
From: Commission, Secretary
Sent: Monday, March 1, 2021 11:33 AM
To: 'BCHydroRegulatoryGroup@bchydro.com'
Subject: British Columbia Hydro and Power Authority – Compliance Filing for the Fiscal 2020 to Fiscal 2021 Revenue Requirements Application – BCUC Staff Question No. 1

March 1, 2021

Mr. Fred James
Chief Regulatory Officer
British Columbia Hydro and Power Authority
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Vancouver, BC V6B 5R3
bchydroregulatorygroup@bchydro.com

Re: British Columbia Hydro and Power Authority – Compliance Filing for the Fiscal 2020 to Fiscal 2021 Revenue Requirements Application – BCUC Staff Question No. 1

Dear Mr. James,

Further to your December 1, 2020 filing of the above-noted matter, enclosed please find British Columbia Utilities Commission Staff Question No. 1. Please file your responses on or before Monday, March 29, 2021.

Regards,



bcuc
British Columbia
Utilities Commission



D. Guest

Administrative Assistant, Regulatory Services

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British Columbia Hydro and Power Authority
Compliance Filing for the Fiscal 2020 to Fiscal 2021 Revenue Requirements Application

STAFF QUESTION NO. 1 TO BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

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A. SECTION 3 – ENERGY STUDIES MODELS

- 1.0 Reference: ENERGY STUDIES MODELS
British Columbia Hydro and Power Authority Fiscal 2020 to Fiscal 2021 Revenue Requirements Application Compliance Filing dated December 1, 2020 (Compliance Filing), Section 3.1.3, 3.2.1, pp. 29, 33
Resource Mix**

On page 29 of the Compliance Filing, British Columbia Hydro and Power Authority (BC Hydro) states:

Over a number of years, the generation from BC Hydro’s hydroelectric facilities must be about equal to the inflows that have occurred, subtracting inflow that is spilled. BC Hydro’s mix of resources is set through long-term planning, such as Integrated Resource Plans, or through planning decisions such as whether to renew or enter into IPP contracts or upgrade BC Hydro facilities. The Energy Studies do not inform these planning decisions.

- 1.1 Please clarify whether the Energy Studies, rather than the Integrated Resource Plans, determines the amount of inflow to spill.
- 1.2 Please confirm, or explain otherwise, that the Energy Studies influence the resource mix for operational purposes.
- 1.3 Please explain how BC Hydro reconciles the mix of resources set through long-term planning versus the mix that it ends up using to meet domestic load.

BC Hydro further shows in Table 3-14 that in F2020 and F2021, the dispatchable percentage of cost of energy is 27 percent and 9 percent, respectively.

- 1.4 Please explain what causes the year-to-year difference in the percentage of dispatchable cost of energy between F2020 and F2021.

**2.0 Reference: ENERGY STUDIES MODELS
Compliance Filing, Section 3.2.4, p. 41
Jurisdiction Review**

On page 41 of the Compliance Filing, BC Hydro states its system optimization objective is consistent with the approach taken for other large hydroelectric systems based on its attendance at conferences in hydropower optimization and correspondents with other experts from peer utilities.

2.1 Please provide a summary of BC Hydro’s jurisdictional review as described in the preamble above.

**3.0 Reference: ENERGY STUDIES MODELS
BC Hydro Fiscal 2020 to Fiscal 2021 Revenue Requirements Application Decision and Order G-246-20 dated October 2, 2020 (BC Hydro RRA Decision), Section 6, p. 198
Compliance Filing, Section 3.2.3, pp. 37–38
Jurisdiction review**

Under Directive 8 contained in the BC Hydro RRA Decision, the BCUC directed BC Hydro to address, in its compliance filing, how price risk and availability risk are recognized in the system optimization objective.

On pages 37 and 38 of the Compliance Filing, BC Hydro describes the nature of price risk and states BCH takes a “risk neutral approach.”

