PEMBINA institute

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Advice to BC Hydro Regarding the Draft Integrated Resource Plan

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Overview

The Pembina Institute appreciates the opportunity to provide comments on the draft IRP. On balance, the efforts on BC Hydro's part to analyze options and make that analysis available to TAC participants have been commendable. We have grouped our recommendations under the following headings:

- Scenario planning
- Clean energy act objectives
- Conservation
- New supply
- TAC process

One overarching challenge of this planning exercise is the fact that the economic and energy policy context in the province is in a period of rapid change, and has been for the last few years. To account for the potential of these fluctuations continuing, BC Hydro should prioritize flexibility in planning for new load and supply options. BC Hydro made commendable efforts to keep options open while reducing expenditures in the short term (IPP portfolio optimization, DSM expenditures revisions, advancing studies for GM Shrum upgrade and Revelstoke 6), yet fails to properly value flexibility in other decisions (Site C, limiting research on DSM options 4 and 5).

Looking at the changes in forecasted load resource balance (LRB) over the IRP drafting period shows a clear indication of the shifts in the planning landscape over the last two years. Between late 2011 and August 2013 the IRP analysis went from predicting an LRB in significant deficit over the entire planning period, to predicting a surplus for the next five to ten years. Taking the base case estimates for F2024 as an example, the LRB prediction went from a deficit of 9,046 GWh to a surplus of of 690 GWh, a swing of nearly 10,000 GWh[1].

There were both policy and economic drivers for this rapid change in the forecast. About half of the shift was due to the redefinition of the self-sufficiency requirement in February 2012[2], and ten percent was due to a revision of expected supply from IPPs (revised downward until F2021,

[1] Calculations based on BC Hydro data, spreadsheet available at: http://pubs.pembina.org/reports/energy-load-resource-balance-changes-bch-pembina.xlsx

[2] Self-sufficiency previously required BC Hydro to plan based on critical water level, and to plan for an additional 3,000GWh insurance after F2020. In February 2012, the definition of self sufficiency was readjusted to allow planning based on average water levels (thus reducing the resource load balance gap by 4,100 GWh), and to remove the insurance requirement.

upward after that). About 15 percent of the shift came from a reduction in the load forecast for residential, commercial, and industrial customers, and another 25 percent from the reduction in LNG base case load. Together, these factors changed the load resource balance predictions by up to 2.6 times the average energy expected from Site C. This is a significant shift in less than two years of planning, and we have reason to expect further shifts as various drivers, such as the size and pace of LNG, climate and environmental policy, technological innovation, and the role of distributed generation, are in rapid evolution.

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 constructive 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 facilitating a dialogue with British Columbians about developments like LNG with such wide ranging and significant costs and benefits.

Scenario planning

1. **Explore changes to provincial energy policy:** In the same way that BC Hydro has made good efforts to assess a range of market factors in developing the IRP, we recommend adopting a planning approach that assesses a range of provincial energy and climate policies. We recognize that BC Hydro does not want to be perceived as undermining the provincial government's role to set policy, but we believe it is important for its responsibility in long term electricity planning to consider the outcomes of a range of possible policies. Given that there were at least two major changes to provincial policy during the development of the IRP (self-sufficiency and LNG clean energy requirements), it seems prudent to ensure the robustness of the planning exercise and explore a range of potential futures.

   In order to avoid a conflict with the province's roles and responsibilities, this additional scenario planning should focus on a range of plausible futures without attempting to apply probabilities to them. It would also likely be more successful if it avoided specific policy instruments and instead focused on the types of outcomes those policy shifts could drive. As an example, a possible variable would be the degree of regional environmental protection in the province, which would have general impacts on the costs and availability of new supply options. There would be many ways that provincial governments could influence regional environmental protection (e.g. environmental assessment, protected areas, environmental pricing/taxation, water use planning, etc.), but the specific policy tool would not be the focus of the IRP, just the implications for resource planning needs and options. Similarly, the IRP could explore other possible policy spaces based on factors like the degree of climate protection (i.e. preference for fossil-fuel energy versus low-carbon options), the priority placed on energy self-sufficiency versus regional grid reliance, etc.

   From this map of possible futures, the IRP would then focus on the current policy context and make plans that are commensurate with current priorities. However, as these priorities shifts, there would remain a broader context to understand and prepare for the consequences of different policies.

