2021 Integrated Resource Plan

Technical Advisory Committee Consultation Summary Report

December 2021

BC Hydro extends our appreciation for the valuable dialogue with Technical Advisory Committee members throughout the development of the 2021 Integrated Resource Plan. In addition to the stated mandate, the TAC provided a way to develop mutual understanding about planning topics before entering into the regulatory process. The TAC functioned through the onset of the global pandemic and ongoing policy evolution. We appreciate the efforts of all TAC members to adapt through these circumstances and continue to contribute to the Integrated Resource Plan's development process.

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BC Hydro 2021 Integrated Resource Plan Technical Advisory Committee

The 2021 Integrated Resource Plan (**2021 IRP**) Technical Advisory Committee (**TAC**) was established in February 2020 to provide ongoing, detailed, technical advice and feedback from a group of knowledgeable parties with experience relevant to BC Hydro's resource planning to support BC Hydro in developing a well-considered plan.

The TAC mandate was to provide their feedback on planning inputs, assumptions, and analysis to BC Hydro during the 2021 Integrated Resource Plan development, prior to the plan being filed with the British Columbia Utilities Commission. A draft Terms of Reference was circulated before the first meeting and finalized following a comment period. Attachment A provides the final IRP TAC Terms of Reference.

About TAC members

TAC members:

- Represent an organization or perspective that has a significant, province-wide, policy-focused interest and stake in the 2021 IRP.
- Have an interest and stake in the IRP that is broad as compared to having a focus on a specific topic within the 2021 IRP.
- They, as individuals, and the organization(s) they represent, have an in-depth understanding of BC Hydro's resource and electricity planning process, usually demonstrated by involvement in previous British Columbia Utilities Commission regulatory processes.
- Combined, they represent a diversity of perspectives to support the development of a robust plan.

Representatives from the following organizations were part of the TAC:

- Association of Major Power Consumers (AMPC)
- BC First Nations Energy and Mining Council (BCFNEMC)
- BC Sustainable Energy Association (BCSEA)
- Canadian Association of Petroleum Producers (CAPP)
- City of Vancouver

- Clean Energy Association of BC (CEBC)
- Climate Action Secretariat (CAS)
- Commercial Energy Consumers (CEC)
- FortisBC Electric
- FortisBC Gas
- Movement of United Professionals (MoveUP!)
- Pembina Institute
- Public Interest Advocacy Center (PIAC)
- University of Victoria -academic representative

BC Hydro representatives chaired and moderated the TAC sessions. Staff representatives from the Ministry of Energy, Mines and Low Carbon Innovation and the British Columbia Utilities Commission were invited to attend TAC meetings as observers.

The TAC met between March 2020 and October 2021

The TAC met eleven times during the development of the 2021 IRP. Given Public Health Orders in British Columbia, all but the first meeting was held virtually:

- **March 3, 2020 (Meeting #1):** primary topics included the overall workplan and IRP overview, policy and decision framework, electrification scenarios and gathering areas of interest from TAC member perspectives.

- **June 16 and 22, 2020 (Meeting #2a/b):** primary topic was a review of the March/April 2020 Load Forecast. This meeting was divided into two sessions during the transition to a virtual platform.

- **June 18 and 24, 2020 (Meeting #3a/b):** primary topic was a review of demand side resource options. This meeting was divided into two sessions during the transition to a virtual platform.

- **July 22, 2020 (Meeting #4):** primary topic was a review of electrification scenarios and linkages with the Electrification Plan.

- **July 29, 2020 (Meeting #5):** primary topics included an update on the IRP work plan, key IRP questions, IRP objectives and uncertainties, and a review of generation supply options.

- **November 26, 2020 (Meeting #6):** primary topics included a review of the load resource balances (system and regional), generation capacity planning, and the market price forecast.

- **December 16, 2020 (Meeting #7):** primary topics included a review of early modelling results of energy and capacity choices and the approach to analyzing the removal of the self-sufficiency provision.

- **January 27, 2021 (Meeting #8):** primary topics included a review of the December 2020 Load Forecast and updated load resource balances and climate change adaptation.

- **April 8, 2021 (Meeting #9):** primary topics included a review of the analysis of domestic non-firm / market allowance, meeting future needs in the south coast, and environmental attributes (pre-read only).

- **July 7, 2021 (Meeting #10):** primary topic was to gather feedback on the Draft 2021 IRP which was publicly released on June 21, 2021.

- **October 14, 2021 (Meeting #11):** primary topic was an update on the contingency resource plans.

Consultation materials, including presentations, summary notes and written submissions are provided at www.bchydro.com/cleanpower2040.

How the TAC provided their insights and feedback

We received feedback from TAC members verbally at each meeting and occasionally through written comments following a meeting.

In addition, TAC members were invited to provide written submissions to form part of the public record on two occasions, each corresponding to our broader external consultation phases: gathering input on the planning topics as we draft our plan and providing feedback on the Draft 2021 IRP.

The TAC's input into creating the Draft 2021 IRP

Comments were provided at each meeting, and periodic reporting on how feedback was considered occurred during subsequent meetings.

During the first phase of broader external consultation we received four submissions from TAC members: two followed the public survey format and two provided feedback on planning topics from TAC meetings. Written submissions provided by TAC members are provided in (the 2021 IRP Application).

