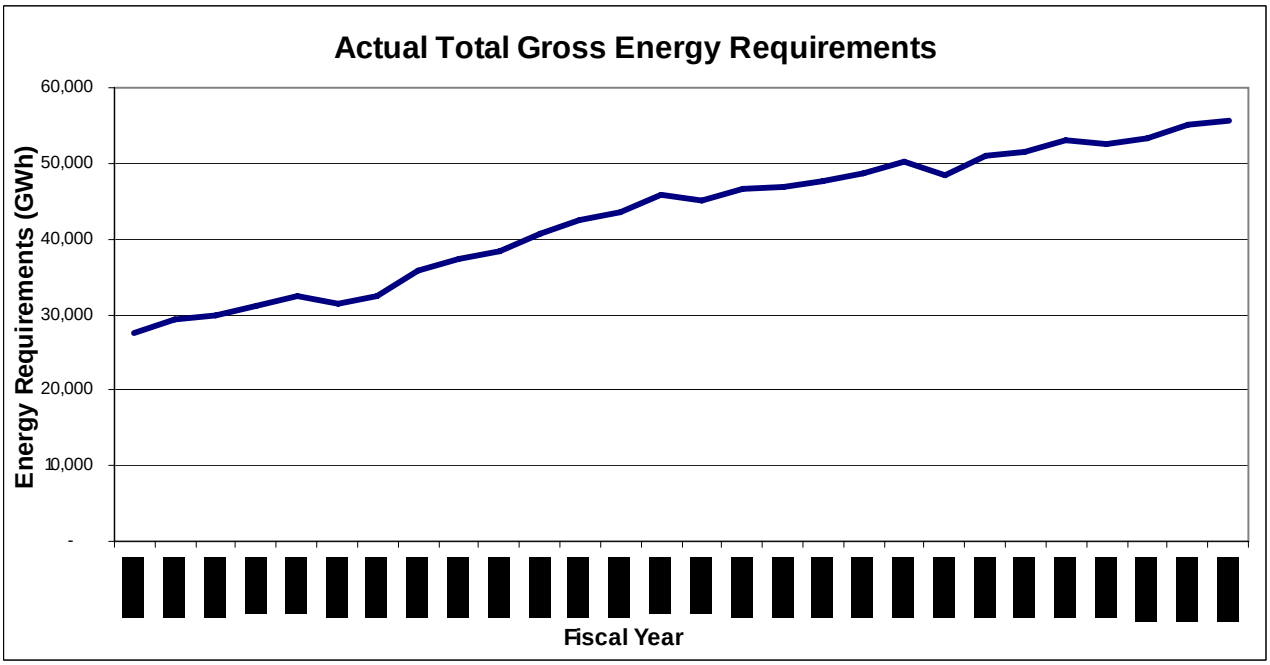
1.0 Reference: Exhibit B-1A, Page 4-8, Figure 4-3

The graph provided covers the period from 1997 to 2025. The economic cycle extends beyond the historical period provided.

1.1.1 Provide a graph with actual data from 1977.

RESPONSE:

The figure below shows the actual total gross requirements, including non-integrated areas, from F1978 to F2005.



2.0 Reference: Exhibit B-1A, Page 4-15, Figure 4-7

The graph appears to indicate that long term load forecasts are heavily influenced by the most recent short term data and do not reflect longer term demand and economic cycles.

1.2.1 Discuss the accuracy of BC Hydro load forecasts and what appear to be significant variations between forecast and actual loads.

RESPONSE:

The accuracy in the forecast is greater in the near term. This is demonstrated by the Table 1 below, which shows the variance as measured by the difference in the weather adjusted and forecast of total gross requirements.

Table 1

Vintage of Forecast[1] Fiscal Year	Fiscal Year Forecast[2]	Total Gross Requirements Forecast (GWh)	Weather and Labor Adjusted Actual Total Gross Requirements (GWh)	Variance (GWh)	Variance (%)
F1996	F1996	48,853	48,846	- 7	- 0.01
F1997	F1997	49,482	49,719	236	0.48
F1998	F1998	50,714	50,722	8	0.02
F1999	F1999	51,764	51,990	226	0.44
F2000	F2000	51,588	51,984	397	0.77
F2001	F2001	52,881	52,778	- 103	- 0.20
F2002	F2002	52,761	52,387	- 374	- 0.71
F2003	F2003	53,804	53,497	- 307	- 0.57
F2004	F2004	54,565	55,250	685	1.26
F2005	F2005	55,935	56,142	207	0.37

Notes:
[1] Vintage Year of Forecast is the year in which the forecast was published.
[2.] Fiscal Year of Forecast is the year for which the forecast is developed.

In contrast to Table 1 above, the variance, farther into the forecast period, is higher. This reflects greater uncertainty and variability in the load, the drivers of forecast, and the relationship between the load and the drivers. In addition, the variance may reflect unforeseen geopolitical events that may impact sales.

Table 2

Vintage of Forecast[1]	Fiscal Year Forecast[2]	Total Gross Requirements Forecast (GWh)	Weather Adjusted and Labor Adjusted Actual Total Gross Requirements (GWh)	Variance (GWh)	Variance (%)
F1996	F2005	59,926	56,142	- 3,784	- 6.32
F1997	F2005	59,660	56,142	- 3,518	- 5.90
F1998	F2005	58,284	56,142	- 2,142	- 3.68
F1999	F2005	59,076	56,142	- 2,934	- 4.97
F2000	F2005	56,324	56,142	- 182	- 0.32
F2001	F2005	55,483	56,142	659	1.19

Notes:
[1] Vintage Year of Forecast is the year in which the forecast was published.
[2.] Fiscal Year of Forecast is the year for which the forecast is developed.

2.0 Reference: Exhibit B-1A, Page 4-15, Figure 4-7

The graph appears to indicate that long term load forecasts are heavily influenced by the most recent short term data and do not reflect longer term demand and economic cycles.

1.2.2 Does BC Hydro attempt to model fluctuations in the business cycle in load forecasts to evaluate risks?

RESPONSE:

BC Hydro attempts to capture the fluctuations in Gross Domestic Product (GDP) in its uncertainty analysis. GDP is one of the uncertainty variables included in the Monte Carlo model, which is used to determine the forecast uncertainty bands. In the near term, adjustments are made to the forecast to reflect variances, which may be related to business cycles.