2. **Develop and utilize better tools to help decision makers and the public understand the issues and tradeoffs:** The significant documentation for the IRP is an important part of the process that provides transparency for those with the ability to assess the

details. While we support continuous improvement in this documentation, it is also important to acknowledge its limitations in reaching audiences that are not able to explore the material in significant detail. To address this limitation, we recommend that BC Hydro develop and utilize interactive tools that make the issues being explored in the IRP more accessible to decision makers and the public. Although the details of resource planning are undeniably complex, the economic, environmental and social tradeoffs can also be presented in a simple and intuitive manner that allows a broader audience to engage in the process more meaningfully. The Pacific Institute for Climate Solutions citizens engagement stream of research could be a useful local resource in exploring these types of communication and engagement tools.

Clean Energy Act objectives

While our previous recommendations support the idea of exploring alternative provincial energy policy futures, we recognize that BC Hydro has an obligation to comply with existing legislation.

3. **Provide overall assessments of performance against *Clean Energy Act* objectives:** The executive summary of the IRP currently lists most of the *Clean Energy Act* objectives, but it provides only a limited assessment of how the IRP preforms against those objectives. Table 1-1 provides some of this assessment: in some cases assessing the IRP's performance against the objective, and in others assessing how individual actions relate to objectives without assessing if the net impact of actions is sufficient to meet the CEA objective. We recommend that all objectives be assessed at an IRP level (i.e. does the set of actions in the IRP as a whole meet the objective, in addition to an action level assessment if appropriate) and that a concise version of that assessment be included in the executive summary.
4. **Communicate that B.C.'s GHG targets are likely to be missed under current provincial policy and the IRP actions:** Table 1-1 indicates how different actions will help the province reduce greenhouse gas emissions. While this is useful and relevant information, the draft IRP does not explain how well the province will be doing against its overall GHG targets in 2020 and slightly in advance of 2050. Responsibility for meeting those targets clearly falls to the provincial government, but from our perspective, BC Hydro has an opportunity and responsibility to go beyond presenting greenhouse gas reductions and to help decision makers and the public understand what the IRP means for provincial greenhouse gas emissions.

   Based on analysis Pembina completed on the province's objective of having three to five LNG plants, it is almost certain that B.C. will miss its 2020 greenhouse gas reduction target based on current provincial policies and the actions in the IRP. The actual emissions will depend on the level of development and the technologies used to limit emissions, but based on a scenario of just one large project proceeding (24 million tonnes of LNG per year), the emissions from natural gas extraction and processing, and the LNG facilities, are estimated to be 21 million tonnes per year — 53 per cent of the provincial target for 2020. Given that the facilities will be operational into the 2040's and beyond, it is equally important to acknowledge the degree to which they would consume B.C.'s emissions target for 2050 (11 million tonnes for the entire province).

   We do not expect BC Hydro to figure out how B.C. is going to meet its greenhouse gas reduction targets, but we do think BC Hydro should be clear to decision makers that one of the consequences of the IRP is almost certainly to be B.C. missing its targets.

Conservation

There have been a number of encouraging shifts in the analysis and characterization of demand side management opportunities through the IRP process (e.g. the redevelopment of DSM option 5 and improvements to some of the language that characterized DSM in a negative light). These are on top of improvements from the last long-term acquisition planning process that did not look at DSM options more expensive than the cost of supply. We still see several areas in the draft IRP where conservation efforts could be improved.

