BC hydro

Integrated Resource Plan

Chapter 8

Clean Energy Strategy

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8.1 Introduction

This chapter describes BC Hydro's strategy to support the clean energy sector in B.C. and promote clean energy opportunities for First Nations communities. In response to a request from the Minister of Energy and Mines (**Minister**), coupled with feedback received during the final phase of Integrated Resource Plan (**IRP**) consultation, the following Recommended Action ensures that the IRP aligns with and supports the Province's long-term vision for clean energy in B.C.

> RECOMMENDED ACTION: Advance a set of actions that will support a healthy, diverse clean energy sector and promote clean energy opportunities for First Nations communities.

8.2 Background

For over a decade, the B.C. Government has advanced its clean energy vision for the province. In 2002, the B.C. Government released a B.C. Energy Plan with Policy Action No. 13 providing that independent power producers (**IPPs**) "are to develop new generation, with BC Hydro's role limited to undertaking efficiency improvements at existing facilities" and Site C with Cabinet approval.[1] In 2007, the B.C. Government issued a new B.C. Energy Plan with an increased focus on clean energy, environmental leadership and energy security.[2] This 2007 B.C. Energy Plan contained policy direction to BC Hydro to become electricity self-sufficient (Policy Action No. 10), to "[e]nsure clean or renewable electricity generation continues to account for at least 90 per cent of total generation" (Policy Action No. 21), and to introduce a standing offer program for clean generation projects (Policy Action No. 11). The 2010 *Clean Energy Act* (***CEA***) introduced 16 British Columbia energy objectives, of which a number relate to clean or renewable resource development, economic development and greenhouse gas (**GHG**) reduction, including the 93 per cent clean or renewable electricity generation target. Refer to Table 1-1 in Chapter 1.

[1] *Energy for our Future: A Plan for B.C.* (November 25, 2002), pages 9 and 30.
[2] *The B.C. Energy Plan: A Vision for Clean Energy Leadership* (February 27, 2007).

Since 2002, BC Hydro has conducted eight power acquisition processes to procure clean or renewable energy from private producers, as well executing a number of bilateral agreements, resulting in 87 Electricity Purchase Agreements (**EPAs**) which are currently active. Refer to Table 8-1.

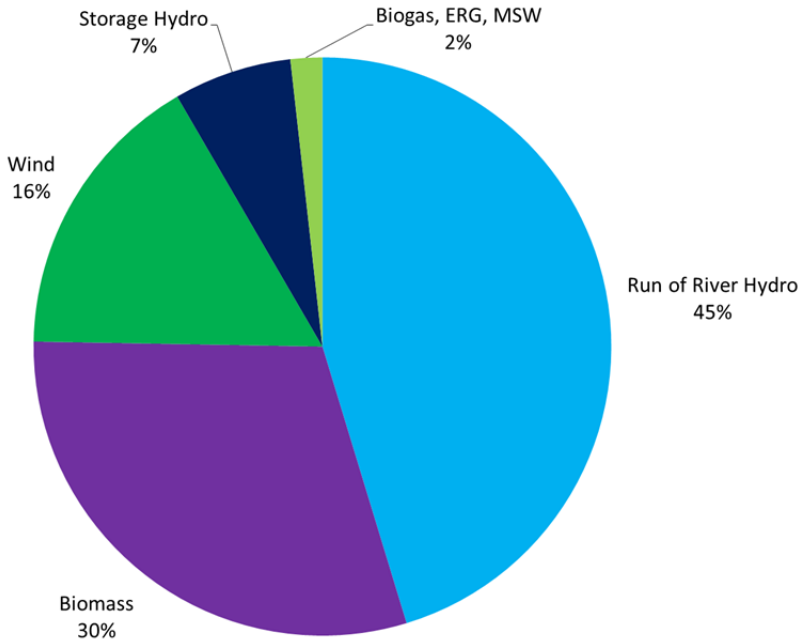
Table 8-1 BC Hydro Power Acquisition Processes Since 2002

