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British Columbia Utilities Commission
Sixth Floor, 900 Howe Street
Vancouver, BC V6Z 2N3

Attention: Mr. Patrick Wruck, Commission Secretary

Dear Sirs/Mesdames:

**Re: British Columbia Hydro and Power Authority (BC Hydro) Supply Chain
Applications Project Phase Two - Final Submission**

We enclose for filing in the above proceeding BC Hydro's Final Submission, dated January 22, 2019.

Yours truly,

FASKEN MARTINEAU DuMOULIN LLP



for

Christopher Bystrom
Personal Law Corporation

CRB/gvm
Encl



**BRITISH COLUMBIA UTILITIES COMMISSION
IN THE MATTER OF THE UTILITIES COMMISSION ACT
R.S.B.C. 1996, CHAPTER 473**

and

**BRITISH COLUMBIA HYDRO AND POWER AUTHORITY
SUPPLY CHAIN APPLICATIONS PROJECT PHASE TWO**

Final Submissions of

British Columbia Hydro and Power Authority

January 22, 2019

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PART ONE: INTRODUCTION AND OVERVIEW

A. INTRODUCTION

1. In its Phase Two Verification Report (the “Verification Report” or “Report”) filed on October 12, 2018, BC Hydro is requesting acceptance pursuant to section 44.2 of the Utilities Commission Act (“UCA”) of a cost range of \$38.5 million to \$45.4 million in Implementation Phase capital expenditures for the Supply Chain Applications Project (the “SCA Project” or “Project”).¹ The SCA Project will replace BC Hydro’s existing PassPort supply chain information technology (“IT”) system with an SAP IT system and make improvements to BC Hydro’s supply chain business processes for third party materials and service acquisitions. The SCA Project will close 13 identified capability gaps in BC Hydro’s current supply chain system and processes, and will meet BC Hydro’s supply chain business requirements.

2. In Decision and Order G-158-17, dated October 19, 2017 (the “Phase One Decision”), the British Columbia Utilities Commission (the “BCUC” or “Commission”) accepted in the public interest the capital expenditures ranging from \$22.5 million to \$29.7 million required to complete work on the SCA Project to the end of the Definition Phase. In its Phase One Decision, the BCUC found that the SCA Project is needed, as BC Hydro’s current supply chain system is inadequate for the size and complexity of BC Hydro. In its letter marked as Exhibit A-2 in this proceeding, the BCUC confirmed the results of the Phase One Decision as follows:

In the Phase One Decision, the BCUC found that, given the capability gap issues raised, the current supply chain system employed by BC Hydro is inadequate considering the size and complexity of BC Hydro and determined that there is a need to address this. The BCUC further determined that the work BC Hydro has done to identify and evaluate alternative supply chain applications is reasonable and the selection of an SAP-based system was justified. Accordingly, the Panel considers that the issues of project need and alternatives for the SCA Project have been resolved in the Phase One Decision, and therefore are out of the scope for this proceeding.²

¹ Exhibit B-1, Verification Report, as amended by Exhibit B-1-2, Errata No. 1.

² Exhibit A-2.

3. After the issuance of the Phase One Decision, BC Hydro successfully carried out the planned Definition Phase activities. The Verification Report presents the updated cost, benefits, scope, risk register, and schedule information for the SCA Project as directed by the Commission in the Phase One Decision. The updated analysis has confirmed the ability of the SCA Project to close the capability gaps in the existing supply chain system, and meet BC Hydro's business objectives while achieving significant benefits.

4. The estimated cost of the SCA Project has not materially changed since the Phase One Application. The \$71.3 million Expected Cost (i.e. the most likely cost, analogous to a P50 estimate) is approximately \$5.4 million higher than the equivalent expected cost (or mid range estimate) in the Phase One Application. The \$79.3 million Authorized Cost, which includes the project reserve, is the same as the authorized cost (or upper bound estimate) in the Phase One Application. Based on the expected annual benefits from the SCA Project, the net present value ("NPV") of discounted cash flows and revenue requirements continue to be positive, indicating that customer rates will be lower with the SCA Project all else being equal.

5. Based on the updated analysis as presented in the Verification Report, BC Hydro is requesting acceptance of the Implementation Phase capital expenditures of the SCA Project as reflected in the draft order in Appendix A of the Report.³

B. SUBMISSION OVERVIEW AND KEY POINTS

6. In Order G-229-18, the BCUC determined that the scope of this proceeding includes, but is not necessarily limited to: (1) whether the benefits flowing from the SCA Project remain credible and sufficient; (2) whether the total project costs are reasonable; (3) whether the scope of the SCA Project is acceptable if it has changed significantly since the Phase One Decision; and (4) whether the SCA Project benefits have sufficient baseline information to enable accountability for benefit capture.

7. This Final Submission is organized around the above scope items, as follows:

³ Exhibit B-1, Verification Report, Appendix A.

- Part Two: The scope of the SCA Project continues to meet the identified need for the SCA Project, including meeting BC Hydro's supply chain business requirements and closing the 13 identified capability gaps in BC Hydro's current supply chain system and processes. The minor changes in scope since the Phase One Decision have no material impact on the costs, benefits, schedule or risks of the project.
- Part Three: The estimate of total project costs is robust and reasonable. Total Definition Phase costs were below the expected cost for this work. While the Expected Cost for the Implementation Phase has increased, the total Authorized Cost has not changed since the Phase One Application.
- Part Four: The estimated benefits flowing from the SCA Project have been refined and are realistic and achievable. The quantifiable benefits are sufficient to justify the project on the basis of a positive NPV analysis.
- Part Five: BC Hydro has developed a comprehensive and well-structured benefits tracking process for the SCA Project. BC Hydro will internally track the estimated benefits until at least the time they are fully realized.

PART TWO: THE SCOPE CONTINUES TO MEET THE NEED FOR THE SCA PROJECT

8. In this Part, BC Hydro addresses the scope of the SCA Project and highlights the following points:

- The scope of the SCA Project continues to meet the identified need for the project. It continues to meet BC Hydro's business needs and close the 13 capability gaps.
- Changes to the scope of the SCA Project from the Phase One Decision are minor, and have no material impact on the costs, benefits, schedule or risks of the project.

A. SCOPE CONTINUES TO MEET NEED

9. The functional and technical components of SAP that are in scope for the SCA Project have not changed materially since the Phase One Decision. The key scope elements continue to include the implementation of the following SAP-based systems: materials management; purchasing; and integration with previously implemented SAP modules.⁴ The SCA Project will close the capability gaps in the existing supply chain IT system, meet BC Hydro's Supply Chain Business Requirements, and deliver a significant level of quantifiable and non-quantifiable benefits.⁵

10. Closing the capability gaps in BC Hydro's existing supply chain IT system remains a fundamental justification for the SCA Project. As part of the Phase One Application, BC Hydro performed a gap assessment of its current supply chain IT system and business processes. Through this process, 13 capability gaps in the current supply chain IT system and associated business practices were identified. Throughout the Definition Phase, BC Hydro relied on this objective as a central guiding principle and BC Hydro continues to affirm this objective. As part of the Design Phase, PricewaterhouseCoopers ("PwC") validated the Phase One Application

⁴ Exhibit B-1, Verification Report, Table 4-1.

⁵ Exhibit B-1, Verification Report, p. 4-2.

capability gap assessment against the Design Stage outputs. PwC's work confirms that the SCA Project will close the capability gaps as identified in the Phase One Application.⁶

11. The SCA Project will continue to allow BC Hydro to address 150 of the 153 Supply Chain Business Requirements that were identified as part of the development of the Supply Chain Business Model. PwC and BC Hydro undertook an updated assessment of the preliminary design and have confirmed that it will address all 150 technology-related business requirements. The results of the updated assessment were consistent with PwC's findings in relation to the conceptual design.⁷

12. Finally, the discrete benefits flowing from the SCA Project and the expected quantifiable benefits that will result were analyzed, validated and refined by PwC and BC Hydro during the Definition Phase. The benefits of the SCA Project are discussed in Part Four of this Final Submission.

13. The Phase One Decision found that the SCA Project is needed given the capability gaps and that the current supply chain system employed by BC Hydro is inadequate considering the size and complexity of BC Hydro. The work done since the Phase One Decision confirms that the SCA Project continues to meet the identified need for the project.

B. CHANGES IN SCOPE ARE MINOR

14. There have been only minor changes to the scope and design of the SCA Project since the Phase One Application. These minor scope changes have no material impact on the cost,⁸ benefits,⁹ schedule¹⁰ or risk¹¹ of the SCA Project.

⁶ Exhibit B-1, Verification Report, pp. 4-2 to 4-3.

⁷ Exhibit B-1, Verification Report, p. 4-3.

⁸ Exhibit B-4, BCOAPO IR 1.5.1.

⁹ Exhibit B-4, BCOAPO IR 1.7.1.

¹⁰ Exhibit B-3, BCUC IR 1.19.1.4.

¹¹ Exhibit B-3, BCUC IR 11.19.1.5.

