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February 15, 2019

Mr. Patrick Wruck
Commission Secretary and Manager
Regulatory Support
British Columbia Utilities Commission
Suite 410, 900 Howe Street
Vancouver, BC V6Z 2N3

Dear Mr. Wruck:

RE: Project No. 1598877
British Columbia Utilities Commission (BCUC or Commission)
British Columbia Hydro and Power Authority (BC Hydro)
Review of the Regulatory Oversight of Capital Expenditures and Projects
Rebuttal Evidence

BC Hydro writes in compliance with Commission Order No. G-226-18 to provide its written Rebuttal Evidence in this proceeding. BC Hydro will be filing under a separate cover letter further rebuttal evidence in the form of an independent expert report from Dr. Paul Carpenter and Dr. Toby Brown of The Brattle Group.

As set out in the attached Rebuttal Evidence, BC Hydro's view is that the Commission should not accept the proposals of the Commercial Energy Consumers Association of B.C. (**CEC**) as set out in the evidence of Mr. Craig filed as Exhibit C3-10.

On February 14, 2019, the B.C. government (the **Government**) issued its Comprehensive Review of BC Hydro: Phase 1 Final Report (the **Final Report**). As indicated in the Final Report, the Commission's jurisdiction to regulate BC Hydro will be increasing in several aspects. Amongst other changes, the Government has rescinded Direction Nos. 3, 6 and 7 (also on February 14, 2019) and issued Direction No. 8, and will be returning the review of BC Hydro's Integrated Resource Plan to the Commission. BC Hydro believes that the experience under the revised legislative structure will demonstrate that the Commission's regulatory processes, which now includes the review of BC Hydro's Integrated Resource Plan, provide a sound basis for the Commission to exercise effective oversight over BC Hydro's capital expenditures and projects.

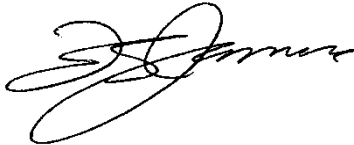
BC Hydro will be filing its Fiscal 2020 to Fiscal 2021 Revenue Requirements Application (**RRA**) by the end of this month. As the application will exemplify a number of aspects of BC Hydro's Revised Proposal in Exhibit B-7, it will also be of interest to the Commission and interveners in this proceeding. BC Hydro therefore requests that its Fiscal 2020 to Fiscal 2021 RRA, once filed, be added to the evidentiary record in this proceeding. This

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is consistent with the Commission's prior direction that the record related to BC Hydro's Fiscal 2017 to Fiscal 2019 RRA be on the record in this proceeding.

For further information, please contact Geoff Higgins at 604-623-4121 or by email at bchydroregulatorygroup@bchydro.com.

Yours sincerely,



Fred James
Chief Regulatory Officer

cu/ma

Enclosure (1)

**Review of the Regulatory Oversight of Capital
Expenditures and Projects**

**Rebuttal Evidence of
British Columbia Hydro and Power Authority**

February 15, 2019

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1 Purpose and Summary of Rebuttal Evidence

The purpose of this Rebuttal Evidence is to respond to the evidence of Mr. Craig and Mr. Thomson filed by the Commercial Energy Consumers Association of British Columbia (CEC) and the responses to information requests on the evidence of Mr. Craig and Mr. Thomson.

The evidence filed by Mr. Craig and Mr. Thomson was carefully reviewed and considered by Directors, Senior Managers, and subject matter experts in BC Hydro's Finance, Integrated Planning, Technology, Properties, Project Delivery, and Supply Chain Key Business Units including those listed in the table below.

Key Business Unit	Role
Finance	<ul style="list-style-type: none"> Director, Finance Capital & Planning Finance Manager, Capital & Planning
Integrated Planning	<ul style="list-style-type: none"> Director, Dam Safety Director, Line Asset Planning Director, Stations Asset Planning Manager, Portfolio Optimization and Management Technical Strategic Principal, Portfolio Optimization and Management Technical Strategic Principal, Stations Asset Planning Senior Engineer, Deficiency Investigation
Technology	<ul style="list-style-type: none"> Director, Technology Planning Project Manager, Technology Planning & Performance
Properties	<ul style="list-style-type: none"> Director, Properties Project Manager, Properties Planning & Asset Management
Project Delivery	<ul style="list-style-type: none"> Manager, Commercial Management Business Developer, Commercial Management
Supply Chain	<ul style="list-style-type: none"> Manager, Fleet Services Senior Manager, Fleet Asset Management

The conclusions reflected in this Rebuttal Evidence are based on the reviews undertaken.

The following summarizes our Rebuttal Evidence:

- 1 • **BCUC’s Existing Regulatory Processes Facilitate Effective**
2 **Oversight:** In section 2, we provide evidence that Mr. Craig has not
3 demonstrated a need for his proposed additional annual capital filing
4 process, making the following key points:
- 5 ▶ The BCUC can exercise effective oversight over capital
6 expenditures and projects through the existing regulatory processes
7 contemplated in the Utilities Commission Act;
- 8 ▶ Existing regulatory processes provide opportunities for the
9 Commission to request and review any information relevant to its
10 decision making;
- 11 ▶ BC Hydro’s performance metrics are included in its Service Plan;
- 12 ▶ The Commission has the obligation to set just and reasonable
13 rates, which includes the application of the prudence standard, and
14 BC Hydro has a strong incentive to avoid disallowed costs;
- 15 ▶ Mr. Craig’s proposed annual capital filing would not provide an
16 opportunity for earlier or more proactive decision making; and
- 17 ▶ The benefits of Mr. Craig’s proposed process are unclear,
18 hypothetical and unproven.
- 19 • **Mr. Craig’s proposal would interfere with the management of the**
20 **utility:** In section 3, we explain how Mr. Craig’s proposal is seeking to
21 direct the management of the utility, which Mr. Craig acknowledges is
22 outside the Commission’s jurisdiction. Mr. Craig’s proposal is not
23 confined to the filing of oversight information as he claims, but would
24 direct BC Hydro’s management in terms of what information should be
25 created and used to manage its capital portfolio and the standard by
26 which our capital portfolio should be judged to be prudent.

- 1 • **Mr. Craig’s Proposal will lead to Inferior Asset Management, Capital**
2 **Planning, Capital Delivery Approaches:** In section 4, we explain that
3 Mr. Craig’s proposal would lead to an inferior approach to asset
4 management and capital planning and delivery, and we make the
5 following key points:
- 6 ▶ Mr. Craig has not accurately characterized our capital framework,
7 practices, procedures, and policies. Our well-established and
8 well-performing practices for the planning and delivery of capital
9 investments have recently been recognized and endorsed by
10 independent bodies;
- 11 ▶ Mr. Craig’s definition of cost effectiveness does not conform to our
12 or the Commission’s use of that term;
- 13 ▶ Mr. Craig’s proposed approach will not ensure that Commission
14 oversight is more effective; does not provide more structure to
15 ensure that our investment drivers, strategies, plans, and studies
16 are more comprehensively addressed; and does not evaluate the
17 cost effectiveness of our capital investments;
- 18 ▶ We have a robust capital planning process in which our Service
19 Plan commitments and corporate priorities provide guidance to the
20 capital planning process; and
- 21 ▶ We provide information on our capital plans to the Commission in
22 revenue requirements applications. However, the long-term capital
23 plan in of itself is not an effective way to measure cost
24 effectiveness.

25 Under a separate cover letter, we are also filing a report from Dr. Paul R. Carpenter
26 and Dr. Toby Brown of The Brattle Group responding to the following aspects of
27 Mr. Craig’s evidence:

- 1 • Mr. Craig’s description of the role and objectives of the regulator when
2 overseeing capital investments; and
- 3 • Mr. Craig’s proposal for an annual process for the review of capital
4 drivers, strategies and plans.

5 BC Hydro has not responded to every statement in the evidence of Mr. Craig and
6 Mr. Thomson with which it disagrees. We have sought to confine this Rebuttal
7 Evidence to the key issues and inaccuracies in the evidence of Mr. Craig and
8 Mr. Thomson. Opting not to respond to a particular claim or statement does not
9 mean that we are in agreement.

10 The remainder of this Rebuttal Evidence is organized in a question and answer
11 format.

1 **2 BCUC Existing Regulatory Processes Provide Means**
2 **for Effective Oversight**

3 **2.1 BCUC's Regulatory Processes are Sufficient**

4 **Q1. Does BC Hydro agree with Mr. Craig's assertion that BC Hydro's Capital**
5 **Filing Guidelines are "not sufficient"¹ and that an annual capital filing**
6 **process is required "in order for the Commission to effectively carry out**
7 **its oversight and regulatory responsibilities with regard to BC Hydro's**
8 **capital investments"?**²

9 **A1.** No. In our view, Mr. Craig's evidence does not demonstrate any insufficiency
10 in our proposed 2018 Capital Filing Guidelines or that the Commission's
11 approach to overseeing capital is, or has been, ineffective.

12 Our proposed 2018 Capital Filing Guidelines reflect the regulatory processes
13 contemplated under the Utilities Commission Act (**UCA**) and employed by the
14 Commission in exercising oversight over the capital investments of BC Hydro
15 and other utilities in B.C. for many years. The Commission exercises
16 oversight through the review and approval of integrated resource plans (or
17 long-term resource plans), revenue requirements and major project
18 applications, project-specific compliance reports, as well as through inquiries
19 into specific issues. BC Hydro believes this is a sound approach that has
20 been commonly employed in the industry.

21 As part of the Comprehensive Review, the Government of B.C. announced
22 that it intends to table legislation to update BC Hydro's regulatory framework,
23 including amendments to the Hydro and Power Authority Act and the Clean
24 Energy Act so that section 44.1 of the UCA applies to BC Hydro. This would

¹ Exhibit C3-10, para. 367.

² Exhibit C3-10, para. 453.

1 mean that, going forward, BC Hydro's Integrated Resource Plan (IRP) would
2 be reviewed and approved by the BCUC and not by government. On
3 December 10, 2018, government issued BC Hydro Integrated Resource Plan
4 Regulation (B.C. Reg. 266/2018) under the Clean Energy Act prescribing
5 February 28, 2021 as the date for BC Hydro's next IRP. The IRP outlines our
6 long-term plan to meet B.C.'s future electricity demand through conservation,
7 generation and transmission, and through upgrades to existing infrastructure.

8 In our view, the Commission has exercised, and can continue to exercise
9 effective oversight over capital investments through the regulatory processes
10 it has customarily used to oversee utilities in B.C., which will now include the
11 review of BC Hydro's IRP. There is no need to institute a new annual filing
12 requirement to ensure effective oversight by the Commission.

13 **2.2 BCUC's Regulatory Processes Provide a Forum for the** 14 **Regular Filing of Relevant Information**

15 **Q2. What is your response to Mr. Craig's claim that an additional annual**
16 **filing is required for the Commission to gather information such as**
17 **"reports on the main drivers of capital expenditures", "strategy papers",**
18 **"capital plan information", "business case information", and "project**
19 **completion reports"?**³

20 **A2.** The additional filing proposed by Mr. Craig is not required because we
21 regularly file the types of information listed by Mr. Craig in our revenue
22 requirements and major project applications. We have also filed integrated
23 resource plans either with the BCUC or with the government, which provide
24 extensive information on BC Hydro's load forecasts and resource plans that
25 can also be used by the Commission to inform its decision making. As noted
26 above, the Government is tabling legislation so that BC Hydro's IRP will be

³ Exhibit C-3-10, para. 366; see also Exhibit C-3-13, CEC Response to BCUC IR 1.1.

1 reviewed and approved by the Commission. We also file project completion
 2 reports with the Commission as directed.

3 In the Fiscal 2017 to Fiscal 2019 Revenue Requirements Application (RRA)
 4 proceeding, we filed information in the Fiscal 2017 to Fiscal 2019 RRA and
 5 responses to information requests, that corresponds to the types of
 6 information listed by Mr. Craig. Between the information we have historically
 7 provided and the additional information in the proposed 2018 Capital Filing
 8 Guidelines to be included in future revenue requirements applications, there
 9 is no need for an additional set of guidelines to cover the information listed in
 10 paragraph 366 of Mr. Craig's evidence.

11 The table below cross-references the types of information Mr. Craig lists with
 12 information provided in the Fiscal 2020 to Fiscal 2021 RRA.

13 **Table 1 Additional Information in F2020 – F2021**
 14 **RRA**

	Mr. Craig's Requested Additional Guidelines	F2020 – F2021 RRA
a	Review of BC Hydro's driver documentation as it relates to driving capital spending and specifically how cost effectively they drive capital.	<ul style="list-style-type: none"> • Chapter 3 – Load and Revenue Forecast • Chapter 6 – Capital Expenditures and Additions • Appendix H – Fiscal 2020 to Fiscal 2024 Capital Plan • Appendix L – BC Hydro Technology Strategy and 5-Year Plan • Appendix M – Asset Health – Generation • Appendix N – Asset Health – Transmission and Distribution • Appendix W – BC Hydro's Reliability Indices
b	Review of BC Hydro's strategy papers as they relate to driving capital spending and specifically how cost effectively they drive capital.	<ul style="list-style-type: none"> • Chapter 3 – Load and Revenue Forecast • Chapter 6 – Capital Expenditures and Additions • Appendix I – Capital Expenditures Greater than \$5 million • Appendix J – Capital Expenditures Greater than \$20 million • Appendix K – Summaries of Capital Project Strategies, Plans, and Studies • Appendix L – BC Hydro Technology Strategy and 5-Year Plan
c	Review of BC Hydro's full capital plan portfolios and specifically how cost effectively they arrange for and drive capital.	<ul style="list-style-type: none"> • Appendix H – Fiscal 2020 to Fiscal 2024 Capital Plan

	Mr. Craig's Requested Additional Guidelines	F2020 – F2021 RRA
d	Review of BC Hydro's business cases for any of its capital expenditure plans or investments and specifically the evidence that the decision for approval is based on cost-effective plans.	<ul style="list-style-type: none"> Chapter 6 – Capital Expenditures and Additions Appendix H – Fiscal 2020 to Fiscal 2024 Capital Plan Appendix J - Capital Expenditures Greater than \$20 million
e	Review of BC Hydro's post-implementation reports on capital expenditures additions and specifically how cost effective the resulting capital investments will be.	<ul style="list-style-type: none"> Appendix G – Variance Explanations BC Hydro notes that it also files Project Completion and Evaluation Reports for major projects
f	Review of BC Hydro's overall CMS and specifically the degree to which it is improving over time in delivery of cost-effective capital expenditures and investments	<ul style="list-style-type: none"> Chapter 6 – Capital Expenditures and Additions Appendix F – Independent Audit of Capital Asset Management in BC Hydro Appendix P – BC Hydro Load Forecast Audit Appendix HH – Summary of BC Hydro's Internal Audits

1 **Q3. If there is information lacking in BC Hydro's applications, are there**
2 **Commission processes available to address this?**

3 A3. Yes, the Commission's existing processes provide ample opportunity for
4 information gathering. First, we engage with Commission staff to develop
5 applications that meet the Commission's information needs or align
6 applications with Commission-approved guidelines. Second, if we were to file
7 an application that was materially deficient, the Commission could reject the
8 application and require us to refile an adequate application. Third, the
9 information request process used by the Commission provides the
10 opportunity for further information to be requested and provided after the
11 initial application is filed. Fourth, the Commission may also direct us to
12 provide certain information to the Commission in the future if, when making its
13 Decision, it is dissatisfied with the level of information filed. Finally, the
14 Commission can ultimately choose not to grant the requested approval if we
15 have not provided sufficient evidence to justify our requests. Therefore, there
16 is no need to institute an additional process to provide information to the
17 Commission.

1 **2.3 BC Hydro Already Gauges its Performance through its Service**
2 **Plan**

3 Q4. **What is your response to Thomson’s statement that Mr. Craig’s**
4 **proposal would be useful as a “repository of performance information**
5 **over time”?**⁴

6 A4. As discussed in Part 4 of this Rebuttal Evidence, we do not believe
7 Mr. Craig’s proposal would result in a useful repository of information to
8 gauge our performance. Furthermore, BC Hydro already collects performance
9 information over time. Our performance is primarily benchmarked through our
10 Service Plan⁵ which sets four goals (Reliable and Responsive Service,
11 Affordability, Commitment to Clean Power, and Safety) that align with our
12 mission. Each goal has a set of performance measures. In fiscal 2018, we
13 successfully met or exceeded all 13 of our Service Plan performance
14 measures. For fiscal 2019, we are on track to meet all of our performance
15 measures, with the exception of our target for Lost Time Injury Frequency.
16 Key aspects of our performance with respect to Reliable and Responsive
17 Service, and Affordability as they relate to our capital plan are discussed
18 below.