Acquisition Process	Launch
Green Power Generation Call	October 2002
F2006 Open Call for Power	December 2005
Standing Offer Program (**SOP**)	April 2008
Bioenergy Phase 1 Call Request for Proposals (**RFP**)	February 2008
Clean Power Call	June 2008
Integrated Power Offer	Mid-2009
Community-Based Biomass Power Call Request for Expressions of Interest (RFEOI)	April 2010
Bioenergy Phase 2 Call RFP	May 2010
Bilateral agreements (e.g., Forest Kerr, Waneta Expansion)	Various

As of August 2, 2013, of the 87 active EPAs which have been signed since 2002, 41 are for IPP projects in operation, representing approximately 5,300 gigawatt hours per year (**GWh/year**) of contracted energy, about $4 billion of capital investment, and about 3,500 direct construction jobs. Another 46 IPP projects are in development, representing another 7,100 GWh per year of contracted energy (5,000 GWh/year anticipated post-attrition) and a projected capital investment of $4 billion and about 3,000 direct construction jobs.

As shown in Figure 8-1, BC Hydro's portfolio of active EPAs signed since 2002 covers a wide range of clean energy technologies, including run-of-river hydro, wind, storage hydro, biomass, biogas, municipal solid waste (**MSW**) and energy recovery generation (**ERG**).

Figure 8-1 EPAs since 2002 by Project Technology (Percentage of Post-Attrition Firm Energy)



Including all EPAs established since the late 1980s, IPPs now supply about 20 per cent of the electricity required to serve BC Hydro's domestic customers. That number is expected to increase to 25 per cent by F2017, when more IPPs with EPAs reach Commercial Operation Date (**COD**) and accounting for EPAs that are renewed. IPPs, and the clean energy sector more broadly, have become an integral part of the diverse electricity supply mix in B.C., and play an essential role in serving BC Hydro customers with 93 per cent clean or renewable electricity.

8.3 Objectives and Principles

The Clean Energy Strategy addresses the Minister's request to do more to support the clean energy sector in B.C and promote clean energy opportunities for First Nations communities, which also advances the following *CEA* objectives:

- Objective 2(c), "to generate at least 93% of the electricity in British Columbia from clean or renewable resources…"

- Objective 2(h) to encourage the switching from one kind of energy source or use to another that decreases greenhouse gas emissions in British Columbia
- Objective 2(i) "to foster the development of First Nation and rural communities through the use and development of clean or renewable resources."

In scoping the Clean Energy Strategy, BC Hydro was guided by its energy and capacity Load-Resource Balances and by the *CEA* objective 2(f) "to ensure the authority's rates remain amongst the most competitive of rates charged of public utilities in North America."

The strategy is based on the principles that integrate learning from BC Hydro's previous call processes and periodic reviews of its power procurement practices, as follows[3]:

- Acquisitions align with the electricity requirements of BC Hydro's customers, as set out in this IRP and future updates. (This is how most electric utilities time their procurements.)
- The optimal balance of risk is struck between IPPs and BC Hydro, as purchaser on behalf of its customers
- A continual focus on finding the most cost-effective clean energy resources through competitive, or competitively benchmarked, processes

[3] The most recent review was undertaken by Merrimack Energy Group, Inc., *Final Report on BC Hydro's Energy Procurement Practices* (February 2011) **(Merrimack Report**). Merrimack found that BC Hydro had incorporated "lessons learned" from previous procurements and was moving its power procurement process more in-line with the procurement processes implemented by utilities that are recognized as leaders in the industry. Additionally, Merrimack identified several potential areas for improvement, and included nine recommendations under four functional areas: (1) Energy and Demand Supply Planning (2) Sourcing and Procurement (3) Interconnections, and (4) Evaluation and Risk Allocation. One of the procurement-related recommendations was to make the energy procurement process more transparent for all stakeholders and First Nations by preparing energy procurement procedures for posting on BC Hydro's website. As a result, BC Hydro developed an "Overview of BC Hydro's Energy Procurement Practices" which is posted on BC Hydro's website and is comprised of guiding principles and procurement procedures. It outlines BC Hydro's general energy procurement practices, namely procurement principles and procedures, for those parties interested in selling electricity to BC Hydro under various power procurement processes.