15. The Conceptual Design Report attached to the Phase One Application described at a high level how SAP will be implemented to address the Supply Chain Business Requirements. Since the Phase One Application, the Conceptual Design Report has been updated and the design advanced to reflect changes to BC Hydro's IT landscape since 2015.¹² The minor changes to the scope of the SCA Project due to changes to BC Hydro's IT landscape and advanced design of the Project were described in the Verification Report, as follows:

- In the Phase One Application, a SAP to Unifier interface was included in scope. However, in 2015, when the Conceptual Design Report was written, Unifier was just being developed and the specific interactions between the two systems were unknown. Based on the analysis completed in the Design Stage and the actual use of Unifier,¹³ BC Hydro determined that automatic interfacing of detailed contract line-item information from Unifier to SAP was not required, and therefore removed the SAP to Unifier interface from scope.¹⁴ As a result, the Expected Cost was reduced by \$0.3 million. However, the Authorized Cost remained unchanged as the \$0.3 million was added to the project reserve in case the interface between SAP and Unifier is determined to be needed during the Implementation Phase.¹⁵
- The original scope of the SCA Project included plans to expand the use of SAP's cross application timesheet to cover contract resources. However, BC Hydro decided to consolidate the management of all contingent labour resources through FlexTrack Inc.'s Vendor Management System ("FlexTrack VMS") that will integrate with SAP.¹⁶ Flextrack VMS, which is being implemented through a

¹² Exhibit B-1, Verification Report, p. 4-7.

¹³ Exhibit B-1, Verification Report, p. 4-8.

¹⁴ Exhibit B-3, BCUC IR 1.19.1.2.

¹⁵ A \$0.3 million reserve was included in the Authorized Cost due to the risk that the Unifier interface may still be required to meet Site C's business requirements (Exhibit B-4, BCOAPO IR 1.5.1). A reduction in risk was also recorded as result of this minor change in scope. See item 4 in Table 5-1 of the Verification Report (Exhibit B-3, BCUC IR 1.19.1.5).

¹⁶ Exhibit B-1, Verification Report, p. 4-7.

separate technology project, provides a uniform end-to-end process platform from requirement definition, resource sourcing, evaluation, timesheets and expenses, payment, to contract closure.¹⁷ Including this functionality in SAP would have been duplicative and BC Hydro therefore removed this functionality from the scope of the SCA Project.¹⁸ This minor scope change requires the coordination of activities between the FlexTrack VMS and the SCA Project, which is a risk that will be monitored by both projects.¹⁹

- The Conceptual Design Report was updated to reflect that BC Hydro did not proceed with the planned Graphic Work Design Project, which was going to combine BC Hydro's AutoCAD and geographic information system engineering tools.²⁰
- While the Conceptual Design Report referenced dynamic discounting, this capability of SAP's Ariba has been implemented since November 2015 and was therefore removed from the Conceptual Design Report.²¹ Indeed, its removal should have been made prior to the submission of the Phase One Application.²²

16. The above changes in scope to reflect BC Hydro's technology environment and the advanced design of the SCA Project have no material impact on project costs,²³ benefits,²⁴ schedule²⁵ or risk²⁶ of the SCA Project. In short, the changes in project scope since the Phase One Decision are minor and inconsequential to the SCA Project.

¹⁷ Exhibit B-1, Verification Report, Appendix R, section 4.4.6.

¹⁸ Exhibit B-3, BCUC IR 1.19.1.2.

¹⁹ See Risk No. 19 in the SCA Project's risk register attached as Appendix P to the Verification Report (Exhibit B-3, BCUC IR 1.19.1.5).

²⁰ Exhibit B-1, Verification Report, p. 4-8; Exhibit B-3, BCUC IR 1.19.1.2.

²¹ Exhibit B-1, Verification Report, p. 4-8.

²² Exhibit B-3, BCUC IR 1.19.1.2.

²³ Exhibit B-4, BCOAPO IR 1.5.1.

²⁴ Exhibit B-4, BCOAPO IR 1.7.1. None of the changes in benefits between the Phase One Application and the Verification Report are a result of the above-noted minor scope changes (Exhibit B-3, BCUC IR 1.19.1.6).

²⁵ Exhibit B-3, BCUC IR 1.19.1.4.

²⁶ Exhibit B-3, BCUC IR 1.19.1.5.

C. CONCLUSION AND REQUESTED FINDINGS

17. The Commission should find that the scope of the SCA Project has not materially changed and continues to meet the identified need for the Project.

PART THREE: PROJECT COST ESTIMATE IS ROBUST AND REASONABLE

18. In this Part, BC Hydro addresses the costs of the SCA Project and highlights the following points:

- BC Hydro's costs to the end of the Definition Phase were below the expected amount and no project reserve was used.
- BC Hydro's revised cost estimate for the SCA Project is robust and reasonable.
- The Expected Cost (i.e., the mostly likely cost) is \$5 million above the expected cost (or mid-range estimate) in the Phase One Application.
- The Authorized Cost (which includes reserves for risks) remains the same as the authorized cost (or upper bound estimate) in the Phase One Application.

A. COSTS TO END OF DEFINITION PHASE ARE BELOW EXPECTED AMOUNT

19. The SCA Project's expected cost to the end of the Definition Phase is \$25.4 million, which includes:

- actual costs from the Early Design Work, Identification Phase, and Early Definition Stage as included in the Phase One Application;
- actual life to date costs for Definition Phase activities from October 2017 to the end of August 2018; and
- the forecast cost for the balance of the Definition Phase, which includes trailing costs for Definition Phase activities until the end of the regulatory process.²⁷

20. The \$25.4 million expected cost is \$0.7 million lower than the \$26.1 million mid-range estimate for the same activities presented in the Phase One Application. The \$0.7 million difference is attributable to the SCA Project not requiring the entire \$2.3 million in

²⁷ Exhibit B-1, Verification Report, p. 2-4.

contingency.²⁸ During the Definition Phase, an estimated \$1.5 million contingency was drawn upon to cover a \$0.8 million increase in the System Integrator's Definition Phase costs and \$0.7 million in additional BC Hydro internal costs. BC Hydro provided a detailed explanation of the additional work undertaken by the System Integrator and BC Hydro during the Definition Phase that was covered by the draw on contingency.²⁹ In short, the draw on contingency was due to a longer than estimated Design Stage and subsequent transition to the Implementation Phase. The additional System Integrator work was for additional benefits analysis, additional project management tasks, and additional process design, documentation and workshops.³⁰ It is important to note that BC Hydro expected the contingency to be spent.³¹

21. In summary, the actual costs of the SCA Project over the Definition Phase were below the expected cost and no project reserve was used. This is an indicator of the successful completion of the Definition Phase activities.

B. REVISED PROJECT COST ESTIMATE IS ROBUST AND REASONABLE

22. Based on the updated information available from the Definition Phase activities, BC Hydro developed a new cost estimate for the SCA Project, as is BC Hydro's standard practice.³² As presented in the Verification Report, the Expected Cost estimate is \$71.3 million with an accuracy range of +15 per cent /- 10 per cent, and the Authorized Cost estimate is \$79.3 million, which includes project reserves. Given the level of project definition, BC Hydro only referenced the Expected and Authorized Cost amounts in the Verification Report. However, based on the accuracy range of the Expected Cost, the lower bound estimate is \$66.7 million.³³ In comparison, in the Phase One Application, the Project cost range included a lower bound

²⁸ Exhibit B-1, Verification Report, p. 2-5.

²⁹ Exhibit B-1, Verification Report, p. 2-4. Exhibit B-3, BCUC IR 1.4.4.

³⁰ Exhibit B-1, Verification Report, p. 2-4; Exhibit B-3, BCUC IR 1.4.4.

³¹ Exhibit B-4, CEC IR 1.5.1.

³² Exhibit B-4, CEC IR 1.6.1 and 1.7.6.

³³ Exhibit B-3, BCUC IR 1.2.1. This is 6.2 million higher than the lower bound estimate in the Phase One Application. A detailed calculations breakdown has been provided in Revised Table O-1 (Exhibit B-3, BCUC IR 1.2.1.2).

cost of \$60.5 million, a mid-range cost of \$65.9 million (the expected cost estimate at that time), and an upper bound cost of \$79.3 million (the authorized cost estimate at that time).

23. Both the Expected Cost and Authorized Cost were prepared using BC Hydro's standard cost estimating practice for technology projects, and reflect BC Hydro's bottom up estimate of the cost to deliver the SCA Project. BC Hydro's standard cost estimating practices for technology projects are typically accurate and are improving. Over the last three years, BC Hydro came within four per cent of total approved funding for completed technology projects.³⁴ This result can be attributed to a number of project management, governance, controls and delivery practices improvements, which BC Hydro has undertaken since 2013 to ensure accurate cost estimation and effective risk management.³⁵ The BCUC should therefore have confidence in BC Hydro's ability to the deliver the SCA Project on budget.