Table 1 summarizes the feedback from the TAC and how it was considered as we developed the Draft plan. Table 1(a) summarizes feedback relating to matters falling outside the scope of this 2021 IRP. They highlight areas where we made changes as a result of or aligned with TAC feedback, as well as areas where we considered the feedback but did not make changes.

This table was shared with TAC members[1] prior to filing to solicit edits on how we described their feedback. The comments in the table do not represent consensus views of TAC members but rather, is meant to provide a flavour of feedback received by highlighting comments that were emphasized or shared across more than one TAC member. The table is also not meant to be comprehensive. Meeting notes and member submissions provide further details on feedback received.

Table 1. Highlights of how TAC input was considered during Draft IRP development

General / Planning Objectives / Policy	
Feedback	**Consideration of Feedback**
Have a portfolio flexible enough in the 2021 IRP to manage the increased uncertainty. Be cautious about making large capital commitments in the document to support uncertain growth.	The Draft IRP aligns with this feedback by emphasizing incremental and scalable resources to react to future uncertainties. This includes both the demand-side measures and the stepped approach to transmission upgrades.

[1] Tables 1 and 1 (a) were originally one table when shared with TAC members prior preparing the 2021 IRP Application.

TAC members expressed interest in • the use of scenarios in the planning process; • the impacts of COVID-19 on the load forecast; • electric vehicle uptake assumptions including rate and timing; and • characteristics of resource options and load resource balances.	As a result of these interests, meeting agenda topics and presentation materials were designed to incorporate the interests of TAC members.
Load Forecast and uncertainty	
Feedback	**Consideration of Feedback**
The scope of the 2021 IRP should consider very conservative assumptions of load growth, including flat or negative and/or an emphasis on the downside uncertainty in load.	The 2021 IRP aligns with this feedback. A low load scenario of flat or declining load growth across the planning horizon is considered, and the 2021 IRP includes contingency resource plans for these scenarios.
BC Hydro should cover a range of future load outcomes and scenarios to capture uncertainty.	In alignment with this feedback, load scenarios that look at higher and lower loads were used to capture a wide range of uncertainty.
Some suggested that electrification loads that were more in line with meeting Provincial climate targets (as outlined in the Accelerated electrification scenario) should be represented in the Reference Load Forecast.	BC Hydro revisited this topic a number of times across meetings to address TAC members' questions about what Provincial electrification activities were in the Reference Load Forecast, and which activities were in the Electrification scenario, and why this distinction was made in the Draft IRP. The 2021 IRP's Contingency Resource Plans and associated Near-term Actions illustrate how BC Hydro is preparing to support achievement of legislated Provincial greenhouse gas emissions reduction targets.
There was an interest in understanding BC Hydro's decision-making process and timelines for switching from a Base Resource Plan to a higher Contingency Resource Plan.	BC Hydro committed to writing up its process and rationale in a 'triggers and signposts' piece to articulate its thinking and timing of switching from its Base Resource Plan in the event of a contingency situation. This has been included in the 2021 IRP.
Resource options and analysis / Near-term energy and capacity needs	

Feedback	Consideration of Feedback
There was a request for more information on resource options characterization (both supply and demand side), including the detailed resource options database. One view expressed was that our prices were inflated with regard to how we characterized of some energy resources.	BC Hydro provided a summary of the resource options results to the TAC which is included as part of the 2021 IRP Application. BC Hydro also provided presentations on the topics raised and responded to issues, included rationalization of the prices chosen.
There was interest in the interplay of potential electrification initiatives and coordination with demand-side measures initiatives, and how changing the level of one may impact the other. For example, how space heating demand response programs may be sensitive to the load to be added from various low-carbon electrification initiatives.	In response to this feedback, BC Hydro looked at this issue and concluded the increase in demand-side measures' potential would not be materially different from the options modelled.
BC Hydro was encouraged to consider all economic and social benefits of independent power producer projects and demand-side measures, including direct, indirect and induced benefits.	In response to this feedback, BC Hydro engaged a third-party consultant, Deetken, on a broader economic development metric that has been included in the portfolio analysis for the 2021 IRP. More information on this metric is provided in Appendix O of the 2021 IRP Application.
Interest was expressed in distributed generation, its potential, and BC Hydro's approach to it in the 2021 IRP.	In response to this feedback and to broader consultation, BC Hydro created a customer based combined solar and batteries resource option that was considered in developing the 2021 IRP. This resource option was not selected for the Base Resource Plan because of economic reasons. It remains an option for the Contingency Resource Plans, as well as an option for future resources.
BC Hydro was asked to expand the range of demand-side measures to considered to ensure we are capturing its maximum potential in meeting prospective energy requirements.	In response to this feedback, BC Hydro created additional demand-side measure options that would achieve greater energy savings. These resource options were considered in developing the 2021 IRP and were not selected for the Base Resource Plan but remain options for future resources.
Interest was expressed in better reflecting 'affordability' when comparing options. Specifically, some TAC members felt that the present value and the rate impact measures are insufficient when it comes to illuminating this	BC Hydro considered this request and, given the complexity of the issue, determined that more granular measures would not be helpful in highlighting key impacts or trade-offs.

concept. They felt that broader tests of bill impacts (benefits) for participating and non-participating customers would provide better information.	Specifically, the calculation of bill impacts requires many assumptions to be made about customer characteristics including their overall energy usage, and how their energy usage is spread out throughout the year. Given that these characteristics vary widely among customers, bill impact calculations that use general assumptions would not have provided a measure that could have helped differentiate between various demand-side measures options. BC Hydro believes that this interest was already covered to some degree through the existing cost tests.
Climate change and adaptation	
Feedback	**Consideration of Feedback**
Interest was expressed in seeing further detail on the assumptions behind climate scenario models.	Studies and analysis are ongoing at BC Hydro and will be incorporated into long-term planning on a regular basis. We have included an appendix (Appendix I) on this topic in the 2021 IRP Application.