2.0 Reference: Exhibit B-1A, Page 4-15, Figure 4-7

The graph appears to indicate that long term load forecasts are heavily influenced by the most recent short term data and do not reflect longer term demand and economic cycles.

1.2.3 With the long lead times required to bring new supply on, how does BC Hydro plan to manage the risks of over and under supply due to load variations from forecast?

RESPONSE:

BC Hydro does not agree that load forecast is heavily influenced by short term events.

In terms of either over or under supply, as discussed in the LTAP, all resource options are evaluated through a staged process that allows for modifications or off-ramps to specific projects or acquisition programs. Similarly, BC Hydro's calls are targets that can be adjusted up or down depending on changes to load forecasts or other events influencing B.C.'s domestic and the western electricity market.

As discussed in the response to BCUC IR 2.327.1, BC Hydro believes there to be higher risks of being short rather than being long on supply. Therefore, to the extent that BC Hydro has more supply than it needs to meet domestic requirements, it will look to the export market and to defer subsequent programs, where possible.

3.0 Reference: Exhibit B-1A, Page 4-23, Section 4.4.3.2

BC Hydro has a 30 year contract, commencing in 1999, with a termination provision after the first 10 years.

1.3.1 Is any of the capacity under the contract used to provide service to Terasen Gas Vancouver Island and to ICP?

RESPONSE:

Yes. As part of the arrangements to deliver gas to ICP, BC Hydro currently assigns TGVI a capacity of 22 TJ/day under the Bypass Transportation Agreement (BTA) with Terasen.

3.0 Reference: Exhibit B-1A, Page 4-23, Section 4.4.3.2

BC Hydro has a 30 year contract, commencing in 1999, with a termination provision after the first 10 years.

1.3.2 What is the daily contract demand/capacity under the contract?

RESPONSE:

The current Contract Quantity under the agreement is 275 TJ/day.

3.0 Reference: Exhibit B-1A, Page 4-23, Section 4.4.3.2

BC Hydro has a 30 year contract, commencing in 1999, with a termination provision after the first 10 years.

1.3.3 Is the termination provision limited to a one-time option or is it for the balance of the contract term?

RESPONSE:

The termination provision may be invoked to commence on any November 1st after October 31, 2009. BC Hydro must provide minimum notice of 12 months prior to the effective date of the termination.

3.0 Reference: Exhibit B-1A, Page 4-23, Section 4.4.3.2

BC Hydro has a 30 year contract, commencing in 1999, with a termination provision after the first 10 years.

1.3.4 What is the termination cost by year for the last 20 years of the contract?

RESPONSE:

Section 8.03 of the BTA between BC Hydro and BC Gas (now Terasen) grants BC Hydro the option to terminate the agreement on or after November 1, 2009 on provision of not less than 12 months notice. If the option is elected, then BC Hydro must pay Terasen "the then undepreciated net book value, being the original cost of facilities less accumulated depreciation … of the incremental facilities installed by BC Gas after the commencement of this agreement …".

In providing service to BC Hydro to serve Burrard under the BTA, Terasen has to date added the Fraser Valley Compressor Station and ancillary facilities to its Coastal Transmission System. The net book value of these facilities at the end of each calendar year for the last 20 years of the contract has been estimated by Terasen as follows:

Estimated BTA Termination Payments: ($ million)

2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
22.7	21.8	20.9	20.0	19.0	18.1	17.2	16.3	15.3	14.4
2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
13.5	12.6	11.7	10.7	9.8	8.9	8.0	7.1	6.1	5.3

4.0 Reference: Exhibit B-1A, Page 5-10, Section 5.4.1

BC Hydro states that in emerging technologies, wave and tidal energy both appear to have good potential in BC and fuel cells and integrated gasification combined cycle are also mentioned as near commercial technologies.

1.4.1 Where are the potential sites for wave and tidal energy?

RESPONSE:

None of the analysis in the 2006 IEP is based on the characterization of near-commercial technologies as described on page 5-1 of the 2006 IEP (Exhibit B-1A, line 12-17).

Two potential tidal energy sites identified in the 2005 Resource Options Report (ROR) are located at Discovery Passage (4 km east of Campbell River) and Race Passage (20 km southwest of Victoria).

Two potential wave energy sites identified in the 2005 ROR are located at Ucluelet (west coast of Vancouver Island) and Winter Harbour (northwest end of Vancouver Island).

4.0 Reference: Exhibit B-1A, Page 5-10, Section 5.4.1

BC Hydro states that in emerging technologies, wave and tidal energy both appear to have good potential in BC and fuel cells and integrated gasification combined cycle are also mentioned as near commercial technologies.

1.4.2 What is the access to transmission for the sites that have potential?

RESPONSE:
None of the analysis in the 2006 IEP is based on the characterization of near-commercial technologies as described on page 5-1 of the 2006 IEP (Exhibit B-1A, line 12-17).

For the tidal and wave energy sites identified in response to JIESC IR 1.4.1, the road and transmission requirements have not been estimated.

4.0 Reference: Exhibit B-1A, Page 5-10, Section 5.4.1

BC Hydro states that in emerging technologies, wave and tidal energy both appear to have good potential in BC and fuel cells and integrated gasification combined cycle are also mentioned as near commercial technologies.

1.4.3 Are there fish and marine traffic issues with the potential sites?

RESPONSE:

None of the analysis in the 2006 IEP is based on the characterization of near-commercial technologies as described on page 5-1 of the 2006 IEP (Exhibit B-1A, line 12-17).

As stated in the 2005 ROR (Appendix B, page 30), for tidal projects 'the main impacts would be on fish and marine mammals and on navigation and fishing operations. These impacts would depend on the technology used and the site and development characteristics, and would require investigation for each individual site".

For wave projects (Appendix B, page 32), the 2005 ROR states that during construction of an oscillating Water Column farm, "disturbance of marine flora and fauna may occur. After construction the structure may develop into an artificial reef, promoting marine fauna".

4.0 Reference: Exhibit B-1A, Page 5-10, Section 5.4.1

BC Hydro states that in emerging technologies, wave and tidal energy both appear to have good potential in BC and fuel cells and integrated gasification combined cycle are also mentioned as near commercial technologies.

