IN THE MATTER OF

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

APPLICATION FOR A
CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY
FOR REVELSTOKE UNIT 5

DECISION

July 12, 2007

Before:

R.H. Hobbs, Chair
A.J. Pullman, Commissioner

TABLE OF CONTENTS

TABLE OF CONTENTS

1.0 BACKGROUND AND REGULATORY PROCESS

1.1 Revelstoke Dam and GS

Under the terms of the Columbia River Treaty ("CRT") between Canada and the United States which was ratified in 1964, Canada undertook to provide 15.5 million acre-feet of storage in the Columbia River basin in Canada usable for improving the flow of the Columbia River by constructing three dams on the Columbia River; the first near Mica Creek, with approximately 7.0 million acre-feet of storage ("Mica"); the second near the outlet of Arrow Lakes, with approximately 7.1 acre-feet of storage ("Keenleyside" or "Arrow"); and the third on Duncan Lake ("Duncan") with approximately 1.4 million acre-feet of storage. The Duncan and Keenleyside Dams were completed in 1967 and 1968 respectively. The Mica Dam was completed in 1973 and created the Kinbasket reservoir. In 1976-1977 four 457 MW turbines were installed at the Mica Dam which was until recently the only one of the three CRT dams to be used to generate electricity.

Following completion of the Mica Dam and Generating Station BC Hydro began to plan the Revelstoke Dam and Generating Station ("GS"). Construction Permits and a water licence were received in 1976. The Revelstoke Dam and GS were commissioned in 1984 as a four-unit facility consisting of an earth fill wing dam and a concrete gravity main dam and four 500 MW turbines. As with the Mica GS the facility was originally designed to accommodate six units, but the construction of the fifth and sixth units were deferred until additional capacity was required. The Revelstoke GS currently operates at a combined maximum capacity of 1,980 MW.

BC Hydro states that, while Revelstoke Dam does provide some flood protection, it was constructed primarily as a power generation facility using the water stored upstream in the Kinbasket Reservoir. Although the dam was not constructed under the terms of the CRT, it operates in conjunction with and is directly affected by operations at Mica Dam to the north and the Keenleyside Dam to the south, both of which are regulated by the CRT. Revelstoke Dam is located on the Columbia River approximately 5 kilometres north of the community of Revelstoke, B.C., and immediately west of Mount Revelstoke and Mount Revelstoke National Park. The dam impounds Revelstoke Reservoir, which is about 129 kilometres long and 115 square kilometres in area with a mean depth of 46 metres.

1.2 Revelstoke Unit 5

In the early 1990s, BC Hydro began to examine the feasibility of installing a fifth unit into the existing powerhouse at Revelstoke GS.

The funding of the development of the fifth unit at Revelstoke has been the subject of a number of Commission orders and decisions as described below.

In the REAP filed on March 31, 2004, BC Hydro included Resource Smart capacity additions for Revelstoke Unit 5 and Mica Unit 5, and preserved a 2009 in-service date ("ISD") for the first of these projects (F2005/F2006 Proceeding, Exhibit B1-23, p. 6; Order No. G-96-04 and Reasons for Decision, p. 121). Investigation expenditures were estimated to be $1.2 million and $6.5 million for F2005 and F2006, respectively.

The Commission Panel approved the $1.2 million F2005 investigation costs related to capacity additions for Revelstoke 5 or Mica 5 and denied approval for $6.5 million sought for F2006 stating that BC Hydro could apply for approval of F2006 expenditures following filing of the 2005 REAP. However, the Commission Panel accepted BC Hydro's submission that following the investigation stage for Revelstoke Unit 5, a Certificate of Public Convenience and Necessity ("CPCN") would be required before proceeding.

In that proceeding, BC Hydro testified that Revelstoke Unit 5 was more economical than Mica Unit 5 and would be considered first for development and that the sequencing of Revelstoke Unit 5 and Mica Unit 5 had been explored as alternatives to supplying new capacity, with the optimum sequence being considered to be Revelstoke Unit 5 followed by either Mica Unit 5 or possibly Revelstoke Unit 6 rather than Mica Unit 5 followed by Revelstoke Unit 5 (Order No. G-96-04 and Reasons for Decision, p. 121).

BC Hydro did not file for approval of investigation costs beyond the $1.2 million approved by Order No. G-96-04, and now estimates that its forecast costs to September 2007 are $15.2 million (Exhibit B-1, p. 6-2). The parties to the F2007/F2008 NSP settlement agreed that no costs for

Revelstoke Unit 5 would be included in the F2007 and F2008 revenue requirements and preserved an opportunity for parties to challenge the development costs for Revelstoke 5 in the 2006 IEP/LTAP proceeding (Order No. G-143-06, Appendix A, sections 34 and 39). The development costs were not challenged. By Order No. G-29-07 dated March 15, 2007, the Commission approved the Definition Phase costs of $12.5 million.

1.3 Orders Sought

BC Hydro submits that Revelstoke Unit 5 is in the public convenience and necessity and requests that a CPCN be granted for the construction and operation of Revelstoke Unit 5, as proposed (the "Application"). BC Hydro is seeking the issuance of a CPCN for Revelstoke Unit 5 that targets an ISD of October 2010. The October 2010 ISD P50 cost estimate is $280 million and P90 cost estimate is $320 million (Exhibit B-1, p. 3-8).

BC Hydro further submits that the CPCN order should read as follows:

A CPCN is granted to BC Hydro for Revelstoke Unit 5, subject to the following conditions:

(1) A CPCN is granted to BC Hydro for Revelstoke Unit 5 as described in the Application.

(2) BC Hydro is directed to file with the BCUC quarterly progress reports on the Revelstoke Unit 5 schedule, costs and any variances or difficulties that the Project may be encountering, followed by a final report upon Project completion. BC Hydro is to determine the form and content of the reports in consultation with BCUC staff.

(Exhibit B-1, p. 1-6 and Appendix D)

1.3.1 Review and Approval Process

To meet the October 2010 ISD, BC Hydro states that it is filing this Application with the expectation that the proposed process will support a CPCN being granted no later than the end of July 2007. BC Hydro recommends a written process for the review of this Application since the timing, costs and benefits of Revelstoke Unit 5, as well as other issues pertinent to a CPCN Application, were recently

vetted as part of the 2006 IEP/LTAP oral hearings, and that the three customer groups in that proceeding supported the advancement of Revelstoke Unit 5 (Exhibit B-1, pp. 1-7, 1-8).

Letters in support of a written process were filed with the Commission:

1. On April 16, 2007, BC Old Age Pensioners Organization ("BCOAPO") (Exhibit E-1);
2. On April 16, 2007, Commercial Energy Consumers Association of BC ("CEC") (Exhibit E-2); and
3. On April 18, 2007, Joint Industry Electricity Steering Committee ("JIESC") (Exhibit E-3).

On May 2, 2007, the Commission received a letter (Exhibit E-4) from the City of Revelstoke, the host community, that "fully endorses" Revelstoke Unit 5 and BC Hydro's Application.

By Order No. G-43-07 dated April 20, 2007, the Commission approved a written hearing process and timetable and also established the registration of Intervenors and Interested Parties as Friday, May 11, 2007 (Exhibit A-1). On April 27, 2007, as per Appendix B of the Order No. G-43-07, BC Hydro confirmed the publication of the Notification of the Application and Written Hearing (Exhibit B-2). One round of Information Requests was issued by the Commission and by Intervenors and was responded to by BC Hydro on Friday, May 18, 2007. BC Hydro's final written submission was filed on Tuesday, May 29, 2007, with Intervenors' final written submissions being filed on Tuesday, June 12, 2007; and BC Hydro's written reply on Tuesday, June 19, 2007.

Along with other Intervenors, on May 11, 2007 the Shuswap Indian Band ("Shuswap") and Simpcw First Nation ("Simpcw"), registered as an Intervenor for this Application (Exhibit C6-1).

The following is a list of Exhibits that were submitted by the legal counsel representing the Shuswap and Simpcw:

1. SHUSWAP INDIAN BAND & SIMPCW FIRST NATION – Online web registration dated May 11, 2007 from McDonald & Company, legal counsel, requesting Registered Intervenor status (Exhibit C6-1);

2. Letter dated May 11, 2007 from McDonald & Company, legal counsel, filing comments (Exhibit C6-2);

3. Letter dated June 1, 2007 from McDonald & Company requesting time extension as set out in Regulatory Timetable (Exhibit C6-3);

4. Letter dated May 15, 2007 from McDonald & Company, legal counsel, filing inquiry on consultation policy, process and request for extension (Exhibit C6-4);

5. Letter dated June 5, 2007 from McDonald & Company, legal counsel, filing additional request for extension and comments (Exhibit C6-5);

6. Letter dated June 11, 2007 from McDonald & Company, legal counsel (Exhibit C6-6), filing response to Commission request (Exhibit A-5); and

7. Letter dated June 6, 2007 from McDonald & Company, legal counsel, filing comments on process on the request for extension to the regulatory timetable (Exhibit C6-7).

On May 15, 2007, counsel representing the Shuswap and Simpcw made requests of the Commission for oral submissions and an extension of the timetable to review the materials for Revelstoke Unit 5 (Exhibit C6-4). On May 24, 2007, the Commission responded to the Shuswap and Simpcw request and said "the Commission will continue with the written review process for the Application that was established by Order No. G-43-07 dated April 30, 2007" (Exhibit A-3).

On June 1, 2007, counsel representing the Shuswap and Simpcw again made requests of the Commission for an extension of the timetable to review the materials for Revelstoke Unit 5 (Exhibit C6-3). It was also submitted that:

> "Since the Environmental Assessment and Approval Process is still on-going and there has been no determination by the EAO or the Ministers that there is an adequate consultation process in place, that BC Hydro has met its obligation to consult with First Nations, or to grant an EAC to BC Hydro, BCUC cannot rely on such submissions in the Application and proceedings for the Revelstoke 5 Project" (Exhibit C6-3, p. 3).

The Environmental Assessment Certificate ("EAC") was granted by the Ministers on May 30, 2007 (Exhibit B-5).

On June 6, 2007, BC Hydro filed a submission opposing the Shuswap and Simpcw request for an extension (Exhibit B-5), to which it attached as Attachment 1 a supplemental response to BCUC 1.17.1, being a copy of each of:

(1) the EAC issued with respect to Revelstoke Unit 5 dated June 5, 2007;

(2) the Environmental Assessment Office's (EAO) Reasons and recommendations as to why the EAC should be issued; and

(3) relevant extracts from the EAO's Assessment Report.

On June 5, 2007, counsel representing the Shuswap and Simpcw again made requests of the Commission for an extension of the timetable to review the materials for Revelstoke Unit 5 (Exhibit C6-5). In the same letter of June 5, 2007, the Shuswap and the Simpcw made the following request of the Commission:

> "As previously requested, the Shuswap and Simpcw require an extension of the Regulatory Timetable established for this Application proceeding for six months to enable the Shuswap and Simpcw to commence discussions with BC Hydro in respect to establishing a request consultation process for the Shuswap and Simpcw with respect to their unique aboriginal rights and title.
>
> Further, additional time and resources are required for the Shuswap and Simpcw to engage with BC Hydro and the Crown with respect to the on-going trespass and breach of aboriginal rights, title and interests from the existing Revelstoke Dam, including the fact that there are Shuswap members buried under the reservoir created at Revelstoke."

On June 6, 2007, counsel representing the Shuswap and Simpcw again made requests of the Commission regarding the process for consideration of an extension of the regulatory timetable for this proceeding (Exhibit C6-7).

On June 7, 2007, the Commission in response to the Shuswap and Simpcw letters dated June 1, 2007, June 5, 2007, and June 6, 2007, again denied the requests for an extension, stating that it would continue with the written review process for the Application that was established by Order No. G-43-07, and that other issues raised in previous correspondence may be considered in the final decision of the Commission on this Application (Exhibit A-4).

The Shuswap and Simpcw filed a letter dated June 6, 2007 on a Confidential basis (Exhibit C6-7). By letter dated June 7, 2007, the Commission stated that "Participants in this proceeding may request a copy of your letter, and then the Commission will need to make a decision regarding whether or not the letter should be held on a Confidential basis" (Exhibit A-4).

On June 8, 2007, BCOAPO stated (Exhibit C2-3), in response to the Commission letter of June 7, 2007 (Exhibit A-4), that "We take no position regarding BC Hydro's request for disclosure and we trust the Commission has sufficient information to make a decision based on the merits of each interested party's position".

On June 8, 2007, the JIESC stated that "the JIESC supports BC Hydro's request for disclosure to it of the June 6th letter submitted by the First Nation Intervenors" (Exhibit C3-3). On June 10, 2007, the JIESC provided further submissions and clarification of its June 8, 2007 letter (Exhibit C3-4).

On June 8, 2007 (Exhibit C4-3), IPPBC stated that "The IPPBC supports BC Hydro's request that a copy of the letter dated 6 June 2007, as referred to below, be made available to BC Hydro by no later than this afternoon".

On June 8, 2007, the Commission requested that the Shuswap and Simpcw either waive their request that the letter be kept on a Confidential basis or provide support for their request by 10:00 a.m., Monday, June 11, 2007 (Exhibit A-5).

On June 11, 2007, counsel representing the Shuswap and Simpcw withdrew their request that their June 6, 2007 letter be held on a confidential basis (Exhibit C6-6).

Commission Determination

The Commission Panel concludes that the majority of the stakeholders with the exception of the Shuswap and Simpcw supported Order No. G-43-07, which established a Regulatory Timetable including a written public hearing for review of the Application.

The Commission adhered to the Regulatory Timetable established by the Order, with the exception of the exhibits of the Shuswap and Simpcw listed as items 2-7 above. The Shuswap and Simpcw, although registered as Intervenors, filed neither information requests nor submissions on the dates established by Order No. G-43-07. Nevertheless, the submissions of Shuswap and Simpcw are accepted as part of the record in this proceeding and are considered in Section 5 of this Decision.

The three First Nations Councils with an interest in Revelstoke Unit 5, the Ktunaxa Nation Council ("KNC"), the Okanagan Nation Alliance ("ONA") and the Shuswap Nation Tribal Council ("SNTC") did not register as Intervenors or interested parties for review of this Application.

The Commission Panel concludes that the majority of the information requests were adequately responded to by BC Hydro and that those requests to which BC Hydro did not reply were for a variety of acceptable reasons.

1.4 Application

On April 13, 2007 BC Hydro applied to the Commission under sections 45 and 46 of the Utilities Commission Act for a CPCN for the installation of a new 500 megawatt ("MW") generating unit, designated Revelstoke Unit 5, which will be installed alongside the existing four generating units at its Revelstoke Generating Station. In the Executive Summary to its Application BC Hydro states that Revelstoke Unit 5 was one of the significant projects identified in its 2006 Integrated Electricity Plan/Long-Term Acquisition Plan ("2006 IEP/LTAP") proceeding, wherein evidence was led that clearly showed Revelstoke Unit 5 is required for system reliability purposes on or before its earliest ISD of October 31, 2010. In addition BC Hydro notes that two events have taken place since the 2006 IEP/LTAP proceeding, namely the development of a new peak load forecast which indicates that peak

demand has increased between 120 MW to 230 MW in the 2010 to 2015 period, and the issue of the Provincial Government's new energy plan, entitled *The BC Energy Plan: A Vision for Clean Energy Leadership* ("2007 Energy Plan"), on February 27, 2007 whose Policy Action 21 states that BC Hydro is to ensure that clean or renewable generation contributes at least 90 percent of total generation (Exhibit B-1, pp. 1-1,1-2).