3.1 Please elaborate on how price risk is recognized in the system optimization objective through BC Hydro’s “risk neutral approach.”

**4.0 Reference: ENERGY STUDIES MODELS
Compliance Filing, Section 3.2.3, pp. 38–39
Energy Studies Models Constraints**

On pages 38 and 39 of the Compliance Filing, BC Hydro explains the risk of having too little or too much water is managed through constraints into the Energy Studies models. However, BC Hydro will make decisions to not follow economic, risk neutral price signals in order to reduce the risk of too little or too much water.

4.1 Please explain how BC Hydro determines the appropriate constraints to establish in the Energy Studies Models in order to manage water levels.

4.2 Please elaborate under what circumstance would BC Hydro make decisions to not follow economic, risk neutral price signals in order to reduce the risk of too little or too much water.

4.2.1 Please comment on how frequently BC Hydro makes decisions to not follow economic, risk neutral price signals in order to reduce the risk of too little or too much water.

4.3 Please clarify whether the Energy Study Models, in conjunction with the constraints established, would produce an output in accordance with economic, risk neutral price signals that would put BC Hydro’s system at risk of having too much or too little water.

4.3.1 If yes, please discuss whether the constraints and/or the objective function of the Energy Study Models can be adjusted to reduce the risk described above.

**5.0 Reference: ENERGY STUDIES MODELS
Compliance Filing, Section 3.2.5, pp. 41–43
Alternative Systems Optimization Objective**

On page 41 of the Compliance Filing, BC Hydro states: “In response to the BCUC’s Decision, BC Hydro

tested an alternative system optimization objective to underscore why maximizing CNRO is a desirable objective from the perspective of ratepayers. The results indicated that using the alternative objective could increase the annual cost of energy by approximately \$30 million to \$50 million, on average.

On page 42 of the Compliance Filing, BC Hydro describes the alternative system optimization:

Specifically, we conducted a test to determine the difference between BC Hydro's system optimization objective of maximizing expected CNRO and an objective where there is a preference to serve load using BC Hydro owned or contracted resources and to discourage wholesale electricity trade unless it is necessary to manage surpluses and deficits". However, BC Hydro notes it "[d]id not change the objective function of the model; rather, BC Hydro changed the input market price so that exports were given a low price and imports were given a much higher price. Under this approach, the model still imports or runs thermal generation or meet any deficits (to meet load) and still exports surplus (to avoid spill) but has no economic incentive to take advantage of wholesale electricity market opportunities.

BC Hydro also states on page 43 that: "The variability of inflow that between a low water year and high water year (+/- 7,000 GWh/year) means that there will always be large swings in BC Hydro's Cost of Energy. The Cost of Energy can change by +/- \$200 million to \$400 million each year due to do the uncertainty around key drivers of inflow, load, and market prices."

- 5.1 Please confirm, or otherwise explain, that exports were given a low price and imports were given a much higher price as a way to simulate the alternative objective function without changing the objective function in the model.
 - 5.1.1 Please comment on the effect of the assumption of higher import and lower export prices on the modelled cost of energy.
 - 5.1.2 Did BC Hydro conduct a sensitivity analysis with respect to the import/export pricing assumptions?
- 5.2 Please explain whether it is possible to change the objective function of the model to reflect the alternative objective function.
 - 5.2.1 If the objective function of the model is changed to reflect the alternative objective function and the market price assumptions were reversed, i.e. imports are given a low price and exports were given a high price, would the alternative system optimization still result in an increase to the annual cost of energy?
 - 5.2.2 Is it possible to run the alternative objective function on historical data that uses actual market prices?
 - 5.2.2.1 If yes, please provide the analysis on the alternative objective function using historical market price data in the most recent one-year period.

**6.0 Reference: ENERGY STUDIES MODELS
Compliance Filing, Section 3.4.1, p. 52
Amazon Web Service**

On page 52 of the Compliance Filing, BC Hydro identifies the update of the Amazon Web Service as its third priority (ahead of back testing) in order to remain current due to technology changes.

