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October 18, 2010

BC Sustainable Energy Association
5-4217 Glanford Avenue
Victoria, BC
V8Z 4B9

Attention: Thomas Hackney, Director

Dear Mr. Hackney:

**Re: Terasen Utilities (comprised of Terasen Gas Inc., Terasen Gas (Vancouver Island) Inc. and Terasen Gas (Whistler) Inc.) 2010 Long Term Resource Plan
Response to the BC Sustainable Energy Association ("BCSEA") Information Request ("IR") No. 1**

On July 15, 2010, Terasen Gas filed the Application as referenced above. In accordance with Commission Order No. G-146-10 setting out the Regulatory Timetable for the review of the Application, the Terasen Utilities respectfully submit the attached response to BCSEA IR No. 1.

If there are any questions regarding the attached, please contact the undersigned or Ken Ross at (604) 576-7343 or ken.ross@terasengas.com for further information.

Yours very truly,

on behalf of the TERASEN UTILITIES

Original signed:

Diane Roy

Attachment

cc (e-mail only): Erica Hamilton, Commission Secretary
Registered Parties



Terasen Gas Inc., Terasen Gas (Vancouver Island) Inc. Terasen Gas (Whistler) Inc. [collectively (the "Terasen Utilities" or the "Utilities")] 2010 Long Term Resource Plan (the "2010 LTRP" or the "Application")	Submission Date: October 18, 2010
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1.0 Reference: Alternative Energy Services, Exhibit B-1, Table ES-1

The footnote to Alternative Energy Services in Table ES-1 states "Statistics from a forth company - Terasen Energy Services - which served all alternative energy customers prior to 2010. TES is not the subject of this Long Term Resource Plan. Information provided for context only."

- 1.1 Are all of Terasen's 'alternative energy services' provided exclusively by Terasen Energy Services (and not by the other Terasen Utilities)? If not, please explain.

Response:

The Negotiated Settlement Agreement with respect to TGI's 2010-2011 Revenue Requirement Application, which has been approved by the Commission, allows that TGI will be developing and delivering alternative energy services in the future.

- 1.2 Does Terasen Energy Services include any services or products that are not 'alternative energy services'? If so, please explain.

Response:

The nature of the alternative energy services referred to in the above caption are described in the opening paragraph to Section 3.1.1 of Exhibit B-1 (page 52) of the LTRP, which is copied below:

'Geo-exchange, waste heat recovery, biomass and solar thermal energy systems are examples of integrated energy solutions that utilize thermal heating and cooling energy from the environment to replace or supplement traditional natural gas or electrically fired space and water heating systems. District energy systems use a variety of heating sources, including traditional heating sources such as gas and non traditional sources like sewage heat recovery, to deliver heating and cooling to the end use customer.'

This is an accurate description of the all the activities undertaken by Terasen Energy Services. These activities that are now being offered by TGI.



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- 1.3 Does Terasen Energy Services provide any services or products the delivery of which is regulated under the Utilities Commission Act? Is Terasen Energy Services a "public utility" under the Act, either in general or regarding the provision of particular services?

Response:

In the past few years, Terasen Energy Services has participated in projects that are regulated by the Commission. For example, the Dockside Green District Energy Project in Victoria, to which Terasen Energy Services is a partner, is an energy system that falls under regulation (see Commission Order No. C-1-08, dated April 18, 2008).

If Terasen Energy Services provides any services that fall under the definition of "public utility," it is subject to regulation by the Commission.

- 1.4 Please confirm that "Terasen Utilities," as the term is used in the 2010 LTRP, does not include Terasen Energy Services. If there are exceptions, please explain.

Response:

Confirmed.



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2.0 Reference: Exhibit B-1, p.E-1

Terasen states,

"In 2010, Terasen Gas Inc. ("TGI"), Terasen Gas (Vancouver Island) Inc. ("TGVI") and Terasen Gas (Whistler) Inc. ("TGW"), collectively referred to as the "Terasen Utilities" or "the Utilities", began integrating a range of alternative energy solutions and services into their core natural gas transportation and delivery business, while at the same time significantly increasing expenditures on energy efficiency and conservation programs. This Long Term Resource Plan ("LTRP") builds on those initial steps to transform the Terasen Utilities into a complete, integrated energy provider of alternative energy solutions incorporating the reliability of conventional energy services."

- 2.1 This passage indicates that some "alternative energy solutions and services" have begun to be integrated into the Terasen Utilities' "core natural gas transportation and delivery business." Please explain how these "alternative energy solutions and services" relate to the "Alternative Energy Services" provided by Terasen Energy Services. What criteria distinguish services provided by the Terasen Utilities from services provided by Terasen Energy Services?

Response:

Prior to January 1, 2010, Terasen Energy Services provided alternative energy services within the Terasen group of companies. From 2010 onward, it was agreed and approved as part of the Negotiated Settlement Agreement with respect to the TGI 2010-2011 Revenue Requirement Application that TGI will be developing and delivering alternative energy services. There are no other criteria that distinguish the alternative energy services delivered by Terasen Energy Services from those under development by TGI.

- 2.2 Is the organization of "alternative energy solutions and services" between the Terasen Utilities and Terasen Energy Services changing over time? For example, is it Terasen's intention to migrate "alternative energy solutions and services" out of the Terasen Utilities and into Terasen Energy Services?

Response:

TGI will be providing alternative energy services throughout the service area of the Terasen Utilities as set out in the Negotiated Settlement Agreement with respect to TGI's 2010-11 Revenue Requirements Application. It is not our intention to migrate these services out of TGI



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and into Terasen Energy Services. Please see also the responses to BCUC IR 1.2.2 and BCSEA IR 1.2.1.

The demand for alternative energy solutions and services is growing and evolving, however, so the nature of the alternative energy services offered by TGI and the terms and conditions of service will need to evolve accordingly to meet customer requirements going forward.

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3.0 Reference: Exhibit B-1, Figure ES-1; p.130 footnote 124

Figure ES-1, Energy Use and GHG Reduction Opportunities in B.C., has a pie chart under the heading GHG Emissions that shows "Electricity 21.0%" and "Natural Gas 21.8%." The source is "Live Smart BC 2006." There is also a pie chart titled "Energy" with the source given as "NRCan 2007."

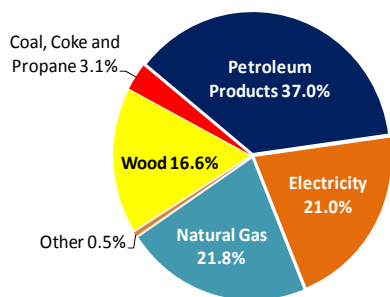
Footnote 124 on p.130 states "2007 NRCan data shows that natural gas served 21.8% of B.C.'s end use energy demand - electricity served 21%."

3.1 Please explain or correct the two pie charts. Are the chart labels reversed? Are the sources reversed?

Response:

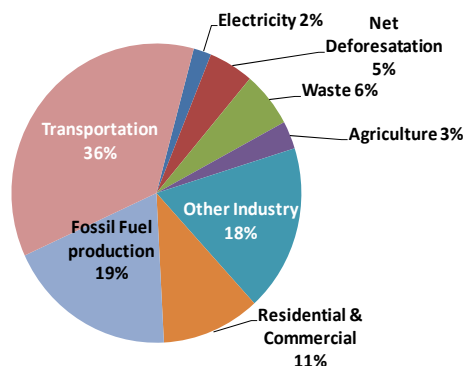
It is acknowledged that the two pie charts in Figure ES-1 on page E-3 (Executive Summary) of Exhibit B-1 of the LTRP are reversed. The charts for Energy and GHG Emissions have been recreated for Figure ES-1. The GHG emission chart on the right has also been updated to 2008.

Energy



Source: NRCan 2007

GHG Emissions



Source: Livesmart BC 2008



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- 3.2 The title of Figure ES-1 refers to "GHG emissions reductions opportunities in B.C." Is this phrase used in the sense that "GHG emissions" is synonymous with "GHG emissions reductions opportunities"?

Response:

Please refer to the corrected Figure ES-1 presented in the response to BCSEA IR 1.3.1. The two phrases identified within this question and presented in Figure ES-1 are not synonymous. The two charts GHG Emissions and Energy [consumption] together provide insight into where some of the biggest opportunities for reducing GHG emissions exist within the context of the amounts of different types of energy that are relied on in BC.

For example, since petroleum products are the largest category of energy consumed and the transportation sector has the highest GHG emissions, the Terasen Utilities believes that this sector has the highest potential for GHG reductions. Although natural gas is the second largest source of energy consumed (approximately equal to electricity), the residential and commercial sectors have much lower emissions than the transportation sector and offer a much smaller opportunity for emission reductions. This is particularly the case since simply switching from gas to electricity for thermal energy uses would require a doubling of the clean electricity generation in the province.

- 3.3 Or does "reductions opportunities" refer to an analysis of cost-effective reductions opportunities, for example, comparable to a conservation potential review? If so, please explain the methodology and criteria by which a sector's GHG emissions reductions opportunities were estimated. And please provide a bar graph and table showing, by sector, total GHG emissions, GHG emissions reductions opportunities, and the percentage the latter is of the former.

Response:

Please see the response to BCSEA IR 1.3.2. The term "reductions opportunities" in this case does not refer to an analysis of cost-effective reductions opportunities comparable to a conservation potential review. While the observations that can be made from Figure ES-1 are higher level, more detailed investigations, such as identifying emissions reductions potential through EEC programs that are developed from Conservation Potential Review studies will play an important role in identifying effective EEC initiatives in terms of both costs and uptake.



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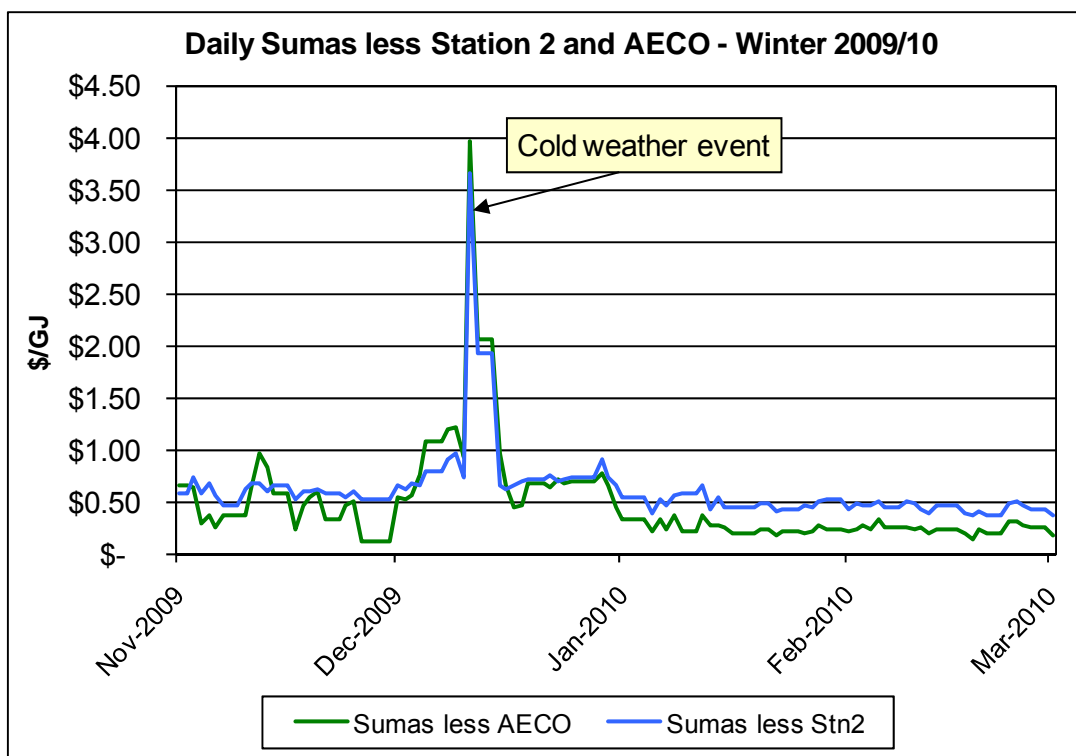
4.0 Reference: Exhibit B-1, 1.3 Long-Term Resource Plan Objectives, p.6

"...Ensuring a sufficient supply of gas and the capacity to deliver gas to customers during anticipated peak demand periods is an ongoing objective for the Utilities. Acquiring resources that improve the reliability and security of supply will also help to reduce rate volatility."

- 4.1 How does acquiring resources that improve the reliability and security of supply help to reduce rate volatility?

Response:

Acquiring resources that improve the reliability and security of supply helps to reduce rate volatility for the customers of the Utilities. Reliable resources and secure sources of supply provide the Terasen Utilities with the ability to meet customer load requirements during peak demand periods in a cost effective manner. Without such resources the Terasen Utilities would be exposing customers to both the risks of supply shortfall and more volatile market prices. During peak demand periods, pipelines and storage facilities within the Pacific Northwest are fully utilized by the Terasen Utilities and other utilities in the region, such as Puget Sound Energy, Northwest Natural, Cascade and Avista. During these periods interruptible customers can be curtailed. This was the case in December 2008 when cold weather and peak demand caused Terasen Gas to curtail large industrial customers in order to free up capacity on the system to serve core customers. The result of this peak demand with constrained resources is that market prices at the Sumas hub can spike and disconnect from other regional prices. An example of the occurrence of such a scenario is illustrated through the following figure. During last winter, periods of cold weather and maximum flows on Spectra Energy's T-South pipeline segment raised Sumas daily prices above Station 2 and AECO prices by \$4.00 per gigajoule. The absolute level of these regional prices before this cold spell was about \$5 per gigajoule. The Terasen Utilities were able to mitigate the adverse effects of this price spike on gas costs and customers through the use of storage gas, contracting for firm transportation service on third party pipelines and utilizing Alberta gas transported on the Southern Crossing Pipeline.



Furthermore, if the Terasen Utilities were not to utilize secure and reliable resources, such as storage and pipeline transportation service, and instead purchase more supply on the spot market during periods of cold weather and high demand, it is very likely that this would compound the price increases and increase volatility at Sumas.

By acquiring resources through infrastructure development or contracting firm supply from third parties, the Terasen Utilities secure reliable sources of supply and reduce their exposure to this market price volatility, which, in turn, help to reduce rate volatility. For example, Southern Crossing Pipeline secures gas supply from Alberta, a more liquid and less constrained marketplace, while contracting for storage and the associated transportation capacity, which enables summer priced gas to be withdrawn during the winter period.