24. BC Hydro provided detailed information in the Verification Report to demonstrate that its cost estimate is robust and reasonable. Information on the revised SCA Project cost estimate in Appendix F of the Report includes a summary of major outputs and inputs to the model, a table containing all life to date and future direct costs estimates of the project, calculations of the Authorized and Expected Cost of the project, and calculations of the project reserve. The Expected Cost and Authorized Cost are addressed in more detail below.

(a) Expected Cost \$5 Million Above Phase One Estimate is Reasonable

25. The SCA Project's Expected Cost is \$71.3 million. The Expected Cost represents BC Hydro's base case expectation or most likely ("P50") cost estimate for the SCA Project. It is comprised of the SCA Project's actual recorded cost (including interest during construction) of \$24 million as of August 31, 2018, forecast additional costs for the Definition Phase of \$1.4 million, and the forecast cost of \$45.9 million for the Implementation Phase.³⁶

³⁴ Exhibit B-4, CEC IR 1.1.1.1.

³⁵ See Exhibit B-4, CEC IR 1.5.2 for additional detail regarding BC Hydro's evaluation of its long term cost estimating.

³⁶ The forecast cost of the Implementation comprises a direct forecast cost of \$37.9 million and an indirect forecast cost of \$8.0 million (Exhibit B-1, Verification Report, p. 2-8).

26. The Expected Cost of \$71.3 million has a cost estimating accuracy range of +15 per cent /- 10 per cent in accordance with BC Hydro standard practice. The estimating accuracy range corresponds to an AACEI Class 3 cost estimate, as required by the Commission.³⁷ For the SCA Project, the estimating accuracy range of +15/-10 per cent applies only to future estimated costs. It is important to note the amount of future estimated costs is now lower than it was in the Phase One Application. Therefore, although the accuracy range is the same as it was in the Phase One Application, the range of cost is narrower due to the smaller amount to which it applies.³⁸ This can be seen by the fact that the reserve amount for unknown risks (determined based on the +15 per cent accuracy range) is \$1.2 million less than the reserve in the Phase One Application, reflecting a reduction in unknown risks due to the work completed during the Definition Phase.³⁹

27. When compared with the type of cost estimate BC Hydro would develop for an infrastructure project, the Expected Cost is analogous to a P50 estimate.⁴⁰ A P50 estimate refers to BC Hydro's level of confidence regarding the estimated cost of the SCA Project. The Expected Cost is the cost point at which there is a 50per cent chance of the SCA Project coming in above this cost and a 50 per cent chance of it coming in below this cost.⁴¹

28. Adding to the degree of certainty of the estimate is that the System Integrator has agreed to a fixed price for all of the remaining scope of work for the Implementation Phase of the SCA Project.⁴²

29. The Expected Cost of \$71.3 million is approximately \$5.4 million higher than the \$65.9 million mid-range (expected) cost estimate in the Phase One Application.⁴³ This variance is primarily due to a \$6.6 million increase in the forecast direct cost of the Implementation

³⁷ Exhibit B-1, Verification Report, pp. 2-11 to 2-12.

³⁸ Exhibit B-3, BCUC IR 1.2.2 and 1.2.2.1.

³⁹ Exhibit B-3, BCUC IR 1.2.2.

⁴⁰ Exhibit B-1, Verification Report, p. 2-12.

⁴¹ Exhibit B-4, CEC IR 1.2.2 for an explanation of the difference between a P50 estimate and a P90 estimate.

⁴² Exhibit B-1, Verification Report, pp. 2-9 to 2-10.

⁴³ Exhibit B-1, Verification Report, p. 2-2.

Phase, offset by a \$1.3 million decrease in contingency and IDC. These variances from the Phase One Application are discussed below.

Forecast Direct Costs of Implementation Phase

30. BC Hydro's forecast direct cost for the Implementation Phase is \$37.9 million, representing a \$6.6 million variance from the forecast direct cost in the Phase One Application. This variance is due to an increase in the costs of the System Integrator (\$3.4 million) and BC Hydro's internal costs (\$3.2 million).⁴⁴ BC Hydro has provided a detailed breakdown of both variances between operating and capital costs, and amongst individual workstreams.⁴⁵

31. The underlying driver for the increase in the Implementation Phase direct costs was an overall increase in the complexity and understanding of the SCA solution.⁴⁶ This in turn led to changes in the SCA Project's schedule and necessitated the allocation of additional resources in order to complete the associated activities. BC Hydro explained why there was an increase in the complexity and understanding of the SCA solution, as follows:

The Implementation Phase project schedule and cost estimates included in the Phase One Application were developed based on information provided by the Systems Integrator through the Request for Proposal (RFP) process, which were in turn based on the conceptual level information provided to them through the procurement process (such as the Conceptual Design Report and the 153 Supply Chain Business Requirements). The System Integrator combined this information with their experiences implementing SAP at other clients to estimate the amount of configuration and customization that would be required, which in turn drove the estimated project timeline and resource requirements (both their own, and BC Hydro's).

As is the case with technology projects, it was not until the System Integrator interacted directly with the more than 200 BC Hydro business specialists in the Design Stage workshops that they understood the full range of the detailed

⁴⁴ Exhibit B-1, Verification Report, Table 2-3.

⁴⁵ See Exhibit B-3, BCUC IR 1.5.1.1 for a detailed breakdown of BC Hydro's varied System Integrator costs which were divided between operating costs (\$2.2 million) and capital costs (\$1.2 million). See also Exhibit B-3, BCUC IR 1.5.2 for a detailed breakdown of BC Hydro's varied internal costs which were divided between operating costs (\$0.8 million) and capital costs (\$2.5 million).

⁴⁶ Exhibit B-1, Verification Report, p. 2-9.

requirements to be met by the solution. For example, through the design process, the initial 153 Supply Chain Business Requirements have been detailed into roughly 1,000 specific requirements that the solution needs to enable.⁴⁷

32. BC Hydro outlined specific aspects of the SCA solution which became more complex than anticipated through the above-noted process.⁴⁸ For example, interactions between SAP ECC, Ariba and supply chain workspace were initially estimated to require five interfaces. The design process, however, identified 19 discreet interactions.⁴⁹

33. The extension of the Implementation Phase by two and a half months also contributed to an increase in forecast costs both for the System Integrator and BC Hydro.⁵⁰ While it is difficult to attribute specific cost impacts to an extension of the Implementation Phase schedule, BC Hydro estimates that \$0.4 million (all capital) of System Integrator costs and \$1.0 million of BC Hydro costs (\$0.5 million operating and \$0.5 million capital) are primarily attributable to the schedule change.⁵¹

34. As noted in the Phase One Application, BC Hydro signed the System Integrator to a fixed price contract. This contract did not permit the System Integrator to change key elements of its pricing, such as labour rates. As the contract was for a defined scope of work, however, the System Integrator was allowed to update their pricing based on the more detailed understanding of the solution to be developed.⁵² As noted above, the System Integrator has now agreed to a fixed price for the remaining scope of work for the SCA Project.⁵³ The increases in complexity and understanding of the solution described above are reflected in fixed price for the Implementation Phase.

⁴⁷ Exhibit B-3, BCUC IR 1.5.3.

⁴⁸ Exhibit B-3, BCUC IR 1.5.3.

⁴⁹ See Exhibit B-3, BCUC IR 1.5.3 for additional examples of unanticipated complexity.

⁵⁰ Exhibit B-3, BCUC IR 1.5.1.1 and 1.5.2. For example, in relation to increased internal costs, positive variances were recorded for the Change Management, Project Management, and Project Facilities workstreams.

⁵¹ Exhibit B-3, BCUC IR 1.24.1.

⁵² Exhibit B-3, BCUC IR 1.5.1.

⁵³ Exhibit B-1, Verification Report, pp. 2-9 to 2-10.

35. The remaining scope of work for the System Integrator is divided between three work packages: Phase #3: Realization; Phase #4 Final Preparation; and #5: Stabilization.⁵⁴ BC Hydro explained why the fixed price for each Work Package increased or decreased since the original estimates in the Phase One Application. For example, the increase associated with the Phase #3: Realization Work Package was due to a two-month extension, and the associated increase in time and the number of System Integrator resources required to successfully deliver the Work Package.⁵⁵ The increases to the System Integrator's costs mirror the underlying driver for the increase in Implementation Phase direct costs – an overall increase in the complexity and understanding of the SCA solution.⁵⁶

36. The potential for increases in costs due to further increases in complexity or extension to the project schedule is covered by the SCA Project contingency and reserve amounts. Any additional complexity that would result in increased costs will be drawn from the project contingency. BC Hydro has implemented a rigorous change control process to ensure that only changes that can be accommodated within the SCA Project schedule and budget, and meet a business need, are ultimately approved for inclusion in the SCA solution.⁵⁷ Similarly, if the system does not go live on the target in-service date, BC Hydro would draw on the schedule contingency⁵⁸ and would use its cost contingency and reserve amounts if the schedule change impacted project costs that were not covered by the System Integrator's fixed-price contract.⁵⁹

37. In summary, BC Hydro's updated direct cost forecast now incorporates the additional resources and extended project schedule required to complete the Implementation Phase as confirmed by the Definition Phase activities.