19 ***BC Hydro has a Consistently High Level of System Performance***

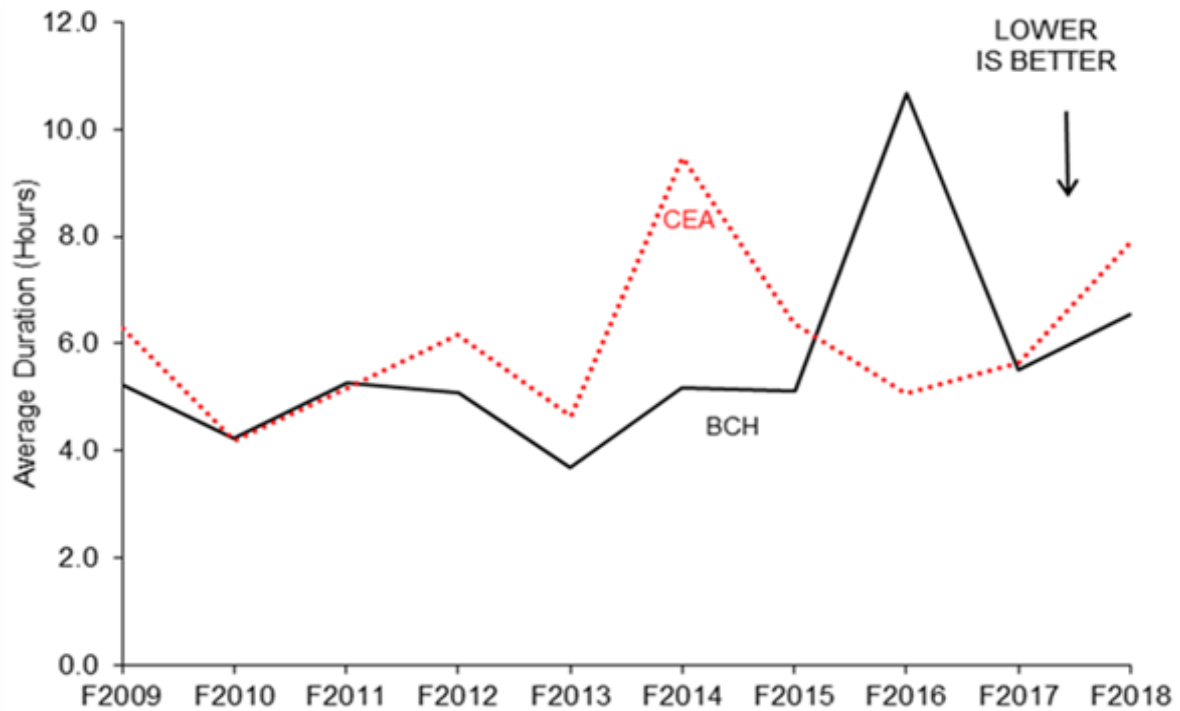
20 System Average Interruption Duration Index (**SAIDI**) and the System Average
21 Interruption Frequency Index (**SAIFI**) measure the duration and frequency of
22 customer interruptions. BC Hydro tracks these metrics on an ongoing basis.
23 Our performance on SAIDI and SAIFI metrics is also compared regularly with
24 utility industry peers by the Canadian Electricity Association (**CEA**).

⁴ Exhibit C3-15, CEC Response to CEABC IR 4.3, p. 10.

⁵ The Service Plan will be filed as an appendix to the Fiscal 2020 to Fiscal 2021 RRA.

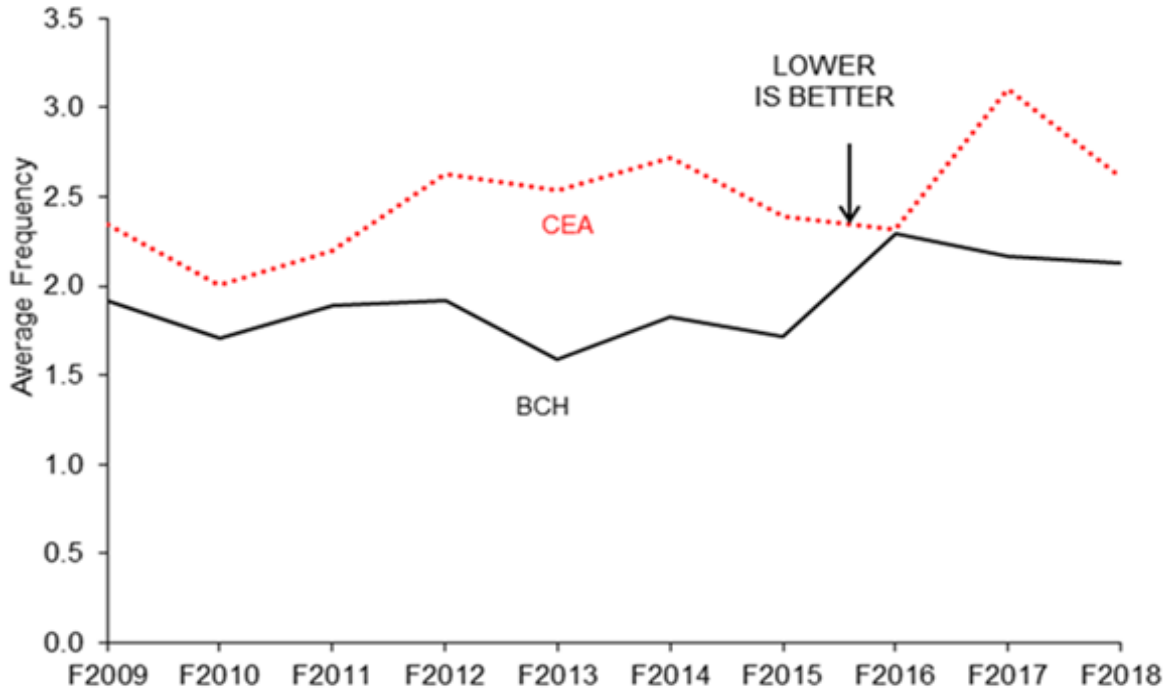
1 [Figure 1](#) below shows that in the past decade our unadjusted system average
2 duration (“all-events” SAIDI) trend has performed as good as or better than
3 the CEA composite, with the exception of fiscal 2016 due to the August 2015
4 summer wind storm. In addition our unadjusted system average frequency
5 (“all-events” SAIFI) trend has consistently out-performed the CEA SAIFI
6 composite.

7 **Figure 1 SAIDI (All Events) – Average Interruption**
8 **Duration per Average Customer**



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Figure 2 SAIFI (All Events) – Average Number of Interruptions per Average Customer

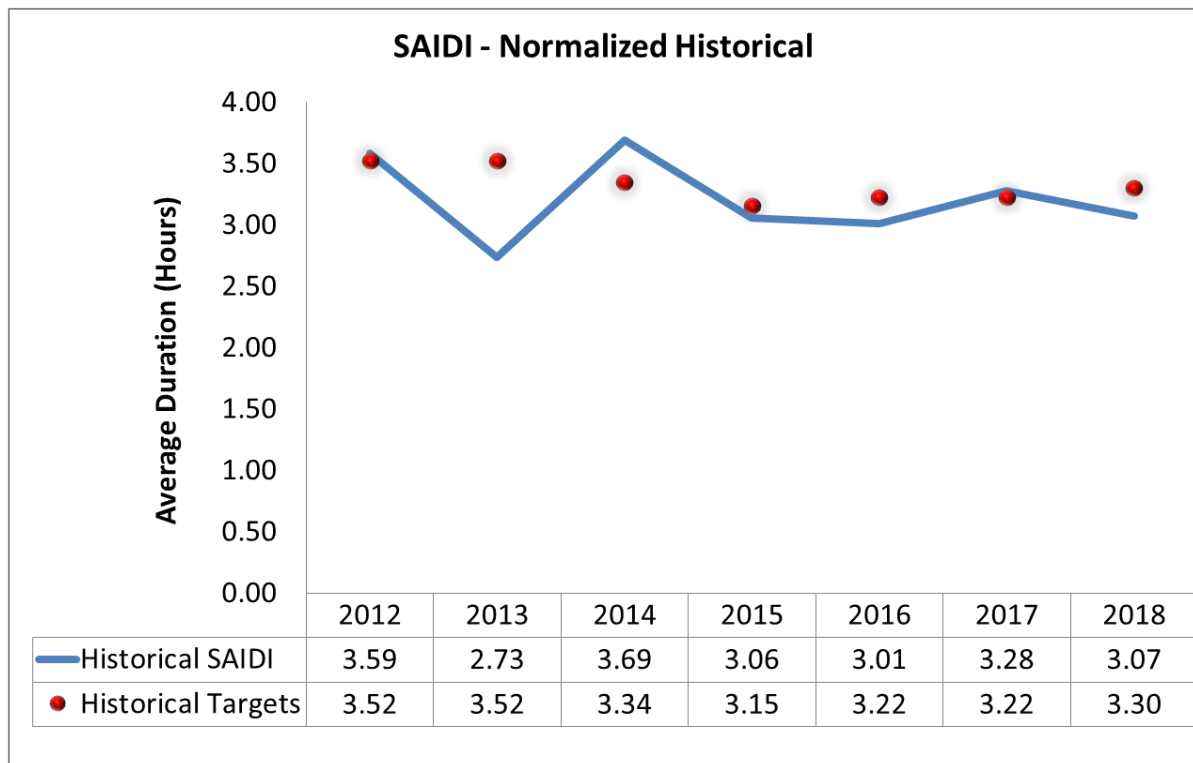
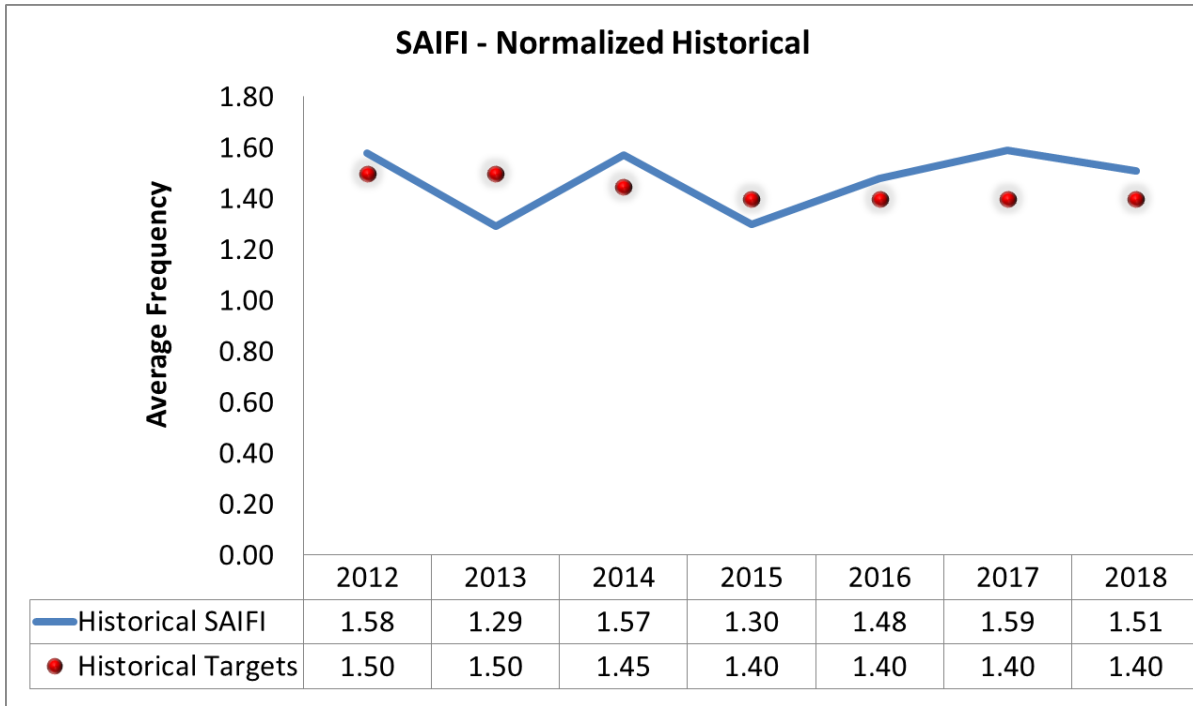


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As shown in [Figure 3](#) below, when outage impacts related to uncontrollable major weather events are removed, normalized SAIDI (which measures the total outage duration with storm impact adjustments experienced by an average customer in a year) was 3.28 hours in fiscal 2017, and further improved to 3.07 hours in fiscal 2018. Normalized SAIFI (which measures the number of sustained disruptions per year excluding major events) was 1.59 disruptions in fiscal 2017, and 1.51 disruptions in fiscal 2018.

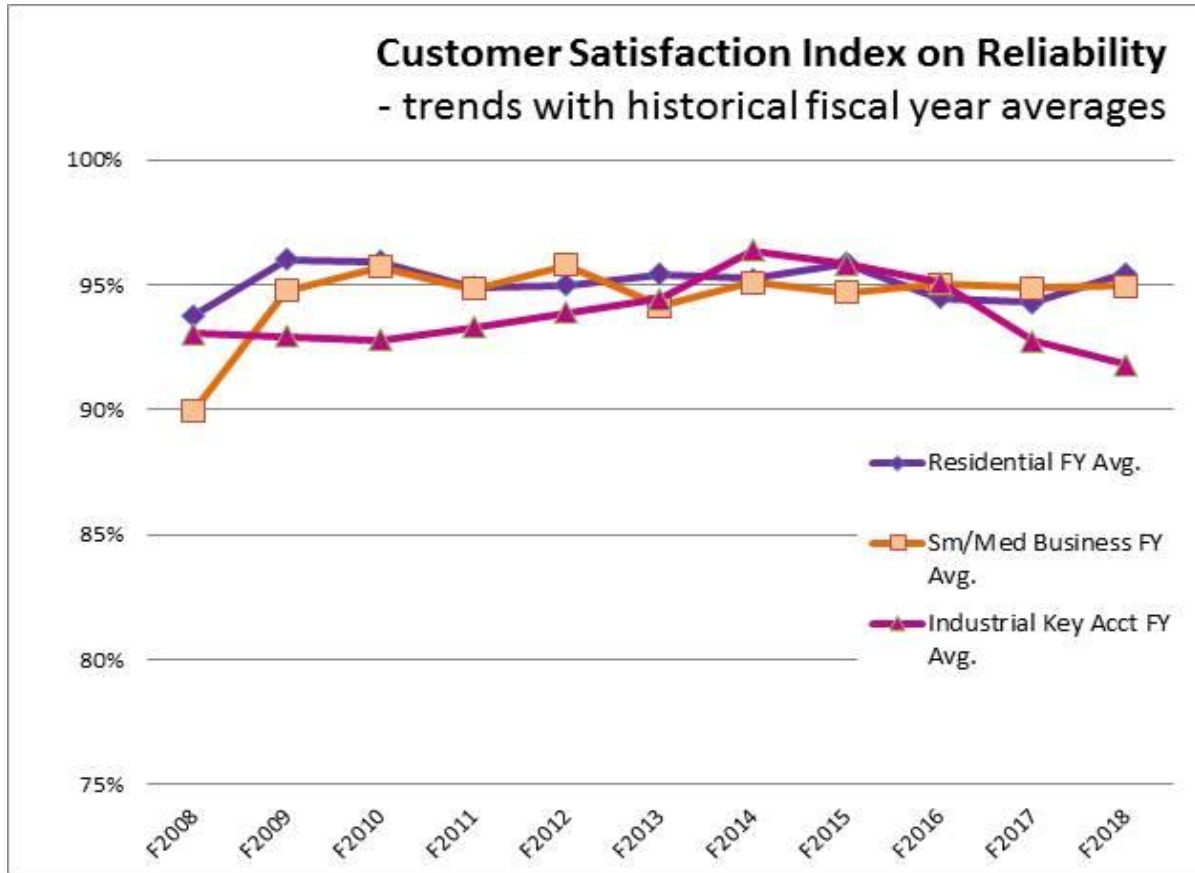
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Figure 3 SAIFI and SAIDI – Normalized Historical Measures



1 In addition, the reliability scores in BC Hydro’s Customer Satisfaction Index
2 indicate that customers continue to be satisfied with the level of reliability they
3 are receiving. This is shown in [Figure 4](#) below:

4 **Figure 4 Customer Satisfaction Index on**
5 **Reliability**



6 Lastly, asset-related safety incidents on the transmission and distribution
7 systems have declined. This indicates that our investment plans are
8 addressing safety related risks on the system.