5. **Accelerate timelines for DSM options 4 and 5:** We do not agree with the lack of urgency regarding the investigation and potential deployment of activities in DSM options 4 and 5, which wouldn't move forward until at least the next IRP is completed (potentially 2017). We understand that the lack of data on potential energy and capacity savings from these options complicate their inclusion in supply options and expenditure plans; however, until further research is conducted to pilot and evaluate these approaches this will remain a self-fulfilling prophecy, and we will miss a potential opportunity for long term savings provided by these DSM options. Some resources were allocated in recommended action 3 to advance some of the codes and standards research called for in options 4 and 5; however, from our perspective, the scope of effort is not sufficient to ensure adequate information is available to include options 4 and 5 in future planning. This information should be available when DSM expenditures ramp up again in or around F2017, and before a decision is made on Site C.
6. **Accelerate timelines for capacity DSM options:** Similarly to the previous recommendation, language on this in the draft IRP does not convey a sense of urgency in the explorations of capacity focused DSM, which is incongruent with the fact that BC Hydro is projecting relatively near term capacity constraints.
7. **Clarify the degree of DSM uncertainty that the provincial government can influence:** The uncertainty analysis conducted on DSM options has been a useful exercise that appears to have helped reduce the potential of overestimating expected savings from DSM options. However, it is important to acknowledge that there are different types of uncertainty, some of which can be influenced or completely controlled by the provincial government. For example, whether or not the provincial government is going to pass regulations for new lighting standards is something that is uncertain from BC Hydro's perspective, but something that the B.C. government can see with relatively high certainty because they make the decision as to whether regulations will proceed or not. BC Hydro has not indicated how significant these 'controllable' sources of uncertainty are, and because all of the sources of uncertainty are lumped together, decision-makers are presented with a picture of uncertainty that is overstated. The presentation of the IRP should be revised to indicate the different types of uncertainty.

New supply

8. **Include metrics of flexibility in portfolio analysis:** Some resource options offer more flexibility to BC Hydro than others; DSM expenditures and expected savings can be adjusted up or down depending on the short term forecast, as was done in this revision of the IRP. The current DSM plan decreased expenditure by $127M, a 22 percent decrease in the F2014-2017 plan proposed in the last draft of the IRP, while maintaining long term energy savings objectives. This is a timely example of the capacity of DSM to respond quickly to new load resource balance outlooks. Despite the obvious value of this

flexibility, there is currently no way to explicitly include this as a decision factor in the portfolio analysis which guides the new supply outlook in the IRP.

Similarly, through the recent IPP portfolio optimization process, the IPP contribution to the forecasted energy surplus was reduced by roughly 1,800 GWh, and a further 1,500 GWh was delayed by 0.5 to 2 years. This is another example of flexibility which would not be offered by committing to larger supply sources, like Site C. This adaptive advantage could be leveraged further going forward by releasing smaller annual calls for power based on the latest revisions of the load resource balance. Had we adopted such an approach instead of the large power calls of the early 2000s, we might not be finding ourselves in the current surplus situation. Incorporating a mechanism for pre-approval of projects, such as discussed in recommendation 9 below, could further decrease in-service time and allow for a more reflexive response to predicted mid-term load increases.

The current inability to assess and value the flexibility of different supply options is a significant shortfall which should be remedied, preferably as an explicit quantitative factor in the portfolio optimization. One way to do this, albeit computationally expensive, would be to consider various decision points with alternate scenarios along the planning horizon, and to calculate the risk of stranded assets for various supply options based on decisions along these multiple paths. Another approach could be to add a 'flexibility credit' akin to the 'capacity credits' used to adjust UEC and consider different values for flexibility when doing sensitivity analysis. Finally, portfolios should be compared to each other under a range of possible load resource balance gaps. This was done in the Site C sensitivity analysis, and shows that under a small gap scenario the NPV of Site C is more than a billion dollars more expensive than a more adaptive clean resources portfolio (Table 6-12).

9. **Account for deliverability and cost uncertainty for supply projects:** The draft IRP continues to suffer from a relatively weak approach to characterizing uncertainty on supply side resources apart from an assumed attrition rate for new projects. This stands in stark contrast to the excellent effort to characterize and account for uncertainty in DSM options. The implications of this weakness are unclear, but based on the relatively significant implications of assessing uncertainty in efficiency and conservation options, it would be prudent to apply a similar approach to supply side options.

   All supply-side options will have uncertainties about costs that will impact their attractiveness relative to each other and to DSM options. Site specific projects such as Site C that are not easily replaced with alternatives will also have uncertainty relating to deliverability (i.e. can the project be developed) that are not assessed in the IRP. Taking Site C as an example, there is a probability that it will not be approved, there is a probability that it will take longer to develop than anticipated, and there is a probability that its cost will differ from the estimate currently presented in the IRP. From Pembina's perspective, these types of uncertainties seem material to the planning process in the same way that DSM uncertainties have proven to be. For the portfolio analysis, the energy savings expected for DSM measures is adjusted downward in an effort to reflect their uncertainty; to ensure a fair comparison, the average energy expected from supply options should be similarly adjusted to capture delivery uncertainty.