- Effective participation by First Nations to support economic development in their communities and meaningful consultation with First Nations on clean energy projects in their traditional territories

8.4 Actions

The Clean Energy Strategy advances a number of actions over the next two years, as outlined below. It is envisioned the strategy will be reviewed with government annually.

1. Undertake EPA renewals that are cost-effective as summarized in section 8.4.1
2. Broaden opportunities through the Standing Offer Program (**SOP**) and Net Metering Program (section 8.4.2)
3. Promote First Nations participation in clean energy projects (section 8.4.3)
4. Highlight energy acquisitions as part of the IRP Contingency Resource Plans (**CRPs**) (section 8.4.4)
5. Pursue bilateral agreements (section 8.4.5)
6. Work with government to advance electrification (section 8.4.6)
7. Continue to encourage the use of clean or renewable electricity by the Liquefied Natural Gas (**LNG**) industry (section 8.4.7)
8. Regularly update the inventory of clean or renewable resource options in B.C. (section 8.4.8).

8.4.1 Undertake EPA Renewals

In support of this strategy, BC Hydro plans to renew expiring EPAs at cost-effective prices for clean or renewable IPP projects currently in operation and with contracts set to expire in coming years. As described in section 4.2.5.1, in its EPA renewal negotiations, BC Hydro will consider the seller's opportunity cost, the electricity spot market, the cost of service for the seller's plant, and other factors such as the attributes of the energy produced and other non-energy benefits. For planning

purposes, BC Hydro has assumed that about 50 per cent of the bioenergy EPAs will be renewed; about 75 per cent of the run-of-river EPAs that are up for renewal in next five years will be renewed; and that all other EPAs will be renewed. By F2017, EPA renewals are expected to account for 1,200 GWh/year of energy, and by F2033, about 6,400 GWh/year. Thus renewals are a major resource that BC Hydro plans to rely on to meet future customer demand, second only to Demand Side Management (**DSM**) in terms of energy volume.

8.4.2 Broaden Opportunities through Standing Offers for Clean Energy

BC Hydro has offered a SOP for small-scale clean energy projects since 2008 and a Net Metering Program for residential and commercial customers since 2003. In this action, BC Hydro focuses on expanding opportunities that both support the clean energy sector and promote clean energy opportunities for First Nations. The specifics of this recommendation respond to not only the feedback received through consultation on the August 2013 Revised IRP, but also reflect input received through other means, such as the feedback collected on net metering, as described below. Specific actions include:

- Increasing the maximum project size eligible under the Net Metering Program from 50 kilowatts (**kW**) up to 100 kW and communicating this change to interested customers. BC Hydro is currently developing an application to the British Columbia Utilities Commission (**BCUC**) to implement this recommendation[4]. As described in BC Hydro's 2013 Net Metering Evaluation Report No. 3 to the BCUC,[5] there has been substantial interest in the Net

[4] In October 2011, BC Hydro applied to the BCUC to amend the current Net Metering tariff. As part of that filing, a number of interveners along with the BCUC requested that among other things, BC Hydro explore raising the project size threshold of the Net Metering tariff and to solicit input on the economic and other barriers faced by developers in connecting small-scale clean Distributed Generation less than 1 MW to our system. BC Hydro held a series of workshops and meetings to identify and assess the barriers to developing small scale generation projects. BC Hydro recognized that customers such as municipalities, schools and First Nations were constrained by the 50 kW cap and were either forced to split their projects into smaller components or abandon them all together. BC Hydro proposed to increase the Net Metering project size threshold from 50 kW to 100 kW.