1 ***BC Hydro Has Delivered \$6.9 Billion of Projects Within 0.4 per cent of***
2 ***Budget***

3 A key metric that we use to evaluate our performance in the delivery of capital
4 projects is to compare the actual project costs for in-service projects to the
5 original approved expected cost, over a rolling five-year period. On this
6 metric, we perform very well. This performance measure is included in
7 BC Hydro's Service Plan, with a target of actual costs falling within
8 +5 per cent to -5 per cent of the original approved expected cost (First Full
9 Funding) in aggregate, excluding project reserve amounts. This metric is
10 calculated using the results of all Generation and Transmission projects as
11 well as major Distribution and Properties projects.

12 Projects included in this metric for the five-year period of fiscal 2014 to
13 fiscal 2018 had an aggregate original approved expected cost of
14 \$6.936 billion. The actual aggregate costs for these projects were within
15 \$27.9 million (or 0.40 per cent) of the original approved expected cost.

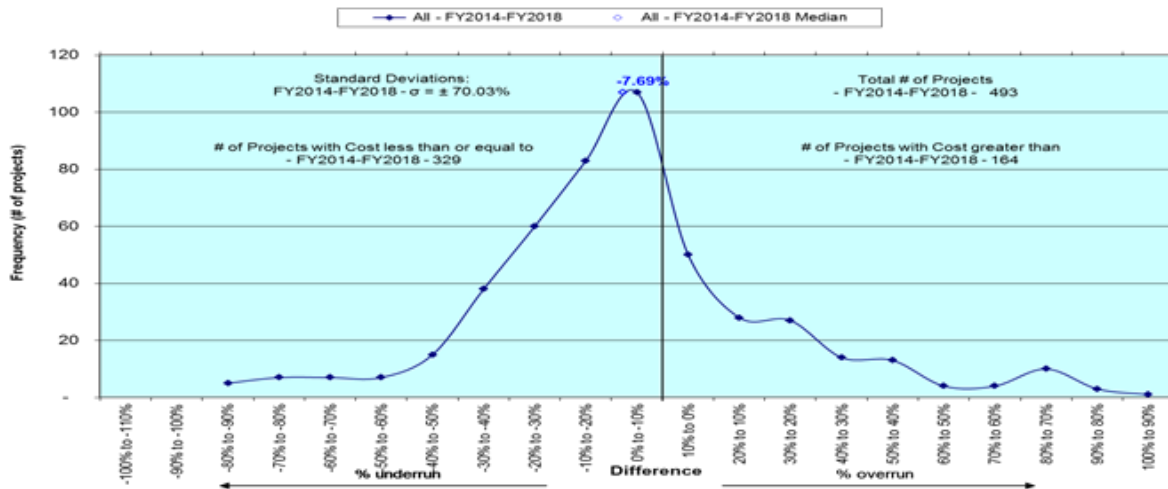
16 ***A Significant Majority of the Projects Over the Past Five Years Were***
17 ***Under Original Approved Expected Cost***

18 In addition, of the 493 projects included in this analysis, 66.5 per cent had an
19 actual cost that was less than original approved expected cost. The median
20 project was 7.7 per cent below the original approved expected cost.

21 [Figure 5](#) below provides a visual summary of the performance of all
22 493 projects against the original approved expected cost.

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Figure 5 Summary of Actual Cost to Original Approved Expected Cost



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2.4 The Commission Can Review the Prudence of Expenditures in Revenue Requirements Applications

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Q5. What is BC Hydro’s response to Mr. Craig’s claim that his proposal is needed because the Commission’s ability to deny expenditures at the time of an RRA is constrained as it can result in “wasted” spending by BC Hydro,⁶ and Mr. Thomson’s similar claim that it is “too late” to deny expenditures once they have been made?⁷

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A5. The views of Mr. Craig and Mr. Thomson are factually incorrect, inconsistent with the BCUC’s obligations under the UCA, and undermine the incentive properties of the prudence standard that shape the behaviour of the utility.

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First, at the time of the RRA, the Commission can make determinations with respect to whether projects are in the public interest before significant dollars have been spent. In any RRA, and indeed at any time, we have hundreds of projects in various stages of the project lifecycle, from early planning stages

⁶ Exhibit C3-10, para. 92; see also paras. 98-99 and 450.

⁷ Exhibit C3-15, CEC Response to CEABC IR 2.2, p. 5.

1 to the final implementation phase. If the Commission believes it is warranted,
2 in a revenue requirements application it can inquire into the public interest of
3 projects that are in their early stages, before significant dollars are spent.
4 Further, the Commission can order BC Hydro to file a Certificate of Public
5 Convenience and Necessity (**CPCN**) for extension projects, and can set the
6 thresholds for major projects applications, which provides the opportunity to
7 review projects in detail.

8 Second, by its nature, the prudence standard is always applied to dollars that
9 have already been spent. It would be contrary to the Commission's
10 obligations under the UCA to suggest that it is "too late" for the Commission
11 to disallow costs if they have already been incurred. For both Crown and
12 investor-owned utilities, the Commission is charged with approving rates that
13 are just and reasonable. Allowing the recovery of imprudent expenditures in
14 rates is inconsistent with that standard.

15 Third, the application of the prudence standard by disallowing expenditures
16 creates an incentive for the utility to act prudently to avoid the disallowance of
17 costs in the future. The prudence standard creates incentives for BC Hydro,
18 just as it does for an investor-owned utility. We have a strong incentive to
19 avoid the disallowance of expenditures by the Commission because the
20 disallowed expenditures will impact the income statement of the shareholder.
21 Our shareholder, the B.C. Government, budgets based on a planned return
22 from BC Hydro and does not expect to have to pay for costs found to be
23 imprudent by the Commission. Having its return from BC Hydro reduced can
24 impact the B.C. Government's ability to meet its budget, and any resulting
25 impacts on taxpayers could have political consequences. Our Board of
26 Directors is answerable to the B.C. Government, and the Board of Directors
27 oversees the management of BC Hydro. We can confirm that we have a
28 strong incentive to avoid disallowances of expenditures.

1 **2.5 Mr. Craig’s Proposed Annual Filing Would not Allow for Earlier**
2 **or Proactive Decisions**

3 **Q6. How does BC Hydro respond to Mr. Craig’s claim in paragraph 94 of his**
4 **evidence that the Commission should be involved in the “earlier” stages**
5 **of the capital management processes and Mr. Thomson’s statement in**
6 **response to CEC’s response to CEABC IR 1.2.2 that one of the central**
7 **tenets of CEC’s proposal is that it would allow the Commission to**
8 **consider BC Hydro’s expenditure drivers and strategies proactively?**

9 A6. Adding an annual information filing would not give the Commission any
10 opportunity to make “earlier” or more “proactive” decisions. Mr. Craig states
11 that his proposed annual filing would be for information purposes only, and
12 therefore would not allow for a decision-making opportunity. The
13 Commission’s decisions would still need to occur in integrated resource
14 planning, revenue requirements, major project or other proceedings.

15 Although Mr. Craig professes that his process would be confined to
16 information gathering,⁸ he contradicts that when he states that his annual
17 process could give rise to Commission directions punishable by disallowance
18 of costs.⁹ Even so, Mr. Craig’s process would still not give the Commission
19 any opportunity to make “earlier” or more “proactive” decisions for several
20 reasons.

21 First, the addition of an annual information filing does not change the fact that
22 at any one time we will have a significant number of strategies and plans, and
23 hundreds of projects and programs in various stages of their lifecycle. This is
24 the case in a revenue requirements application, and would be the case for
25 CEC’s proposed annual filing. Filing annually will not give the Commission

⁸ Exhibit C3-10, p. 54

⁹ Exhibit C3-13, CEC Response to BCUC IR 1.2, p. 6.

1 any “earlier” look at strategies, plans, projects, or programs, but would at best
2 give the Commission more frequent looks. At worst, Mr. Craig’s annual filing
3 would produce a summary of data in which any single investment cannot be
4 easily understood or evaluated.

5 Second, the ability to make “earlier” or more “proactive decisions” on plans,
6 strategies, projects and programs would be similar to that in revenue
7 requirements applications. Specifically, any attempt to make decisions at an
8 earlier planning stage will be limited by the level of information available at
9 these early planning stages. Because engineering work has not begun or has
10 not progressed very far, cost estimates for projects and programs in early
11 stages, if available at all, are highly uncertain. Details on available
12 alternatives, stakeholder engagement, First Nations consultation,
13 environmental impacts and other factors relevant to a cost effectiveness
14 determination may be uncertain and only available at a high level or not
15 available at all.

16 Because information on projects and programs takes time and cost to
17 develop, BC Hydro does not give internal approval for the full funding of a
18 project in the early stage, but instead approves its projects and programs in
19 phases as they develop. We would not expect the Commission to approve
20 projects and programs at early stages based on the limited information
21 available at that time. For example, we would not be able to satisfy the
22 Commission’s CPCN Guidelines based on the information available in the
23 Identification Phase of a project.

24 Any early assessment of a strategy, plan, project or program will therefore
25 always be subject to the later assessment of projects or programs when the
26 information is available to assess the need, alternatives, costs, benefits,
27 stakeholder and First Nation impacts, and all the other factors relevant to a
28 cost-effectiveness determination.

1 **2.6 Benefits of Mr. Craig’s Proposal are Unclear, Hypothetical and**
2 **Unproven**

3 **Q7. Has Mr. Craig demonstrated any benefits of his proposal?**

4 A7. No. Mr. Craig makes only speculative assertions regarding the potential for
5 his proposed process to increase the “cost effectiveness” of BC Hydro capital
6 portfolio. These savings are based on an incorrect quantification of our capital
7 portfolio¹⁰ and are based on the assumption that the proposed process would
8 be more effective than relying on the Commission’s existing regulatory
9 processes and BC Hydro’s management to improve our planning processes.
10 However, as discussed in section 4 of this Rebuttal Evidence, Mr. Craig’s
11 proposal would not be useful in assessing the cost effectiveness of our capital
12 investments or our performance.

13 Based on our review of Mr. Craig’s proposal, we do not believe the proposed
14 process described by Mr. Craig could result in increasing the financial cost
15 effectiveness of the capital portfolio or that we should even adopt such a goal.
16 Assuming that the cost effectiveness of a capital portfolio could be calculated,
17 the cost effectiveness of the capital portfolio would increase or decrease
18 depending on the nature of the needs and opportunities at any given time. In
19 some years there may be a need to incur significant costs to meet reliability
20 requirements or increase generation to meet growing load, and in other years
21 there may not. While in other years there may be opportunities to achieve
22 significant financial benefits from financial value-driven projects and in other
23 years there may not. The result is that the cost effectiveness of the capital
24 portfolio in any one year (assuming that this could be calculated) could never
25 be judged by reference to the cost effectiveness of historical years. Therefore,
26 Mr. Craig’s proposal would not be useful in increasing cost effectiveness.

¹⁰ Mr. Craig incorrectly states that BC Hydro’s capital portfolio is \$220 billion over 10 years in its response to BCUC IR 1.3 (Exhibit C3-13, p. 8)

1 Finally, improvements in the capital portfolio cost effectiveness may not
2 necessarily lead to financial cost savings. Cost effectiveness should consider
3 many factors other than financial ones such as risk mitigation benefits,
4 alignment with corporate objectives and improvements to key performance
5 indicators. Assuming that the cost effectiveness of a capital portfolio could be
6 calculated, increasing cost effectiveness may, for example, be the result of
7 mitigating safety, environmental and reliability risks, which could ultimately
8 increase financial costs but result in a higher overall net value.

9 **Q8. Would an annual capital filing as Mr. Craig proposes assist revenue**
10 **requirements or major project proceedings?**

11 A8. No. An annual capital filing, as Mr. Craig proposes, would duplicate much of
12 the information we already file in revenue requirements and other project
13 proceedings and would likely significantly confuse the evidentiary record and
14 complicate the Commission's decision-making process. The evidentiary
15 record in many proceedings is already large and complex. Adding historical
16 years of annual capital filings to this record, as proposed by Mr. Craig, would
17 complicate the evidentiary record as the annual capital filings could be out of
18 date or out of sync with the evidence in the proceeding. We anticipate there
19 would be voluminous and unnecessary information requests seeking to
20 reconcile all of the data and seeking explanation of variances that would have
21 no material impact on the decisions before the Commission. It is unclear how
22 the annual filing information could be used effectively in any Commission
23 proceeding.

24 **Q9. Has Mr. Craig or Mr. Thomson provided any evidence that Mr. Craig's**
25 **proposal has been used successfully in other jurisdictions?**

26 A9. No. There is no evidence on the record that would suggest that Mr. Craig's
27 proposal is used in other jurisdictions. We note that the various information

1 filings that Mr. Thomson describes in Exhibit C3-15 are not the same as the
2 type of annual filing and detailed cost-effectiveness information requirements
3 that Mr. Craig proposes.

4 For example, in Exhibit C3-15, in response to CEABC IR 1.1.2 and 1.1.3,
5 Mr. Thomson refers to various practices in B.C. related to the filing of
6 information with the Commission. BC Hydro's proposed Capital Filing
7 Guidelines are based on the regulatory processes used by the Commission
8 for utilities in B.C. Mr. Thomson's experience with B.C. utilities is consistent
9 with our Revised Proposal and does not include the type of annual filing
10 proposed by Mr. Craig.

11 In Exhibit C3-15, in response to CEABC IR 1.2.2, Mr. Thomson references
12 filing requirements while FortisBC was under Performance Based
13 Ratemaking (**PBR**). These types of filings are made in compliance with a PBR
14 plan approved by the Commission, and do not resemble the type of annual
15 filing requirements Mr. Craig is proposing. In fact, the annual filing
16 requirements under PBR are generally much less onerous than what we
17 would be expected to file in a revenue requirements application under a cost
18 of service ratemaking approach.

19 **3 Mr. Craig's Proposal Interferes with Utility** 20 **Management**

21 **Q10. Does Mr. Craig recognize the limits of the Commission's jurisdiction in**
22 **relation to management of the utility?**

23 A10. Yes. Mr. Craig states in Exhibit C3-14, in response to MoveUP IR 1.2: "The
24 Commission cannot seek to direct the management decision making process
25 at BC Hydro." Mr. Craig also states in Exhibit C3-14, in response to
26 MoveUP IR 1.1:

1 “The Court of Appeal decision in regard to the BC Hydro and
2 Power Authority Board’s responsibility to manage the company
3 and its planning is clear and has influenced the CEC to avoid
4 recommending that the Commission create any process which
5 would attempt to insert Commission or other party led decision
6 making into BC Hydro’s management of the Utility.”

7 **Q11. How does Mr. Craig reconcile his proposal with the limitation on the**
8 **Commission’s jurisdiction with respect to management of the utility?**

9 A11. Mr. Craig states that he has attempted to confine his proposal to merely the
10 seeking of Commission oversight information. For example, he states in
11 Exhibit C3-14, in response to MoveUP IR 1.2:

12 “The CEC has attempted to ensure that its recommendations to
13 the Commission are confined to seeking Commission oversight
14 information not for the purpose of interfering in the management
15 process but for the purpose of the Commission’s approval role
16 responsibilities under the UCA.”