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5.0 Reference: Exhibit B-1, 2.1.1 Natural Gas Supplies, p.14

"...It should be recognized that new connections to markets must be developed in order for the full potential of the B.C. shale gas reserves to be realized. The Utilities are working closely with other regional stakeholders to ensure that these developments will not negatively impact its ability to competitively access supply."

- 5.1 Please elaborate on how the development of natural gas infrastructure might negatively impact Terasen's ability to competitively access supply. How would such negative impacts be prevented?

Response:

Increasing exports of gas to markets outside of B.C. and the PNW as a result of new infrastructure development could significantly alter the dynamics of supply availability to the market hubs at Station 2 and Huntingdon for the Terasen Utilities. Consequently, the primary markets for B.C. production would be markets that are outside of B.C. leading to potential price increases and increased bidding pressures in order to attract the supply to be delivered to Station 2 and Huntingdon, particularly during the winter months. Furthermore, transportation costs for gas delivery to Station 2 could be impacted by these developments.

Historically, the BC natural gas resource industry has been developed to serve the B.C. and Pacific Northwest (PNW) markets. Over the last decade, however, more and more of B.C. production has been piped to Alberta and other eastern markets through direct connections with the TransCanada owned Nova Gas Transmission Limited system ("NGTL") system, or other pipelines such as the Alliance Pipeline that came in-service in 2000. Currently, more than one third of B.C. production serves markets other than B.C. and the PNW, and this trend is expected to grow. The trend to move B.C. supply east is occurring in response to the relatively small market in B.C. and the PNW as well as declining production levels in Alberta and the increased demand forecasted from the oil sands development.

Incremental B.C. supply is a positive economic development for this Province due to its emergence as a long term source of gas supply and royalty revenues received by the government. However, all consumers in B.C. including the customers of the Terasen Utilities could be negatively impacted if the majority of this supply bypasses the B.C. and PNW markets altogether. This potential is due to the development of new infrastructure expansions which are intended to export this supply directly to Alberta in order for producers to gain access to bigger and more liquid markets on a daily basis year round. The B.C. and PNW market is seasonal and weather driven, although the region at large is capacity constrained during peak weather conditions as evidenced by significant price spikes during these periods.



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NGTL's Horn River and Groundbirch pipeline projects will provide producers with an avenue to connect over 2 BCF/d of Horn River and Montney supply by 2015 on to NGTL's Alberta pipeline system. Furthermore, these daily volumes are expected to increase significantly by 2020 and beyond on both pipelines. The development of new infrastructure by NGTL would require that producers and other shippers commit for services with NGTL that could span out for a few years in the future. Furthermore, the Pacific Trails pipeline has been proposed to further transport northern B.C. supply to Kitimat for export to Asian and other overseas markets due to the proposed construction of a Liquefied Natural Gas facility. While B.C. supply has been forecasted to grow by about 2 BCF/d between 2009 and 2014 primarily due to the Horn River and Montney plays, the incremental pipeline projects moving gas out of B.C. could equal 3.5 BCF/d over the same period.

As stated in Section 6.2.4, page 179 of the LTRP, the Terasen Utilities will continue to engage in strategies designed to ensure that these negative impacts are reduced or prevented. The fundamental objectives for the Terasen Utilities are to secure gas supply over the long term while minimizing the cost of the annual supply portfolio. In order to meet these objectives, the liquidity of the Station 2 marketplace from a supply availability and competitive pricing perspective are of paramount importance. The Terasen Utilities have attempted to mitigate these impacts through the following ways:

1. Relationship building with new producers active in the Horn River and Montney plays including establishing contractual agreements in order to acquire B.C. unconventional supply in the portfolios.
2. Facilitating the increase of gas flow to Station 2 and on Westcoast's T-South system in order to increase market liquidity within BC at the Station 2 and Huntingdon hubs.
3. Entering into multi-year contracts with producers at Station 2 and upstream at the Ft. Nelson plant's outlet in order to ensure long term access to supply.
4. Representing customers' interests in NGTL and other regulatory proceedings due to their direct affect on the supply and pricing of gas in the B.C. market.
5. Implementing the T-South Enhanced Service pilot with Westcoast in order to promote southbound gas supply in and through the province. This service allows for gas to be delivered to Huntingdon or Kingsgate markets for new incremental capacity contracted on the Westcoast T-South system by shippers.
6. Conducting a preliminary feasibility study to determine how best to address the constraints on the TGI system between Kingsvale and Kingsgate.



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The Terasen Utilities will continue to monitor the developments related to B.C. supply and infrastructure in order to pursue strategies and ways of mitigating potential adverse impacts in the interests of providing reliable and cost effective service to customers.



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6.0 Reference: Exhibit B-1, Figure 2-11: Payback on Incremental Capital Costs for a Natural Gas Heated Home

6.1 Please provide the 'bottom line' figure of \$10.31/GJ in \$ per kWh.

Response:

As calculated in the table below, \$10.31/GJ equals 4.125 ¢/kWh.

90% efficiency adjusted	$\$10.31/\text{GJ} / 0.90 = \$11.46/\text{GJ}$
Conversion to kWh (1 GJ = 277 kWh)	$\$11.46/\text{GJ} / 277.78 = \$0.04125/\text{kWh}$

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7.0 Reference: Exhibit B-1, 2.1.1.2 B.C. and Regional Electricity Issues; 4.3.2.2 Residential Single Family Homes and Townhouses ; 5.6.1.1 British Columbia Building Code

"Electricity and natural gas are competing energy sources in a number of consumer end uses such as space and water heating" [p.21]

"The primary goal of the building code revision is Net Zero energy utilization¹¹⁹, with a secondary goal of Net Zero GHG emissions. Preliminary analysis has shown that this may lead some customers to adopt electric equipment for space and water heating, due to lower upfront capital costs¹²⁰; however, the Utilities believe that the energy cost of using natural gas in the long run will be lower and therefore benefits the customer. Terasen Utilities can play a part in mitigating the impact of this regulation by working with industry professionals to identify the prescriptive construction measures so that individuals and organizations can meet the building code requirements while continuing to use natural gas for space and water heating." [p.124]

7.1 The Utilities say there is a competition between electricity and gas, including with respect to the choice of energy source for home space and water heating. On what basis should the competition be resolved? market competition? regulation? negotiation? If monetary cost and GHG reductions are both considered to be relevant factors, how should they be factored into the decision of fuel choice?

Response:

Not only is there competition between gas and electricity for the space heating and water heating markets, there is also competition of a similar nature between electricity and alternative energy sources for thermal energy loads in BC. From the consumers' perspective, both alternative energy and gas-based energy solutions are at a disadvantage relative to electricity because both face the hurdle of having much higher upfront capital costs than simple electric baseboard or electric resistance heating solutions. The consumers may recoup some or all of the capital cost differential over time since alternative energy and gas-based systems typically have lower ongoing energy costs and operating and maintenance costs. But the challenge of the higher upfront capital costs for gas and alternatives is a very significant one. Natural gas-based energy solutions also face the challenges of overcoming government policy that is increasingly restrictive towards the use of fossil fuels in the province and growing public sentiment that natural gas and other fossil fuels are not part of a sustainable energy future.

British Columbia's legislated energy objectives mandate very large reductions in GHG emissions in the province. With this imperative to move rapidly towards a low carbon future achieving these objectives in an efficient and cost-effective manner is a very difficult task. Natural gas today provides about the same amount of end-use energy as electricity. Replacing

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all of the natural gas thermal end use in BC with “green” electricity will require an approximate doubling of electricity supply in BC met by new GHG-free electricity supply. While electrification on this scale may have the potential to achieve the province’s GHG targets, it would cause significant economic and environmental dislocation due to the high financial and environmental costs of new “green” electricity supply. Further, the province and taxpayers in the province reap significant benefits from natural gas royalties and other economic activity derived from the natural gas industry. There is the danger that should the domestic use of natural gas be marginalized by government, the “social license” given by British Columbians for natural gas extraction and government’s subsequent collection of significant financial benefits from the natural gas sector will diminish significantly.

The full costs of electric solutions for thermal energy demands are largely hidden from the consumer because the consumer only experiences the rolled-in average cost of electricity supply rather than the much higher incremental cost of new electricity supply that must be acquired to meet the thermal loads¹. The province’s rich endowment of hydro-based and renewable electricity is a very valuable resource that should not be wasted in serving the lower value thermal energy demands in the province. The Terasen Utilities’ concern is that the evaluation of energy solutions should not be based on simplistic methods that ignore such hidden costs.

The energy solutions for serving thermal energy demands in BC are in most cases regulated utility products and services (although situations of private ownership of energy facilities to serve one’s own energy needs are not²). Since regulated products and services are involved the Terasen Utilities believes that many of the issues will continue to arise in the regulatory forum, subject to prevailing government policy and legislation. The Terasen Utilities believes that the evaluation methodologies should be comprehensive and integrated across the spectrum of energy solutions, including an appropriate assessment of the costs of carbon, to avoid inefficient results and unnecessary expense in achieving BC’s energy objectives and GHG emission reduction targets.

¹ Rate design changes for electricity such as the Residential Inclining Block rate structure have partially mitigated this concern but TU believe this continues to be a significant issue.

² Even in cases where energy solutions are not regulated utility products and services, utility interests are affected since utilities are generally providing input energy and connecting facilities, such as the electricity to run heat pumps or back-up natural gas service.



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8.0 Reference: Exhibit B-1, p.E-9; 5.1 The Purpose and Benefits of Energy Efficiency and Conservation

"Further, cost / benefit criteria for approval of EEC funding do not adequately consider the implications of carbon reduction targets." [p. E-9]

"Going forward, it is important for the Utilities to secure ongoing funding to provide consistent programs to the market and thereby maximize the benefits of EEC initiatives. While the Utilities' EEC activities align with the B.C. Government's recent energy and climate actions, we believe that the current cost-benefit criteria for some programs are outdated and limit the benefits that can be delivered for emission reductions and for certain customer groups such as low income earners." [p.115]

8.1 Please elaborate on how the current cost-benefit criteria for EEC funding are inadequate. Please provide an example.

Response:

Please see the response to BCUC IR 1.32.1.

8.2 How should the EEC funding cost/benefit criteria be modified to adequately consider the implications of carbon reduction targets?

Response:

Please see the response to BCUC IR 1.32.1.



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9.0 Reference: Exhibit B-1, 8. Action Plan; p.E12-E13

- 9.1 Terasen says it will pursue and secure "funding solutions" regarding EEC. Does "funding solutions" mean Commission approval of DSM expenditures by Terasen to be recovered in rates? If there are other funding possibilities under consideration, please explain.

Response:

Funding solutions refers to recovery of DSM expenditures in rates. There are no other funding possibilities under consideration. The Terasen Utilities will put forward a request for funding of its next tranche of EEC initiatives in the next Revenue Requirement Application.



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10.0 Reference: Exhibit B-1, 8. Action Plan, All-energy thermal baseline forecast

"Terasen Utilities will continue working with other utilities and governments to understand the complete nature of thermal energy demand within the province. ... we have started a dialogue with other utilities in the province on the potential for developing a cooperative all-energy base-line forecast for the province's thermal energy needs against which examine alternative future scenarios and energy choice implications."
[p.185]

- 10.1 What is the current status of these efforts? When will the product be available?
What utilities and governments are participating?

Response:

These efforts are on-going. The Terasen Utilities have established informal agreements with BC Hydro and FortisBC to pursue the possibility of developing such a baseline thermal energy demand forecast. We have also received interest from the Ministry of Energy Mines and Petroleum Resources in participating in these efforts. Similarly, we have received interest from other organizations such as the Ministry of Transportation in the possibility of establishing a baseline forecast of energy demand in the Transportation industry. It is hoped that these initiatives will proceed and will provide a valuable input into future energy and emission reduction decision making, but at this time it remains too early to identify a completion date. It is the Terasen Utilities' intent to continue these efforts through the rest of 2010 and into 2011.

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11.0 Reference: Exhibit B-1, 8. Action Plan

“The Action Plan describes the activities that Terasen Utilities intends to pursue over the next four years based on the information and recommendations provided in this Resource Plan.” [p.185]

- 11.1 Please explain all of the temporal periods associated with the 2010 Long Term Resource Plan. For example: What is the Plan’s planning horizon? When does Terasen anticipate filing the next Long Term Resource Plan and what time period will it cover? Does the reference to activities over the next four years mean activities that will be completed within the next four years, or that will be initiated within the next four years?

Response:

The planning horizon for the LTRP is 20 years. The Action Plan has a four-year timing window, meaning that the activities in the Action Plan are ongoing or will be initiated within the next four years. These activities might or might not be completed within the four year window. At the current time, the Terasen Utilities see the appropriate frequency for submitting their LTRP as every two years and have submitted Resource Plans in 2004, 2006, 2008 and 2010. It is likely that the Terasen Utilities will submit its next LTRP in two years time.

These periods are applied to the LTRP as a result of both the BCUC’s Resource Planning Guidelines and the needs of the business to balance long term strategic planning with short term tactical initiatives. Four years is chosen for the Action Plan since it may take that long to further investigate and initiate some activities. Submitting LTRP every two years allows the Utilities to respond to emerging changes in the energy planning and policy environment, while taking sufficient time for an effective planning and stakeholder engagement process.

It should be noted that many aspects of the Resource Planning process are ongoing and the LTRP itself presents only a snapshot in time of the outcome of those activities. It should also be noted that while the overall planning horizon is 20 years, some aspects of the Resource Plan might be analyzed over a shorter or longer period of time as a result of either data availability or the nature of certain activities. For example, funding for EEC programs are amortized over 10 years whereas the useful life of some assets may be as long as 40 or 50 years.



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12.0 Reference: Exhibit B-1, 8. Action Plan

"Going forward the Utilities will seek approval of an overall business and regulatory model and seek CPCN approval of specific projects." [p.186]

"To help facilitate the development of a market for natural gas in the transportation sector, Terasen Utilities plans to submit an application to the Commission in the summer of 2010 to outline the business plan and provide a comprehensive solution for customers." [p.186; and p.E-5]

12.1 Are the "overall business and regulatory model" and transportation natural gas "business plan" different anticipated filings? Please explain the scope of each, and the anticipated timing of filing.

Response:

The two items referred to in this question relate to different filings. The quote regarding an overall business and regulatory model relates to TGI's planned filing with respect to alternative energy services. The quote with respect the transportation natural gas business plan refers to the Terasen Utilities plan to file an application for approval of a more complete transportation fuel service offering. Please see the response to BCUC IR 1.56.2 for the timing of anticipated filings related to the LTRP Action Plan.