10. **Account for the impacts of climate change on new projects:** The draft IRP discusses climate change impacts for BC Hydro's existing system, and the conclusion relayed in the draft IRP is that the potential impacts are minor when looking out to 2050.

This may be a valid conclusion for the existing system, especially within the planning horizon, but the level of analysis is inadequate for new projects given those projects will be operational into the 2060s and 2070s and beyond when climate change impacts are expected to accelerate. For example, changing flows on the Peace River could positively or negatively impact the timing and availability of energy from Site C, and those types of impacts need to be accounted for in the analysis. We recommend accelerating the next steps in BC Hydro's climate change adaptation strategy with a focus on assessing the implications for Site C and figuring out how to account for climate change impacts on power projects where BC Hydro is not the proponent. The analysis should also be extended beyond hydro-electric projects to assess the potential implications for wind and biomass resources.

11. **Delay construction decision on Site C:** For several reasons, we feel a decision to move ahead with Site C continues to be premature. BC Hydro has clearly not addressed the concerns being expressed by Treaty 8 First Nations and until those concerns are substantively addressed, it is not clear how the project would have free, prior and informed consent from those communities. The conclusion that Site C is the cheapest supply option does not appear to be robust enough to justify a multi-billion expenditure. Based on the information presented in the IRP, we consider a gradual commitment through smaller regular power calls to be a more fiscally prudent approach – even if costs might be higher.

    According to BC Hydro's portfolio analysis, without LNG, upgrades to GM Shrum and Revelstoke 6 would be sufficient to fill the capacity gap until F2027 (under DSM option 2, p. 6A-19) or F2028 (under DSM option 3, p. 6A-31). Even considering a seven year construction period, that would still provide until F2019 or F2020 to make a decision on Site C. This delay should be used to better understand the future of LNG, the role of distributed generation, and the conservation potential of DSM option 4 and 5, and thus inform the need for Site C. Given the magnitude of the expenditure, we also consider that it would be in the public interest for this project to be reviewed by the BCUC.

12. **Strengthening the analysis of Site C:** There are three specific areas where we think the analysis and consideration of Site C should be strengthened prior to committing to the project: accounting for cost uncertainty, strengthening the sensitivity analysis, and factoring in non-financial considerations.

    The assumption that Site C is a more cost effective option should be further tested for robustness. For a F2024 in-service date, The IRP estimates the NPV cost difference between Site C and an optimized clean resource alternative to be 630 million dollars: less than 8 percent of the estimated total cost of the investment for Site C. The gap nearly halves (360 million) assuming a ten percent capital cost overrun for Site C; cost overruns larger than this are not uncommon for large projects – particularly if there is competition for skilled labour from other large scale projects, like LNG plants, major pipeline construction, or a growth of NG sector in NE BC. We recommend that BC Hydro re-evaluate the portfolio cost comparisons once the cost implications of the previous four recommendations are considered, and after the cost estimate for Site C is revised based on new information that emerges from the joint review panel.

    The sensitivity analysis conducted in Section 6.4 offers some insights, but is limited by the fact that each factor is only considered in isolation, and that some intermediate options are not considered. For example, the sensitivity analysis clearly shows that Site C is not cost effective under the low-gap scenario, with an additional NPV cost of over a

billion dollars over the clean resource option. Given that BC Hydro only assigns a ten percent likelihood to this scenario, we also would recommend considering intermediate options, and a broader range of likely outcomes. This would help illustrate the size gap in which the clean portfolio is cost competitive with Site C, the likelihood of that outcome, and whether it can be achieved through more aggressive DSM. Furthermore, given that delaying Site C to F2026 shows to be more cost effective than meeting the earliest in service date of F2024, it would also be valuable to show what the cost advantages (if any) are to delaying Site C to F2028 or F2030. While we appreciate that there are limits to duration of environmental permits, if they are granted, we still would consider it a valuable source of information for BC Hydro and the government, who grants the aforementioned permits, to consider.

