

REQUESTOR NAME: Independent Power Producers of British Columbia

INFORMATION REQUEST ROUND NO: 1

TO: BRITISH COLUMBIA HYDRO & POWER AUTHORITY

DATE: July 17, 2008

PROJECT NO: 3698514

APPLICATION NAME: 2008 Long Term Acquisition Plan

1.0 TOPIC: 8. Load forecast Methodology

Reference: Exhibit B-1, Section 2.2.1, 2007 Load Forecast Methodology Overview

Please provide the Load Forecast after DSM by region including by substation in these regions and the forecast history of the substations. Where necessary combine substation loads for the purposes of protecting the confidentiality of customer load data e.g. where one or two customers are the only customers served by a particular substation.

2.0 TOPIC: 8. Load forecast Methodology

Reference: Exhibit B-1, Section 2.2.1, 2007 Load Forecast Methodology Overview

On page 2-2, BC Hydro states that, “*Potential loads such as electric plug-in vehicles (EPVs) have not specifically been factored into the Load Forecast underpinning the 2008 LTAP.*”

- 2.1 Since the Provincial Government is adopting very strong policies and legislation aimed at reducing GHG emissions, please provide the estimates of the impact on the Load Forecast if these policies are successful in shifting energy consumption away from high-GHG energy sources towards greener, cleaner, low-GHG sources such as electricity from renewables.

3.0 TOPIC: 8. Load forecast Methodology

Reference: Exhibit B-1, Appendix D, pp. 28-34, Residential Forecast

On page 30 of 103, BC Hydro states that, “*Over the last ten years, the average annual use rate grew by about 71 kWh per year [from 10,230 kWh to 10,940 kWh per year per account], corresponding to an average annual compound growth rate of 0.68%.*” On page 29 of 103, BC Hydro states its current forecast for the annual use rate as “*...the 5, 11, and 21 year growth rates for use per account are 0.40%, 0.47%, and 0.41% respectively.*”

- 3.1 Please explain why it should be reasonable to expect the increase in the use rate to slow to this extent, especially since the higher rate of increase over the past 10 years was measured during a period when there were many successful DSM programs, while the lower rates of increase for the 5, 11, and 21, year forecast periods assume that no further DSM programs are implemented.
- 3.2 Please give a detailed description of the inputs, outputs, and process of the Statistically Adjusted End Use (SAE) model, with a detailed explanation as to how the annual use rates are determined for the Lower Mainland and Vancouver Island, going forward through the forecast period.

4.0 TOPIC: 8. Load forecast Methodology

Reference: Exhibit B-1, Appendix D, p. 46, Medium-Term Mining Outlook

BC Hydro states that, “*Reflected in the 2007 forecast are three large potential mining projects in the Northwest corridor of the province.*”

- 4.1 Specifically, which projects are these three, and what is the timing and amount of the electricity load from each that is included in the forecast?
- 4.2 Are these the only new mining projects included in the forecast? Please give details of any others, including location, timing, and anticipated load.
- 4.3 What is the timing and the amount of the load reduction due to the negative recommendation of the Kemess North project?
- 4.4 What level of “sustained higher Copper prices” would lead to the continued operation of Highland Valley Copper beyond 2020? Please provide any forecasts of future Copper prices that BC Hydro has obtained?

5.0 TOPIC: 8. Load forecast Methodology

Reference: Exhibit B-1, Appendix D, p. 73, Statistically Adjusted End Use Model (SAE)

Figure A1.1 on page 73 gives an equation used for the Commercial forecast (which is supposedly similar to one that is used for the Residential forecast).

- 5.1 Since the coefficients in these equations are determined by the regression of historical data, how does BC Hydro eliminate the effects of historical DSM programs and rate increases, which are implicitly included in the historical data, in order to produce a model which can predict the future load excluding the impact of any new DSM programs or rate increases?

6.0 TOPIC: 9. Comparison to 2006 Load Forecast

Reference: Exhibit B-1, Section 2.2.4, p. 2-8, Impact from Rate Increases

On page 2-8, BC Hydro states, “*The 2007 Load Forecast incorporates proposed rate increases from the F09/F10 RRA plus a forecast of long-term rate increases.*”

- 6.1 Please provide the forecast of long-term rate increases that has been incorporated in the Load Forecast, and the associated long-term financial forecast. Please provide these as a fully functioning Excel spreadsheet model.