[5] https://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/corporate/independent-power-producers-calls-for-power/net-metering/net-metering-evaluation-report-april2013.pdf.

Metering Program and a number of stakeholders and First Nations have requested a higher limit on the size of eligible projects, such as up to 500 kW or 1 megawatt (**MW**). BC Hydro has agreed to raise the limit to 100 kW, which maintains the intent of the program as primarily a load displacement initiative. However, BC Hydro recognizes the significant interest from First Nations, communities and others for small project development (above 100 kW but below 1 MW) and is addressing this interest through a new project stream within the SOP, as described next.

- Introducing a "micro-SOP" component within the overall SOP annual target to enable projects in the range of 100 kW to 1 MW. This change reflects feedback from First Nations and communities that, while an increase to the Net Metering cap enables projects up to 100 kW, it still leaves no room for projects in the 100 kW to 1 MW range.[6] The "micro-SOP" will be a simpler, more streamlined process within the SOP. It will aim to reduce costs to the developer and provide greater certainty around interconnection study costs and associated upgrade costs. A simplified form of the SOP electricity purchase agreement will be developed. Based on feedback and requests, it is expected that the micro-SOP will enable municipal and First Nations projects, as well as some commercial and industrial customers who want to use existing infrastructure such as water or wastewater treatment facilities, waste heat, and energy from industrial processes to produce small amounts of electricity.
- Increasing the SOP's annual target from 50 GWh/year to up to 150 GWh/year (including the new micro-SOP stream) to enable more small-scale projects in communities throughout BC Hydro's service area in any given year without unduly impacting rates. This responds to feedback received through the IRP consultation process from First Nations and the clean energy sector, as well as

[6] BC Hydro does not rely on Net Metering Program savings for planning purposes because the savings cannot be counted on to be delivered with certainty. The savings depend on among other things the consumption habits of customers participating in the Net Metering Program, equipment status and weather. The savings are expected to small; BC Hydro's current Net Metering Program has, as of August 2, 2013, resulted in about 1 MW of installed capacity from about 228 projects.

ongoing interest over the last year from the clean energy sector, customers and First Nations communities wanting to develop clean or renewable energy projects under 15 MW. It also responds to the government's continued commitment to regional economic development and supporting First Nations seeking distributed generation projects located closer to consumers of electricity. This increase in the annual target could enable a number of small projects each year to be developed in a way that meets the *CEA* objectives described above.

- To enable a greater role for clean or renewable energy projects as prescribed in the *CEA*, the Ministry of Energy and Mines directed BC Hydro to amend the SOP by removing high-efficiency cogeneration using non-clean fuels from SOP eligibility. Cogeneration can still be used by customers for load displacement purposes.

8.4.3 Promote First Nations Participation in Clean Energy Projects

As evidenced in the discussion in the previous section, many First Nations across the province have expressed a strong interest in participating in the clean energy sector as such projects can present economic opportunities within their territories that are consistent with their values. There is very strong support from First Nations for participation in clean energy development, with benefits including short- and long-term employment opportunities, development and transfer of skills into other economic opportunities, and financial benefits.

Specific actions include:

- Engaging First Nations and IPPs on how to introduce new elements to the SOP to encourage First Nations participation. Note that the SOP offers a standard contract with preset prices to all projects under 15 MW that meet the eligibility requirements. BC Hydro has received considerable feedback from First Nations on their desire for greater participation in SOP projects, including some specific proposals regarding SOP eligibility requirements. A range of mechanisms could

be effective to encourage greater First Nations participation in the SOP. However, not all mechanisms may be endorsed by different First Nations. Rather than BC Hydro deciding to implement a specific mechanism at this time, BC Hydro will engage further with First Nations and the clean energy sector on the mechanisms to encourage greater participation in the SOP. Following the consultation, BC Hydro intends to make additional revisions to the SOP requirements.