⁵⁴ Exhibit B-1, Verification Report, pp. 2-9 to 2-10.

⁵⁵ Exhibit B-5, Confidential BCUC IR 1.1.1.

⁵⁶ Exhibit B-5, Confidential BCUC IR 1.1.1.

⁵⁷ See Exhibit B-3, BCUC IR 1.5.4 for a list of items identified to date.

⁵⁸ Exhibit B-3, BCUC IR 1.24.2.1.

⁵⁹ Exhibit B-3, BCOAPO IR 1.3.1.1.

Indirect Future Costs: Contingency and IDC

38. The Indirect Future SCA Project Costs are comprised of: (i) Contingency; and (ii) Interest during Construction (“IDC”). BC Hydro’s forecast of these costs remain reasonable and is lower than in the Phase One Application.

39. The current contingency for the Implementation Phase of \$5.7 million is lower than the \$6.3 million Implementation Phase contingency included in the Phase One Application. To derive the current contingency, a rate of 15 per cent was applied to the direct forecast cost for the Implementation Phase consistent with BC Hydro’s standard contingency rate for technology projects.⁶⁰ In contrast, in the Phase One Application, a rate of 20 per cent was applied.⁶¹ The reduction in contingency reflects BC Hydro’s expectation that cost variations will be minimized, as the scope of the SCA Project is now more clearly defined.⁶² A reduction of this kind is in-line with a contingency’s underlying purpose: addressing costs that cannot be specifically identified at the time of estimate preparation but can nonetheless be expected with varying degrees of probability. As the Design Phase is now complete, fewer costs remain unidentified.

40. IDC on the Implementation Phase was estimated at \$2.3 million with rates applied to the direct cost accumulated in each fiscal year from fiscal 2016 to fiscal 2022. This is less than the Phase One Application estimate of \$3 million which applied to the direct cost accumulated in each fiscal year up to fiscal 2020. As noted in Table 2-4 of the Verification Report, the IDC rates noted in the Verification Report are lower than those of the Phase One Application, resulting in a lower IDC.⁶³ The lower IDC rates reflect BC Hydro’s actual weighted cost of debt in fiscal 2016 to fiscal 2018 and revised forecast weighted average cost of debt for fiscal 2019 and fiscal 2020. The revised forecasts reflect the Ministry of Finance’s lower forecast short-term and long-term interest rates, and the impact of debt hedges related to BC Hydro’s

⁶⁰ Exhibit B-4, CEC IR 1.9.2.

⁶¹ Exhibit B-1, Verification Report, p. 2-10.

⁶² Exhibit B-4, CEC IR 1.9.1.

⁶³ Exhibit B-3, BCUC IR 1.6.1.

current debt management strategy, which was not finalized at the time the Phase One Application was filed.⁶⁴

41. Overall, the \$5.4 million increase in the Expected Cost for the Implementation Phase is reasonable given the increase in complexity and understanding of the SCA Project since the Phase One Application. BC Hydro has demonstrated that its budget is robust and based on reasonable assumptions. Although there has been an increase in Expected Cost for the SCA project, the Authorized Cost has remained in line with the Phase One Application and there is still a compelling need for the project.

(b) Authorized Cost same as Upper Bound Estimate

42. The Authorized Cost of \$79.3 million remains the same as in the Phase One Application. The Authorized Cost includes the sum of the Expected Cost of \$71.3 million and a revised project reserve of \$8.0 million.⁶⁵ The Authorized Cost is analogous to a P90 estimate, plus an additional project reserve for specific quantified risks. BC Hydro's estimating practice defines a P90 cost estimate as the cost estimate that will not be exceeded 90 per cent of the time.⁶⁶

43. BC Hydro requires a project reserve to address potential cost risks to the SCA Project beyond those included in determining the Expected Cost. The \$8.0 million reserve is divided into \$1.3 million for known discrete risks, \$6.5 million to mitigate unknown risks, and an incremental IDC amount of \$0.2 million.⁶⁷

44. Known discrete risks are ones that have not been assigned a probability of occurrence, but may be realized by the SCA Project. For example, BC Hydro identified the potential infeasibility of its plan to have a portion of the development work completed

⁶⁴ Exhibit B-3, BCUC IR 1.6.1.

⁶⁵ Exhibit B-1, Verification Report, p. 2-12.

⁶⁶ See Exhibit B-4, CEC IR 1.2.2 for an explanation of the difference between a P90 estimate and a P50 estimate.

⁶⁷ Exhibit B-1, Verification Report, p. 2-12.

offshore.⁶⁸ As in the Phase One proceeding, a reserve of \$1.0 million was allocated based on pricing provided by the System Integrator which included two pricing models (partial offshore development and full onshore development).⁶⁹ During the Design Stage, BC Hydro undertook a number of activities associated with the partial offshore development model which were aimed at risk mitigation. In particular, the model's implications on privacy and cyber security were assessed through these activities. BC Hydro provided a detailed breakdown of all such risk mitigation activities associated with the partial offshore development model.⁷⁰

45. BC Hydro identified an additional discrete risk resulting from the decision to remove the Unifier to SAP interface, as it may still be required to support Site C-specific processes. An amount of \$0.3 million was reserved to mitigate this risk.⁷¹ BC Hydro has explained how the amount of \$0.3 million was determined and provided a detailed breakdown of key work activities and their estimated cost. In brief, a base cost of \$240,000 was established by the System Integrator, which increased to \$0.3 million with BC Hydro's specification reviews and testing support and the addition of a 15 per cent contingency.⁷²

46. The reserve of \$6.5 million for unknown risks is reduced by \$1.2 million from the \$7.7 million reserve for unknown risks in the Phase One Application. The reserve for unknown risks was determined by multiplying the upper end of the estimating accuracy range, which is 15 per cent, by the sum of the future direct Implementation Phase costs and the contingency on this future direct cost. Access to the project reserve will require additional financial approval from the SCA Project Steering Committee, the President, and the Board of Directors.⁷³

⁶⁸ Exhibit B-3, BCUC IR 1.20.5.

⁶⁹ Exhibit B-1, Verification Report, p. 2-13; Exhibit B-3, BCUC IR 1.20.2.

⁷⁰ See Exhibit B-3, BCUC IR 1.20.1.

⁷¹ Exhibit B-1, Verification Report, p. 2-13.

⁷² See Exhibit B-3, BCUC IR 1.19.6.

⁷³ Exhibit B-1, Verification Report, pp. 2-13 to 2-14.

C. CONCLUSION AND REQUESTED FINDINGS

47. The Commission should find that the SCA Project costs to date are on track and the revised cost range is robust and reasonable. While the Expected Cost for the Implementation Phase of \$71.3 million is approximately \$5.4 million higher than the expected cost estimate in the Phase One Application, the Authorized Cost of \$79.3 million remains the same as the upper bound cost estimate in the Phase One Application. Therefore, overall, the cost estimate has not materially changed since the Phase One Application. Further, based on the estimated benefits flowing from the SCA Project discussed below, the Project continues to have a positive NPV based on the Authorized Costs.

PART FOUR: PROJECT BENEFITS REMAIN CREDIBLE AND SUFFICIENT

48. In this Part, BC Hydro addresses the benefits of the SCA Project and highlights the following points:

- The updated benefits analysis increases the credibility of the estimated benefits from the SCA Project: BC Hydro and PwC have validated and refined the benefits analysis. The refined benefits analysis is described in two reports (the PwC Conclusion and Summary on SCA Benefits Analysis Post Design Phase and the SCA Benefits: Updated Analysis Post Design Phase) included as Appendix G and Appendix H, respectively.
- The benefits of the SCA Project continue to be significant: The annual recurring quantifiable benefits of the SCA Project at stabilization are expected to be \$34.8 million (the “Expected Benefits”), with \$23.0 million of this amount monetized (the “Monetized Benefits”). This compares to BC Hydro’s mid-range estimate of \$26.2 million in annual benefits identified in the Phase One Application.
- The NPV analyses demonstrate that the benefits remain sufficient to justify the SCA Project: The SCA Project continues to have a strong, positive NPV in all scenarios, using both Expected Benefits and Monetized Benefits. The Base Case (Expected Cost/Monetized Benefits) NPV of the discounted cash flows and the NPV of the revenue requirements are \$41.8 million and \$28.6 million, respectively. The NPV of discounted cash flows for the Expected Cost/Expected Benefits scenario is \$102.5 million. Detailed information supporting the cost, benefits and NPV analysis of discounted cash flows are contained in the updated Appendix F.⁷⁴
- There continues to be significant non-quantifiable benefits associated with the SCA Project.

⁷⁴ As amended by Exhibit B-1-2, Errata No. 1.

