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September 18, 2007

British Columbia Hydro and Power Authority
333 Dunsmuir Street
Vancouver, BC
V6B 5R3

Attention: Ms. Joanna Sofield, Chief Regulatory Officer

Dear Ms. Sofield:

Re: Terasen Gas Inc. ("TGI") and Terasen Gas (Vancouver Island) Inc. ("TGVI") Application for System Extension & Customer Connection Changes Review (the "Application") Project No. 3698472

Response to the British Columbia Hydro and Power Authority ("BC Hydro") Information Request ("IR") No. 1

On July 31, 2007, Terasen Gas filed the Application as referenced above. In accordance with Commission Order No. G-90-07 setting out the Regulatory Timetable for the Application, TGI and TGVI respectfully submit the attached response to BC Hydro IR No. 1.

If there are any questions regarding the attached, please contact Mr. Tom Loski, Director, Regulatory Affairs at (604) 592-7464.

Yours very truly,

TERASEN GAS INC. and
TERASEN GAS (VANCOUVER ISLAND) INC.

Original signed by: Tom Loski

For: Scott A. Thomson

cc (e-mail only): Registered Parties

Attachment

1.0 Reference: Application, page 3

In its application, Terasen states that "The Companies believe that … the connection and attachment policies should help meet societal and governmental policy and objectives, including promoting energy efficiency and conservation and also encourage the optimal consumer energy mix."

In respect of government policy and objectives, Terasen goes on to say that the Energy Plan is "a made in BC solution to the common global challenge of ensuring a secure, reliable supply of affordable energy in an environmentally responsible way."

One key objective of the 2007 BC Energy Plan is the reduction of overall greenhouse gas emissions and a number of policy actions have been set out by the government in this regard.

Policy Action 18 requires that "All new electricity generation projects will have zero net greenhouse gas emissions."

Policy Action 19 requires "Zero net greenhouse gas emissions from existing thermal generation power plants by 2016."

Policy Action 20 requires "Zero greenhouse gas emissions from any coal thermal electricity facilities."

Policy Action 21: "Ensure clean or renewable electricity generation continues to account for at least 90% of total generation."

1.1 Since Policy Actions 18, 19 and 20 will result in zero net greenhouse gas emissions, would Terasen agree that the use of natural gas in future to provide space and water heating would result in higher greenhouse gas emissions in BC than the use of electricity to provide space and water hearing? If not, please explain fully.

Response:

Terasen does not agree with the statement that the use of natural gas to provide space and water heating will result in higher greenhouse gas emissions than the use of electricity. The view that using electricity for space and water heating produces lower greenhouse gas emissions than would natural gas can only be supported if one considers the province of BC to be an island separated from the region and the rest of the North America in this matter. GHG emissions are a regional and global issue and do not stop at the border of neighbouring states and provinces. It is not appropriate to isolate this issue solely within BC. The Companies are of the view that Provincial Government recognizes this as evidenced by its participation in the Western Climate Initiative. Further, the goals outlined in Policy Actions 18, 19, and 20 may result in zero net emissions only if BC Hydro reaches this goal. How these goals are achieved and

the cost at which they are achieved has not been determined and as such it is not known if government and customers are supportive or not.

The Energy Plan identifies that Powerex will continue to trade power generated in BC and purchase power generated outside of the province in part to keep rates competitive. As noted in the BC Hydro 2007 Rate Design proceeding ("BCH 07 RDA"), in Terasen's response to BCUC IR No. 1 (Exhibit C-7-5), Question 3, *"the Terasen Utilities believe that it is appropriate to consider natural gas-fired generation to be the marginal source of electricity supply in the region in which BC Hydro operates"* (excerpt below)

3.0 Reference: Exhibit C7-4, Terasen Utilities, p. 2, Marginal Electricity Supply

3.1 Terasen states that regardless of the region a utility is located in, the marginal source of supply is likely to be natural gas. Please confirm that Terasen believes this applies in the case of BC Hydro.

Response:

Yes, the Terasen Utilities believe that it is appropriate to consider natural gas-fired generation to be the marginal source of electricity supply in the region in which BC Hydro operates. This is largely a function of the interconnectedness of the electricity grid in the region and across western North America, and the considerable amounts of electricity trading that occurs between British Columbia and other jurisdictions. Additional detail is provided below:

The Company further describes that natural gas fired electrical generation accounts for 83% of new generation in the Pacific Northwest between 2000-2006 and is expected to account for 75% of the 2007 generation (also refer to Exhibit C-7-5 in the BCH 07 RDA, TGI Response to BCUC IR No. 1, Question 3.1 included under Attachment 1.1 to these responses).

Terasen's Final Argument in the BCH 07 RDA on page 5, paragraphs 10 and 11 (excerpt below) also stated:

10. Electricity is not the "right fuel" when it comes to space and water heating, and its use for those applications is less efficient than the consumption of natural gas. In North America the marginal source of electricity is likely to be gas-fired generation. Documents obtained from the US Department of Energy Federal Energy Management Program (FEMP) suggest that in the Western Interconnection gas fired generation is on the margin 80% to 90% of the time.[9] These gas fired generation facilities operate at a lower efficiency than do natural gas furnaces and water heaters.[10] Gas fired generation on average operates at an energy efficiency rate of roughly 45-60% based on combined cycle technology, and older generators like Burrard Thermal Generating Station operate even less efficiently.[11] In contrast, new high efficiency natural gas fired furnaces operate at 95% efficiency and natural gas fired water heaters operate at an efficiency ranging between 60% and 85%. British Columbia is interconnected with Alberta and the Western United States and electricity moves freely across the interconnection. In any given hour, the domestic load will be supplied by a mix of BC Hydro owned and contracted resources and net imports.[12] BC has been a net importer for the past five years, and a significant portion of those imports come from the United States.[13]

11. In short, a GJ of natural gas produces more heat energy when consumed in a domestic water or space heater located in British Columbia than it would if the natural gas was exported, burned to generate electricity for re-import into British Columbia, and used for the same space and water heating applications.