Table 1(a). Highlights TAC input provided during Draft IRP development on matters that fall outside the scope of the 2021 IRP.

Electrification	
Feedback	**Consideration of Feedback**
BC Hydro should take more of a leadership and proactive role in advancing electrification in the province including proactively incenting electrification load in the 2021 IRP.	The Draft IRP continues to be a plan for how the power system will meet future electricity needs, considering a range of scenarios. BC Hydro's Electrification Plan sets out actions to increase low carbon electrification, attract new load and connect customers more efficiently. The Electrification Plan was filed with the Commission in August 2021 as part of our Fiscal 2023 to Fiscal 2025 Revenue Requirements Application and is being reviewed as part of that proceeding. In addition, the 2021 IRP addresses the additional load resulting from the Electrification Plan.
FortisBC and BC Hydro should compare their electrification assumptions, as it is important for intervenors to understand the relationship between utility assumptions trajectories of gas and electricity projections.	
Provide information on greenhouse gas emission reductions that were tied to liquified natural gas and mining electrification, the risks of not achieving the desired level of electrification with	

those sectors and asked what BC Hydro is going to do to capture this load.	

Self-sufficiency / Domestic non-firm and market allowance	
Feedback	**Consideration of Feedback**
BC Hydro was requested to undertake additional analysis to inform long-term planning under the assumption that the self-sufficiency requirement is rescinded.	The 2021 IRP adheres to Provincial electricity self-sufficiency legislation. Analysis was undertaken to look at impacts under various planning positions if the self-sufficiency requirement was to be removed. No further work was done for the 2021 IRP as the electricity self-sufficiency requirement remains in place.

Providing feedback on the draft 2021 IRP

At Meeting #10, TAC members were invited to provide verbal feedback on the Draft IRP, including feedback on the draft elements, additional feedback on planning inputs, our analysis and any gaps in that analysis. We also received feedback via email and formal written submissions that reviewed and considered.

Table 2 below provides TAC member feedback on the Draft IRP and how this feedback was considered in the 2021 IRP. Table 2(a) summarizes the feedback on matters that fall outside the scope of the 2021 IRP. Comments in the table do not represent TAC member consensus; rather, they represent feedback from individual members or from more than one member. This is also not a comprehensive list of all comments, the TAC meeting notes, and written submissions provide a more detailed indication of the feedback received.

Feedback received regarding Indigenous Nations interests is included in Chapter 4 of the 2021 IRP Application.

Table 2. Summary of TAC feedback on the Draft IRP and how this feedback was considered in the 2021 IRP[2]

Context and inputs	
Electrification (General)	
Feedback	**How feedback was considered**
Increase the profile of the climate emergency in the 2021 IRP. Clarify upfront in the 2021 IRP that there is a gap of the base resource plan of the Draft IRP in meeting climate targets and how it aligns (or not) with CleanBC. The plan comes across as BC Hydro taking steps to reduce greenhouse gas emissions because customers would like it, rather than a moral and scientific imperative from a corporate perspective.	Since releasing the Draft IRP, BC Hydro has filed its five-year Electrification Plan as part of BC Hydro's Fiscal 2023 to 2025 Revenue Requirement Application. This plan outlines BC Hydro's active role in incenting fuel switching to support provincial GHG emissions reductions. The 2021 IRP addresses the additional load resulting from the Electrification Plan. In response to consultation, we've also included text in the 2021 IRP that describes more about the electrification plan and where it, and the CleanBC targets, are addressed in the 2021 IRP.
Various suggestions were provided about how to characterize BC Hydro's five-year electrification plan and CleanBC greenhouse gas (GHG) reduction targets in the 2021 IRP, including: show the electrification plan on top of the reference case in load forecast graphs; show an accelerated electrification line that meets GHG reduction targets in the base plan; and include electrification plan actions in the IRP Near-term Actions. A comment from another TAC member stated that how BC Hydro had characterized electrification in the base resource plan was appropriate as it is an accurate interpretation of current provincial policy implementation and aligns with the provincial government's emissions forecasts.	BC Hydro has incorporated the five-year Electrification Plan targets to the Accelerated electrification scenario and updated its associated contingency resource plans.

[2] The BC First Nations Energy and Mining Council feedback is found in Chapter 4 of the 2021 IRP Application.