The issue of the need for capacity is addressed in Section 4 of this Decision.

BC Hydro states that an ISD of October 2010 is considered reasonably achievable, subject to Commission approval of Revelstoke Unit 5, but that October 2010 is the earliest possible ISD and such a project schedule does not include any float available to accommodate unforeseen delays. Nevertheless, BC Hydro believes it is in the interest of ratepayers to proceed with the Project as soon as possible, and accordingly has framed its CPCN Application around an October 2010 ISD (Exhibit B-1, p. 1-2).

The schedule and its impact on capital costs are reviewed in Section 2 of this Decision.

BC Hydro states that the addition of a fifth generating unit at the Revelstoke GS is the most cost-effective option currently available to it and that in comparison to other alternative sources of additional capacity, Revelstoke Unit 5 is attractive because it:

- has a low environmental impact since it is contained within the existing footprint of the Revelstoke GS, requires no significant transmission reinforcement and is not diverting new water;
- is well advanced and near completion in terms of securing Government agency approvals, and stakeholder engagement input and consensus;
- has a firm contract for the turbine and generator that can be procured to meet an ISD as early as October 2010;
- is a very long-term source of additional capacity to the BC Hydro system. The estimated remaining life of the Revelstoke GS is at least 50 years;
- has the lowest unit capacity cost ("UCC**"**), and one of the shortest lead times, of the capacity sources available to BC Hydro and is the only realistic source of significant additional capacity within B.C. that could conceivably be available by the winter of 2010/11;

- provides significant operational and ancillary services including system shaping, operating reserves, load following and rotational energy. These ancillary attributes are required to support non-firm sources of new energy supply from independent power producers ("IPPs"); and

- aligns with the 2007 Energy Plan.

  (Exhibit B-1, pp. 1-3 to 1-5)

In the 2006 IEP/LTAP proceeding, BC Hydro testified:

> "… Revelstoke 5 is a very cost-effective resource addition for a capacity project. It continued to showup in 23 portfolios, either somewhere in 2011 or 2015, and subsequent business case analysis that we've done, which wasn't included in the IEP analysis, shows that there are trade benefits. So it became what I call a bit of a slam-dunk. It's a project that doesn't need additional transmission, has many trade benefits, has efficiency benefits, sits exactly in the right part of the system in terms of its ability to enhance the system, and really fits well with what the IPPs have brought forward in terms of some of their non-firm resources"(T8:982-983).

As BC Hydro states a major opportunity for review of Revelstoke Unit 5 by customer groups and other Intervenors was the 2006 IEP/LTAP proceeding. And as BC Hydro notes, the three customer group intervenors – the JIESC, CEC and BCOAPO – strongly supported Revelstoke Unit 5 (Exhibit B-1, p. 5-2). The views of the Intervenors and BC Hydro, as expressed in this proceeding, are considered in this Decision, and the costs and benefits of the project are reviewed in Section 6 of this Decision.

1.5 Other Applications and Approvals

BC Hydro provides the following listing of Provincial and Federal Approvals required by the Project:

	Approval	**Agency**	**Status**	**Expected Approval**
A	Section 17(3) of *BCEAA*	EAO and BC Ministers of Environment and of Energy, Mines and Petroleum Resources	EAC Application filed October 2006 EAO is preparing the Project assessment report for the end of April; Minister's recommendation is due in the middle of June.	EAC; Approval Issued June 2007
B	Columbia River WUP Addendum	CWR	Revised Addendum filed in November 2006 and revised in March 2007.	Following EAC; July 2007
C	Sections 18 to 20 of *CEAA*	DFO is the "Responsible Authority" under *CEAA*	*CEAA* review process harmonized with EAC Application review. The *CEAA* trigger was confirmed by DFO on March 15, 2007.	Screening of Project, preparation of a screening report and decision to allow Project to proceed. Harmonized provincial-federal environmental assessment review; Decision expected shortly after issuance of EAC, in July 2007

D	Section 35(2) of the *Fisheries Act*	DFO	Review is part of *BCEAA-CEAA* harmonized process	Habitat Authorization Agreement for the potential "harmful alteration, disruption, or destruction" (HADD) of fish habitat One month after EAC is issued, in July 2007

(Source: Exhibit B-1, p. 3-19, Table 3-8)

1.5.1 Provincial Permits, Approvals and Authorizations

Water License

BC Hydro states that for an October 2010 ISD, no amendment is required to Conditional Water License ("CWL") No. 47215 which was issued to BC Hydro in 1976, and which, in addition to several agreements negotiated with the Provincial Government over subsequent years, serves to derive a flow regime prescribing minimal and maximal flows and storage capacities for Revelstoke Dam. BC Hydro states that following installation of the fifth unit, Revelstoke Dam would continue to operate within the reservoir limits established under CWL No. 47215 (as amended), under which BC Hydro is permitted to divert 2,550 m^3/s of water for power generation and store a maximum volume of 1.9×10^9 m^3 of water inside the reservoir (Exhibit B-1, p. 3-20).

Columbia River WUP Addendum

In November 1996, the B.C. Ministers of Employment and Investment, and Environment, Lands and Parks announced the creation of the Water Use Plan ("WUP") process to define how best to allocate water use to benefit environmental, social and power generation interests. Through this process, recommendations and strategies were developed through an in-depth consultative process and submitted to the provincial Comptroller of Water Rights ("CWR") (Exhibit B-1, p. 3-20).

In 2000 BC Hydro initiated the Columbia River WUP, which encompassed operations of the Mica, Revelstoke and Keenleyside facilities. At its final June 2004 meeting, the Columbia River WUP Consultative Committee reached consensus on an operating plan, which included provision for a year-round minimum flow release of 5000 cubic feet per second ("cfs") at Revelstoke Dam, as well as a comprehensive package of monitoring studies and physical works in lieu of operational changes. The WUP Consultative Committee report provided the basis for development of the draft Columbia River WUP, which was submitted to the CWR for review and approval in June 2005. As part of the Revelstoke Unit 5 Project regulatory approval process, BC Hydro states that it facilitated a review of the Columbia River WUP by interested members of the Consultative Committee, First Nations representatives and other stakeholders, the purpose of which was to evaluate the need for revisions to the existing recommendations for operational changes, non-operational changes and monitoring programs as provided in the draft Columbia River WUP. Proposed revisions to the Columbia River WUP resulting from the review were submitted to the CWR by BC Hydro on 27 June 2006 for final review and approval and the Columbia River WUP was authorized by the CWR on January 26, 2007 (Exhibit B-1, p. 3-20). Approval of the Addendum to the WUP is expected shortly after the issuance of the EAC (Exhibit B-1, p. 5-6).

B.C. Environmental Assessment

BC Hydro filed the approved Revelstoke Unit 5 EAC on June 6, 2007 (Exhibit B-5).

Federal Environmental Assessment/Fisheries Act Authorization

BC Hydro states that the *CEAA* review is nearing completion, with a decision expected by July 2007. Section 5(1) (d) of *CEAA* states that an environmental assessment of a project is required before the Government of Canada "issues a permit or license, grants an approval or takes any other action for the purpose of enabling the project to be carried out in whole or in part". Revelstoke Unit 5 triggered a review under *CEAA* since an Authorization Agreement under Section 35(2) of the *Fisheries Act* is required from DFO for changes in the flow regime that are anticipated to occur once Revelstoke Unit 5 is operational. A Section 35(2) *Fisheries Act* Authorization is identified in the *Law List Regulations* as

a trigger for an environmental assessment pursuant to *CEAA*. The 35(2) Authorization is expected by July 2007. As the sole federal agency responsible for issuing an authorization for the Project, DFO is the *CEAA* Responsible Authority. The Responsible Authority and the responsible Provincial Ministers under *EAA* have the final decision regarding the determination of significance of environmental effects, if any, associated with the Project. Consultation with Environment Canada confirmed that the Certificate of Exception issued for the original Revelstoke project in 1976 exempts the fifth unit from further review under the *International River Improvements Act*. Accordingly, Environment Canada concluded that it is not a Responsible Authority under Section 5(1) of *CEAA* for Revelstoke Unit 5. Consultation with Canadian Coast Guard representatives also confirmed that an approval under the *Navigable Waters Protection Act* will not be required for the Project. As Revelstoke Unit 5 does not meet the threshold for a comprehensive study under Section 7, Part II of the *Comprehensive Study List Regulations*, the *CEAA* assessment is limited to a screening level review, which is a less intensive assessment (Exhibit B-1, pp. 3-21, 3-22).

Municipal Bylaws

BC Hydro states that under the *Hydro and Power Authority Act*, it is exempt from requirements established through municipal zoning and community plan by-laws (Exhibit B-1, p. 3-22).

2.0 PROJECT DESCRIPTION AND IMPACTS

The technical details of the Revelstoke Unit 5 project and its proposed construction schedule and ISD are reviewed in this Section. The project's social and economic impacts and its effects on the overall transmission system are considered in the context of this review.

2.1 Technical Description

BC Hydro describes the scope of the Revelstoke Unit 5 project as consisting of the installation of a fifth turbine/generator set, having a nameplate capacity of 500 MW, in the existing empty turbine bay immediately east of Unit 4; and work relating to the extension of the penstock and upgrades of transmission equipment. Since all the installation work associated with Revelstoke Unit 5 will be confined to the penstock and the existing powerhouse, the project will not require the permanent use of any land additional to that already occupied by the existing Revelstoke Dam and GS (Exhibit B-1, pp. 3-2, 3-4).

BC Hydro identifies ten significant supply contracts to be tendered and awarded as part of the Revelstoke Unit 5 project namely; turbine and generator; civil works; generator transformers; penstock; gas insulated switchgear ("GIS") and bus; generator terminal equipment; completion contract; exciter; governor; and protection and control equipment (Exhibit B-1, p. 3-2).

BC Hydro describes the major equipment to be installed as "Best in Class", comprising the following: the penstock is 75 meters (m) long, and 7.9 m in diameter, exposed steel supported by four ring girdles with an expansion joint; the turbine is a vertical shaft Francis turbine with a maximum discharge capability of approximately 400m^3/s; the generator is an air-cooled, umbrella-type generator with a rated capacity of approximately 500 MW; the transformer is a 16 kV/500 kV water-cooled generator transformer; the GIS contains sulphur hexafluoride (Exhibit B-1, p. 3-2).

BC Hydro states that the Revelstoke Unit 5 turbine is being designed with a relatively flat efficiency curve over a wide range of power outputs and that at an output of 430 MW, the turbine efficiency is close to maximum (Exhibit B-3, BCUC 1.4.5.1). BC Hydro expects Revelstoke Unit 5 to operate at 96 percent efficiency, which is slightly over 2 percent higher than Units 1 to 4 (Exhibit B-3, IPPBC 1.2.1).

BC Hydro states that the equipment will have the following service lives:

Equipment Description	**Expected Life (Years)**
Penstock	70
Turbine	70
Generator	40 (minimum)
Transformer	35
500 kV gas insulated switchgear	40
Ancillary equipment	40

(Exhibit B-1, p. 3-2)

BC Hydro was asked to provide the scope and cost of any work in excess of $5 million associated with its installed base of large generators in excess of 250 MVA rating and the scope and cost of any work in excess of $5 million associated with its installed base of 500 kV GIS. BC Hydro objected to providing this information (Exhibit B-3, BCUC 1.20.2, 1.20.3).

IPPBC submits that since BC Hydro did not respond to the requests for the scope and cost of work done on generators and switchgear of similar ratings to those to be installed at the Revelstoke Unit 5 project the appropriateness of the life expectancy and resulting capital maintenance expenditures cannot be judged. IPPBC notes that BC Hydro is planning to spend $67 million to repair and replace four generator stators at Peace Canyon Generating Station and the units are only 27 years old (IPPBC Submission, p. 3).

Commission Determination

The Commission Panel accepts BC Hydro's assessment of the equipment it proposes to install at Revelstoke Unit 5 as "Best in Class", but notes that there have been significant expenditures incurred by BC Hydro on components such as turbines, generators, transformers, 500 kV GIS and ancillary equipment at BC Hydro's major hydroelectric facilities (e.g. GM Shrum, Peace Canyon, Mica, Revelstoke), which were made significantly earlier than the expected service life for those components. In addition to the example of the generator stators at the Peace Canyon GS cited by IPPBC, BC Hydro mentions the $78 million of planned capital expenditures on the generator stators at the Mica GS (BC Hydro Reply, para. 34). The Commission Panel therefore rejects the timing and amount of Sustaining Capital expenditures associated with Revelstoke Unit 5 and will expect to be presented with an assessment of Sustaining Capital expenditures based on past experience with similarly-sized units in any future applications for generating unit additions. The Commission Panel expects that BC Hydro will exercise extra diligence over the quality control of the turbine manufacturer, especially where the stators are concerned to ensure it receives the quality it is paying for.

2.2 Implementation Schedule

BC Hydro states that the earliest ISD for Revelstoke Unit 5 is October 31, 2010, that it is advancing all applications and development activities to support this earliest possible ISD and that the key determinants affecting its ability to achieve the October 2010 ISD are (Exhibit B-1, pp. 3-5, 3-6):

- timely receipt of the EAC pursuant to EAA and a favourable CEAA determination;
- timely receipt of a CPCN; and
- securing long lead time/critical path equipment.

BC Hydro provides a high-level project schedule that shows the target durations and dates for approximately 30 activities necessary to achieve the October 2010 ISD (Exhibit B-1, Appendix F). The target dates for the three key determinants, in addition to several other key project dates, are shown in the table below:

Decision Points and/or Milestones	Date
Consultation with the Ktunaxa Nation Council, Okanagan Nation Alliance and Shuswap Nation Tribal Council	Started 2005 Ongoing
BC Hydro Board of Directors Implementation Phase approval, subject to Government agency and BCUC approvals	May 2007
Environmental Approval Certificate Application ("EACA") decision	June 2007
Department of Fisheries and Oceans ("DFO") *Fisheries Act* Authorization decision	July 2007
CPCN Approval	July 2007
B.C. Comptroller of Water Rights ("CWR") Columbia River Water Use Plan ("WUP") Addendum decision	July 2007
Award the final design and construction components of the turbine and generator contract	October 2007 or earlier
Issue balance of critical path equipment supply tenders	August 2007 to January 2008
Commence construction on site	Spring 2008
Targeted ISD	October 2010

(Source: Exhibit B-1, p. 3-7)

BC Hydro states that while it believes the ISD of October 2010 is "reasonably achievable" and that it is desirable to target this date as compared to a "later, more conservative" October 2011 ISD in order to deliver the benefits associated with the project as soon as possible (Exhibit B-3, BCUC 1.6.2), it also identifies the following risks that could prevent the October 2010 schedule from being met (Exhibit B-1, pp. 6-17, 6-18, Table 6-5):

- high probability but low impact risks associated with First Nations issues;
- low probability but high impact risks associated with delays in the EAC and CPCN processes; and

- medium probability and medium impacts risks associated with project implementation.