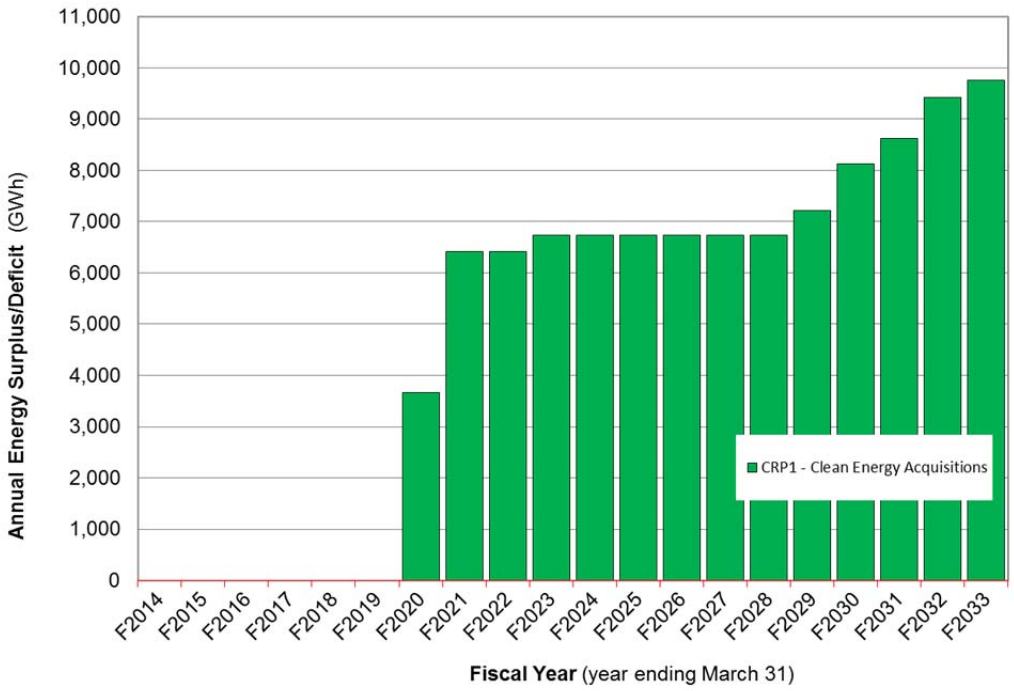
- As the need for the next major call for power emerges, engaging First Nations and the clean energy sector on how to encourage First Nations participation in that new call for power. Outside of the SOP, when BC Hydro procures new clean resources it typically does so through a competitive bid process. The evaluation of the bids in a competitive process considers financial, technical, environmental and other factors. Going forward, BC Hydro intends to put greater emphasis on First Nations participation in clean energy projects, and will consult with First Nations and the clean energy sector on how best to do so.
- As noted in section 4.2.3, BC Hydro is continuing to give weight to maintaining or improving relationships with First Nations as it manages its IPP portfolio through deferrals, downsizing or terminating pre-COD EPAs, where those projects are in material default of provisions in the contracts
- As set out in section 4.2.3.2, BC Hydro is continuing to honour prior commitments to explore clean energy development with First Nations and agreements to negotiate EPAs with First Nations. Undertaking the above mentioned changes to SOP and Net Metering will facilitate greater participation of First Nations in clean energy development. Feedback from many First Nations indicates that some of their projects are likely to be relatively small scale, in the 50 kW to 1 MW range. Therefore the increased cap on Net Metering projects combined with the introduction of a micro-SOP element within the SOP will help facilitate these types of projects.

8.4.4 Energy Acquisition as Part of the IRP CRPs

The clean energy sector has asserted that market uncertainty is a dampener on maintaining a healthy sector in B.C. At the same time, forecasting future need for electricity in B.C. is very challenging given developments in the oil and gas, mining and LNG sectors combined with external events.