12.2 The 2010 LTRP contemplates Terasen moving increasingly into alternative energy services beyond Terasen's core natural gas delivery service that is regulated by the Utilities Commission. This raises questions about the Commission's role regarding Terasen's alternative energy services. What process does Terasen see for identifying and resolving these regulatory questions?

Response:

In TGI's 2010-2011 Revenue Requirements Application ("RRA"), TGI outlined its rationale and strategy for offering alternative energy services and proposed a regulatory model for undertaking these services. The outcome of the RRA proceeding was a Negotiated Settlement Agreement ("NSA"), which was approved by Commission Order No. G-141-09, dated November 26, 2009. Section 13 of the NSA addresses alternative energy solutions. It states:



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13. Alternative Energy Solutions

Alternative Energy Solutions ("AES") means Geo-exchange, Solar-thermal and District Energy Systems as those terms are described in the Application.

Natural Gas service taken in combination with AES will be charged under TGI's natural gas rates.

The Parties agree that the costs incurred by TGI to provide AES should not be recovered as part of natural gas service rates, and visa versa. The Parties agree that TGI's proposed New Energy Solutions Deferral Account, attracting AFUDC, is an appropriate mechanism to address allocation issues as between TGI's gas customers and TGI's AES customers. Therefore, the Parties agree that the new Energy Solutions Deferral Account will remain in effect pending a future rate design application at an unspecified future date after 2011 and will capture and record the following (plus AFUDC) to be recovered from AES customers:

- (a) Direct costs associated with AES projects as outlined on pages 267-268 of the Application, including cost of design, equipment, etc. constructing and financing; and*
- (b) Sales and marketing O&M and other development costs will be directly charged to the deferral account by time sheets or other direct charge (estimated at \$1.0 million in 2010 and \$1.5 million in 2011, representing a portion of the agreed upon Gross O&M reduction from gas customers of \$4.0 million in 2010 and \$5.5 million in 2011); and*
- (c) An appropriate overhead allocation, which the parties have agreed will be \$500,000 in each of 2010 and 2011 (representing a portion of the agreed upon Gross O&M reduction from gas customers of \$4.0 million in 2010 and \$5.5 million in 2011).*

Revenues received from customers for all AES projects, which are based on contracts approved by Commission will be recorded in the AES deferral account.

The risk of non-recovery of amounts in the New Energy Solutions Deferral Account will not be borne by natural gas ratepayers. The Parties agree that any debit balance in the New Energy Solutions Deferral Account will not be recovered through natural gas rates and any credit balance will not be applied to reduce natural gas rates.

In evaluating AES projects, TGI will apply the economic test outlined in the Application. The Parties agree that the proposed GT&C (Section 12A – Alternative Energy Extensions) are acceptable. Pursuant to the Utilities



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Commission Act, within the Alternative Energy class of service, project-specific contracts with AES customers will be filed with the Commission for acceptance as a rate, at which time the Commission may review and adjust the economic test and GT&C Section 12A – Alternative Energy Extensions.

The CPCN threshold of \$5 million applies to AES projects brought forward in 2010 and 2011.

The Parties agree that it is premature to address issues relating to the gas load and gas consumption profiles of AES projects that incorporate a natural gas component. Such issues are appropriately addressed in a future rate design application, once TGI has sufficient AES customers that take gas so as to provide reliable information on gas load and gas consumption profiles.

TGI will capture costs and revenue on a project specific basis and will report on AES projects as part of the next Revenue Requirements application.

The Commission has therefore approved the structure under which TGI may pursue alternative energy services. TGI will be filing an application with the Commission that addresses the regulatory framework and business model that determine customer rates for AES service.

- 12.3 What is Terasen able to say at this point about whether the alternative energy services it proposes to develop – both the thermal applications and the transportation applications – are amenable to being provided under a public utility service model? What principles does Terasen suggest would be applicable?

Response:

The alternative energy services that the Terasen Utilities plans to implement are public utility services under the *Utilities Commission Act*. The definition of "public utility" in the *Utilities Commission Act* is, in part:

"public utility" means a person, or the person's lessee, trustee, receiver or liquidator, who owns or operates in British Columbia, equipment or facilities for (a) the production, generation, storage, transmission, sale, delivery or provision of electricity, natural gas, steam or any other agent for the production of light, heat, cold or power to or for the public or a corporation for compensation..." [Emphasis added.]



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This definition encompasses alternative energy services and, as such, these services must be pursued under a public utility service model.

In fact, alternative energy services are currently being provided under a public utility service model by TGI and other utilities, such as Dockside Green Energy LLP (see Commission Order No. C-1-08, dated April 18, 2008). Please see the response to BCSEA IR 1.12.1 and 1.12.2.

The Terasen Utilities believes that its transportation or NGV services are also amenable to being provided under a public utility service model. NGV services have been provided by the Terasen Utilities and regulated by the Commission in the past and are consistent with service already provided to natural gas customers by TGI under its NGV rate schedules (e.g. Rate Schedule 6). The NGV services that the Terasen Utilities plans to implement are a natural gas service and a natural extension of the services it already offers. Please see the Terasen Utilities responses to BCUC IR 1.10.3.1 and 1.13.1 for further discussion of why it is appropriate for the Terasen Utilities to pursue NGV services. As described in the LTRP, TGI will be filing an application with the Commission for approval of business and regulatory models for a complete NGV service offering.



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13.0 Reference: Exhibit B-1, 8. Action Plan, p.188

- 13.1 Please provide examples of technologies that may prove to be disruptive of Terasen's core natural gas service offerings.

Response:

Technologies that would be disruptive of the Terasen Utilities' core natural gas service offerings would be those that have a material negative effect on natural gas as a desirable energy choice. Possible signs of this sort of technology or development might be an unusually high number of customers leaving the natural gas system or a sharp drop in use per account where these changes are attributable to particular technology changes or innovations. For example, an air source heat pump that has solved the problem of cold weather freeze-up with high dependability and is comparatively inexpensive to purchase and operate might be an example of something that could impact the Terasen utilities' core business. The intent here is that the Terasen Utilities needs to be vigilant with respect to new heating and energy technology developments in order to anticipate and react to those that may impact core business. This may include equipment or technologies that are only in the early stages of research and development.



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14.0 Reference: Energy Efficiency and Conservation, Conservation Potential Review, Exhibit B-1, s.5.3.1, p.118

Terasen Utilities say they will be conducting a Conservation Potential Review in late 2010.

14.1 What is the current status of Terasen's 2010 Conservation Potential Review?
Please file it, if available.

Response:

The Terasen Utilities' 2010 Conservation Potential Review study has not been completed at this time. A vendor has been selected to conduct this study and initial project meetings have taken place. This study is expected to be completed in Q1 of 2011.



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15.0 Reference: Energy Efficiency and Conservation, Interruptible Industrial Customers, Exhibit B-1, s.5.4.1, p.118

"TGI believes that there is significant potential for a reduction in Interruptible Industrial consumption."

15.1 Please explain the Interruptible Industrial consumption concept. Does the program target demand savings or energy savings or both?

Response:

The Terasen Utilities' approach to the Interruptible Industrial customers is under development but was outlined at a high level in Terasen Gas Inc.'s 2010-2011 Revenue Requirement Application on pages 230 – 234, which is included in Attachment 15.1.

At this stage, the Terasen Utilities are looking to convene a meeting of an Industrial stakeholder group to obtain input as to the types of projects and savings that are available in this sector as the Terasen Utilities have not been dealing extensively with industrial DSM and are unable to state unequivocally whether the program will target demand savings or energy savings or both.



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16.0 Reference: Energy Efficiency and Conservation, Innovative Technologies, Natural Gas Vehicles, Exhibit B-1, 5.4.2; and p.E-3, E-5

Terasen states: *"Natural gas is viewed [by the Province] along with electricity and hydrogen as an important clean transportation fuel for the Province."* [p.E-3]

16.1 What are Terasen's views regarding the relationship between natural gas vehicles (NGV) and electric vehicles (EV) [or hybrid electric vehicles] in terms of programs to encourage conversion or replacement of gasoline and diesel vehicles? Is it as simple as EV being more suited for gasoline passenger vehicles and NG being more suited for diesel trucks? What about gasoline trucks?

Response:

The Terasen Utilities believes that there is no single solution for clean transportation. EV's, hybrids, natural gas and hydrogen all have their own specific merits and potential benefits. These benefits vary widely depending on the service application and the stage of development of the technologies involved. All potential solutions for clean transportation need to be evaluated on their specific merits and potential.

With respect to NGVs, the specific advantages include:

- Availability of commercially proven NGVs supported by OEM dealer networks-particularly with respect to the heavy duty application market segments
- Fuel costs well below traditional fuels (See Figure 2.7 on page 21 of the LTRP)
- Proven fuelling infrastructure solutions
- Lower vehicle capital cost than EV's, hybrids or H2 vehicles

As the advantages of NGVs are strongest in heavy duty vehicle markets, the Terasen Utilities' plan is to focus on these markets. NGV's may also compete effectively in light duty vehicle markets and this potential opportunity should not be discounted or eliminated for the future.

As highlighted in a study by Deloitte Consulting, the main challenges for EV relate to cost, range and battery life. Please see Attachment 16.1 for a copy of the referenced study by Deloitte Consulting. These challenges become more difficult in heavy duty service as the capacity of the battery needs to be much greater. Additionally, the range issue is of more concern for a commercial truck than it is for a passenger vehicle used for commuting. Therefore, the Terasen Utilities believes that in the near to mid-term its current NGV strategy will not be impacted by the adoption of EV technology.



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- 16.2 Are programs to encourage NGVs in competition with programs to encourage EVs, or will they be?

Response:

As discussed in the response to BCSEA IR 1.16.1, the Terasen Utilities believes that there is no single solution for clean transportation. EV's, hybrids, natural gas and hydrogen all have their own specific merits and potential benefits.

The various clean technology options may ultimately be in competition for market share in some transportation market segments. At this point in time, however, the Terasen Utilities believes that its programs to encourage NGVs are not in competition with EV programs. EV programs are targeted at low range small passenger vehicles while the Terasen Utilities' NGV programs are targeted at high mileage heavy duty fleets. The overall market for clean transportation technologies is large and there is sufficient room for each technology to develop in the transportation market.

It should also be noted that as NGV products are more fully developed than EVs, the Terasen Utilities believes that they hold more potential for immediate benefits in transportation markets.

- 16.3 Has Terasen talked with BC Hydro about coordination of Terasen's NGV programs and any EV programs that BC Hydro may initiate? If so, please describe the outcome.

Response:

As part of an effort to coordinate demand side management programs, the Terasen Utilities has had initial discussions with BC Hydro that include discussions related to potential coordination of low emission vehicle programs. Follow up discussions are planned for October/November 2010 to seek out areas in which the two organizations might collaborate. To date no specific areas of collaboration have been identified.

The Terasen Utilities are also pursuing opportunities to collaborate with FortisBC in this area. These discussions are presently focused on use of NGV utility trucks within the FortisBC fleet (Kelowna base).



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16.4 What are Terasen’s views regarding how hydrogen, as a vehicle fuel, fits into the alternative vehicle-fuels picture in B.C.

Response:

It is the Terasen Utilities’ view that hydrogen (“H2”) as a vehicle fuel still is some way away from becoming a practical, reliable and economic option. Activities to develop H2 vehicles are best regarded as research efforts that are directed to future markets. A number of barriers – vehicle cost, infrastructure cost, vehicle reliability, and availability of hydrogen infrastructure³, as examples – need to be overcome before hydrogen can be regarded as a viable practical option for regular service.

As an illustrative example, a recent five-year project to provide 20 H2 powered fuel cell buses for Whistler was projected to cost \$89 million,⁴ with each bus projected to cost \$2.25 million. Comparable natural gas powered buses can be purchased for approximately \$450,000 per bus. Thus, approximately 100 natural gas buses could have entered service for the same cost. It should also be noted that the cost of fuelling infrastructure for natural gas bus fleets can be covered in the fuel cost while still providing a cost reduction of over 40% versus diesel.⁵ Hydrogen fuelling costs are considerably higher than diesel.⁶

With respect to GHG emissions reductions, natural gas buses deliver 23% reductions versus diesel.⁷ GHG emissions reductions from H2 fuel cell (FC) buses vary greatly depending on the source of the H2 and are the subject of much debate. Even if GHG emissions from H2 Buses were assumed to be zero, 100 natural gas buses would still deliver 107% of the GHG emissions reductions of the 20 H2 FC buses purchased for Whistler at the same cost.⁸

In sum, the Terasen Utilities’ view is that natural gas presents a very viable economic option today while hydrogen vehicles are at a much earlier stage of development.

³ Industry Canada, Hydrogen and Fuel Cells, <http://www.ic.gc.ca/eic/site/hfc-hpc.nsf/eng/mc00084.html>

⁴ Cost Breakdown: \$10 million for pre-production phase, \$45 million for 20 buses, and \$34 million for operating costs. http://www2.news.gov.bc.ca/news_releases_2005-2009/2007OTP0057-000539.htm

⁵ Terasen Utilities business case for BC Transit – Based on Abbotsford operation and fleet of 25 buses.

⁶ A day’s fill-up could cost as much as \$1,200 for 500 kilometers of travel.

<http://www.canada.com/topics/sports/story.html?id=7b9c39e1-7de0-4184-af7a-21c6610670e5>

⁷ GHGenius Model v 3.18, Natural Resources Canada, available at www.ghgenius.com

⁸ Calculation: 100 NG buses / 20 H2 buses = 5:1 ratio at same cost. Multiply 23% reduction by 5 = 115%



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- 16.5 Terasen says it plans to submit an application to the Commission in the summer of 2010 to outline the business plan regarding LNG and CNG [p.E-5]. Has this been submitted? If so, please provide a copy or an internet reference. If not, please discuss the current status.

Response:

The referenced application has not yet been submitted to the Commission for review. The Terasen Utilities is presently developing an application which contemplates an end-to-end business model to offer LNG and CNG refuelling services to vehicles running on natural gas in a return-to-home fleet context. We presently anticipate filing this application by the end of 2010.



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17.0 Reference: Natural Gas New Load, Exhibit B-1,

In discussing possible pipeline capacity constraints, Terasen states,

"Addition of a large new industrial load could advance the need for this capacity expansion. For example, FortisBC has also identified growing electric system capacity constraints in the Okanagan. A new natural gas fired peaking generator is one of the resource options being considered to provide a firming resource for a range of potential renewable resources and to avoid extensive new transmission requirements." [p.E-10]

17.1 Please provide, or provide references to, more information about this potential FortisBC gas-fired peaking generator.