These risks are discussed further in Section 3 of this Decision. Given the risks of project delay, BC Hydro includes P50 and P90 estimates for an October 2011 ISD. The P90 capital cost estimate for the October 2011 ISD is $350 million, $30 million more than the $320 million P90 capital cost estimate for the October 2010 ISD (Exhibit B-3, BCUC 1.6.2).

The JIESC supports proceeding with the Revelstoke Unit 5 project with the goal of having it in-service for October 2010 (JIESC Submission, p. 1).

IPPBC states that it appears that the capacity addition associated with Revelstoke Unit 5 can be acquired at a very small cost to the ratepayers, and in such situations these additions should not be delayed (IPPBC Submission, p. 1)

Commission Determination

The Commission Panel accepts that there are benefits associated with the earliest possible implementation of the Revelstoke Unit 5 project, and encourages BC Hydro to undertake all reasonable and economically feasible methods to achieve the October 2010 in-service date. The Commission Panel is also sensitive to potential impacts on safety and the project expenditures resulting from efforts to attempt to adhere to an unrealistic schedule, and therefore directs BC Hydro to advise the Commission as to a new in-service date as soon as possible and adjust the project budgets accordingly if it becomes apparent that the October 2010 in-service date is no longer achievable.

2.3 Transmission Requirements

BC Hydro includes in its Application a study performed by the British Columbia Transmission Corporation ("BCTC") of the transmission system requirements associated with the addition of Revelstoke Unit 5, in which are identified the following significant issues (Exhibit B-1, Appendix E):

- to support Revelstoke Unit 5 integration, a new 250 Mega Voltage Ampere Reactive ("MVAr") switched capacitor bank at Ashton Creek substation is required to be in-service by October, 2010;
- the need for reinforcements to relieve congestion on the West of Selkirk cut plane will not impact the cost of adding Revelstoke Unit 5 into the system;
- with the addition of Revelstoke Unit 5 to the 5MB2 bus at the Revelstoke GS, which already has Units 3 and 4 connected to it, the Most Severe Single Contingency ("MSSC") in the Northwest Power Pool ("NWPP") increases from approximately 1,200 MW to 1,500 MW when the three Revelstoke units connected to 5MB2 bus are at full output. It is expected that there will be an increase in the amount of contingency reserve that is required to be maintained in the BCTC control area as a result of this change;
- Nicola substation 500 kV bus reconfiguration cost is not to be included in the justification of Revelstoke Unit 5;
- the complete loss of the Revelstoke GS after Revelstoke Unit 5 is built will have an acceptable impact on the BCTC system and neighbouring systems provided the pre-disturbance import from the U.S. system is less than about 1,000 MW; and
- the coastal reliability must run ("RMR") requirement for Revelstoke Unit 5 has been determined for two generation capacity scenarios. For the dependable generation capacity scenario, the system operating point with Revelstoke Unit 5 is within the thermal limits of the Interior to Lower Mainland ("ILM") path. For the maximum generation capacity scenario, an increase in the coastal RMR is required to stay within the thermal limits of the ILM path.

  (Exhibit B-1, Appendix E, p. iii)

BC Hydro states the full capital cost of the Ashton Creek substation capacitor bank addition has been included in all economic and revenue requirement and rate impact calculations (Exhibit B-1, p. 3-13). BC Hydro explained that the direct uninflated costs of $4.57 million are included in the economic evaluation spreadsheets provided in Appendix I of the Application (Exhibit B-3, BCUC 1.7.1.1), but that

the costs are actually part of the BCTC capital plan and are not BC Hydro project costs (Exhibit B-3, BCUC 1.8.2).

BC Hydro states that it can manage the increase in MSSC through operating procedures and that simulations for the period between 2011 and 2016 show that its system is exposed to this increased MSSC for about 8 percent of the time, primarily over the winter months (Exhibit B-1, p. 3-14). BC Hydro stated that this increase in MSSC could be avoided by adding a third 500 kV bus at the Revelstoke GS (Exhibit B-3, BCUC 1.50.3), but that the third bus would cost approximately $16 million with annual benefits of between $0.3 million and $0.6 million, so this option was not pursued (Exhibit B-3, BCUC 1.50.2). BC Hydro stated that the increased contingency reserves identified by BCTC could be as high as 500 MW (Exhibit B-3, BCUC 1.47.3), and that it can accommodate these additional operating reserve requirements through the availability of off-line units and operating on-line units at their most efficient operating points instead of at their maximum output levels (Exhibit B-3, BCUC 1.47.1).

Regarding the issue identified by BCTC concerning the complete loss of the Revelstoke GS, BC Hydro states that it would be a highly unusual condition to be importing more than 1,000 MW and have Revelstoke GS operating at full load while one of the lead-shafts at the Revelstoke GS or one of the 500 kV lines connecting Revelstoke to the system is out-of-service and that, in those rare situations, it would plan to have sufficient internal operating reserves in place to maintain system reliability (Exhibit B-3, BCUC 1.26.1).

Although BCTC concluded that an increase in coastal RMR is required for the ILM path to stay within thermal limits for maximum interior resource dispatch scenarios, BC Hydro states that its studies show there is limited impact and that for the 2015/2016 scenario absent an upgrade to the ILM path, the study year results under the identified range of water conditions show that, on average, the economic generation dispatch may be limited for a period of less than 50 hours per year. BC Hydro states that this level of re-dispatch can be managed and should not cause any material impact on the value of Revelstoke Unit 5 to BC Hydro's system (Exhibit B-1, p. 6-12) and that there are no dispatch limitations after the ILM upgrade (Exhibit B-1, p. 3-16).

Commission Determination

The Commission Panel accepts BC Hydro's assessment of transmission impacts as identified by BCTC, and endorses BC Hydro's departure from maximum generation dispatch in the North Interior or South Interior in order for the planned flows on the ILM path to stay within the ILM thermal limit. The Commission Panel accepts that BC Hydro can operate Revelstoke Unit 5 off the existing bus 5MB2 without unacceptable incremental reliability risks.

2.4 Social and Environmental Impacts

BC Hydro states that the Revelstoke Unit 5 project will not cause any significant adverse environmental or socio-economic effects, and anticipates that any environmental or socio-economic effects can generally be avoided or minimized through mitigation measures (Exhibit B-1, p. 3-16). However, because of the comprehensive review of the environmental, socio-economic and cultural effects undertaken by the EAO as part of BC Hydro's EAC for Revelstoke Unit 5, BC Hydro states that it is not submitting detailed information on the potential environmental and socio-economic effects of the project as part of this Application (Exhibit B-1, pp. 3-16, 3-17).

In the 1990's, BC Hydro worked with the Canadian Columbia River Intertribal Fisheries Commission ("CCRIFC") and its member First Nations at the time (Ktunaxa-Kinbasket Tribal Council, Okanagan Nation Fisheries Commission and the Shuswap Nation Fisheries Commission) to assess potential impacts on First Nation rights and interests. The CCRIFC executive board recommended to member First Nations that there did not need to be a comprehensive community-based review of the project, and instead CCRIFC independently reviewed environmental and fisheries issues and recommended a number of conditions (Exhibit B-1, pp. 5-3, 5-4).

BC Hydro also conducted extensive consultations in the course of the development of the Revelstoke Unit 5 project as further described in Section 5 of this Decision. BC Hydro includes a comprehensive listing of the comments it received from the public, First Nations and Government Agencies during the EAC process, and its responses to those comments, as Appendix L to the Application.

Based on previous and current consultations, BC Hydro identifies eight mitigation and compensation commitments that are included in the Revelstoke Unit 5 capital budget costing a total of $990,000 (Exhibit B-1, p. 3-23, Table 3-9).

The Columbia River WUP contains a provision whereby the addition of a fifth turbine unit at the Revelstoke Dam would trigger a review of those parts of the Columbia River WUP that might be affected by potential incremental impacts and/or operational changes that would occur due to Revelstoke Unit 5. A draft Addendum to the Columbia River WUP prepared for Revelstoke Unit 5 reflects the recommendations of the Revelstoke Unit 5 Core Committee and was submitted to the CWR in November 2006 (Exhibit B-1, p. 5-6). BC Hydro identifies five commitments costing a total of $520,000 arising from the draft Addendum to the Columbia River WUP (Exhibit B-1, pp. 3-23, 3-24, Table 3-10).

BC Hydro states that these costs are not part of its capital budget but are either incremental to ongoing or future funding through WUP remissions and therefore to the Provincial Government's account, or incremental operation and maintenance costs and therefore applied against the cost of energy. BC Hydro states that it is in discussions with the CWR to determine the final accounting for these costs (Exhibit B-1, p. 3-23).

BC Hydro stated that with five units installed at Revelstoke as compared with four units, higher daily turbine discharges at both Revelstoke and Mica GS will be possible; with the most significant increases in the Mica/Revelstoke daily discharge volumes being expected to occur during the July to September period. The additional Mica/Revelstoke discharge volume will typically be held in the Arrow reservoir for much of the year and then returned by early spring the following year, thus increasing Arrow reservoir levels from mid-summer through early spring (Exhibit B-3, BCUC 1.34.2).

With respect to IPPBC's concern regarding allowances for the costs that may arise as a result of the monitoring and review processes between the terms of successive WUPs, BC Hydro submits that this is problematic in that it would result in an artificial exercise of estimating what the adverse effects could be many years before the monitoring is initiated. Therefore, BC Hydro has not made any additional

provision in the annual costs of Revelstoke Unit 5 with respect to possible adverse effects that may be uncovered by monitoring programs (BC Hydro Reply, para. 41).

Commission Determination

The Commission Panel notes that BC Hydro has received its Environmental Assessment Certificate, and accepts that BC Hydro has adequately considered the social and environmental aspects of the Project.

3.0 PROJECT RISKS AND RISK MANAGEMENT

The Commission's CPCN Guideline No. 3 (iii) requires that Applicants include "a statement identifying any significant risks to successful completion of the project". Section 6 of the Application is entitled "Project Risks and Risk Management". This Section deals with the significant Project risks and BC Hydro's proposed methods of management and mitigation. An update to the risk management plan is provided in response to an Information Request (Exhibit B-3, BCUC 1.10.3).

BC Hydro states that it has completed several risk screenings and created a Project Risk Register that identifies all of the major Project risks and their associated mitigation strategies. BC Hydro states that the risks associated with Revelstoke Unit 5 are considered within the three phases of the Project, namely development; construction and commissioning; and operations (Exhibit B-1, p. 6-1). A summary table of the risks, mitigation strategy, and probability/impact is provided (Exhibit B-1, Table 6-5, pp. 6-17 to 6-19).

A total of 40 risk items have been identified and evaluated, with risk mitigation activities identified and implemented to address them. BC Hydro stated that risks will continue to be identified, and mitigation strategies developed throughout the Project (Exhibit B-3, BCUC 1.10.3).

3.1 Development

BC Hydro states that Revelstoke Unit 5 is at an advanced stage of development, and that many of the development phase risks have been confirmed and mitigated. BC Hydro identifies the remaining development risks as relating to permits (EAC, WUP addendum and CPCN) and First Nations. First Nations issues are addressed in Section 5 of this Decision. So far as permits are concerned the Project received its EAC on June 5, 2007; it considers that the WUP review is unlikely to affect project cost or schedule and this Decision addresses the CPCN. Therefore, the development risks associated with a delay of this project should now be very low.

3.2 Construction and Commissioning (Implementation)

BC Hydro states that it has completed a comprehensive and detailed schedule for the Project and established the necessary project management structure to reduce schedule risks. BC Hydro believes the Project is on schedule for an October 2010 ISD (Exhibit B-1, p. 6-7). The Implementation schedule risks are considered to be medium to low (Exhibit B-1, Table 6-4, p. 6-8).

BC Hydro states that it has reduced capital cost risk through a careful review of the nature of cost risks, and has developed associated mitigation plans including a staged approach to securing Project contracts and measures such as predefined escalation provisions within the contracts. Further, contracts for over 50 percent of the Project's direct costs subject to tender volatility have been executed for the longest and largest lead time equipment (Exhibit B-1, p. 6-5). BC Hydro states that there are nine remaining significant contracts that will be tendered and awarded as part of the Project being: Civil; Generator Transformers; Penstock; GIS and Bus; Generator Terminal Equipment; Completion Contract; Exciter; Governor; and Protection and Control Equipment (Exhibit B-1, p. 6-7). BC Hydro states that its current Project plan is to issue three of the remaining significant, critical path Project tenders following receipt of the Commission and its own Board of Directors' approvals and to issue the remaining significant tenders as soon as practical thereafter, which will maximize the opportunity to obtain as many competitive responses as possible and also further firm up the overall Project cost and any associated escalation.

The suppliers to the Project are near capacity. BC Hydro identifies the risk that it will either not receive any competitive responses for one or more of these tenders or that tenders exceed the cost estimates. BC Hydro states that it is addressing these risks by using budgetary cost estimates from suppliers in the current cost estimates, the addition of a tender volatility reserve in the P90 cost estimates, and increasing the number of potential suppliers for each tender by proactively communicating with these suppliers in advance of tender advertising to make the work as attractive as possible to them (Exhibit B-1, p. 6-7).

Another risk BC Hydro identifies is availability of construction workers which could impact the Turbine and Generator, Civil, Penstock and Completion contracts and states that it has addressed this risk by undertaking rigorous constructability reviews that have developed a detailed execution and construction

plan for the Project, including the identification of required trades for each contract well in advance of the construction period and enlarging the pool of potential workers as much as possible (Exhibit B-1, pp. 6-7, 6-8).

Project contractors are required to provide a detailed risk management plan for their scope of work (Exhibit B-3, BCUC 1.10.3). Detailed risk register and mitigation action planning will be maintained (Exhibit B-3, BCUC 1.10.4) BC Hydro manages risks through regular review and updates, which include monthly risk management review meetings (Exhibit B-3, BCUC 1.10.3).

BC Hydro states that the Environmental Management Plan ("EMP") is consistent with the EMP developed and successfully applied by in past projects such as Seven Mile Unit 4 (Exhibit B-1, p. 6-9). BC Hydro also does not foresee any environmental issues which will result from operating Revelstoke Unit 5 because it is contained within the Revelstoke GS (Exhibit B-1, p. 6-10).

In response to an information request concerning project capital cost overruns which exceed the amount of the Commission's CPCN, BC Hydro responded that it has provided the project estimates as a basis to be transparent and explicit about the nature of risks and as a basis to understand the impact of risks and set a context in the event they manifest. BC Hydro believes that it is lawful and would be appropriate for the Commission in the context of Revelstoke Unit 5 to put BC Hydro on notice that in the absence of a persuasive case presented at the next revenue requirement proceeding after Revelstoke Unit 5 comes into service, that BC Hydro will not be allowed to recover more than the expected cost of the project in rates. For example, if the Commission in granting a CPCN for Revelstoke Unit 5 concluded that at the October 2010 ISD P90 cost the project is in the interests of BC Hydro's ratepayers, BC Hydro would expect to have to demonstrate that costs incurred incremental to the October 2010 ISD P90 cost were not the result of imprudent execution of the project. If it could not do so, BC Hydro would not expect to be able to recover in rates the depreciation and finance charges associated with the incremental cost (Exhibit B-3, BCUC 1.6.2).