1.4.4 What is the status of the technologies and their reliability?

RESPONSE:

None of the analysis in the 2006 IEP is based on the characterization of near-commercial technologies as described on page 5-1 of the 2006 IEP (Exhibit B-1A, line 12-17).

The 2005 ROR provides the information used in the 2006 IEP. Information found on ocean wave, tidal, fuel cells and integrated gasification combined cycle technologies are found in Appendix B, Pages 21-31 of the 2005 ROR. The 2005 ROR was circulated to industry for their comment and input prior to filing to ensure updated information was included at that time.

5.0 Reference: Exhibit B-1A, Page 6-5, Section 6.3

The Multi-Attribute Portfolio Analysis (MAPA) spreadsheet model gathers costs and attributes details of each project from a database that contains data for all of the resource options.

1.5.1 Describe the data in the database.

RESPONSE:

The database referred to in the referenced sentence is the Resource Options Database that is described in detail in the 2005 ROR (Exhibit B-1B, Appendix F). A printout of the database is provided in Appendix B of the 2005 ROR. The 2005 ROR identifies the source of the data for all of the different resource types.

An extensive First Nations and Stakeholder engagement process was used for the 2005 ROR to solicit information on resource options. Data was obtained from:

- **Participants at the Regional First Nations and Stakeholder Engagement information sessions and workshops;**
- **Members of Provincial Integrated Electricity Plan Committee;**
- **Participants at two Technical Resource Options Workshops;**
- **Technology-specific workshops and meetings with suppliers;**
- **Studies commissioned by BC Hydro, such as the B.C. Wind Potential study by Garrad Hassan and the biomass study by BW McCloy & associates; and**
- **Project information received directly from Independent Power Producers (IPPs).**

BC Hydro reviewed the data and compared it with industry standards to provide quality assurance and consistent assumptions.

5.0 Reference: Exhibit B-1A, Page 6-5, Section 6.3

The Multi-Attribute Portfolio Analysis (MAPA) spreadsheet model gathers costs and attributes details of each project from a database that contains data for all of the resource options.

1.5.2 What is the source of the data in the database?

RESPONSE:

Please refer to the response to JIESC IR 1.5.1.

5.0 Reference: Exhibit B-1A, Page 6-5, Section 6.3

The Multi-Attribute Portfolio Analysis (MAPA) spreadsheet model gathers costs and attributes details of each project from a database that contains data for all of the resource options.

1.5.3 How is the data validated?

RESPONSE:

Please refer to the response to JIESC IR 1.5.1.

5.0 Reference: Exhibit B-1A, Page 6-5, Section 6.3

The Multi-Attribute Portfolio Analysis (MAPA) spreadsheet model gathers costs and attributes details of each project from a database that contains data for all of the resource options.

1.5.4 Who in the BC Hydro organization reviews and approves the data or assumptions?

RESPONSE:

Overall responsibility for review and approval of data or assumptions lies with the executive of BC Hydro. As appropriate, authority is delegated to the Power, Planning, and Portfolio Management department in Distribution or the relevant group within the company.

5.0 Reference: Exhibit B-1A, Page 6-5, Section 6.3

The Multi-Attribute Portfolio Analysis (MAPA) spreadsheet model gathers costs and attributes details of each project from a database that contains data for all of the resource options.

1.5.5 Will MATA be used to rank projects?

RESPONSE:

As discussed in Chapter 6 of the 2006 IEP, MAPA is a tool used in the portfolio analysis, including the costing of each portfolio, as well as the performance with respect to other attributes being analyzed. MAPA is not used to rank, select or reject projects or pick individual projects.

5.0 Reference: Exhibit B-1A, Page 6-5, Section 6.3

The Multi-Attribute Portfolio Analysis (MAPA) spreadsheet model gathers costs and attributes details of each project from a database that contains data for all of the resource options.

1.5.6 Will MATA be used as a tie-breaker?

RESPONSE:

Please refer to the response to JIESC IR 1.5.5.

5.0 Reference: Exhibit B-1A, Page 6-5, Section 6.3

The Multi-Attribute Portfolio Analysis (MAPA) spreadsheet model gathers costs and attributes details of each project from a database that contains data for all of the resource options.

1.5.7 Will MATA results potentially cause a lower cost project to be rejected in favor of a higher cost project?

RESPONSE:

Please refer to the response to JIESC IR 1.5.5.

6.0 Reference: Exhibit B-1A, Page 7-41, Section 7.2.5.2

BC Hydro states that having a short position causes a utility to be a net market importer of electricity, with little influence over the source and environmental impacts of the electricity supply.

1.6.1 Explain why BC Hydro feels that it is necessary for it to control the source and environmental impacts in other jurisdictions or on behalf of other authorities.

RESPONSE:

BC Hydro does not feel that it is necessary to control the source and environmental impacts in other jurisdictions or on behalf of other authorities. To meet the 50 per cent BC Clean Electricity target, however, which stipulates that the electricity must be generated from facilities located in B.C., BC Hydro must consider the source of electricity from other jurisdictions.

7.0 Reference: Exhibit B-6-4, BCUC IR 1.243.2

Residential use per customer appears to be increasing despite more efficient appliances and DSM.

1.7.1 If use per customer is increasing, is it possible that BC Hydro DSM results are overestimated?

RESPONSE:

BC Hydro does not believe that an increasing customer use rate means that DSM results are overstated.

There are many factors that have an influence on residential use. The factors that are placing upward pressure on electricity use rates include:

- **the trend to larger homes**
- **more entertainment electronic and computing equipment**
- **a higher heating fuel share for electric space heating.**

No inference can be made that DSM programs are overestimated because use per customer is increasing. BC Hydro uses state of the industry techniques and methodologies to evaluate its DSM programs, and has a high degree of confidence in the results derived from its DSM evaluations.

7.0 Reference: Exhibit B-6-4, BCUC IR 1.243.2

Residential use per customer appears to be increasing despite more efficient appliances and DSM.

1.7.2 Is it possible that there may be an inherent bias to produce analysis that supports a favorable result for DSM programs?

RESPONSE:

Please refer to the response to JIESC IR 1.7.1.

8.0 Reference: BC Hydro 2006 Call for Tenders

BC Hydro has limited bids for supply to generation within the provincial borders in the most recent CFT.

1.8.1 Explain the supply risks that BC Hydro has identified for resources outside of the province and discuss the degree of risk.

RESPONSE:

Please refer to the response to BCUC IR 2.362.1.