A. VALIDATED AND REFINED BENEFITS ANALYSIS INCREASE CREDIBILITY OF BENEFITS

49. Since the Phase One Decision, BC Hydro validated and refined the analysis of the discrete benefits flowing from the SCA Project and the expected quantifiable benefits that would result. As part of its Definition Phase activities, BC Hydro engaged PwC's supply chain consulting practice to review and work with BC Hydro to update the potential benefits of the SCA Project based on the completed design work. The results of the review are set out in the reports included in Appendices G and H of the Verification Report.⁷⁵

50. As demonstrated by the evidence in this proceeding, BC Hydro and PwC undertook significant effort to quantify and identify the potential for monetization of the benefits available through the SCA Project. The main aspects of the benefits analysis as described in the Verification Report and explored in the information requests are discussed in the subsections below.

Approach to Reviewing and Updating Benefits

51. The review and update to the benefits of the SCA Project used the approach described on pages 3-4 to 3-5 of the Verification Report and in more detail in Appendix H. The steps in this process are reviewed below.

52. In Step 1 (Document Review and Analysis), PwC reviewed existing documentation and validated capability gap assessments against design stage outputs. The benefits were assessed for completeness, reasonableness to measure, and likelihood of realization as a result of this process.⁷⁶

53. In Step 2a (Stakeholder Validation), PwC conducted interviews with SCA team members from BC Hydro and PwC to confirm assumptions and inputs for forecasted quantitative and qualitative benefits and measurement.⁷⁷

⁷⁵ Exhibit B-1, Verification Report, Appendices G and H.

⁷⁶ Exhibit B-1, Verification Report, p. 3-4.

⁷⁷ Exhibit B-1, Verification Report, p. 3-5 and Appendix H, p. 64; Exhibit B-3, BCUC IR 1.10.1.

54. In Step 2b (Industry Peer and Benchmark Comparison), PwC compared forecasted benefits to the measurement of benefits realized by industry peers. The underlying purpose of this step was to assess the realization timeframe and ratio, and identify any changes to the benefits that might be necessary.⁷⁸ PwC explained the results and process as follows:

The key findings from the industry peer group and benchmark comparison was validation on a commensurate level of detail of the analysis and clarification of what benefits can be monetized vs. non-monetized and highlight additional qualitative benefits to consider. The comparison was also used to validate realization timelines, and was used to challenge the assumptions and analysis for further clarification and accuracy.

During the benefit analysis PwC and BC Hydro spent time reviewing the reasonability of realization timeframes and ratios. The basis of these reviews was founded on benchmark comparisons, PwC experience on other system implementation projects, and business logic based on volume, frequency of transaction and other like inputs.

The benefit testing process was applied in three key areas to all benefits which had an expected quantified benefit of greater than zero:

- Timeframe to Achieve Benefit - Each benefit was assessed to determine a reasonable duration to 'ramp up' to achieving 100 per cent of the expected annual benefit. This was based on benchmarks and PwC's experience;
- Realization Ratio - The realization ratio is a factor to offset the impact of any known potential information deficit that may affect the realization of the quantified benefit. The realization ratio was adjusted up or down, based on the level of confidence from the Phase One Application. This resulted in some instances, such as Benefit ID No. 2, where the ratio went from 50 per cent to 70 per cent based on greater availability of data and a bigger sample size to analyze, which increased the level of confidence; and
- Expected Quantified Benefit Calculation - Each expected quantified benefit was calculated during Design stage, based on BC Hydro historical

⁷⁸ Exhibit B-1, Verification Report, p. 3-5. PwC identified and selected industry peers by looking at their total spend, categories of spend, comparable operations including distribution, and systems in use. Industry comparables were drawn from previous projects where PwC has consulted (Exhibit B-3, BCUC IR 1.10.2).

volume data with modifications for future demand forecasts as change to future state operations occurs. This was tested against benchmarks and PwC experience.⁷⁹

55. The updated realization ratios were based on how the SCA Project's design would support the realization of certain benefits, as well as known challenges, unique factors, or data unavailability that could impact BC Hydro's ability to realize a benefit.⁸⁰ While the reasonability of the realization timeframe (or ramp-up rate), realization ratios, and benefit calculation were tested for all identified benefits through a benchmark comparison, the effort expended on the benefits with quantified savings was higher than non-quantifiable benefits.⁸¹

56. As PwC explained, based on its experience executing a wide variety of technology projects, its benchmark range modification began with an evaluation of similarities and differences.⁸² When comparing the forecast benefits from the SCA Project to industry peers, PwC performed both macro level and micro level analyses.⁸³ This approach created a more accurate basis of comparison to specific project outcomes, and allowed for the better refinement of benchmarks.⁸⁴

57. In Step 3, PwC tested the refined benefits with BC Hydro stakeholders to confirm the reasonableness of the findings and a detailed report was developed to summarize confirmed benefits, key performance indicators, assumptions, gaps, risks, and any other additional considerations.⁸⁵ As was the case with Step 2b, all identified benefits were considered in the benefits testing step. PwC described the approach applied in Step 3 as follows:

⁷⁹ Exhibit B-3, BCUC IR 1.10.3.1.

⁸⁰ Exhibit B-4, CEC IR 1.13.1.

⁸¹ As explained in Exhibit B-3, BCUC IR 1.10.3, key benefits are those identified as having a possible quantifiable value.

⁸² Exhibit B-4, CEC IR 1.23.5.

⁸³ Exhibit B-4, CEC IR 1.23.4.

⁸⁴ Exhibit B-4, CEC IR 1.23.5.

⁸⁵ Exhibit B-1, Verification Report, p. 3-5.

This benefit testing process step applied the expertise of BC Hydro stakeholders to confirm the reasonableness of the benefit findings. In this step, BC Hydro employees considered each benefit and applied some or all of the following considerations based on the applicability to each individual benefit:

1. Evaluated existing processes to estimate or measure volumes, frequencies and durations of transactions which could be impacted by the new SCA Design;
2. Assessed or examined whether the benefits which had been identified would be considered reasonable and that the application of the system and processes could produce the intended result;
3. Considered which key performance indicators would be required to evaluate or manage the performance of the future state process;
4. Challenged the assumptions made by the design and benefits team in assessing the potential benefits; and
5. Considered the gaps and risks associated with the future state design and how they may impact the achievement of the projected benefit.⁸⁶

58. PwC provided an explanation of the key findings of the benefits testing process and the impact the findings had on the benefits.⁸⁷

59. Ultimately, the approach used to review and update the benefits of the SCA Project aligns with BC Hydro's stated objectives of (i) validating and updating the quantifiable and non-quantifiable benefits as required based on the SCA Project's design work; (ii) refining the assessment of the attainability of the benefits based on the experiences of industry peers; and (iii) providing documentation for future benefits tracking and analysis.⁸⁸

⁸⁶ Exhibit B-3, BCUC IR 1.10.4.

⁸⁷ As PwC noted, the key findings of the benefits testing process with BC Hydro stakeholders was a logical validation of the work done by the benefit team; thereby allowing experienced BC Hydro personnel to confirm the assumptions PwC made about BC Hydro specific systems, processes, regulations, and people. PwC also identified certain key areas which evolved since the Phase One Application (See Exhibit B-3, BCUC IR 1.10.4.1).

⁸⁸ Exhibit B-1, Verification Report, p. 3-4.

60. As a result of the benefits analysis, the number and type of benefits was reviewed and updated, the baseline assumptions and calculation logic for each discrete benefit was reviewed, validated, and refined, the ramp up rate was reviewed and validated, and the realization rate assigned to each discrete benefit was updated based on the design work and increased confidence in the ability to achieve the benefits. The key updates to the benefits analysis are reviewed in the following sections.

Update to the Number and Type of Benefits Identified

61. BC Hydro identified 67 discrete benefits associated with closing the 13 capability gaps. When compared with the 64 benefits identified in the Phase One Application, 11 benefits were newly identified and eight benefits were removed to form the revised discrete benefits.⁸⁹

62. As in the Phase One Proceeding, the discrete benefits flowing from closing the 13 capability gaps either reduced cost, reduced effort, or reduced risk for BC Hydro.⁹⁰ In summary:⁹¹

- Cost reduction benefits are comprised of cost savings and cost avoidance benefits.
- Effort reduction benefits are those that can be achieved through eliminating or streamlining efforts to save time.
- Risk reduction benefits are non-quantified benefits associated with reducing the overall risk in the supply chain.

63. As set out in Table 3-2 of the Verification Report, the revised benefits analysis resulted in the identification of four new cost reduction benefits, six new effort reduction benefits, and one new risk reduction benefit. At the same time, one cost reduction benefit and seven effort reduction benefits were removed. BC Hydro has provided, in Appendix F of the

⁸⁹ Exhibit B-1, Verification Report, Table 3-2; Appendix F, Tab F1.

⁹⁰ Exhibit B-1, Verification Report, pp. 3-5 to 3-6.

⁹¹ Exhibit B-1, Verification Report, p. 3-6.

Report, details on each identified benefit, including the related capability gap, problem statement, benefit type, business impact, calculation logic, rationale for change from Phase One (if any), and benefit quantification (if applicable).