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[8] Energy Plan, page 21, Exhibit C7-10, Tab 6
[9] Exhibit C7-10, Tab 8; Tr. 5 p.727 ll.1-6; B-43
[10] Tr. 5 p.728 ll.20-24;
[11] Tr. 5 p.730 l.19-p.731 ll. 1-6; Exhibit B-44
[12] Exhibit B-46, p.2

The Company believes that the most appropriate use of energy resources, from both a cost and greenhouse gas perspective, is for customers to use natural gas for heating applications and electricity for non-heating applications. It is the Companies' belief that by taking this direction, BC Hydro will be more likely to achieve the policy actions as laid out in the Energy Plan.

Please also refer to the Terasen Final Argument page 9, paragraph 20, excerpt below.

> 20. Moreover, GHG emissions are a global issue. There is little prospect of North America moving away from fossil fuel based electricity generation in the near future. The Energy Plan contemplates the increased production of natural gas. If this increased natural gas production were to be used domestically for space heating at up to 90% efficiency, rather than exported for the generation of electricity at no more than 40%-60% efficiency, all else being equal this would have the result of freeing up hydroelectricity for export to markets that would otherwise be burning fossil fuels to generate electricity.[27] The continued development of "clean" generation in BC in pursuit of the self-sufficiency objective, combined with the continued existence of a pronounced winter peak, will mean that as a general proposition, there should be even more energy available than today for export in off-peak hours.[28] This is the same logic that underlies Manitoba Hydro's program, to which Commissioner Milbourne referred, of qualifying surplus exports from its predominantly hydro-based system as GHG offsets;[29] it is a recognition that GHG emissions are a global problem, not one that can be addressed within BC alone. The reasoning set out above is consistent with BC Hydro's Service Plan objective to "Profitably increase Western market share based on access to assets in BC and the Western System and increased trading activity."[30]

The policy actions set forth in the Energy Plan are the goals that the Province has laid out for among other things, reducing greenhouse gas emissions. Significant work on the part of utilities and industry must be undertaken to determine how these policy actions are to be met, if it is at all feasible to meet the actions and if so, how the actions will be met and at what cost will they be met. At present, the Company is not aware of any current BC Hydro generation that meets the target of zero greenhouse gas emissions all current generation produces some greenhouse gas emissions. Ensuring that future generation meets the target of zero net greenhouse gas emissions will require, at the least, a selection of electricity generating projects that have very low carbon production and an investment in green credit trading, all at a cost to rate payers. Terasen does not know if the Province or the end use customers will be supportive of these costs or if this target is achievable.

In addition, Terasen Gas believes it is inappropriate to consider aspects of the Energy Plan in isolation of one another. The Energy Plan also promotes the responsible development of natural gas resources within the Province, highlights the importance of using the right fuel for the right use at the right time and recognizes the importance of natural gas in the Provinces energy mix.

The Companies are supportive of the goals as laid out in the Energy Plan with respect to BC Hydro and believes that by working together, Terasen will help BC Hydro achieve the objectives.

1.2 Please estimate the impact on provincial greenhouse gas emissions from the requested changes to TGI and TGVI's system and connection policies.

Response:

Please refer to the response to Question 1.1 above. In Terasen' Final Argument in the BCH 07 RDA, on page 7, paragraph 16, the Companies stated:

> **II. GHG Emissions**
>
> 16. As indicated above, the evidence of the Terasen Utilities was that imported electricity will typically be generated by gas-fired generation because gas fired generation is on the margin in the Western Interconnection the vast majority of the time. Gas fired generation is not as efficient as direct use of natural gas in domestic space and water heaters. Electric space and water heating using electricity generated by gas fired generators at the margin throughout the Western Interconnection generates more GHG emissions than if natural gas and alternative energy sources are used for space and water heating in BC. As a result, even though BC Hydro's system is hydro-based, efforts to reduce the amount of electricity consumption in British Columbia can get "more bang for the buck" (using the words from of the US Department of Energy FEMP website) in terms of GHG reductions than attempting to reduce natural gas consumption.[19] The Terasen Utilities have calculated that if the additional space and water heating loads are served directly by natural gas instead of through gas fired electricity generation at the margin, the GHG emissions savings would be expected to be in the range of approximately 1,200,000 to 1,500,000 tonnes over the same period (2008-2020).[20] The GHG emission benefits of burning natural gas in domestic water and space heaters in BC are multiplied if the marginal source of generation in the Western Interconnection at a particular point in time is coal fired (e.g. imports from Alberta).

The reduction in emissions with respect to this application is based upon the number of customers that choose to use gas instead of electricity as a result of changes to the connection charges; however the effect of changes to BC Hydro's rate design and attachment policies will also have an impact on the type of attachments to both BC Hydro and TGI/TGVI. As such, the Company does not believe it is possible to determine

the impact on provincial gas emissions purely as a result of the changes sought in this application.

1.3 Please explain how the requested changes to TGI and TGVI's system and connection policies will help to meet the provincial government's "aim to reduce BC's greenhouse gas emissions by at least 33 per cent below current levels by 2020", as stated on page 14 of the February 13, 2007 Speech from the Throne.

Response:

Please refer to the response to Question 1.1.