8.0 Reference: BC Hydro 2006 Call for Tenders

BC Hydro has limited bids for supply to generation within the provincial borders in the most recent CFT.

1.8.2 What legal and trade protections exist for energy?

RESPONSE:

1. International Trade Agreements

(a) *North American Free Trade Agreement*

Please refer to the response to BCUC IR 2.362.3.

(b) Agreements under the World Trade Organization

The *General Agreement on Tariffs and Trade* (GATT) and the *General Agreement on Trade in Services* (GATS) are international trade agreements to which Canada is a party that fall under the auspices of the World Trade Organization. The GATT and the GATS also apply to trade between Canada and the United States, in addition to NAFTA, and thus may provide further trade protections to Canada vis-à-vis US measures in certain circumstances. However, with respect to trade in electricity, the rights and obligations of NAFTA are superior to those of the GATT and the GATS, and thus it is NAFTA that would provide the most effective protection to Canada (and BC Hydro) in the event that the United States imposed any restriction on the export of electricity to Canada. As noted, NAFTA is fully discussed in the response to BCUC IR 2.362.3.

2. Inter-Provincial Trade Agreements

There are currently two inter-provincial trade agreements that could potentially provide protection to BC Hydro in the event it purchased electricity from suppliers located outside of the Province, but within Canada. These agreements are the *Agreement on Internal Trade* (ITA) and the *BC-Alberta Trade, Investment, and Labour Mobility Agreement* (TILMA).

(a) ***Agreement on Internal Trade***

The ITA is an agreement among the Federal Government, the Provinces and the Territories intended to reduce internal barriers to trade within Canada. The ITA is not comprehensive in scope and does not apply to all economic activity or to all sectors. In particular, the procurement of electricity for resale by BC Hydro is not subject to the ITA. In addition, the ITA has no application to trade in any form of energy, including electricity, so that other Provinces have no obligations under the ITA that would discipline or limit their ability to impose restrictions on the inter-provincial trade in electricity. Thus, the ITA provides no protection to BC Hydro in the circumstances.

(b) ***BC-Alberta Trade, Investment, and Labour Mobility Agreement***

The TILMA is a trade enhancing agreement between B.C. and Alberta only, which is scheduled to come into effect between the two provinces as of April 1, 2007. Unlike the ITA, TILMA is intended to be relatively comprehensive in scope. While it will not apply to BC Hydro's procurement of electricity for resale, it will generally apply to trade in energy between the two provinces. In this regard, TILMA Article 3 provides that BC and Alberta must each ensure that their measures do not operate to restrict trade between them. Subject to any exceptions, this obligation would prevent Alberta from imposing restrictions on the export of electricity to BC. However, the obligations of Article 3 have been made subject to Article 6, which provides that either Party may adopt measures inconsistent with Article 3 for "legitimate objectives". Such objectives are defined to include public security and safety, public order, protection of human life and health and, perhaps most importantly here, the prevention or relief of critical shortages of goods essential to a Party. Thus, after TILMA enters into force and relying on Article 6, Alberta will remain free to impose TILMA-consistent restrictions on electricity exports to BC, if the restrictions are required to prevent a critical shortage of electricity within Alberta. BC will have no ability under TILMA to prevent or eliminate such restrictions.

TILMA has its own dispute settlement process which, unlike NAFTA, will be directly accessible to BC Hydro to challenge allegedly inconsistent Alberta export restrictions. That process also allows for the awarding of monetary fines if a Party fails to eliminate a measure which has been found to be inconsistent with the Agreement. However, similar to NAFTA, BC Hydro has concerns with respect to this process. First, of course, the process will not be effective to address any export restriction that is TILMA-consistent. Second, the process will be relatively time consuming, during which time the subject export restriction will remain in place. Finally, while monetary fines may be awarded if a Party fails to bring a measure into compliance with the Agreement, those fines cannot exceed $5 million with respect to any one matter under consideration. Clearly there may be cases where a Party would rather pay the relatively small monetary fine than eliminate a domestically popular export restriction.

The above being the case, it is BC Hydro's view that TILMA cannot be relied upon to protect it from restrictions on the export of electricity that might be imposed by Alberta.

8.0 Reference: BC Hydro 2006 Call for Tenders

BC Hydro has limited bids for supply to generation within the provincial borders in the most recent CFT.

1.8.3 Under what conditions would BC Hydro contract with or invest in a generation facility outside of the Province?

RESPONSE:

Please refer to the response to JIESC IR 1.9.4.

8.0 Reference: BC Hydro 2006 Call for Tenders

BC Hydro has limited bids for supply to generation within the provincial borders in the most recent CFT.

1.8.4 Reconcile the provincial objective of facilitating exports by IPPs with any prohibition by BC Hydro on acquiring resources from outside of the province.

RESPONSE:

In the 2005 REAP Negotiated Settlement documents (see Schedule A – item #5), BC Hydro outlined the reasons why F2006 Call projects are to be located in British Columbia. In particular, this document indicates that this mandatory requirement is aligned with the intent of the 2002 BC Energy Plan, as follows:

"The 2002 BC Energy Plan stresses that unless domestic energy sources are developed, British Columbians could find themselves increasingly dependent on imports and vulnerable to price swings. Policy Action No. 13 addresses this concern by providing that BC's IPPs are to develop new electricity generation in BC."

Furthermore, with regard to Policy Action No. 13, the 2002 BC Energy Plan states "With BC Hydro's participation limited to efficiency improvements and capacity upgrades at existing facilities, IPPs will be able to serve new domestic loads and explore opportunities in the export market". Thus, the objective of facilitating IPP exports is not incompatible with the objective of having IPPs serve new domestic loads. The F2006 Call was designed to reflect the 2002 Energy Plan directive to having new power generation in BC coming from IPPs.

As set out at page 1-5 of the 2006 IEP, BC Hydro will examine allowing projects located outside of B.C. to bid into the F2007 call, subject to securing firm point-to-point transmission to the BC Hydro service area and a risk assessment that incorporates jurisdictional risk.

8.0 Reference: BC Hydro 2006 Call for Tenders

BC Hydro has limited bids for supply to generation within the provincial borders in the most recent CFT.

1.8.5 In Alberta and in Washington State, what changes in regulatory conditions, terms of service and transmission capacity would be needed in order for BC Hydro to acquire resources in those jurisdictions?