The broader supply of new power for electrification needs a coordinated strategy with the clean energy industry for supply.	At this time, the load resource balance of existing and committed resources with the Reference Load Forecast shows no new renewable supplies are needed in timeframes addressed by the 2021 IRP's Near-Term Actions. The need for new renewables and any associated programs for acquiring them will be considered as part of the next integrated resource plan cycle, potentially accelerating that cycle if circumstances in our planning environment warrant.
Ensure the BC Hydro has flexibility to respond to policy changes between integrated resource plan submissions.	BC Hydro will be monitoring for signposts, which will include policy changes. If the impact of policy changes or other supply/demand drivers result in an updated load resource balance and BC Hydro determines that the Base Resource Plan of the 2021 IRP and associated Near-term Actions are inadequate, BC Hydro will advance contingency resources and this will lead to a new integrated resource plan cycle.
Climate change impacts	
Feedback	**How feedback was considered**
Provide more information on climate change impacts and underlying assumptions of the analysis.	Studies and analysis are ongoing at BC Hydro and will be incorporated into long-term planning on a regular basis. We have included an appendix on this topic in the 2021 IRP Application.
Load Forecast	
Feedback	**How feedback was considered**

Feedback on the load forecast generally focused on electrification assumptions. This included views that the reference load forecast should include higher levels of electrification, pointing to activities such as heavy-duty electric vehicles and off-road transportation electrification. Clarify electrification assumptions between the reference case and our contingency scenarios, including whether the electrification plan's estimates regarding new industrial rates are in the IRP reference case, and to show uptake in other jurisdictions when it comes to electric vehicle planning. BC Hydro was encouraged to explicitly consider demand for future green or blue hydrogen production.	The reference forecast includes electrification activities that have a higher level of probability of materializing and includes activities where government has spelled out policies – such as a light-duty electric vehicle mandate. We've also included an Accelerated Electrification scenario which has included heavy duty electric vehicles, 100 per cent achievement of BC Hydro's five-year Electrification Plan, other aspects to meet greenhouse gas emission reduction targets. We've developed contingency resource plans for the scenario; and have identified the near-term actions to prepare BC Hydro to meet the scenario if it unfolds. BC Hydro has considered hydrogen production in our Accelerated Electrification scenario.

Resource Options

Feedback	How feedback was considered
Make the full resource options database available, including the cost assessment for the clean energy technologies that are developed by independent power producers, any associated cost adders, and the cost decline trajectory for those technologies over time. Provide a cost curve for demand-side measures options to understand the cost of demand-side measures versus other resources.	A representative summary of the Resource Options Database that includes the full array of supply and demand resource types is included in our 2021 IRP Application. It includes an assessment of the cost decline trajectory for relevant technologies, as well as a supply curve of available supply resources. The complete Resource Options Database contains commercially sensitive data and calculations that are inappropriate for publication. The resource options database does not include cost adders or adjustments that would reflect the value of any one resource option from the perspective of the grid. The financial attributes of resource options (i.e., Unit Energy Cost or Unit Capacity Cost) in the Resource Options Database enable a high-level comparison of resource costs from the perspective of a resource developer. Comparison of resource options from the perspective of the grid is best achieved through portfolio modelling, where the dynamic

	interactions between portfolios of resources and the grid are taken into account. The 2021 IRP does not have a cost curve per se for demand-side options; however, the 2021 IRP has identified multiple demand-side resource options that represent combinations of demand-side measures that cover a wide range of technical and financial attributes. The cost-effectiveness of the selected demand-side measures is demonstrated in the demand-side measures expenditure request being submitted as part of BC Hydro's Fiscal 2023 to 2025 Revenue Requirement Application.
A TAC member viewed that public policy objectives are not adequately accounted for when considering value of independent power production. They suggested a full accounting of the costs and benefits of adding independent power production to the system must include its contribution to economic growth, taxes to all levels of government, its unique role in fostering First Nation reconciliation and economic development, and its environmental benefits over other types of generation.	BC Hydro included a measure of economic development which expanded on the jobs measure to include a measure of direct, indirect and induced jobs. This measure is applied at the portfolio level, rather than as an attribute of individual resource options. More information can be found in Appendix O of the 2021 IRP Application. Additionally, BC Hydro engaged Simon Fraser University to develop a more comprehensive environmental attributes measure, similarly applied at the portfolio level. More information can be found in Appendix O of the 2021 IRP Application.
A TAC member suggested the cost of renewables presented are inflated.	Financial attributes of supply-side resources were assessed and informed by input from internal and external technical stakeholders and/or review of contemporary technical literature. Although there is likely to be a degree of error in estimating the costs of these resource options, the process to develop these estimates was reviewed by multiple stakeholders and deemed in general to be reasonable.
Revise the approach to assessing capacity values to clean energy projects by contemplating valuing beyond trading profits.	The portfolio modelling undertaken considers both system and regional needs for capacity. Clean energy projects within a portfolio that provide dependable capacity will have their capacity

	contribution towards regional or and system capacity needs accounted for within the portfolio valuation.