17 **Q12. Has Mr. Craig successfully limited his proposal to seeking Commission**
18 **oversight information?**

19 A12. No. Mr. Craig’s proposal does not confine itself to seeking oversight
20 information. The effect of the proposal would be to direct utility management
21 processes, which Mr. Craig has stated the Commission cannot do. Three key
22 indicators that Mr. Craig’s proposal inappropriately interferes with utility
23 management are as follows:

- 24 • Mr. Craig’s proposal would replace the well-accepted prudence standard
25 with his own conception of “cost effectiveness.” Mr. Craig’s concept of
26 “cost effectiveness” is not based on industry standards nor is it in line
27 with either the Commission’s or BC Hydro’s use of the term, but is a new
28 concept to govern how BC Hydro should manage its capital plan.
29 Mr. Craig uses his concept of cost effectiveness to seek to determine
30 how the utility’s capital plans should be evaluated, which capital projects

1 and programs should proceed, which expenditures may be imprudent,
2 and how rates should be set. For example, on page 6 of Exhibit C3-13,
3 in response to BCUC IR 1.1.2, Mr. Craig says that the Commission could
4 disallow costs if BC Hydro fails to take an action that would be more
5 “cost effective” as Mr. Craig’s understands the term;

- 6 • Mr. Craig’s framework and information requirements do not seek to
7 simply gather available information, but force the utility to create new
8 information that is in line with Mr. Craig’s approach to managing capital
9 according to “cost effectiveness”. For example, in response to
10 BCUC IR 1.1.2, Mr. Craig refers to a Commission “standard” for
11 information requirements and states that “the nature of the
12 cost-effectiveness information that will best service Commission needs is
13 as yet a work in progress.” It is clear that Mr. Craig is not proposing
14 information gathering, but is proposing that the Commission should
15 direct what information should be created by the utility as part of its
16 management decision-making process, and that this information must be
17 in line with his governing concept of “cost effectiveness”; and
- 18 • Mr. Craig’s framework and information requirements not only prescribe
19 what information should be created by utility management, but would
20 impose a process whereby the Commission (and presumably interveners
21 such as the CEC) would continually improve this information over time
22 resulting in improvements in the “cost effectiveness” of BC Hydro’s
23 capital plan. Mr. Craig refers to the Commission “encouraging BC Hydro
24 to do better”,¹¹ but it is clear that this encouragement would be by way of
25 directives from the Commission. Mr. Craig refers to the “[r]efining of
26 standards, criteria, strategies and practices”¹² and the Commission

¹¹ Exhibit C3-13, CEC Response to BCUC IR 1.2, p. 6.

¹² Exhibit C3-13, CEC Response to BCUC IR 1.2, p. 6.

1 ordering “prospectively set formulas and methods”.¹³ Mr. Craig also
2 states that the disallowance of recovery of costs could be threatened if
3 BC Hydro fails to comply.¹⁴

4 Mr. Craig’s proposal is therefore not limited to seeking oversight information,
5 but seeks to redefine the standard by which BC Hydro’s capital is judged and
6 to direct BC Hydro management on how it should be managing its capital
7 portfolio. Mr. Craig’s proposal would therefore interfere with BC Hydro’s
8 management in a way that Mr. Craig admits is not within the jurisdiction of the
9 Commission.

10 **4 Mr. Craig’s Proposal will lead to Inferior Asset** 11 **Management, Capital Planning, Capital Delivery** 12 **Approaches**

13 **4.1 Capital: Frameworks, Practices, Procedures, and Policies**

14 **Q13. What is BC Hydro’s response to Mr. Craig description of BC Hydro’s**
15 **“Capital Management System” and component parts in paragraphs 5,**
16 **101, 102, and 103 of his evidence?**

17 A13. The “Capital Management System” referenced by Mr. Craig includes many
18 components of any capital framework. However, we do not structure these
19 components into the same “Capital Management System” framework as
20 presented in Mr. Craig’s evidence. We have summarized and broadly
21 categorized below the frameworks, processes, policies, procedures, and
22 practices we use.

23 (a) Integrated Planning: Our asset management framework and enterprise
24 capital planning process, which includes the enterprise prioritization

¹³ Exhibit C3-13, CEC Response to BCUC IR 1.2, p. 7.

¹⁴ Exhibit C3-13, CEC Response to BCUC IR 1.2, p. 6.

1 framework, provide the appropriate frameworks and processes to assess
2 capital drivers, capital strategies, studies and plans, and to develop the
3 Capital Plan;

4 (b) Financial Approval and Authorization: We have well-established
5 management and accounting policies and procedures, and a
6 well-established financial approval authority policy, that set the funding
7 approvals required for capital investments in each phase of a project's
8 lifecycle. These approval requirements and processes have been
9 developed to balance financial controls with operational efficiency, based
10 on the nature and risk of the capital investments. The policies and
11 procedures apply to all groups delivering BC Hydro's capital
12 investments;

13 (c) Capital Delivery: Capital projects and programs are delivered using
14 Project and Portfolio Management (**PPM**) practices or delivery practices
15 that are in alignment with PPM practices and tailored to the complexity
16 and size of the project or program.¹⁵ PPM practices are consistent with
17 industry standards such as those of the Project Management Institute,
18 the Project Management Book of Knowledge, and the Association for the
19 Advancement of Cost Engineering International Recommended
20 Practices. PPM is structured as a Quality Management System,
21 consistent with the principles of International Organization for
22 Standardization (**ISO**) 9001, and the 2008 Quality Management Systems
23 Requirements. Technology capital projects and programs are delivered
24 using the Information Technology Delivery Standard Practices, which is
25 also aligned with PPM practices. Using the PPM practices allows for
26 consistent management of project risk, scope, schedule and cost; and

¹⁵ For a more detailed description of our capital delivery processes, please refer to Chapter 6 of the F2020-F2021 RRA.

1 (d) Project and Portfolio Monitoring and Measurement: Our framework for
2 capital post-implementation performance evaluation and reporting is
3 outlined in our management and accounting policies and procedures.
4 The policy requires a Project Completion and Evaluation Report (**PCER**)
5 for all projects with a forecast cost over \$1 million and outlines the
6 required content, roles and responsibilities, timing, and required
7 approvals for the PCER.

8 The Project Budget to Actual Cost measure evaluates our performance,
9 from a portfolio perspective, in the delivery of all Generation and
10 Transmission projects as well as major Distribution and Properties
11 capital projects. The measure compares the actual project costs for
12 projects placed in service to the original approved expected cost, over a
13 rolling five year period. As noted in [A4](#), this performance measure is
14 included in our Service Plan, with a target of actual costs falling within
15 + 5 per cent to - 5 per cent of budget, excluding reserve amounts.

16 We provide descriptions of our capital planning, authorization, delivery, and
17 measurement frameworks, processes, policies, procedures, and practices in
18 revenue requirements applications. This information is provided in Chapter 6
19 of the Fiscal 2020 to Fiscal 2021 RRA expected to be filed in late
20 February 2019, and in Chapter 6 of the Fiscal 2017 to Fiscal 2019 RRA. We
21 also provided additional information in response to information requests in the
22 Fiscal 2017 to Fiscal 2019 RRA proceeding.

1 **Q14. In paragraph 18, Mr. Craig proposes a framework for capital planning**
2 **information to be available to the Commission. Does Mr. Craig's**
3 **framework reflect how BC Hydro characterizes its capital drivers and**
4 **strategies?**

5 A14. Mr. Craig's framework in paragraph 18 does not accurately describe our
6 drivers, strategies, and plans. We address each separately below.

- 7 • **Drivers:** Mr. Craig recognizes our investment drivers of growth and
8 sustainment, which are reflective of our need to serve new load and
9 maintain system condition and performance. Mr. Craig's framework
10 includes external risk exposure and stakeholder condition standards as
11 separate drivers. We categorize investments with external risk exposure,
12 such as Dam Safety investments, as part of our sustainment portfolio
13 because such investments are required to operate the system safely. We
14 also do not make investments in the system primarily on the basis of
15 stakeholder concern (in the absence of other drivers). We engage and
16 consult with stakeholders and First Nations to understand and address
17 concerns as a normal part of our operations. There are instances where
18 this will trigger an assessment to determine if there is an underlying
19 deficiency, such as a system performance deficiency or a safety
20 deficiency that is negatively impacting stakeholders. Any identified
21 deficiency could be a potential investment and would be assessed
22 according to our corporate risk framework to determine if and when the
23 deficiency will be addressed. Furthermore, stakeholder engagement and
24 First Nation consultation activities are completed when implementing
25 capital investments as appropriate. Impacted stakeholders and First
26 Nations are identified and engaged throughout the project lifecycle;
- 27 • **Strategies:** The strategies presented in the table on page 4,
28 paragraph 18 of Mr. Craig's evidence appear to be alternatives for

1 resolving issues associated with each driver group presented. We
2 typically assess alternatives in consideration of the specific project needs
3 in the Identification Phase of the project where alternatives can be better
4 defined and evaluated. While some consideration of alternatives is
5 undertaken during the development of strategies, plans and studies, the
6 full evaluation of alternatives is typically undertaken when a project has
7 been initiated and involves activities such as consultation and
8 engagement with impacted First Nations and stakeholders as
9 appropriate; a substantial commitment of time and resources is required
10 to complete a reasonable level of project definition. It would be neither
11 prudent nor cost effective to perform these activities and incur the time
12 and costs to assess alternatives earlier than the Identification Phase
13 when the need and / or drivers may still be uncertain as the load
14 forecast, asset condition, and other drivers are subject to change. The
15 associated solution scope and cost are also uncertain this early in the
16 planning process; and

- 17 • **Plans:** As discussed more fully in section [4.2](#), given the size and
18 complexity of our capital investment portfolio, and our decisions and the
19 trade-offs required to keep our integrated system operating safely and
20 reliably, Mr. Craig's templates are ineffective, not useful, and not
21 feasible.

22 **Q15. Does BC Hydro believe it should adopt Mr. Craig's proposed framework**
23 **for capital planning?**

24 A15. No. Mr. Craig's proposed framework does not appear to be aligned with
25 industry standards and is inferior to our own asset management practices.
26 Our asset management practices are mature as evidenced by the recent

1 Office of the Auditor General of B.C audit of our practices.¹⁶ We have
2 developed asset management frameworks for the system which are aligned
3 with asset management standards including Publicly Available Specification
4 55 (commonly referred to as PAS 55) and ISO 55000. The alignment with
5 asset management standards used by our utility industry peers allows us to
6 participate in industry-wide benchmarking and other performance
7 improvement activities.

8 We are committed to continuous improvement. Improvements to our
9 processes will be detailed in the Fiscal 2020 to Fiscal 2021 RRA. For
10 example, over the past several years, we implemented the PPM practices
11 described above, and a lessons learned procedure to identify opportunities to
12 improve the delivery and outcomes of future projects. These lessons learned
13 generally result in recommendations to alter a practice or procedure, address
14 a knowledge gap or improve project delivery tools. Lessons learned are
15 documented throughout the project lifecycle and a lessons learned meeting is
16 conducted prior to a project being placed into service. Consistent with our
17 practice, we will continue to assess and make improvements to our capital
18 planning and delivery processes going forward.

19 Our well-established and well-performing practices for the planning and
20 delivery of capital investments have recently been recognized and endorsed
21 by the following independent bodies:

- 22 • **Office of the Auditor General of B.C.** - In December 2018, the Office of
23 the Auditor General of B.C. released an independent audit of Capital
24 Asset Management in BC Hydro. The audit found that BC Hydro's capital
25 asset management systems and practices reached a generally

¹⁶ The audit will be filed as an appendix to the F2020-F2021 RRA and can also be found at the following link:
http://www.bcauditor.com/sites/default/files/publications/reports/OAGBC_BC-Hydro-Asset-Management_RPT.pdf

1 advanced level of maturity. On page 17 of the report the Auditor General
2 stated: “BC Hydro has a generally advanced level of maturity in asset
3 management. Its success in this regard is a result of concerted effort
4 over several years by a set of skilled professionals focused on ensuring
5 that a reliable source of electrical power will be supported by a mature
6 asset management practice.” The Auditor General also commented: “I
7 am pleased to say that because BC Hydro is managing its assets well,
8 we made no recommendations in this audit.”¹⁷

- 9 • **Claudia M. Baca Project Management Consultant** - In 2016,
10 BC Hydro completed its second Organizational Project Management
11 Maturity Model (**OPM3**) Assessment. The Assessment standards are
12 designed by the Project Management Institute and the review was
13 conducted by an independent project management consultant. BC Hydro
14 received the highest score among approximately 50 participating
15 organizations from around the world. BC Hydro received a score of
16 91 per cent, which represents a significant increase in maturity from its
17 first assessment in 2010. The OPM3 Assessment Report is included as
18 Appendix A;
- 19 • **Project Management Institute** - Also in 2016, BC Hydro received the
20 Project Management Office (**PMO**) of the Year Award from the Project
21 Management Institute, recognizing superior organizational project
22 management capabilities. The Project Management Institute’s
23 November 10, 2016 press release states:

24 “The PMO of the Year Award honors a PMO that has
25 demonstrated superior organizational project
26 management abilities by adding value to its
27 organization through its support of successful

¹⁷ See footnote [16](#)

1 strategic initiatives. The award recognizes a PMO that
2 has established a vision for value delivery and has
3 had a positive and clear impact on business results.”

- 4 • **PricewaterhouseCoopers (PwC)** - PwC conducted an audit of
5 BC Hydro’s Information Technology (IT) Planning and Project Delivery.
6 PwC gave BC Hydro a “G” rating, indicating that only minor issues and
7 impacts were identified. The summary of the key findings of the audit
8 were as follows:
 - 9 ▶ The Technology group has established effective processes to
10 manage investment planning and project delivery which include a
11 robust project delivery framework, a strong Project Management
12 Office and defined processes to evaluate and prioritize capital
13 investments; and
 - 14 ▶ Key improvement opportunities include developing a benefits
15 realization process and incorporating resource capacity constraints
16 into the capital investment prioritization process.

17 A copy of PwC’s audit report is included as Appendix B. BC Hydro’s
18 Technology Group has responded to the recommendations in the audit,
19 including developing a benefits realization methodology to help improve the
20 outcomes of capital investments by monitoring benefits through all stages of
21 investment.

22 **4.2 Cost Effectiveness – Definition and Assessment**

23 **Q16. In paragraph 13 of his evidence, Mr. Craig states:**

24 “The CEC is of the view that the primary guiding principle for the
25 information to be obtained with respect to the Commission’s
26 regulatory oversight of capital should be to understand the
27 cost-effectiveness of capital expenditures and investments. CEC
28 submits that in order to understand the cost effectiveness of

1 [capital] expenditures, two key components of information are
2 required – costs and Benefits.”

3 **In Exhibit C-3-15-1, Mr. Craig in his response to CEABC IR 5.2 states:**

4 The objective of assessing cost-effectiveness is to identify a
5 particular benefit of the capital expenditure and investment,
6 determine the appropriate measure for understanding the
7 benefit, identify the costs related to achieving that benefit and be
8 in a position to calculate the cost for the unit of benefit delivered.

9 This approach is common throughout all of the CEC’s
10 preliminary identification of methodology for examining
11 cost-effectiveness, regardless of the group with particular types
12 of capital investments and expenditures to manage. Of course,
13 details vary with type but the fundamental principle of analysis
14 remains the same.

15 **Is this aligned with how BC Hydro defines cost effectiveness?**

16 A16. Our definition of cost effectiveness aligns with our understanding of the
17 Commission’s use and definition of the term as referenced in a number of
18 Decisions. In the Vancouver Island Generation Project (**VIGP**) decision
19 in 2003, the Commission Panel made a distinction between cost effective and
20 least cost. The Commission Panel stated that “cost-effective” included a
21 “consideration of project characteristics such as reliability, dispatchability,
22 timing, and location as well as cost or price, in the case of an EPA. Least-cost
23 is taken to only include cost or price considerations.”¹⁸

24 In the Vancouver Island Transmission Reinforcement (**VITR**) Project CPCN
25 Application decision in 2006, the Commission Panel referenced the
26 description of cost effectiveness in the VIGP decision, and provided further

¹⁸ Page 77; Online at: <https://www.ordersdecisions.bcuc.com/bcuc/decisions/en/111684/1/document.do>

1 clarification by stating “[t]he task is not to select the least cost project, but to
2 select the most cost-effective project.”¹⁹

3 Our understanding of the Commission’s use of the term “cost effective” is that
4 it considers not just the economic cost of a capital investment or the
5 economic benefits from undertaking that capital investment, but also the
6 non-quantifiable or non-economic considerations such as safety and
7 environmental risks as the case permits. We view the Commission’s
8 description as broad enough to assess both capital investments where adding
9 economic value is a priority and capital investments undertaken to minimize
10 the impact of safety, environmental, or reliability risks. We believe this
11 broader view of capital investments is necessary to assess what capital
12 investments are in the public interest and whether rates are just and
13 reasonable.

