

Integrated Resource Plan

Appendix 7C-2

**Public and Stakeholder Consultation – Appendices
to the Summary Report 2011**

Pre-Consultation

BC Hydro Integrated Resource Plan

Consultation Summary Report Appendix 1

APPENDIX 1

Pre-Consultation — September - December 2010 Review of Technical Data and Consultation Design

From September to December 2010, BC Hydro sought pre-consultation input from First Nations and stakeholders regarding the design and content of its consultation pre-consultation. As part of the process, a feedback form was sent to stakeholders around the province. The goal of the feedback form was to receive input from stakeholders on the proposed IRP consultation topics and consultation methods. 28 responses were received. For a brief description of pre-consultation results please go to www.bchydro.com/irp.

Purpose

During Technical Review and Foundation for Integrated Resource Planning, BC Hydro presented information about the consultation plan and potential consultation topics and sought feedback on the IRP Public and Stakeholder Consultation Plan for 2011. Specifically, BC Hydro sought stakeholder feedback on the following consultation topics:

- Conservation Options
- Electricity Generation Options
- Electrification
- Transmission Options
- Export Marketing Potential

Notification

More than 230 emails were sent to stakeholders inviting them to submit a feedback form. A follow-up reminder email was sent to stakeholders in advance of the feedback deadline, and the original feedback deadline of December 15, 2010 was extended to December 22, 2010.

Pre-Consultation Participation

Total participation in this stakeholder consultation was 28.

- 27 feedback forms were submitted: 22 through the online feedback form, 3 through email, and 2 through the mail.
- One written submission was received in the form of a letter submitted by email by the Sierra Club on behalf of the David Suzuki Foundation, Pembina Institute, Sierra Club BC, Watershed Watch Salmon Society, and West Coast Environmental Law.

Key Results from Pre-Consultation Feedback Forms

- **Participants were asked what Integrated Resource Plan topics they would like to provide input on.** Participants showed a strong interest in all five Integrated Resource Plan topics, with Electricity Generation Options selected by 83% of all respondents, and Conservation Options selected by 65% of all respondents. Electrification received the lowest number of responses at 39%.
- **Participants were asked how important each of the proposed Integrated Resource Plan topics were to them.** Participants regarded all five topics presented in the feedback form as important topics by ranking them as very important or somewhat important (between 83% and 96% regard the topics as “somewhat” or “very important”).
- **Participants were asked how likely they were to participate in a list of consultation methods for the Integrated Resource Plan Public and Stakeholder Consultation in 2011.** Interest was very high for participation in a variety of public and stakeholder consultation methods, with between 63% and 90% respondents indicating that they are “very likely” or

“somewhat likely” to participate in the five consultation methods listed (stakeholder meetings, public open houses, consultation workbook and feedback form, online consultation workbook and feedback form, email/written submissions). Respondents were “very likely” to participate in an online consultation workbook feedback form, stakeholder meetings and email/written submissions, and “somewhat likely” to participate in public open house meetings.

- **Participants were asked if they would like to receive updates on the Integrated Resource Plan Consultation process for 2011.** A large majority of participants (90%) expressed interest in receiving updates on the Integrated Resource Plan Consultation process for 2011.
- **When asked how they would like to receive updates on the Integrated Resource Plan Public and Stakeholder Consultation Program in 2011,** a large majority of participants (90%) indicated that they would like to receive further information through regular email updates, and 60% indicated that they would like to receive information through the BC Hydro IRP website.
- **Participants were asked to provide any additional comments regarding consultation topics and how they would like to be consulted on the IRP.** Some participants said the following:
 - o Want flexibility to attend public meetings
 - o Want open mike at public meetings
 - o Want to know how BC Hydro will be publicly acknowledging input and responding to input from stakeholders
 - o BC Hydro should maximize the opportunity to engage the public on the IPR process as widely as possible
 - o Transparency is critical, need comprehensive and environmentally responsible planning
 - o Priority topics include Demand-Side Management (DSM), electricity planning to reduce greenhouse gases, renewable energy options
 - o An analysis, explanation and justification of the self-sufficiency and insurance requirements is required

Submissions

One submission was received in the form of a letter submitted by email by the Sierra Club on behalf of the David Suzuki Foundation, Pembina Institute, Sierra Club BC, Watershed Watch Salmon Society, and West Coast Environmental Law. The letter focused on the following areas for consideration:

- Transparency planning must be comprehensive and environmentally responsible
- Surplus electricity requirement should be eliminated

Consultation Terms of Reference

**BC Hydro
Integrated Resource Plan**

**Consultation Summary Report
Appendix 2**

2011 Integrated Resource Plan



Public & Stakeholder Consultation Terms of Reference

February 8, 2011



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INTRODUCTION

The Integrated Resource Plan (IRP) is a 20-year plan that describes how BC Hydro proposes to meet future growth in demand for electricity through energy conservation and clean energy. Underpinning the plan is the long-standing planning objective to ensure reliable, cost-effective electricity supply, as well as important new objectives related to clean energy, greenhouse gas reduction and achieving electricity self-sufficiency contained in the *Clean Energy Act*.

In addition to developing a 20-year plan to meet future domestic electricity requirements, the IRP will include an exploration of market opportunities to export electricity to support clean energy and economic development objectives, and an assessment of transmission requirements looking 30 years out.

The *Clean Energy Act* requires BC Hydro to submit an IRP to the Ministry of Energy by the end of November 2011 after which government will review the IRP and decide whether to approve it.

This Terms of Reference describes the scope and nature of the IRP Consultation to inform and consult the public and stakeholders in 2011. In recognition of the unique interests of First Nations, BC Hydro has developed a dedicated First Nations consultation program. Details of the First Nations consultation are set out in a separate plan. Notwithstanding the existence of this separate consultation stream, BC Hydro invites and encourages First Nations to participate in the public and stakeholder consultation.

BACKGROUND

British Columbia's *Clean Energy Act*

The new *Clean Energy Act* establishes a long-term vision for British Columbia to become a clean energy leader, and establishes energy objectives for BC Hydro in developing its IRP. The IRP is BC Hydro's plan for achieving self-sufficiency, ensuring that 93 per cent of generation in the province comes from clean resources and ensuring conservation reduces growth in electricity demand by at least 66 per cent. As well the plan will contain an assessment of transmission options looking 30 years out, given the inherently longer lead times required for transmission.

Integrated Resource Planning

As part of the IRP process, BC Hydro analyzes potential future demand resulting from a growing population, economic development and potential electrification. In addition, BC Hydro explores future conservation plans and develops a province-wide inventory of potential renewable energy sources including wind, wave, tidal, geothermal, bioenergy, run-of-river hydro, large hydro (Site C), solar and others.

The IRP will include an evaluation of the need for and comparisons to the Site C Clean Energy Project, a potential third dam and hydroelectric generating station on the Peace River in northeastern B.C., and will consider it within various combinations of other energy options in the context of a long-term plan.