7.0 TOPIC: 11. Existing & Committed Resources and TOPIC: 13 SD 10 Impact

Reference: Exhibit B-1, Section 2.3.2, Burrard Generating Station

On page 2-11 BC Hydro states, “*...an appropriate maintenance program can be implemented to allow it to rely on the [Burrard] plant for 900 MW and 3,000 GWh/year for planning purposes through the planning horizon.*”

However, on page 5-24 BC Hydro states that “*Burrard’s energy contribution is a secondary issue to*

maintaining a reliable and secure system, however, increasing usage of Burrard to generation electricity could negatively impact its ability to provide capacity for both technical and environmental permit/social license reasons.”

- 7.1 Is it BC Hydro’s intention to actually generate 3,000 GWh annually at Burrard, or will a substantial part of this energy be acquired from imports, while Burrard remains on standby, as a capacity resource, only to be used if needed? If the answer is the latter, then how does that differ from the present 2,500 GWh market allowance, which can no longer be filled from imports after 2015, due to the self-sufficiency requirement in SD10?
- 7.2 Assuming a fuel cost of \$9 per GJ, what is the fuel cost per MWh to generate power at Burrard, and what is the variable operating and maintenance cost per MWh?
- 7.3 What is the projected GHG compliance cost for any energy generated at Burrard?
- 7.4 What is the annual fixed cost to keep all 6 units on standby as a capacity resource?
- 7.5 What is the annual cost to maintain the firm gas transmission contract in order to allow Burrard to be available if it is needed as a 900 MW capacity facility?
- 7.6 What capital will be required to permit Burrard to operate reliably at 900 MW?

8.0 TOPIC: 16. Resource Options

Reference: Exhibit B-1, Appendix F-12, Firm Energy Load Carrying Capability

- 8.1 Please confirm the following understanding of the FELCC Assessment conducted for the SOP Application: 14 years of stream flow data was taken from 7 small projects from the F2006 CFT and this data was scaled up to an average annual generation of 500 GWh. Then the worst consecutive 3½ years of stream flow from these scaled-up 7 projects was assumed to be aligned with the worst 3½ years of energy production from the Heritage System (i.e. 1942-1945???) and the findings showed that the scaled up 7 projects could have contributed an average of 425 GWh per year (855 of 500 GWh) over the 3½ year critical water period. Is that a correct understanding of the analysis?
- 8.2 What were the first and last months chosen for the 3½ year critical water period? Why was 3 ½ years chosen rather than 3 years or 4 years? Doesn’t this introduce a distortion, since water flows tend to be seasonal over the year.
- 8.3 Is it fair to conclude from this analysis that the definition of “firm” energy that is most important to BC Hydro is the lowest amount of energy that is likely to be available to the BC Hydro system over BC Hydro’s most critical 3½ year period of water flows? This measure of “firm”energy is referred to as FELCC?
- 8.4 Since wind resources are assumed to be not correlated to hydro system inflows, wind resources are given an FELCC equal to 100% of their expected annual energy. Is that correct?
- 8.5 ELCC, on the other hand, is a measure of capacity contribution rather than energy contribution, and is only used to develop the capacity side of BC Hydro’s load/resource balance. Is that correct?. Once the ELCC is calculated for each existing or prospective project, please explain how that ELCC is used in developing the capacity load/resource balance? Is the load side of this balance equal to Hydro’s forecast of the annual peak load in the coldest period of the year? How long is that coldest period (for planning purposes), and what is the assumed temperature (for

planning purposes)?

9.0 TOPIC: other . Natural Gas Price Forecast
Reference: Exhibit B-1, Section 4.3, p. 4-15

We understand from the information sessions that the Global Energy forecast of Natural Gas prices was based on an assumption that oil would be priced at around \$85/bbl.

- 9.1 Please provide an updated forecast of gas prices if oil remains at \$145/bbl.
- 9.2 Please also provide the electricity price forecast associated with this updated gas price forecast.

