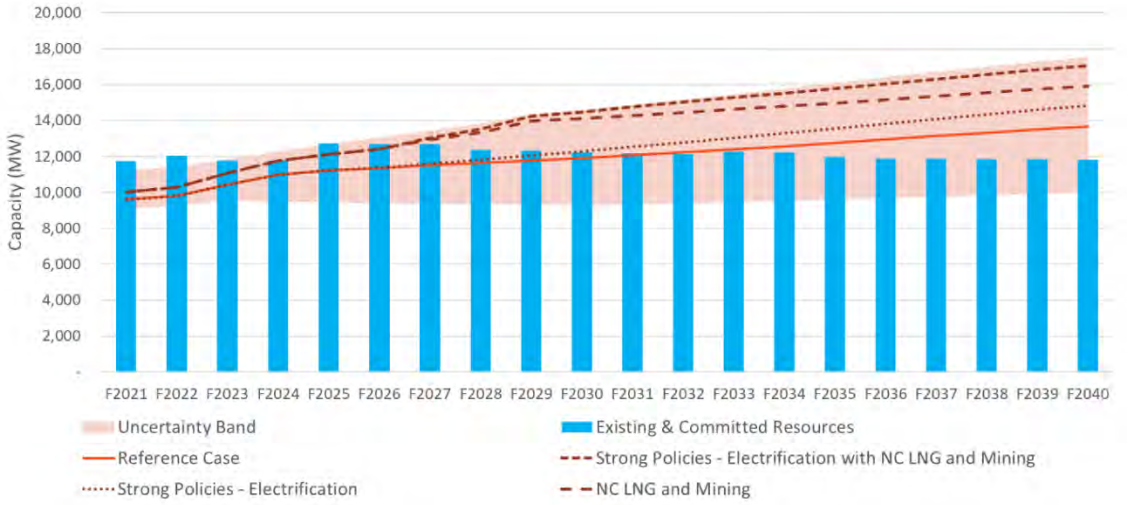


Figure 9 below provides BC Hydro's integrated system-wide capacity LRB against the three illustrative electrification scenarios discussed in section 1.1 above.

Figure 9 Energy Load Resource Balance (Electrification Scenarios)



1.4 Assumptions for evaluating resource options

As mentioned in section 1.2 above, planned resources are identified through the IRP process. This section provides the assumptions being used to evaluate various resource options in the 2021 IRP.

Electricity Market Price

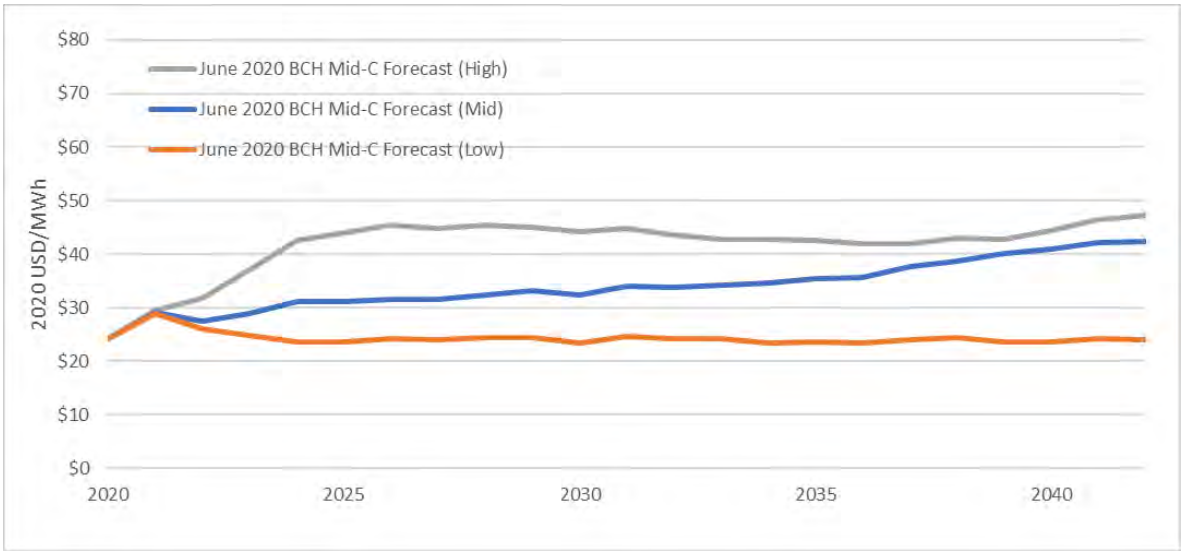
Electricity Market Price assumptions are used in modelling to reflect the economic value of any intra-year surplus or shortfall of energy. These values are an important input into the evaluation of any resource options because different resource options will lead to different amounts and timing of energy surplus or shortfall conditions.

BC Hydro's market price forecast is an estimate of day-ahead market electricity price at the Mid-Columbia (**Mid-C**) and Alberta trading hubs. The forecasts are based on the Hitachi ABB Power Grids (**ABB**) Power Reference Case forecast. ABB uses industry standard methods to prepare an integrated assessment of regional power, fuel, and emissions markets. They produce this assessment and associated power and gas price forecasts twice a year, and it is used by a number of utilities and independent power producers in North America, Europe and Japan for various

investment decisions and resource planning studies. The market price forecast reflects long-term average conditions and does not reflect short-term price volatility. High and low scenarios are used to reflect uncertainties related to the supply and price of natural gas and the associated generation resource buildout in the Western interconnect.

Figure 10 below illustrates BC Hydro's current market price forecast for average annual Mid-C price in 2020 US$/MWh including the low and high scenarios. This forecast will be updated in early 2021 and reflected in the 2021 IRP.

Figure 10 June 2020 Mid-C Price Forecast



Weighted Average Cost of Capital

Another important input into the evaluation of any resource options is the Weighted Average Cost of Capital (**WACC**), which in turn establishes the discount rate used to determine the present value of future costs and benefits. The WACC is determined by the cost of equity and debt associated with the financing of any resource option. For the 2021 IRP, BC Hydro is assuming that the cost of capital is the same regardless of whether a resource option is advanced by BC Hydro or by the private sector. Although BC Hydro does not have direct visibility into the financial

parameters of potential private sector developments, we have assumed that in general private sector developers have access to similar borrowing rates as BC Hydro.

The key inputs into BC Hydro's WACC are:

- A five-year forecast of 10-year borrowing rates from the Government of B.C.'s Treasury Board;
- Historical spread between 30-year and 10-year Province of B.C. debt;
- The BCUC's benchmark utility's post-tax Return on Equity of 8.75 per cent; and
- BC Hydro's target capital structure of 60 per cent debt and 40 per cent equity.

Based on these inputs, BC Hydro's WACC, and discount rate, is 5.04 per cent which rounds to 5.0 per cent.