Approval Process

The *Clean Energy Act* has amended the regulatory oversight, review and approval process for resource plans in British Columbia. BC Hydro, as a publicly-owned utility, remains accountable to the Ministry of Energy and regulated by the BC Utilities Commission.

Following public and stakeholder review of the draft IRP, BC Hydro will make any final amendments based on this input, and submit the final Plan at the end of November 2011 to the Ministry of Energy for subsequent government review, after which the government will decide whether or not to approve the IRP.

The BC Utilities Commission will continue to regulate BC Hydro’s rates, provide oversight for future BC Hydro projects and programs, while advancing the government’s energy objectives and long-term resource plans.

CONSULTATION PROCESS

Consultation takes place in the following three phases:

Phase	Consultation Objective	Timing of Consultation
<i>Technical Review and Foundation for Integrated Resource Planning</i>	<ul style="list-style-type: none"> ✓ Gather input on consultation design ✓ Gather technical information about potential resource options 	Fall 2010
<i>Considering our Clean Energy Future – Assessing and Evaluating Options</i>	<ul style="list-style-type: none"> ✓ Gather public, First Nations and stakeholder input into development of draft IRP 	March/April 2011
<i>Reviewing the Draft Integrated Resource Plan</i>	<ul style="list-style-type: none"> ✓ Seek public, First Nations and stakeholder feedback on the draft IRP 	Fall 2011

BC Hydro is conducting a comprehensive, multi-round consultation process with the public and stakeholders to inform the development of the IRP. BC Hydro is also working with its long-standing Electricity Conservation & Efficiency Advisory Committee as it constructs options for energy conservation (called demand-side management options).

A technical IRP advisory committee comprised of energy experts who have demonstrated a long-standing interest in BC Hydro’s long-term electricity plans, has been established to provide additional detailed input and feedback throughout the development of IRP.

The process for developing the IRP includes the following phases of consultation and analysis:

Technical Review and Foundation for Integrated Resource Planning (Fall 2010)

During this initial phase, BC Hydro sought input on the design of consultation for subsequent phases taking place in 2011. This involved seeking input from stakeholders about the proposed consultation topics and methods.

Also, during this first phase of developing the IRP, BC Hydro sought input from those with information about the resource potential in B.C. in order to update this inventory of potential renewable energy sources.

In December, BC Hydro established an IRP Technical Advisory Committee that will aid it in creating a thorough, well-considered plan through detailed, technical, advisory input and feedback. The Committee consists of knowledgeable participants with a significant stake, interest and experience in BC Hydro's resource planning process. BC Hydro will use the Technical Advisory Committee to review its approaches and to evaluate its planning assumptions, leading to a more robust plan that is inclusive and considerate of the range of expert opinion available in the B.C. private and public sectors. This advisory input is in addition to input provided by the public, First Nations and stakeholders through a province-wide consultation process.

Considering our Clean Energy Future – Assessing and Evaluating Options (March/April 2011)

During this phase, BC Hydro will gather public and stakeholder input into the development of the draft IRP. This will include input on potential future conservation and efficiency, electricity generation options (including Site C), electrification, approaches to planning transmission and export market potential.

Reviewing the Draft Integrated Resource Plan (Fall 2011)

Through *Reviewing the Draft Integrated Resource Plan*, public and stakeholder consultation will be undertaken to gather feedback on the draft IRP. Consultation input will be considered along with financial, technical, environmental, and economic development input as BC Hydro finalizes the IRP for submission to the Ministry of Energy.

MEETING BEST PRACTICES IN CONSULTATION

Consultation best practices have been developed using the International Association for Public Participation (IAP2) Core Values of Public Participation and IAP2 Code of Ethics for Public Participation Practitioner, the Office of the Auditor General of British Columbia Public Participation: Principles and Best Practices for British Columbia, 2008/2009 Report 11, and an independent survey of six other consultation best practices documents.

The IRP consultation program incorporates the following best practice criteria:

- **Why Consult?** *There is support for, and a clear understanding of the importance of including public input in planning, policy and infrastructure decisions that affect the public interest.*
- **Accountability.** *There are well-defined policy or consultation guidelines including: mandate for consultation activities, areas where consultation is required and/or an optional activity, general steps in the process, roles and responsibilities, and feedback and evaluation.*
- **Policy Framework.** *Policy frameworks identify the role of consultation processes (advisory or joint decision-making), and outline public and corporate rights and responsibilities related to consultation processes.*
- **Fair, Transparent and Legitimate.** *Where possible, stakeholders have the opportunity to influence the design of a consultation program. The public is made aware of opportunities to participate and materials are made available in a manner that encourages public understanding.*
- **Identifying Topics and Decisions for Consultation.** *Consultation is only conducted when there are decisions that can benefit from public input, and input is used effectively to improve decisions.*
- **Clarity of the Terms of Reference for Consultation.** *There is a clear Terms of Reference for the consultation including a description of the design or steps in the public consultation process. Consultation plans usually elaborate with nature and purpose of specific consultations.*
- **Consultation Methods.** *A range of consultation methods are used to maximize opportunities for participation. Staff and consultants have the necessary skills to implement consultation programs.*
- **Reporting.** *Consultation Summary Reports provide participants, the public and decision makers with an analysis of input.*
- **Consideration of Input.** *The public is kept informed as consultation progresses (reporting at each consultation phase), including how input is considered and used.*

CONSULTATION METHODS

The IRP Public and Stakeholder Consultation will provide a variety of opportunities to provide input into the development of the draft IRP to account for various levels of interest and ability to participate. For example, some participants may feel comfortable providing their input in an open house or multi-stakeholder meeting, while others may wish to complete a feedback form, submit a written submission or participate in an online forum. Online consultation opportunities will be provided to allow participants to provide feedback at their convenience. Consultation methods may include, but are not limited to:

Consultation	<i>Technical Review and Foundation for Integrated Resource Planning</i>	<i>Considering our Clean Energy Future – Assessing and Evaluating Options</i>	<i>Reviewing the Draft Integrated Resource Plan</i>
	Fall 2010	March/April 2011	Fall 2011
Consultation Materials (Content)			
-Backgrounder and Feedback Form	•		
-Consultation Workbook and Feedback Form		•	•
-Technical Discussion Paper / Briefs		•	•
-Display boards		•	•
-PowerPoint presentations		•	•
-Web page	•	•	•
Public/Stakeholder Notification			
-Print/Radio ads		•	•
-Web promotion		•	•
-Email, letter and phone notification of stakeholders	•	•	•
-Email notification to Electricity Conservation & Efficiency Advisory Committee	•		
-Email notification to Technical Advisory Committee	•	•	•
-BC Hydro bill insert		•	•
-Media relations; media advisories		•	•

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Consultation	<i>Technical Review and Foundation for Integrated Resource Planning</i>	<i>Considering our Clean Energy Future – Assessing and Evaluating Options</i>	<i>Reviewing the Draft Integrated Resource Plan</i>
	Fall 2010	March/April 2011	Fall 2011
Consultation Methods			
-Online feedback form	•	•	•
-Multi-Stakeholder meetings ¹	•	•	•
-Open Houses		•	
-Written submissions		•	•
-Technical Advisory Committee meetings	•	•	•
-Attitude Survey			•
-Participant Interviews			•
-Webinars			•
Input Analysis and Reporting			
-Meeting notes	•	•	•
-Feedback Form analysis	•	•	•
-Electricity Conservation & Efficiency Advisory Committee analysis	•		
-Technical Advisory Committee analysis		•	•
-Consultation Summary Report	•	•	•
Consideration of Input			
-Review of Consultation Summary Report	•	•	•
-Consideration Memo		•	•

In addition, extensive notification to the public and stakeholders regarding the consultation period and ways to participate will be completed. Examples of notification include radio and newspaper advertisements and postcards mailed to households in the region.