Response:

The potential option for a peaking plant to serve load in the Okanagan area is discussed in FortisBC's 2009 Resource Plan available for review on the FortisBC web site at: http://www.fortisbc.com/about_fortisbc/planning/resource_planning.html.

17.2 Is it correct to assume that a gas-fired peaking generator would add to the 'peakiness' of Terasen's load and, specifically, to the design day demand in the area?

Response:

The potential FortisBC natural gas fired peaking generator would operate during peak electricity demand period as explained in the current FortisBC's resource plan. It is also expected that the peak demand for natural gas and electricity in the Okanagan will be coincidental. Therefore, it would be correct to assume that a gas-fired peaking generator would add to the 'peakiness' of design day gas demand in the Okanagan area.



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- 17.3 Do Terasen's existing rate structures fully compensate Terasen, and by extension existing ratepayers, for the incremental cost of meeting the additional design day demand associated with a gas-fired peaking generator?

Response:

The potential for a new industrial customer to impose incremental costs on the gas system that might affect other customers is limited to distribution and transmission impacts. The evaluation process that TGI undertakes when attaching a new industrial load confirms that revenues from a new industrial customer will fairly recover the incremental distribution and transmission costs imposed on the system.

The Terasen Utilities believes that natural gas is a good choice for serving peak energy demands since natural gas can be stored under ground or in the form of liquefied natural gas ("LNG") ready for use during peak demand periods. Natural gas is thus complementary to other green technologies used to meet base energy demand since it can be deployed as required to meet demand as the demand arises. Natural gas is therefore a reliable and cost-effective energy supply source for a gas-fired peaking generator which, in turn, would be providing reliability to the electricity system in peak conditions or as back-up generation for green electricity supply which tends to be intermittent or may not have a generating profile that matches well the customer demand profile.

TGI's industrial rate structures (such as Rate Schedule 22 or 25) would compensate the Terasen Utilities for the incremental costs associated with a new gas fired peaking generator. TGI's rate structure for industrial customers includes a significant demand charge component that would be applicable to the peak day demand that the gas-fired generator would impose on the system. The economic analysis that would occur to assess the attachment of a new industrial load would consider the costs of any dedicated facilities serving that customer and an appropriate share of the costs of upstream common facilities. If it is necessary to construct common facilities that would serve both the peaker and other future TGI customers, then the Company would allocate the cost of service to the peaker and other customers on a capacity or other suitable basis. Costs associated with any dedicated facilities for the peaker would be included as part of the peaker service rate evaluation.

TGI would evaluate the most appropriate pipeline system reinforcements required to meet the incremental natural gas demand associated with the gas fired generator. If the estimated capital costs of the system reinforcements were greater than \$5 million, then it would apply to the Commission for a CPCN for approval to construct the system reinforcement facilities, and would include a completed tariff supplement for rates associated with the new facilities. If the capital costs were less than \$5 million, those capital costs would be reviewed in the Terasen Utilities next revenue requirements proceeding. In addition, dedicated costs for facilities specific to the peaker service such as service lines and measurement stations would be subject to the Company's attachment policies and main extension test.



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It is important to note that industrial customers on the gas system typically arrange for their own natural gas supply and contract only for transportation service with Terasen Gas. Since the commodity portion of natural gas rates is market-based there is not the same issue as in the electricity sector in BC where a new customer implicitly receives a share in the lower cost embedded (i.e. Heritage) energy supply but the new load is in effect driving the need to acquire higher cost marginal energy supply.



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18.0 Reference: Electricity Costs, Exhibit B-1, p.E-4

Terasen states:

"At the same time, the British Columbia Hydro and Power Authority's ("BC Hydro") most recent Service Plan expects electricity rate increases of approximately 9%, 13% and 5% in each of the next 3 years as electricity self sufficiency, renewable resource development and replacement of aging infrastructure are top agenda items."

18.1 Please provide updated figures for BC Hydro's expected future electricity rate increases based on evidence from the Commission's proceeding regarding BC Hydro's F2011 Revenue Requirements Application, for example, BC Hydro's response to JIESC IR3.40.3.

Response:

The percentage rate increases of 9%, 13% and 5% for BC Hydro quoted from page E-4 of the Executive Summary of the LTRP are rounded net rate changes from BC Hydro's current Service Plan for F2011, F2012 and F2013 based on the sum of the yearly revenue requirement rate increases and the net change in BC Hydro's rate rider from the previous year.

The response from BC Hydro's F2011 Revenue Requirement Application (Exhibit B-13-1, JIESC IR 3.40.3) is included in Attachment 18.1. The updated BC Hydro rate increase expectations for F2011, F2012 and F2013 are 9%, 16% and 5%. Only the F2012 increase has been changed materially, increasing a further three percent relative to the forecast in the Service Plan. BC Hydro's response to JIESC IR 3.40.3 also sets out expected net rate increases for BC Hydro for F2014 and F2015 at 9% and 6% respectively.

These large expected electricity rate increases for BC Hydro's customers over a five-year period underline the importance of avoiding inefficient electricity load growth and seeking alternative and integrated energy solutions in BC that help to meet consumer energy demands in the province cost effectively. Electrification initiatives that add additional electricity demand beyond that already expected will make achieving British Columbia's energy objectives increasingly difficult. The objectives which will experience this increasing difficulty are achieving electricity self-sufficiency, finding cost effective conservation and demand-side measures to offset at least 66% of BC Hydro's load growth and keeping BC Hydro's rates among the most competitive of rates charged by public utilities in North America. Seeking alternative and integrated energy solutions will help to relieve the pressure on achieving these electricity-related energy objectives and at the same time assist in achieving the mandated GHG emission reductions in a cost effective manner.



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19.0 Reference: Energy Efficiency and Conservation, future funding, Exhibit B-1, s.5.5; p.E-8

"The Terasen Utilities are implementing a significant increase in EEC activity for 2010 and 2011. Over the long term, the Utilities need to secure long term EEC funding." [p.E-8]

"We are planning to submit a request for on-going funding as part of the 2012 RRA for both TGI and TGVI." [p.119]

19.1 Please confirm that Terasen is not seeking Commission approval of any EEC funding in this (2010 LTRP) proceeding.

Response:

Confirmed. The Terasen Utilities is not seeking Commission approval of or funding for any of the EEC Scenarios in the 2010 LTRP proceeding. The Scenarios are provided for illustrative purposes. The next EEC funding request will be made as part of the upcoming Revenue Requirement Applications.

19.2 When does Terasen anticipate filing its 2012 RRA?

Response:

We anticipate filing our next RRA for both TGI and TGVI in the spring/summer of 2011.



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20.0 Reference: General

At Terasen's Planning Stakeholders Meeting on February 12, 2010, a participant said that Terasen and BC Hydro were about to sign a memorandum of understanding. At the BC Hydro Integrated Resource Plan workshop regarding resource options on September 14, 2010, a participant said that BC Hydro and Terasen had recently signed an MOU.

20.1 Please provide a copy of the MOU between Terasen and BC Hydro.

Response:

Please refer to Attachment 20.1 for a copy of the MOU between the Terasen Utilities and BC Hydro.



Terasen Gas Inc., Terasen Gas (Vancouver Island) Inc. Terasen Gas (Whistler) Inc. [collectively (the “Terasen Utilities” or the “Utilities”)] 2010 Long Term Resource Plan (the “2010 LTRP” or the “Application”)	Submission Date: October 18, 2010
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21.0 Reference: Exhibit B-1,

“With the ability to supply markets throughout North America, the Alberta gas trading hub is one of the continent’s most open marketplaces. Demand for natural gas from Alberta oil sands production is also expected to grow. Natural gas producers and shippers are therefore developing pipelines that will take gas from B.C. west into Alberta. Our analysis shows that by 2015, almost twice as much (3.5 billion cubic feet (“Bcf”) – per day) capacity could be built to flow natural gas west into Alberta and off shore to global markets than is expected to be produced (1.9 Bcf per day) in B.C. This increased competition for B.C. supply could ultimately lead to higher prices and increased price volatility for gas flowing south through B.C. where the Terasen Utilities currently purchase the majority of our customer’s supply.” [underline added]

21.1 Should “west” here read “east”? If not, please explain.

Response:

Confirmed. ‘West’ as underlined in the above passage should read ‘East’.

21.2 Substantively, please explain how an excess of pipeline capacity over B.C. natural gas supply could lead to higher prices and increased price volatility for gas in southern B.C.

Response:

Note that in the referenced paragraph from Exhibit B-1, the underlined word “west” was in error and should read “east”.

Price and volatility (i.e. the relative movement of prices) changes vary largely due to the market conditions based on supply, demand and available infrastructure utilized to facilitate movements of supply from the production region to the marketplace. During peak demand periods, the Station 2 and Sumas markets demonstrate higher prices and price volatility as the demand exceeds the pipeline infrastructure capacity to serve the region, leading to price disconnects.

By introducing incremental demand relative to the incremental supply, this situation could be exacerbated and ultimately lead to higher prices and volatility. Installation of 3.5 Bcf/d of incremental take-away pipeline capacity provides increased access to Alberta markets and markets abroad (i.e. increased demand). In comparison, the forecast increase in supply is only 1.9 Bcf/d. As discussed in the response to BCSEA IR 1.5.1, much of the proposed take-away



Terasen Gas Inc., Terasen Gas (Vancouver Island) Inc. Terasen Gas (Whistler) Inc. [collectively (the "Terasen Utilities" or the "Utilities")] 2010 Long Term Resource Plan (the "2010 LTRP" or the "Application")	Submission Date: October 18, 2010
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pipeline capacity could lead to the new, incremental supply by-passing the Station 2 and Sumas markets altogether. Under this scenario, the incremental demand exceeds the incremental supply, so natural gas prices and volatility could rise as the Terasen Utilities might have to bid higher prices to attract the gas supply away from other competing markets.

Attachment 15.1

report used to refine the results of the CPR. The evidence demonstrates the benefits of extending funding for a further year.

TGI will use the same portfolio approach and same financial treatment as that approved in BCUC Order No. G-36-09 to assess TGI's EEC expenditures. The portfolio approach allows flexibility in allowing the Company to redirect dollars from one program area to another as long the TRC test for the portfolio as a whole is 1.0 or greater. In this case, the portfolio under consideration would include all EEC programs, i.e. the previously-approved funding as well as the proposed new funding.

(2) RE-ALLOCATION TO LOW INCOME PROGRAMS AND RENTAL HOUSING

Of the EEC funding approved for 2010 and requested for 2011, TGI will allocate a minimum of \$800 thousand to conservation for the low income and rental housing sector, with the potential for an additional re-allocation. The minimum proposed amount of \$800 thousand for EEC activity for the low income and rental housing sector is based upon the annual proposed expenditure in the Joint Initiatives program area of Terasen Gas' EEC Application, and approved in BCUC Order No. G-36-09. We are in the process of implementing EEC programming for the low income and rental housing sector for the 2009 - 2010 period. As such we believe we will be able to increase the funding toward the low income and rental sector above \$800 thousand. It is our intention to re-allocate an additional \$1.6 million in funds from both the Residential and Commercial programs outlined above to low income and rental programs in each of 2010 and 2011.

(3) INDUSTRIAL ENERGY EFFICIENCY

This Application sets out our plan for the development of industrial programs including a revised Manufacturing and Industrial Conservation Potential Review ("CPR"), stakeholder meetings, program development and lastly funding requests. As such, it addresses the following Commission directives in BCUC Order No. G-36-09:

"The Commission Panel takes note of the MEMPR Letter of Comment, and directs Terasen to commence the planning process for the development of an industrial EE program and to file a report outlining the process contemplated and scheduling of the development plan with the Commission for review within 90 days of this Decision. The matters addressed in the report should include those raised by MEMPR in Exhibit C4-1."

TERASEN GAS INC.
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Exhibit C1-4 (not C4-1) from the MEMPR broadly states that it notes the absence of an industrial energy efficiency program and that this may result in missed opportunities for energy reduction. The MEMPR goes on to further state that:

“Ministry submits that the Commission include in its final determination on the Application:

- 1. A requirement for the Companies to refine the CPR for the manufacturing sector at the earliest opportunity.*
 - a. Include the Companies’ largest manufacturing accounts in the CPR.*
 - b. Identify and develop specific DSM measures for the manufacturing sector.*
- 2. The Commission should establish a timeline for the Companies to submit for approval a supplemental application for manufacturing sector DSM measures.”*

With respect to the development of EEC programs for manufacturing sector, it is important to note that the approvals received via BCUC Order No. G-36-09 actually do include funding for industrial customers. The funding approved so titled “Commercial” customers includes those customers in sales Rate Schedules 2, 3, 4, 5, 6, and transportation Rate Schedules 23 and 25. Of these, TGI considers Rate Schedules 4, 5, 6, 23 and 25 to represent primarily large commercial and industrial customers¹⁴⁹¹⁵⁰. Therefore the only customers who do not currently have access to any funding, and for which additional funding is required, are those in the Interruptible Rate Schedules 7, 22 and 27. For customers in Rate Schedules 4, 5, 23 and 25, there is currently sufficient funding available, but TGI needs to further develop manufacturing process load programs for customers in Rate Schedules 4, 5, 23 and 25.

Key in developing industrial and manufacturing programs for customers served under Rate Schedules 4, 5, 23 and 25 as well as interruptible Rate Schedules 7, 22 and 27 is that since the time of both the Conservation Potential Review - Manufacturing Sector Report (“Manufacturing CPR”) (commissioned in 2006) and the EEC Application, the industrial sector has significantly changed in scope and scale (this is further referenced in Part III, Section C, Tab 4). Primarily, volumes have decreased in the industrial sector as a result of changes in the marketplace, fuel switching alternatives and changes in economic drivers. For example the Manufacturing CPR identified a number of opportunities in the forestry and greenhouse sector. Since the time of the Manufacturing CPR, forestry has significantly declined with many operations either closed, idled and in a number of cases, in bankruptcy proceedings. Those that are operational may have difficulty raising capital for asset expenditures or have already taken steps to become efficient and that has partly led to their resilience. Similarly, nearly all greenhouses have

¹⁴⁹ Note that in Rate Schedule 23 and 25, customers represented include heavy industry, strata corporations, institutions. This is covered in greater detail in Section 5 of this application.