There are several non-financial factors where Site C differs substantially from the clean portfolio and we think it would be valuable to explore these tradeoffs in more detail and figure out how to more explicitly include them in the IRP decision making framework. In particular:

- Compared to the clean resource portfolio, Site C has more than double the land footprint, an additional 3,110 ha reservoir, and 123 km of affected stream (Table 6-14, p. 6-39). Because the clean portfolio selected by the optimizers includes municipal solid waste generation, the selected portfolio has a greater GHG footprint than Site C (217,000 tonnes CO2e/yr); though this could be reduced by prioritizing low-emissions or carbon neutral resources.
- While Site C would offer 30 percent more jobs during the seven year construction period, the clean energy portfolio is estimated to offer 13 times more jobs for operation of the facilities, thus offering real opportunities for long term economic development in rural areas (table 6-15, p. 6-40).
- And as discussed earlier, the clean portfolio offers the significant advantage of being adjustable throughout the planning period, thus diminishing the risk of stranded assets and managing the possibility of further rate increases.

13. **Expedite permitting for additional renewable energy projects:** We would not want a delay in Site C or other renewable energy projects to translate into increased pressure to build natural gas-fired generators in the province because they are deemed to be the only option that can be deployed quickly enough to meet demand. To mitigate against this risk and keep options open, we recommend moving ahead with permitting work for additional renewable energy generation projects such that they can be deployed on a faster timeline if needed. This would necessitate some sort of additional relationship with independent power producers that would reserve BC Hydro's right to access the power at a certain price, while also giving the producer the financial certainty to move forward with the permitting steps that aren't typically completed until an electricity purchase agreement is in place.
14. **Test approaches to better integrate non-financial factors into future IRPs:** The efforts to characterize environmental attributes in this IRP represent a notable improvement from past BC Hydro planning processes. They still leave much to be desired, however, because although the characterization has become much more sophisticated, there is still limited ability to incorporate the information into the analysis in a material way. Making progress on this challenge should be a priority post-IRP approval so that possible approaches can be developed and reviewed prior to the start of the next IRP.

One approach would be to estimate the non-financial costs for resource options in the same way that BC Hydro pioneered efforts to include GHG costs several years ago. Estimating other environmental costs is admittedly a challenge, but that is not a good reason to avoid the issue because by avoiding it, the current approach is akin to saying those environmental attributes (beyond GHGs) do not have a value, which is clearly not the case in reality.

TAC Process

The following four recommendations relate to the TAC process itself and are for consideration for future IRPs or other BC Hydro planning processes.

15. **Form an ongoing resource planning advisory committee:** as we have discussed, the electricity landscape is shifting rapidly, and BC Hydro should cultivate a capacity to adjust its plan on a more ongoing basis. Regular engagement with stakeholders on issues of resource planning would provide a forum to address changes as they occur, get diverse perspectives on possible paths forward, and build relationships that allow participants to engage each other with trust and clarify areas of consensus. The existing Energy Efficiency and Conservation committee is a successful model that could inspire such a committee.
16. **Increase the effort to find consensus within the TAC:** The TAC's terms of reference made space to actively explore possible areas of consensus, but this option was not attempted through the process. While it is hard to predict if consensus would have been possible given the range of perspectives represented on the TAC, it would have been worth the effort to try. The potential value in this exercise is that BC Hydro may be able to find areas where there is explicit support (or opposition) across a range of interests and it allows those parties to directly seek compromises.
17. **Use an external facilitator:** While the BC Hydro staff tasked with facilitating the TAC did a good job, our perspective is that the overall process would be more effective with an external facilitator (an approach used by BC Hydro for other processes such as the EC&E committee). Given that BC Hydro was also a participant in the discussions, a facilitator from an organization not affiliated with any of the participants would likely have helped advance the TAC discussions and improve the quality of advice to BC Hydro.
18. **Increase participant funding:** The participant funding made available to TAC members was adequate to prepare for meetings and participate in those meetings. Pembina appreciates this support, and encourages BC Hydro to continue making participant funding available for future processes. In the interests of supporting well thought through advice from the TAC, we would also recommend that BC Hydro make additional participant funding available to acknowledge the time requirements involved in developing advice to BC Hydro outside of TAC meetings. There were five instances in which BC Hydro solicited TAC input in addition to advice provided during meetings and funding was not available for these contributions.