2.0 Reference: Application, page 4

The Application lists one of Terasen's objectives as being to "encourage the "right fuel" choice." The company believes that natural gas is an appropriate fuel for space and water heating applications and that the connection policies and tests should send the appropriate signal to customers for these energy uses."

2.1 Please explain why the company believes natural gas is the "right" fuel for space and water heating applications.

Response:

As noted in Terasen's Final Argument in the BCH 07 RDA, Terasen believes

> *"The clear implication of this principle is that BC's Heritage electric power is a scarce and extremely valuable resource that should not be squandered through inefficient use when other alternatives are available. Electricity is not the right fuel when it comes to space and water heating applications; rather, the right choice is natural gas or alternative energy sources."*[1]

Natural gas is the right choice as it will result in lower greenhouse gas emissions for space and water heating applications than the electrical alternative. Please also refer to the response to Question 1.1

Further in the Terasen's Final Argument in the BCH 07 RDA, the Companies noted:

> *"Starting in 2005, BC Hydro added the following message to its website, and the message remained on the website as of the hearing:*
>
> *We encourage customers to think about how they use energy.*
>
> *It's important to match your energy source to its best use. Electricity is best suited for lighting and powering our appliances and televisions, whereas natural gas is ideal for space and water heating."*[2]

From this it appears that BC Hydro believes that the right use of electricity is not for space heating.

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[1] BCH 07 RDA, Terasen Final Argument, page 3, paragraph 4

[2] BCH 07 RDA, Terasen Final Argument, page 6, paragraph 12

2.2 Assuming electricity has net zero greenhouse gas emissions will eventually be required under the 2007 Energy Plan, please provide a comparison of greenhouse gas emissions from space and water heating using natural gas and electricity.

Response:

As noted in the response to Question 1.1, Terasen does not believe it is realistic or appropriate to assume that there will eventually be zero net greenhouse gas emissions as set out, but not required, by the 2007 Energy Plan. The Energy Plan also sets out that "new" generation must be net zero net greenhouse gas emitting, but does not suggest that "all" current generation be zero net greenhouse gas emitting.

Therefore, it is the Companies' belief that in the context of a new incremental customer, all other things being equal, greenhouse gas emissions will rise if that customer uses electricity for space heating.

Please also refer to the response to Question 1.2.

3.0 Reference: Appendix 2, page 14

The Application states that "The forecast was based on a forecast wholesale natural gas price of US$8.00 per million Btu in 2006 declining to US$6.00 per million Btu in 2011 and staying relatively flat for the following ten years."

3.1 Please provide the annual values of the wholesale natural gas price forecast.

Response:

Please see the table below for the natural gas prices as forecast in the 2006 EIA Energy Outlook and GLJ April 2006 natural gas price forecast which were used in the Willis Energy Study included in Appendix 2 of the Application.

.	High Price Case	High Economic Case	Reference Case	Low Economic Case	Low Price Case	GLJ April 06 Forecast
2006 $US/MMBtu	7.37	7.49	7.32	7.16	7.26	8.25
2007 $US/MMBtu	7.00	6.74	6.56	6.39	6.24	8.80
2008 $US/MMBtu	6.85	6.38	6.17	5.99	5.72	7.70
2009 $US/MMBtu	6.52	5.90	5.71	5.52	5.30	7.05
2010 $US/MMBtu	6.37	5.55	5.37	5.20	4.86	6.45
2011 $US/MMBtu	6.20	5.37	5.11	4.95	4.52	6

3.2 Please indicate the source of this forecast.

Response:

The source of the natural gas price forecasts used in the Willis Energy study included in Appendix 2 of this Application is the April 2006 GLJ Quarterly Report, and the 2006 EIA Annual Energy Outlook.

3.3 Please summarize the underlying assumptions of this forecast.

Response:

The Companies do not forecast natural gas prices, but rather rely on third party gas price forecasts. The assumptions and discussion of the various gas price forecasts below are drawn from the third party sources who prepared each of the forecasts that Terasen reviewed in its 2006 Resource Plan (see Figure 2-5, page 18 of the 2006 TGI Resource Plan).

The EIA uses the last 30 years of data, including normal weather and storage inventories to generate the price forecasts. The reference case is based on an optimistic future with the assumption that natural gas supplies will enter the market to soften prices, from sources such as LNG Imports, Alaska and the Mackenzie Delta. Prices are shown as softening significantly in the short term with the arrival and impact of anticipated new supplies. EIA's high and low price and high and low economic forecasts as compared to the reference case are generated to provide a balance and sensitivity of reasonableness to the reference case assumptions.

GLJ Petroleum Consultants Ltd. prepares commodity price and market forecasts every quarter after a comprehensive review of information available to the reported quarter. Information sources include numerous government agencies, industry publications, Canadian oil refiners and natural gas marketers.

4.0 Reference: Appendix 2, page 22

The Application states that "an aggressive promotional campaign with a moderate incentive could persuade customers to convert to gas water heaters at the time that their electric heater needs replacement."

4.1 Please justify this statement considering the limited response to a joint Terasen Gas/ BC Hydro program of this nature that operated on Vancouver Island from October 2005 to February 2007.

Response:

The referenced Appendix 2 (the Willis Energy Market Competitive Assessment) is a report prepared by Willis Energy for Terasen Gas and whose statements and findings are the independent opinions of Willis Energy. Terasen Gas treats the report as a starting point to examine the opportunities, threats and suggestions made by Willis Energy in the report and would conduct more in depth analysis of the statements in the reports to determine which items justify or require attention.