If load grows faster than projected, the need for energy could be advanced significantly. Figure 8-2 shows the timing and volume of clean energy needs in a large gap scenario after capacity needs have been met. In this large gap scenario, clean energy acquisitions are projected to begin to come online in F2020, growing to about 7,000 GWh/y by F2023. For more details about the clean energy required to prepare for larger than expected energy demand, refer to Appendix 9A which sets out BC Hydro's CRPs.

Figure 8-2 Potential Clean Energy Acquisitions in Large Gap Scenario without LNG (GWh)



While a number of factors could lead to a significant increase in expected resource requirements for a persistent period of time, some key signals that will be monitored included:

- Increasing activity in the mining and upstream oil and gas and LNG sectors trending above expected levels, including the number of applications for service and the volumes requested
- Emergence of a trend of ongoing DSM under-delivery
- Failure to renew and/or bring to COD EPAs as forecast
- Load growth after DSM (actual and forecast) persistently trending close to or above the trajectory of the large gap scenario
- Adverse regulatory permitting experience for supply-side resources

BC Hydro is of the view that the IRP and power acquisition processes must be linked. This view is supported by observations made in the Merrimack Report. BC Hydro proposes to review the IRP in two years (as set out in section 1.1.1 of the IRP). Should new information and the outcomes of analysis identify additional need, the November 2013 IRP can be updated to recommend a new call for energy. BC Hydro therefore has time to monitor the above factors and communicate to the clean energy sector any updates to its estimated level of need for new clean or renewable resources.

If load growth is trending upward to the degree that an energy gap is expected in the near to medium term, then BC Hydro will consider a process to procure additional energy that will balance its immediacy of need against the volume required and the process design to arrive at the best outcome in terms of price, product, timing and risk. For illustrative purposes, should the fall 2015 review of the IRP indicate a need for a power acquisition process which targets the procurement of 3,000 GWh/year or more of clean or renewable energy, BC Hydro would likely launch a call with EPA awards taking place nine to 12 months later, such that successful projects could be online as early as F2020-21.

BC Hydro acknowledges that any resources acquired through such an acquisition process would involve additional time to obtain required permits and reach COD. Large clean energy projects typically require at least two years to obtain their material permits and even longer if they are 50 MW or larger and have to go through an environmental assessment process. Once key permits are in hand, IPPs typically require another one to two years for project construction and in some cases even longer if there are financing obstacles. Thus, the time period from the date of EPA award until project completion and the start of commercial operation can range from three to six years as evidenced by BC Hydro's Clean Power Call experience.[7]

Depending on the level of load growth realized in BC Hydro's service area and consistent with the recommendations provided in the Merrimack Report, the necessary acquisitions could be completed through a variety of cost-competitive processes such as RFPs, standardized offers or bilateral negotiations. The final mix of procurement approaches selected by BC Hydro will be dependent on the volume and timing of energy required, potential sources of energy available and a determination of the most cost-effective method to acquire resources.

8.4.5 Pursue Bilateral Agreements

Working with the B.C. Government, BC Hydro will enter into cost-effective bilateral procurements, benchmarked to competitive processes, where those procurements further the *CEA* British Columbia energy objectives. One example is the bilateral negotiations and agreement between BC Hydro and AltaGas in 2010 in which AltaGas agreed to contribute $180 million towards the development of the Northwest Transmission Line (**NTL**) and received EPAs for the Forrest Kerr, McLymont and Volcano power projects. This bilateral agreement created the foundation for the development of NTL, which is opening up that region of the province for greater economic development. A second bilateral agreement with Imperial Metals paved

[7] Aeolis Wind Power Corporation, a wind project developer, states in its October 18, 2013 e-mail to BC Hydro concerning the IRP that "[l]ead times for a large scale wind power project can reach six to seven years". In addition, there have been suggestions that future power acquisition processes should be smaller and targeted (technology/region/product specific).

the way for transmission to be extended north of NTL, with development of the Iskut Extension.