RESPONSE:

Some of the required elements for acquiring long-term import contracts are identified on pages 8-23 to 8-24 of the 2006 IEP which state: "BC Hydro plans to consider allowing projects located outside BC to bid into the [F2007] call, subject to the securing of firm point-to-point transmission service to the BC Hydro service area and a risk assessment that incorporates jurisdictional risk." This issue may be guided by the Province's updated and expanded 2006 Energy Plan and by the results of BC Hydro's updated jurisdictional comparison analysis attached to the response to BCUC IR 1.173.1.

9.0 Reference: Exhibit B-6-4, BCUC IR 1.280.2, BC Progress Board

The Progress Board reports states:

Each potential solution requires a balancing of interests and impacts, Is it better to use the latest clean coal technology to bur BC coal and accept that it will result in greenhouse gas emissions, or build a hydroelectricity dam that generates emission-free power but requires the flooding of a river valley? Is it better to build a natural gas pipeline and a generating plant on Vancouver Island or install a higher voltage power line from the mainland which will use electricity supply from elsewhere, including imports? (Attachment 1 to BCUC 1.280.2; Page 33, Strategic Imperatives for British Columbia's Energy Future.)

The province may require a large firm resource in addition to Site C or in place of Site C due to delays or increased costs.

In the recent past, utilities have formed partnerships for the development of generating facilities, including coal fired generation. The facilities may be outside of the utility's service area or state or provincial boundaries.

If a large resource is required, comment on the following supposition:

1.9.1.1 Natural gas is a relatively scarce commodity that has a demand that is often coincident with electricity demand in the region, straining both commodity supply and pipeline capacity.

RESPONSE:

BC Hydro's analysis of natural gas markets is presented in Chapter 3 of the 2006 IEP. The analysis finds that natural gas is a commodity that has a demand that is often coincident with electricity demand. As set out in pp. 3-9 to 3-10 of the 2006 IEP (Exhibit B1-A):

> **"WECC's electricity and natural gas markets have become closely inter-related since natural gas has become the predominant fuel for new electricity generation. The inter-related nature of the electricity and natural gas markets means that price shocks or supply effects in one market quickly cross over to the other. … Short-term supply shocks (e.g., hurricanes in the Gulf of Mexico, pipeline disruptions in the Western U.S.) and spikes in demand (e.g., a cold storm in the U.S. Pacific Northwest and BC) mean higher spot prices for electricity in markets."**

9.0 Reference: Exhibit B-6-4, BCUC IR 1.280.2, BC Progress Board

The Progress Board reports states:

Each potential solution requires a balancing of interests and impacts, Is it better to use the latest clean coal technology to bur BC coal and accept that it will result in greenhouse gas emissions, or build a hydroelectricity dam that generates emission-free power but requires the flooding of a river valley? Is it better to build a natural gas pipeline and a generating plant on Vancouver Island or install a higher voltage power line from the mainland which will use electricity supply from elsewhere, including imports? (Attachment 1 to BCUC 1.280.2; Page 33, Strategic Imperatives for British Columbia's Energy Future.)

The province may require a large firm resource in addition to Site C or in place of Site C due to delays or increased costs.

In the recent past, utilities have formed partnerships for the development of generating facilities, including coal fired generation. The facilities may be outside of the utility's service area or state or provincial boundaries.

If a large resource is required, comment on the following supposition:

1.9.1.2 BC has an abundance of coal and has to date not exploited the resource for its electricity needs.

RESPONSE:

The 2005 ROR (Appendix F of the 2006 IEP (Exhibit B1-B)) states that "British Columbia has significant coal resources in a number of areas" and "availability of coal is not a constraint on how much coal-fired generation could be built in the planning period" (p. 7-15). The LTAP's provision that the F2007 and F2009 calls will be competitive and all-source allow proponents of coal projects the opportunity of participation. In addition, the LTAP provides means to accommodate large projects in the F2007 call, such as a larger call volume, longer commercial operation date window and investigation into the prospect of a Request for Proposal (RFP) process.

For further details as to what steps BC Hydro has taken to evaluate coal generation as a provincial resource, and to identify what is needed to facilitate the development of coal-based generation, please refer to the response to JIESC IR 1.9.2.

9.0 Reference: Exhibit B-6-4, BCUC IR 1.280.2, BC Progress Board

The Progress Board reports states:

Each potential solution requires a balancing of interests and impacts, Is it better to use the latest clean coal technology to bur BC coal and accept that it will result in greenhouse gas emissions, or build a hydroelectricity dam that generates emission-free power but requires the flooding of a river valley? Is it better to build a natural gas pipeline and a generating plant on Vancouver Island or install a higher voltage power line from the mainland which will use electricity supply from elsewhere, including imports? (Attachment 1 to BCUC 1.280.2; Page 33, Strategic Imperatives for British Columbia's Energy Future.)

The province may require a large firm resource in addition to Site C or in place of Site C due to delays or increased costs.

In the recent past, utilities have formed partnerships for the development of generating facilities, including coal fired generation. The facilities may be outside of the utility's service area or state or provincial boundaries.

If a large resource is required, comment on the following supposition:

1.9.1.3 BC Hydro is resistant to the development of coal generation as a long term electricity supply resource.

RESPONSE:

BC Hydro is not resistant to the development of coal generation as a long-term electricity supply resource. The F2006 Call was designed as a competitive, all source process and received bids from two proponents of coal projects. In addition, the LTAP's provision that the F2007 and F2009 calls will be competitive and all-source allow the proponents of coal projects the opportunity of participation.

As with all resource options, there are certain risks associated with coal projects, such as the potential costs of future greenhouse gas (GHG) regulation that need to be managed by either BC Hydro or the proponent to mitigate potential cost and supply risk. The LTAP addresses this through the provision that the use of GHG adders and GHG offset cost risk allocation between IPP and BC Hydro will be considered in the Definition phase of the F2007 and F2009 calls.

9.0 Reference: Exhibit B-6-4, BCUC IR 1.280.2, BC Progress Board

The Progress Board reports states:

Each potential solution requires a balancing of interests and impacts, Is it better to use the latest clean coal technology to bur BC coal and accept that it will result in greenhouse gas emissions, or build a hydroelectricity dam that generates emission-free power but requires the flooding of a river valley? Is it better to build a natural gas pipeline and a generating plant on Vancouver Island or install a higher voltage power line from the mainland which will use electricity supply from elsewhere, including imports? (Attachment 1 to BCUC 1.280.2; Page 33, Strategic Imperatives for British Columbia's Energy Future.)