5.0 Reference: Appendix 2, page 36, Table 60

The Application states that the annual energy costs of Air to Air Heat Pumps in the Lower Mainland, Interior and Vancouver Island are $275, $275 and $334 respectively.

5.1 The indicated costs do not match those in Appendix D of Appendix 2. Please confirm or correct these costs.

Response:

Terasen has confirmed with the author of the report that the tables were incorrect. Included in Attachment 5.1 to these responses, are replacements to pages 36 and 40 of Appendix 2 of the Application.

6.0 Reference: Application, page 9

Terasen states that a developer cannot normally charge more for a new home with gas heating.

6.1 Please provide, for the last five years, the percentage of new single family dwellings in developments already served with natural gas that installed natural gas service.

Response:

Terasen gathers data on the number of new homes attaching to pre-existing natural gas mains. This information is provided in the table below.

		Number of New Residential "On Main" Attachments
TGI	**2003**	214
	2004	417
	2005	369
	2006	273
TGVI	**2003**	1,388
	2004	1,388
	2005	1,476
	2006	700

However, there is no data available on homes that were constructed on pre-existing mains which chose not to connect to Terasen's system. To do so would require specific knowledge of each new home constructed in the province which would then need to be mapped to Terasen's entire existing distribution system. If the data were available, the effort required to map and analyze the results would likely prove too high for the benefit obtained.

7.0 Reference: Application, Section 4.4

Terasen provides an analysis of 2006 data.

7.1. For each of TGI and TGVI, please provide the percentage of customers whose service line cost exceeded the current maximum allowance of $1,100 in 2006.

Response:

For 2006, 28% of new TGI service lines and 50% of new TGVI service lines exceeded the $1,100 maximum Service Line Cost Allowance.

7.2. For each of TGI and TGVI, please provide the average customer contribution (excluding the $85 application fee) in 2006.

Response:

Customer contribution is derived from three different sources: 1) $215 for each new service installed, 2) additional service line contribution that exceed the $1,100 SLCA and 3) main extensions that require a contribution. The number of customers for each type of contribution varies as seen in the table below.

Company	Contribution Type	Average Customer Contribution		# of Customers Impacted
TGI	**$215 SLIF**	$	215	11,028
	Cont. for >$1,100 Service Line	$	1,309	3,130
	Main Extension Contribution*	$	5,534	39
TGVI	**$215 SLIF**	$	215	3,003
	Cont. for >$1,100 Service Line	$	522	1,495
	Main Extension Contribution*	$	2,877	11

***Average cost calculated on a 'per main extension' basis as a single customer (typically a developer) pays for the entire amount.**

7.3. For each of TGI and TGVI, please provide what the average customer contribution would have been in 2006 (excluding the $85 application fee) under Terasen's proposed policy, but excluding the proposed energy efficiency allowance.

Response:

This response builds on the response to Question 7.2 by making the following changes based on the proposed policy changes: 1) $215 is eliminated for new service lines, 2) service line contributions now begin at $1,535 and 3) the effect of increasing the service line contribution is reflected in contributory main extensions. Though in some cases the average customer contribution may increase, it should be noted that the number of customers who are affected has decreased with the net impact being a decrease in contribution.

Increasing the service line cost allowance to $1,535 in the case of TGI results in an increase to the average customer contribution. Though not intuitive, this outcome is driven by the fact that the change to the service line cost allowance would decrease the number of customers paying a contribution by 38%, but the total amount of contribution being paid would only decrease by 23%. Decreasing the number of customer paying a contribution by a greater percentage than the change in total contribution results in a higher average contribution. However, on an individual basis, every customer who is currently required to pay a contribution towards their service line would experience a lower charge from implementing a service line cost allowance of $1,535. Though in some cases the average customer contribution may increase, it should be noted that the number of customers who are affected has decreased with the net impact being a decrease in contribution.

Company	Contribution Type	Average Customer Contribution	# of Customers Impacted
TGI	**$215 SLIF become $0**	$ -	N/A
	Cont. for >$1,535 Service Line	$ 1,465	2,050
	Main Extension Contribution*	$ 4,664	39
TGVI	**$215 SLIF become $0**	$ -	N/A
	Cont. for >$1,535 Service Line	$ 258	972
	Main Extension Contribution*	$ 2,007	11

***Average cost calculated on a 'per main extension' basis as a single customer (typically a developer) pays for the entire amount.**

7.4. For each of TGI and TGVI, please provide what the average customer contribution would have been in 2006 (excluding the $85 application fee) under Terasen's proposed policy, including the proposed energy efficiency allowance.

Response:

Terasen does not collect data on appliance efficiency and hence cannot calculate the effect on customer contribution from energy efficiency allowances. In order to gauge the magnitude of the proposed change an estimation of the impact of including energy efficiency allowance is provided by assuming that: 1) 30% of the customers making a contribution (those above the service line cost allowance of $1,535) have both water and space heating loads, 2) that 5% have high efficiency water and space heating and 3) 1% have a LEED building with high efficiency water and space heating.

Based on these assumptions, the average customer contributions are provided in the table below.

Company	Contribution Type		Average Customer Contribution	# of Customers Impacted
TGI	**$215 SLIF become $0 + High Eff.**	$	-	N/A
	Cont. for >$1,535 Service Line + High Eff.	$	1,433	1,943
	Main Extension Contribution* + High Eff.	$	4,248	39
TGVI	**$215 SLIF become $0 + High Eff.**	$	-	N/A
	Cont. for >$1,535 Service Line + High Eff.	$	226	945
	Main Extension Contribution* + High Eff.	$	1,687	11

***Average cost calculated on a 'per main extension' basis as a single customer (typically a developer) pays for the entire amount.**

When contrasted with the table from the response to Question 7.3, the effect of increasing the service line cost allowance by the energy efficiency allowance is to slightly decrease the number of customers required to make a contribution, but the overall effect based on the stated assumptions is minor.