¹ The rationale for multi-stakeholder meetings is to build awareness of various and competing interests in development of the IRP. Fall 2011 multi-stakeholder meetings are intended for representative groups.

CONSULTATION REPORTING

At the conclusion of each phase of consultation, a Consultation Summary Report will be produced, summarizing input received during the consultation period. Consultation Summary Reports provide participants, the public and decision makers with an analysis of input. Generally, each report will:

- Provide an overview of the consultation phase, methods and tools
- Report on levels of participation
- Summarize input received through:
 - Feedback forms
 - Submissions
 - Key themes from multi-stakeholder meetings
 - Key themes from open houses
- Include appendices:
 - Consultation materials
 - Meeting notes from multi-stakeholder meetings and open houses
 - Notification materials (including copies of newspaper ads, emails sent to stakeholders, etc.)
 - Returned feedback forms
 - Others

Consultation Summary Reports will be posted to the project website and consultation participants will be advised when the report is available.

HOW INPUT WILL BE USED

It is important that consultation participants have a clear understanding of how public and stakeholder input will be used after each phase of consultation. Input received through consultation will be considered, along with technical, financial, environmental and economic development input, as BC Hydro refines the IRP.

A Consideration Memo will be prepared that summarizes how public and stakeholder input was considered by BC Hydro during each phase of consultation. The Consideration Memo will be posted on the project website.

Multi-Stakeholder Meeting Notes

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**Consultation Summary Report
Appendix 3**

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**BC Hydro Integrated Resource Plan
Victoria - Multi-Stakeholder Meeting**

Hotel Grand Pacific

463 Belleville Street,
Victoria, BC

MEETING DATE

MARCH 9, 2011

1:00 P.M. – 3:00 P.M.

PURPOSE	Meeting notes from a multi-stakeholder group meeting with stakeholders BC Hydro staff on March 9, 2011 at Hotel Grand Pacific, 463 Belleville Street Victoria, British Columbia
FACILITATOR	Judy Kirk, Kirk & Co. Consulting Ltd.
PRESENTER	Cam Matheson, BC Hydro
MULTI-STAKEHOLDERS PRESENT	Doug Barbour Gerald Bennie Donavon Bishop Rob Buchna Laura Byrne Jon Colemann Judith Cullington Cynthia Day Guy Dauncey Mark Demecha Steve Duen Tom Duncan Nikki Elliot Bernie Gaudet Tom Hackney Franklin Hornbrook Jayne Ingram Ken Kaps David Lenton Mervyn Lougher-Goodey Elisabeth Nelson Peter Ostergaard Andrew Pape-Salmon John Partyka Ron Percival Murray Peterson Steve Price Juergen Puetter TJ Schur Adam Taylor David Ward Rob Wickson
STAFF ATTENDEES	Kenna Hoskins, BC Hydro Lindsay Fane, BC Hydro Steve Watson, BC Hydro Nancy Spooner, Kirk & Co. Consulting Ltd. Don Bradley, Kirk & Co. Consulting Ltd. Tim Lai, Kirk & Co. Consulting Ltd. Emilie Yee, Kirk & Co. Consulting Ltd. , Recorder

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Hotel Grand Pacific

463 Belleville Street,
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MEETING DATE

MARCH 9, 2011

1:00 P.M. – 3:00 P.M.

AGENDA	<ol style="list-style-type: none"> 1. Welcome and Review Agenda 2. Consultation Workbook Overview 3. Discussion 4. Closing Remarks
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KEY THEMES

1. **Conservation and Efficiency** – While acknowledging additional codes & standards, reduced consumption and higher deliverability risk, encouraged BC Hydro to include the more proactive, greater conservation approach in the draft Integrated Resource Plan.
2. **Electricity Generation Options** – While acknowledging the need for additional capacity provided by large hydro facilities such as the proposed Site C, gas-plant capacity or capacity provided by pump storage, participants encouraged BC Hydro to include more innovative renewable energy projects such as electricity generation options such as small and large-scale solar, geothermal and wind.
3. **Community Ownership of electricity generation options** – Participants encouraged BC Hydro to consider increasing opportunities for communities to be partners in the ownership of new electricity generation projects such as transmission lines, wind projects or small hydro, for example, to encourage community support for citing new electricity and transmission and to enhance community economic development.
4. **Electrification** – Participants said they would like BC Hydro to include a more pro-active approach to electrification in the Integrated Resource Plan so that British Columbia and North America benefit from the environmental benefits of reducing reliance on fossil fuels.

DISCUSSION

1. **Judy Kirk – Welcome and Introductions**
Judy Kirk welcomed participants to the stakeholder meeting, explained the format of the meeting and introduced the consultation workbook and feedback form. Roundtable introductions followed. Judy emphasised the five consultation topics and the feedback form at the back of the consultation workbook.
2. **Cam Matheson – Consultation Workbook**
Cam Matheson reviewed the format of the consultation workbook and explained the processes and factors BC Hydro considers when energy planning. Cam explained the difference between demand side options and supply side energy options and how BC Hydro factors this into the balancing the options when developing a long-term plan.

(Abbreviations will be used and mean: Q: Question, A: Answer, and C: Comment)

Q: *Steve Craigs:* Page 5 in workbook shows the gap so does that mean in seven years we are going to see rotating brown outs if the gap is not filled? How long until Site C comes along?
A: *Cam Matheson:* When you get to the point of black out and brown outs there has something seriously gone wrong.
Q: *Steve Craigs:* The supply gap doesn't mean no source, right?
A: *Cam Matheson:* We take steps to fill that gap and that is what we are doing here in this plan. I argue that for