14 We note the CEC agreed with this understanding of cost effectiveness in
15 previous proceedings. For example, the CEC submitted in the Ruskin Dam
16 and Powerhouse Upgrade Project CPCN Application proceeding that “the
17 cost-effectiveness part of the test is multi-faceted, including safety, reliability,
18 security, environment, socio-economics, first nations as well as cost, scope,
19 schedule, procurement, task plan and risks.”²⁰

20 **Q17. Where and how does BC Hydro consider cost effectiveness with regard**
21 **to its capital portfolio?**

22 A17. Broadly speaking, with regard to capital, BC Hydro considers cost
23 effectiveness as defined in [A16](#) when: developing its Capital Plan; developing

¹⁹ Page 15; Online at:
https://www.bccub.com/Documents/Proceedings/2006/DOC_12040_1-VITR%20Decision-July%207%202006%20-%20Web.pdf

²⁰ Page 1; Online at:
https://www.bccub.com/Documents/Arguments/2011/DOC_29361_12-16-2011_CEC_Final_Argument.pdf

1 strategies, studies, and plans that determine solutions that feed into the
2 Capital Plan; and developing and delivering projects. We briefly discuss these
3 three situations below.

4 (i) Developing our Capital Plan

5 BC Hydro's capital investments planning process is described in Chapter 6 of
6 the Fiscal 2017 to Fiscal 2019 RRA and an updated description will be
7 provided in Chapter 6 of the Fiscal 2020 to Fiscal 2021 RRA. The annual
8 capital planning process applies a common approach to planning, prioritizing
9 and governing investments across BC Hydro so that the Capital Plan is
10 updated and prioritized to respond to the latest information on the system
11 risks and needs. This is done by selecting the highest priority investments
12 that can be cost effectively delivered given available financial and labour
13 resources in order to meet overall business objectives and provide a
14 consistent and appropriate management of risks across all asset categories.
15 This view of cost effectiveness is consistent with the Commission's approach
16 as discussed in [A16](#) and reflects our obligation to serve. Our Service Plan
17 Performance Measures, which set four goals related to Reliable and
18 Responsive Service, Affordability, Commitment to Clean Power, and Safety,
19 allows us to ensure our Capital Plan is achieving the desired results.

20 Given the size and complexity of BC Hydro's capital portfolio, we have been
21 working over the past 18 months in a structured and deliberate manner to
22 enhance our existing enterprise prioritization framework by implementing a
23 value-based decision making approach that will build on our existing capital
24 investment planning processes. The value-based decision-making approach
25 is a prioritization tool that will capture the relative importance of the capital
26 cost and value of an investment by translating a variety of investment benefits
27 into a common economic scale. Using this tool, the capital portfolio can be
28 optimized by selecting the investments that will bring the highest total net

1 value to the organization while satisfying any financial, resource, or timing
2 constraints.

3 This value-based decision making approach is aligned with our Service Plan
4 commitments and corporate priorities, and considers value to be elements
5 such as our service plan measures, risks mitigated (reliability, safety,
6 environmental risks etc.), cost savings, and costs avoided. It will allow for a
7 better understanding and communication of the implications of our capital
8 investments, and is similar to the approach being taken by a number of our
9 utility peers in Canada.

10 The value-based decision making approach differs from what Mr. Craig has
11 proposed in its capacity to:

- 12 • Appropriately optimize BC Hydro's capital portfolio given its complexity
13 and size;
- 14 • Align with the commitment and priorities of BC Hydro and with
15 BC Hydro's asset management practices and framework; and
- 16 • Take into account the changes in investment value over time for
17 optimization purposes.

18 (ii) Developing Strategies, Plans, and Studies

19 As defined in our Revised Proposal filed as Exhibit B-7, we develop
20 strategies, plans, and studies to seek solutions to effectively invest in the
21 power system and infrastructure, and investigate and / or implement broader
22 regional, system, or business unit solutions or policies. In our response to
23 CEC IR 1.19.1 filed as Exhibit B-4, we explained that the primary purpose of
24 our strategies, plans, and studies for the power system is to document the
25 identification of system needs and risks along with potential response to allow
26 us to coordinate and optimize the development of the power system in

1 response to those needs over a long time frame. Optimizing the development
2 of the power system minimizes the risk of stranded assets and ensures we
3 mitigate risk by maintaining future system performance and anticipating load
4 growth. Similarly, the primary purpose of our strategies and plans for
5 Technology is to document the identification of our technology needs and
6 risks along with potential responses. This is a holistic cost-effective approach
7 to managing the development of the power system and supporting
8 infrastructure given that strategies, plans, and studies, and proposed
9 solutions change over time in response to changing needs and emerging
10 risks.

11 Typically a financial benefit analysis or a net present value analysis is not
12 included in strategies, plans, and studies for the reasons stated in the
13 preceding paragraph. Undertaking a financial benefit analysis for proposed
14 solutions would be doing so before the Initiation Phase as seen in [Figure 6](#)
15 below, before the scope has been defined and at a time when the costs are
16 reflective of high-level planning allowances. There are a few exceptions
17 where undertaking a financial benefit analysis to determine the proposed
18 solution is appropriate. In those situations, the strategy, plan, or study will
19 include the financial benefit analysis.

20 In Appendix K of the Fiscal 2020 to Fiscal 2021 RRA, we will provide
21 summaries of strategies, plans, and studies that are related to projects listed
22 in Appendix I and will provide in Appendix L the Technology Strategy and
23 5-Year Plan. We expect this will assist the Commission and interveners in
24 contextualizing the identified solutions or projects within the strategies, plans,
25 and studies; and

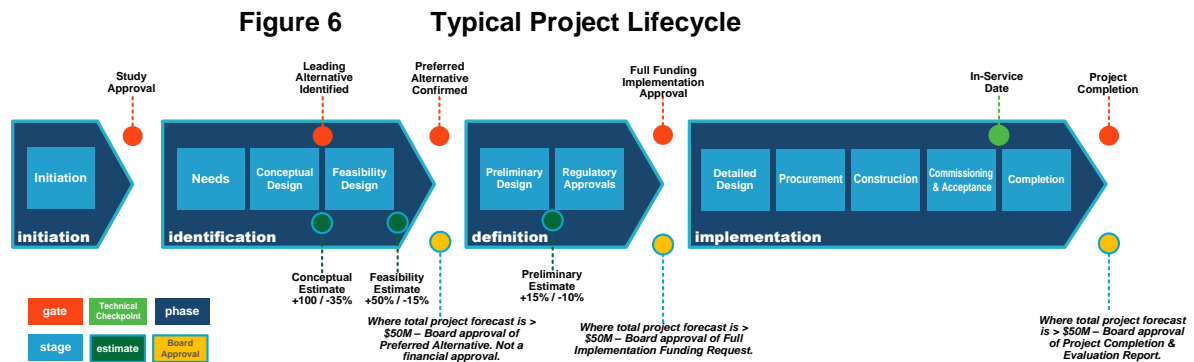
26 (iii) Developing and Delivering Projects

1 Inclusion in the capital plan is not a guarantee that a project or solution will be
2 initiated and/or implemented. The project's need, alternatives, cost, and
3 expected impacts and outcomes are evaluated to varying degrees throughout
4 the project's lifecycle (see [Figure 6](#) below for an illustration of the lifecycle for
5 a typical project). The business case or justification document for projects
6 outlines and assesses the project's justification, alternatives, cost, expected
7 impacts and outcomes, and risk and risk mitigation strategies. The project's
8 alternatives are typically assessed during the Identification Phase of the
9 project's lifecycle.

10 For projects initiated to add economic value, financial criteria will be a key
11 consideration in determining if a project will be advanced and what alternative
12 is selected. For projects initiated to manage risks, where there are multiple
13 viable alternatives, where applicable, financial criteria including net present
14 value (or cost-benefit analysis) is considered in the selection of the preferred
15 alternative. Financial criteria are considered along with other attributes
16 including, but not limited to, safety, public interest issues, and environmental
17 and archeological impacts using a decision-making framework. The
18 decision-making framework provides a logical way to integrate multiple
19 strategic objectives when comparing options and for the assessment of
20 complex trade-offs for decision-makers, and is typically included in business
21 cases or justification documentation.

22 We provide similar information in major project applications and as requested
23 in revenue requirements proceedings. Given that we processed over 400
24 funding requests for projects with a forecast cost over \$1 million in
25 fiscal 2018, it is not efficient to provide all business cases or justification
26 documents in our revenue requirements applications.

1



2 **Q18. What is BC Hydro’s response to Mr. Craig’s proposal in paragraph 54 of**
 3 **his evidence that BC Hydro should use “the CEC template for**
 4 **information requirements” that “flows from outlining 7 important**
 5 **Commission oversight information requirements”?**

6 **A18.** We do not agree “the CEC template for information requirements” is
 7 necessary to provide the Commission with the information Mr. Craig’s
 8 outlines. As discussed in section [2.2](#), we already file the types of information
 9 listed by Mr. Craig in our revenue requirements applications and in major
 10 project applications, and these processes provide a forum in which the
 11 Commission can request further information as needed for its decision
 12 making. As described in [A1](#), as an outcome of the Government Review, we
 13 will be filing the IRP with the Commission.

14 Further, it is our view that Mr. Craig’s templates:

- 15 • Will not ensure that Commission oversight is more effective;
- 16 • Will not provide more structure to ensure that investment drivers,
 17 strategies, plans, and studies are more comprehensively addressed; and
- 18 • Do not evaluate the cost effectiveness of our capital investments.

19 In the table below, we assess the effectiveness, structure, and feasibility of
 20 Mr. Craig’s proposed templates.

1
2

Table 2 Assessment of CEC’s Proposed Templates

Capital Investment Type	Assessment of CEC’s Proposed Templates		
	Effectiveness	Structure	Feasibility
Power Systems: Generation Transmission Distribution Dam Safety	<ul style="list-style-type: none"> Mr. Craig’s proposed templates are summarized at a high-level, based on system averages and risk percentages, and would neither provide information to assess the cost effectiveness of our capital investments nor ensure effective commission oversight. Given the size and complexity of our capital investment portfolio, a collection of spreadsheets will not allow for optimization of the overall portfolio and the decisions and the complex trade-offs we make to keep the integrated system operating safely and reliably. Furthermore, relative investment cost effectiveness should be evaluated within the context of the overall portfolio and across BC Hydro instead of the siloed approach proposed by Mr. Craig. 	<ul style="list-style-type: none"> As discussed in A17, we develop strategies, plans, and studies to document the identification of system needs and risks along with potential responses to allow us to coordinate and optimize the development of the system. Proposed solutions are often selected to address multiple system needs, and must be coordinated to maintain the integrity of the electric system. The templates split the capital portfolio into multiple single-driver views and fail to recognize that an integrated approach to planning is important to preventing a sub-optimal overall capital portfolio. 	<ul style="list-style-type: none"> It is not feasible for BC Hydro to provide the data in the form proposed by Mr. Craig nor is it feasible to use it in the way Mr. Craig suggests given the size and complexity of our capital portfolio and the challenges of planning and operating an integrated system. Our value-based decision making approach will employ a technology tool with the capability to calculate benefits, determine investment inter-dependences, manage the relationships between assets and investments, and prioritize and optimize based on value and cost.
Properties	<ul style="list-style-type: none"> Mr. Craig’s proposed templates will not provide information to assess cost effectiveness currently or over time. Knowing the 	<ul style="list-style-type: none"> We find the proposed templates to be vague and not useful in assessing the Properties’ capital portfolio. As noted in section 7.3 of the 	<ul style="list-style-type: none"> Much of the template is not applicable to Properties’ projects or would take significant effort to collect without any clear benefit: <ul style="list-style-type: none"> – “Growth / Supply”

Capital Investment Type	Assessment of CEC's Proposed Templates		
	Effectiveness	Structure	Feasibility
	<p>unit cost or benefit of a project does not necessarily lead to an understanding of its cost effectiveness.</p> <ul style="list-style-type: none"> Focusing on a per benefit or costs without consideration of the type of project or the project drivers may lead to the unintended consequence of focusing on a short-term lowest cost objective as opposed to the benefits and cost over the long term 	<p>Revised Proposal filed as Exhibit B-7, all of Properties capital investments are considered sustaining investments and result in the replacement of existing end of life assets. As such, specific capital strategies are not required.</p>	<p>and "Security Risk" are not applicable.</p> <ul style="list-style-type: none"> For "Life Extension" and "Performance Sustainment" each facility has a mix of assets with different ages, conditions, and remaining life; and the performance of individual assets is considered when assessing the need for replacement. The main safety risk is seismic risk and the primary stakeholders are internal employees and building occupants.
Fleet	<ul style="list-style-type: none"> Mr. Craig's proposed templates would not be effective at evaluating the cost effectiveness of the Fleet capital portfolio or the programs represented in the portfolio. Developing a program to use Mr. Craig's condition assessments would be costly and will not necessarily reduce major component failures such as engines or transmissions. 	<ul style="list-style-type: none"> Mr. Craig's proposed templates will not be useful in assessing Fleet asset strategies as the measures and terms are not well-defined and differ from fleet management best practices. We currently use fleet best practices to determine the age, mileage, and maintenance cost. We are doubtful of the proposed templates efficacy in understanding and managing Fleet capital portfolio or its drivers. 	<ul style="list-style-type: none"> The templates are not feasible as we do not currently have some of these metrics and attempting to forecast them would be very challenging. For example, the "Stakeholder Concerns" or "Risk Exposure" templates. It is also challenging to reasonably forecast changes in fuel efficiency over a ten year period due to factors such as technological advancements.
Information Technology	<ul style="list-style-type: none"> Using Mr. Craig's templates will present 	<ul style="list-style-type: none"> We use a portfolio management 	<ul style="list-style-type: none"> The proposed templates may not

Capital Investment Type	Assessment of CEC's Proposed Templates		
	Effectiveness	Structure	Feasibility
	<p>difficulties in gathering cost and benefit data and establishing meaningful matching of costs and benefits (optimizing the portfolio). This will reduce cost effectiveness.</p> <ul style="list-style-type: none"> The difficulty of attempting what Mr. Craig proposes may be much greater than he suggests. Tracking costs by investment driver and strategy is feasible, but assessing investment benefits and matching them to costs would be very onerous, and difficult to present in a clear and understandable way. 	<p>approach for capital planning. The objective of our portfolio management approach is to allocate resources to business change initiatives that contribute most to BC Hydro's strategic objectives, even when funding or short-term priorities change, and are achievable within limited resources and limited ability to change. Mr. Craig's templates do not lend themselves to such an approach.</p>	<p>provide the desired results and may be impractical to implement. We do not have ready access to all the information needed to complete the templates as proposed and also do not have all benefit information tracked for all investments given the challenges of tracking and measuring effort benefits.</p>

1 **Q19. In the responses to the Commission's information requests filed as**
 2 **Exhibit C3-13, Mr. Craig provided examples of how the metrics included**
 3 **in the proposed templates could be used by BC Hydro. What is**
 4 **BC Hydro's response?**

5 A19. We have identified a number of errors and misunderstandings in Mr. Craig's
 6 responses to information requests on his evidence. We will address a few of
 7 them below.

8 **Exhibit C3-13, Response to BCUC IR 2.1**

9 On pages 11 and 12, Mr. Craig suggests that one example of where an
 10 aggregation of information would be useful to the Commission would be to

1 answer the question as to what the risk level for seismic withstand is for our
2 dams. As Mr. Craig states, we do in fact have information on seismic
3 withstands on a dam-by-dam basis. BC Hydro has identified the following
4 technical errors in Mr. Craig's example, including:

- 5 • Mr. Craig's suggestion to assign importance to the dams by the capacity
6 in megawatts (**MW**) or the total annual energy generated in gigawatt
7 hours (**GWh**) of the associated generating station follows a narrowly
8 utilitarian view of risk that only considers the consequence of lost
9 generation. Risk of this kind is minor compared to the human and
10 societal costs to the downstream population and infrastructure in the
11 event of a dam failure and is an entirely inappropriate reflection of the
12 importance of our dams. The alternative suggestion to weight data by the
13 physical mass of the dams is even less appropriate. We classify dams in
14 accordance with the B.C. Dam Safety Regulation, based on the
15 consequences of dam failure. By this scheme, dams are classified as
16 having Low, Significant, High, Very High and Extreme consequence.
17 This consequence classification could be used for aggregating results
18 and in fact is considered in the prioritization of projects; and
- 19 • Engineered structures, including dams, are not designed according to
20 earthquake magnitude but rather to ground motions (displacements,
21 velocities, accelerations) expected to occur at the site of the structure
22 with a given probability of annual occurrence (in line with Mr. Craig's
23 "expected to occur once every 10,000 years") referred to as the Annual
24 Exceedance Probability. The required Annual Exceedance Probability
25 varies by the dam's consequence classification and the design
26 earthquake ground motions vary site-to-site.