8.0 Reference: Application, page 8

Terasen notes that BC Hydro's proposed allowance of $1,900 per customer for new residential extensions was based on a 20-year present value of allocated Distribution demand-related costs. On page 24 of the application, Terasen states that its proposed system-wide approach for the target PI is consistent with BC Hydro's proposed system extension test.

8.1. Given that BC Hydro has proposed to apply its allowance on an individual customer basis, please explain fully why Terasen considers BC Hydro's proposed system extension test to be consistent with Terasen's proposed system-wide approach for the target PI.

Response:

The reference to consistency with BC Hydro's proposed test on page 24 of the Application is only with respect to the matter of adopting a system-wide aggregated approach to establishing targets for the system extension test. For residential customers, BC Hydro has adopted a system-wide allowance of $1,900 per customer employing a calculation based on allocated costs in the cost of service study. BC Hydro's proposed approach does not conduct a full incremental evaluation of the expected revenues and costs from a particular system extension. If BC Hydro had adopted a different approach that looked at the specific incremental revenues and costs from individual system extensions the residential per customer allowances would have varied from one extension to the next rather than being a constant amount of $1,900 per customer. Alternatively, if BC Hydro was to perform detailed evaluations of the incremental costs and revenues of system extensions to which the $1,900 per customer allowance had been applied some extensions would have a positive NPV and others would have a negative NPV because the $1,900 per customer allowance would not be equally appropriate for all extensions. In the Application, the Companies are seeking to have the target Profitability Index (PI) established on a system-wide aggregated basis rather than requiring each individual main extension to have a PI greater than 1.0. In this specific aspect of adopting a system-wide target measure the approaches of the two companies are similar.

9.0 Reference: Application, page 29

Terasen states that current customers will benefit from the proposed energy efficiency credits because the system and extension tests and policies will not discourage attachment to the system for customers who consider conservation and efficiency.

9.1. Please confirm that the implementation of the proposed energy efficiency credits would result in higher rates for current customers. If confirmed, please explain how higher rates constitutes a benefit for current customers. If not confirmed, please explain fully how increases in the SLCA would not result in higher rates for current customers.

Response:

The implementation may or may not result in higher rates for current customers. The energy efficiency credit is only used as a factor in calculating the main extension test. The only time in which it will actually affect a customer is if the main extension in question was marginally uneconomic. In this case the credit may allow the customer to be attached without a contribution when otherwise the customer may have had a contribution, which could translate into higher rates.

However there is a possibility that actual consumption may be higher than forecast rather than lower (or equal to the forecast with the inclusion of the credits). As such the customer's consumption may cause rates to go lower. This is no different than the affect of variations in consumption of current customers. However, if rates were to increase as a result of this policy change, the Companies believes that it is appropriate, in order to send appropriate signals to customers about the use of efficient appliances.

Similarly, an increase in the SLCA will not necessarily translate into an increase in rates. The SLCA is the maximum amount of capital that the Companies will install to serve a customer. The customer pays a contribution only when the costs to serve them are higher than the SLCA. Increasing the SLCA for efficiency will only impact rate base in those instances where the cost to serve the customer is higher than the SLCA prior to the increase due to efficiency. The Companies believe this scenario will not be high in frequency.

Attachment 1.1

3.0 Reference: Exhibit C7-4, Terasen Utilities, p. 2, Marginal Electricity Supply

3.1 Terasen states that regardless of the region a utility is located in, the marginal source of supply is likely to be natural gas. Please confirm that Terasen believes this applies in the case of BC Hydro.

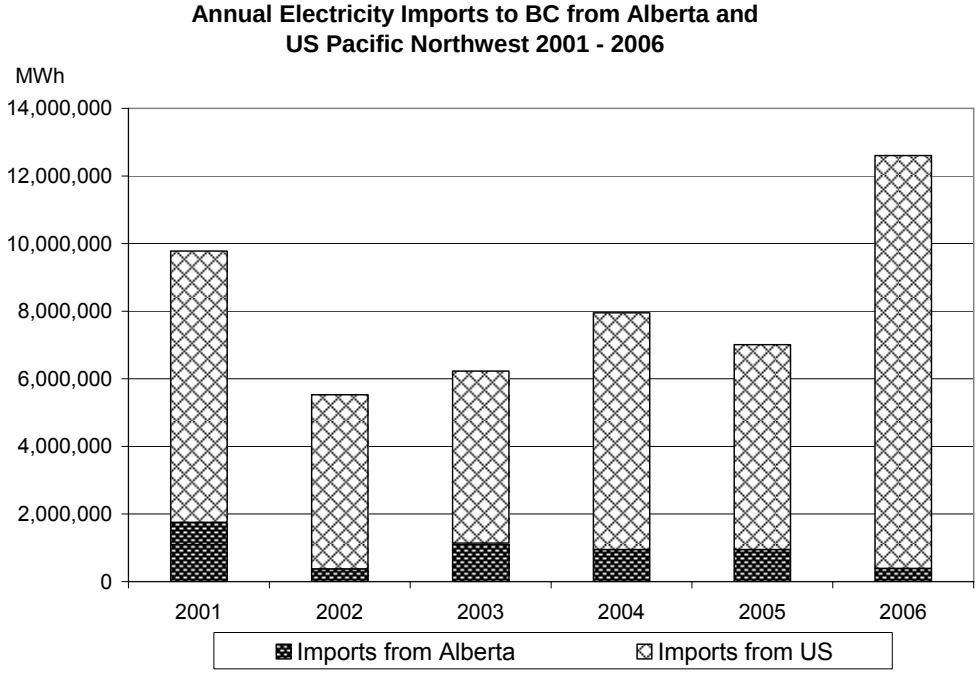
Response:

Yes, the Terasen Utilities believe that it is appropriate to consider natural gas-fired generation to be the marginal source of electricity supply in the region in which BC Hydro operates. This is largely a function of the interconnectedness of the electricity grid in the region and across western North America, and the considerable amounts of electricity trading that occurs between British Columbia and other jurisdictions. Additional detail is provided below:

- BC Hydro (through Powerex) participates in electricity trade within the interconnected region of the Western Electric Coordinating Council (WECC), which also includes Alberta and all or most of the 11 western most States and small portions of other States and Mexico. It is the Terasen Utilities' understanding that a majority of trading between BC and the U.S. involves energy generated in the Pacific North West (PNW) which generally includes the States of Washington, Oregon, Idaho and Montana.

- BC Hydro currently relies on electricity imports to meet customers' demands and this reliance has been increasing. Figure 1 below shows Statistics Canada data for electricity imports to BC since 2001. Although BC's exports are not included in this data BC Hydro has indicated in their 2006 IEP (pages 3-6 and 3-7) that they have been a net importer of electricity in recent years.

Figure 1

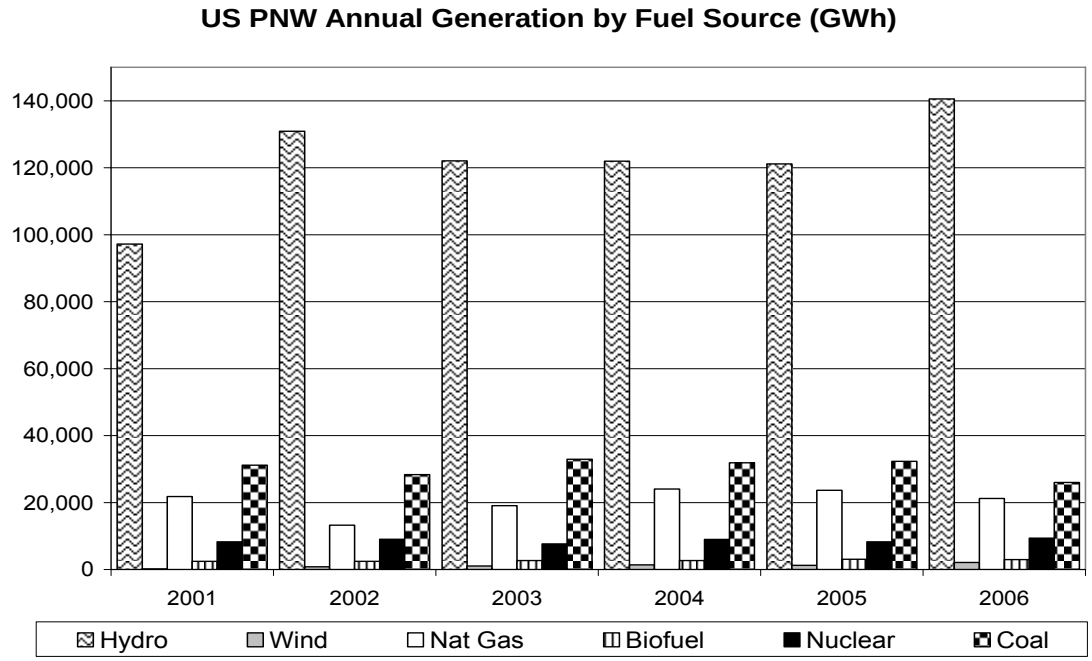


(Source: Statistics Canada CANSIM Table 127-0001 Electric Power Statistics Monthly for BC)

- Statistics Canada data (Statistics Canada CANSIM Table 127-0001 Electricity Power Statistics Monthly for Alberta) also shows that in Alberta, 95% or more of the electricity generated uses fossil fuels (natural gas, coal or various forms of petroleum based fuels) as a fuel source, making the marginal source of imported electricity from Alberta primarily a combination of clean burning natural gas fired generation and generation from other, more GHG and pollutant intensive fossil fuels.

- According to statistics from the U.S. Energy Information Administration (EIA), hydro electric generation in the U.S. Pacific Northwest (Washington, Oregon, Idaho and Montana) - accounted for between 63% and 70% of generation during 2005 and 2006 while coal and natural gas accounted for between 23% and 30% of generation. Figure 2 shows electricity generation by source in these states since 2001. If other states in the WECC are included, fossil fuels account for closer to 60% of electricity generation.