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- BC if we find ourselves short we like having the ability to go to energy markets and buy because they'll be able to have the supply. Brown outs are a remote possibility.
- Q: *Steve Craigs:* What if you built Site C today, when would it be ready?
- A: *Cam Matheson:* The in service date for Site C is looking like 2020-2021.
- C: *Dave Conway:* That's correct, Cam.
- Q: *Doug Barber:* What is Site C?
- A: *Cam Matheson:* Site C is the third largest hydro electric project on the Peace River. Williston Reservoir sits up stream of two existing facilities that form 40% of the overall electricity for the province and Site C would be the third dam on the Peace River and would reuse the water from Williston Reservoir.
- C: *Judy Kirk:* It is important to look at Site C and alternative options and Cam will go through that as we go on through the workbook.
- Q: *Gerald Bennie:* We are not even looking at nuclear energy as an option. If we are buying from foreign markets we are buying it anyway.
- A: *Cam Matheson:* As a utility company we don't spend time looking at it as there is a prohibition to build nuclear energy in BC. We are buying energy from the energy market but it wouldn't be a high percentage of what we buy in the long run.
- C: *Judy Kirk:* I want to show that on page 39 there is a full page for additional comments. This would be the place to put that comment there.
- C: *Cam Matheson:* British Columbia is interconnected to the Western North American Grid which covers half the continental United States and there are very few nuclear plants.
- Q: *Juergen Puetter:* What forms the basis for growth? Why does demand side management achieve such optimistic levels?
- A: *Cam Matheson:* We have a sophisticated way to forecast demand. Our demand forecast is an important element of planning. It has been endorsed by the British Columbia Utilities Commission (BCUC) and our actual customer demand. Year over year it is close to our actual demand.
- C: *Juergen Puetter:* We are seeing an explosion of demand and the energy demand of that is huge. According to BC Hydro's numbers, the growth in the Lower Mainland is 1-2% and in the Peace River region it's 15%.
- A: *Cam Matheson:* We are asking you if you think we have properly taken into account the high growth of BC's economy in the North due to oil gas and other factors. You are looking at quickly growing elements and we do take that growth into account. We update our annual forecast every year. I encourage you to make your comment if you feel we have under forecasted.
- C: *Juergen Puetter:* The price of oil is \$100 a barrel. That is a huge growth and the numbers are not correctly reflected in my opinion.
- C: *Judy Kirk:* To clarify, what you are trying to say is that the load forecast in the north in particular is off and you are suggesting that because of the change of oil price it is imperative to have a better look at these options.
- Q: *Rob Wickson:* Cam, you were talking about transmission lines into the Vancouver area from the northeast travelling over severe country side. In Montreal, we had horrible weather but we were serviced by four generators in the area. How do you ensure people will have power they need?
- A: *Cam Matheson:* You try to make sure people have resources available and this is what our Burrard Thermal facility is for, although we don't count Burrard Thermal in our total capacity any more. For those of you who don't know, Burrard Thermal is a large natural gas thermal plant in Port Moody in the lower mainland. It has 900 megawatts of capacity and six generating units. We try to have that capacity in our electricity island (Fraser Valley, lower mainland and Vancouver Island). You want to make sure you have the capacity in that load centre. For us, part of that comes from our strong interconnections to other areas like the state of Washington. In the Contingency Resource Plan we deal with this question and come up with a plan that will help us in that event.

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- Q: *Rob Wickson:* When you come up with estimates, I assume you base that on experience that you've observed elsewhere?
- A: *Cam Matheson:* Yes, we also base it from our own experience with Power Smart and our other programs.
- Q: *Rob Wickson:* You've looked at places like Europe?
- A: *Cam Matheson:* Yes, we have.
- Q: *Tom Duncan:* Cam, I see the 79% is given as a current target, if government came to you and wanted you to be 100% would you be able to do it and how would you do it? Would the price still be below the resource options and how deeply would that take you into account?
- A: *Cam Matheson:* My first reaction is it's not a yes or no kind of answer. We have to ask ourselves what is the probability and what is the risk we are willing to take. That is ultimately how you have to look at the question.
- C: *Judy Kirk:* This is the very question that BC Hydro is looking for your input on. The issue that BC Hydro is dealing with is whether they were to go a greater conservation and efficiently level, would people be willing to subject themselves to get there and would they want BC Hydro to take the risk it takes to get to that level. This is exactly what we want your feedback on. Planners at BC Hydro are looking 20 years into the future and the entire economy for consumers. It's a case of just how much are people willing to risk?
- Q: *Rob Wickson:* The risk is on both demand and supply side management.
- C: *Judy Kirk:* That is exactly what we are asking for.
- A: *Cam Matheson:* I think you are right, Tom. There are lots of risks on both sides. One of the things we consider is increasing our demand side management. 80% of new need by 2020 is an aggressive target for us. One of the things we think about is when you have a supply side resource, you have escalated costs and resources and it's difficult to manage that risk. Once it's in the ground and you are able to operate, what it's going to be able to do for you? Generally, you know what it can produce. With demand side management, you are talking about the behaviour of the province and we don't have that experience. I think that is a good point to consider as well.
- Q: *Juergen Puetter:* The Clean Energy Act forms the basis of your plan. You talk about the new florescent bulbs but you actually increase green house gases. In Alberta, where electricity is created from coal it makes sense to use them but not here. If that would reduce green house gas emissions why would we burn gas and oil and why would we switch to high efficiency light bulbs. Why are you going that direction and not the other way?
- C: *Judy Kirk:* We have your comments but I am going to move on to Tom because we have another topic which might get closer to what you're taking about right now.
- Q: *Tom Duncan:* One of the objects of Clean Energy Act is job creation and retention. How do you address that? Also, the last week in the media there were huge questions around how the smart meters will save us money. I find it hard to believe that there isn't a plan in place already instead of planning 20 years out by using an expensive metering process. I have concerns with staff losses and how to buy into the smart metering process when the bill is so huge.
- A: *Cam Matheson:* As far as jobs, the intention is that we are going to retrain the meter readers and repurpose them to keep them working.
- Q: *Tom Duncan:* The media has been huge around smart meters and the costs around them. If you can track losses then why don't you have a plan in place to deal with that?
- C: *Cam Matheson:* My view is that detection is the biggest issue around theft. We can't detect when it's stolen from us right now because our grid is not technically capable. Smart meters will be able to tell us that in an easier and specific way and that is our real problem because theft numbers are huge for us.
- Q: *Guy Dauncey:* In the big picture, the goal of BC Hydro is to reduce green house gasses has not been focussed on enough. With the increased conservation goal, we need to move to electric vehicles. Is there some way