1 There is a flaw in Mr. Craig’s understanding of dams that renders invalid his
2 main point that a statement could be generated to say something like “the
3 cost effectiveness of upgrading BC Hydro’s dam capacities to withstand
4 seismic events is expected to [sic] \$1,000,000 per % upgrade...” All dams are
5 unique and widely varying in their design, construction quality, site foundation
6 and abutment characteristics, and the seismic hazard to which they are
7 subjected. They are consequently each unique in the combination of
8 methods, extent of work, and cost of upgrades required. It is not possible to
9 develop a single-valued figure or even a range of costs for such upgrades
10 that could usefully serve as an index for “cost effectiveness”. In this context,
11 cost effectiveness of seismic upgrades can only be considered, first on a
12 dam-by-dam basis as a relative measure between alternative upgrade
13 schemes in order to select a preferred alternative, and then from dam-to-dam
14 as one input – relative cost to reduction of risk—to prioritizing projects across
15 the fleet.

16 Moreover, considering the risks associated with the dams from individual
17 types of hazards, such as earthquakes, is of little value. Instead, the risks
18 from all hazards (earthquake, flood, design or construction deficiencies,
19 degradation of condition, operational failure of discharge facilities, etc.) need
20 to be considered together in order to derive a useful picture and to
21 understand how capital works should be prioritized.

22 **Exhibit C3-13, Response to BCUC IR 2.2**

23 On page 13, Mr. Craig makes references on how remaining life should be
24 determined for different types of assets. It is unclear how Mr. Craig is defining
25 remaining life. There are a number of measures used to define remaining life
26 depending on the purpose such as design life, financial depreciation life, age
27 of population still in-service, etc., A good heuristic for high volume, low value

1 assets, is using a simple life curve. For high value assets, age alone is not an
2 appropriate determining factor for assessing remaining life span. Condition
3 and performance are more critical as many of our assets have exceeded their
4 design life. Therefore, condition, deteriorating performance, criticality and
5 probability of failure drive the need for replacement rather than simply the age
6 of the asset. It is not clear how Mr. Craig's proposed templates and
7 methodology will take that into account.

8 On page 14, with regard to Civil Works Integrity, Mr. Craig notes that this is
9 not "an intangible or an unknown without quantitative understanding of the
10 issues." Mr. Craig further points to the example of the WAC Bennett Dam Rip
11 Rap Upgrade project and "the predictive capability of the engineering to
12 establish what form of upgrade would be necessary and when it may be
13 needed to be completed" as being quantitative and well-founded on
14 engineering research and experience. This was a relatively straightforward
15 matter in terms of dam safety upgrades, and even so was subject to
16 significant cost uncertainty until detailed engineering and constructability
17 assessments were completed. Such work is completed as a matter of course
18 by the time projects are brought forward to the Commission, but is usually not
19 yet completed or even started for proposed solutions or projects early in their
20 lifecycle. Furthermore, the matter of when such works need to be completed
21 is typically not quantifiable, but is rather a product of engineering experience
22 and judgment.

23 **Exhibit C3-13, Response to BCUC IRs 4.1-4.3**

24 On pages 26, Mr. Craig states that "BC Hydro has shown the ability to define
25 and manage a number of risks that might otherwise be thought of as
26 presenting too much uncertainty in their evaluation", and points to our
27 evaluation of the flood and seismic risks to its dams. On page 27, Mr. Craig

1 further takes the view that “virtually all risks as being amenable to such
2 definition, measurements, and quantifications as may be necessary to
3 connect the risk to the physical changes that may be required to either reduce
4 the risk and/or to mitigate the impacts” and that this makes it “possible to
5 quantitatively measure the cost effectiveness of managing the risks.”

6 Mr. Craig later makes the very important—albeit somewhat understated—
7 point that there are limitations in the validity of the understanding of the risk
8 and the measures available to represent the risk, as well as limitations in the
9 validity of the underpinning engineering assessments. A mature asset
10 management system must recognize these limitations. For these reasons, our
11 Dam Safety Program employs “risk-informed” rather than “risk-based”
12 decision-making.

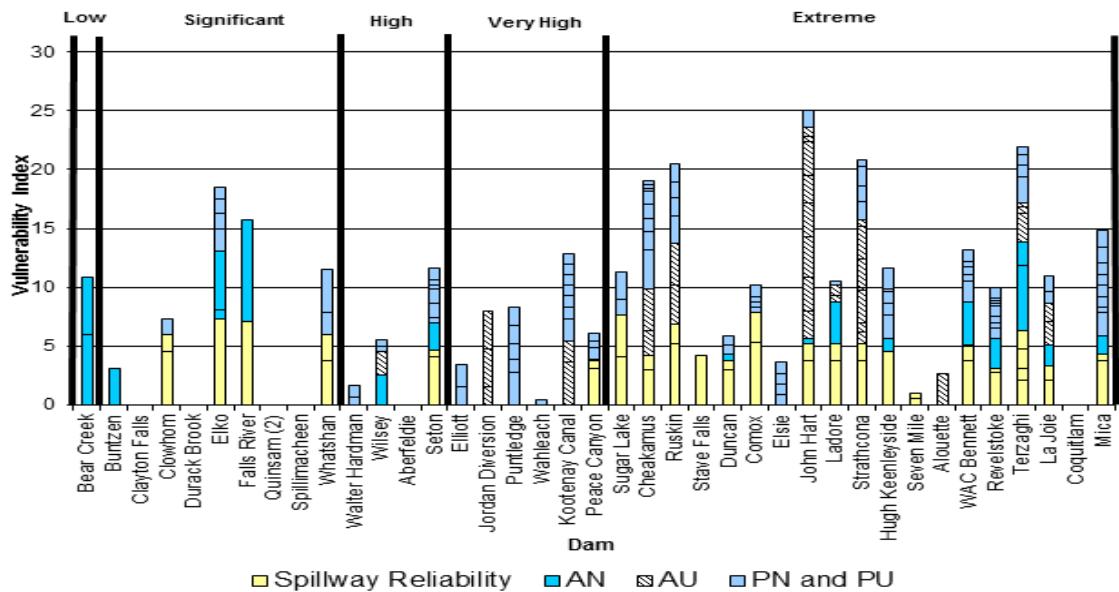
13 In fact, given the limitations in the present-day ability to properly quantify risks
14 associated with engineering infrastructure, Dam Safety typically does not
15 assign risk values to identified physical deficiencies in dams, but rather
16 characterizes them by way of a “Vulnerability Index”, which characterizes the
17 degree of concern that exists with respect to the integrity of the dam. The
18 Vulnerability Index is essentially 10 times the product of the following factors:

- 19 (a) The magnitude of the gap between the actual performance capacity of
20 the dam feature of concern and its required or minimum desired capacity
21 (range of 0-1);
- 22 (b) The criticality of the feature to the safety of the dam (range of 0-1);
- 23 (c) The effectiveness of interim risk controls (range of 0 for fully effective
24 controls to 1 for ineffective controls); and
- 25 (d) The frequency of stressing of the feature (range of 0-1).

1 The scheme is set up such that, at some point in the future when reliable
2 probabilistic values are widely achievable, the calculation can be converted
3 into a probability of failure.

4 For each dam, the Vulnerability Indices associated with each characterized
5 deficiency are aggregated and charted, as below. With no factor relating to
6 the consequences of failure, the Vulnerability Index is not a measure of risk.
7 Risk is roughly established by sorting the dams according to their
8 consequence classifications, with risk inferred to be greater for vulnerabilities
9 in higher consequence dams.

10 **Figure 7 Dam Safety Vulnerability Index**



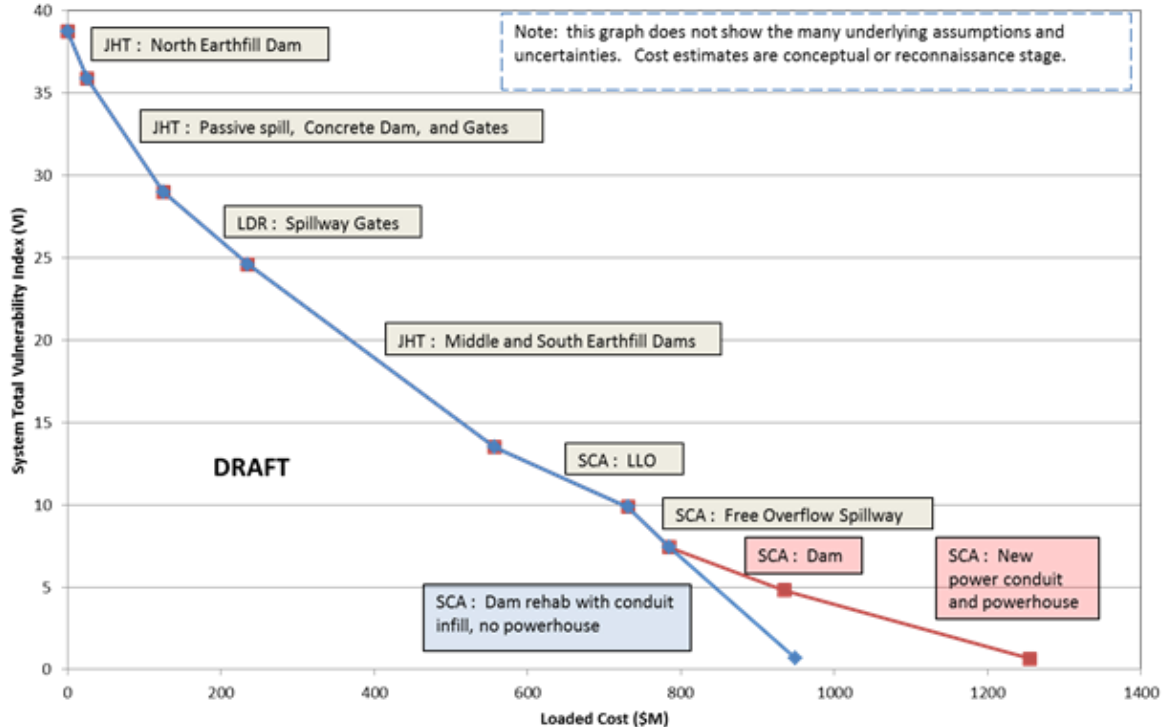
11
12 Some dam safety risks are not absolutely quantified, owing to the limitations
13 alluded to by Mr. Craig. Nevertheless, the recent audit of our Dam Safety
14 Program, conducted by a team that included international subject matter
15 experts in Dam Safety management and hazardous industries, found that
16 “BC Hydro continues to be a leader in risk assessment in the international
17 dam safety community with a transparent, systematic and robust risk

1 assessment process.” Similarly, risks in other BC Hydro portfolios related to
2 generating, transmission and distribution assets are often represented by
3 some proxy, such as the Transmission and Distribution Asset Health Index
4 and Generation Equipment Health Rating.

5 Circling back to the cost-effectiveness of our investments, Dam Safety
6 projects are prioritized with an eye to maximizing the ratio between reduction
7 of risk and cost to the ratepayer. An example of how this is done comes from
8 BC Hydro’s strategy for upgrades to the dams on the Campbell River on
9 Vancouver Island. Below is a chart that shows a number of deficient features
10 on the three dams of the system: Strathcona, Ladore and John Hart.
11 Proposed investments were prioritized with those having greatest risk
12 reduction to cost ratios coming first. The projects were released in that order:
13 John Hart (JHT) comprising several features first, followed by Ladore Spillway
14 Gates second, and Strathcona (SCA) Low Level Outlet and Free Overflow
15 Spillway last. Note that SCA Free Overflow Spillway could not precede
16 provision of the new Low Level Outlet, being a case where a project cannot
17 be prioritized by a so-called cost-benefit ratio alone. Future projects at
18 Strathcona Dam—an upgrade of the dam body and construction of a new
19 powerhouse to remove the power conduit from underneath the dam—have
20 lower risk reductions relative to cost and are being considered for some point
21 in the future.

1
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Figure 8 Illustration: Deficient Features on the Campbell River System Dams



3 As described previously, while cost-effectiveness is considered in terms of
4 comparing proposed solutions and in prioritizing work, there is no
5 single-valued figure or even a range of costs for such upgrades that could
6 usefully serve as an index or benchmark for determining whether an upgrade
7 is or is not “cost-effective”.

8 **4.3 BC Hydro’s Corporate Strategies and System Strategies**

9 **Q20. In paragraph 232 of his evidence, Mr. Craig states that:**

10 [T]here is an apparent absence of critical assessment being
11 undertaken in developing corporate strategies at the higher
12 levels, or at least articulation of this assessment in the reporting
13 that the Commission currently receives. Rather, corporate
14 strategies appear to be reported at the lower levels of planning.

1 **Is Mr. Craig's statement correct?**

2 A20. No. In this context, we take corporate strategies to mean our Service Plan
3 commitments and corporate priorities.

4 We have an annual planning process that determines priority areas of focus
5 to deliver on our Service Plan commitments, including the government's
6 mandate letter. We also examine key areas of risk and opportunity related to
7 delivering on our mandate to safely provide reliable, affordable, clean
8 electricity throughout British Columbia. Specific actions related to supporting
9 our service plan goals and priorities are reviewed each year, and initiatives
10 requiring supporting investment would typically go through a business case
11 process, including the evaluation of alternatives to determine the most cost
12 effective way to achieve the desired outcomes.

13 Through the IRP development process, we develop high-level long term
14 strategies and specific near term actions related to meeting the electricity
15 needs of the province. During the process, we compare a range of options to
16 meet electricity needs and develop the most cost-effective course of actions
17 by performing analysis at the portfolio level and trading off options in a
18 decision framework. Examples of the options compared include demand side
19 management, construction or extension of facilities, and new or renewed
20 electricity purchase agreements with power producers. The IRP is developed
21 considering our goals as well as the uncertainties in our operating
22 environment. The IRP provides context and informs lower levels of planning
23 and capital decision making.

24 **Q21. In paragraph 234 of his evidence, Mr. Craig states:**

25 The Commission should be able to clearly identify BC Hydro's
26 overarching strategies, how they relate to the business drivers,

1 and be able to determine whether or not they are cost effective
2 solutions to the issues facing the utility.

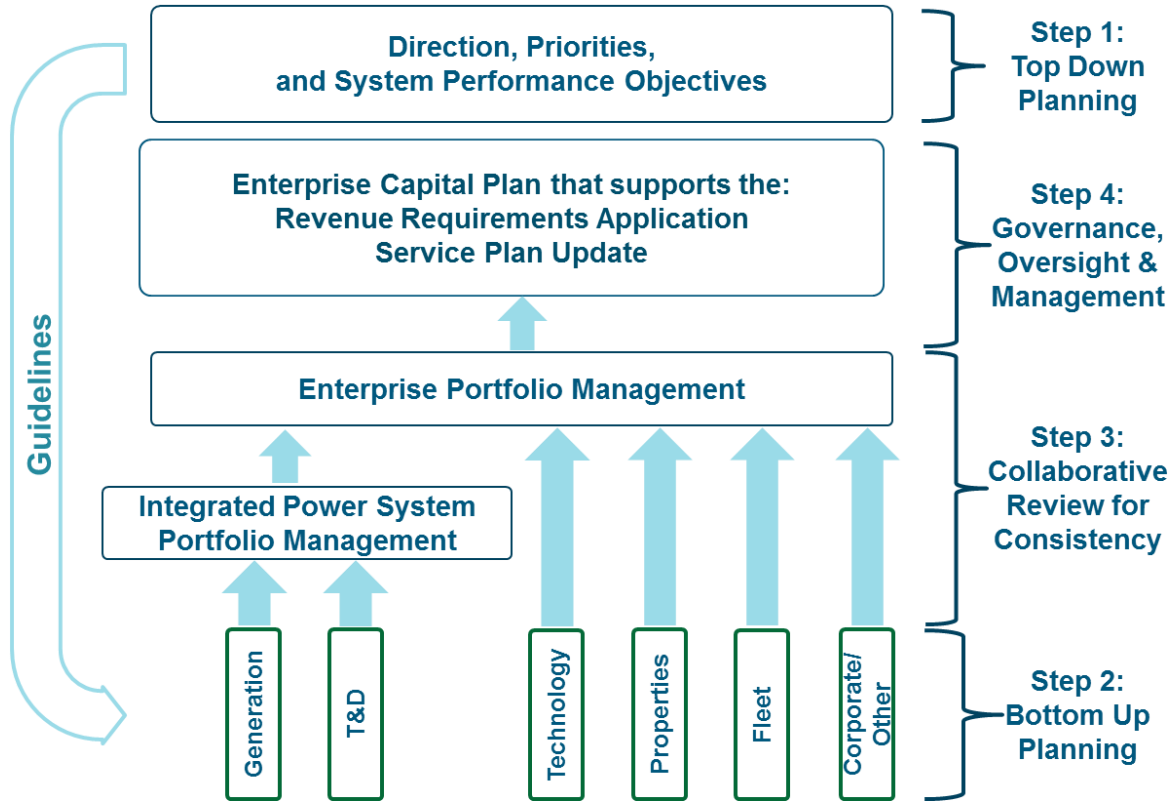
3 **What is the relationship between our Service Plan commitments and**
4 **corporate priorities and our strategies, studies, and plans as described**
5 **in the Revised Proposal?**

6 A21. Our Service Plan commitments and corporate priorities provide guidance
7 when determining the solutions for a region or area, facility or group of
8 facilities, river system, or asset class. As described in [A17](#), strategies, plans,
9 and studies document the assessment of system needs and the identification
10 of solutions, and are usually implemented over a long duration.