8.4.6 Work with Government to Advance Electrification

Electrification reduces GHG emissions while supporting the long-term demand for clean or renewable resources. Government policy on climate action drives signals that can incent electrification. With this action, BC Hydro will focus on working with the B.C. Government to advance electrification options for industrial, transportation and other sectors. Examples include the following:

- In 2008, BC Hydro developed a shore power rate to enable cruise ships at Canada Place, operated by Port Metro Vancouver, to turn off their diesel generators while berthed. The rate application was supported by government direction to the BCUC in the form of the Shore Power Regulation.[8] BC Hydro is working with the B.C. Government, the ports and industry to expand the availability of shore power to shipping at other B.C. ports.
- BC Hydro is working with the B.C. Government, local governments and other partners to manage the installation of 13 electric vehicle (**EV**) fast-charging stations across B.C. Direct current fast-charging stations require only 20 to 30 minutes for an 80 per cent charge and are necessary to give EV owners the confidence to travel between communities.
- BC Hydro is proceeding with the implementation of the Dawson Creek/Chetwynd Area Transmission Project (**DCAT**) to serve electricity demand in the South Peace/Dawson Creek area due to natural gas exploration and development in the Montney Basin shale gas deposits. The industrial customers that drove the need for DCAT provided security for 60 per cent of the DCAT capital costs, demonstrating their commitment to electrifying their facilities. Meanwhile, BC Hydro is investigating the South Peace transmission upgrades in response to unprecedented load growth in the Dawson

[8] B.C. Reg. 291/2008.

Creek/Groundbirch areas driven by natural gas developments, which are projected to continue over the next 25 years and will require an additional transmission infrastructure following DCAT's completion. BC Hydro is currently in the planning stages for this additional transmission infrastructure.

8.4.7 Continue to Encourage the Use of Clean or Renewable Electricity by the LNG Industry

BC Hydro and the B.C. Government have been working with LNG developers to ensure they understand the benefits of taking clean energy from BC Hydro's grid for some or all of their supply. As noted in Chapters 1 and 2, BC Hydro's current view is that the larger-scale plants will choose to use natural gas direct drives for the compression function (as is allowed by government policy), but may choose electricity from the grid for ancillary requirements. Smaller proposed LNG projects may take grid supply for compression as well as for ancillary requirements.
BC Hydro and government continue to have discussions with LNG developers to understand their electricity supply requirements. Technical system studies have been completed and viable proposals for supplying clean electricity from the grid have been made to several LNG developers. BC Hydro is prepared to serve all electricity demand arising from the development of this industry in B.C., and has plans in place for both supply resources and transmission infrastructure to meet expected and higher than expected demand.

8.4.8 Regularly Update the Inventory of Clean or Renewable Resource Options in B.C.

BC Hydro is committed to maintaining a current understanding of resource potential, prices and technical capabilities of different clean or renewable technologies in B.C.

BC Hydro looks forward to further engaging industry associations, equipment manufacturers, suppliers, consultants and others with information that will it help maintain an accurate, up-to-date understanding of the resource potential in B.C., including alternative proposals to serve customers' needs in B.C. Given the pace of change in renewable resource technology, BC Hydro is considering maintaining an

"evergreen" approach to managing this data, so that decision-making is always based upon current data.

8.5 Implementation

The actions within the Clean Energy Strategy will be implemented over the next two years, and progress will be reviewed annually with the B.C. Government. Key dates to implementation are as follows:

- F2014 and F2015
  - Increase SOP annual target immediately
  - Commence engagement with IPPs and industry experts on the Resource Options inventory
  - Engage with stakeholders and First Nations on design and launch of micro-SOP component of SOP
  - Engage with First Nations and IPPs on SOP enhancements that promote First Nations participation
  - Engage IPPs, First Nations and interested stakeholders on SOP review
- Fiscal 2016
  - Undertake IRP Review starting in fall of 2015