PEMBINA institute

Aligning electricity planning with B.C.'s climate and social goals

Recommendations to BC Hydro on the Draft Integrated Resource Plan

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Overview

The Pembina Institute appreciates the opportunity to provide comments on the 2021 draft Integrated Resource Plan (IRP). On balance, BC Hydro's efforts to analyze options and make that analysis available to the participants of the Technical Advisory Committee (TAC) have been commendable. Following the structure of the IRP process (planning context, load forecast, resource options), we have grouped our comments and recommendations under the following headings:

- Alignment with *Clean Energy Act, Climate Accountability Act* and CleanBC
- Self-sufficiency and Alignment with *Declaration on the Rights of Indigenous Peoples Act* (DRIPA)
- Wild cards: Liquified natural gas (LNG), blue hydrogen, and upstream electrification of natural gas production
- Demand-side management (DSM): Alignment with Electrification Strategy, CleanBC objectives, and long-term affordability
- Engagement process

One overarching challenge of this planning exercise is the global uncertainty caused by the pandemic and the climate emergency. The future of the pandemic is still unclear, and so are the shape of the recovery and its long-term impacts on global trade, local economies, and government fiscal policies. This is truly a wildcard, which BC Hydro can mostly address by prioritizing flexibility, and revisiting load forecast assumptions on a regular basis.

The climate emergency will also induce complex changes that are hard to forecast — either driven by mitigation policies or by the catastrophic accumulation of system shocks and stresses

that we are starting to witness. On the other hand, the clean energy transition has some logical ramifications on electricity usage that BC Hydro can plan for.

On a global level, COVID-19 and the climate crisis will create ongoing, and likely non-linear, change that will deeply affect the economic and energy context of the province. Our recommendations suggest some ways to partially address this uncertainty by having BC Hydro maximize the flexibility of its supply and DSM options, and play a proactive role in advancing public conversations about a broader set of possible future energy policy environments. That said, it is paramount that the B.C. government also take a more proactive role in guiding utility planning and programs through clear directive and new enforcement instructions to the BC Utilities Commission (BCUC).

In the shorter term, we are expecting a revised climate plan this fall, which is anticipated to close the growing gap between projected emissions and B.C.'s 2030 reduction target, and provide more detail on Indigenous involvement and leadership in helping achieve B.C.'s reduction targets, while also charting a course for decarbonization by mid-century. This is likely to bring more clarity for planning purposes. Completion of the BC Hydro electrification strategy will also provide additional actions that would benefit from being explicitly integrated into the IRP given their impact on load but also given its *de facto* use as a vision for the electricity future of the province. Given the timing, we recommend that:

> **Recommendation 1: BC Hydro should request an extension from the government and the BCUC to deliver the final IRP. The IRP should incorporate new government policy and insights from BC Hydro's electrification strategy.**

Alignment with the *Clean Energy Act*, the *Climate Accountability Act*, and CleanBC

Based on BC Hydro's own analysis, the reference load forecast used in the IRP is not aligned with B.C.'s legislated climate target, and therefore the IRP is misaligned with the Climate Accountability Act, CleanBC, and government policy direction, conceptually and materially.

Conceptual misalignment

The reference case used in the IRP is also internally inconsistent from a climate perspective: it presumes that business as usual will more or less continue on a linear track, even if B.C. does not meet its climate target. Given the current context of commitments to net-zero emissions from countries and the private sector around the world, recent reports and models from international authorities on climate and energy policy (e.g.: International Energy Agency, Intergovernmental Panel on Climate Change), any projections based on historical records are certain to be grossly inadequate. We therefore consider the reference case to be flawed.

On the other hand, we understand BC Hydro's hesitancy to start securing additional clean energy resources ahead of a clear increase in clean energy demand. This could result in rate increases, which would in turn make clean electrification more difficult to achieve. We therefore acknowledge that BC Hydro, in the absence of clear direction from government, is walking a delicate balance in this IRP: prudent planning requires preparing for a clean transition, but also planning based on real market and policy signals.

While BC Hydro is concurrently developing a five-year electrification strategy, this strategy is not represented in the Draft IRP, and the long-term consequences of this transition to low-carbon energy are not sufficiently explored. The IRP does include two contingency scenarios to represent an energy future aligned with B.C.'s legislated climate targets ('accelerated electrification' and 'accelerated electrification with DSM underdelivery'), but these scenarios are not sufficiently fleshed out to truly understand the long-term ramifications of this energy trajectory and clarify the short-term action needed to prepare for, *and to actively foster*, this transition.