Objectives, measures, and portfolio analysis (general comments)	
Feedback	**How feedback was considered**
The flexibility of the plan to handle changes is key whether it be policy, or market or load, and the IRP needs to demonstrate we can respond to variability. Build in flexibility with ability to respond to any number of contingencies, whether they are from changing opportunities or elements of the economy. This includes flexibility to avoid negative outcomes and flexibility to take advantage of new opportunities.	The 2021 IRP incorporates flexibility through the development of scalable demand-side options; and a staged approach to transmission upgrades. We've also developed a monitoring approach that considers signposts and regularly updated load resource balances to signal any changes in a timely manner, and Near-term actions to prepare BC Hydro to advance contingency resources if needed.
Support CleanBC initiatives but emphasize least cost power needs to receive at least equal priority in integrated resource plan decision-making.	BC Hydro is obligated to meet customer load and keeping costs down for customers was a planning objective for the 2021 IRP.
Improve clarity of modelling and analysis. This included the need to understand cost and rate implications for full suite of resource options, including economic measures needed on an annual basis (present values are not sufficient). The 2021 IRP should recognize the stranding risk of overbuilding in context alongside the risk of inadequate supply. The analysis should also include cost implications of lower electric vehicle and industrial electrification uptake to ratepayers.	As part of the decision framework, we've included measures beyond just present value numbers; we've included rate impacts, jobs and environmental impacts. We've included annual costs associated with various demand-side measures options and benefits associated with electricity purchase agreement renewals resulting from the portfolio analysis (see Chapter 7 of the 2021 IRP Application). The 2021 IRP also considers a Low load scenario where demand is lower than the Reference Load Forecast.

Clarify sub-objectives, including clarifying the meaning of the cost risk of transmission uncertainty and demand-side measures under-delivery, and the measure 'ability for all to benefit' perhaps should be implementation rather than a criterion.	We have included clarifying text in the 2021 IRP, describing how the cost risk of transmission uncertainty and demand-side measure under-delivery is a proxy. The 2021 IRP provides transparency about the planning objectives and how the decisions were made.
Suggest expanding socioeconomic (to include local and provincial government tax revenues) environmental measures (to include impacts and benefits to terrestrial and marine resources, interests in culture; avoided environmental impact of the alternative supply choices; cumulative impact benefits where less clean generation has been developed in favour of clean generation), and reconciliation (e.g., revenues/royalties, capacity investments, employment, self-determination and self-reliance).	BC Hydro included a measure of economic development which expanded on the jobs measure to include a measure of direct, indirect and induced jobs. This measure is applied at the portfolio level, rather than as an attribute of individual resource options. More information can be found in Appendix O of the 2021 IRP Application. Additionally, BC Hydro engaged Simon Fraser University to develop a more comprehensive environmental attributes measure, similarly applied at the portfolio level. More information can be found in Appendix O of the 2021 IRP Application.

Base Resource Plan

Demand-side measures (general)

Feedback	How feedback was considered
Broaden the financial measures of rate impacts to include program participants and non-participants bill impacts, as evaluating bill impact reductions (benefits) for customers, instead of just rate impacts represents a more comprehensive perspective. This could also be qualitative if quantitative is challenging. Feedback also questioned whether analysis could include distribution of bill impacts for time-varying rates, such as opt-out rates. There was concern about ability of different types of customers to respond.	Similar to how we responded to TAC member input, BC Hydro considered this request and, given the complexity of the issue, determined that more granular measures might not be helpful in highlighting key impacts or trade-offs. Specifically, the calculation of bill impacts requires many assumptions to be made about customer characteristics including their overall energy usage, and how their energy usage is spread out throughout the year. Given that these characteristics vary widely among customers, bill impact calculations that use general assumptions would not have provided a measure that could have

	helped differentiate between various demand-side measures options. BC Hydro believes that this interest was already covered to some degree through the existing cost tests.
Explain the negative present value numbers for higher levels of demand-side measures.	The present value numbers, including negative numbers as applicable, are explained in the 2021 IRP.
Do not consider under-delivery of demand-side measures to be a risk and believe the 2021 IRP generally overemphasizes demand-side measures uncertainty (versus supply uncertainty).	This comment was noted.

Energy efficiency

Feedback	How feedback was considered
TAC members generally support energy efficiency programs.	This comment was noted.
Further consider ramping up sooner and pursuing higher levels of energy efficiency, combined with finding other ways to mitigate equity issues and barriers (such as through program design).	Our assessment is that the selected portfolios represent a cost-effective way to meet future customer needs. We are ready to ramp up demand-side measures if needed, however on balance, pursuing more demand-side measures at this time could: • Increase bills for those not able to take advantage of energy efficiency programs; • Default customers into opt-out time-varying rates that are not well-suited to them; and • Increase the risk to ratepayers of demand-side measures under-delivering on their expected savings, potentially requiring BC Hydro to pursue more expensive options.

	The comment about finding other ways to mitigate equity issues and barriers was noted.
Include more extensive demand-side measures options such as option five explored in last integrated resource plan which considered societal level changes as we transition from incentive programs to codes and standards	No more options are being considered at this time over and above those in the Draft IRP, which themselves were expanded based on input from the TAC and Phase One (Input) consultation; however, BC Hydro acknowledges this comment and can be considered in our next integrated resource plan.
Provide a benefit-to-cost ratio of the plan (e.g., could total resource cost be higher?)	The 2021 IRP compares options through a multiple-objective decision-making framework. It did not go this step further to consolidate all benefits into one metric to allow the calculation of a cost-benefit ratio. Total resource cost could be higher; however, we believe an appropriate balance was struck the balanced amongst competing 2021 IRP objectives.
Provide more information on the options, such as what 'base' and 'ramp up' includes and to put it into context with current and historical levels.	The Demand-side Measures Expenditures Request will provide details of the measures and expenditures. BC Hydro is filing its fiscal 2023 to 2025 Demand-side Measures Expenditure Request with the Commission to seek approval for the expenditures over that period to achieve the savings.