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- to gather data that doesn't penalize us so we can promote electric vehicles and heat pumps? Secondly, I think we are paying four to five cents per kilowatt hour. Why not value the conservation value less and put the money where it is needed? Thirdly, with existing Power Smart programs, for instance, if you want to get a heat pump, you need to have a lot of money. I feel that the next step for the provincial government is to have a repayment system on the meter. Even though repayment is less than the savings, it is a benefit to the household. You can open a whole new door of avenues.
- A: *Cam Matheson*: I think it makes sense to make people use the product individually and conserve electricity and find new applications for it on the other.
- C: *Guy Dauncey*: When you meet your goals, you've got to separate those out.
- A: *Cam Matheson*: On this long-term plan, we have a base plan with a base demand so we can always see them as distinct things.
- Q: *TJ Schur*: I would be interested in using the \$135 million on what the three programs are; conservation, regulation, Power Smart. How much is going into each program and what is the "bang per buck" per program? If it's regulated it's less about choice and it's mandated. Where do you focus on that to get the most for your money?
- A: *Cam Matheson*: I can't give specific percentage of the top of my head, but the biggest percentage is going to our Power Smart programs.
- Q: *TJ Schur*: What is the commitment to government regulation?
- A: *Cam Matheson*: Right now we are working with the government to help us put in place standards and the degree which they are taken up by those governments you'll see it reflected in those programs and rates.
- C: *Judy Kirk*: We want to know how far you'd be prepared to go.
- Q: *TJ Schur*: I just feel like without knowing those specific numbers I can't make a decision on what option to choose for this plan. I would like to see more of that information before I make a choice.
- A: *Cam Matheson*: We do have a detailed amount of info on that on our website.
- Q: *Mervyn Lougher-Goodey*: Our city has been so successful in our demand side management and conservation; we have delayed a requirement for a water treatment for decades. However, even with increases in population, because of fixed costs we are charging our rate payers more. We had a meeting weeks ago and it was voted that folks wanted to take away the water use restrictions (so they could water their lawns, etc.), and we could charge those people more, but it goes against the psychology of demand side management. We still have the restrictions in place, but the person in the street is who you have to face. Industry is trying to catch up.
- Q: *Steve Price*: We have a large senior population. We are banning light bulbs now, are we going to ban electric heat in the future? It's also just a device that uses energy. When we use the smart meters, people who are on fixed incomes don't have the luxury of turning the heat up because it costs too much. It's almost like you have to design some sort of special package for people in the apartments and fixed incomes so they aren't frozen out of their houses. Ultimately, you have to phase out electric heat and there needs to be a grandfather clause if your condo with baseboard heaters.
- Q: *Laura Bryne*: I want to point out that for our municipality, one of the huge bills we have is related to lighting our streets. There are no options for conservation and we have no power to retrofit. We could be saving but we can't and I'd like to see BC Hydro change that.
- Q: *Bernie Gaudet*: Regarding the impacts on climate change, what considerations have been made for future planning and electricity? You mentioned Cam that we can be sure about what the supply is once a new facility is built but I'm curious about is the water supply going to be there? Is there any impact that you've been able to identify for the future supply and infrastructure?
- A: *Cam Matheson*: Your question is the impacts from climate change going to effect? We have looked and it is a concern for BC Hydro. We do know there is warming going on and the thing that scientists need to figure

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- out is if the warming trend actually means a drying trend? There isn't consensus. Much of the water comes to the reservoir during the spring in April to June and snow melts into our reservoirs to follow the demand we have. What people speculate is that what will happen is more precipitation will fall as rain than snow, so you'll have water spread out through the year, but not concentrated in the spring. But others say we are heading towards a drying trend but we can't conclude that now. We are watching it closely. A consideration for us is does it make sense to make new resources that they should be water based or given the nature of warming does it makes sense to build facilities that use other types of fuel.
- Q: *Juergen Puetter*: In the Peace Region, in the early 1980's, water flow to the reservoir increased in the summer which proved directly that the glaciers were melting. Currently, much of the water coming from the Bennett Dam is non-renewable resource water. That's disappearing and I don't see that being considered by BC Hydro in your current plans.
- Q: *Tom Duncan*: I almost got blown off the highway. There has been a study done on wind power here on Vancouver Island and I don't know why BC Hydro doesn't start getting wind power in effect on the island. The gap can be dealt with if BC Hydro produced wind power on the island.
- A: *Cam Matheson*: The quick answer is that starting in 2002 with the energy plan; BC Hydro became a buyer electricity rather than producer. For people on fixed incomes, it's time for you to tell the government that we need to produce the electricity yourselves.
- Q: *Rob Wickson*: What I don't see in this plan is the innovations in terms of how people at home can produce power at then and sell it back to the grid.
- A: *Cam Matheson*: I agree, but it's coming. This is a very fast growing area of the business. There are couple things we need to do before we see a world with a mass number of electric vehicles and solar panels.
- Q: *Tom Hackney*: I have a question about numbers here. When I look at the demand side forecast on page 5, it looks to me that you are projecting 16,000 gigawatt hours per year with a supply gap. With overall demand side management plan, the goal is at least 66% if not more to 79% and I'm not seeing that reflected in this graph as it seems that it that seems to show less than half. The red line is the total supply gap?
- C: *Cam Matheson*: The 66% is actually the red dotted line and the blue bar; we are talking fiscal 2021 which is the target, where you see the green line, that is about 75%.
- A: *Lindsay Fane*: The difference between the red and green line is the demand side management. I'll go over with that later on with you offside.
- Q: *Ron Percival*: For Site C, it looks like you have a fixed cost but I wonder if it's the 30 year old cost estimate.
- A: *Cam Matheson*: All we have is the cost that we've got and we are working on a cost estimate but it's not yet available yet. We have an existing range.
- C: *Dave Conway*: We provided a range in the Stage 1 Report but those old numbers are based on an old concept and we will be filing a new number once we optimize the dam design.
- C: *Cynthia Day*: I just want to highlight that this book says that the new numbers would be out in the spring.
- Q: *Judith Cullington*: I'm following up on Rob's comment. I would like to see you include nano projects as well as the major projects. What if you took all the money from Site C and put a solar generator on all roofs in British Columbia? What would that mean for budgets? I'd love to see some more attention to things like feed and tariffs and thinking around local energy and security. If we had some options available that is what I would like to see.
- Q: *Guy Dauncey*: For a 30 year plan, there sure is a lack of imagination. With solar, what you've quoted is incorrect because we see that the price is falling already. Once that happens, you could have every roof in the province to play with. These coal numbers don't show up anywhere in the world and I think that this is erroneous data.