¹⁵⁰ Note that the programs described in the EEC Application do not include programs for industrial process energy efficiency programs for these rate schedules.

installed wood waste systems used as their primary energy source. Gas has been used only as a backup; although due to recent low gas prices and increases in wood waste prices and lack of wood waste, we have seen an increase in gas use as a primary fuel. As a result of these changes there may not be as significant an opportunity for gas related EEC programs for these industrial groups.

To ensure that TGI provides programs that meet the customer's needs, TGI needs to better understand the economic and environmental drivers of this diverse group of customers. TGI proposes the following process for the design and implementation of a program to develop both programs for firm industrial customers served under Rate Schedules 4, 5, 23 and 25 as well as programs and funding for interruptible customers served under Rate Schedules 7, 22, and 27.

(a) Stakeholder Consultation

Stakeholder input is crucial to the development of any industrial EEC program due to the relatively small number of customers on industrial rates and the potential for the relatively large incentives needed to spur activity in the industrial sector negatively impacting rates for non-participants. TGI convened a workshop with industrial customers, the MEMPR and other stakeholders on May 19, 2009. Through this workshop and comments received from participants, it became apparent that TGI must do more work to develop programs to meet EEC needs of this group of customers. There was support for additional funding and programs and energy efficiency audits. However, participants and TGI acknowledged:

- TGI does not have experience with developing industrial programs, and will require further time to develop suitable programs; and
- Incentives and programs may have to be unique to either the industrial group or in many cases the individual customer.

We will convene further industry specific workshops, and customer meetings concurrent with the RRA process. The input gathered in the additional meetings and workshops will be invaluable in developing industrial EEC programs.

(b) Update to 2006 Manufacturing Sector Report in Terasen Gas CPR

TGI will commission an update to the 2006 Manufacturing CPR. It has now been three years since the last Manufacturing CPR, and the market has changed significantly since the report was originally received by the Company in May 2006. An updated report will give the Company a very high-level indication of the size and nature of EEC opportunities in this sector. The findings will be then be validated with the MEMPR Industrial DSM Stakeholder Group.

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(c) Initial High-Level Budget

The budget below represents TGI's initial, high-level estimate of the expenditures that will be required to support EEC activity for the interruptible industrial sector for 2010 and 2011. It includes funding for: activity related to the workshops and customer meetings; an additional staff member with expertise in the Industrial and Manufacturing Sector; and, a series of in-depth energy savings potential studies, or mini-CPRS, with individual customers in the food processing, manufacturing and forest products sectors in 2010. Collectively the workshops, meetings with individual customers, updated Manufacturing CPR and audits in 2010 will provide data for evaluating the provision of incentives budgeted for 2011. TGI expects that the learnings from programs in 2010 and 2011 will help form the basis for expanded programs in the period 2012 forward.

Table C-3-4: TGI's High-Level Budget of the Expenditures Required to Support EEC Activity for the Interruptible Industrial Sector for 2010 and 2011

Industrial EEC	
Preliminary Budget for RRA	
2010	
Item	Budget Amount
Stakeholder Activity	\$5,000
Additional position to administer Industrial DSM Program	\$120,000
Consultant Update to 2006 Manufacturing CPR	\$100,000
Energy Savings Potential Studies	
Food Processing Sector (3)	\$60,000
Manufacturing Sector (3)	\$60,000
Forest Products Sector (3)	\$90,000
Total Year 1	\$435,000
2011	
Item	Budget Amount
Stakeholder Activity	\$5,000
Additional position to administer Industrial DSM Program	\$120,000
Incentives	
Food Processing Sector (1)	\$500,000
Manufacturing Sector (1)	\$250,000
Forest Products Sector (1)	\$1,000,000
Total Year 2	\$1,875,000

TGI will continue to provide leadership developing expanded EEC programs. We believe that the process for determining programs described above is prudent and will result in appropriate industrial energy efficiency program needs. The funding request is reasonable and necessary to initiate a successful suite of industrial programs in the manner directed by the Commission. We respectfully request that the Commission approve the above noted funding for industrial EEC.

(d) Innovative Technologies

In its April 16, 2009 decision on TGI and TGV Energy Efficiency and Conservation Application, the BCUC stated that:

“The Commission Panel considers that Innovative Technologies, NGV and Measurement programs can be appropriate vehicles for encouraging commercial development of technologies to reduce or replace natural gas consumption and related GHG emissions.”

The BCUC further stated that:

“The Commission Panel finds that there is insufficient evidence with respect to the nature and scope of the proposed program, and accordingly rejects the Innovative Technologies, NGV and Measurement program expenditures at this time. Terasen may wish to bring forward projects in this program area for consideration as they become more fully developed.”

TGI has since evaluated the market and need for innovative technologies. This Section of the Application provides an overview of EEC initiatives we intend to pursue through the use of innovative technologies. TGI’s proposed programs are in the interests of customers and therefore should be approved.

(e) Residential and Small Commercial

Hydronic Based Heating Systems - Hydronic heating systems use liquid (water with corrosion inhibitors) to distribute energy for space and domestic hot water heating through a supply and return closed-loop piping system.

The flexible nature of this system ensures that the energy input can be changed with changes in technology and public policy, thus promoting a more sustainable energy design. An old low efficiency boiler can be upgraded to a high efficiency condensing boiler. Later the customer installing the boiler may be able to obtain energy from a district energy heating system, biomass, ground or solar energy

Attachment 16.1

Deloitte.

Gaining traction
A customer view of electric
vehicle mass adoption in
the U.S. automotive market



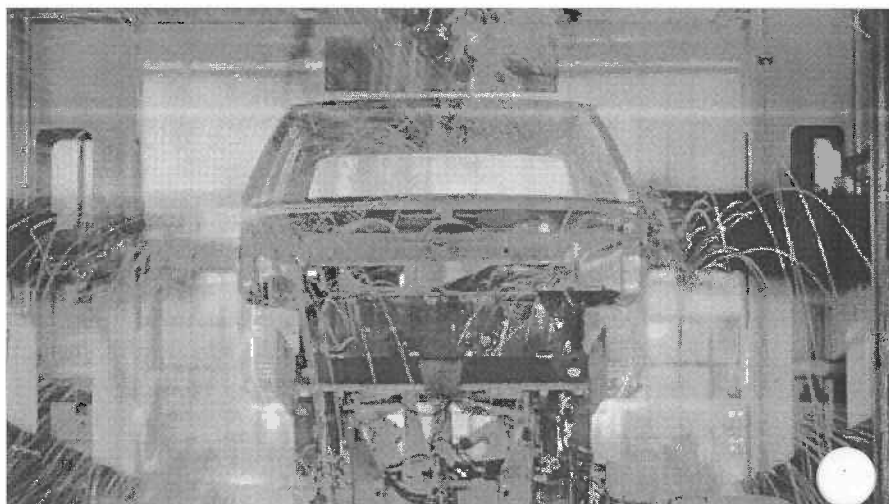
Opening

Is this the time for the electric car? Who is likely to buy these vehicles? ("If we build them, will buyers come?") What will Original Equipment Manufacturers (OEMs) need to do to make these vehicles acceptable for the mass market? These are challenging questions given the substantial investments automakers and suppliers will have to make in order to bring electric vehicles to the mass market. To answer these questions and others, Deloitte recently completed a proprietary market study that includes primary and secondary customer research and interviews with executives from major automotive OEMs, clean-tech start-ups, dealers, and energy companies. Our findings are presented in this report.

As the industry begins to recover from the effects of the 2008/2009 recession, quite a few factors are converging to make the idea of an electric vehicle (EV) more attractive than ever. Government tax credits, emission regulation and fuel economy standards, and unstable oil prices are contributing to a shift in both focus and attitude among industry leaders. Most of the major global OEMs have announced plans for vehicles powered by an electric motor with an on-board battery pack. Also, several start-up companies have announced their intentions to bring "pure" electric vehicles to market in the next 12 to 18 months. These announcements have generated great enthusiasm in the media and at recent auto shows.

Indeed, the future of the electric car looks good. But there are challenges. So far, most EVs have been powered by internal combustion engines (ICE) with supplemental electric motors and battery storage — in other words, they are not the true electric cars of the popular imagination. As a result, the size of the market opportunity has been difficult to gauge. How big is the potential demand? Who are the likely buyers of the electric car? At the same time, certain barriers need to be overcome before market adoption could achieve critical mass. These topics were the focus of our research:

- Market opportunity
- Target customers
- Barriers to adoption
- Market forecast



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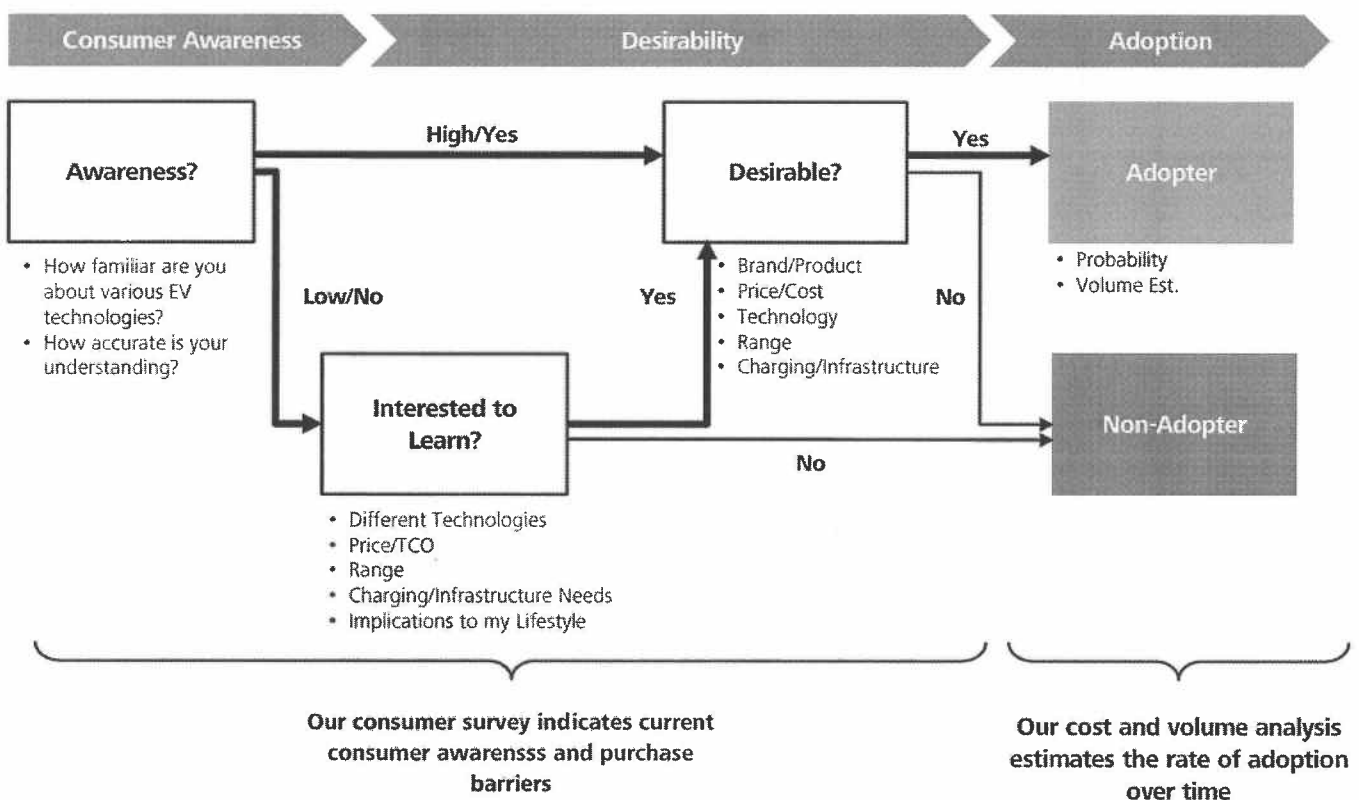
About our study

The analysis presented in this report comes from original primary and secondary research, including interviews with executives from major automotive OEMs, clean-tech start-ups, dealers, and energy companies, as well as a survey of nearly 2,000 current vehicle owners.

To this qualitative and quantitative data we applied Deloitte's Demand Driven Analytics Methodology (Figure 1) to assess the consumer's perspective about the future of electric vehicles in the U.S. market.

Assessing future demand for electric vehicles was somewhat challenging since it meant testing consumer preferences for a product with which they are largely unfamiliar. For this reason, we focused on uncovering consumers' familiarity with EV technologies and products; with their opinions around price, brand, range, charging, the infrastructure, and the cost of ownership; and with the consumer's imagined "fit" of an EV in his or her lifestyle given a range of demographic parameters.

Figure 1. Deloitte's demand driven analytics methodology

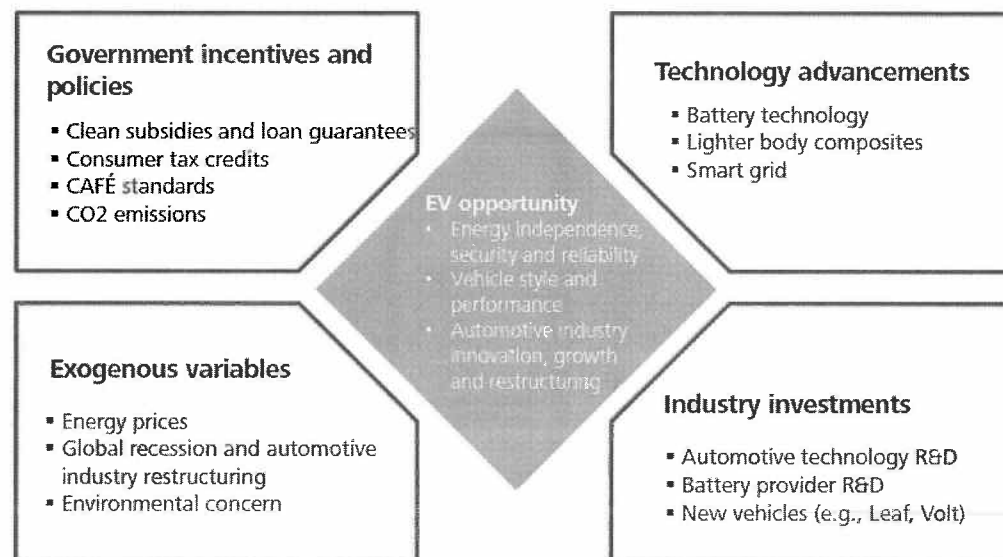


Market opportunity

Electric vehicles present a tremendous opportunity for the struggling, established automotive industry (Figure 2). They can enable the OEMs to respond to the growing public clamor for energy independence, security, and reliability since the grid is powered by multiple sources including coal, natural gas, nuclear power, and renewable sources. EVs are also introducing innovative body materials and styling, and today's electric motors deliver high performance and torque over a wide rpm range, which makes driving the new EVs a satisfying experience even when compared to traditional ICE vehicles.