10.0 TOPIC: 34. DSM Plan
Reference: Exhibit B-1, Appendix K, Sub-Appendix C, DSM Plan Tables, pp. 100-117 of 213

- 10.1 Please provide the tables in this Sub-Appendix as a fully functioning Excel spreadsheet model. If possible, since this model already exists, please issue this as a new Exhibit as soon as possible, rather than waiting until the deadline for this round of IR responses.

11.0 TOPIC: 34. DSM Plan
Reference: Exhibit B-1, Appendix K, Sub-Appendix Conservation Potential Review, pp. 53-56, Fuel Switching

As part of the Conservation Potential Review, BC Hydro has conducted an extensive analysis of the possibilities for residential fuel switching from electricity to gas for space or water heating, cooking, and clothes drying.

- 11.1 Please provide a similar analysis showing the potential for fuel switching from gas to electricity over the next 20 years. Please provide this analysis for the mid, the high, and the weighted average gas price forecasts and for a forecast that is premised on \$140/bbl oil.

12.0 TOPIC: 37. Clean Power Call LTAP Action Items
Reference: Exhibit B-1, Application, Section 6.2.6.3 Execution and Risk Mitigation

- 12.1 In the table on page 6-36 it states that proposals are to be submitted on November 25, 2008 with EPA's awarded on June, 2009. How was the length of the period between submission and award determined? Was any financial analysis carried out with respect to impacts on bidders resulting from the length of this period carried out? If so, please provide it.

13.0 TOPIC: 37. Clean Power Call LTAP Action Items
Reference: Exhibit B-1, Application, Section 6.2.6.3 Execution and Risk Mitigation, Exhibit B-1-1, Appendix M, Request for Proposals

- 13.1 On Page 9 it states that: "the entire output from the Project must qualify as clean or renewable

electricity in accordance with guidelines to be published by the British Columbia Ministry of Energy, Mines and Petroleum Resources. Guidelines will be posted to the RFP Website when available”? When does BC Hydro expect these guidelines to be posted?

14.0 TOPIC: 37. Clean Power Call LTAP Action Items

Reference: Exhibit B-1, Application, Section 6.2.6.3 Execution and Risk Mitigation, Exhibit B-1-1, Appendix M, Request for Proposals

- 14.1 On page 11 it states that “BC Hydro does not intend to consider variations, whether Essential Variations or Value Variations, to the Specimen EPA which...” Are the words “intend” meant to be an absolute bar or is BC Hydro reserving the right to consider variations to any part of the Specimen EPA?

15.0 TOPIC: 37. Clean Power Call LTAP Action Items

Reference: Exhibit B-1, Application, Section 6.2.6.3 Execution and Risk Mitigation, Exhibit B-1-1, Appendix M, Request for Proposals

- 15.1 On page 18 of Appendix M, reference is made to “Hourly Firm Adjustment”? Please provide the details of the methodology that will be used to determine this adjustment including any studies, models, calculations or data bases that will be used. In particular, please provide any relevant market data including but not limited to pricing information for “on-peak hourly Firm Energy” and monthly HLH firm energy that was used in the calculation. Will the natural gas price forecast in the Application be used in this determination?
- 15.2 Please provide the details of the methodology that will be used in the “risk assessment” with respect to items (i) to (iii) on page 18 of Appendix M including any studies, models, calculations or data bases that will be used.
- 15.3 Please provide the details of the methodology that will be used to determine “interconnection, transmission and generation impacts and costs on a portfolio basis” as set out on page 18 of Appendix M including any studies, models, calculations or data bases that will be used.
- 15.4 Please provide the details of the methodology that will be used to determine the “wind integration costs on a portfolio basis” as set out on page 18 of Appendix M including any studies, models, calculations or data bases that will be used. How does this differ from the “Wind Integration Adjustment” that is also referred to on page 18 of Appendix M?