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- A: *Cam Matheson:* The data on coal came from developers and others and so that's what you see reflected here. It's remote that we would consider coal in our plan. Solar is the current range that we are working with and we will update our report, as it comes down in price we will reflect that.
- Q: *Doug Barbour:* Is that a true projection at \$200 for biomass or waste fuel?
- A: *Cam Matheson:* That is a reasonable upper limit, yes.
- Q: *Cynthia Day:* I just wanted to point out that in the table there is no solar icon, we are looking at a 20 to 30 year plan but we aren't planning for sources that are futuristic. I think that if we can invest as much as we have as long as we have, we should get that education point out there to get every bit of energy from our environment and not build old technology like Site C.
- A: *Cam Matheson:* I would encourage you to put that in your feedback form. We haven't seen a solar bid into our private call for power and we are open to bids of course but we haven't seen it. In my view we have to think carefully.
- Q: *Ron Percival:* In considering a portfolio with gas in it, I don't think the rate payer should take the risk with gas because there is a big diff between \$3-\$12 for gas.
- Q: *Juergen Puetter:* Cam, for back up capacity, the largest capacity is putting the extra generation into the Bennett dam. Why is that not being considered if that is the largest in BC?
- A: *Cam Matheson:* When those facilities were built there were placeholders for two additional units at each facility. There was no such provision for Bennett Dam.
- C: *Juergen Puetter:* But my understanding is they want to put it on the opposite side of the dam to maximize the water in the Williston reservoir.
- Q: *Adam Taylor:* Are these projected costs or are they based on 2011 costs or do you have a projection on what those costs will be in the future? When you are trying to say, x costs x, have you forecasted those costs or are those costs based on a fixed year?
- A: *Cam Matheson:* It's a net present value of what those considerations are, they are meant to be broad so we can relate from one to the other.
- C: *Judy Kirk:* It's the long-term costs rolled up to today's costs. It considers the length of the project and that's what we try to represent.
- Q: *TJ Schur:* In order to answer the questions we need to talk about the 5 areas of diversification. It's not in this book to help us answer the question and balance it out. I'm confused with turbines, it doesn't account for what the turbine is. In terms of misconception, this doesn't help us in any way. Again, I don't see how people can consider when making their choice that the idea that there is a long term, it doesn't give justice to how that is a risk component in the long term. I think there is a good relationship between clean energy projects and BC Hydro but it's not communicated well. Cam, even today you mentioned that Site C is a quality project and a clean energy project is expensive.
- Q: *Guy Dauncey:* Regarding Site C, why are there no open houses in the Peace area?
- A: *Judy Kirk:* There are and we have very good representation up in that region. There is a meeting in Fort St. John on March 24 and others that we can talk about offline in the interest of time.
- Q: *Tom Duncan:* I think Guy mentioned that if we are going to electric vehicles and we have rate increases of 50% how are the public going to want to come to the table? How can I tell what my costs are going to be? How do you recharge a conservation vehicle? I would like to suggest that those vehicles are charged a different rate.
- C: *Guy Dauncey:* Electric vehicles costs way lower than our current fuel. It's up to 3-4 times lower than oil and gas.
- Q: *Guy Dauncey:* We are past a critical point, BC Hydro has to be leaders in climate change and not just sit and

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- wait. We should be the fastest growing in electric vehicles because we've got 90% clean energy and it's the cheapest in North America.
- Q: *Rob Wickson:* The kind of vehicles that we are going to be using is going to change to connect to the public transportation system. Changes are coming in how we use our land, and that has to work into this plan.
- Q: *Juergen Puetter:* Is the ability to develop blue fuel being considered in your plan? This is also known as green methanol.
- C: *Ron Percival:* Electric vehicles are coming to North America, Europe and worldwide. BC Hydro has to be proactive in creating infrastructure to allow that to happen.
- Q: *Judith Cullington:* I was surprised not to see any discussion of the smart grid.
- A: *Cam Matheson:* Smart grid is committed already so it's not a feature of the long-term plan.
- Q: *John Partyka:* You can't connect existing demand around Dawson Creek so that is a good example of what happens when you don't look ahead. I'm surprised there is a question whether BC Hydro should be acting now. The demand is growing, the boat has been missed and I don't know you'll be able to catch up. You have people voting with their cheque books. The Chinese are coming in with money and the idea that asking question we are being proactive about is tough for me to understand.
- A: *Cam Matheson:* We are regulated, and our system is subject to tariff requirements and you are basically waiting until the load has occurred and then you go and build it. But that's not BC Hydro's decision it's determined by the regulatory constraints that we work under.
- C: *John Partyka:* You need to step back and review the regulatory process then.
- Q: *Ron Percival:* I have to agree with what John said. We have load and generation assets that we can't get connected. There are developers in this room that have been trying for 10 years to get connected.
- Q: *Steve Price:* Just thinking, do we have a Burrard Thermal equivalent on Vancouver Island in case we are isolated for a long time?
- A: *Cam Matheson:* Yes we do, it's in Campbell River. 70-80% of our generating needs come from offshore. The island is in a peculiar situation.
- C: *Steve Price:* If something like Burrard Thermal was to be designed, that would be something you may want to factor into future plans.
- A: *Cam Matheson:* BC Hydro planned a gas plan and there was a lot of controversy so we went ahead and strengthened the underwater ties in Tsawwassen.
- Q: *Tom Hackney:* A couple of things, the factoring in of environmental concerns in a decision making process can be very important. I would suggest that that kind of planning that the broader public needs to be engaged in. There is the possibility of getting support or it could be a mess. In terms of the First Nations groups that may want to develop energy projects, how does BC Hydro propose or deal with those counter pressures from some groups at local level are interested in asking for development, creating an opposite effect?
- Q: *TJ Schur:* Further to environmental concerns, I don't suspect its top down with BC Hydro as they are fully engaged in all jurisdictions. I would be proactive in my opinion because of the economic and the clean development that will rely on the advantage of low cost clean energy where other energy heavy development and industry.
- Q: *Guy Dauncey:* Because this plan doesn't go in front of the British Columbia Transmission Corporation, when will that consultation go into some kind of technical review?
- A: *Kenna Hoskins:* The Technical Advisory Committee members have participated actively in long-term energy

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planning and it's a two way dialogue. Our intent is to have a two way dialogue challenging information.

C: *Tom Hackney:* There isn't time to bring an expert in so we have dialogue but we don't have the technical ability to get into too much detail. It's not a formal utility hearing.

Q: *Juergen Puetter:* In terms of export, there are three opportunities and only two are not considered here.

A: *Cam Matheson:* If you have observations please let us know.

Q: *Guy Dauncey:* There is public belief that the independent power producers are coming as a loss. That is exaggerated when it comes to export. Is it possible to build a structure that encourages municipals and community so they don't feel like they can be helpful? They can become an owner so they can support development.

Q: *Tom Duncan:* Has California paid their bill? In Duncan, we control our water, when we sell to our neighbours they pay more. We can't be selling power for less than what we've paid at current market value.

A: *Judy Kirk:* So you're saying as long as BC Hydro charged more of a premium and as long as its excess power. Thanks for your comment.

Q: *Rob Wickson:* We are all in the same bathtub. Wind energy can create significant investment in BC including good jobs.

Q: *Juergen Puetter:* I think you have a tough job, but you've done a great job at laying it out here despite my criticism you may have sensed from me.

4. Feedback Forms

Participants of the meeting were thanked for participating and were encouraged to complete and submit feedback forms. Participants were also encouraged to attend one of the upcoming open houses (dates, times and locations listed in the consultation workbook).

5. Closure

The meeting ended at 3:00 p.m.

Integrated Resource Plan Appendix 7C-2

**BC Hydro Integrated Resource Plan
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Meeting**

Coast Discovery Inn &
Marina

975 Shoppers Row,
Campbell River, BC

MEETING DATE MARCH 10, 2011 1:00 P.M. – 3:00 P.M.