But electric vehicles also pose a threat to OEMs, as they could lead to reconfigured value chains and massive industry restructuring. The threat is a complicated problem influenced by a wide range of factors including government policies and incentives, technology advancements in components such as batteries, and market forces including the price of gasoline.

Figure 2. Electric vehicle and activity drivers



Target customers

Based on our research, we have created a profile of consumers most likely to buy electric vehicles (early adopters, see Figure 3) and those least likely to do so (non-adopters, see Figure 4) in the foreseeable future.

The early adopters will be a small number of buyers, nowhere near the volume needed for mass adoption. They will be young, high-income individuals who already own one or more vehicles. We expect early adoption to be centered in southern California primarily due to infrastructure investments already made in the region (and discussed later in this document).

On the other side of the spectrum are the non-adopters. These consumers tend to be highly insensitive to environmental matters and are rarely politically active. They live predominantly in suburban and rural areas and drive larger vehicles — SUVs and trucks — a relatively significant distance every week. Non-adopters are very price sensitive; with low household incomes (HHI), they

view EVs as expensive. Since a relatively high percentage do not have garages, charging an EV could be difficult. These consumers would be poor targets for any EV marketing campaign and are unlikely to want to buy an EV unless prices dropped significantly and ranges expand to accommodate their typical driving distances.

Figure 3. Early adopter profile: 2011–2020

- Similar to early adopters of hybrids, early adopters of EV's will be young, very high income individuals — adoption is already being popularized by high-profile celebrities
- Average incomes are expected to be in excess of \$200K HHI who already own one or more vehicles
- Early adoption will be concentrated around southern California where weather and infrastructure allow for ease of EV ownership

Source: Deloitte survey, interviews and analysis

Figure 4. Non-Adopter profile

EV perception	Top purchase influencer	HHI	Gender	Location	Garage	Miles per week
"Expensive"	Price	\$54K	49% Male	Suburban and rural	36% no garage & power	600

The early majority

Eventually, mass adoption will be spurred by the development of competitive offerings. We refer to consumers coming on board at this time as the “early majority” and would include those individuals who are the most likely to buy immediately after the “early adopter” wave.

These consumers have a very distinct profile (Figure 5), beginning with a much higher-than-average HHI at \$114K. They tend to reside in urban or suburban areas, but nearly 90 percent have garages with electrical power

(which resolves the challenge of charging the EV). Their weekly mileage is low — about 100 miles. Environmentally sensitive, they perceive an EV as “green and clean;” they are concerned about U.S. dependency on foreign oil and are politically active. Finally, this group is willing to pay a premium for convenience.

Among the U.S. population, about 1.3 million people fall into this segment. Among these, the most likely “early majority” are men and women ages 40 to 44. This group is the most likely target for electric vehicles.

Figure 5. Early majority profile

EV perception	Top purchase influencer	HHI	Gender	Location	Garage	Miles per week
“Green and clean”	Reliability	\$114K	67% Male	Urban and suburban	88% have garage & power	100

Early Majority Population & Volume Potential

- Given a few key demographic and psychographic attributes of the mass adopter segment we can approximate the segment's population size
 - Men represent 49% of the total population and 67% of this segment
 - 13.4% of men have an income of \$100K or more
 - 12.3% of Households have an income between \$100K to \$150K
 - 44.9% of men vote, 44.5 % of women vote
- There are 1.3 million men and women in the U.S. who have the demographic characteristics in the Early Majority segment

Source: U.S. Census

Barriers to adoption

Our research indicates that a sizeable demographic segment of U.S. consumers would consider buying an electric vehicle; however, we also identified barriers to mass adoption.

In our survey we asked consumers which variables would encourage them to buy an electric car (Figure 6) and which

would discourage them from doing so (Figure 7). The top four factors in the "pro" column are price, reliability, cost to charge, and convenience to charge. If these four are favorable, the consumer's attitude toward the EV would be positive. The top three variables in the "con" column are price, range, and size of the vehicle.

Figure 6. Factors encouraging Survey Respondent EV purchase

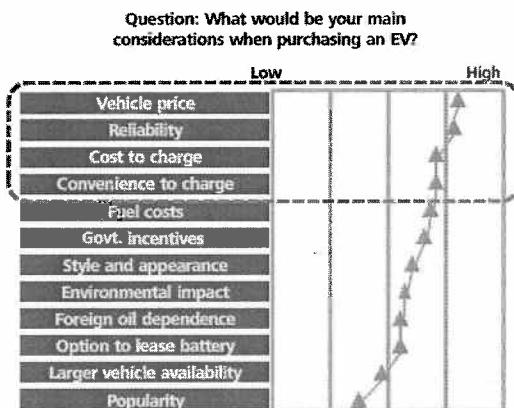
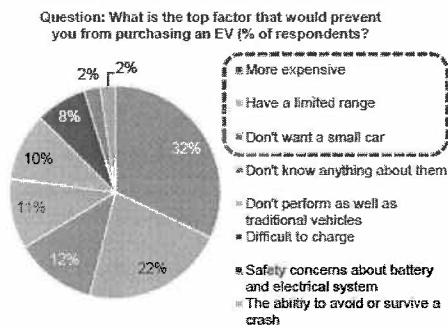


Figure 7. Factors discouraging Survey Respondent EV purchase



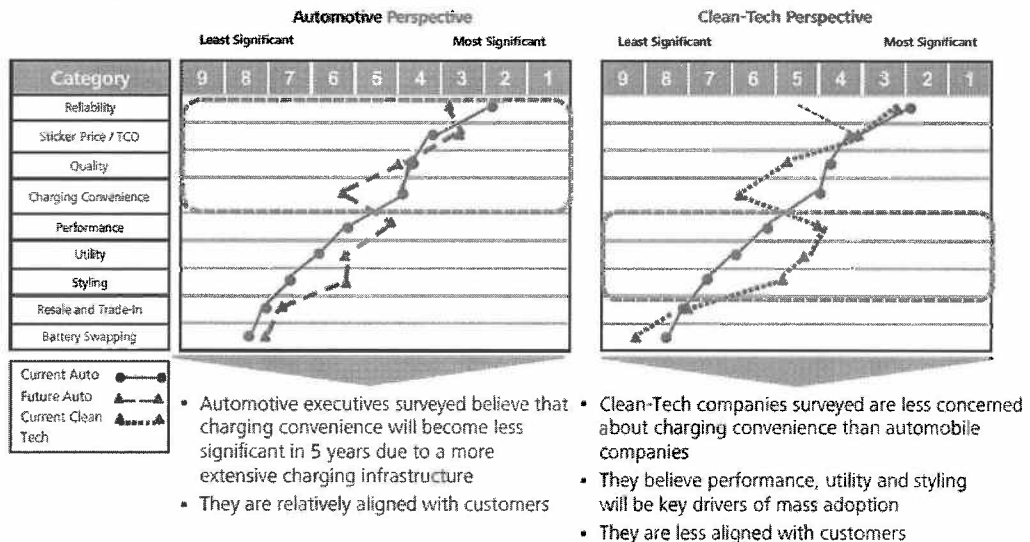
We also interviewed executives from major automotive OEMs, clean-tech start-ups, dealers, and energy companies. In these inquiries, we noticed an interesting trend: at this time, the leaders of traditional automotive OEMs seem to have a closer, clearer understanding of customer surveyed concerns than do executives from clean-tech start-ups surveyed (Figure 8).

For example, clean-tech executives surveyed think that quality and charging convenience are less important than performance and styling to consumers. But, our research indicates that, potential buyers aren't concerned with those factors at this point; right now, their concerns are more basic. Auto executives surveyed realize something clean-tech executives do not: U.S. consumers are accustomed to a certain type of automotive experience. For EVs to become popular, they must mimic the experience and performance that drivers have become accustomed to.

Synthesizing all this quantitative and qualitative data, we have identified six potential barriers to the mass adoption of electric vehicles:

- Familiarity
- Brand
- Range
- Charging
- Infrastructure
- Price and cost of ownership

Figure 8. Respondents Perceptions of factors driving EV adoption



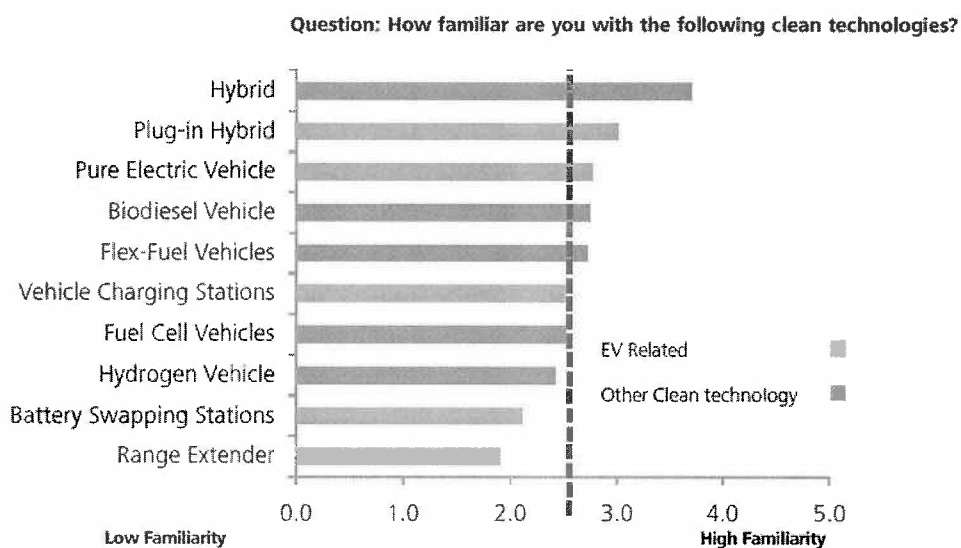
Barriers to adoption

A. Familiarity

We discovered that customers are largely unfamiliar with alternative fuel technologies other than hybrids (Figure 9). It's natural that they would be hesitant in their enthusiasm for something they know nothing about. Furthermore, their familiarity (and subsequent comfort) with "hybrid" vehicles comes from massive education efforts by a few automobile manufacturers — efforts already 10 years underway at a cost of more than \$1 billion.

Electric vehicles represent an even more radical departure from ICE vehicles than did hybrids; public acceptance will require more education about issues such as charging, ranges, and the driving experience itself. Messaging will need to focus on "educating" and "correcting" because many people have wrong preconceptions about EVs. For these reasons, it's highly likely that educating customers on EV technologies will cost even more than it did for hybrids.

Figure 9. Customer Surveyed Familiarity

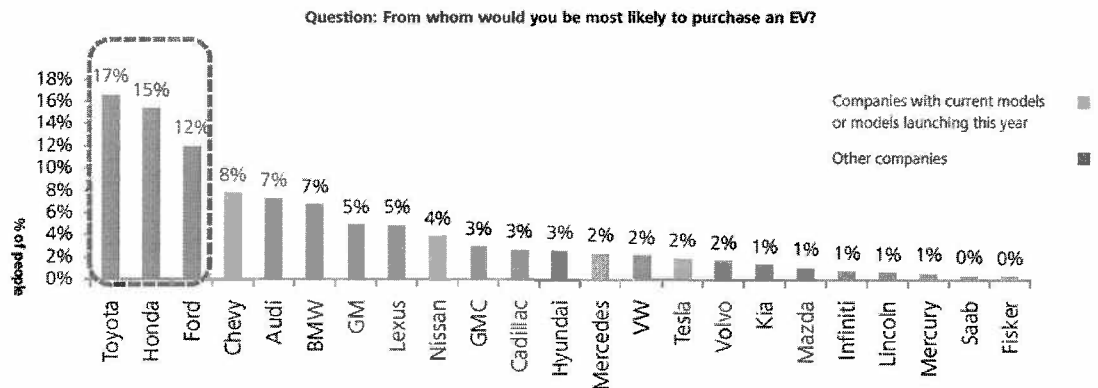


B. Brand

Experience tells us that when it comes to automotive purchases, consumers are brand-driven; we believe they will buy EVs only from a brand they trust (Figure 10). Our study indicates that Toyota, Honda, and Ford have brand "permission" in this space due in part to the "green equity"

they have built with their hybrid vehicles. We think that EVs from these three OEMs will have the highest likelihood of success. As a corollary, Nissan and Chevrolet will likely face challenges in their upcoming EV launches. As first-to-market products, their vehicles will bear the cost and burden of educating consumers.

Figure 10. Brand preference

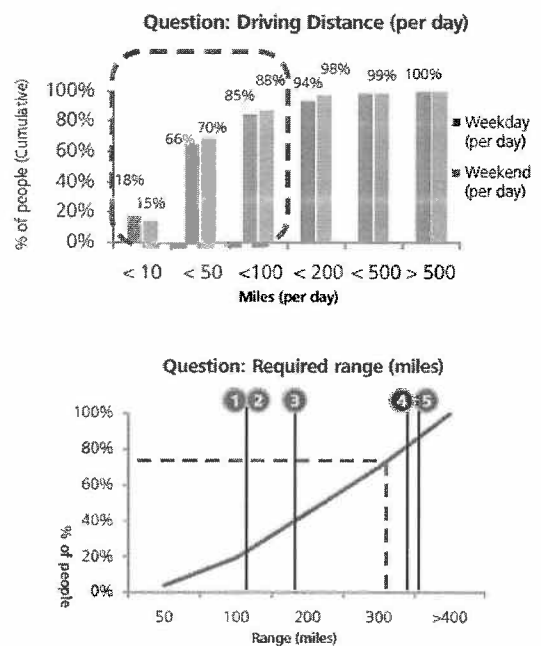


C. Range

Even though EVs meet the daily range requirements of most drivers, range anxiety is pervasive amongst our survey participants. Technically a 50-100 mile electric range would meet the daily driving requirements of most customers, a statistic that clean-tech executives focus on. But our research indicates that consumers aren't comfortable with that range. Most expect a minimum range of 300 miles before they would consider an EV (Figure 11).

Essentially, consumers want the equivalent range of an ICE vehicle on a tank of gas. This gap is important: customers want the freedom and convenience they associate with a full tank of gas. They want the convenience and peace-of-mind knowing they can make from point A to point B without the worry of running out of fuel/energy.