Material misalignment

The lack of details on the two 'accelerated electrification' scenarios makes it difficult to determine the extent to which this misalignment between the draft IRP and government direction has material consequences, and how the short-term action recommendations in the IRP should be amended to ensure BC Hydro starts building the needed infrastructure and programs before the next IRP (scheduled for 2025).[1] Table 1 summarizes the key difference between the draft IRP base resource plan and that of the 'accelerated electrification' contingency scenario. Key differences are the scale of DSM needed, the scale of new supply needed by 2030, and the renewal of IPP contracts expiring between 2026 and 2030. The first two might warrant, in our opinion, action before the next IRP.

In addition, the IRP is also silent on whether the increased demand under the accelerated scenario would require upgrades in the transmission and distribution infrastructure beyond those planned in the base scenario. These upgrades would also need to be initiated before the next IRP. So beyond the conceptual and narrative alignment, there are important actions that may need to be initiated in the short term to prepare for an accelerated electrification scenario which should be laid out in the final IRP.

[1] For a discussion of how the Dragft IRP integrated electrification objectives see the TAC sides from Meeting #4 (July 22, 2020) statting at slide 5: https://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/corporate/regulatory-planning-documents/integrated-resource-plans/current-plan/2021-irp-tac-mtg4-20200722-slides.pdf

Table 1: Main difference in actions proposed in the draft IRP between the reference and 'accelerated electrification' scenarios

Resources needed in base case	Resources needed in 'accelerated electrification' contingency scenario	Key difference
DSM		
"Continue with a base level of energy efficiency programs and plan to ramp up to higher levels in future years to achieve 1700 GWh/year of energy savings and 290 MW of capacity savings at the system level by fiscal 2030;"	"Ramp-up from base to higher levels of energy efficiency programs to achieve up to 2,300 GWh/year of energy savings and up to 420 MW of capacity savings at the system level by fiscal 2030;"	*Higher level of DSM, delivering an additional 600 GWh/yr (+35%) and 130 MW (+) by 2030*
"shift home charging by 50 per cent of residential electric vehicle drivers to off-peak demand periods to achieve 100 MW of capacity savings at the system level by fiscal 2030."	"Implement EV peak reduction initiatives to achieve 75 per cent EV driver participation and up to 480 MW of capacity savings by fiscal 2030;"	*Higher level of DSM leading to 75% of EV drivers charging off peak and delivering an additional 380 MWh (+380%) of capacity by 2030*
Transmission and distribution		
[...upgrade] existing transmission infrastructure into the South Coast region to achieve 550 MW of capacity [...] by fiscal 2033; prepare to initiate a second step of upgrades of existing equipment to achieve an additional 700 MW of capacity for the South Coast region by fiscal 2039;	N/A	*The Draft IRP does not clarify whether the accelerated scenario would require additional T&D upgrades.*
New supply		
	Temporarily bridging load with market supply including up to 300 MW of capacity for four years [2025, 2028, 2029, 2030] and up to 2,000 GWh/year of energy for four years;	*Temporary reliance on market to create flexibility in planning without leading to long-term reliance on imports.*
Offer a market-price based renewal option to existing clean or renewable independent power producers with electricity purchase agreements expiring in the next five years [... to] produce a total of roughly **900 GWh** [...] plan to acquire new energy and capacity resources starting with **580 GWh** in fiscal 2031, then shifting to primarily capacity resources starting with **110 MW** in fiscal 2038.	Initiate processes to renew electricity purchase agreements to provide **2,100 GWh** of energy supply and 260 MW of capacity supply by fiscal 2030; [...] Initiate processes to acquire new clean resources to achieve up to **3,400 GWh/year** of energy supply and up to **310 MW** of capacity at the system level by fiscal 2030;	*Additional ~ 4,000 GWh/yr (4/5th of a Site C) of supply needed by 2030 from IPP renewals and new projects.* *Note that it is unclear in the reference scenario what would happen to IPP projects with contracts expiring between 2026 and 2030.*

To address the disconnect between BC Hydro planning and BC government policy direction and ensure prudent planning we recommend that the Draft IRP be modified in the following ways:

Recommendation 2: The main body of the IRP should recognize and discuss the alignment, or misalignment, of the reference scenario with CleanBC objectives.