3.3 Operations

BC Hydro points out that detailed performance guarantees and warranties included in all of the equipment contracts should ensure that the new equipment operates as expected. IPPBC submits that the provision for maintenance capital is very optimistic, amounting to less than 10 percent of the initial capital, spread over 40 years noting that Unit 5 is expected to operate nearly 80 percent of the time because it will be preferentially operated to gain efficiency which may result in increased wear and tear and require greater and/or earlier capital maintenance expenditures.

As noted in Section 2.3, BCTC identified certain issues with respect to the integration of the Revelstoke Unit 5 into the system, three of which are operational in nature, namely the MSSC where BC Hydro states that its simulations indicate that the requirement to rely on the NWPP Reserve Sharing Procedure to some additional level might exist up to 8 percent of the time and that this level of occurrence can be handled through operating procedures and will not have a material impact on the overall cost-effectiveness of Revelstoke Unit 5; *Forced Outage of the Full Revelstoke Generating Station* where BC Hydro notes the two scenarios under which this restriction is contemplated are double contingency conditions and that it would be a highly unusual condition to be importing more than 1,000 MW and have Revelstoke GS operating at full load while one of the lead-shafts at Revelstoke GS or one of the 500 kV lines connecting Revelstoke to the system is out-of-service; and RMR for Revelstoke Unit 5 where the ILM upgrade has been delayed and which BC Hydro states will not need to be addressed until "much closer to F2013" (Exhibit B-1, pp. 6-11, 6-12).

So far as concerns the risk that the Project may not deliver the benefits promised to its ratepayers BC Hydro observes that the bulk of the energy gains will result primarily from the preferential operation of the new, more efficient unit, calculated using the turbine supplier's proposed performance curve and that the existing turbine and generator contract includes performance guarantees and are backed up with substantial Liquidated Damages provisions (Exhibit B-1, p. 6-13).

The Commission Panel's views on the value of the shaping benefits provided by Revelstoke Unit 5 are set out in Section 6.3 of this Decision.

Impact of Cost/Benefit Uncertainties on UCC

BC Hydro provides a UCC range for various risks (Exhibit B-1, Figure 6-1, p. 6-23). The UCC is most sensitive on the downside to project delays, and most sensitive on the upside to market values of the energy gain.

Commission Determination

The Commission Panel concludes that development risks are low and should not be the cause of a delay in the October 2010 ISD. However, the Commission Panel agrees that there remains a delay risk due to construction activity delays. The Commission Panel concludes that BC Hydro has identified the most significant risks to the Project, and that BC Hydro has developed proactive mitigation plans for the most significant risks related to construction activities. Given the risk of delay, the sensitivity analyses provided by BC Hydro in the P50 and P90 cost estimates for an October 2011 ISD are particularly helpful. The UCC are still low even with the higher capital costs resulting from a one year delay in the ISD.

4.0 NEED AND PROJECT JUSTIFICATION

BC Hydro states that Revelstoke Unit 5 is a Project designed primarily to provide capacity to its system and that due in part to its higher efficiency than the existing four Revelstoke units, it has the added benefit of providing an additional 130 GW.h of energy system-wide. Although its installed capacity will be 500 MW, due to high tailrace water levels when multiple units are generating, there will be lower static head resulting in Unit 5 producing only 480 MW of dependable capacity (Exhibit B-1, p. 1-1).

4.1 2006 IEP/LTAP

BC Hydro filed its 2006 IEP/LTAP Application on March 29, 2006. This application was reviewed in a lengthy process which culminated in Order No. G-29-07 dated May 11, 2007 and the accompanying Reasons for Decision ("2006 IEP/LTAP Decision"). Among other matters, the Commission's determination on the load resource balance, definition phase funding for Revelstoke Unit 5, and project evaluation methodology, are of direct relevance to this Application, and each will be discussed below. The Revelstoke Unit 5 CPCN Application was filed on April 13, 2007, which is prior to the issue date of the 2006 IEP/LTAP Decision. For the purposes of this Decision and in particular to determine need, the Commission Panel prefers the findings in the 2006 IEP/LTAP Decision to the evidence filed by BC Hydro in this proceeding.

4.2 Dependable Capacity

4.2.1 Load Resource Balance

When the total demand for electricity is equal to the total dependable supply from existing resources the system is said to be in load resource balance. On a forecast basis the system will usually be in a surplus or deficit position: when the demand for electricity exceeds the supply there is said to be a load resource gap. A load resource gap may exist on either or both of an energy or capacity basis. Each of BC Hydro's forecasts of the output of existing and forecast resources, and its 2005 Load Forecast and an update in February 2006, were reviewed extensively as part of the 2006 IEP/LTAP proceeding.

The 2006 IEP/LTAP Decision stated that "… there is a critical need for new resources based on reliability planning criteria, but the magnitude of BC Hydro's long-term need for energy and capacity for reliability planning purposes may be somewhat overstated" (2006 IEP/LTAP Decision, p. 80). The Commission Panel in the proceeding provided its view of the existing energy and capacity load/resource balances, and the capacity load/resource balance is reproduced below.

Commission Panel View of Existing Capacity Load/Resource Balance

	F2009	**F2015**
Demand before DSM (Mid-Load Forecast)	11,000	11,800
Existing DSM (EE2 and LD)	300	400
Demand after existing DSM	**10,700**	**11,400**
Reserve Requirements (After Sharing and Alcan)	1,200	1,300
Demand after DSM Plus Reserve Requirements	11,900	12,700
Existing and Committed New Supply		
Heritage Hydro	9,800	9,800
Heritage Thermal	1,000	0 - 1,000
Resource Smart	0	100
Existing Purchase Contracts	800	700
F2006 Call Firm Energy (After Attrition Allowance)	0	500
Total Supply	11,600	11,100 - 12,100
Capacity Load/Resource Surplus (Deficit) Before CE	(300)	(600) to (1,600)

(Source: 2006 IEP/LTAP Decision, p. 81)

As can be seen, it was the Commission Panel's view that the system would be in a deficit position, before the Canadian Entitlement ("CE") of 300 MW for the fiscal year ending March 31, 2009 growing to between 600 MW and 1,600 MW by fiscal year 2015.

4.2.2 Definition Phase Funding Forecast for Unit 5

BC Hydro requested a determination under Section 45(6.2)(b) of the Act that expenditures of $12.5 million in F2007 and F2008 required to complete the Definition Phase of Revelstoke Unit 5 was in the interest of persons within B.C. who receive, or may receive, service from BC Hydro. The Commission Determination on the matter is reproduced below:

> **"The Commission Panel concludes that BC Hydro's options for acquiring adequate capacity in the near-term are limited and that, based on BC Hydro's preliminary analysis, Revelstoke Unit 5 may be a cost-effective capacity addition. BC Hydro's request for a determination under Section 45(6.2)(b) of the Act that expenditures of $12.5 million in F2007 and F2008 required to complete the Definition phase of Revelstoke Unit 5 are in the interests of persons within B.C. who receive, or who may receive, service from BC Hydro was approved in Order No. G-29-07. …** The Commission Panel notes that the onus remains with BC Hydro to demonstrate the cost-effectiveness of Resource Smart projects relative to other potential sources of new capacity in any CPCN application, and that the CPCN proceedings remain the best venue for Intervenors to provide evidence and argument regarding alternate sources of capacity" (2006 IEP/LTAP Decision, p. 168).

4.2.3 Project Evaluation Methodology

BC Hydro's project evaluation methodology was examined at length during the 2006 IEP/LTAP proceeding and was itself the subject of a dedicated round of information requests.

BC Hydro proposed that two tests be employed in the financial evaluation of a project: (1) an economic test and (2) a ratepayer impact test. In the 2006 IEP/LTAP Decision it was stated that:

> **"The Commission Panel accepts BC Hydro's argument that two tests may be considered for use in project evaluation. The first, and the more important, is an economic analysis of a project, which should only use the incremental cash flows disbursed by BC Hydro as its key input. The second, and less material test is a ratepayer impact analysis which examines how BC Hydro will recover a project's costs from its ratepayers and which may include items typically not found in a conventional economic analysis such as sunk costs, interest during construction and costs allocated from other departments of BC Hydro"** (2006 IEP/LTAP Decision, pp. 200-201).

The 2006 IEP/LTAP Decision further found that for the foreseeable future incremental capital projects will be effectively financed with 100 percent debt and that BC Hydro borrows at rates that reflect the Provincial Government's credit rating and current nominal interest rate on 20 to 30-year debt for BC Hydro which was approximately 4.60 percent per annum, and that this was the appropriate discount rate for BC Hydro to use to evaluate resource options under the current assumptions of 100 percent debt

financing. In addition, no justification was found for the use of different discount rates for the economic and ratepayer impact analyses (2006 IEP/LTAP Decision, pp. 202-204).

4.3 Forecast of Capacity Required

BC Hydro's 2006 Load Forecast is found as Appendix B to the Application. BC Hydro states that this forecast is dated January 2007 and that all the material differences between it and the previous forecast are presented in Appendix B of the Application and that it represents the official annual update to the Load Forecast (Exhibit B-3, BCUC 1.12.4).

BC Hydro states that since the close of the evidentiary phase of the 2006 IEP/LTAP proceeding the development of the 2006 Load Forecast has indicated that peak demand has increased between 120 MW to 230 MW in the 2010 to 2015 period (Exhibit B-1, p. 1-1; p. 4-2).

No Intervenor commented on the 2006 Load Forecast and it was the subject of only a small number of information requests. BC Hydro states that none of the 192 information requests issued by the BCUC staff and intervenors took issue with the project load resource balance contained in the Application (BC Hydro Argument, pp. 1-2).

Commission Determination

The Commission Panel determines that a capacity addition of the size of Revelstoke Unit 5 is justified on the basis of the capacity requirements accepted in the 2006 IEP/LTAP Decision. Section 7 will examine project alternatives in order to determine if Unit 5 is the most economic and feasible available option.

Regarding project evaluation methodology, the Commission Panel again notes that this Application was filed prior to the issuance of the 2006 IEP/LTAP Decision and expects BC Hydro to comply with its findings in this regard in the future.

5.0 FIRST NATIONS - DUTY TO CONSULT

By letter dated June 7, 2007 (Exhibit A-4), the Commission Panel said that it may consider in the final decision issues raised in correspondence from Shuswap and Simpcw dated June 1, 2007 (Exhibit C6-3), June 5, 2007 (Exhibit C6-5), in June 6, 2007 (Exhibit C6-7) and in the letter from BC Hydro dated June 6, 2007 (Exhibit B-5). This section considers four such issues: "EAC and Duty to Consult and Accommodate"; "Scope and Adequacy of EAC Process"; "Sufficiency of Consultation"; and "The Representation Issue".

The issues related to the Shuswap and Simpcw request for an extension of the Regulatory Timetable have previously been considered and reviewed in Section 1 of this Decision.

5.1 EAC and Duty to Consult and Accommodate

The Shuswap and Simpcw submit that:

> "… it is the Shuswap and Simpcw position that the EAC Application and Approval Process does not establish an adequate consultation process sufficient to discharge the Crown's duty to consult and accommodate aboriginal rights, title, and interests"(Exhibit C6-3, p.4).

The Provincial and Federal Governments have created legislation, the Environmental Assessment Act and the Canadian Environmental Assessment Act, which ensure that regulatory approvals must be obtained before Revelstoke Unit 5 can proceed and that the project will not proceed until consultation and, if necessary, accommodation has completed.

Section 8 of the EAA requires a person to obtain an EAC for a reviewable project. Pursuant to section 5 of the EAA, the Reviewable Projects Regulation (B.C. Reg. 370/2002) Part 4 – Energy Projects, Table 7 – Electricity Projects, Power Plants defines a reviewable project to be a "Modification of an existing facility that results in the facility having a rated nameplate capacity that has increased by > 50 MW of electricity".

A harmonized environmental process was established for the regulatory reviews pursuant to the EAA and the CEAA. The review of the First Nations consultation was led by the EAO.

BC Hydro's consultation activities were also coordinated with the activities of the B.C. CWR. As noted in the Application, the proposed revisions to the Columbia River WUP were submitted to the CWR by BC Hydro as a Draft Addendum in November 2006 for final review and approval. Approval of the Columbia River WUP Addendum follows issuance of the EAC (Exhibit B-1, Section 6, p. 4).

In the Reasons for Decision issued with Order No. C-4-06 dated July 7, 2006, the Commission said:

> "The government has legislated regulatory approvals that must be obtained before VITR proceeds. Pursuant to Section 8 of the EAA, BCTC requires an EAC for VITR. Given the Section 11 Order and the Terms of Reference for VITR, the Commission Panel is satisfied that a process is in place for consultation and, if necessary, accommodation. In the circumstances of VITR, the EAO approval, if granted, will follow sometime after this decision. Through this legislation, the government has ensured that the project will not proceed until consultation and, if necessary, accommodation has also concluded. The Commission Panel concludes that it should not look beyond, and can rely on, this regulatory scheme established by the government" (VITR Decision, p. 48).

5.2 Scope and Adequacy of EAC Process

The Shuswap and Simpcw submit that:

> "The EAC Application and Approval Process relates only to significant "adverse environmental effects" of the Revelstoke 5 Project and any such consultation process therein does not include consideration or consultation with respect to a full range of potential and significant impacts and infringements on asserted aboriginal rights and titles such as, among other things, the conflict with the use of the lands and the existing Revelstoke Dam and existing footprint of the Revelstoke Dam impacting aboriginal rights and title. Moreover, the EA process does not allow for accommodation negotiations" (Exhibit C6-3, p. 4).

The Section 11 Order, issued pursuant to the EAA, sets forth the scope of the assessment in section 4.1, and then at section 5.3 requires the proponent to consult with First Nations (Exhibit B-1, Appendix K, p. 5). Section 4.1 of the Section 11 Order states:

> "The scope of the assessment for the Project will include consideration of the potential for environmental, social, economic, health and heritage effects and potential effects on First Nations' Aboriginal interests, and will take into account practical means to prevent or reduce to an acceptable level any potential adverse effects of the Project."

In addition to the Section 11 Order, the EAO issued Terms of Reference for the EAC Application. The Terms of Reference also make it clear that the EAC Application was to specifically address First Nations issues (Exhibit B-1, Appendix K, section 5).

5.3 Sufficiency of Consultation

The Shuswap and Simpcw submit that:

> "The Shuswap and Simpcw are also of the position that there is not a sufficient consultation process in place and that BC Hydro has <u>not</u> fulfilled the duty to consult and accommodate with the Environmental Assessment and Approval Process as asserted in the Final Submissions with respect to the BCUC Application proceedings" (Exhibit C6-3, p. 4).

The Shuswap and Simpcw further submit that:

> "We also state that it is also too early for the BCUC to determine whether there is an adequate <u>consultation process</u> in place … This would give the appearance that the BCUC has prejudged the matter and shows biased as it is able to make such a determination solely based on submissions from BC Hydro, without hearing from us on the matter" (Exhibit C6-3, p. 3).

The Shuswap and Simpcw further submit that:

> "… the EAC Application and Approval Process does not establish an adequate consultation process sufficient to discharge the Crown's duty to consult and accommodate aboriginal rights, title, and interests" (Exhibit C6-3, p. 4).