The province may require a large firm resource in addition to Site C or in place of Site C due to delays or increased costs.

In the recent past, utilities have formed partnerships for the development of generating facilities, including coal fired generation. The facilities may be outside of the utility's service area or state or provincial boundaries.

If a large resource is required, comment on the following supposition:

1.9.1.4 While BCH has invested research funds and resources in testing and developing small niche resources such as hydrogen and fuel cells, it has not done so with coal technologies.

RESPONSE:

BC Hydro continues to invest in resources in terms of studying and monitoring future resource options and their potential timing and application to meet BC Hydro's future system needs. The LTAP provides that BC Hydro will continue to monitor a wide range of new technologies, including monitoring developments of clean coal technologies, such as Integrated Gasification combined Cycle (IGCC) with carbon sequestration. In addition to coal-based technologies, BC Hydro is also monitoring ocean energy resource options and distributed generation.

9.0 Reference: Exhibit B-6-4, BCUC IR 1.280.2, BC Progress Board

The Progress Board reports states:

Each potential solution requires a balancing of interests and impacts, Is it better to use the latest clean coal technology to bur BC coal and accept that it will result in greenhouse gas emissions, or build a hydroelectricity dam that generates emission-free power but requires the flooding of a river valley? Is it better to build a natural gas pipeline and a generating plant on Vancouver Island or install a higher voltage power line from the mainland which will use electricity supply from elsewhere, including imports? (Attachment 1 to BCUC 1.280.2; Page 33, Strategic Imperatives for British Columbia's Energy Future.)

The province may require a large firm resource in addition to Site C or in place of Site C due to delays or increased costs.

In the recent past, utilities have formed partnerships for the development of generating facilities, including coal fired generation. The facilities may be outside of the utility's service area or state or provincial boundaries.

1.9.2 What steps has BC Hydro taken to evaluate coal generation as a provincial resource and to identify what is needed to facilitate the development of coal based generation?

RESPONSE:

BC Hydro has taken a number of steps to evaluate coal generation and facilitate the development of coal generation:

1. **The coal resource is identified and characterized in the 2005 ROR.**
2. **Coal projects were included in the 2006 IEP portfolio analysis and evaluated for different GHG cost scenarios.**
3. **The F2006 Call was designed to facilitate the inclusion of all commercial resource types, including coal. Two coal-fired generation projects were bid into the F2006 Call.**

Factors that may affect coal projects were raised during the Negotiated Settlement Process in relation to the 2005 Resource Expenditure and Acquisition Plan. These included understanding issues related to lead times, flexibility of commercial operation dates, GHG emissions and the size of projects. BC Hydro will be seeking input on these issues in the design of the F2007 Call.

BC Hydro will also continue to monitor emerging advanced coal technologies (for example, IGCC).

9.0 Reference: Exhibit B-6-4, BCUC IR 1.280.2, BC Progress Board

The Progress Board reports states:

Each potential solution requires a balancing of interests and impacts, Is it better to use the latest clean coal technology to bur BC coal and accept that it will result in greenhouse gas emissions, or build a hydroelectricity dam that generates emission-free power but requires the flooding of a river valley? Is it better to build a natural gas pipeline and a generating plant on Vancouver Island or install a higher voltage power line from the mainland which will use electricity supply from elsewhere, including imports? (Attachment 1 to BCUC 1.280.2; Page 33, Strategic Imperatives for British Columbia's Energy Future.)

The province may require a large firm resource in addition to Site C or in place of Site C due to delays or increased costs.

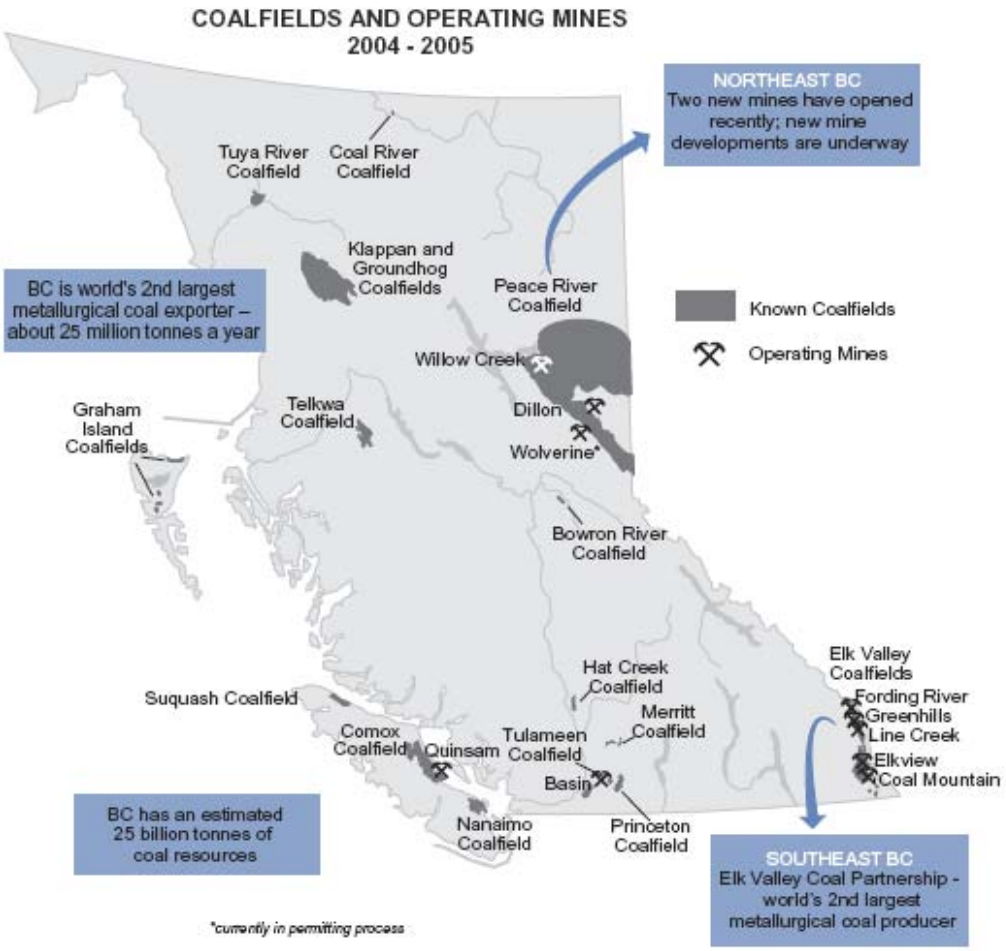
In the recent past, utilities have formed partnerships for the development of generating facilities, including coal fired generation. The facilities may be outside of the utility's service area or state or provincial boundaries.