Update to Quantified Benefits

64. The benefits analysis undertaken by BC Hydro and PwC resulted in an updated forecast of the quantified benefits flowing from the SCA Project. The change in the estimated quantified benefits was a result of updates to the quantification calculation and realization ratio of each discrete benefit through the analysis outlined above.⁹² The rationale for the changes in the realization ratio and quantification calculation are set out in Tab F1 of Appendix F and in the benefits report in Appendix H, and were elaborated on in response to information requests.⁹³ The review of the ramp up rates validated the ramp-up rates used in the Phase One Application, and therefore the ramp-up rates did not change.⁹⁴

65. The resulting quantified benefits in the Verification Report equal a maximum potential benefit forecast of \$64.4 million annually, assuming a 100 per cent realization rate. This is an increase of \$12 million compared to the maximum potential annual benefit in the Phase One Application of \$52.4 million. Applying the updated realization ratios to the maximum potential quantified benefits, the expected quantified benefits (the “Expected Benefits”) of the SCA Project are \$34.8 million. This exceeds the mid-range benefits estimate in the Phase One Application of \$26.2 million. The benefits analysis therefore confirms that there will be significant, credible benefits flowing from the SCA Project.

Update regarding Quantified versus Monetized Benefits

66. The updated benefits analysis incorporates a new distinction between benefits that can be quantified, and quantified benefits that can also be monetized (referred to as “Monetized Benefits”). The updated benefits analysis recognizes that it might be difficult to

⁹² Exhibit B-1, Verification Report, p. 3-9.

⁹³ Exhibit B-1, Appendix F, Tab F1 and Appendix H; Exhibit B-3, BCUC IR 1.17.5,

⁹⁴ Exhibit B-1, Verification Report, 3-9, Exhibit B-3, BCUC IR 1.17.5,

monetize the financial value of some effort reduction benefits. Specifically, based on PwC's advice, BC Hydro assumed that where effort reductions are in short-time increments distributed across large working groups, the effort-reduction benefits will not be monetized.⁹⁵

67. BC Hydro's estimate of how much of the Expected Benefits can be monetized was based on the following approach:

- BC Hydro monetized the financial value of all expected cost reduction benefits, amounting to approximately \$20.4 million that can be monetized.⁹⁶
- BC Hydro estimated that it can monetize approximately 18 per cent or \$2.6 million of the expected effort reduction benefits of \$14.4 million. Specifically:
 - BC Hydro monetized 100 per cent of Benefit ID No. 16 because the total effort to complete the relevant function will no longer be required after the SCA Project is implemented.⁹⁷
 - BC Hydro monetized the financial value of expected effort reduction benefits where effort is concentrated or the effort time savings are significant. BC Hydro estimated that 20 full-time equivalent ("FTE") positions could be reduced without impacting the business or introduce new risks.⁹⁸ The time savings and associated reduction in FTEs will result from the restructuring of processes and work methods in heavily impacted areas.⁹⁹

⁹⁵ Exhibit B-1, Verification Report, Appendix G, p. 3.

⁹⁶ Exhibit B-1, Verification Report, Table 3-4.

⁹⁷ Exhibit B-1, Appendix I-1, p. 24.

⁹⁸ See Exhibit B-3-1, Confidential BCUC IR 1.13.1 for a breakdown of the estimated number of positions by business area.

⁹⁹ Exhibit B-3, BCUC IR 1.13.2.

- BC Hydro allocated the savings from the 20 FTE reductions to each effort reduction benefit (except for Benefit ID No. 16) on a pro-rata basis.¹⁰⁰ As illustrated in the response to BCUC IR 1.13.2, excluding Benefit ID No. 16, which was monetized at 100 per cent, all other effort benefits were monetized at 15.7 per cent.

68. It is important to recognize, however, that the effort-reduction benefits that are not monetized still have significant value. As stated by PwC:

These effort benefits are often used to increase resource capacity to support the delivery of benefits, focus on higher value activities and/or support change management efforts, all of which add value to the organization.¹⁰¹

69. In other words, by redeploying saved time toward other higher-value activities, these effort reduction benefits can help manage increasing workload, which may otherwise result in increased headcount.¹⁰² Given the value of these benefits, BC Hydro has run its NPV analyses on scenarios using Expected Benefits (i.e. the expected level of quantifiable benefits) and Monetized Benefits (i.e. the expected level of quantifiable benefits that can make an incremental reduction to BC Hydro's revenue requirements).

70. The Expected Benefits and Monetized Benefits resulting from the analysis are presented in comparison to the Phase One mid-scenario benefits in Table 3-4 of the Verification Report as follows:

¹⁰⁰ Exhibit B-3, BCUC IR 1.13.2.

¹⁰¹ Exhibit B-1, Verification Report, Appendix G, p. 4.

¹⁰² Exhibit B-1, Verification Report, p. 3-14.

Table 3-4 Cost Reduction and Effort Reduction – Expected Benefits and Monetized Benefits (\$ million)

Benefit Type	Phase One Mid Scenario Benefits	Verification Report Expected Benefits	Verification Report Monetized Benefits
Cost Reduction Benefits	11.5	20.4	20.4
Effort Reduction Benefits	14.7	14.4	2.6
Total	26.2	34.8	23.0

71. As shown above, the estimated Expected Benefits of \$34.8 million and Monetized Benefits of \$23.0 million are comparable to the mid-scenario benefits in the Phase One Application of \$26.2 million.

Explanation of Change in Benefits

72. BC Hydro has provided a number of explanations and analyses of the changes in the benefits from the Phase One Application to the Verification Report:

- (a) In the body of the Verification Report, BC Hydro analysed the change in benefits by benefits type (Table 3-2) and by capability gap (Table 3-3). On pages 3-10 to 3-13, BC Hydro provided a detailed discussion of the benefits by capability gap that resulted in annual variances greater than +/- \$500,000.¹⁰³
- (b) In Tab F1 of Appendix F of the Verification Report, for each discrete benefit BC Hydro provides a discussion of the rationale for the change in the realization ratios and benefit calculation from the Phase One Application.
- (c) In the Benefits Report in Appendix H a detailed benefits analysis is provided for each discrete benefit, including a description of the benefit and the rationale for the change from the Phase One Application.

¹⁰³ See also Exhibit B-3, BCUC IR 1.12.3 for a revised Table 3-3, which summarizes the changes in the Monetized Benefits by capability gap and provides an explanation of significant variances in relation to capability gaps 1, 2, and 3.

- (d) In BC Hydro's response to BCUC IR 1.17.5, BC Hydro consolidated and provided further elaboration on the rationale for the changes in the realization ratio and baseline assumptions.

73. The key driver of the change in the benefits that was the focus of information requests¹⁰⁴ was Benefit ID No. 5. Benefit ID No. 5 quantifies BC Hydro's increased ability to manage contracts and suppliers to ensure anticipated contract benefits are fully realized, do not erode, and are increased over time.¹⁰⁵ In the Phase One Application, BC Hydro's focus for this benefit was on pre-contract award efforts to negotiate better terms and therefore BC Hydro calculated the value of this benefit as a reduction of 0.5 per cent of overall spend. PwC advised taking a broader focus to quantify the benefits from active contract and supplier management not only to negotiate better terms, but also to mitigate value leakage. This was explained further as follows:

PwC experience and additional market research indicates that by taking a 'broader' more holistic view through the consideration of post-contract value leakage that these savings could potentially be increased.

PwC's report 'A Holistic Approach to Third Party Contracts' included in Attachment 1 to BC Hydro's response to CEC IR 1.23.1, indicates that cost leakage from contract non-compliance can generate between 0.5 per cent and 3 per cent in contract specific savings. As this report is generated from a wider supply chain sampling than solely the utility industry, PwC corroborated this range by evaluating confidential benchmark data derived from previous utility industry consulting engagements. Secondly this range was evaluated against other commercially available market intelligence.

Beyond the research, our evaluation considered the potential for success for BC Hydro relative to the range reported in the data. Mitigating contract value leakage can be greatly enhanced through improvements to systems and

¹⁰⁴ See Exhibit B-3, BCUC IRs 1.12.3 to 1.12.7 and 1.17.5; and Exhibit B-4, CEC IR 1.26.1.