- 6.1 Please elaborate on how the Amazon Web Service is relied upon in running BC Hydro's Energy Studies models.

6.2 Please explain why updating the Amazon Web Service is a higher priority than back testing.

**7.0 Reference: ENERGY STUDIES MODELS
Compliance Filing, Section 3.4.1, p. 52
Load Variability Model**

On page 52 of the Compliance Filing, BC Hydro states that its Load Variability Model needs to be redeveloped due to the complexity of the architecture of the existing model, to incorporate functional improvements and to address succession planning within the team.

7.1 Please explain whether the redevelopment of BC Hydro’s Load Variability Model would impact the load forecasting models and process. If yes, please explain how.

**8.0 Reference: ENERGY STUDIES MODELS
Compliance Filing, Section 3.4.2, p. 56 and Section 3.4.3. p. 56
Benchmarking and Back Testing**

On page 56 of the Compliance Filing, BC Hydro states that its “operational planning models and tools meet all of BC Hydro’s operational requirements. They are regularly improved, validated and updated.”

On page 56, BC Hydro also provides the following summary of the estimates to complete the benchmarking and back testing work:

Table 3-18 Summary of Resources Required for Benchmarking and Back Testing Plan

| Resource | Cost and Time Estimate |
|----------------------------------|--|
| 1 FTE (consultant) | 3 years at \$55 per hour = \$340,000 |
| Internal subject matter experts | ~1200 hours over 3 years at \$125 per hour = \$150,000 |
| UBC Program (Professor Shawwash) | \$100,000 |
| Project Manager | ~1/2 day per week for 3 years at \$120 per hour = \$75,000 |
| Total | \$665,000 |

8.1 What is BC Hydro’s current budget for Energy Studies model testing and benchmarking? Please identify what, if any, portions of this are incremental to BC Hydro’s planned budget.

**9.0 Reference: ENERGY STUDIES MODELS
BC Hydro RRA Decision, Section 6, p. 199; Compliance Filing, Appendix D, p. 2
Within Month Model Review Frequency**

Directive 12 from the BC Hydro RRA Decision included the following:

5. Provide a brief description for each of the within-month planning tools used, which includes:
 - a. the age of each tool;
 - b. how frequently each tool is reviewed and updated;
 - c. whether source code or documentation exists that supports each tool;

On page 2 of Appendix D to the Compliance Filing, BC Hydro states under review frequency, the SOPHOS and Ultralight Models’ review was included in 2019 Energy Studies internal audit.

9.1 Please elaborate on whether the SOHPOS and Ultralight Models are reviewed on a regular basis. If yes, please provide the review frequency. If not, please explain why not.

**10.0 Reference: ENERGY STUDIES MODELS
BC Hydro RRA Decision, Section 6, p. 199; Compliance Filing, Section 3.4.3, p. 58
Audit Report**

Directive 12 from the BC Hydro RRA Decision included the following:

6. Provide the most recent audit report that identifies the scope and results of the review of the within-month planning tools.

In response, BC Hydro states on page 58 of the Compliance Filing that it has not conducted an audit of this nature.

- 10.1 Please discuss the cost and internal resources required to conduct an audit that identifies the scope and results of the review of the within-month planning tools.
- 10.2 Please explain whether BC Hydro has plans to conduct an audit as described above in the future. If yes, please provide an estimate on the scope and timeline. If not, why not?

B. SECTION 5 – LOAD FORECAST

**11.0 Reference: LOAD FORECAST
BC Hydro RRA Decision, Section 6, p. 198; Compliance Filing, Section 5.1.1, p. 69
Forecast Types**

Directive 5 from the BC Hydro RRA Decision states that “BC Hydro is directed to, as part of its compliance filing:

1. Provide the BCUC with general time estimates to prepare: a comprehensive load forecast, “partial updates” and “adjustments”...;

On page 69 of the Compliance Filing, BC Hydro provides Table 5-21 which includes the following forecast types: Comprehensive, Update, and COVID-19 Scenarios. “Adjustment” is not included as one of the forecast types.