16.0 TOPIC: 37. Clean Power Call LTAP Action Items

Reference: Exhibit B-1, Application, Section 6.2.6.3 Execution and Risk Mitigation, Exhibit B-1-1, Appendix M, Request for Proposals and Appendix F3

- 16.1 On page 18 of Appendix M, reference is made to a wind integration adjustment of \$10.00/MWh. Please confirm that the sole methodology for calculating this adjuster is set out in Appendix F3.
- 16.2 On page 4 of Appendix F3 it says that the regulating reserves were valued at the California ISO ancillary services market prices. Please explain how these market prices are determined? How does this market operate? How are transmission costs and losses factored into these prices? Are they based on any delivery point? What is its relevance to British Columbia? Is there any

- difference between BC Hydro's cost of providing these services and the market prices?
- 16.3 On page 4 of Appendix F3 reference is made to "Regulating and Load Following Reserve Costs". What is the difference between these reserves and the spinning reserves that BC Hydro is required to maintain? Is there any duplication of these reserves?
- 16.4 On page 4 of Appendix F3 it says: "The final power output was adjusted assuming production losses of 13.6 per cent. How was this figure arrived at? Do these losses vary with turbines manufactured by different turbine suppliers?
- 16.5 On page 9 of Appendix F3 it says: "Energy shift costs represent lost opportunity costs of having to forgo low price imports/high price exports due to these reserve commitments"? As BC Hydro becomes energy self-sufficient will this conclusion change? If a new 2,000-3,000 megawatt transmission line is built from California to the U.S. Pacific Northwest, how would this conclusion change? If a plug in electric hybrid becomes readily available? Vehicle to grid bi-directional charging capability is achieved?
- 16.6 On page 16 of Appendix F3 it states: "The energy shift costs due to lost import opportunities are considerably higher than the energy shift costs due to export opportunities. This is partly due to the fact that BC Hydro is net short and is more frequently importing than exporting." As BC Hydro becomes energy self-sufficient, will total energy shift costs decrease?
- 15.7 On page 17 of Appendix F3 it states: "Until this analysis is complete, BC Hydro plans on using the \$10/MWh wind integration cost estimate as required"? Will this analysis be completed before the current bid submission date of November 25, 2008? If yes, then when? If it is completed before June 2008, will it be used in the bid evaluation process? Will it be made publicly available when it is completed?

17.0 TOPIC: 37. Clean Power Call LTAP Action Items

Reference: Exhibit B-1, Application, Section 6.2.6.3 Execution and Risk Mitigation, Exhibit B-1-1, Appendix M, Request for Proposals

- 17.1 On page 18 of Appendix M, reference is made to "an adjuster (in \$/MWh, to be determined for each Project based on interconnection studies and further studies commissioned by BC Hydro relative to bulk transmission upgrades, energy losses and/or other matters)..". Please provide the details of the methodology that will be used to determine this adjustment including any studies, models, calculations or data bases that will be used and in particular how the determination will be made between upgrades that will be required as a result of the Seller's generating project and those that are required by the general need to upgrade or expand the network. Will the further studies requested by BC Hydro be published in a manner similar to the feasibility studies? If not, why not?
- 16.2 Please provide a detailed transmission grid map, or electronic reference, that identifies each substation and transmission line.
- 16.3 Please provide a table comparing estimated versus actual interconnection costs for the generating projects in the 2006 call. How will differences between actual and estimated costs for the Clean Power Call be handled in the EPA?
- 16.4 It would appear that the results of the interconnection studies pursuant to the signed Feasibility

Interconnection Study agreements with BCTC for Transmission System connected Projects and with BC Hydro for Distribution System-connected Projects will not be available until after the current bid submission date of November 25, 2008. Given this uncertainty, how is the Seller supposed to estimate the amount of its Interconnection Security, as set out on page 32 of Appendix B-1-1, Appendix M, and its impact on the Seller's proposed selling price?

- 16.5 Please provide the details of what measures will be taken to ensure the accuracy of the estimates in the feasibility studies. Who bears the risk of inaccurate estimates?
- 16.6 Please provide the details of how network and distribution upgrades will be completed prior to the Seller's COD date(s).
- 16.7 What is the difference between Transmission Provider Interconnection Facilities and Network Upgrades? If these facilities are to be funded by the Seller, when will the cost estimates be first made available? When is payment required? What measures will be taken to ensure the accuracy of any estimates in the feasibility studies. Who bears the risk of inaccurate estimates?