11 The figure below depicts the Annual Enterprise Capital Planning Process and
12 shows the relationship between corporate strategies into the bottom up
13 planning process which feeds into the capital portfolio and ultimately the
14 approved Capital Plan.

1
2

Figure 9 Annual Enterprise Capital Planning Process



3
4
5

Our revenue requirements applications provide comprehensive information on service plan commitments and corporate priorities and actions required to meet those commitments and priorities.

6

4.4 Capital Plans and Capital Planning Process

7

Q22. In paragraph 297 of his evidence, Mr. Craig states:

8
9
10
11
12

The CEC’s view is that it is ultimately valuable for the Commission to have an informed view of, and oversight of, these plans for capital expenditures and investments that embody the driving needs for capital and the strategies underlying capital decisions.

1 **What is the current regulatory oversight of BC Hydro's capital plans?**

2 A22. We value the Commission being able to review our Capital Plan, which
3 reflects the long-term projection of the investment needs of the BC Hydro
4 system, and to understand the connection between the performance of our
5 assets and the level of investments reflected in the Capital Plan. In revenue
6 requirements applications, we provide detailed information on the capital
7 planning process in Chapter 6 and provide the same information on the
8 Capital Plan that is presented to BC Hydro's Board of Directors (**Briefing**
9 **Note**). The Briefing Note also includes a description on what is driving the
10 level of investment reflected in the capital plan. In the Fiscal 2017 to
11 Fiscal 2019 RRA, the Briefing Note for the Fiscal 2017 to Fiscal 2026 Capital
12 Plan was filed as Appendix G, and in the Fiscal 2020 to Fiscal 2021 RRA the
13 Briefing Note on the Fiscal 2020 to Fiscal 2024 Capital Plan will be filed as
14 Appendix H.

15 The Briefing Note provides details on the long-term capital expenditure
16 forecasts by major portfolio, an overview of the annual capital planning
17 process, and descriptions of the investment strategies of each sub-portfolio.
18 New information included in the Fiscal 2020 to Fiscal 2021 RRA is data on
19 the portfolio risk-profile of the investments included within the capital plan and
20 the expected long-term implications for BC Hydro's assets. We believe this is
21 an appropriate level of information to include in revenue requirements
22 applications as it provides:

- 23 • Long term investment projections and the directional impact on future
24 rates;
- 25 • An understanding of our robust capital planning process, including the
26 oversight and governance by the Board of Directors; and

- 1 • Insight into the system needs and the strategic objectives driving
2 investments and provides supporting context for the capital expenditures
3 in the test period.

4 **Q23. In paragraph 299 of his evidence, Mr. Craig states:**

5 Having oversight of these plans provides the Commission with
6 the opportunity to evaluate BC Hydro's performance in regard to
7 its expenditures during RRAs and capital project applications.

8 **Is the capital plan an appropriate way to evaluate BC Hydro's**
9 **performance?**

10 A23. We primarily gauge our performance through the Service Plan Performance
11 Measures, which we have been meeting. Capital plans are not financial
12 approval mechanisms and, in themselves, are not an effective way for the
13 Commission to evaluate our performance for the following reasons:

- 14 1. The long-term capital plan includes projects at various levels of project
15 definition. It includes projects ranging from those that have not yet been
16 initiated (i.e., future projects) to projects that are in the Implementation
17 Phase. Future projects have a high degree of uncertainty with regards to
18 project scope, schedule, and cost which makes any measure of their
19 cost effectiveness too uncertain to gauge BC Hydro's performance;
- 20 2. The long-term capital plan is subject to change due to the evolving risks
21 and emerging needs of the system; and
- 22 3. Benefits reflected in the capital plan may not be additive at the portfolio
23 level making it difficult to assess cost effectiveness at the portfolio level.

24 These are also the reasons financial approval is not granted at the portfolio or
25 plan level. Inclusion in the capital plan is not a guarantee that a project or
26 solution will be initiated or implemented. The project's need, alternatives,

1 cost, and expected impacts and outcomes are subject to review prior to
2 approval.

3 **Q24. What would be the operational impact to BC Hydro of adding an annual**
4 **capital filing as proposed by Mr. Craig?**²¹

5 A24. We currently follow an annual capital planning cycle, which takes from
6 between six to twelve months to complete. The Power System Capital Plan,
7 which includes generation, dam safety, transmission and distribution projects
8 is the most complex and the largest, and involves a significant amount of time
9 and effort. Once the capital planning process is completed, BC Hydro begins
10 the process of “releasing” the planned capital for projects and programs that
11 will be initiated in the fiscal year. The release process involves: i) work
12 planning, which is the review of the scope of planned capital investments to
13 determine the appropriate time within the fiscal year to release the work and
14 which delivery group to release the work to; and ii) obtaining the financial
15 approvals required to initiate the work. End-to-end, the annual capital
16 planning, work planning, and obtaining financial approval, usually takes
17 longer than 12 months and often overlaps with the start of the next annual
18 capital planning cycle.

19 Including an annual capital report review proceeding as proposed by
20 Mr. Craig will extend the annual capital planning cycle and may impact our
21 ability to effectively and efficiently manage the release of capital investments
22 in a timely manner. Timely release of capital investments is important to
23 ensure that the downstream resource availability and constraints are properly
24 managed. The downstream resources are required to deliver the released
25 projects and programs.

²¹ Exhibit C3-10, para. 332

1 **4.5 Project Approval Requirements and Completion Reporting**

2 **Q25. What is BC Hydro’s response to Mr. Craig’s statement in paragraph 388**
3 **of his evidence that “Improving the business cases would have the**
4 **potential to improve the decision making with regard to improving**
5 **BC Hydro’s cost effectiveness in deploying capital”?**

6 A25. BC Hydro has policies and procedures in place that ensure the development
7 of strong business cases.

8 BC Hydro’s Management and Accounting Policies and Procedures and
9 Financial Approval Authority Policy outline requirements for capital investment
10 and business case approvals. These approval requirements and processes
11 have been developed to balance financial controls with operational efficiency,
12 based on the nature and risk of the capital investments. The policies and
13 procedures apply to all groups delivering BC Hydro’s capital investments.

14 Business case requirements have been developed over time to ensure
15 business cases provide necessary decision-making information to the Board
16 of Directors, the executive team, the gate board or portfolio and program
17 directors. The business case requirements are also aligned with the 2015
18 Certificate of Public Convenience and Necessity Application Guidelines for
19 large and complex projects.

20 Key business case requirements include:

- 21 • Description of the problem or opportunity;
- 22 • Description and analysis of alternatives, and justification for selected
23 alternatives;
- 24 • A decision-making matrix listing the criteria and measure used to assess
25 alternatives is typically required for projects;

- 1 • Assessment of the adequacy of First Nations consultation and
2 stakeholder engagement, where applicable;
- 3 • Project information including the scope, schedule, forecast cost, risk
4 management, and implementation approach;
- 5 • Project impacts and benefits information is required for all projects with a
6 forecast cost greater than \$20 million, and information on ongoing cost
7 and savings is required if the amount is expected to exceed \$100,000;
8 and
- 9 • A rate impact analysis is required for all projects with a forecast cost
10 greater than \$100 million.

11 **Q26. What is BC Hydro's response to Mr. Craig's statement in paragraph 410**
12 **of his evidence that in the SAP Inquiry there were numerous documents**
13 **purporting to be post-implementation follow-up processes that had no**
14 **basis of benefits having been established to enable a follow up?**

15 A26. As discussed in Chapter 6 of the Fiscal 2020 to Fiscal 2021 RRA to be filed in
16 late February 2019, the Technology group has developed and is currently
17 piloting a benefits realization process to help ensure that benefits claimed in
18 business cases are credible and realized. For the piloted projects, benefits
19 identified in business cases are tracked for a pre-determined time or until all
20 material benefits have been realized. Project initiators are required to
21 document completion of outcomes and benefit attainment during project
22 implementation and following project completion.

23 We also develop project completion reports that summarize how the project
24 performed with regard to scope, cost, and schedule, and evaluate the
25 project's expected impacts and benefits. It will inform the reader of the extent

1 to which investment objectives, impacts and benefits were achieved and to
2 identify "lessons learned" to improve future investment decisions.

3 For projects that have been subject to major project application proceedings,
4 we also file the project completion reports to the Commission as directed. In
5 Appendix J of the Fiscal 2020 to Fiscal 2021 RRA, we will provide the
6 expected impacts and benefits for projects with a forecast cost greater than
7 \$20 million.

8 **4.6 Conclusion**

9 **Q27. Does BC Hydro recommend that the Commission adopt Mr. Craig's**
10 **recommendations?**

11 A27. No. Based on our review of Mr. Craig's evidence, Mr. Craig's proposal is not
12 feasible for BC Hydro to adopt and would lead to asset management, capital
13 planning, and capital delivery approaches that are inferior to BC Hydro's
14 current approaches. As discussed above, BC Hydro has well-established
15 practices that are performing well, are aligned with industry best practices,
16 and have been endorsed by third parties. Mr. Craig's approach to measuring
17 cost effectiveness of our capital is not aligned with our practices or with our
18 understanding of the Commission's use and definition of the term, and would
19 not add value. We also do not believe the proposal can be developed into a
20 useful tool for the Commission's oversight of our capital expenditures and
21 projects.

**Review of the Regulatory Oversight of Capital
Expenditures and Projects**

Appendix A

**OPM3 Assessment BC Hydro
Capital Infrastructure – Project Delivery**

BCHydro Capital Infrastructure
Project Delivery
OPM3 Assessment

Agenda

Project Objective & Scope

Organizational Maturity Results

Observations & Noteworthy Insights

Recommendations & Action Plans

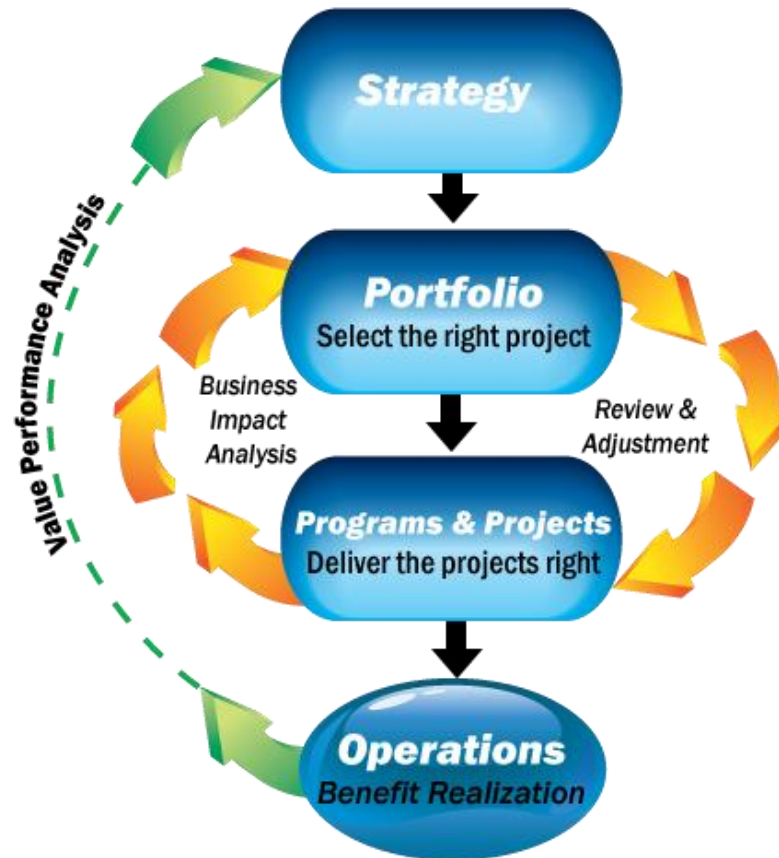


Project Objective & Scope

Assessment Objectives



What is Organizational Project Management?



- **Portfolio management:** Making the decisions that deliver the greatest business value
- **Program and Project management:** Efficiently delivering the business value of your decision
- Establish a review and adjustment process
- Achieve the benefits promised to the organization

What is the *Organizational Project Management Maturity Model (OPM3®)* ?

A Best Practice based maturity model that measures the extent to which organizations utilize their capabilities to achieve their strategic results.

Includes Practices from best in class organizations on Project, Program, Portfolio Management, as well as Organizational Enablers.

Assessment Product Used:

Organizational Project Management Maturity Model (OPM3®)