- 11.1 Please confirm, or explain otherwise, that BC Hydro does not perform a forecast “adjustment.”
- 11.2 Please explain when did BC Hydro introduced “COVID-19 Scenarios” as one of the forecast types.
 - 11.2.1 Please explain whether the “COVID-19 Scenarios” will continue to be a forecast type in place to respond to other similar extraordinary circumstances after the COVID19 pandemic.

C. SECTION 7 – SUBSIDIARIES

**12.0 Reference: SUBSIDIARIES
Compliance Filing, Section 7.3.1, 7.4, Table 7-24, pp. 86–87, 91
BCHPA Captive Insurance Company Ltd.**

On page 86 of the Compliance Filing, BC Hydro states:

BCHPA CIC is part of BC Hydro’s regulated business in that BCHPA CIC serves as an intermediary to provide BC Hydro access to the global reinsurance market in support of BC Hydro’s overall insurance requirements (i.e., it sells BC Hydro insurance at market rates).

On page 87 of the Compliance Filing, BC Hydro states:

The day to day management of BCHPA CIC [BCHPA Captive Insurance Company Ltd.] is outsourced to Aon Insurance Managers. The work of Aon Insurance Managers is overseen by BC Hydro's Treasury Department. Aon Insurance Managers is responsible for bookkeeping, preparation of financial statements, tax filings, license renewal, actuarial work, and issuance of insurance policies.

BC Hydro's revenue requirements do not include BCHPA CIC costs or revenues, and as a result, BC Hydro ratepayers do not receive the benefit of BCHPA CIC's planned net income or loss. The planned costs of insurance procured by BC Hydro from BCHPA CIC, which reflect market rates, are included in BC Hydro's revenue requirements.

Table 7-24 of the Compliance Filing shows that the net losses of Edmonds Centre Developments Limited and Fauquier Water and Sewerage Corporation are included in BC Hydro's revenue requirement. Further on page 91 of the Compliance Filing, BC Hydro states that these companies are part of BC Hydro's regulated business.

- 12.1 Please explain why BCHPA CIC's costs and revenues are not included in BC Hydro's revenue requirements given that it is part of BC Hydro's regulated business and other subsidiaries' net losses that are part of BC Hydro's regulated business, such as Edmonds Centre Developments Limited and Fauquier Water and Sewage Corporation, are included.
- 12.2 Please discuss whether the costs related to the oversight of BCHPA CIC is embedded within various BC Hydro budgets and included in the revenue requirement.
 - 12.2.1 If yes, please quantify the annual cost included in BC Hydro's revenue requirement and the rationale for recovering these costs from BC Hydro's ratepayers.

**13.0 Reference: SUBSIDIARIES
Compliance Filing, Section 7.3.2, p. 88; Appendix F-5
Columbia Hydro Constructors Ltd.**

On page 88 of the Compliance Filing, BC Hydro states:

BC Hydro provides limited financial accounting and oversight services on behalf of CHC [Columbia Hydro Constructors Ltd.].

[...]

When CHC is active and engaged by BC Hydro, its costs flow through to BC Hydro and are included in the cost of the associated capital project(s). BC Hydro's revenue requirement does not include planned costs, revenues or net income of CHC. BC Hydro prepares unaudited financial statements on behalf of CHC, which are provided in Appendix F-5.

CHC's Statements of Operations and Retained earnings in Appendix F-5 does not show any general and administration expenses in fiscal 2020.

- 13.1 Please confirm, or explain otherwise, that CHC is currently not active.
- 13.2 Please clarify whether the cost of providing financial accounting and oversight services to CHC is embedded within various BC Hydro budgets and included in the revenue requirement.
 - 13.2.1 If yes, please quantify the annual cost included in BC Hydro's revenue requirement and the rationale for recovering these costs from BC Hydro's ratepayers.