18.0 TOPIC: 37. Clean Power Call LTAP Action Items

Reference: Exhibit B-1, Application, Section 6.2.6.3 Execution and Risk Mitigation, Exhibit B-1-1, Appendix M, Request for Proposals

- 18.1 Please provide the details of the methodology that will be used to determine the "Proponent's opportunity cost relative to the Project" as set out on page 19 including any studies, models calculations or data bases that will be used.
- 18.2 Please provide the details of the methodology that will be used to determine the value of the residual rights that BC Hydro considers available to it as discussed on page 19 including any studies, models, calculations or data bases that will be used. Does BC Hydro wish to acquire residual rights from public institutions Sellers such as Columbia Power/Columbia Basin Trust, and municipal governments? From GBL projects? First Nation Sellers? Projects where First Nations have an equity share or residual ownership rights?

19.0 TOPIC: 37. Clean Power Call LTAP Action Items

Reference: Exhibit B-1, Application, Section 6.2.6.3 Execution and Risk Mitigation, Exhibit B-1-1, Appendix M, Electricity Purchase Agreement Term Sheet

- 19.1 On page 26 it says: "The total firm energy during system freshet (May 1 to July 31) may not exceed one-quarter of the total firm energy proposed." Please provide the details of the methodology that was used to set this limitation including any studies models, calculations and data bases that were used.
- 19.2 If a new 2,000-3,000 megawatt transmission line is built from California to the U.S. Pacific Northwest, how would this be factored into the methodology and what would the outcome be? If plug in electric hybrid become readily available, how would this be factored into the methodology and what would the outcome be? Vehicle to grid bi-directional charging capability is achieved?
- 19.3 If the existing intertie between Terrace and Kitimat is upgraded so that the transfer capability from Terrace to Kitimat and Kitimat to Terrace is the same, how would this be factored into the methodology and what would the outcome be? Are there any discussions between BC Hydro and Alcan with respect to this upgrade? Any discussions that BC Hydro is aware of between BCTC

and Alcan?

- 19.4 Will the above one-quarter limitation apply to any agreement BC Hydro enters for the purchase of electricity from the Waneta expansion project?

20.0 TOPIC: 37. Clean Power Call LTAP Action Items

Reference: Exhibit B-1, Application, Section 6.2.6.3 Execution and Risk Mitigation, Exhibit B-1-1, Appendix M, Electricity Purchase Agreement Term Sheet

- 20.1 On page 27, reference is made (third bullet under the heading “Firm Energy/Plant Changes) to an adjustment on a 5 year basis for firm seasonal and monthly energy deliveries. Please provide the details of the methodology that was used to determine the need for this adjustment including any studies, models, calculations or data bases that were used. In particular please provide any cost-benefit studies that were carried out.
- 20.2 If a new 2,000-3,000 megawatt transmission line is built from California to the U.S. Pacific Northwest, how would this be factored into the methodology and what would the outcome be? If plug in electric hybrid become readily available, how would this be factored into the methodology and what would the outcome be? Vehicle to grid bi-directional charging capability is achieved?
- 20.3 If the existing intertie between Terrace and Kitimat is upgraded so that the transfer capability from Terrace to Kitimat and Kitimat to Terrace is the same, how would this be factored into the methodology and what would the outcome be?

21.0 TOPIC: 37. Clean Power Call LTAP Action Items

Reference: Exhibit B-1, Application, Section 6.2.6.3 Execution and Risk Mitigation, Exhibit B-1-1, Appendix M, Electricity Purchase Agreement Term Sheet

- 21.1 On page 28 energy prices are set out in a time of delivery table. Please provide the details of the methodology that was used to determine the need for this adjustment and the determination of the values in the table including any studies, models, calculations or data bases that were used. Please confirm the natural gas price forecast in the Application was used in this determination.
- 21.2 If a new 2,000-3,000 megawatt transmission line is built from California to the U.S. Pacific Northwest, how would this be factored into the methodology and what would the outcome be? If plug in electric hybrid become readily available, how would this be factored into the methodology and what would the outcome be? Vehicle to grid bi-directional charging capability is achieved?
- 21.3 If the existing intertie between Terrace and Kitimat is upgraded so that the transfer capability from Terrace to Kitimat and Kitimat to Terrace is the same, how would this be factored into the methodology and what would the outcome be?