Recommendation 3: Given its alignment with government policy and its likely requirement for a stable climate (and therefore stable service context for BC Hydro) the 'accelerated electrification' scenario should not be treated as a contingency scenario but be discussed within the main body of the IRP as a trajectory that is desirable and within BC Hydro's influence to shape, not just respond to.

Recommendation 4: The material implication of the 'accelerated electrification' scenario should be more thoroughly explored. In particular:

a. **The need for additional upgrades in transmission and distribution to meet this new load and new supply sources should be assessed and discussed;**
b. **The consequence tables used to illustrate the trade-offs between different planning options should be duplicated (or amended) to illustrate how these trade-offs would be different in the 'accelerated electrification' context;**
c. **Portfolio analysis should be conducted for the accelerated scenario to clarify the lead time needed to get the new supply online, and this timeline should be made explicit as a 'decision horizon' to inform early actions and indicators (see next points);**
d. **All load resource balance graphs should illustrate both the reference case and the 'accelerated electrification' load forecasts.**

Recommendation 5: The consequence table for DSM options should be revised to reflect that greater DSM will be needed for the 'accelerated electrification' scenario, and to clarify how DSM programs can themselves be leveraged to drive electrification (more or this in DSM section below);

Recommendation 6: The IRP should articulate specific market and policy indicators that would signal if we are shifting towards the 'accelerated electrification' scenario (e.g.: rate of uptake of heat pumps, rate of uptake of EVs, code directions, etc.).

Recommendation 7: The IRP short-term actions should include actions included in BC Hydro's electrification strategy, and include description of short-term

actions needed to ensure the resource options required to meet the 'accelerated electrification' scenario.

Recommendation 8: BC Hydro should review internal policies and external partnership agreements that limit its capacity to pursue electrification and fuel switching across all customer classes. The non-competition clauses in MOUs with gas utilities, in particular, should be revisited to ensure BC Hydro electrification programs can reach residential customers currently using gas for heating and cooking.

Recommendation 9: BC Hydro should implement the programs, rates, and policies recommended in the BC Building Electrification Roadmap[2], which it co-sponsored. In particular, it should ensure that electricity connection and system upgrade fees be reduced by recovering these costs through the ratepayer base (plus a base fee for all new connections).

We recognize that given BC Hydro's status as a crown corporation, it is not its role to provide policy advice to the province. It is fair for BC Hydro to state it does not yet see the policy drivers needed to meet climate targets and drive the expected increase in electricity demand; this is also the government's own analysis. However, for planning purposes, BC Hydro should be clear with the kind of policy signals it would consider sufficient to act as if this increased demand was likely to materialize. This does not constitute policy commentary or policy advice, and it could be given as a range of examples based on policies observed in other jurisdictions. This would create more transparency on the utility's assumptions and, by clarifying the conditions under which it should start to shift from one scenario to another, make its use of scenarios actionable. Without such signposts to indicate the present is shifting away from what we had expected the future to hold under the base projections, there is limited value in making contingency scenarios.

[2] https://www.zebx.org/wp-content/uploads/2021/04/BC-Building-Electrification-Road-Map-Final-Apr2021.pdf

Self-sufficiency and alignment with the *Declaration on the Rights of Indigenous Peoples Act* (DRIPA)

Self-sufficiency

The public debate on the future of the Clean Energy Act's (CEA) self-sufficiency requirement has been made more complex by the lack of clarity on the extent to which BC Hydro might rely on imports to meet its future load resource balance. This is further compounded by the lack of clarity on renewal of IPP contracts, and the future of energy opportunities for Indigenous communities in particular.[3] The draft IRP treatment of contingency scenario does provide useful clarity on BC Hydro's expected use for imports, where it was allowed to rely on them for base case planning. The Draft IRP uses imports in the two 'accelerated electrification' scenarios on a temporary basis until new B.C.-based supply is brought online, presumably to enable BC Hydro to postpone its decision on the procurement of this additional power until it is clear this additional demand will manifest. If that is indeed the purpose for this allowance, it would be helpful for BC Hydro to state so explicitly.[4]

We agree with this proposed use of imports to meet temporary gaps in energy or capacity, as a means to delay committing to new supply until evidence of increased demand is made more clear. This use of temporary reliance on electricity markets in planning can mitigate the risk of over-building, and avoid a repeat of the surplus we are currently experiencing as a result of the electricity policies set by the government in 2008 and 2010. This can minimize costs to the ratepayers and avoid unnecessary environmental impacts from projects that might end up generating surplus.