Voluntary time-varying rates and demand response	
Feedback	**How feedback was considered**
Support for time-varying rates and demand response programs. These resources provide valuable flexibility, support initiatives aimed at electrification and enable capital investment to be deferred.	This comment was noted.

TAC members expressed support for opt-in time-varying rates and a gradual approach to implementation.	
As with energy efficiency, BC Hydro was encouraged to consider higher levels with time-varying rates and explore how equity issues could be mitigated.	We are ready to ramp up demand-side measures if needed, however on balance, pursuing more demand-side measures at this time could: • Increase bills for those not able to take advantage of energy efficiency programs; • Default customers into opt-out time-varying rates that are not well-suited to them; and • Increase the risk to ratepayers of demand-side measures under-delivering on their expected savings, potentially requiring BC Hydro to pursue more expensive options.
Consider socializing default (rather than opt-in) time-varying rates with customers as a near-term action so that, if needed, the ability to move there has already been assured. Explore a progressive sequence of rates which could be socialized rather than discrete options.	BC Hydro is planning to apply to the Commission for approval of opt-in time-varying rates as a first step, which will provide opportunity for socialization and to learn more about performance of the rates.
Provide more information on the impacts of each rate in terms of costs and savings, critical peak pricing, and rationale for not including Rate suite 4 consequence table analysis.	The 2021 IRP did not provide a breakdown of each rate as it could not provide meaningful analysis of individual contributions to overall portfolio costs. Information on why Rate suite 4 was not included is provided in the IRP Application. In short, Rate suite 4 includes all default rates and programs. Moreover, the analysis did not show sufficient benefits to move forward with Rate suite 4 at this time.
Improve reader understanding by including how demand-side measures are reflected in the load resource balance, providing a customer accessible vision of the plan rollout, and showing (maybe	In finalizing the 2021 IRP, BC Hydro tried to improve readability from the draft.

in textboxes) to reader why BC Hydro thinks targets can be met (e.g., comparing historical programs).	
There were concerns with whether stated savings could be achieved (savings delivery uncertainty).	As part of the analysis, BC Hydro has looked at uncertainty regarding demand-side measure savings including considering under delivery of savings as one of our contingency scenarios.
Demand response targeting electric vehicle driver participation	
Feedback	**How feedback was considered**
There was support expressed for this initiative.	This comment was noted.
TAC member requested more information on how BC Hydro will deal with uncertainty.	BC Hydro considered electric vehicle driver participation uncertainty when comparing options which factored into the decision not to go up to a higher level (i.e. 75 per cent participation level). This will also be included as a signpost for monitoring for developments that could materially impact the Load Resource Balance.
Recommend the 2021 IRP contemplate alternative futures for electric vehicles and consider how consequences could be quite different depending on various alternative futures.	The analysis did not include alternative futures for electric vehicles. Expanding our electric vehicle analysis can be considered in the next integrated resource plan.
Electricity purchase agreement (EPA) renewals	
Feedback	**How feedback was considered**

TAC member feedback focused on the market price-based approach to the offer for clean or renewable projects. In general, support was expressed for lower prices and a market price-based approach in principle as TAC members felt that the cost of operations should be lower. There were diverse opinions on specific details such as, support for competitive market rates in the short term and then increasing prices when need develops; and the price should be higher as market-based prices don't recognize the economic and social benefits provided by these facilities.	BC Hydro acknowledges these comments. A separate engagement process will occur as part of this program design, which will provide more information on the market-based approach.
Look at renewable natural gas as a fuel for dispatchable gas facilities.	Renewable natural gas (biomethane) has been considered in the 2021 IRP resource options update.
Diverse views were expressed about the electricity purchase agreement with Island Generation. One TAC member felt that there may be some benefit to maintaining the Island Generation electricity purchase agreement for capacity. Another TAC member supported the assumption that the Island Generation electricity purchase agreement would not be renewed.	Although the 2021 IRP continues to assume that the contract with Island Generation is not renewed, contract negotiations for short-term supply arrangements are ongoing.

Transmission upgrades	
Feedback	**How feedback was considered**
There was general support for transmission upgrades, for advancing preparation for long lead time resources, and for early engagement with Indigenous Nations. There was a request to provide more information of costs and ratepayer impacts of transmission compared to other resource options, including a consequence table to show a comparison of options.	This comment was noted. In terms of providing more analysis or a consequence table, during the analysis transmission upgrades was picked consistently across all portfolios. We would expect portfolio analyses run without transmission upgrades (and thus forcing a non-transmission alternative), the replacement would be utility scale batteries, with an expected higher cost.

Future resources	
Feedback	**How feedback was considered**
Provide more information and analysis about future resources in the 2021 IRP. Provide trade-offs and costing information for each category. Identify decision timeframes and benchmarks. There was some support for some advancement of supply options to shorten lead times, prioritizing demand side measures.	Information on different resources in the resource options database is used in the modelling for the 2021 IRP. We are shortening lead times with demand-side measures by preparing to ramp up to higher levels. We are also shortening lead times for utility-scale batteries by exploring their implementation and operationalization on pilot scales.
Approach to BC Hydro small plants	
Feedback	**How feedback was considered**
There was general support for the approach outlined in the Draft IRP.	This comment was noted.
TAC member feedback highlighted the importance of engaging with Indigenous Nations and prioritizing restoration and Indigenous Nations interests.	Aligned with this feedback, engagement with Indigenous communities is included in the approach to small plants end of life decisions.