Figure 11. Survey Respondent's Driving distance, per day and required



Travel distance

- On weekdays and weekends, few consumers surveyed travel more than 100 miles per day
- EVs with a range of 50 miles could meet the daily needs of 66% of drivers on weekdays, and 70% on weekends

Range anxiety

- 70% of drivers surveyed would expect an electric vehicle to travel 300 miles before they would consider purchasing one
- Current EVs vary Considerably in their range
- Nissan Leaf: 100 miles (electric)
- Ford Focus: 100 miles (electric)
- Tesla Model S: 160 miles (electric)
- Chevy Volt: 40 miles (electric) + 300 (combustion)
- Fisker Karma: 50 miles (electric) + 300 (combustion)

D. Charging

Our survey results indicate that consumers want to be able to charge at home and have the convenience of rapid charging stations. Eighty-one percent of surveyed consumers would prefer to charge from home, but 61 percent don't have access to home-charging capabilities, such as a garage with an electric power source.

Relatively few (only 17 percent) would be willing to spend eight hours charging their vehicle at home (fully recharging depleted PHEV/EV batteries can take 2 to 8 hours, depending on the type of charging equipment and battery

size). However, if the charging time is reduced from eight hours to four, consumer willingness doubles. Sixty-nine percent would be willing to pay up to \$1,000 for a vehicle that charges faster (Figure 12), but no more than \$1,000.

Further, 54 percent of surveyed consumers would not consider purchasing an EV until charging locations are widely available and as easy-to-locate as a gas station is today. Currently, there are fewer than 500 stations in the United States, with more than 80 percent of these in California (Figure 13). Clearly, increasing public and private infrastructure will be necessary before the EV can be widely

adopted. In fact, widespread charging stations could be a key enabler to the EV. But the cost would be significant. A station that can service 100 customers in a 24-hour period at 50kWh per charge would cost \$1.8 to \$3.0 million. While the current climate is not strong enough to attract enough private investment, Pike Research predicts that the infrastructure will expand and that by 2015 there will be 5.3 million charging stations globally.

But the real question to us with regard to changing is this: Would consumers be willing to adapt to any charging

time? As one auto executive we interviewed said, "You need an electric car that can recharge in five minutes — that's how a gas station works."

A proposed alternative to rapid charging stations is battery swapping stations; 79 percent of surveyed consumers would consider battery swapping as an alternative to charging their vehicle at home (Figure 14). But technical barriers and other challenges (Figure 15) make this a less-than-ideal option.

Figure 12. Charging time Survey Responses

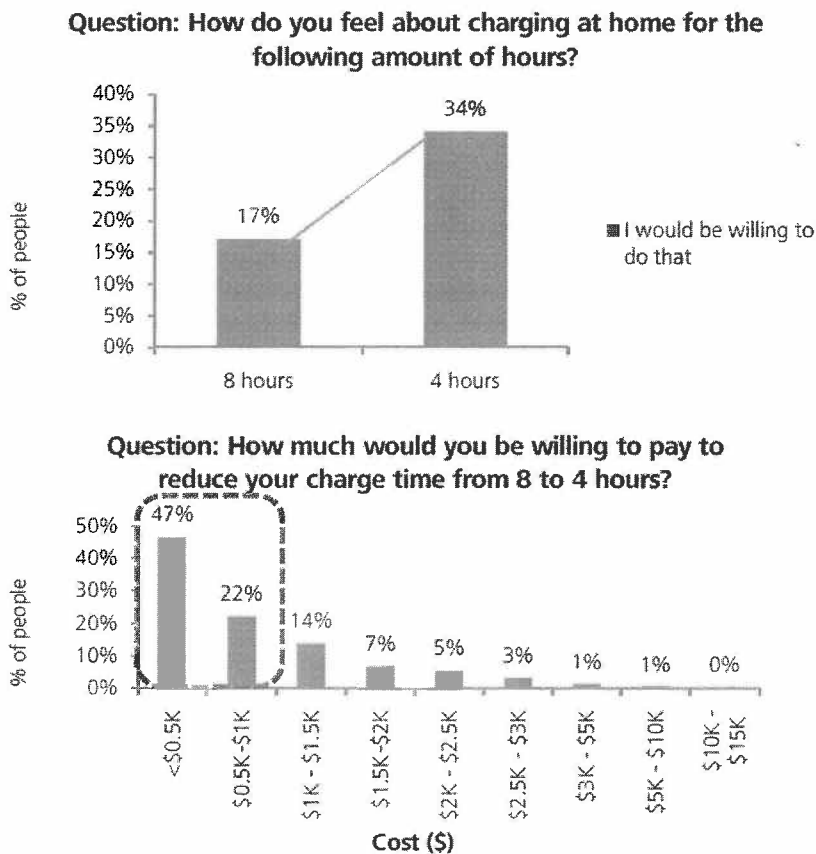


Figure 13. Charging location Survey Responses

Question: Would you rather charge your vehicle at home or at work?

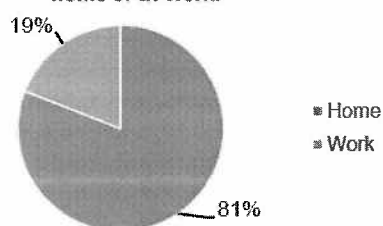


Figure 14. Battery swapping Survey Responses

Question: Would you consider battery swapping as an alternative to charging your vehicle at a charging station?

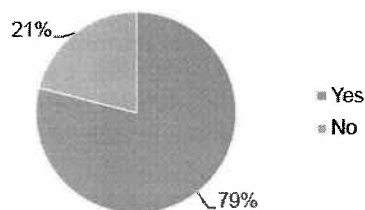


Figure 15. Barriers to battery swapping Survey Responses

Barriers to Battery Swapping

While consumers are open to battery swapping to avoid charging (79% of people surveyed): there are many limitations:

- **Cost:** Each battery swapping station may cost as much as \$500K
- **Standardization:** Battery Swapping requires battery standardization
- **Tragedy of the Commons:** Consumers will have the incentive to treat their batteries poorly, knowing they will swap with someone else

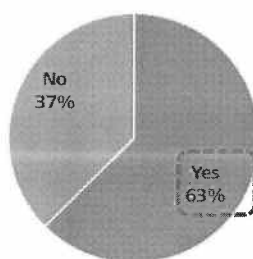
E. Infrastructure

Our research indicates that consumers are anxious about the availability and convenience of infrastructure to support electric vehicles (Figure 16). Another potential concern involves charging times, which tend to be between 6:00 p.m. and 10:00 p.m., potentially putting a heavy strain on the power infrastructure, particularly in areas not equipped to handle this type of load.

Yet, industry insiders we interviewed believe that improvements will be forthcoming. The government has shown willingness to fund the first \$100 million of infrastructure [need to cite source], but building out more extensively will require a much larger investment. Power industry forecasts indicate that the smart grid, with digital real-time metering, should be ready by 2015. But the energy industry will need to do a better job of increasing customer awareness.

Figure 16. Survey Responses Concerns about the grid

Question: Are you concerned about the capacity and reliability of your local utility to support electric vehicle charging?



F. Price and cost of ownership

The greatest factor that will drive or prevent adoption is price.

Sixty-nine percent of consumers surveyed consider price the most important factor in a vehicle purchase, and most of them expect to pay less than \$30K for an EV (Figure 17). Twenty-three percent say the price of gasoline would be a deciding factor, a finding that suggests the importance of more consumer education about EVs and their total cost of ownership. As one automotive executive we interviewed said, "Customers will buy an EV if the cost is comparable to an ICE vehicle; if it's more they won't buy it. People will not sacrifice themselves to save the environment."

When we did a sensitivity analysis on key costs (Figure 18), we discovered that the perceived operating benefits of an EV are sensitive to battery costs and gas prices. In fact, these are likely key parameters in determining the timing and degree of adoption.

For example, Figure 19 shows the projected cost per kWh for lithium ion batteries over time: technology is driving the cost down, but the decrease is slow. Battery costs will have to decrease 40 percent for EVs to be at par with ICEs in total cost of ownership. Since both gas prices and battery costs will inhibit adoption, OEMs will likely need to spend a lot in incentives to sell EVs in the next two to three years. At \$3/ gallon for gas, ICEs are more economical to operate; the EV will not be comparable until battery costs are \$600 or less per kWh (Figure 20), which could occur by 2014, at which time EV adoption will pick-up (assuming fuel costs remain stable).

Figure 17. Price in the purchasing decision of Respondents

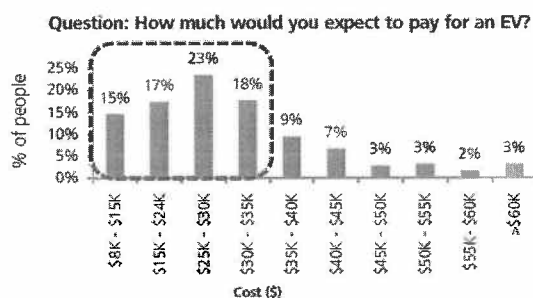
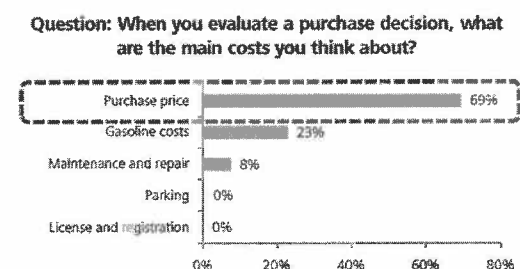
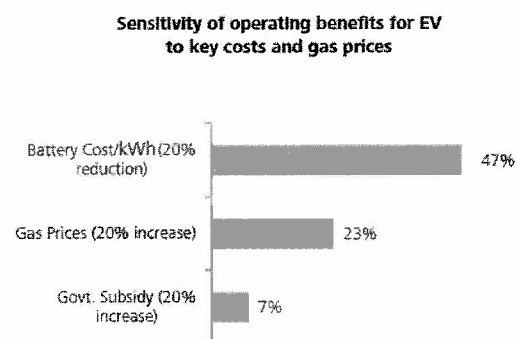


Figure 18. Sensitivity benefits vs. costs



Note: the base line values for the analysis are: Battery cost /kWh = \$1100, Gas price = \$3.00 per gallon, and Govt. Subsidy = \$4000 per EV

Figure 19. Li-ion Battery Cost/kWh

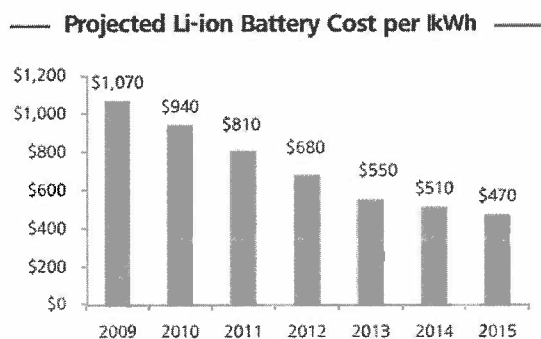


Figure 20. Operating benefit over ICV

Gas Price (\$)	Battery cost / kWh (\$)					
	\$1,000	\$900	\$800	\$700	\$600	\$500
Approx. 2010 Battery Cost						
\$3.00	-\$1,675	-\$1,175	-\$675	-\$175	\$225	\$825
\$3.25	-\$1,525	-\$1,025	-\$525	-\$25	\$425	\$975
\$3.50	-\$1,375	-\$875	-\$375	\$125	\$625	\$1,125
\$3.75	-\$1,225	-\$725	-\$225	\$225	\$775	\$1,275
\$4.00	-\$1,075	-\$575	-\$75	\$425	\$925	\$1,425
\$4.25	-\$925	-\$425	\$75	\$525	\$1,075	\$1,575
\$4.50	-\$775	-\$275	\$225	\$625	\$1,225	\$1,725
\$4.75	-\$625	-\$125	\$425	\$725	\$1,375	\$1,875
\$5.00	-\$475	\$25	\$525	\$825	\$1,525	\$2,025

EV has an Operating Benefit over ICV

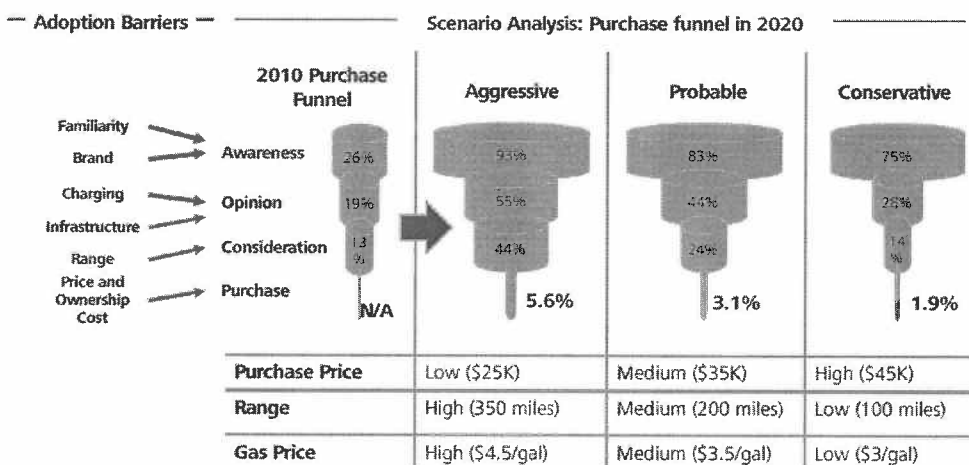
Market forecast

Based on our research, we estimate that in 2020 electric vehicles will account for 3.1 percent of total automotive sales in the U.S. market (Figure 21) or approximately 465K units.

We also expect with volume increasing, many OEMs will enter the market, and that consequently, the market share per OEM will shrink: assuming five OEMs in 2015 making electric vehicles, each OEM will sell only 12,000 units a year on an average. This volume does not appear to be sufficient to push the cost of the battery lower.

In 2020, even with the volume at 465,000 units, each OEM will have only about 93,000 units (Figure 22). If each of the five OEMs has three models, then EV production per model will be only 30,000. At this small volume OEMs will be challenged in recovering the cost of their infrastructure investments, and each OEM will face significant cost pressures.