¹⁰⁵ Exhibit B-1, Verification Report, p. 3-11. For a fuller discussion of Benefit ID No. 5, please see Appendix H, p. 20. Further detailed information on Benefit ID. No. 5 is in Row 8 of Tab F1 of Appendix F.

processes that increase controls through enhanced reporting capabilities including the ability to compare contractual terms to invoices.¹⁰⁶

74. As noted in the PwC study referenced above, the benchmarked range for savings from the elimination of cost leakage from contract non-compliance was between 0.5 per cent and 3 per cent. BC Hydro and PwC determined that a reduction of 1.5 per cent, which is just below the mid-point of the range in the study, is realistic and achievable.¹⁰⁷ The rationale for this conclusion included consideration of a number of factors as described below:

- When reviewing the contributing factors typically associated with contract leakage we determined that the potential for leakage or non-compliance is higher with organizations with a higher service-to-goods procurement ratio. BC Hydro procurement ratio typically exceeds 70 per cent services procurement to 30 per cent goods procurement. This ratio by nature is managed with highly manual processes creating an increased risk of leakage;
- BC Hydro also procures a very wide variety of products and services from a significant number of vendors, across a variety of business verticals with a high variation in complexity of transaction. Managing the procurement of this wide variety of products and services creates an increased risk of leakage;
- BC Hydro is at a lower level of technological maturity with respect to supply chain technologies than the average company that may be reflected in PwC's report. BC Hydro is implementing SAP ECC with some Ariba functionality. This is a logical progression in Supply Chain technology from current state. However, on average, most comparable companies implemented systems at this level of complexity 5 to 15 years ago. The limitations of supply chain technology currently employed by BC Hydro are an impediment to developing further maturity;
- Following from the above, BC Hydro is more dependent on manual processes than the average company that may be reflected in a report of this nature. A lower level of technological maturity requires a dependency on manual processes to minimize contract leakage versus a reliance on data, reporting and automation; and

¹⁰⁶ Exhibit B-4, CEC IR 1.26.1.

¹⁰⁷ Exhibit B-1, Verification Report, p. 3-11.

- The report was tested against other available market intelligence and PwC's experience at industry peers which were determined to align with recommendations provided in this report.¹⁰⁸

75. The reduction of 1.5 per cent for savings from the elimination of cost leakage from contract non-compliance is described by PwC as a “conservative savings rate being applied to all contracts with repetitive spend that are actively managed”.¹⁰⁹ PwC confirmed that this approach is common practice in the industry:

Application of an average cost benefit percentage across all addressable spend is a common practice within the industry as observed by PwC on benefits calculations and is regarded as a reasonable method for organizations with such a wide variety of product and service categories to arrive at an overall estimated benefit.¹¹⁰

76. In summary, based on the PwC study, and an analysis of BC Hydro's service-to-goods ratio, number and variety of vendors and transaction complexity, supply chain technological maturity and related dependence on manual processes, as well as PwC's market intelligence and benchmarking to industry peers, BC Hydro and PwC concluded that the estimated savings from Benefit ID No. 5 are realistic and achievable.

77. In total, BC Hydro expects annual recurring quantifiable benefits of the SCA Project at stabilization to be \$34.8 million, with \$23.0 million of this amount monetized. This represents a significant level of benefits. As shown in the next section, the benefits are sufficient to give the SCA project a positive NPV in all of the NPV analysis scenarios conducted.

B. CONTINUED STRONG, POSITIVE NPV SHOWS THAT BENEFITS ARE SUFFICIENT

78. Consistent with the Phase One Application, BC Hydro performed two sets of NPV analyses: 1) NPV of discounted cash flows (measuring the profitability or the value added of a potential investment), and 2) NPV of the revenue requirements (measuring the net value that

¹⁰⁸ Exhibit B-3, BCUC IR 1.12.4.

¹⁰⁹ The actual savings percentage will vary from contract to contract, but the overall average of 1.5 per cent is considered realistic and achievable (Exhibit B-3, BCUC IR 1.12.6).

¹¹⁰ Exhibit B-3, BCUC IR 1.12.6.1.

will flow to ratepayers). BC Hydro relied on a consistent set of inputs for both analyses.¹¹¹ In addition to using the estimated project costs and benefits, BC Hydro incorporated into its NPV analyses incremental annual operating costs of between \$2.3 million and \$3.4 million related to the SCA Project. Costs of this kind will fund ongoing business support and sustainment.¹¹² This range of annual ongoing costs increased compared to the range used in the Phase One Application (\$1.8 million to \$2.9 million) due to the updated analysis in the Design Stage.¹¹³

79. The result of the NPV Analyses presented in the Verification Report is summarized below.

NPV of Discounted Cash Flows

80. For the NPV of discounted cash flows analysis, BC Hydro ran four updated cost and benefits scenarios:

- Expected Cost / Monetized Benefits (“Base Case”);
- Authorized Cost / Monetized Benefits;
- Expected Cost / Expected Benefits; and
- Authorized Cost / Expected Benefits.

81. Each scenario resulted in a positive NPV of discounted cash flows.¹¹⁴ Table 3-6 of the Application, reproduced below, sets out the results of the NPV analyses.

¹¹¹ Exhibit B-1, Verification Report, p. 3-20.

¹¹² Exhibit B-1, Verification Report, p. 2-17.

¹¹³ Exhibit B-3, BCUC IRs 1.9.1 to 1.9.5.

¹¹⁴ Exhibit B-1, Verification Report, p. 3-21.

Table 3-6 NPV of Discounted Cash Flows: Sensitivity and Breakeven Analysis

Ref	Scenarios	NPV of Discounted Cash Flows (\$ million)	Benefit Percentage Required to Breakeven (%)
BC	Expected Costs / Monetized Benefits	41.8	60%
BD	Authorized Costs / Monetized Benefits	31.9	69%
BE	Expected Costs / Expected Benefits	102.5	38%
BF	Authorized Costs / Expected Benefits	92.6	44%

82. As shown in the table above, all the scenarios result in a positive NPV. Notably, the NPV of discounted cash flows for the Base Case scenario is positive at \$41.8 million. The Base Case scenario represents the most likely cost scenario and incorporates a more conservative estimate of project benefits.¹¹⁵

83. BC Hydro also performed a breakeven analysis for the above scenarios showing the percentage of the Expected Benefits or Monetized Benefits, as appropriate, needed to achieve to break even. To clarify, the percentage reported as the “Benefits Percentage Required to Breakeven” is the percentage of the Expected Benefits or Monetized Benefits required to breakeven – where these values have already been “discounted” to reflect a weighted realization rate of 54%.¹¹⁶

84. As shown in Table 3-6 above, BC Hydro does not require all of the Expected Benefits or Monetized Benefits to materialize in order to breakeven.¹¹⁷ For example, in the Base Case, BC Hydro is required to achieve only 60 percent of the already discounted benefits in order for the NPV to breakeven (sum to zero).¹¹⁸ It is therefore clear that the benefits flowing from the SCA Project remain sufficient to justify the project.

¹¹⁵ Exhibit B-3, BCUC IR 1.15.2.

¹¹⁶ Exhibit B-4, BCOAPO IR 1.15.1.

¹¹⁷ Exhibit B-1, Verification Report, p. 3-21.

¹¹⁸ Exhibit B-3, BCUC IR 1.15.4.

NPV of Revenue Requirements Analysis

85. For the NPV of the revenue requirements analysis, BC Hydro ran two scenarios based on the Monetized Benefits alone. As set out above, benefits of this kind are defined by BC Hydro as the financial value of the expected incremental reduction in its revenue requirements. In both the Expected Cost / Monetized Benefits (“Base Case”) and Authorized Cost / Monetized Benefits scenarios, the NPV of revenue requirements is positive, as shown in Table 3-7 of the Verification Report (as corrected):¹¹⁹

Table 3-7A NPV of Revenue Requirements: Sensitivity and Breakeven Analysis

Scenarios	BC Hydro's Response to IR: BCUC 1.16.5.1	
	NPV of Revenue Requirements (\$ million)	Benefit Percentage Required to Breakeven (%)
Expected Costs / Monetized Benefits	28.6	64%
Authorized Costs / Monetized Benefits	19.4	75%

86. The breakeven analysis shows that not all of the Monetized Benefits are needed for the SCA Project to break even. This analysis further confirms that benefits are sufficient to justify the SCA Project.

Annual Revenue Requirements Impact

87. BC Hydro also estimated the net annual revenue requirements impact of the SCA Project over the period fiscal 2016 to fiscal 2060.¹²⁰ Between fiscal 2016 and fiscal 2026, higher operating costs, amortization, and finance charges will result in a net increase to BC Hydro’s revenue requirements. The financial impact is forecast to peak in fiscal 2021 with a net increase

¹¹⁹ See Exhibit B-1-2, Errata No. 1, Table 3-7A.

¹²⁰ This period corresponds to: the SCA Project’s Definition and Implementation Phases; a 10 year period beyond the SCA Project in service date (fiscal 2021 to fiscal 2030); and a thirty year period reflecting the average life of assets procured using the new supply chain (Exhibit B-1, Verification Report, p. 3-24).

to BC Hydro's revenue requirements of between \$11.0 million in the Base Case scenario and \$12.2 million in the Authorized Cost / Monetized Benefits scenario.¹²¹

88. Despite an initial increase to BC Hydro's revenue requirements, monetized benefits from the SCA Project will begin offsetting this increase in fiscal 2022. The SCA Project is projected to have a favourable impact on BC Hydro's revenue requirements beginning in fiscal 2025 in the Base Case scenario and beginning in 2026 for the Authorized Cost/Monetized Benefits scenario. BC Hydro forecasts that the favourable impact to its revenue requirements will continue beyond fiscal 2030 due to lower amortization and finance costs associated with the procured assets.¹²²

C. SIGNIFICANT NON-QUANTIFIABLE BENEFITS

89. In addition to the quantifiable benefits discussed in detail above, BC Hydro identified a number of non-quantifiable risk reduction benefits which have the potential to impact it from a safety, financial, reputational, and reliability perspective. Key risk reduction benefits for each risk category are summarized in Table 3-5 of the Verification Report and include:

- **Safety:** The SCA Project will reduce the safety risk that vendors might perform work they are not qualified to complete. BC Hydro clarified that this risk stems from the limited accessibility to contract information. This lack of information may result in a vendor subsequently being assigned additional work that is different from the work they were originally contacted to perform.¹²³ SAP functionality such as source lists, outline agreements and service masters (line item level tracking), and more real time visibility of operational contract

¹²¹ See Exhibit B-1, Verification Report, Figure 3.2, as amended by Exhibit B-1-2, Errata No. 1. BC Hydro provided a detailed impact analysis of the NPV of revenue requirements in Appendix J of the Verification Report.