PURPOSE	Meeting notes from a multi-stakeholder group meeting with stakeholders BC Hydro staff on March 10, 2011 at the Coast Discovery Inn & Marina, 975 Shopper’s Row, Campbell River, BC.
FACILITATOR	Nancy Spooner, Kirk & Co. Consulting Ltd.
PRESENTER	Cam Matheson, BC Hydro
MULTI-STAKEHOLDERS PRESENT	Noba Anderson Shaun Anderson Ian Baikie Al Braybrook Jamie Boulding Sterling Campbell Stan Clark Rosemary Croteau Bob Dice Conrad Flebbe Greg Fletcher Frank Greens Russ Hotsenpiller Al Huddleston Kevin Lagan Ian Lightfoot Evan Loveless Geoff Lyons Layne Marshal Norbert Meding Joan Miller Sandra Milligan Ron Neufeld Cheryl O’Connell Tracy Parker Bev Parnham Eric Russcher Neil Smith Jim Van Time Steve Woods Tom Yates
STAFF ATTENDEES	Kenna Hoskins, BC Hydro Lindsay Fane, BC Hydro Steve Watson, BC Hydro Don Bradley, Kirk & Co. Consulting Ltd. Tim Lai, Kirk & Co. Consulting Ltd. Emilie Yee, Kirk & Co. Consulting Ltd. , Recorder

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AGENDA	<ol style="list-style-type: none"> 1. Welcome and Review Agenda 2. Consultation Workbook Overview 3. Discussion 4. Closing Remarks
KEY THEMES	
<ol style="list-style-type: none"> 1. Local community based supply network – While appreciating the opportunity to provide input on large scale generation options, participants said they would like BC Hydro to encourage and support opportunities for individual and community energy generation such as solar or small wind projects. 2. Conservation Measures - While acknowledging the importance of conservation measures across the province, participants encouraged BC Hydro to focus on practicality and workability of proposed programs and products to maximize adoption by the broad population. 3. Transmission – Participants encouraged BC Hydro to accelerate plans for transmission to the North Island to ensure reliability and support economic development. 	

DISCUSSION	
1.	<p>Nancy Spooner – Welcome and Introductions Nancy Spooner welcomed participants to the stakeholder meeting, explained the format of the meeting and introduced the consultation workbook and feedback form. Roundtable introductions followed.</p> <p>Nancy emphasised the five consultation topics and the feedback form at the back of the consultation workbook.</p>
2.	<p>Cam Matheson – Consultation Workbook Cam reviewed the format of the consultation workbook and explained the processes and factors BC Hydro considers when energy planning. Cam explained the difference between demand side options and supply side energy options and how BC Hydro factors this into the balancing the options when developing a long-term plan.</p> <p><i>(Abbreviations will be used and mean: Q: Question, A: Answer, and C: Comment)</i></p> <p>Q: <i>Bob Dice:</i> Can you talk about the policy frame work for Independent Power Producers (IPPs)? Is that a transparent process? What is that based on?</p> <p>A: <i>Cam Matheson:</i> BC hydro is a buyer of energy from the power sector rather than building large power projects. This process has evolved and we have been buying clean IPP power. Regards to transparency, BC Hydro holds open competitive calls for power when we need it. We have processes commercially where we go to a market and private developers bid in around what we actually need. We’ve built the system over the last 8 to 10 years.</p> <p>Q: <i>Bob Dice:</i> My rates are supposed to go up and I thought it was from the fact that there are more calls for power from IPPs. My point-of-view is that BC Hydro should have been involved in those projects to keep the rates down. I don’t find it a transparent process because I don’t know how you can bid on the projects when they aren’t built yet.</p>

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- Q: *Noba Anderson*: Does BC Hydro aim to be revenue neutral or are you subsidised by crown projects?
A: *Cam Matheson*: We are a revenue neutrality company. We need to run the business and deliver a product to our customers. We are not making profit and we subsidized by provincial government agencies.
- Q: *Noba Anderson*: What is the return percentage to the crown?
A: *Stephen Watson*: It is about 15%.
- Q: *Joan Miller*: Regarding the Request for Qualifications (RFQ) for the John Hart project proposal that is going out to bidding. How much of the \$6 billion of new capital spending programs will have the RFQ procurement model? How much money does BC Hydro have to put out?
A: *Stephen Watson*: BC Hydro is doing a different procurement process for the John Hart project. This is an RFQ to bring in innovation and best practice around the world. We will allow the company we choose to assist with final design of the project and they are also bringing funds to the table which guarantees BC Hydro and we can pay them back over 15 years based on performance. The consideration of rates is being factored into this process as well.
- C: *Cam Matheson*: Most of the \$6 billion is going into running our hydro electric facilities. That is where the majority of where the money is going, not to the RFQ processes.
- Q: *Evan Loveless*: What about feed and tariffs?
A: *Cam Matheson*: Feed and tariff's are a supply option and I am going to come back to that shortly.
- Q: *Bob Dice*: Are smart meters a part of this program?
A: *Cam Matheson*: The current program we have in place does not have smart meters in place.
- Q: *Sterling Campbell*: The conservation programs that BC Hydro has implemented, like the new light bulbs or using energy off peak hours , for example, is such that some people cannot buy into it. I just mention it as a caution, that sometimes it's accepted and sometimes not. You have to be careful because conservation is needed but there are concerns about the programs that are being proposed without any real research being done.
- Q: *Tom Yates*: Is this the same feedback form we got in our BC Hydro bill?
A: *Cam Matheson*: No, this is a different feedback form.
- Q: *Bob Dice*: Does biomass as an energy option have the same problem with your clean energy policy?
A: *Cam Matheson*: Biomass is considered clean because there is an offset. By taking it and burning it in an efficient burner, you are accelerating that process so it's on our menu of options.
- Q: *Sandra Mulligan*: Regarding biomass I see that fish waste is missing. In terms of your options, it's a competitive process, but is there room for investment in research and development. We have lots of fish waste in our community but it currently goes to Vancouver for processing. There is huge potential but there needs to be investment in research and development.
- Q: *Evan Loveless*: I thought Site C was not going ahead?
A: *Cam Matheson*: The provincial government has reserved the right to whether or not we go ahead with Site C and at the moment it doesn't have approval. It's a five stage process and right now we are in stage 3 regulatory review. Those applications are being developed right now and haven't been formally submitted.
- Q: *Noba Anderson*: When you calculate greenhouse gas emissions you would start calculating when the project is finished and energy is being generated. I think that that is not a very full picture as we become better at tracking greenhouse gas and we learn what it takes to develop these projects, like travelling to and from, for