Contingency Resource Plans and additional feedback

General	
Feedback	**How feedback was considered**

Provide greater profile in the 2021 IRP about contingency plans as they will provide us with options and resiliency. Provide more information and analysis for the accelerated electrification contingency plan. More information was requested as to what the accelerated electrification would look like in terms of the rate of electrification.	In response to this feedback, BC Hydro held TAC meeting #11 to discuss contingency plans further. This included discussion of how BC Hydro will monitor the adequacy of this 2021 IRP's Near-term Actions and how we would determine if they are no longer adequate and advance contingency resources and a new integrated resource plan.
The 2021 IRP should clarify how the base plan may transition to the accelerated electrification contingency plan. For example, identifying how resources change, and triggers that would indicate a move.	
BC Hydro is encouraged to show costs and impacts to customers under reference versus accelerated electrification scenario. Request further information to better understand financial risk of contingency scenarios, and mitigation measures.	The goal of contingency resource planning in this 2021 IRP is to demonstrate that there are adequate resources that can be advanced in a contingency timeframe. This includes taking Near-term Actions so that we are ready to advance contingency resources if needed. However, we do not take the additional step to find the best of multiple resource options to meet a specific contingency load scenario; that task is appropriate to the IRP development cycle.
If the North Coast liquified natural gas and mining + Accelerated electrification scenarios are not assessed together, the 2021 IRP should clarify why they are being looked at separately.	The North Coast liquified natural gas and mining scenario was developed to identify what contingencies would be needed to address load growth in transmission constrained North Coast region of the province. Combining this scenario with any other scenario would not have provided any additional insights that would impact the development of the 2021 IRP's Near-term Actions.
Provide a better understanding of road maps for decision making, including lead times for resources, approval processes, and decision points to help with plan flexibility.	BC Hydro added a TAC meeting to provide further information on future signposts as to when a contingency resource might need to be advanced.

Provide more information on using flexibility of energy efficiency to handle contingencies.	BC Hydro is approaching energy efficiency as a scalable resource and has developed the options such that they can ramp up to progressively higher levels when needed (or ramp down to lesser levels).
There was support for the use of temporary bridging from the market as a resource in contingency resource plans. Consider renewable natural gas.	This comment was noted. Generating electricity using renewable natural gas is included in the resource options database.
Utility-scale batteries	
Feedback	**How feedback was considered**
In addition to the general feedback of providing more information on the contingency plans listed above, support was mentioned for gaining experience with utility-scale batteries.	This comment was noted.
IRP timing	
Feedback	**How feedback was considered**
TAC members provided views on the 2021 IRP timing, including support for a five-year cycle (advanced if needed), as well as a more frequent cycle such as every two to three years (advanced if required).	This comment was noted.
Miscellaneous	

Feedback	How feedback was considered
Be clear on nomenclature, for example the word flexibility means something different about technology and speaking energy efficiency.	A glossary of terms is included in the 2021 IRP.
Improve engagement through interactive tools for decision makers and to educate public.	BC Hydro acknowledges this comment and will consider options for future integrated resource plans.

Table 2(a). Summary of TAC member feedback provided on the Draft IRP on matters that fall outside the scope of the 2021 IRP.

Context and inputs

Electrification (General)

Feedback	How feedback was considered
Be more proactive on electrification, such as promoting clean portfolio standards for building and industry and looking at business cases for introducing heat pump rates. It was suggested that BC Hydro could do more to incent electrification in the transportation and industrial sectors and create measures to mitigate equity/energy poverty concerns as a result of any burdens through increased electrification. Recognize the role of upstream electrification in meeting targets both in the value of this stable customer base and the opportunity to advance greenhouse gas emission reductions.	BC Hydro's five-year Electrification Plan is being reviewed in the Fiscal 2023 to 2025 Revenue Requirements Application. This includes actions related to industrial electrification. The 2021 IRP considers the additional load resulting from the Electrification Plan.

Assess the value of electrification options in climate management.	The Electrification Plan includes analysis of greenhouse gas emission reductions resulting from the plan.

Climate change impacts	
Feedback	**How feedback was considered**
Given recent summer fire and heat dome events in B.C., BC Hydro may want to include some commentary in the integrated resource plan about the transmission and distribution impacts of fires and impacts of climate change/extreme heat/wildfires on distribution and transmission.	The 2021 IRP focuses on the resources required to meet BC Hydro customers' need for electricity over the next 20 years. Investments or actions that are solely intended to improve the reliability and safety of the BC Hydro system are not addressed in this Application and are also not addressed in the 2021 IRP. Long-term planning for distribution and the non-bulk transmission system are also not addressed in this Application or in the 2021 IRP.

Self-sufficiency and market trade	
Feedback	**How feedback was considered**
Advance analysis and implications of self-sufficiency removal to increase understanding and options for flexibility and inform of market issues.	The 2021 IRP adheres to Provincial electricity self-sufficiency legislation. Analysis was undertaken to look at impacts under various planning positions if the self-sufficiency requirement was to be removed. No further work was done for the 2021 IRP as the electricity self-sufficiency requirement remains in place.
Highlight the risk of relying on imports, in addition to reconciliation issues, includes environmental leakage (non-clean energy in the mix), economic leakage (exporting investments), reliability and energy security (supply constraints can hit quickly).	