Of course, nothing guarantees that BC Hydro would keep to this conservative use of imports should the self-sufficiency requirements be removed; even if in our opinion it is likely given the utility's historical preference for self-generation. To ensure this outcome, the government could set bounds on how imports are to be used by the utility, limiting them to temporary measures to allow for key elements of planning uncertainty to be resolved before committing to new resources. If imports are temporarily used in the base case, and not just in contingency scenarios, the utility should be asked to clarify why it relies on imports, and what signals it is waiting for to start securing these additional resources.

[3] For more on this see https://www.pembina.org/pub/first-nation-leadership-british-columbias-renewable-energy-future

[4] For a discussion of how self-sufficiency was integrated in the Draft IRP see TAC meeting #7 (16 Dec 2020) slides 55-63: https://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/corporate/regulatory-planning-documents/integrated-resource-plans/current-plan/2021-irp-tac-mtg7-20201216-slides.pdf

Role of Indigenous communities in IPP renewals and new supply

The Draft IRP announces BC Hydro's intent to renew most IPP contracts expiring in the next five years, signaling its intent to renew them based on the market value of the electricity generated. While these details will be sorted in one-on-one negotiation, we do support in principle the logic that renewed contracts should reflect the cost of continued operation—which should be much lower than the original price given that the original capital outlay should by now have been fully recovered.

We encourage BC Hydro, guided by its commitment to reconciliation and by the government's DRIPA, to consider the role of these renewals in providing economic opportunities and ongoing benefits to local Indigenous communities. The draft IRP placed reconciliation as a standalone objective, so as not to be seen as a trade-off objective amongst its other four main goals. BC Hydro should also provide some clarification on how Indigenous reconciliation will be considered in IPP renewal decision-making processes.

> **Recommendation 10: The IRP should clarify how BC Hydro intends to consider Indigenous reconciliation when renewing IPPs and securing additional resources. BC Hydro should provide preferential treatment based on the level of Indigenous equity and/or control, and prioritize projects providing meaningful Indigenous employment and other socio-economic benefits to Indigenous communities.**

DRIPA Articles 26 and 32 outline the right of Indigenous Peoples to determine the priorities for the development or use of their lands, territories, and other resources. B.C. recently issued a draft of the DRIPA Action Plan, which includes a commitment to engaging and supporting First Nations in identifying clean energy opportunities as they align with the province's climate goals, and conduct further inquiry into the regulation of Indigenous utilities. To enable and guide implementation of this commitment, we encourage the province to clarify the role of BC Hydro in reconciliation and DRIPA implementation, and to task the BCUC to consider this role when it reviews utility long-term plans and rate applications.[5]

[5] https://ecotrust.ca/priorities/energy/new-energy-modernizing-the-bc-utilities-commission-backgrounder/

Wild cards: LNG, blue hydrogen, and upstream electrification of natural gas production

The Draft IRP mentions BC Hydro's intention to include a contingency scenario for 'accelerated North Coast liquified natural gas & mining load' in the final IRP, but no details were included in the draft. This makes it challenging for us to comment on how BC Hydro will plan for this potentially important additional load. Some comments were provided during the fourth meeting of the TAC outlining three scenarios for LNG and mining electrification, but few details were provided on the level of LNG production or the level of upstream natural gas electrification considered in each.[6]

If the finalization of the IRP is, as we recommend, delayed to integrate new directions resulting from the update of the climate plan in the fall, we encourage BC Hydro to release this draft contingency scenario as soon as it is ready so that TAC participants and other stakeholders can comment on it. We also recommend that the load forecasts that were already shared with the TAC be shared as a standalone document in the meantime.

In absence of details, we offer this overarching recommendation for these proposed contingency scenarios:

> **Recommendation 11: Scenarios for load forecasts resulting from increased LNG exports should consider not only the use of electricity for compression and other on-site electrical demand, but also the electrification of the resulting upstream gas developments.**

In addition to increased LNG production, we note that the B.C. Government has also expressed interest in developing hydrogen production, both through electrolysis (green hydrogen) and through steam methane reforming of natural gas (blue hydrogen).[7, 8] Both types of hydrogen could significantly increase demand for clean electricity, with electrolysis for green hydrogen requiring large quantities of electricity, and blue hydrogen requiring electricity for plant operations, carbon capture and storage, and upstream electrification of natural gas production.