1.9.3 What regions in the province have coal supplies suitable for a coal generation facility and what are the advantages and disadvantages of siting firm long term generation supply in each of these regions?

RESPONSE:

As shown in the map below, B.C. has significant coal resources (metallurgical and thermal) in a number of areas around the Province of B.C. Thermal coal resources suitable for a coal-fired generation facility are available in a number of regions, including the East Kootenays, Northeast Peace River, the Northwest (e.g. Telkwa, Bowser Basin and Tuya coalfields), South Central B.C. (such as Hat Creek, Merritt and Similkameen) and Vancouver Island. For planning purposes, it is assumed that some of these coalfields could support large-scale generation (such as the 500 MW unit described in the 2005 ROR). Other coalfields may only be able to support smaller generating plants.

Factors relating to the siting of coal-fired plants include proximity to the transmission grid; distance from coal reserves; transportation costs; project footprint; waste disposal; access roads; and other environmental and social considerations (such as emissions; labour supply, etc). BC Hydro assumes that each project proponent would evaluate the advantages and disadvantages of its sites in deciding whether to bid into future calls.



(Source: B.C. Ministry of Energy, Mines and Petroleum Resources)

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The province may require a large firm resource in addition to Site C or in place of Site C due to delays or increased costs.

In the recent past, utilities have formed partnerships for the development of generating facilities, including coal fired generation. The facilities may be outside of the utility's service area or state or provincial boundaries.

1.9.4 Has or would BC Hydro consider an ownership position or long term contract for a generation facility inside or outside its service area?

RESPONSE:

With respect to ownership in generating facilities inside or outside the Province, BC Hydro is guided by the 2002 BC Energy Plan (Appendix A, Exhibit B-1B), more specifically Policy Action #13, "The private sector will develop new electricity generation, with BC Hydro restricted to improvements at existing plants."

It follows that BC Hydro does not envision an ownership position in generation facilities other than the Heritage Resources absent direction from the Province. As set out in the 2002 Energy Plan at page 30, "any proposed BC Hydro hydroelectric facility, such as Peace Site C, must be brought to Cabinet for approval before being considered by the Utilities Commission as a source of supply. Cabinet will then decide whether the project should be developed by BC Hydro or the private sector".

With respect to long term contracts with generating facilities inside or outside the province, BC Hydro has and continues to acquire new electricity supply from IPP generators in BC through long-term contracts. Such action is consistent with the 2002 BC Energy Plan.

As stated in the LTAP at pages 8-23 and 8-24, "As part of the development of the F2007 call, BC Hydro plans to consider allowing projects located outside B.C. to bid into the call, subject to the securing of firm point-to-point transmission service to the BC Hydro service area and a risk assessment that incorporates jurisdictional risk." This issue may be guided by the Province's updated and expanded 2006 Energy Plan.

10.0 Reference: Exhibit B-6-3, BCUC IR 1.114.3

BC Hydro states that dispatchable CCGTs are not described as short because the CCGTs would generate economically.

1.10.1 Is BC Hydro basing the statement on incremental/variable costs of a CCGT only?

RESPONSE:

If a Combined Cycle Gas Turbine (CCGT) were awarded a contract through a call process and if BC Hydro contracted that CCGT to be dispatchable, BC Hydro would anticipate that a state of the art CCGT would frequently be economic to dispatch.

On the other hand, if BC Hydro were to award a non-dispatchable contract to a CCGT plant it is BC Hydro's expectation that the plant would operate at all times that it was made available by the owner.

10.0 Reference: Exhibit B-6-3, BCUC IR 1.114.3

BC Hydro states that dispatchable CCGTs are not described as short because the CCGTs would generate economically.

1.10.2 How are fixed gas transportation costs factored into the analysis supporting the assumption that dispatchable CCGTs would generate economically?

RESPONSE:

Gas transportation costs have been included in the fixed OMA cost contained in the 2005 ROR and as such these costs have been factored in explicitly. Once constructed, dispatch decisions are based on variable cost (substantially commodity cost), not fixed cost.

10.0 Reference: Exhibit B-6-3, BCUC IR 1.114.3

BC Hydro states that dispatchable CCGTs are not described as short because the CCGTs would generate economically.

1.10.3 For Vancouver Island, how is the gas transportation rate and rate risk and curtailment risk factored into the economic analysis?

RESPONSE:

In the 2006 IEP, BC Hydro has not modeled new gas-fired generation for Vancouver Island. Rather, for the two portfolios that contain new gas-fired generation in the load center ("Low Land Impact" and "Repowering Burrard") the analysis was based on CCGTs and single cycle gas turbine plants sited in the Lower Mainland.

11.0 Reference: Not Applicable

BC Hydro has stated on a number of occasions that it has been negotiating with ICP to convert the contract to a dispatchable supply around steam supply obligations.

1.11.1 What is the status of the negotiations with ICP on flexibility in operating the facility?

RESPONSE:

In May 2006, BC Hydro, Calpine Island Cogeneration LP and Catalyst Paper entered into a short-term dispatch agreement which allows BC Hydro to dispatch ICP off, subject to certain operating restrictions. All three parties are currently working towards a long term agreement that would allow BC Hydro to fully dispatch ICP and at the same time, meet the respective objectives of Calpine and Catalyst.

11.0 Reference: Not Applicable

BC Hydro has stated on a number of occasions that it has been negotiating with ICP to convert the contract to a dispatchable supply around steam supply obligations.

1.11.2 Provide the schedule of meetings on the dispatch issue that have been held in the last 2 years and are currently scheduled and the companies represented.

RESPONSE:

Meeting details regarding BC Hydro's negotiation concerning ICP are not provided as they are considered confidential.