Figure 2

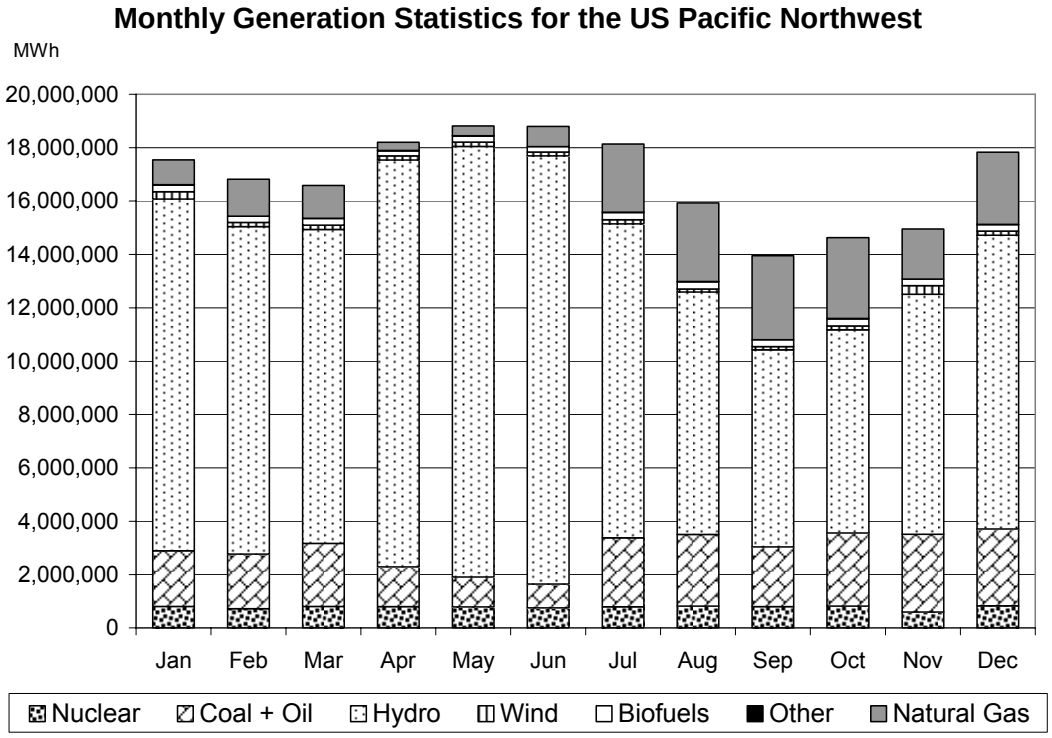


(note: a seventh category 'Other' is not shown since the amount is too small to show on this scale)

(Source: U.S. Department of Energy. The Energy Information Administration, 2006 December EIA-906/920 Monthly Time Series File)

- While a substantial portion of the electricity generated in the U.S. PNW is sourced from hydro, Figure 2 does indicate that both coal and natural gas are the marginal fuels during periods of lower hydroelectric generation. This characteristic of PNW generation is also shown in monthly statistics for 2006 as indicated in Figure 3.

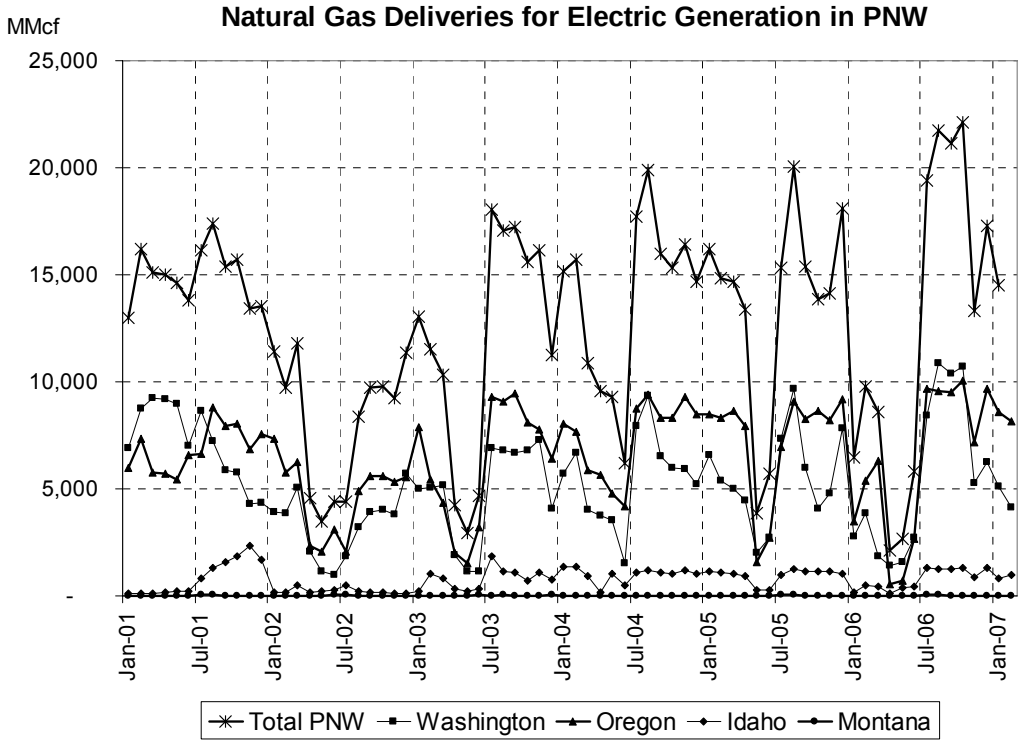
Figure 3



(Source: U.S. Department of Energy. The Energy Information Administration, 2006 December EIA-906/920 Monthly Time Series File)

- Figure 4, below, shows the variability and timing of natural gas deliveries specifically for power generation in the U.S. Pacific Northwest. The seasonal pattern and fluctuation of gas deliveries for power generation since at least as early as 2001 also indicates that natural gas is being used as the marginal resource in the region.

Figure 4



(Source: U.S. Department of Energy. The Energy Information Administration, Natural Gas Delivered to Electric Power Consumers, Spreadsheet file updated 05/31/2007.)

- Further, as demand in this region grows, EIA data also shows that it is natural gas fired generation that is being added to the system and not substantial amounts hydroelectric or other renewable generation. Table 1 shows that almost all new generation developed in this region since 2000 is natural gas fired, with smaller amounts of wind and biofuels and no hydroelectric additions. Since natural gas fired generation is the marginal source of electricity being developed to meet growth and BC is continuing to import electricity from this region, the marginal source of electricity for these imports, and hence for the BC Hydro, is natural gas.