There is also an opportunity to use surplus hydro to create green hydrogen as a storage medium. Currently BC Hydro is looking primarily at utility scale batteries for this function.

> **Recommendation 12: The IRP should consider electricity demand for future green and blue hydrogen production in B.C.**

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[6] https://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/corporate/regulatory-planning-documents/integrated-resource-plans/current-plan/2021-irp-tac-mtg4-20200722-slides.pdf 19

[7] https://www.pembina.org/reports/hydrogen-climate-primer-2020.pdf

[8] https://www.pembina.org/media-release/bcs-hydrogen-strategy-misses-opportunity-prioritize-green-hydrogen

Demand-side management: Alignment with Electrification Strategy, CleanBC objectives, and long-term affordability

We support the direction set into the Draft IRP to prioritize DSM as a means to achieve short- and long-term load resource balance, noting that it significantly decreases planning risks as it can be incrementally ramped up or down as new load manifests or not. However, there are a few issues with the treatment of DSM in the Draft IRP which unnecessarily limits its potential, and which should be addressed in the final plan.

> **Recommendation 13: For DSM, BC Hydro should pursue the 'higher energy efficiency' option in the short term, rather than the 'base energy efficiency' option.**

It seems that the main argument for pursuing the lower level of DSM is that it leads to a lower impact on rates (Figure 1).[9] We believe this argument is flawed, and that there is a strong case for pursuing higher levels of energy efficiency DSM in the short term for three reasons:

1. DSM programs can help drive electrification, which in turn, by increasing load in a period of surplus, exerts a downward pressure on rates. From what we understand, this dynamic relationship between DSM spending and load growth was NOT modelled when the rate impacts of the different DSM options were assessed. We believe that, were it properly captured, this dynamic coupling would more than cancel out the 0.6% rate increase estimated for the 'higher energy efficiency' option (Figure 1).
2. As discussed above, the 'accelerated electrification' contingency scenario relies on the 'higher energy efficiency' DSM option to achieve load resource balance. Thus, opting to pursue this level of DSM in the short term is also a prudent way to prepare for the higher load that will likely materialize if B.C. is to meet its climate targets.

[9] Of the nine criteria listed, only in four does 'higher energy efficiency' not rate better than 'base energy efficiency' two of these relate rate impacts (by F2030 and F2041) ; the other two would be easily outweighed by the increased benefits: (1) the Cost-risk from DSM underdelivering will of course be higher as we rely more on DSM, but the converse is also true: the cost-risk of delays or under delivery by new supply projects also increase as more resources are needed because of reduced DSM. Similarly, while increasing DSM will reduce the number of jobs create by new supply projects, it will also create new jobs in energy efficiency markets. Economic analysis has shown that for a given investment, more jobs are created through energy efficiency programs than through energy supply projects. These jobs also tend to be better distributed across the province, and located where people live and work. (https://www.pembina.org/pub/canadas-renovation-wave p5-7). The fact that consequence tables do not make visible these 'reverse of the medal' arguments is symptomatic of a systemic under-appreciation of the uncertainty associated with 'hard' project (Site C being a clear case in point) and the over-emphasis of the uncertainty of DSM programs.

3. The impact of DSM on energy affordability should be measured in terms of its impact on the total bill for customers, rather than what they pay per unit of energy. By decreasing the total energy consumption of participants, DSM programs will generally save them some money – even if their rate per unit of energy eventually increases to pay for these DSM programs. Consumer bill impact should be evaluated for participant and non-participant clients in different ratepayer classes and used as a metric of affordability. Barriers to participation can be addressed to ensure no client is prevented from accessing the benefits of DSM programs, but the default assumption should be that, with increased offerings and with the support of capacity building programs (as those provided by utility-funded energy managers, see recommendations below), there is no reason for most customers not to avail themselves of these benefits. When there systemic barriers exist, for example for low-income or marginalized customers, these barriers are better addressed through program design rather than by reducing the overall amount of DSM.[10]