¹²² Exhibit B-1, Verification Report, p. 3-24.

¹²³ Exhibit B-4, CEC IR 1.16.1.

information will help reduce the risk of contractors performing work when they are not qualified or were not originally awarded the work.¹²⁴

- **Financial:** The SCA Project will reduce the financial risk of paying for goods and services that are not actually received. Currently, BC Hydro relies on a manual process for invoice approval, which can be a labour intensive and error prone process.¹²⁵ SAP functionality includes service masters and outline agreements, which allows for the creation of standardized service contracts. The creation of Purchase Orders for services will reduce the risk of paying suppliers at incorrect rates by enabling more active contract management. BC Hydro will also benefit from a reduction in risk associated with receiving and paying for non-complaint materials.¹²⁶
- **Reputational:** The SCA Project will reduce the reputation risk of inaccurate reporting of BC Hydro's spending on specific categories of goods or services, and where such spending is directed. SAP reporting functionality will enhance the level of detail and quality of cost information, thereby enriching the spend data for more accurate reporting.¹²⁷
- **Reliability:** The SCA Project will reduce the reliability risk currently present because BC Hydro's existing supply chain system does not automatically trigger a quality inspection for all materials and services that should be inspected. When introduced into BC Hydro's power system, low quality materials and services have the potential to impact system reliability. SCA Project functionality will be able to identify materials and services which require inspection, store the

¹²⁴ Exhibit B-1, Verification Report, Table 3-5. Exhibit B-4, CEC IR 1.16.4.

¹²⁵ Exhibit B-4, CEC IR 1.16.5; Exhibit B-4, CEC IR 1.16.11.

¹²⁶ Exhibit B-1, Verification Report, Table 3-5.

¹²⁷ Exhibit B-1, Verification Report, Table 3-5.

appropriate inspection plans, and trigger a notification advising that an inspection is required.¹²⁸

90. Safety, financial, reputational and reliability risks will be lower relative to current levels as a result of the SCA Project.¹²⁹ The above-noted risk reduction benefits evidence how the SCA Project will positively impact BC Hydro in ways that are not readily quantifiable. Benefits of this kind are nonetheless significant and have a positive effect on risk and ought to be given weight.

D. CONCLUSION AND REQUESTED FINDINGS

91. The Commission should find that the updated benefits analysis has increased the credibility of the benefits from the SCA Project. The estimated Expected Benefits and Monetized Benefits from the SCA Project are significant and are based on a robust and reasonable analysis. The NPV analyses show that the benefits are sufficient to justify the SCA Project.

¹²⁸ Exhibit B-1, Verification Report, Table 3-5.

¹²⁹ Exhibit B-4, CEC IR 1.16.4.

PART FIVE: BC HYDRO HAS A ROBUST AND WELL-STRUCTURED BENEFITS TRACKING PROCESS

92. In this Part, BC Hydro addresses the benefits tracking process for the SCA Project and highlights the following point:

- BC Hydro has implemented a robust and well-structured benefits tracking process for the SCA Project that includes a reasonable initial set of baselines, metrics, and measures that are sufficient to enable accountability for benefit capture.

A. BENEFITS TRACKING PROCESS IS ROBUST AND WELL-STRUCTURED

93. Based on BC Hydro's Technology group pilot program, the SCA Project is utilizing benefits tracking sheets to track and measure progress towards achieving the forecasted benefits. A key step in the benefits tracking process is the documentation of the initial baselines, metrics, and measures as available in the benefits tracking sheet. The benefits tracking sheet is used to capture changes in tracked benefits, metrics, and measures over time.¹³⁰

94. BC Hydro has prepared a tracking sheet for every effort reduction benefit with an annual Expected Benefit above \$500,000 at stabilization, and for every cost reduction benefit.¹³¹ The time and effort of tracking effort benefits under this monetary threshold outweighed the value derived.¹³² At this materiality limit, BC Hydro will be tracking the twelve benefits that comprise approximately 96 per cent of the total Expected Benefits and 99 percent of the total Monetized Benefits. BC Hydro includes the benefits tracking sheets as Appendix I to the Verification Report.¹³³

95. Each benefit tracking sheet in Appendix I includes an initial set of baselines, metrics and/or measures that will be used to track the benefit. BC Hydro will finalize the

¹³⁰ Exhibit B-1, Verification Report, pp. 3-17 to 3-18.

¹³¹ Exhibit B-1, Verification Report, p. 3-18.

¹³² Exhibit B-3, BCUC IR 1.14.4

¹³³ Exhibit B-1, Verification Report, p. 3-18.

baselines and metrics and measures in the Implementation Phase. For example, Benefit ID No. 7 will require a time and motion study to determine time spent to manage pre-SCA Project and post go-live. Newly determined time requirements will then be compared to pre-SCA Project estimates.¹³⁴ Similarly, Benefit ID No. 26 will require a time and motion study to understand the baseline performance for comparison to post-SCA Project performance. Numbers will be updated as efficiency gains are tracked.¹³⁵

96. As part of its project-specific progress reporting, BC Hydro will provide updates on the benefits realization monitoring plan, which will include updates on planned baselines, metrics, and measures for tracking the realization of benefits. The SCA Project's Project Closure and Evaluation Report will provide an update on the status and plans for the realization of benefits.¹³⁶

97. The realization of benefits will depend on the adoption of tools and processes available to BC Hydro, the level of change management that goes into project implementation and governance and benefits tracking. PwC has identified certain dependencies which are overarching to all benefits identified in the review.¹³⁷ BC Hydro has developed tools and plans to ensure these dependencies are accounted for, and ultimately, the benefits are realized.¹³⁸

98. The realization of benefits associated with the SCA Project will be tracked and monitored on an annual basis based on the benefits tracking sheets.¹³⁹ BC Hydro will report to the Commission on the realization of the SCA Project benefits in the Project Closure and

¹³⁴ Exhibit B-1, Verification Report, Appendix I-1, p. 11.

¹³⁵ Exhibit B-1, Verification Report, Appendix I-1, pp. 8 to 9.

¹³⁶ Exhibit B-1, Verification Report, p. 3-18.

¹³⁷ The dependencies include: Master Data Management; Governance and Benefits Tracking; Supplier Engagement; Demand Management; and Change Management (See Exhibit B-1, Verification Report, Appendix G, p. 9).

¹³⁸ BC Hydro has provided a detail explanation of how it intends to address each dependency to ensure the realization of benefits (Exhibit B-3, BCUC IR 1.18.1).

¹³⁹ Exhibit B-3, BCUC IR 1.1.2.2.

Evaluation Report as well as future revenue requirement applications until the benefits have been fully realized.¹⁴⁰

B. CONCLUSION AND REQUESTED FINDINGS

99. The Commission should find that BC Hydro has incorporated a reasonable benefits tracking process for the SCA Project, and that the initial set of baselines, metrics and measures are reasonable and sufficient to enable accountability for benefit capture.

¹⁴⁰ Exhibit B-3, BCUC IR 1.1.2.2.

PART SIX: CONCLUSION AND ORDER SOUGHT

100. BC Hydro submits that the Commission can conclude that the scope questions identified in Order G-229-18 can be answered in the affirmative:

- (a) The updated benefits analysis conducted by PwC and BC Hydro demonstrates that the benefits flowing from the SCA Project remain credible, and the NPV analyses show that the benefits continue to be sufficient to justify the SCA Project.
- (b) BC Hydro's robust cost estimate for the Project demonstrates that the total project costs are reasonable;
- (c) The results of the Definition Phase activities did not result in any significant change to the scope of the SCA Project since the Phase One Decision; the scope continues to meet the identified need for the SCA Project.
- (d) BC Hydro's robust and well-structured benefits tracking process for the SCA Project includes an initial set of baselines, metrics and measures that are sufficient to enable accountability for benefit capture.

101. BC Hydro therefore requests that the Commission accept the Implementation Phase capital expenditures of the SCA Project as being in the public interest.

ALL OF WHICH IS RESPECTFULLY SUBMITTED.

Dated: January 22, 2018 **[original signed by Chris Bystrom]**
Chris Bystrom
Counsel for BC Hydro

Dated: January 22, 2018 **[original signed by Niall Rand]**
Niall Rand
Counsel for BC Hydro