The Shuswap and Simpcw further submit that:

> "… a determination with respect to whether the consultation process established with respect to the EAC Certification Application and Approval process is adequate cannot be made by the BCUC at this time" (Exhibit C6-3, p. 4).

The EAC Application was accepted by the EAO on October 26, 2006. Section 16(2) of the EAA makes clear that the information that the Executive Director requires needs to be in the EAC Application. As to public and First Nations consultations for the BC Hydro Revelstoke Unit 5 Project, the recitals to the EAC state:

> *"I. On October 26, 2006, the Project Assessment Director determined that the notification and consultation measures undertaken and proposed by the Proponent for both the public and First Nations were adequate;*
>
> *J. The Application was made available for review by the public and by representatives from federal, provincial and local government agencies, and the Ktunaxa Nation Council, the Okanagan Nation Alliance and the Shuswap Nation Tribal Council;"*
>
> (Exhibit B-5, Appendix A)

With respect to First Nations, BC Hydro states that its primary objective was to ensure that adequate consultation occurred with the three First Nations identified as interested in Revelstoke Unit 5 - the KNC, the ONC and the SNTC – so that it might have certainty around all aspects of the project, including ongoing certainty until decommissioning (Exhibit B-3, IPPBC 1.9.1).

BC Hydro states that it provided Capacity Funding Agreements to each of the KNC, ONC and SNTC to enable these First Nations to participate in the EAO-led harmonized environmental assessment of Revelstoke Unit 5. The Capacity Funding Agreements are an input into the consultation required of BC Hydro pursuant to the EAA (see Section 5.3 of the EAO's Section 11 Order, attached in Exhibit B-1, Appendix K) and the CEAA. Copies of the Capacity Funding Agreements have been filed with the BCUC on a confidential basis (Exhibit B-3, BCUC 1.21.1; Exhibit B-3, IPPBC 1.9.1).

BC Hydro states "The record is clear that BC Hydro is continuing to engage in and offer capacity funding for information-sharing and negotiations with the SNTC, among other First Nations. BC Hydro is agreeable to meeting with the First Nations Intervenors as part of this on-going process" (Exhibit B-5, p. 8).

BC Hydro states that it is working towards Impact Management Benefits Agreements ("IMBAs") with the KNC, the ONA and the SNTC, and while not listed separately to protect confidentiality, the P50 and P90 estimates include allowances for First Nations Capacity Agreements and IMBAs (Exhibit B-1, p. 3-22; Exhibit B-1, Section 6, pp. 2-3). BC Hydro further stated that although IMBAs have not yet been concluded with the three First Nations, concluding the IMBAs is not a pre-requisite to obtaining an EAC or a favourable CEAA determination under the harmonized environmental assessment process for Revelstoke Unit 5. IMBAs are designed to address the future operation of the Revelstoke GS as it relates to First Nations interests and impacts, and to set the foundation for the subsequent additions at Revelstoke Unit 6, Mica Unit 5 and Mica Unit 6 (Exhibit B-3, IPPBC 1.9.1). BC Hydro submits that the EAC was not conditioned so as to require BC Hydro to enter into IMBAs since their purpose was to address the future operation of the Revelstoke GS and to set the foundation for the subsequent capacity additions at Revelstoke Unit 6, Mica Unit 5 and Mica Unit 6 (BC Hydro Reply, p. 14).

IPPBC submits that it is unclear whether the allowance BC Hydro has made for First Nations Capacity Agreements and IMBAs is adequate including covering the effects of any Court challenges (IPPBC Submission, p. 5). IPPBC also submits that an allowance should be made in the Revelstoke Unit 5

annual costs in recognition of risks and costs that may arise as a result of the monitoring and review processes between the terms of successive WUPs (IPPBC Submission, p. 6).

With respect to IPPBC's concern regarding the allowance for First Nations Capacity Agreements and IMBAs, BC Hydro claims that the duty to consult and accommodate is fulfilled by a good faith commitment to the consultation process and that there is no duty to agree as part of consultation (BC Hydro Reply, para. 36), but submits that it is committed to engaging in and providing capacity funding for information-sharing with First Nations with a view to concluding IMBAs with First Nations in a timely way (BC Hydro Reply, p. 15).

BC Hydro submits that concluding IMBAs is in the interests of BC Hydro and its customers, and accordingly, as the Revelstoke Unit 5 CPCN Application makes clear, it is committed to engaging in and providing capacity funding for information-sharing with First Nations with a view to concluding IMBAs with First Nations in a timely way (BC Hydro Reply, p. 15).

BC Hydro submits that it has met its obligation to consult with the three First Nations (the KNC, the ONA, and the SNTC) with an interest in Revelstoke Unit 5 (BC Hydro Submission, p. 10). BC Hydro states that it has held three meetings with the SNTC, and that the SNTC is receptive to future meetings (Exhibit B-1, Section 5, pp. 5-17, 5-18).

5.4 The Representation Issue

The Shuswap and Simpcw submit that:

> "The Shuswap and Simpcw are pursuing such matter with the Environmental Assessment Office and BC Hydro directly, and are not subsumed within any dialogue with the SNTC…
>
> …As noted, the SNTC does not represent the Shuswap and the Simpcw's unique and distinct aboriginal rights and title" (Exhibit C6-3, p. 4).

The Shuswap and Simpcw state their interest in the Application as follows:

> "The Shuswap and Simpcw have a direct interest in this Application. The Shuswap and Simpcw have unextinguished aboriginal rights, title and interests in and over the areas of BC Hydro's proposed project which are significantly impacted and affected by the proposed project" (Exhibit C6-2, p. 1).

The Shuswap and Simpcw also state:

> "We are also in the process of establishing discussions with BC Hydro with respect to their on-going trespass and breach of aboriginal rights, title and interests from the existing Revelstoke Dam and these significant matters must be addressed prior to this Application proceeding" (Exhibit C6-3, p. 2).

As stated above, the Shuswap and Simpcw submit that the SNTC does not represent the Shuswap and Simpcw unique and distinct aboriginal rights and title and that:

> "These entities are no [not] the same as Shuswap and Simpcw, but were created to deal with common rights and interests of their members, but not with respect to their unique rights and titles of individual members" (Exhibit C6-5, p. 3)

Commission Determination

The Commission Panel concluded in the letter dated May 24, 2007 (Exhibit A-3) that because the Project was subject to the outcome of the assessment being conducted under the EAC Application a process is in place for consultation and, if necessary, accommodation. The Commission Panel did not look beyond the regulatory scheme in the EAA and relied on the EAC process to ensure the duty to consult and accommodate has been satisfied.

The Commission must ensure procedural fairness for participants, including First Nations, in Commission processes. First Nations may be active participants in Commission processes; however, it is not necessary for the Commission to consider whether or not the duty of the Crown to consult and, if necessary, accommodate has been met. Another certificate must be obtained before the project proceeds, and in the process to obtain the EAC the duty of the Crown to consult and, if necessary, to

accommodate must be considered. Pursuant to this regulatory scheme, the government has ensured that First Nations interests are considered before the project proceeds. As was found by the Commission in the VITR Decision, the Commission Panel concludes that it should not look beyond, and can rely on, this regulatory scheme established by the government.

The Shuswap and Simpcw submission that it is too early for the BCUC to determine whether there is an adequate consultation process in place is premised on the proposition that the Commission needs to determine whether there is adequate consultation. The Commission Panel disagrees. It is not necessary for the Commission Panel to determine whether or not the Crown's duty to consult and accommodate has been met. It is only necessary to determine whether or not the project will proceed before the Crown's duty to consult is the subject of regulatory review.

The Commission Panel finds based on a review of the Section 11 Order and the Terms of Reference that the EAO-led environmental process was not confined to a review of the environmental effects of Revelstoke Unit 5, but rather included consideration of the potential affects on First Nations' aboriginal interests.

The Commission Panel notes that BC Hydro carried out public consultation pursuant to the EAO's Section 11 Order and the Public Consultation Policy Regulation. As set out in Section 1 of this Decision, the Minister of Environment and the Minister of Energy, Mines and Petroleum Resources granted the EAC on May 30, 2007. Before granting the EAC, the Ministers were obligated to consider whether the Province has fulfilled its legal obligations to First Nations.

BC Hydro framed the issue as follows:

> "BC Hydro submits that the *BCUC must balance the public interest which favours an expeditious addition of capacity to the BC Hydro system with First Nation interests* and that, in this instance, the balance lies with *recognizing the active participation of the Shuswap Nation Tribal Council (SNTC) to date in the EAO-led harmonized environmental assessment process* and the Columbia River WUP process, and *the opportunities still available for participation and consultation in the Revelstoke Unit 5 CPCN Application*"(emphasis added) (Exhibit B-5, p. 2).

The Commission Panel disagrees with BC Hydro with respect to the submissions in italics. First, the Commission Panel can rely on the regulatory scheme established by the provincial government for consideration of First Nations interests. Therefore, it is not necessary for the Commission Panel to balance the two interests identified by BC Hydro. Second, BC Hydro incorrectly states that the Commission Panel should recognize the active participation of the SNTC in the EAO-led harmonized environmental process and the Columbia River WUP process. Because the Commission Panel can rely on the EAO process, it is not necessary for the Commission Panel to assess the participation of the SNTC, active or otherwise, in the EAO process. Third, the opportunities still available for participation and consultation are again beyond what is necessary for the Commission Panel to consider because the EAO process can be relied upon to ensure consultation and, if necessary, accommodation.

The Commission Panel notes that BC Hydro is continuing to engage in and offer capacity funding for information sharing and negotiations with the SNTC, among other First Nations and that BC Hydro is agreeable to meeting with the First Nations Intervenors as part of this on-going process. However, such efforts are not relevant to this Decision.

BC Hydro submitted: "… while the *BCUC needs to set its mind to the issue of First Nation consultation*, ultimately it only needs to be satisfied that processes are in place for this consultation, and accommodation if necessary, to take place" (emphasis added) (Exhibit B-5, p. 1).

The Commission Panel disagrees to the extent that BC Hydro is suggesting that the Commission Panel needs to consider evidence relevant to First Nations consultation so as to determine whether or not the duty of the Crown to consult and, if necessary, accommodate has been met. Evidence relevant to First Nations consultation may be relevant for the same purpose that the Commission often considers evidence of consultation with other stakeholders. Generally, insufficient evidence of consultation, including with First Nations, is not determinative of matters before the Commission. In this proceeding, the evidence of First Nations and other stakeholder consultation is adequate for the Commission to determine that granting a CPCN for the project is in the public interest, in part, because it is not necessary for the Commission to conclude that the duty of the Crown to consult and accommodate has been met before granting a CPCN.

This Decision assumes that Shuswap and Simpcw is concerned about representation by SNTC on aboriginal title issues arising from both Revelstoke Unit 5 and the Revelstoke Dam and GS. The Commission Panel concludes that the Shuswap and Simpcw submissions regarding representation by SNTC need not be considered because the issue arises from the duty to consult. Again, the Commission Panel can rely on the requirement for an EAC to ensure regulatory review of the duty to consult. It therefore follows that the "representation issues" are not issues for consideration in this proceeding.

The issues raised by the Shuswap and Simpcw in their letter dated June 6, 2007 (Exhibit C6-7), have been fully and adequately addressed in the letter from BC Hydro dated June 11, 2007 (Exhibit B-7).

6.0 ECONOMIC AND RATEPAYER IMPACTS

This Section of the Decision considers the cost of the project and the value of its benefits and considers ratepayer impacts.

6.1 Capital Cost Estimates

BC Hydro forecasts the capital cost of the Project assuming an October 2010 ISD using P50 and P90 estimates. It defines a P50 estimate as the estimated cost at which there is a 50 percent probability actual costs will exceed the authorized amount and a P90 estimate as the estimated cost at which there is high confidence (90 percent) that actual costs will not exceed the estimate (Exhibit B-1, p. 3-7). BC Hydro states that there are risks that the October 2010 ISD project schedule cannot be met and that it included P50 and P90 estimates for an October 2011 ISD (Exhibit B-3, BCUC 1.6.2).

Revelstoke Unit 5 Capital Costs

In-Service Date	P50 / P90	Cost (millions) Loaded
October 2010	P50	$280
October 2010	P90	$320
October 2011	P50	$300
October 2011	P90	$350

(Source: Exhibit B-1, Table 3-3)

Revelstoke Unit 5 Capital Cost Breakdown

$millions	2010 ISD P50	2011 ISD P50	2010 ISD P90	2011 ISD P90
Civil & Install Contracts	38.3	38.3	38.3	38.3
Turbine & Generator Contract Stage 2(1)	74.9	74.9	74.9	74.9
Major Ancillary Equipment (2)	20.9	20.9	20.9	20.9
BC Hydro Resources (3)	26.0	32.0	26.0	32.0
Other (4)	21.6	21.6	21.6	21.6
Total Direct Estimate	181.7	187.7	181.7	187.7
Contingency	18.0	36.0	18.0	36.0
Real Risk Adjusted Direct Cost	199.7	205.7	217.7	223.7
Escalation	16.2	23.3	18.9	27.6
Inflation	5.7	7.0	6.5	9.5
Nominal Risk Adjusted Direct Cost	221.6	236.0	243.1	260.8
Capital Overhead	28.9	31.1	31.6	33.9
Interest During Construction	29.5	32.9	32.0	35.5
Expected Total Cost	280.0	300.0	306.7	330.2
Risk Reserve(5)	Not Included	Included	Not Included	Included
Tender Volatility	Not Included	Not Included	13.3	19.8
Expected Total Cost +Risk Reserve	280.0	300.0	320.0	350.0

(1) Includes allowance for escalation specified in the contract and a provision for the delivery of a one piece runner.

(2) Includes supply and install of Gas Insulated Bus work, Generator Transformers and Terminal equipment, Governor, Exciter, Unit Control and Station Service etc.

(3) Includes Project Management and Project Management Support, Construction Management, Design and Design Management and Quality Assurance.

(4) Includes definition direct costs, the Stage 1 turbine and generator contract, $752,000 in construction water rentals, and Confidential Agreements.

(5) For delays other than regulatory such as equipment supply delays or labour shortages at site.

(Source: Exhibit B-1, Table 3-4 and footnotes)

6.1.1 Tender Volatility

BC Hydro describes the heavy construction market as one where suppliers of equipment and construction services are currently busy and operate at or near capacity and states that this tight market has motivated it to include in its cost estimates a separate reserve for tender volatility as an allowance for the potential for a higher cost or less favourable schedule terms in the tender outcome (Exhibit B-1, p. 3-8).

By securing the longest lead time and largest dollar value contract with Voith Siemens for the turbine and generator, BC Hydro claims to have limited the potential for tender volatility to the remaining nine major contracts which it plans to advertise and award in the fall of 2007. The contract with Voith Siemens has a value of over 50 percent of the total direct costs for Revelstoke 5 subject to tender volatility (Exhibit B-1, p. 3-9).