[10] For recommendations on improving income-qualified programs, see https://ecotrust.ca/latest/research/transforming-income-qualified-home-energy-retrofit-programs-in-bc/

HOW TO READ THIS TABLE

Each column corresponds to a portfolio formed by selecting the level of **Energy Efficiency** and then letting the portfolio optimization fill in the rest of the resource choices

Other portfolio resources chosen by the optimization model

The highest level of new renewables and the largest and fastest transmission build out

The lowest level of new renewables and the least and latest transmission build out

Objective (measure)	What is better?	No Energy Efficiency	Base Energy Efficiency	Higher Energy Efficiency	Higher Plus Energy Efficiency
Net Total Resource Cost ($M PV)	Lower	$2,470	$1,090	$480	-$150
Net Utility Cost ($M PV)	Lower	$2,470	$1,440	$1,210	$960
Cost risk from DSM under-delivery (MW below plan in 2030)	Lower	0	80	110	130
Cost risk from transmission schedule uncertainty (year in service Step 2)	Later	2034	2034	2034	2035
(year in service Step 3)	Later	2042	-	-	-
Rate impact (% change in F2030)	Lower	NA	0.0%	0.6%	1.2%
(% change in F2041)	Lower	NA	0.0%	1.5%	3.7%
Land and water impacts (index)	Lower	10.0	6.3	4.4	NA
New generation jobs (full-time equivalents)	Higher	730	570	370	260

Figure 12. Consequence table of portfolios with fixed energy efficiency options (continued)

the portfolio used as the basis of comparison

the alternative is **worse** than the base portfolio

the alternative is **better** than the base portfolio

Figure 1: Consequence table exploring trade-offs between DSM options (Draft IRP, 37)

Recommendation 14: BC Hydro should use customer bill impact, rather than rate impact, as a measure of energy affordability. Barriers to access DSM offerings by marginalized or remote customers should be addressed through targeted programs rather than by decreasing the level of DSM offered to all customers.

Recommendation 15: Clarify the degree of DSM uncertainty that the provincial government can influence.

There are different types of uncertainty affecting whether DSM programs can deliver on reductions, some of which can be significantly reduced through government policy. For example, whether new efficiency regulations for appliances will be adopted is uncertain for BC Hydro, but within the control of the B.C. government. There is, therefore, significant portion of the DSM uncertainty that can be reduced by regulatory clarity, and the Resource Option inventory could quantify the level of DSM uncertainty that can materially be reduced through policy. This could be assessed quantitatively through modelling tools such as BC Hydro's Policy Impact Estimator (PIE). Currently, with all sources of uncertainty lumped together, decision-makers are presented with a picture of uncertainty that is overstated.

Recommendation 16: Move forward with BC Hydro's plan to implement opt-in time varying rate to postpone capacity investment and support scaling up of capacity-focused DSM, as outlined in the Draft IRP.

Recommendation 17: BC Hydro should continue the use of corporate and community Energy Managers (CEM), and extend the program as it provides critical capacity across local governments and companies to support design, adoption, and implementation of utility DSM programs and government energy policies.

In closing this section, we offer two additional recommendations to improve the analysis of DSM resource options for the next DSM plan ahead of the 2025 IRP.

Recommendation 18: Re-instate DSM Option 5 in the Resource Options.

The current IRP only proposes three levels of DSM: base, higher, and higher plus. These probably align broadly with what was called DSM option 1, 2, and 3 in the previous resource option inventory.[11]

Option 5, which now seems to be missing, was an additional bundle designed by the Electricity Conservation and Efficiency Advisory Committee (recently re-launched as the Conservation

[11] https://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/corporate/regulatory-planning-documents/integrated-resource-plans/current-plan/0003-nov-2013-irp-chap-3.pdf , p3-22.