13.2.2 If no, please clarify where these costs are included in CHC's Statements of Operations and Retained earnings.

On page 88 of the Compliance Filing, BC Hydro also states:

The Columbia Power Corporation also retains the ability to retain CHC to perform work on its generation capital projects. In instances where Columbia Power Corporation has engaged CHC on its projects, Columbia Power Corporation will enter into an agreement with BC Hydro to cover payroll or administration costs required to operate CHC.

13.3 When Columbia Power Corporation retains CHC to perform work on its generation capital projects, please discuss whether BC Hydro's revenue requirement would include any costs related to the payroll or administration costs to operate CHC and any related recoveries from Columbia Power Corporation.

13.3.1 If yes, please confirm, or explain otherwise, that the amounts recovered from Columbia Power Corporation would fully offset any costs incurred by BC Hydro.

13.3.1.1 If not confirmed, please discuss whether any shortfall would be recovered from BC Hydro's ratepayers and the rationale for recovery from BC Hydro's ratepayers.

**14.0 Reference: SUBSIDIARIES
Compliance Filing, Section 7.3.3, p. 90; Section 7.1, Table 7-23, p. 84; Appendix F-7
Tongass Power and Light Company**

On page 90 of the Compliance Filing, BC Hydro states:

BC Hydro includes Tongass' [Tongass Power and Light Company] planned revenue as part of line 1 17 of Schedule 14 of Appendix A (\$132,540 in fiscal 2020 and \$141,508 in fiscal 2021)....

BC Hydro incurs but does not separately track the costs it incurs in support of Tongass (e.g., operations, maintenance, emergency repairs, or capital replacement costs). Instead, these costs are embedded within various BC Hydro budgets. Tongass has no employees, staff or management. Most of the field workers used to support Tongass are from BC Hydro's offices in Terrace, British Columbia. The result is that ratepayers are receiving the benefit of the planned revenues for Tongass and are paying for the planned costs within BC Hydro budgets to support Tongass' operations. Other costs within Tongass' financial statements are not included within BC Hydro's revenue requirements.

The footnote to Table 7-23 of the Compliance Filing states: "In addition to this inclusion, costs incurred by BC Hydro in support of the operations of Tongass Power and Light Company (e.g., cost of energy, certain personnel expenses, maintenance, etc.) are embedded in BC Hydro's revenue requirement."

Tongass' Statements of Operations and Deficit in Appendix F-7 of the Compliance Filing shows revenues consisting of residential, commercial and interest income and expenses consisting of energy costs, depreciation costs and finance charges.

14.1 Please discuss whether it is possible to separately track the costs BC Hydro incurs in support of Tongass (e.g. cost of energy, operations, maintenance, emergency repairs, or capital replacement costs). Why or why not?

14.1.1 To the best of your abilities, please provide an estimate of these costs.

- 14.2 Please confirm, or explain otherwise, that Tongass' forecast energy costs, depreciation costs and finance charges as provided in its Statements of Operations and Deficit are not included in BC Hydro's revenue requirement.
- 14.2.1 If confirmed, please explain how the energy costs in Tongass' Statements of Operations and Deficit differs from the cost of energy that is embedded in BC Hydro's revenue requirement.
- 14.2.2 If not confirmed, please identify the "other costs" within Tongass' financial statements that are not included within BC Hydro's revenue requirement.
- 14.2.3 Please explain why the costs BC Hydro incurs in support of Tongass (e.g. cost of energy, operations, maintenance, emergency repairs, or capital replacement costs) should be included in BC Hydro's revenue requirement while the "other costs" within Tongass' financial statements are not included.
- 14.3 Please confirm, or explain otherwise, that all of Tongass' revenues in its Statements of Operations and Deficit are included in BC Hydro's revenue requirement.
- 14.3.1 If not confirmed, please identify which revenues are not included and the rationale for not including these revenues in BC Hydro's revenue requirement.