BC Hydro states that it has received information from potential suppliers to the remaining major project tenders which confirms its sense that the suppliers are busy and near capacity with resourcing constraints and that as a result, it believes there is a higher than average probability that it may experience higher prices and less favourable schedule terms arising from a lack of competitive response due to low interest by suppliers in competing to secure new work or due to a lack of supplier capacity reflecting resource constraints or reduced labour productivity. As well, these conditions may result in delays during the tendering process and the subsequent construction (Exhibit B-3, BCUC 1.1.4).

6.1.2 Contingency

BC Hydro states that it generated the cost estimate for the project using a bottom up approach by which the direct cost for each work element is estimated and summed to obtain a total direct cost estimate to which contingencies, inflation and escalation beyond base inflation are added as separate line items. For each major component of the work (e.g. each major project contract), it determines the range of estimated costs for that component based on the confidence in the estimate and on the volatility of the cost type, following which it performs Monte Carlo analyses that use as an input, the range of estimated costs for each major component, and generates the appropriate contingency amount for the P50 and P90

estimates. The $18 million P50 contingency and $36 million P90 contingency are based on the remaining project risks and are a result of the Monte Carlo analyses (Exhibit B-3, BCUC 1.1.5).

6.1.3 Escalation and Inflation

BC Hydro states that the total forecasted escalation for the project is based on its forecasted escalation over the life of the project and has been verified by both an independent economist and an independent professional estimator, and that the total forecast escalation for the project is divided into a base inflation amount (approximately 2 percent) and an additional escalation amount to sum to the total forecast escalation amount. It derives the $5.7 million for inflation by applying the base inflation amount to the forecast cashflow for the direct project cost and contingency amounts and the $16.6 million for additional escalation by applying the additional escalation amount to the forecast cashflow for the direct project cost and contingency amounts (Exhibit B-3, BCUC 1.1.5).

BC Hydro states that it used the following inflation rates in its capital cost estimate, which had been recommended as part of the independent external review:

2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
8%	8%	7%	6%	5%	4%	3%

(Source: Exhibit B-1, p. 3-12)

6.1.4 Transmission Costs

As identified in Section 2.3, BCTC has identified a need for one capital upgrade on the transmission network that is attributable to Revelstoke Unit 5 namely a new 250 MVAr 500 kV mechanically switched capacitor (“MSC”) at the Ashton Creek substation (“ACK”) at an estimated cost of $4.5 million. Since it is a non-BC Hydro Project cost, BC Hydro states that it has not included this amount in the Revelstoke Unit 5 costs, but since it is a cost that will be incurred as a result of the Project and ultimately reflected in BC Hydro’s revenue requirements through payments to BCTC it has included it in all economic and revenue requirement and rate impact calculations (Exhibit B-1, p. 3-10).

6.1.5 Operating Costs

BC Hydro calculates that the Revelstoke Unit 5 Project annual costs will be as follows:

Cost of Energy	$1.84 million/yr $5.147/MW.h	Capacity Water Rental – $3.676/kW based on 500 MW Energy Water Rental – will be charged on system annual energy gains; Water Rental rates are set by Provincial Government
Maintenance	$0.21 million/yr	Incremental maintenance based on experience with Units 1 to 4
General & Administration	none	No Incremental Operating or General & Administration costs are expected
Taxes and Grants	$0.28 million/yr	Current rate (based on Order In Council 663/98: $561/MW/yr)
Total Sustaining Capital	$31 million ($2006)	Scheduled over 50 year Project life at years 20, 30 and 40 years; based on equipment replacement experience with Units 1 to 4.

(Source: Exhibit B-1, p. 3-11)

6.2 Energy Gains

BC Hydro states that the installation of Revelstoke Unit 5 would result in energy gains at Revelstoke GS and elsewhere in the system and that its current system modelling studies indicate that these energy gains would be in the order of 130 GW.h/y average with most of the additional energy being derived by preferentially loading Revelstoke Unit 5 as it will be more hydraulically efficient than the existing four units with some additional energy gains resulting from reducing a small amount of spill at the generating facilities on the Columbia River and by enhancing the flexibility to balance the water between key reservoirs. In particular, Revelstoke Unit 5 would allow better water balance between the two large storage reservoirs, Kinbasket and Arrow. This would increase the amount of generation at Arrow in those periods of time when the reservoir would otherwise be too low for the plant to generate. During the period from late winter through late spring there are periods when the lake level may be too low to allow Arrow Lakes GS to operate. In such periods, water must be spilled (bypassing the turbines) to maintain required discharges from Keenleyside Dam. Revelstoke Unit 5 can assist in modifying the inflows into Arrow thereby more effectively managing lake levels and reducing the amount of water that must bypass the turbines at Arrow Lakes GS (Exhibit B-1, pp.4-11, 4-12).

BC Hydro states that the estimated annual energy gain of 130 GW.h/yr with and without Revelstoke Unit 5 includes the efficiency gain at Revelstoke Unit 5 and energy gains elsewhere in the system and was determined by comparing the results of detailed system modeling studies using the Generalized Optimization Model (“GOM”) and comprises the difference in the total system energy generation with and without Revelstoke Unit 5 as set out in the following table.

Components of the Energy Gain	Estimated Energy Gain
Energy Gain at Revelstoke GS from the preferential loading of Revelstoke Unit 5	70 GW.h/yr
Reduced spill on the system, including Revelstoke Unit 5, that would occur absent the Project because of a combination of hydraulic imbalances between upstream and downstream plants and restrictions caused by maximum or minimum storage limits	23 GW.h/yr
Other energy efficiency gains throughout the system	37 GW.h/yr
Total Estimated Energy Gain	130 GW.h/yr

BC Hydro states that the 70 GW.h/yr identified above is the energy gain at Revelstoke GS due to the higher efficiency of Revelstoke Unit 5 compared to the existing four unit plant. The area under the curve based on five units minus the area under the curve based on four units is equal to the energy efficiency gain plus a small amount of energy gain due to spill reduction at Revelstoke GS. In the calculation of the UCC of Revelstoke Unit 5 the total energy gain of 130 GW.h/yr was valued based on the Revelstoke at-site electricity price (Exhibit B-3, BCUC 1.4.5.4).

6.3 Shaping Benefits

BC Hydro states that energy shaping benefits will be realized because Revelstoke Unit 5 will improve system operating flexibility which will allow an increase in the ability to effectively utilize the multi-year storage capability of its system and that by de-bottlenecking the available generation capability on the Columbia River plants with the addition of Revelstoke Unit 5, it is able to better utilize the storage and generating capabilities of its Heritage hydro system. The value of this benefit is a function of the amount of surplus energy available in the system; the expected market price differentials for electricity (daily and seasonal); system operating capability; and tie line transmission constraints (Exhibit B-1, p. 4-12).

In Appendix I of the Application BC Hydro describes how the shaping benefit was calculated and states that detailed system simulation studies of the relative impact of adding Revelstoke Unit 5 have been updated based on the most current load/resource balance and that two load years have been modelled: October 2010 to September 2011 which is the first year Revelstoke Unit 5 is expected to be in-service, and October 2015 to September 2016 which is after the planned reinforcement of the Lower Mainland transmission and the planned retirement of Burrard but before the next Revelstoke or Mica unit is added.

BC Hydro states that the analysis follows its normal modeling procedures and is based on the sequential use of the hydrological simulation model ("HYSIM") and GOM. The simulations are first done in HYSIM to set target reservoir elevations which are inputs to GOM. This allows GOM to adequately capture the year to year storage effects of the large reservoirs. The detailed bi-hourly analysis with GOM captures the types of operating effects that are necessary to quantify the operating benefits provided by Revelstoke Unit 5 (Exhibit B-1, Appendix I, p. 1).

BC Hydro states that GOM uses the 10 years streamflows from October 1, 1964 to September 30, 1973 which is representative of the full 60 years of water record because it contains a range of water conditions, including "wet and dry water years" (Exhibit B-1, Appendix I, p. 1).

BC Hydro states that its modeling shows that during the low value hours of the year, Revelstoke GS will typically operate at minimum load and that the opportunity to shift energy is limited for approximately 20 percent of the time because of the 5,000 cfs minimum flow at Revelstoke GS; that in approximately 20 percent of the time energy generation is reduced with Revelstoke Unit 5 and that water is used during higher value hours. The increase in generation in the remaining 40 percent of the time is not only due to the reduction of generation from a lower valued period but also from the energy gain at Revelstoke GS resulting from preferentially loading the new unit which will be more efficient than the existing units.

The GOM simulation compares Revelstoke GS operation with and without Revelstoke Unit 5 and shows that with Revelstoke Unit 5, the plant is able to shape the energy to better meet the morning and evening peaks, and that less energy is generated during the shoulder periods (Exhibit B-1, Appendix I, p. 5).

In Chapter 6 of the Application BC Hydro reviews the "risks" that the Project will not deliver the promised benefits to its ratepayers and states that Revelstoke Unit 5 increases the flexibility of its system to better manage the resources, including streamflows, in the short (daily) through three year operational time horizon. As the additional unit increases the system flexibility, it reduces the volume-related risks of the overall system operation. As such, Revelstoke Unit 5 helps BC Hydro realize higher value for stored energy, particularly in years when the system has surplus energy. The economic value of the shaping operation is also influenced by the differential in market prices between: light load and heavy load hours; season to season price differentials; and year to year market price changes. To determine this shaping benefit, BC Hydro states that it has modeled in detail Revelstoke Unit 5 for two future years over a range of water conditions and the shaping benefits that were identified for the years 2010/11 and 2015/16 on an annualized basis were found to be $9 million and $14 million respectively. The market price profile (i.e. representation of intra-year price volatility) was the same in both years but 2015/16 had a larger energy surplus (Exhibit B-1, pp. 6-13, 6-14).

BC Hydro states that there remains some price risk or opportunity that results from the intra-period (daily, seasonal or inter-annual) market pricing being less volatile or more volatile than projected and that to address the price volatility risk it reflected its most current model-based forecast of month to month price variations at Mid-C for both heavy and light load hour prices, and incorporated the observed intra-month price impacts to ensure reasonableness with the two hour time step in the GOM analysis. Wheeling and losses to and from B.C. were expressly included in the system benefit analysis. On a year to year basis, there are two types of market price variability: one resulting from variations in the streamflow conditions in the Pacific Northwest including B.C.; and the other being price variations caused by other market conditions such as underlying gas prices and scarcity price premiums. BC Hydro states that in its analysis, and consistent with its forecasting practices, the former is incorporated based on the observed relationships between water volumes and electricity prices and that this reduces the possibility of any systemic errors in price forecasting while year to year price variations (for example the effects of large variations in electricity and gas prices that may be caused by trends or scarcity) were not modelled in the system benefits analysis which would tend to leave room for undocumented additional future benefits of Revelstoke Unit 5, but does not add any risk (no benefit is assumed so none is put at risk) (Exhibit B-1, p. 6-14).

BC Hydro discusses the allocation of shaping benefits between it and Powerex Corp.(“Powerex”), its trading subsidiary, stating that time shifting/system benefits are modelled on a system-wide basis and are referred to as “trade benefits” and that these benefits refer to benefits associated with trade activities in the spot energy market which are facilitated by having more system flexibility. In operation, such system-wide spot market energy benefits are allocated between the its domestic account and Powerex’s trade account pursuant to the Transfer Pricing Agreement (“TPA”) of April 1, 2003 between it and Powerex which sets out the rules governing how BC Hydro uses energy trading to manage its domestic supply and how Powerex uses residual system flexibility for trade purposes. With Revelstoke Unit 5, Powerex would be able to take advantage of the increased system capacity to capture additional export opportunities (Exhibit B-1, Appendix I, p. 6).

BC Hydro states that if there is surplus energy in its system, its domestic account receives credit for the highest value exports and if there is an energy deficit, the lowest cost imports are used to meet domestic requirements and that the availability of Revelstoke Unit 5 means that incrementally higher value can be realized with the same amount of energy surplus and incrementally lower cost imports can be acquired to meet domestic need in a period of energy deficit (Exhibit B-1, Appendix I, p. 7).

JIESC submits that it is concerned that a portion of the benefits from Revelstoke Unit 5 will be for the account of Powerex and may benefit the Province rather than the ratepayers and requests that the Commission recommend that the Province amend Special Direction HC2 to ensure that “all energy and system benefits that will result from Revelstoke Unit 5 accrue to the customers and be available to assist in covering the cost of these facilities” (JIESC Submission, p. 2).

6.4 Unit Capacity Cost (“UCC”)

BC Hydro defines UCC as the present value of the total annual cost of a capacity resource divided by the resource's dependable capacity. It is measured in dollars per kilowatt per year. The UCC in $/kW-yr is the economic cost of a resource. It is the NPV of all incremental costs associated with the resource (net of accompanying benefits such as the energy benefits) divided by its incremental dependable capacity benefit (Exhibit B-3, BCUC 1.53.2).

BC Hydro states that to compare the costs and benefits of Revelstoke Unit 5 with alternative sources of dependable capacity, it calculates the UCC in $/kW-yr and that it has calculated the UCC for Revelstoke Unit 5 under two scenarios: its base case of the P50 cost estimate of $280 million for an October 2010 ISD, and its downside scenario being the P90 estimate for an October 2011 ISD.

Costs include direct capital cost, fixed annual operating costs for operating and maintenance, capacity water rentals and taxes, the cost of future sustaining capital in addition to the capital and operating costs for the upgrade of ACK which was identified by BCTC to enable delivery of Revelstoke Unit 5 capacity to the Lower Mainland.

BC Hydro calculates the UCC of Revelstoke Unit 5 net of the various benefits it is expected to provide and includes in its calculation of the UCC of Revelstoke Unit 5 adjustments for transmission losses. Peak losses were estimated at 12 percent and corresponding average losses were estimated at 8 percent, which resulted in the 480 MW of dependable capacity becoming 430 MW delivered to the load centre and the 130 GW.h/yr energy gain being reduced by 8 percent average losses to 120 GW.h delivered to the Lower Mainland. BC Hydro also includes in the calculation of the UCC of Revelstoke Unit 5 95 percent of the shaping benefits accruing to the domestic trade account.

Revelstoke Unit 5 Unit Cost of Dependable Capacity Net of Benefits

	Oct-2010 P50	**Oct-2011 P90**
Loaded Capital Cost	$280 million	$350 million
Costs	$/kW-yr	$/kW-yr
Revelstoke Unit 5 Capital Cost	29	36
Capacity Water Rentals @ $3.676/kW-yr	4	4
Total Generation Costs including Operating & Sustaining Capital Costs	35	42
Total Cost including Ashton Creek Capacity Station Upgrade	35	42
Cost to Lower Mainland (adjusted for 12% capacity losses)	39	47
Energy-Related Benefits		
Levelized Energy Value at Lower Mainland $59/MWh		
Value of Energy Gain less 8% energy transmission losses	16	16
Minus Water Rental @ $5.147/MWh	(2)	(2)
Energy Shaping Benefit to Domestic Trade Acct (rounded) * 95% * over 95% of Energy shaping expected to go to Domestic Acct.	24	24
Avoided Burrard Costs	1	1
Cost Delivered to LM Net of Domestic Energy-Related Benefits	0	8
Balance of Energy Shaping Benefit to Powerex Trade Acct 5%	1	1
Cost Delivered to LM Net 100%Energy-Related Benefits	(1)	7
Capacity Trade Benefits Resource Adequacy and Ancillary Services Sales ($1.5M/yr declining to zero)	3.5	2.3
Cost Delivered to LM Net of Energy and Capacity-Related Benefits	(5)	4

(Source: Exhibit B-1, Table 4-6, p. 4-18)

6.4.1 Discount Rate

BC Hydro states that the costs and benefits are reported in real dollars (i.e. net of inflation) and discounted using a real discount rate of 5.88 percent. The equivalent UCC would be derived if costs and benefits were inflated to nominal dollars based on BC Hydro's inflation rate assumption of 2 percent per year and discounted using BC Hydro's long-term nominal cost of capital rate of 8 percent. The relationship between the nominal and real rates is as follows: [1.08/1.02-1 = .0588]. BC Hydro does not use the cost of capital determined by the Commission to be appropriate for project evaluation; namely, its incremental cost of debt.