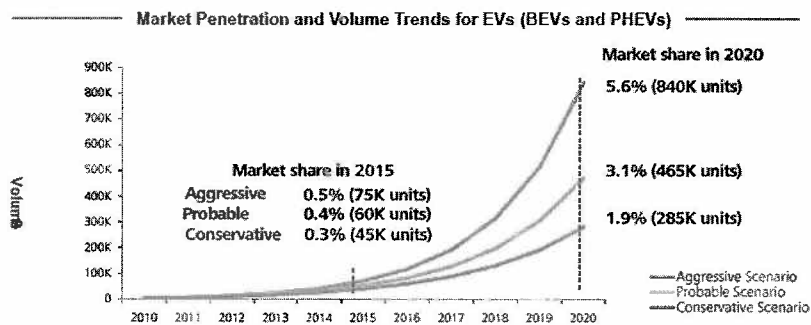
Figure 21. Purchase funnel analysis for 2020 market



NOTE: 1) Analysis considered BEVs and PHEVs only. 2) Current funnel is derived based on the customer survey. The 2020 purchase funnel is based on sensitivity of consideration to purchase price and range within customer clusters and the purchase funnel metrics for Hybrid adoption 3) The U.S. light vehicle volume for 2020 is assumed to be 15 million.

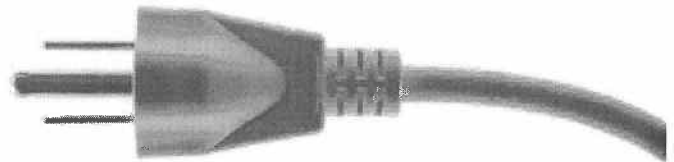
Sources: Deloitte analysis, primary research; GfK Automotive Purchase Funnel Benchmarks, Jan 2010

Figure 22. Market penetration and volume trends for EVs



Note: 1) Analysis considered BEVs and PHEVs only. 2) Current funnel is derived based on the customer survey. The 2020 purchase funnel is based on sensitivity of consideration to purchase price and range within customer clusters and the purchase funnel metrics for Hybrid adoption 3) The U.S. light vehicle volume for 2020 is assumed to be 15 million.

Sources: Deloitte analysis, primary research; GfK Automotive Purchase Funnel Benchmarks, Jan 2010



Conclusions

Electric vehicles are attractive to customers, the automotive industry, and the country. In the U.S., approximately 1.3 million consumers fit the demographic and psychographic profiles of potential "early majority" EV customers. The challenge to the industry at this point is overcoming the six barriers to adoption. We expect that mass adoption will be gradual — roughly 3 percent by 2020 — and that complementary technologies will continue to gain acceptance.

Consumer perspective

EVs bring performance and styling improvement opportunities for automakers. However, range anxieties will be a significant barrier to adoption until technology can address the issue. We conclude that the keys to mass adoption are 1) a reduction in price and 2) a driving experience in which the EV is equivalent to the internal combustion engine vehicle.

Automotive industry

Clean-tech investments are accelerating, supported by government incentives. Because of their investments in hybrids, three OEMs — Toyota, Honda, and Ford — appear to be well positioned in the emerging EV market. We expect that new EV introductions will broaden awareness, build excitement, and boost messaging/imaging. However, given our forecasted volume of 465,000 units across 15 brands/models in 2020, we believe achieving profitability and manufacturing efficiencies will be a challenge.



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Joint Industry Electricity Steering Committee Information Request No. 3.40.3 Dated: August 25, 2010 British Columbia Hydro & Power Authority Response issued September 17, 2010	Page 1 of 2
British Columbia Hydro & Power Authority Fiscal 2011 Revenue Requirement Application	Exhibit: B-13-1

40.0 Reference: **Exhibit B-1, Appendix D; Exhibit B-6, BCUC IR 1.3.2; Exhibit B-11, BCUC IR 2.477.1, 2.540.1.1; BCOAPO IR 2.20.1; Exhibit B-11, JIESC IR 2.37.1;**
Topic: **Rate Increase Forecast**

BC Hydro has provided rate increase forecasts for F2010 to F2014 in the Service Plan and IR responses and a comparison to other utilities for F2010-2011. Since the F2010 Service Plan and F2011 RRA, BC Hydro has filed an Evidentiary Update (EU) and responses to IRs. It is not clear what is included in the current Service Plan rate increase forecasts and what the effect of the EU is on future rates.

The current Application is for 1 year but changes in rates and costs are significant and material to the customers of BC Hydro. BC Hydro has stated that a combined forecast is not available at this time. This is surprising given that BCH filed a detailed 10 year rate increase forecast in the F2008 LTAP proceeding. The IR was not limited to what was available but rather anticipated that a forecast would be developed and provided.

3.40.3 Update the Service Plan rate increase projections for F2010 to F2014 including the impact of all deferred expenditures, CWIP, BCTC amalgamation, etc., providing both the rate rider level and rate rider increase and forecast rate increases to F2021 using the same approach as used for the F2008 LTAP forecast and the best information available.

RESPONSE:

The table below provides the most recent forecast of annual revenue requirements, rate increases and rate rider changes through to F2015, as reviewed and approved by BC Hydro's Board in August 2010. As noted in the response to BCUC IR 1.3.2 the figures beyond F2011 are highly uncertain given that detailed budgeting has not yet occurred. Further, the following caveat applies, as noted in BC Hydro's 2010/11-2012/13 Service Plan (Exhibit B-1, Appendix D) "like all rate forecasts, those contained in this Service Plan for the years beyond F2011 will require future adjustment due to a number of factors, including seasonal changes to water flow levels, fluctuating market conditions, and any new policy directions received. Given the significant impact any or all of these factors may have on BC Hydro as a cost-recovery utility, this Service Plan reflects the best possible forecasting for future rate changes at this point in time."

Joint Industry Electricity Steering Committee Information Request No. 3.40.3 Dated: August 25, 2010 British Columbia Hydro & Power Authority Response issued September 17, 2010	Page 2 of 2
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	F2011	F2012	F2013	F2014	F2015
Projected Rate Increase (%)	6.11	15.61	5.17	9.73	8.58
Projected Rate Rider (%)	4.0	5.0	5.0	4.5	2.5
Rate Rider Change from previous year (%)	3.0	1.0	-	(0.5)	(2.0)
Annual Revenue Requirements (\$ million)	3,227	3,758	3,908	4,271	4,656

BC Hydro has not finalized an updated forecast beyond F2015. In any event, in BC Hydro's view, the longer term forecast of possible rate increases is not relevant to the F11 RRA proceeding.

Memorandum of Understanding

**For the development of enhanced utility integration in support of the
Government's 2007 Energy Plan**

executed on the day of July, 2009 between

**Terasen Gas Inc., Terasen Gas (Vancouver Island) Inc.,
Terasen Gas (Whistler) Inc., Terasen Energy Services Inc.
(collectively referred to as the "Terasen Utilities")**

and

British Columbia Hydro and Power Authority ("BC Hydro")

WHEREAS Policy Action No.2 of the British Columbia ("B.C.") Government's 2007 Energy Plan states that the B.C. Government desires to "ensure a coordinated approach to conservation and efficiency is actively pursued in British Columbia". Elements of the 2007 Energy Plan include but are not limited to, the implementation of the 2008 Energy Efficient Buildings Strategy and the Industrial Energy Efficiency Program.

WHEREAS the Demand Side Management ("DSM") expertise and capabilities of the parties are most effective from a customer perspective when combined and applied in a coordinated way.

WHEREAS the parties recognize that increased DSM activity can drive economic growth.

WHEREAS the parties recognize that as entities with differing corporate structures (BC Hydro is a Crown Corporation and the Terasen Utilities are Investor-Owned Utilities), the parties will have differing impetus and mandates to undertake DSM.

INTRODUCTION AND CONTEXT

The parties share many of the same customers. Customers view their energy demands holistically. Energy conservation in buildings/sites needs to be addressed in a coordinated way.

PURPOSE OF THE MOU

This MOU will establish a non-legally binding framework and set of principles for an enhanced approach for DSM program coordination between the parties. The combined skills and DSM expertise of the parties are better applied together to improve the delivery of conservation initiatives and total energy DSM programs that will help drive the prosperity of the province while meeting the goals of government.

The parties to this MOU acknowledge that if they wish to jointly carry out specific initiatives that may arise out of this MOU, they will have to engage in further discussions and prepare further agreements and other documents to define, among other things, each party's responsibilities and other details.

This MOU is not an exclusive arrangement and does not restrict either party from pursuing their mandates, either on their own or in collaboration with any other party.

STATEMENT OF SHARED OBJECTIVES

- To reduce overall energy consumption and net greenhouse gas (GHG) emissions.
- To coordinate each party's efforts in support of B.C. Government's goals.
- To provide the most cost-effective DSM programs on behalf of customers and ratepayers, while maintaining distinct and well-regarded brand identities.
- To reduce customer and marketplace confusion.
- To share knowledge and research findings.

KEY AREAS OF FOCUS

- **Defining Consistent Terminology, Best Practices and Approaches:** Working together to define consistent terminology, best practices and approaches for DSM initiatives and energy use reporting that will support the needs of both parties and government goals.
- **Coordination:** Working together to investigate where DSM programs can be coordinated to work towards a more efficient delivery of conservation initiatives to our customers, removing barriers and increasing the uptake of programs.
 - The scope of the DSM programs will include without limitation the following: residential, commercial and industrial initiatives
- **Data Exchange:** To share information within the restrictions of privacy legislation and other applicable laws and internal policies that will help develop better understanding of the marketplace the needs and barriers of our customers and the development of more effective DSM plans.
- **Program Delivery:** To investigate the opportunities for the combined delivery of programs and offers through coordinated/cooperative key account manager activities.
- **Customer Education:** To investigate the benefits of combining/coordinating our communication and promotional materials to help deliver a cost effective coordinated DSM program delivery.
- **Supply-Demand Alignment:** To investigate the opportunities available to district and regional authorities for the development of distributed electrical generation and combined heat and power projects.
- **Codes and Standards:** To investigate working together to develop and influence codes and standards work, including drafting a recommendation regarding attribution of savings from codes and standards.
- **Communities:** To investigate working together on developing sustainable energy programs for communities.
- **Innovation:** To investigate the opportunities for the development of carbon sequestration or carbon offsetting programs to provide customers with viable GHG reduction strategies.

GUIDING PRINCIPLES

The parties will comply with the following guiding principles in developing and carrying joint initiatives under this MOU:

- **Energy Plan Principles** – adherence to the core principles of conservation, cooperation, coordination, innovation and efficiency underlying the 2007 Energy Plan, and the *Greenhouse Gas Reduction Targets Act* and other government legislation.
- **Administrative Efficiency** – allocation of responsibility based on the respective strengths of each party and coordination of both parties' efforts to avoid any duplication of efforts and costs.
- **Simplicity** – choosing the simpler, more efficient and more cost-effective course of action.
- **Consistent Protocols** – developing and implementing simple, efficient and consistent protocols to facilitate and govern their collaborative efforts.
- **Mutual Respect** – acknowledging and respecting any limitations and obligations the other party may have:
 - under the *Freedom of Information and Protection of Privacy Act*,
 - under any other applicable laws,
 - under internal policies,
 - and with respect to its reputation in the marketplace.
- **Compliance with law** – in carrying out joint initiatives the parties will comply with, among other applicable laws, the *Competition Act*.

STEERING COMMITTEE

The parties will establish a steering committee (the "Steering Committee") which will have equal representation from both parties, both in terms of numbers and in terms of seniority of members.

- **Role** – The role of the Steering Committee will be to administer and carry out the intent of this MOU and ensure that the initiatives mentioned within the MOU are progressed by the relevant working groups/personnel of each party. The Steering Committee will approve the project Charter a detailed document that outlines the reporting structure and management process for the MOU.
- **Decisions** – Decisions of the Steering Committee will be made by the consensus of its members.
- **Reporting** – The Steering Committee will bi-annually prepare a written report for each party's Executive Sponsor to detail:

- The nature and extent of the issues dealt with by the Steering Committee;
 - The effectiveness of the MOU and whether any amendments to it are advisable;
 - The initiatives undertaken by the parties pursuant to this MOU;
 - Any other information required by the Sponsors.
- **Rules of Conduct** – In addition to the rules of conduct set out in this section of the MOU, the Steering Committee will be entitled to develop and implement additional rules of conduct and to change such rules at any time.

ADMINISTRATION AND IMPLEMENTATION

- **Meetings** – meetings will be held when mutually agreed to by the members of the Steering Committee and at places and times agreeable to the parties, but the meeting shall be held not less frequently than 3 times per year. Meetings by teleconference are acceptable under this MOU.
- **Agenda** – the agenda for the meetings will be prepared by the host of the meeting and agreed to by both parties.
- **Record** – the host of the meeting shall ensure that a record of the meeting is kept and circulated in advance of the next meeting.
- **Working groups** – the parties may establish joint working groups to undertake projects of mutual interest to both parties.
- **Expenditures** – each party is to bear its own costs in relation to meeting the aims and objectives of this MOU. All activities that may be carried out under this MOU are subject to the availability of appropriated funds and other resources.
- **Confidentiality of MOU** - parties understand that the content of this MOU is not confidential and that it may be shared with interested parties.
- **Announcements of initiatives**- neither of the parties will make public statements about initiatives that result from this MOU without informing and obtaining the permission of the parties prior to doing so, which will not be unreasonably withheld.
- **Intellectual property** – this MOU does not grant any right to either party to use each others logos, trademarks or other intellectual property. Any such use will only be permitted through a legally binding agreement between the parties.

DURATION

- Activities under this MOU may commence on the date of signature and are to continue until July 31st, 2012.
- A party may terminate the MOU at any time without liability by providing the other party with no less than 30 days notice. In such event, the party wishing to terminate the MOU shall consult the other to determine the effect of such dissociation on activities in progress.

The parties have signed this memorandum of understanding as of the day and year first above written.

Terasen Gas

By: Doug Stout, Vice President, Marketing and Business Development

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On behalf of

Terasen Gas Inc.
Terasen Gas (Vancouver Island) Inc.
Terasen Gas (Whistler) Inc.
Terasen Energy Services Inc.

British Columbia Hydro and Power Authority

By: Bev Van Ruyven, Executive Vice-President, Customer Care and Conservation

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Appendix 1

NEXT STEPS

- The parties will define the composition of the steering committee to prioritize the areas of collaboration outlined in the Key Areas of Focus. The role of the steering committee initially will be to activate working groups or other entities as required to progress initiatives within the framework of this MOU.
- The parties will meet regularly through various committees and working groups (as required) to deliver on the objectives of this MOU.
- The initiative will be launched at an appropriate event (Kick Start Event) that will be co-developed by the parties.
- The organizations will incorporate specific joint strategies and actions for each of the focus areas into their business plans or processes. Specific projects or programs may be a natural outcome of this work.