Table 1: Type of Electrical Generation Installed in the PNW 2000 to 2006

Generation Fuel / Type	Total Installed Nameplate Capacity (MW)	% of Total
Wind	812.9	16
Natural Gas	4249.2	**83**
Hydro	3.3	0
Fuel Oil	35.6	1
Biofuels	38.7	1
Landfill Gas	2.1	0
Total	5141.8	

(Source: U.S. Department of Energy. The Energy Information Administration, Form EIA-860, "Annual Electric Generator Report.")

- Table 2 below indicates that this trend is going to continue.

Table 2. Summary of Generation Projects in the PNW Proposed for 2007 (Source: EIA)

2007 Proposed Generation Projects

Fuel / Generation Type	Net Summer Capacity (MW)	% of Total Summer Capacity
Natural Gas	1558.83	75
Hydroelectric	0	0
Wind	499.4	24
Biofuels	26.04	1
Fuel Oil	0	0
Landfill Gas	6.12	0
Energy From Waste	0	0
Total	**2090.39**	

(Source: U.S. Department of Energy. The Energy Information Administration, Form EIA-860, "Annual Electric Generator Report.")

In summary, at any point in time there is a finite amount of operable generation connected to the grid in western North America. As shown by Figures 2 and 3 above, nuclear generators will supply base load in almost every circumstance. Existing coal plants will likely also run as long as they are low cost source. Hydro generators will also always operate, although there will be load shaping of the hydro resources through the use of reservoirs. If there are wind farms they will be generating if there is wind. As marginal resources are brought on line to meet high demand periods or supplement wind energy production, that resource will be natural gas fired generation in almost all cases in the Pacific Northwest region. Similarly, reductions in load will most likely result in reductions natural gas fired generation although reductions in hydro powered generation may also occur in order to conserve reservoir levels, which will merely time-shift hydro production.

Attachment 5.1

Table 59 - Impact of Air to Air Heat Pump Program (PJ/yr)

	Retrofit	New Construction
Lower Mainland	3.1	1.2
Interior	0.9	0.2
Vancouver Island	0.6	0.4
Total	***4.6***	***1.8***

Retrofit
For the Retrofit values the impact values are based on 5% of all the housing types except for high-rises being converted from gas heating to air to air heat pumps over the next five years. This seems like a high number, however air to air heat pumps do provide an air conditioning benefit and there is not a penalty with respect to annual energy costs.

Natural Resources Canada data indicated that the heat pump share of the space heating market grew from 1.7% in 1997 to 2.6% in 2004 and the market activity of heat pump suppliers appears to have dramatically increased recently. Accordingly, a 5% increase in the retrofit market over the next 10 years appears reasonable. However, the 5% value is not based on a market analysis.

New Construction
For new Single Family Homes, air to air heat pumps will be an easier sell.

The opportunity impact values in the table above are based on the market share for air to air heat pumps being increased by 10% over the existing forecast values.

In comparing the overall economics of an air to air heat pump to a gas furnace with air conditioning, it is important to consider a number of factors such as:

- The type and efficiency of the heat pump.
- The type and efficiency of the furnace and air conditioning unit.
- Specific gas and electricity rates

The table below compares the annual energy costs of an air-to-air heat pump with a gas furnace.

Table 60 - Air-to-Air Heat Pump vs. Gas Furnace

	Air to Air Heat Pump	High Efficiency Gas Furnace
Lower Mainland	$584	$783
Interior	$486	$651
Vancouver Island	$398	$647

The assumptions used in calculating annual energy costs are provided in Appendix D.
In comparing the equipment and installation costs of air to air heat pumps with high efficiency gas furnaces it is necessary to also consider the cost of conventional air conditioning. The table below is an estimate of the capital costs of the two alternatives.

9.1.6 Increase in Geothermal Space Heating Market Share

The table below indicates a potential decrease in annual natural gas sales for each region if the market share for geothermal space heating was increased by five percent for single family dwellings and high-rise MURBs with respect to new construction. Geothermal is not considered competitive in the retrofit market although there have been some conversions such as the Mole Hill project in Vancouver.

New Construction

For the luxury market, especially large single family dwelling and high-rise MURBs, installation of geothermal systems can be used as an added selling feature. According to an interview conducted with Terasen Gas customer representatives, this opportunity is not considered a very large threat.
Any incentives should be targeted to the developer who would incur additional engineering costs at the project planning stage

Table 69 - Impact of Increase Geothermal Space Heating (PJ/yr)

	Retrofit	New Construction
Lower Mainland	-	0.4
Interior	-	0.1
Vancouver Island	-	0.1
Total	-	***0.6***

Table 70 - Geothermal and Natural Gas Space Heating - Annual Energy Costs

	Geothermal	Natural Gas High-Efficiency
Lower Mainland	$441	$783
Interior	$367	$651
Vancouver Island	$300	$647

9.2 Commercial

9.2.1 Air to Air Heat Pumps

In the Commercial sub-sectors where small to medium size buildings dominate, air-to-air heat pumps will replace at least a small percentage of the gas fired roof-top units or small gas fired boilers. The table below is an estimate of the impact.

Table 71 - Estimated Impact of Air-to-Air Heat Pumps (PJ/yr)

	Retrofit	New Construction
Lower Mainland	0.8	0.2
Interior	0.5	0.1
Vancouver Island	0.1	< 0.1
Total	***1.4***	***0.3***