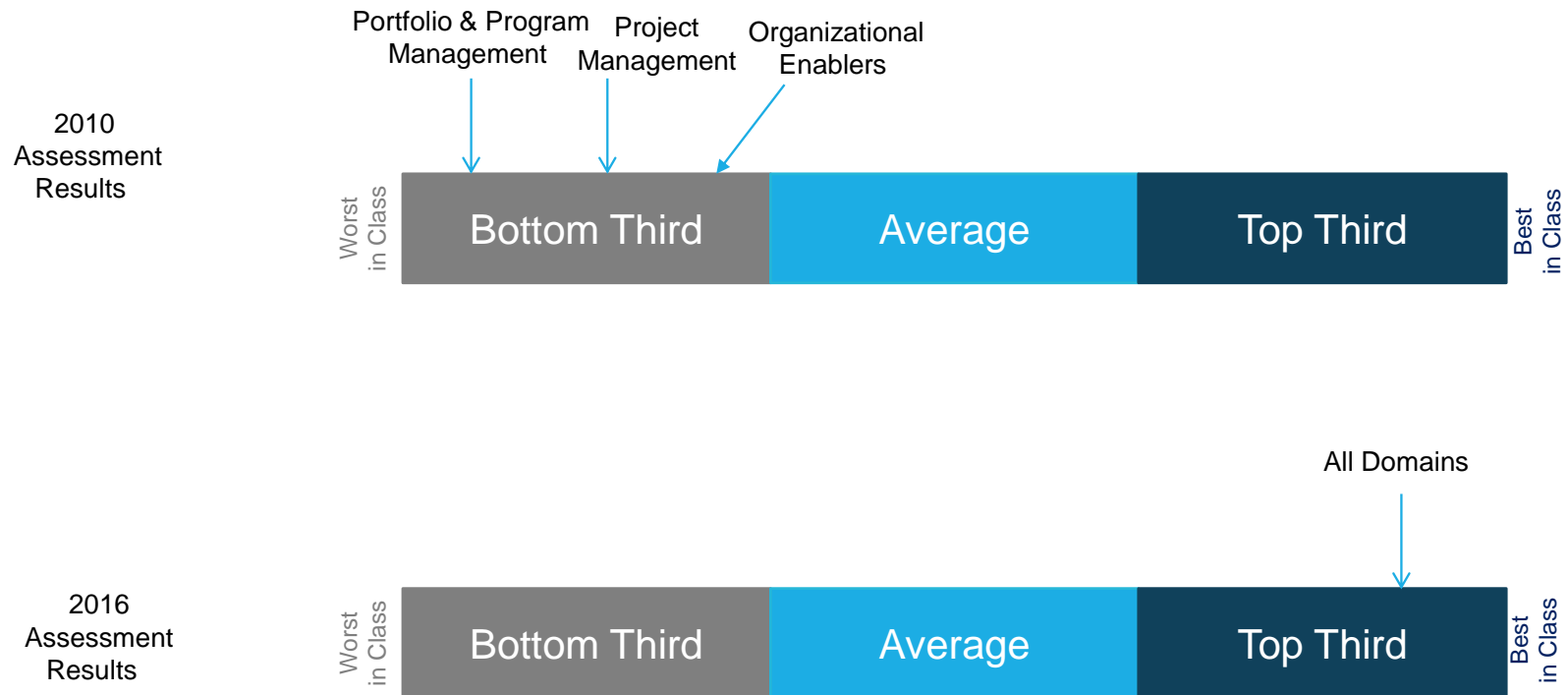
OPM3[®] Construct



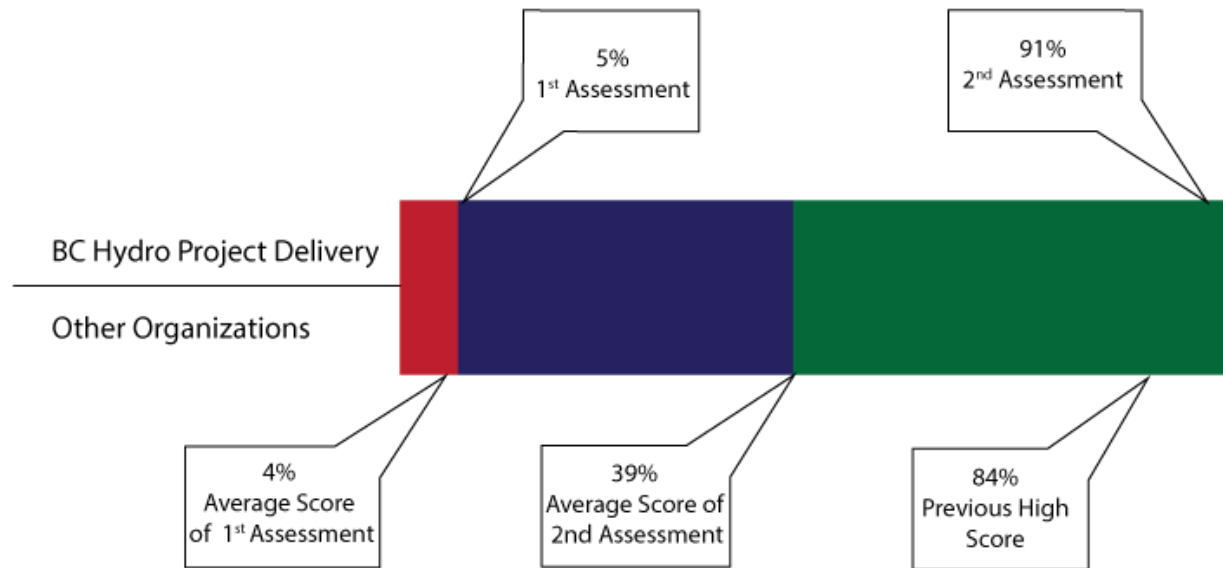
Total score = 0%
0 out of 1 Best Practices achieved

Maturity Results

Significant Improvement

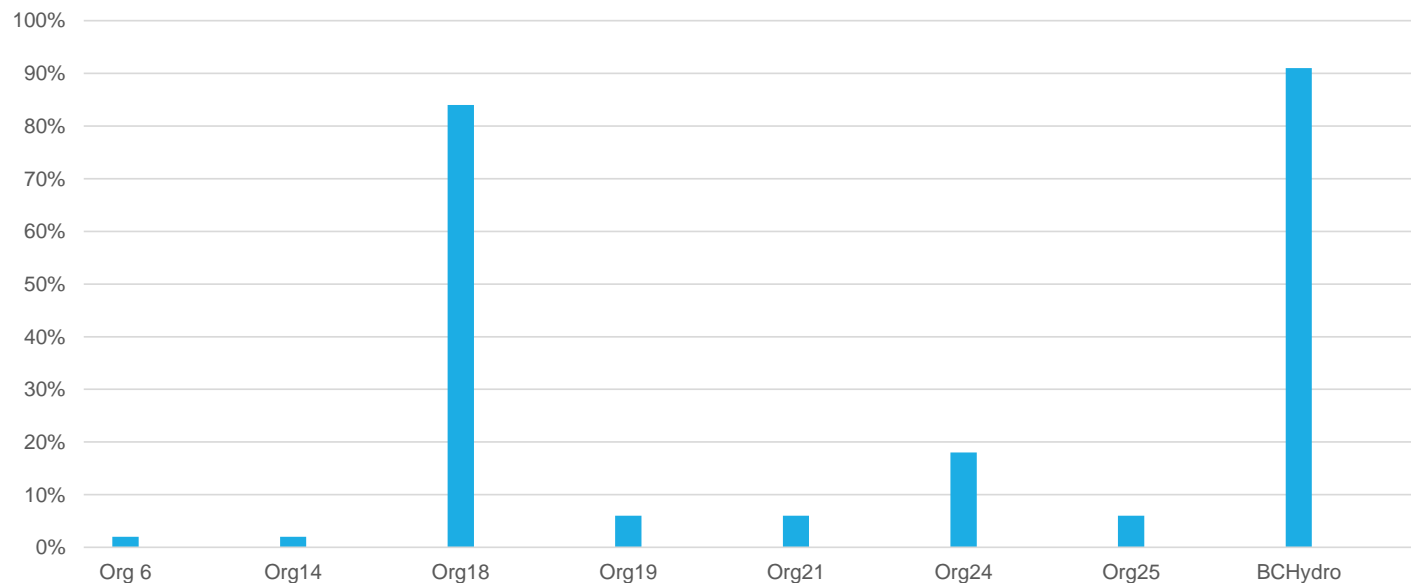


Maturity Score



Comparison to International Utilities

Comparison Data - Utilities



Project Management Findings

140 Best Practices Achieved / 100%

1.
 - Project Delivery has been successful in transferring the PPM practices that have been utilized and proven for years into a structured methodology that is properly standardized, well communicated and widely implemented across the different projects. Project Delivery has recently added a Deliverables Checklist. The entire structure has been implemented via the BCHydro intranet with easy accessibility to the processes and practices.
2.
 - Project Delivery has implemented Project Controls which are validating the integrity of the project management and technical processes required to deliver successful projects.
3.
 - Conformance audits have been implemented which are the mechanism to measure the outputs of the process and to validate the processes are in control in the organization. Continuous improvement of the processes happens as needed
4.
 - The knowledge area of Stakeholder management has significant process work (RESP) completed to manage the complex relationships that are required for Project Delivery projects.

Project Management Findings

140 Best Practices Achieved / 100%

5. {
 - Project Managers report that the scheduling procedure, schedulers, cost analysts and PMIS (Primavera P6) tools work well to manage their projects.
6. {
 - The project managers reported in most interviews that too much of their time is lost on creating documentation which may not be warranted on their projects even though a scalable process has been created.
7. {
 - The organization performance measures show that high performance is being achieved on # of project less than or equal to Expected Cost and Capital in service. Lower performance is realized in milestones met and capital expenditures. These lower performance results are due to the addition of the T&D department results which were not previously following the defined processes.
8. {
 - Project Managers have reported that they appreciate direct mentoring and coaching by the process owners. The also reported favorable comments on the independent reviews that have been implemented.

Program Management

Program Management – 54 Best Practices / 100%

1.
 - The organization has recently redefined a program to only be a program of projects. Prior to this decision, programs could be a program of work which does not fit the industry definition for programs
2.
 - The Benefit Realization process has been incorporated into the project level and reported out via the Project completion reports. Benefit realization is not being reported at the program or enterprise level.
3.
 - There are few programs in the Project Delivery portfolios.
4.
 - The process owner has decided to apply continuous improvement to the whole of the program management methodology instead of doing continuous improvement on each discreet process.

Portfolio Management

28 Best Practices 100%

1.
 - The organization has reached best in class performance in the creation of a Portfolio Delivery Strategy that describes the portfolio roadmap for completion as well as the delivery and performance plan.
2.
 - Portfolio optimization is being completed for the only elements available to the organization, resource allocation (This finding is limited by the scope of the assessment. Other optimization techniques may be performed by Asset Management).
3.
 - The process owner has decided to apply continuous improvement to the whole of the portfolio management methodology instead of doing continuous improvement on each discrete process.

Organizational Enablers

77 Best Practices / 77%

1.
 - Project Delivery is assessed as best in class in the following areas within Organizational Enablers:
 - Governance
 - Strategic Alignment
 - Internal Communities of Practice
 - Knowledge Management and Project Management Information Systems
2.
 - Noteworthy achievements include: The Resource Manager Allocation process which fulfills most of the Best Practices in this category.
3.
 - The organization has not developed a competency development framework.
4.
 - The organization has a career path but few project managers knew of its existence. In a few cases, there was an emotional response to the discussion concerning the existing career path.
5.
 - The organization is in the process of redesigning its PPM Information center to include the PPM practices, training, job aides and guides.

Implementation of OPM



Recommendations

Project Management Recommendations

- Improve Project Management Scalability
- Monitor performance metrics

Program Management Recommendations

- Add benefit realization to the Score Card
- Continue to refine Program Management

Portfolio Management Recommendations

- Increase portfolio optimization

Organizational Enablers Recommendations

- Create competency development framework
- Career framework communication

Implementation of OPM Recommendations

- Let it soak
- Apply business intelligence to implementation
- Apply for PMO of the Year award

Thank You!

Review of the Regulatory Oversight of Capital Expenditures and Projects

Appendix B

Information Technology (IT) Capital Planning and Project Delivery Audit



SUMMARY AUDIT REPORT

TRANSMISSION, DISTRIBUTION & CUSTOMER SERVICE BUSINESS GROUP

IT CAPITAL PLANNING & PROJECT DELIVERY AUDIT

Q4 F2016

MARCH 21, 2016

AU1614TDCS

Prepared By:

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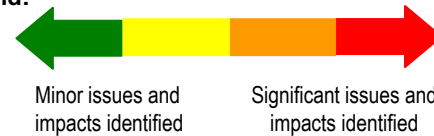
Distributed To: K. Morison
G. Reimer
C. Yaremko
J. McDonald
Audit & Finance Committee

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IT Capital Planning & Project Delivery Audit F2016

AUDIT TYPE	AUDIT RATING
RISK BASED	G

Legend:



Audit Objectives

- ❑ Assess whether effective processes are in place to plan, manage and deliver information technology (IT) capital projects.
- ❑ The audit team retained Jason Bergeron, a Subject Matter Expert from PwC. Jason has over 18 years of experience in managing large IT engagements, including IT assessments and system deployment projects across various industries.
- ❑ This audit was conducted in conformance with the International Standards for the Professional Practice of Internal Auditing.

Background

- ❑ The Technology group is responsible for planning, designing, delivering, and managing BC Hydro's information and communications technologies. They enable the business to sustain and enhance existing systems, build new capability, and consider future technology needs.
- ❑ The F2015-F2024 Rate Plan provides Technology with a capital budget of \$811M over the 10-year period. For F2016, the actual spend was \$78.4M against a budget of \$95.4M.
- ❑ As of January 2016, 151 active projects were managed by 14 internal Project Managers and 57 external Project Managers (a combination of providers that includes Accenture, Fujitsu, Telus and independent consultants).
- ❑ Since 2013, the Project Management Office within Technology has made significant improvements to IT project delivery processes.
- ❑ Over the past 12 months, Technology Management has also made a number of changes across the overall IT function as a result of external and internal reviews.
 - ◆ Areas identified for improvement included resource estimation, portfolio prioritization, delivery model selection and benefits tracking. Management completed a range of short term actions to address these areas.
 - ◆ In February 2016, the Technology function was reorganized to streamline operations.
- ❑ To further enhance and strengthen the Technology function, a "Technology Renewal" project was initiated in early 2016.

Key Findings

Summary

- ❑ The Technology group has established effective processes to manage investment planning and project delivery which include a robust project delivery framework, a strong Project Management Office and defined processes to evaluate and prioritize capital investments.
- ❑ Key improvement opportunities include developing a benefits realization process and incorporating resource capacity constraints into the capital investment prioritization process.

IT Capital Planning & Project Delivery Audit F2016

Governance

- ❑ An appropriate governance structure is in place to oversee investment planning and project delivery. There is a layered approach to oversee technology projects and programs.
 - ◆ External oversight is provided by the Regulator who reviews projects over \$20M.
 - ◆ Internal oversight comprises a subcommittee of the Board, Executive Team and a designated Executive Vice-President responsible for Technology. Additional steering committees oversee more complex and higher risk projects.
 - ◆ In January 2016, the Executive Team replaced a previous Technology Governance Committee to strengthen decisions over technology. A formal mandate has not yet been established to clarify expectations of the Executive Team and to record key decisions.
- ❑ An investment strategy is in place to align Technology projects to corporate priorities. A 5-Year Strategic Plan (covering F2017-F2021) was approved in March 2016 and highlights clear alignment of technology investments with corporate priorities.
- ❑ A benefits realization process is not established to follow up and determine whether planned benefits as a result of projects are being realized. In addition, setting of targets to better measure Technology performance requires some attention.

Investment Planning and Portfolio Management

- ❑ A defined framework with clear criteria and processes are in place to identify and prioritize IT investments.
 - ◆ Processes exist to identify needs and pre-screen potential projects. Detailed criteria are defined to score proposed projects to facilitate prioritization and funding decisions.
 - ◆ During the annual capital planning process, the Technology group leadership team and the Capital Portfolio Manager work together to propose project mixes which are submitted to the Chief Information Officer and oversight groups for review and approval.
 - ◆ Monthly meetings review and release projects to the initiation phase of the project delivery lifecycle. New project requests are also considered if funding is available.
 - ◆ The capital portfolio is continuously adjusted in response to changing business priorities. In early F16, changes in corporate priorities required a re-evaluation of the portfolio. Adjustments accommodated high priority corporate initiatives such as Supply Chain and Customer Strategy.
- ❑ Budget constraints are actively considered when making investment decisions. The F2015-F2024 Capital Plan sets total Technology capital spending at \$811M. For F16, the Technology capital budget was \$95.4M. Portfolio level spend is tracked against budget and reported monthly.
- ❑ Key improvement opportunities include:
 - ◆ Capacity constraints are not actively factored in the prioritization process. There is no requirement to demonstrate resource availability during project prioritization and release. This may result in the selection of projects that lack an appropriate resources mix.

IT Capital Planning & Project Delivery Audit F2016

- ◆ Project pre-screening processes applied across the business groups are not consistent. A standard procedure for prioritization across business units may better capture the highest value projects to the organization.
- ◆ The absence of an industry standard portfolio management tool has resulted in a manual and inefficient process and places reliance on one individual (the Capital Portfolio Manager). The market for automated portfolio management tools is mature and such tools are able to simplify multi-dimensional analysis around budget and resource constraints with enhanced reporting.

Project Management and Delivery

- A robust and managed project delivery process is in place which includes an established framework, monitoring mechanisms and a compliance function.
- The framework incorporates key components of a standard delivery lifecycle including mandatory gate reviews and approval processes with defined deliverables. All projects are required to follow the framework and any exceptions must be approved by the Project Management Office.
 - ◆ Overall, projects are managed in accordance with the delivery framework. However, Audit Services noted that projects which did not follow the full delivery framework had requests for additional funding and schedule extensions.
 - ◆ Processes are in place to ensure business requirements are defined and that user acceptance is obtained before projects are placed in service.
- The Project Management Office is accountable for all project delivery and closely monitors the status of active projects. Detailed monthly project dashboards, monthly financial reports and schedule variance reports are regularly reviewed.
- The Project Management Office chairs all project gate reviews, conducts annual quality reviews of active projects and assesses the performance of Project Managers.
 - ◆ During the gate review, the Project Manager must go through a standard set of requirements to demonstrate that projects are ready for the next phase. Audit Services attendance at a gate review confirmed a robust and structured process.
 - ◆ Annual quality reviews follow an established criteria and scoring mechanism to assess compliance with the delivery framework.

Management Comments and Action Plans

- Management agrees with the recommendations in the audit report and will address the majority of recommendations by December 2016. The remaining recommendations, which require some planning time, will be implemented by March 2018.