6.4.2 Exclusions from UCC Calculation

BC Hydro excludes IDC and Corporate Overhead from its UCC calculation. It states that interest during construction is implicitly included in the discounted cashflow method used to calculate the UCC. The time value of money is accounted for in the present value calculation and the UCC captures the impact of the timing of costs versus benefits.

BC Hydro states that its general practice is to not include overhead in any of its calculations of the UCC because it is not an incremental cost of implementing the project but is a cost that would be incurred whether the project proceeds or not so they are not part of the economic cost of doing the project and that this treatment is consistent with its calculation of unit costs in the 2006 IEP/LTAP (Exhibit B-3, BCUC 1.53.2).

IPPBC submits that "IDC is a very real and factual cost, and is a direct consequence of the capital spending and, as such, should be included in the UCC calculation as well as the capital budget. Similarly overhead costs should be included in both the capital budget and the UCC calculation". IPPBC calculates that the inclusion of these two items might make a difference of $8-$10/kW-yr in the UCC for Unit 5 which would be "significant, but not enough to reject it"(IPPBC Submission, p. 2).

6.4.3 Energy Gains

BC Hydro states that it used the EIA March 2006 forecast of the electricity price scenario in the Lower Mainland levelized over a fifty year period commencing in 2011 to derive a levelized value of $59/MWh, from which it deducted transmission losses and water rentals of $5.147/MWh, which yielded a net reduction to the UCC of Revelstoke Unit 5 of $14 /kW-yr (Exhibit B-1, p. 4-16; Exhibit B-3, BCUC 1.54.1).

6.4.4 Shaping Benefits

BC Hydro states that the annualized energy shaping benefits ranged from $9 million in the 2010/11 study year to $14 million in the 2015/16 study year and that the difference is largely due to additional surplus energy available in the 2015/16 study year and to the benefit of the additional capacity for better managing the additional non intermittent energy that is being acquired from IPP projects (Exhibit B-1, pp. 4-12, 4-13). BC Hydro provides the following table setting out the total and BC Hydro share of the benefit for the 2015/16 study year. System energy gains are those gains arising from increased turbine efficiency, spill reductions and system head gains. The total trading gains is the difference between the total value and the system energy gains.

	REV5*	**REV4****	**Difference**
Total Value	$668.3	$645.0	$23.3 million
Net Surplus Energy	8,214	8,032	132 GWh/yr
Value of Energy Gain			$9.2 million
Total Gain from trading			$14.1 million
BC Hydro trading benefit	$635.6	$622.1	$13.6 million
Percentage - BC Hydro trading benefit			96.4%

* Revelstoke GS with five generating units
** Revelstoke GS with four generating units
(Source: Exhibit B-3, BCUC 1.52.1)

In order to value the energy shaping benefits BC Hydro states that it used the EIA100 price scenario; the average of the two study years; and the allocation of the shaping benefits of 95 percent to domestic and 5 percent to Powerex (Exhibit B-1, Appendix I), which resulted in a net reduction to the UCC of Revelstoke Unit 5 of $24/kW-yr.

In its 2006 IEP/LTAP Application BC Hydro had included calculations, which ranged from $3 million to $22 million, of the annual value of the shaping benefits Revelstoke Unit 5 might produce under the following four scenarios:

- Scenario 1 with surplus energy and higher margin between peak and light load prices;
- Scenario 2 with constrained energy and lower margin between peak and light load prices;
- Scenario 3 with balanced energy and higher margin between peak and light load prices; and
- Scenario 4 with balanced energy and lower margin between peak and light load prices.

Scenario 2 was selected as the reference case; it contains conservative energy supply/demand and market assumptions for Unit 5.

In the 2006 IEP/LTAP proceeding, BC Hydro stated "The primary factors affecting the amount of energy related benefits are (1) BC Hydro's supply/demand balance and (2) electricity market price conditions:

(1) When BC Hydro has greater annual energy supply relative to demand, there is more energy available for Unit 5 to shape to higher value periods; and

(2) Unit 5 creates more value when electricity market prices have greater differentials between peak load hours and light load hours, and when market prices are strong in both the winter and summer seasons. Market prices peak during the winter because of the supply/demand influence of the Pacific Northwest while market prices peak during the summer because of the supply/demand influence of other markets, such as California. Overall, BC Hydro system operation tends to be more constrained in the winter than in the summer. Therefore, when and if significant market strength exists during the summer, Unit 5 adds flexibility in operations to capture additional value"(2006 IEP/LTAP Exhibit B-1B, Appendix E, p. 7).

6.4.5 Burrard Savings

BC Hydro calculates that on winter days when Burrard units may be needed to meet the peak demand the required number of units must be running at minimum generation so that their output can be increased to meet demand but that once Revelstoke Unit 5 is in-service a cost savings will be achieved because relatively fewer Burrard units will need to be run. Based on the EIA100 electricity and gas price forecast, BC Hydro estimates the cost saving to be $3 million per year through F2014 net of the value of the additional energy generated. Depending on the gas price forecast, the project cost saving would range from $2 million to $8 million. These estimates of the additional Burrard cost do not include the cost of GHG offsets. This cost saving reduces the UCC of Revelstoke Unit 5 by $1/kW-yr (Exhibit B-1, p. 4-13).

6.4.6 Other Benefits

BC Hydro identifies certain ancillary services such as operating reserves, reactive support and rotational inertia which are not monetized in the domestic market as BC Hydro self-provides its needs and states that while Revelstoke Unit 5 will provide additional support which has value to BC Hydro's operations; it has not assigned any monetary benefit for such services in this Application (Exhibit B-1, p. 4-13)

Commission Determination

In evaluating a project which primarily provides dependable capacity to its ratepayers BC Hydro has calculated the UCC of the project using incremental costs and excluding IDC and Corporate Overhead and the Commission Panel agrees with this approach. A UCC of a project in dollars per kilowatt year adjusted for capacity losses to the load centre gives a metric or range of metrics which can be meaningfully compared with other projects and upon which decisions can be made. The Commission Panel is comfortable with the energy gains the project will produce and with the evaluation of those gains at the EIA forecasted price as the energy gains will either reduce imports or will be available for export compared to the status quo.

The Commission Panel is concerned that the methodology used by BC Hydro to calculate the potential energy shaping benefits overestimates the benefits. One of the methodology concerns is the use of only two system model years, with the average of the results being applied to a 50 year analysis. Both model years that were used forecast an energy surplus rather than a balanced or constrained position; these energy surpluses appear in part to have been caused by EPAs awarded in the F2006 and the 2007 Calls which were originally envisaged as coal fired projects. For the purposes of forecasting shaping benefits, the Commission Panel concludes that BC Hydro should not assume an annual benefit in each of the 50 years of the project life of $11 million that results from BC Hydro's methodology, and should assume that many of the 50 years will yield the $3 million constrained scenario benefit that BC Hydro filed in the 2006 IEP/LTAP proceeding. The Commission Panel observes that for the P50 2010 ISD the energy shaping benefit is $24/kW-yr assuming an annual $11 million shaping benefit compared to $6/kW-yr assuming an annual $3 million shaping benefit. Therefore, the UCC for the Project is $(5)/kW-yr assuming an annual $11 million shaping benefit and $13/kW-yr assuming an annual $3 million shaping benefit, both assuming the P50 estimate and the 2010 ISD. Finally, the Commission Panel notes that the UCC of the Project would have been reduced and thus enhanced had BC Hydro used a discount rate that reflected its incremental cost of debt as determined by the Commission in the 2006 IEP/LTAP Decision.

6.5 Revenue and Rate Impacts

BC Hydro states that while Revelstoke Unit 5 is primarily being completed to ensure that BC Hydro can reliably meet its obligations to its customers, it is in a relatively unique situation of providing sufficient associated services to substantially or completely offset the costs to complete and operate the Project, and that once the associated domestic benefits and Powerex trade benefits are taken into account Revelstoke Unit 5 will initially have a relatively neutral impact on rates and tend over time to have a beneficial impact on rates.

BC Hydro demonstrates the cumulative rate impact of Revelstoke Unit 5 under the following scenarios:

- P50 capital cost and October 2010 ISD with BC Hydro domestic benefits;
- P50 capital cost and October 2010 ISD with BC Hydro domestic and Powerex trade benefits;

- P90 capital cost and October 2011 ISD with BC Hydro domestic benefits; and
- P90 capital cost and October 2011 ISD with BC Hydro domestic and Powerex trade benefits,

and states that this range includes the largest risk i.e. the Project has an October 2011 ISD and costs $350 million and that the cumulative rate impact of Revelstoke Unit 5 at its maximum is less than 1 percent and then gradually declines over time to less than 0.1 percent rate increase (Exhibit B-1, pp. 6-23, 6-24).

7.0 PROJECT ALTERNATIVES

BC Hydro compares the costs, benefits and risks of Revelstoke Unit 5 with feasible alternative sources of capacity that are advanced enough to meet its requirement for capacity prior to F2013, at which date BC Hydro states that the CE would be fully consumed if new capacity supply is not acquired within its system. BC Hydro states that based on its 2005 Resource Options Report, the 2006 IEP/LTAP proceeding and subsequent analysis it is not aware of any of its own projects nor has any third party proponent brought forward, or has shelf ready, any project that would compare to Revelstoke Unit 5 other than the following;

- Mica Unit 5;
- Repowered Burrard;
- Pumped Storage;
- Demand Side Management;
- Load Curtailment;
- Waneta Expansion Project; and
- Simple cycle gas turbines.

Mica Unit 5

BC Hydro states that Mica Unit 5 has not been advanced to the same level as Revelstoke Unit 5 as it has higher costs and less system benefits in comparison to Revelstoke Unit 5 and that Mica Unit 5 is still in the initial Investigation Phase and not sufficiently advanced to meet an ISD prior to F2013. Although it expects the capital costs of the generating equipment to be similar, it has not entered into a turbine or generator contract and it expects that Mica Unit 5 would require more regional transmission upgrades than Revelstoke Unit 5, namely: new series capacitor banks between Mica and the Nicola Substation ($34 million direct 2006 dollars).While it expects Mica Unit 5 to produce both energy gains and shaping benefits, it estimates that Mica Unit 5 would provide only approximately 50 GW.h of incremental energy, and that because of the configuration of the storage reservoirs and the hydraulic balance between Kinbasket reservoir, Revelstoke reservoir and Arrow Lakes, the system shaping

benefits for Mica Unit 5 are expected to be less than those provided by Revelstoke Unit 5 (Exhibit B-1, p. 4-20).

Repowered Burrard

BC Hydro states that a repowered Burrard is not an alternative to Revelstoke Unit 5 as it is an existing resource that is already being relied on and is considered in the resource stack and that even if Burrard were maintained past F2014 or repowered, there would still be a requirement for a capacity resource both prior to and after Burrard is repowered (Exhibit B-1, p. 4-21).

Pumped Storage

BC Hydro states that it does not consider pumped storage a feasible alternative to Revelstoke Unit 5 because: it would be more expensive; it would consume energy; it would have less system benefits; and no pumped storage project is sufficiently advanced to meet BC Hydro's capacity requirements (Exhibit B-1, p. 4-22).

Demand Side Management ("DSM")

BC Hydro states that the DSM targets included in the load/resource balance already include 700 MW by F2015 and 1,300 MW by F2025 from the contributions of EE2 and LD2, and EE3, EE4 and EE5 Considering the timing imperative for capacity, it is not possible to defer the need for Revelstoke Unit 5 with DSM that goes beyond the targets set in EE3, EE4 and EE5 (Exhibit B-1, p. 4-24).

Load Curtailment

BC Hydro states that load curtailment projects may be developed in the future that can be relied upon for long-term planning, but it is not aware of any projects that could compete with Revelstoke Unit 5 and that the largest load curtailment proposal of which it was aware of was that of Catalyst Paper Corporation who proposed curtailing up to 140 MW of load at its Elk Falls mill. This amount, even when combined with the curtailment of 77 MW by other customers in the winter of 2007/2008, is

considerably less than the 480 MW of dependable capacity that Revelstoke Unit 5 would provide (Exhibit B-1, pp. 4-24, 4-25).

Waneta Expansion Project

BC Hydro states that CPC and Columbia Basin Trust ("CBT") own the rights to develop and construct additional generation facilities at Waneta and are currently evaluating the project which BC Hydro understands would consist of a second physically separate powerhouse of up to 435 MW and whose benefits would include additional dependable capacity year-round, and energy, the majority of which is generated in the freshet utilizing water that would otherwise be spilled. Although the project at 435 MW of installed capacity is a smaller project than Revelstoke Unit 5, BC Hydro states that it is expected to be more expensive because it requires a new power station and intake structure whereas Revelstoke Unit 5 consists of installing a new unit in an existing bay. BC Hydro's understanding of the project is that it would primarily provide freshet energy and dispatchable capacity and that the dependable capacity that could be attributable to the plant would be similar to that provided by Seven Mile where low winter flows and limited reservoir storage reduce the recognition of assured capacity (Exhibit B-1, p. 4-25).

Simple cycle gas turbines ("SCGT")

BC Hydro estimates that five 100 MW SCGT units would be needed to provide the dependable capacity associated with Revelstoke Unit 5 and states that SCGTs are not a cost-effective alternative to Revelstoke Unit 5 because they have a higher UCC; reliance on SCGTs to meet peak electricity demands would expose BC Hydro to winter peak gas commodity prices; they have a higher development risk than Revelstoke Unit 5 due to greenfield site development; and would have additional costs and challenges as a result of the 2007 Energy Plan's requirement for 100 percent GHG offset contained in Policy Action 18.

BC Hydro expects that because of concerns about emissions there would be siting challenges associated with SCGTs, particularly in the Lower Mainland/Vancouver Island load centre and estimates that if the SCGT were sited outside the Lower Mainland/Vancouver Island region, the UCC net of energy benefit for an Interior SCGT delivered to the Lower Mainland would increase by the peak transmission losses

of 7 percent and that this cost increase excludes the impact of any regional transmission reinforcements that may be required (Exhibit B-1, p. 4-29).