22.0 TOPIC: 37. Clean Power Call LTAP Action Items

Reference: Exhibit B-1, Application, Section 6.2.6.3 Execution and Risk Mitigation, Exhibit B-1-1, Appendix M, Electricity Purchase Agreement Term Sheet

- 22.1 On page 29, first bullet, reference is made to BC CPI. Why was BC CPI chosen and not the broader Canadian CPI?

- 22.2 On page 29 it says: “Line losses from the point of interconnection to Lower Mainland will be deducted.” Please provide the details of the methodology that will be used to determine the line losses including any studies, models, calculations or data bases that will be used.
- 22.3 On page 29, Non-firm Energy pricing Option B is described with reference to mid-C indices for On-Peak and Off-Peak hours. Please define specifically which indices BC Hydro is proposing to use, and please provide the daily historical data for these indices from Jan 1, 1998 to August 15, 2008, plus the monthly averages for On-Peak and Off-Peak hours for the same period. Do the index definitions of On-Peak and Off-Peak hours differ in any way from the BC Hydro definitions of HLH and LLH hours?
- 22.4 Please provide BC Hydro’s 40-year forecast of the monthly averages for the On-Peak and Off-Peak Mid-D indices that BC Hydro is proposing to use for Non-firm Energy pricing Option B.

23.0 TOPIC: 37. Clean Power Call LTAP Action Items

Reference: Exhibit B-1, Application, Section 6.2.6.3 Execution and Risk Mitigation, Exhibit B-1-1, Appendix M, Electricity Purchase Agreement Term Sheet

- 23.1 On page 30, there is a table of time of delivery factors. Please provide the details of the methodology that was used to determine the values in the table including any studies, models, calculations or data bases that were used. Please confirm the natural gas price forecast in the Application was used in this determination.
- 23.2 If a new 2,000-3,000 megawatt transmission line is built from California to the U.S. Pacific Northwest, how would this be factored into the methodology and what would the outcome be? If plug in electric hybrid become readily available, how would this be factored into the methodology and what would the outcome be? Vehicle to grid bi-directional charging capability is achieved?
- 23.3 On page 30 it says that “all environmental attributes to vest in BC Hydro. Has sharing the risks and benefits of these attributes between Sellers and BC Hydro ever been considered? If not, why not? Will the leveled prices submitted for regulatory approval and publicly released be adjusted to reflect the benefits to BC Hydro of acquiring these attributes?

24.0 TOPIC: 37. Clean Power Call LTAP Action Items

Reference: Exhibit B-1, Application, Section 6.2.6.3 Execution and Risk Mitigation, Exhibit B-1-1, Appendix M, Electricity Purchase Agreement Term Sheet

- 24.1 On page 30 it says there will be “No flow through or other charges”. Has BC Hydro ever conducted or commissioned a benefits and cost study of not allowing any flow through charges? If it has, please provide a copy of it. For example, what if transmission reliability standards are changed?

25.0 TOPIC: 37. Clean Power Call LTAP Action Items

Reference: Exhibit B-1, Application, Section 6.2.6.3 Execution and Risk Mitigation, Exhibit B-1-1, Appendix M, Electricity Purchase Agreement Term Sheet

- 25.1 On page 31 it says that: “On the first anniversary of COD, performance security amount reduced to \$6.00/MWh (adjusted for BC CPI from January 1, 2008) multiplied by the annual firm energy.” Why is it necessary to require the Seller to post security after the one year anniversary

date after COD when BC Hydro has a right of setoff as per page 31 of Appendix M under the heading “Payment Terms”? In the EPAs that BC Hydro has entered into since the early 1990’s has any seller not delivered electricity in accordance with its agreement after the first anniversary of COD? If yes, please provide the details of the failure including the quantity of electricity not delivered and the duration of each failure to deliver.