Energy Management Advisory Committee) to represent a more holistic shift towards integrated sustainability practices:

> *"This option aims to create a future where buildings are net-zero consumers of electricity with some buildings being net contributors of electricity back to the grid. Energy efficiency and conservation activities are pervasive throughout society and ingrained in a business decision-making culture. This shift is reflected through wide-spread district energy systems and micro-distributed generation; smaller, more efficient housing and building footprints; community densification; distributed workforce and hoteling (shared workspace); best practices in construction and renovation; efficient technology choices and behaviour; and an integrated community perspective (land-use, zoning, multi-use areas). A carbon-neutral public sector contributes to the culture shift. All BC Hydro customers would be exposed to marginal cost price signals to a greater extent. For the industrial sector, a market transformation to certified plants occurs, supported with expanded regulation."*[12]

We believe there is still value in the ongoing development of this DSM package, and to ensure it remains one option for consideration in resource planning. This holistic thinking is crucial when envisioning profound shifts in the long-term trajectory for B.C.'s energy system, particularly in the context of a significant shift towards electrification. Will we see the current use of the internal combustion engine simply shift to electrical vehicles, or might we see a deeper re-thinking of transportation prioritizing transit, active transportation, and walkable communities? How might such a shift affect future load balances? These holistic sustainability scenarios are increasingly achievable with the rise of distributed energy solutions, the internet of things, and telework. This raises another consideration for future DSM plans:

> **Recommendation 19: BC Hydro should start to develop DSM plans for transportation-related loads; as more and more people and goods use electric vehicles, demand on the grid will not only be impacted by when people charge vehicles, but also by how much they drive.**

Generally, we find that there is a lack of clarity on what is included in the three levels of DSM.[13] A presentation was given to the TAC committee that outlines how uncertainty in DSM delivery was characterized, and how it was considered in the context of load forecast uncertainty and uncertainty of supply sources.[14] We are encouraged by what seems a more rigorous treatment of DSM uncertainty than in previous IRP, and that the discussion explicitly states the value DSM offers by its capacity to be ramped up or down over time to better match supply to demand. It

[12] https://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/corporate/regulatory-planning-documents/integrated-resource-plans/current-plan/0003-nov-2013-irp-chap-3.pdf , p3-22.

[13] https://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/corporate/regulatory-planning-documents/integrated-resource-plans/current-plan/2021-irp-tac-mtgs3ab-presentation-20200600.pdf , 40

[14] https://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/corporate/regulatory-planning-documents/integrated-resource-plans/current-plan/2021-irp-tac-mtg7-20201216-slides.pdf, 40

still seems, however, that the IRP overemphasizes the uncertainty in DSM program's capacity to deliver expected energy savings, while systematically ignoring the important uncertainty in the completion timeline for new generation projects. While some of the longstanding bias toward discounting uncertainty in 'hard' supply options and overemphasizing uncertainty in DSM supply options has been corrected, the trend remains – as illustrated by the presence of DSM uncertainty risk in consequence tables and the total absence of new supply uncertainty risks (see Figure 1 as an example).

Recommendation 20: Better integrate non-financial factors into future IRPs.

Given that the detailed portfolio analysis results have not yet been shared, it is difficult to comment on whether the characterization of environmental and social attributes in this IRP have been improved compared to previous ones. From what we can see, optimization is still primarily driven by impact on rates, with only qualitative discussion of other attributes. This limits the capacity to incorporate information into the portfolio analysis in a material way. Making progress on this challenge should be a priority for the planning team.

Engagement Process

Overall, we found the format of the draft IRP document, and the TAC session that preceded its release to be conducive to engagement with the Technical Advisory Committee. The consequence tables and tables in appendix B were particularly helpful in understanding how the BC Hydro planning team understood trade-offs across different attributes and made choices. We commend the planning team for the overall clarity of these documents and quality of the conversation it facilitated in the TAC process.

The lack of a comprehensive package including the finalized resource option inventory, the electrification strategy, the details of the load forecast scenarios, and the results from the portfolio optimization did, however, make it more difficult get a more comprehensive view of these trade-offs and provide informed comments.

The IRP is an important document not only for infrastructure and program planning, but also as a shared vision for the electricity future of the province. While the current IRP is considerably more accessible than previous one, thanks to its plain-English style and concision, it still poses significant barriers for interested B.C. residents and decision-makers who might not have the technical background or time to make sense of it. The next recommendation, provided also during the previous IRP engagement, is meant to address this challenge:

Recommendation 21: BC Hydro should develop and utilize interactive tools and visualizations to help decision-makers and the public understand key factors affecting load resource balance and decision timelines.

Although the details of resource planning are undeniably complex, the economic, environmental and social tradeoffs could be presented in an intuitive manner, allowing a broader audience to engage in envisioning and shaping the province's energy future. BC Hydro could partner with the Pacific Institute for Climate Solutions and citizen-engagement experts from B.C.'s four research universities to develop such a tool.