Canadian Entitlement

BC Hydro states that it already depends heavily on the CE's capacity as a contingency resource and to backstop the existing planning reliance on 400 MW from external markets and that as such the CE capacity is not an alternative to Revelstoke Unit 5. BC Hydro states that the CE is a resource that Powerex sells into the markets to maximize its value on behalf of the Province of British Columbia (its owner) and that whenever BC Hydro needs to rely on the CE; it must ask Powerex to reserve the required amount of capacity. While Powerex has previously estimated that the opportunity cost of the CE equates to approximately $10/kW-yr based on three months of reliance per year, there is no assurance that the CE will be available to BC Hydro at that cost on an ongoing basis or over the long-term and any substantial increase in the number of MW relied upon would increase the number of months that such reliance would be expected to occur, and thus impact the price. To the extent that the opportunity cost of relying on the CE is comparable to the cost of purchasing (i.e. reserving) capacity, then the CE is analogous to the purchase of capacity from the market (Exhibit B-1, pp. 4-32, 4-33).

BC Hydro submits that consistent with good utility practice, the Commission's previous CPCN decisions and the *CPCN Application Guidelines* it has compared the costs, benefits and associated risks of Revelstoke Unit 5 and a number of alternatives. BC Hydro submits that its alternative assessment process was appropriate and that all reasonable alternatives have been evaluated based on the best currently available information and to the level of precision necessary to identify Revelstoke Unit 5 as the best overall alternative to meeting BC Hydro's capacity needs by F2013.

Commission Determination

The Commission Panel accepts BC Hydro's analysis with respect to the options available to it and agrees with its assessments concerning Mica Unit 5, Repowered Burrard, Pumped Storage, DSM, Load Curtailment, Waneta Expansion and simple cycle gas turbines. The Commission Panel also agrees the Canadian Entitlement is not a suitable source of dependable capacity in the long-term.

8.0 CONCLUSION

The Commission Panel concludes that a CPCN should be issued for Revelstoke Unit 5. The Commission Panel relies on evidence in the 2006 IEP/LTAP proceeding to conclude that Revelstoke Unit 5 is required for system reliability purposes on or before its earliest in-service date of October 2010. And the Commission Panel concludes that Revelstoke Unit 5 is the least cost alternative to meet this requirement.

An ISD of October 2010 is considered reasonably achievable, and the Commission Panel agrees with BC Hydro that it is in the interests of ratepayers for the Project to proceed as soon as possible. Therefore, the CPCN is granted based on an October 2010 ISD.

BC Hydro is directed to file Quarterly Progress Reports and a Final Report within six months of the end or substantial completion of the Project. The Quarterly Progress Reports are to be in the form set out in response to an information request found at Exhibit B-3, BCUC 1.16.1 and amended in the BC Hydro Submission at paragraph 14 and in the BC Hydro Reply Submission at paragraph 10. The progress report format will be generally as set out in Appendix A to Order No. C-8-07. The Final Report will report on cost variances from the P50 October 2010 ISD estimate of $280 million.

DATED at the City of Vancouver, in the Province of British Columbia, this 12th day of July 2007.

Original signed by:

ROBERT H. HOBBS
CHAIR

Original signed by:

A.J. (TONY) PULLMAN
COMMISSIONER

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BRITISH COLUMBIA UTILITIES COMMISSION

ORDER NUMBER C-8-07

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IN THE MATTER OF
the Utilities Commission Act, R.S.B.C. 1996, Chapter 473

and

An Application by British Columbia Hydro and Power Authority
for Approval of a Certificate of Public Convenience and Necessity
for the Revelstoke Unit 5 Project

BEFORE: R.H. Hobbs, Chair
A.J. Pullman, Commissioner July 12, 2007

CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY

WHEREAS:

A. On April 13, 2007, British Columbia Hydro and Power Authority ("BC Hydro") applied (the "Application") pursuant to Sections 45 and 46 of the Utilities Commission Act (the "Act") for a Certificate of Public Convenience and Necessity ("CPCN") for the installation of the Revelstoke Unit 5 Project (the "Project"); and

B. The Project is located at the Revelstoke Dam and Generating Station ("GS") located on the Columbia River, five kilometres ("km") upstream from the City of Revelstoke and 130 km downstream from the Mica Dam and Generating Station; and

C. The Project includes the installation of a 500 MW fifth turbine/generator set in the existing empty turbine bay immediately east of Unit 4 at the Revelstoke GS, the extension of the penstock for Unit 5, a generator transformer and related upgrades to transmission equipment located in the existing powerhouse; and

D. The Project has an P50 estimated cost of $280 million and a target in-service date of October 2010; and

.../2

E. The British Columbia Transmission Corporation ("BCTC") has identified a need for a system upgrade as a result of the Project, which consists of one new 250 Megavolt-Ampere Reactive ("MVar") capacitor at the Ashton Creek Substation. As this is a transmission system upgrade, the cost is not included in the estimated cost of the Project but ultimately will be reflected in BC Hydro's payments to BCTC; and

F. By Order No. G-43-07, the Commission established a written public hearing process and Regulatory Timetable for the review of the Application; and

G. By letter dated May 24, 2007, the Commission responded to a submission dated May 15, 2007 from the Shuswap Indian Band ("Shuswap") and Simpcw First Nation ("Simpcw") regarding the obligation to consult and accommodate, and denied requests for an oral hearing and an extension of the Regulatory Timetable; and

H. By letter dated June 7, 2007, the Commission responded to submissions dated June 1, June 5 and June 6, 2007 from the Shuswap and Simpcw, denying a further request for an extension of the Regulatory Timetable and determining that other issues raised in the submissions may be considered in the Commissions decision on the Application; and

I. BC Hydro, the Independent Power Producers Association of British Columbia, the British Columbia Old Age Pensioners' Organization et al. and the Joint Industry Electricity Steering Committee filed Final Submissions; and

J. BC Hydro filed its Reply Submission on June 12, 2007; and

K. BC Hydro proposed a progress reporting format in response to BCUC IR 1.16.1 in Exhibit B-3, and amended the proposal in paragraph 14 of its Final Submission and paragraph 10 of its Reply Submission; and

L. The Commission has considered the Application and the evidence and submissions presented on the Application, and has determined that it is in the public interest that a CPCN be issued to BC Hydro for the Project subject to the conditions and directions set out in this Order and the Decision that is issued concurrently with it.

NOW THEREFORE pursuant to Sections 45 and 46 of the Act, the Commission orders as follows:

1. A CPCN is granted to BC Hydro for the Revelstoke Unit 5 Project as set out in the Application, with a targeted in-service date of October 2010.

2. BC Hydro is directed to file with the Commission Quarterly Progress Reports on the Project showing planned vs. actual schedule, planned vs. actual costs, and any variances or difficulties that the project may be encountering. The Quarterly Progress Reports will be filed within 30 days of the end of each reporting period.

3. The progress report format will be generally as set out in Appendix A to this Order.

4. BC Hydro is directed to file with the Commission a Final Report within six months of the end or substantial completion of the Project that provides a complete breakdown of the final costs of the Project, compares these costs to the P50 cost estimate and provides a detailed explanation and justification of all material cost variances.

5. Subject to paragraphs 2, 3 and 4 of this Order, the format and content of the reports required by this Order will be determined by BC Hydro in consultation with Commission staff, or by determination of the Commission.

6. BC Hydro will comply with the directions of the Commission in the Decision that is issued concurrently with this Order.

DATED at the City of Vancouver, in the Province of British Columbia, this 12th day of July 2007.

BY ORDER

Original signed by:

Robert H. Hobbs
Chair

Attachment

British Columbia Hydro and Power Authority
Application for a Certificate of Public Convenience and Necessity
Revelstoke Unit 5 Project

Project Quarterly Progress Report Format

Table of Contents

4. Project Costs

4.1.1 Project Cost Summary including explanation of variances

4.1.2 Financial Summary including explanation of variances

4.1.3 Summary of Individual Contracts (Construction and Procurement) Exceeding $3M with Budget Amount, Award Amount, Approved Change Orders

4.1.4 Project Cost Summary for BCTC Ashton Creek Upgrade Project.

5. Project Resource Management

5.1.1 Engineering Resources (Man-hours, Planned vs. Actual – non- cumulative) both in chart and table format. Provide explanation for variance and corrective action taken.

5.1.2 Construction Resources (Man-hours, Planned vs. Actual – non-cumulative) both in chart and table format. Provide explanation for variance and corrective action taken.

6. Project Risks

6.1.1 Current Project Risks

6.1.2 Risks Going Forward

7. Stakeholder or First Nation Issues

7.1.1 An ongoing cost report of all existing and new issues using Table 3-9 in Exhibit B-1 as a budget. The columns of "spent to date", "estimate to complete", "forecast total to complete", and "variance" are to be added.

7.1.2 An Explanation of new issues and variances will be provided.

LIST OF TABLES

Table 1 Project Milestones

Table 2 Project Expenditure Summary, Table & Chart of CAPEX Cumulative Distribution Function showing an October 2010 ISD P50 Approved, Upper Bound (October 2010 ISD P90), Current Forecast to Complete, Spent to Date (Escalation and Contingency are to be identified separately).

Table 3 Summary of Variances Greater than $3M

Table 4 Summary of Contracts exceeding $3M

Table 5 Summary of Outstanding Claims greater than $3M

Table 6 Table of Project Risks including Risk Description & Explanation, Date Risk Originated, Date Risk Last Reviewed, Level/Severity of Risk, Mitigation Plan, Contingency Plan, Mitigation Cost Amount (including schedule delay), Contingency Reserve Amount Required, Total Contingency Reserve Required to Date, Contingency Reserve Remaining.

IN THE MATTER OF
the Utilities Commission Act, R.S.B.C. 1996, Chapter 473

and

British Columbia Hydro and Power Authority
Certificate of Public Convenience and Necessity Application
for Revelstoke Unit No. 5

EXHIBIT LIST

Exhibit No.	Description
COMMISSION DOCUMENTS	
A-1	Letter dated April 19, 2007 issuing Order No. G-43-07 establishing a Written Public Hearing and Regulatory Timetable for the review of the Certificate of Public Convenience and Necessity Application for Revelstoke Unit 5
A-2	Letter dated May 4, 2007 issuing Information Request No. 1 to BC Hydro
A-3	Letter dated May 24, 2007 regarding the Commission's Aboriginal consultation policy, for the BC Hydro Revelstoke 5 Project written proceeding.
A-4	Letter dated June 7, 2007 responding to the Shuswap Indian Band and Simpew First Nation's application for an extension (Exhibits C6-3, C6-5)
A-5	Letter dated June 8, 2007 to Shuswap Indian Band and Simpew First Nation requesting that they waive the Confidentiality of the June 6, 2007 letter or provide support for the Confidentiality request
APPLICANT DOCUMENTS	
B-1	Letter dated April 13, 2007 filing BC Hydro's Application for a Certificate of Public Convenience and Necessity for Revelstoke Unit 5
B-2	E-mail dated April 27, 2007 – List of Publications regarding Notice of Application
B-3	Letter dated May 18, 2007 filing response to Commission and Intervenors' Information Request No. 1
B-4	CONFIDENTIAL - Letter dated May 18, 2007 filing response to Commission and Intervenors' Information Request No. 1

Exhibit No.	Description
B-5	Letter dated June 6, 2007 BC Hydro submission opposing the Shuswap Indian Band and Simpew First Nation's application for an extension
B-6	E-mail dated June 8, 2007 requesting a copy of the Shuswap Indian Band and Simpew First Nation's Confidential letter dated June 6, 2007
B-7	Letter dated June 11, 2007 filing response to Shuswap Indian Band and Simpew First Nation's Confidential letter (Exhibit C6-6 and C6-7)

INTERVENOR DOCUMENTS

C1-1	**EPCOR UTILITIES INC. –** Letter dated May 1, 2007 from Kelly S. Lail, Director, filing request for Registered Intervenor status
C2-1	**THE BC OLD AGE PENSIONERS ORGANIZATION *ET AL*. (BCOAPO)–** Letter dated May 4, 2007 from Leigha Worth, Counsel, requesting for Registered Intervenor status
C2-2	Letter dated May 4, 2007 filing BCOAPO Information Request No. 1
C2-3	Letter dated June 8, 2007 filing comments on confidential submission by Megan Burntt, legal counsel for the Shuswap Indian Band & Simpcw First Nations
C3-1	**JOINT INDUSTRY ELECTRICITY STEERING COMMITTEE (JIESC)** – Web registration dated May 4, 2007 from Brian Wallace, Bull, Housser & Tupper, requesting Registered Intervenor status
C3-2	E-mail dated May 4, 2007 filing JIESC Information Request No. 1
C3-3	E-mail dated June 8, 2007 requesting a copy of the Shuswap Indian Band and Simpew First Nation's Confidential letter dated June 6, 2007
C3-4	Letter dated June 10, 2007 filing comments on confidential submission by Megan Burntt, legal counsel for the Shuswap Indian Band & Simpcw First Nations
C4-1	**INDEPENDENT POWER PRODUCERS OF BC (IPPBC)–** Letter dated May 4, 2007 from David Austin, requesting Registered Intervenor status and on behalf of Steve Davis, President of IPPBC
C4-2	Letter dated May 4, 2007 filing Information Request No. 1 to BC Hydro

Exhibit No.	Description
C4-3	E-mail dated June 8, 2007 requesting a copy of the Shuswap Indian Band and Simpew First Nation's Confidential letter dated June 6, 2007
C5-1	**COLUMBIA POWER CORPORATION (CPC)–** Letter dated May 7, 2007 from Fred J. Weisberg, Weisberg Law Corporation and on behalf of Bruce Duncan, Vice President of CPC, requesting Registered Intervenor status
C6-1	**SHUSWAP INDIAN BAND & SIMPCW FIRST NATION** – Online web registration dated May 11, 2007 from Megan Berntt, McDonald & Company, legal counsel, requesting Registered Intervenor status
C6-2	Letter dated May 11, 2007 from Megan Berntt, legal counsel, filing comments
C6-3	Letter dated June 1, 2007 request time extension as set out in Regulatory Timetable
C6-4	Letter dated May 15, 2007 from Megan Berntt, legal counsel, filing inquiry on consultation policy, process and request for extension
C6-5	Letter dated June 5, 2007 from Megan Berntt, legal counsel, filing additional request for extension and comments
C6-6	Letter dated June 11, 2007 from Megan Berntt, legal counsel, filing response to Commission request (Exhibit A-5)
C6-7	Letter dated June 5, 2007 from Megan Berntt, legal counsel, filing comments on process on the request for extension to the regulatory timetable
C7-1	**TERASEN UTILITIES (TGI/TGVI/TGW) –** Letter dated May 11, 2007 from Tom Loski, Director, requesting Registered Intervenor status
	INTERESTED PARTY DOCUMENTS
D-1	**MOYSA, N**. – Letter dated May 1, 2007 filing request for Interested Party status

Exhibit No.	Description
LETTERS OF COMMENT	
E-1	Letter of Comment dated April 16, 2007 in support of written hearing process from BC Old Age Pensioners Organization (BCOAPO)
E-2	Letter of Comment dated April 16, 2007 in support of written hearing process from Christopher Weafer, of Owen Bird, legal counsel for Commercial Energy Consumers Association of BC (CEC)
E-3	Letter of Comment dated April 18, 2007 in support of written hearing process from R. Brian Wallace, Bull Housser & Tupper, legal counsel for Joint Industry Electricity Steering Committee (JIESC)
E-4	Letter of Comment dated May 2, 2007 in support of written hearing process from Alan Mason, Director, Community Economic Development, of the City of Revelstoke