12.0 Reference: Exhibit B-6-1, BCUC IR 1.10.2; Exhibit B-6-3, BCUC IR 1.163.2

BC Hydro is pursuing green/clean/renewable resources and has an objective of acquiring 50% of its new supplies from these resources.

1.12.1 Identify any costs (and facilities – storage, generation, transmission, voltage support) that are associated with firming up (shaping) intermittent or non-firm resources.

RESPONSE:

The 50 per cent target referred to in the IR arises out of Policy Action No. 20 of the BC Energy Plan, which provides that electricity distributors such as BC Hydro "<u>will</u> pursue a voluntary goal to acquire 50 per cent of new supply from BC Clean Electricity over the next 10 years." Further, BC Hydro is not simply pursuing "green/clean/renewable resources". The F2006 Call was, and the F2007 and F2009 calls are proposed to be, "all source".

With respect to the firming of non-firm and intermittent resources, BC Hydro has addressed this in the F2006 Call by providing evaluation credits for hourly firm energy. Please refer to the response to BCUC IR 1.185.1. This approach to firming intermittent resources will be reassessed and informed by stakeholder input in the design of future calls.

BC Hydro has not conducted a study to determine the cost of integrating intermittent (primarily considered to be wind) resources into the system, and has not quantified capacity constraints or constraints in acquiring intermittent resources. To date, there is no material amount of intermittent resources on the BC Hydro system, so the need for, and opportunity to, study the effects first hand has not arisen.

BC Hydro is monitoring other jurisdictions where there is an existing or emerging intermittent resource base, for example Alberta where there is significant amounts of wind generation.

12.0 Reference: Exhibit B-6-1, BCUC IR 1.10.2; Exhibit B-6-3, BCUC IR 1.163.2

BC Hydro is pursuing green/clean/renewable resources and has an objective of acquiring 50% of its new supplies from these resources.

1.12.2 Outline the capacity constraints that would affect the ability to economically receive and transfer intermittent generation supply such as wind.

RESPONSE:

Please refer to the response to JIESC IR 1.12.1.

12.0 Reference: Exhibit B-6-1, BCUC IR 1.10.2; Exhibit B-6-3, BCUC IR 1.163.2

BC Hydro is pursuing green/clean/renewable resources and has an objective of acquiring 50% of its new supplies from these resources.

1.12.3 What are the constraints in acquiring and depending on intermittent generation sources? Quantify the GWh and MW limits and explain the reasons for the limits.

RESPONSE:

Please refer to the response to JIESC IR 1.12.1.

13.0 Reference: None

BC Hydro employs the Utility Cost (UC), Total Resource Cost (TRC) / Participant Cost, Rate Impact Measure (RIM) / Non Participant Cost (NPC) and Societal Cost in evaluating DSM programs. The Commission has set thresholds that each program must meet. On April 1 BC Hydro implemented Stepped Rates for Transmission service customers.

1.13.1 Is it possible that rate incentives for conservation and DSM programs may result in lower production and negative effects on the provincial economy while at the same time the DSM evaluation tests and thresholds employed could indicate a positive result?

RESPONSE:

The evaluation tests used by BC Hydro to assess DSM programs do not reflect positive or negative effects on the provincial economy.

As set out in the response to BCOAPO IR 1.50.1, with regards to the test measures set by the British Columbia Utilities Commission, please refer to Directive 60 of the October 29, 2004 decision concerning BC Hydro's F05/F06 RRA.

13.0 Reference: None

BC Hydro employs the Utility Cost (UC), Total Resource Cost (TRC) / Participant Cost, Rate Impact Measure (RIM) / Non Participant Cost (NPC) and Societal Cost in evaluating DSM programs. The Commission has set thresholds that each program must meet. On April 1 BC Hydro implemented Stepped Rates for Transmission service customers.

1.13.2 How does BC Hydro identify and reflect negative effects on the provincial economy in the evaluation of DSM and rate programs?

RESPONSE:

Please refer to the response to JIESC IR 1.13.1.

14.0 Reference: Exhibit B-6-3, BCUC IR 1.164.1

The information below is from a reference source on fluorescent light fixtures:

(http://www.naturalhandyman.com/iip/infelectrical/inffluor.shtm

Can you use a dimmer with fluorescent light fixtures? Yes and no. Yes, there is a specially-designed dimmer switch that will work with some fluorescent fixtures. However, this type of dimmer is "ballast-dependent", meaning that each brand of fluorescent dimmer will only work with certain ballasts from certain manufacturers. In other words, trying to find a dimmer to match your fixture may be a mind-numbing chore. The ideal situation is to choose the dimmer and the light fixture together to assure compatibility. Also, these dimmers will not work for incandescent fixtures. You cannot mix fluorescent fixtures and incandescent fixtures on the same switch.

The CFL evaluation reports indicate that listening to salesmen warning customers about use of CFLs with a dimmer was one of the requirements of the study (Supply Side Assessment, May 12, 2005 - Sampson Research).

1.14.1 Does BC Hydro agree that limitations and costs of dimmers for CFLs are a limiting factor in the acceptance of CFLs and their installation in many environments?

RESPONSE:

BC Hydro agrees that there are some applications where CFLs currently are not the best option for customers.

14.0 Reference: Exhibit B-6-3, BCUC IR 1.164.1

The information below is from a reference source on fluorescent light fixtures:

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The CFL evaluation reports indicate that listening to salesmen warning customers about use of CFLs with a dimmer was one of the requirements of the study (Supply Side Assessment, May 12, 2005 - Sampson Research).

1.14.2 What steps are being taken in the industry to address the issue of costs and technologies for dimming of fluorescent fixtures?

RESPONSE:

It is BC Hydro's understanding that in the residential sector, dimmers and dimmable fixtures/CFL lamps are not currently a major focus for manufacturers.

14.0 Reference: Exhibit B-6-3, BCUC IR 1.164.1

The information below is from a reference source on fluorescent light fixtures:

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The CFL evaluation reports indicate that listening to salesmen warning customers about use of CFLs with a dimmer was one of the requirements of the study (Supply Side Assessment, May 12, 2005 - Sampson Research).

1.14.3 Has BC Hydro undertaken surveys to determine the number of unused free and purchased CFLs?

RESPONSE:

Yes, BC Hydro has undertaken surveys looking at usage and purchase behaviours for residential consumers. This information is considered in the evaluated results of BC Hydro's program.