Government priorities such as greater participation in external markets can help balance achieving both CleanBC and least cost power goals. Increasing external market participation should be balanced with ensuring market imports are generally as clean as BC Hydro generation. Recommend that the 2021 IRP include information on green import and exports, including financial benefits and opportunities that also support CleanBC targets.	
Suggest the development of an external market strategy, understanding of BC Hydro's long-term external market expectations could greatly impact B.C.'s supply and demand options.	

Base Resource Plan

Demand-side measures (general)

Feedback	How feedback was considered
Request to include more information on underlying assumptions of energy efficiency and rate structures, and implementation timing and cost impacts.	BC Hydro's fiscal 2023 to 2025 Demand-side Measures Expenditure Request will provide the requested information. It will be filed as part of the F2023 to F2025 Revenue Requirements Application.
Clarify the degree of demand-side measure uncertainty in the 2021 IRP that the province can influence through tools such as regulations.	This analysis goes beyond the scope of the 2021 IRP

Energy efficiency

Feedback	How feedback was considered

Consider examining areas of the economy where efficiency programs can be most effective.	This level of analysis goes beyond the scope of the 2021 IRP.
Revise the security requirements for large customers.	Design and implementation of demand-side measures goes beyond the scope of the 2021 IRP.

Voluntary time-varying rates and demand response	
Feedback	**How feedback was considered**
TAC member suggested including a section in the 2021 IRP or Application to summarize BC Hydro's understanding of its vulnerable rate payers and how it defines this group. For example, what are the challenges that those groups may have with dealing with the impacts of plan elements?	The comment about defining vulnerable rate payers was noted.
Provide more information to help large industry understand its role in the plan. Provide more information on how this element differs from existing rates, on timing recommendations, and more information on load curtailment. Provide more information for commercial customers and profile and include them more in the plan.	BC Hydro's fiscal 2023 to 2025 Demand-side Measures Expenditure Request will provide the requested information. It will be filed as part of the F2023 to F2025 Revenue Requirements Application.
Feedback was also received with regard to element design and implementation. This included: any changes to higher levels of savings needs engagement with Indigenous Nations and consideration of community circumstances; phasing of time-varying rates requires lead time to secure political acceptance; consider regional programming for industry which could be helpful in capacity constrained areas; continue to use corporate and energy managers and expand these program; and provide significant incentives for automated response permission settings with opt-out capability.	Design and implementation of demand-side measures goes beyond the scope of the 2021 IRP.

Demand response targeting electric vehicle driver participation	
Feedback	**How feedback was considered**
There are new and accessible technologies to help make this resource option more cost-effective. Pursuing smart-charging will help encourage innovation, which would benefit from collaboration with academic institutions with data sharing for research on machine-learning, AI, technology development, and policy analysis.	Design and implementation of demand-side measures goes beyond the scope of the 2021 IRP

Electricity purchase agreement (EPA) renewals	
Feedback	**How feedback was considered**
There was a request to provide more information to assess the impacts of this action, including support to review of assumptions to assess project viability under market-price based approach. More information on cost implications to ratepayers was requested.	A separate engagement process will occur as part of this program design, which will provide more information on the market-based pricing approach.
Provide details in the 2021 IRP on the evaluations BC Hydro will undertake to assess the potential for renewal, including assumptions about renewal agreements. Summary level information is requested if details cannot be provided.	
Establish a framework for contract renewal that will both satisfy the BC Hydro's need to demonstrate ratepayer protection and the independent power producer sector's need to attract and service	

investment capital. Establish an electricity purchase agreement/independent power producer strategy.	

Contingency Resource Plans and additional feedback

General

Feedback	How feedback was considered
The 2021 IRP should outline what changes may happen provincially or federally that would move us from base case to electrification scenario. Augment the accelerated electrification scenario with policy changes that would help meet GHG targets, which may also help facilitate how local government can see their initiatives in the plan.	BC Hydro acknowledges the comments on the request for identifying policy changes that would either move BC Hydro to the contingency or how to meet greenhouse gas emission reduction targets. While the 2021 IRP does not address or speculate on new policies that are needed to meet greenhouse gas emission reduction targets, BC Hydro is developing signposts which could include watching for policies that would impact the demand and supply side forecasts and influence the load resource balances and the viability of implementing the 2021 IRP.
Provide more information and activity regarding industrial electrification including LNG electrification and a link to mining demands. Work with Indigenous Nations to determine highest value options. Continue to work towards (in partnership with government) developing additional transmission lines such as the North Montney project.	Activity related to industrial electrification is found in the Electrification Plan filed as part of the Fiscal 2023 to 2025 Revenue Requirement Application.

Miscellaneous

Feedback	How feedback was considered

Provide context information for topics of interest (both in and out of scope of this integrated resource plan) – how they are addressed or where they are addressed – such as Site C, net metering, the two-tiered residential inclining block (RIB) rate, heat pumps, UNDRIP, distributed generation.	The 2021 IRP and IRP Application provides information on the planning environment and context for the 2021 IRP.