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- example. I think that all of us at the local government level don't track things like travel and that is not included in your 93%.
- A: *Cam Matheson:* We are beginning to do that but you are right. In terms for that 93% level it is just purely operational.
- Q: *Geoff Lyons:* We will be refuting in this pricing because we have the technology proven in Australia that will be cheaper.
- A: *Cam Matheson:* Your personal contacts would be good because we take this pricing from developers around the province and so if you want that info on the record for the Resource Options Update then we would be interested in your point-of-view there.
- Q: *Bev Parnham:* I am wondering in terms of Site C and the amount of electricity that it will generate, when we look at wind they are quite small. What is the cost for one or two wind projects that would generate the same about a Site C because these have been on scale?
- A: *Cam Matheson:* BC Hydro or any utility as it considers new supply wouldn't pick a particular resource they are always using a combo of resource types and we call that portfolios. We have three portfolio's set out which include different options and I will go over those. On page 18, you'll see a rendering of the three portfolios. Portfolio two has Site C in it so it gives you an idea. Site C by comparison is very different.
- Q: *Bev Parnham:* Do any portfolios take into account conservation?
- A: *Cam Matheson:* Yes, the overall plan will.
- Q: *Rosemary Croteau:* What is government's resistance to nuclear power?
- A: *Cam Matheson:* I think the bugaboo for nuclear power that the waste has to be stored somewhere and it takes 10,000 years to dissolve and then it has to be put in the ground and eventually it becomes a problem. It's radioactive and dangerous to humans. I think it's going to make a comeback, and jurisdictions like Ontario and others have had to rebuild their facilities because they need firmness and capacity where you don't have large hydro to choose from. Nuclear doesn't have air emissions and it will be the last option.
- Q: *Sandra Mulligan:* Where are we right now for comparison purposes?
- A: *Cam Matheson:* It is large hydro. The purchases from IPP's have now reached about 15% of the overall system. The majority of generation resources are large hydro.
- A: *Cam Matheson:* 10,000 GWh is about a fifth of our system as a whole. The demand is 57,000 GWh and these portfolios are 10,000 GWh. They will likely need something large.
- Q: *Sandra Mulligan:* These numbers are meant to fill the gap?
- A: *Cam Matheson:* New supply combinations are not an exact thing we want to do but we are looking for your preferences of options here.
- Q: *Sandra Mulligan:* It's confusing because you have numbers and it's not clear what you mean because it's not that different.
- A: *Lindsay Fane:* In these profiles especially the one with renewable mix, its half wind and half small hydro. The number of turbines represents one turbine but not the amount of energy. Thus, in portfolio two, do the 4000 GWh come from Site C?
- A: *Cam Matheson:* We didn't want people thinking you could build wind projects and they would be was equivalent to Site C. Site C is huge and will become BC Hydro's fourth largest generating project. A wind turbine is tiny in comparison.
- Q: *Joan Miller:* Why don't you have wave or tidal?
- A: *Cam Matheson:* You can substitute in the intermittent section of these portfolios. Our experience with tidal and wave is that we haven't seen them in many bids from IPP's. In most regions wave and tidal has not become commercial. Wind was in the same situation about 15 years ago, but now it's commercially proven and I expect it will become the same.

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Q: *Bob Dice:* I'm not convinced with ROR. I have no idea what the environmental impact of Site C is. I feel stuck trying to provide advice because I don't know the impacts.

A: *Cam Matheson:* It's a good point. The consultation workbook is meant to be broad planning exercises and we have a lot of info about Site C on our website and we've been studying Site C for over 30 years now. There is no question Site C has a big environmental footprint but because Site C makes use of water from Williston Reservoir, you don't need as near big the footprint that you would normally have if you were to build another project as big as Site C somewhere else and that is the key thing that makes Site C an attractive option for us. Site C has high value energy capacity value.

Q: *Bev Parnham:* Coming from an area where we are now looking at potentials of alternative power, what is your economic development plan for geographically widespread jobs? And also, does BC Hydro take into consideration the possibility of rural communities benefitting from these jobs and dispersing them across the province so there is a net benefit for more people.

A: *Cam Matheson:* Yes, it is. If that is a serious driver for you then I think that you'd be interested in portfolio one because you get the widespread economic benefit.

Q: *Noba Anderson:* I would like to see is getting people more involved in energy generation. Are there ways of doing that reduction conservation piece while generating small amounts of power? I think that over time that is ultimately the way to go. Even small communities can use tidal or solar, where is that in all of this?

A: *Cam Matheson:* It's a newly emerging part of the utility business in general. It's not that big anywhere and that's why it's not a central feature of this plan. It is coming like a train and it will come soon. One of the things to prepare is create an electricity grid that is capable of handling that. With a traditional electricity grid you know where your demand centres are – in our case it is the lower mainland and Vancouver Island. Then you build those generation facilities and connect them to transmission lines to distribution lines at the local level. They all travel one way from generators to demand. What you are talking about is where supply and demand are mixed. They are taking but also giving back to the system and a constant two way flow. Our grid is a one-way grid so we need the infrastructure that is capable with dealing with that change with the flow of electrons. This is expensive but if we want that it's going to cost us.

Q: *Noba Anderson:* That system exists? I want to put the energy back on the grid if I'm making it.

A: *Cam Matheson:* You'd be paying more money to do that then you have benefits to so that's why people don't typically do that now. We are heading there but we aren't there yet.

Q: *Evan Loveless:* Has there been analysis of potential scenarios?

A: *Cam Matheson:* We are developing analysis about what those scenarios look like and it will be documented in the plan. The question to provincial cabinet is how important is that to you.

C: *Evan Loveless:* Right now it is a philosophical question.

A: *Cam Matheson:* Yes, but people are passionate about it. People in our Victoria meeting pushed very hard that electric cars are coming and you need to prepare.

Q: *Joan Miller:* With opportunities that you lay out for electrification, I know that the transmission lines are a big issue. Vancouver Island sits in an important place of economic future with regards to other clean energies. Is there a project called the Juan de Fuca transmission line? Is there the opportunity to have the RFQ process so you could have people interested get involved?

A: *Cam Matheson:* Yes, there is.

Q: *Al Braybrook:* We have a transmission corridor with lots of potential for wind and run-of-river projects and they are getting close to approvals. When those two come on line, they will maximize the transmission line that exists. Our region is supportive of IPP, but beyond that we have been hammering away at British Columbia Utilities Commission (BCUC) and BC Hydro. We have a lot of potential and capacity but we have a

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- bottle neck. This plan makes the whole thing look farcical. We invited BC Hydro up to a gathering at Fort McNeil and proponents so they could talk technically with each other. BC Hydro stated they were close to identifying where the gaps in the system were. They said they would be releasing their findings but we've heard nothing. What is your info about when this info is being released?
- A: *Cam Matheson*: I honestly don't know you'll have to connect with those folks that you met with.
- Q: *Al Braybrook*: There are people who are willing to partner and move ahead on this thing but the inaction with BC Hydro to date is surprising and they are amongst the worst forecasters in the world.
- Q: *Bob Dice*: I worked in forestry and when the IPP gold rush was on and IPP's were all planning their own access routes and that was just crazy. I think government needs to get involved with planning of those roads. Everyone has a different line and will affect different viewscapes. There needs to be planning ahead but I hear you.
- A: *Cam Matheson*: Yes, but you've got people who don't want to disrupt the environment for "potential" IPP energy projects.
- Q: *Bob Dice*: I think government needs to facilitate the building of those roads.
- Q: *Evan Loveless*: There is a process called WREZ and the government did a lousy job compared to the United States. I think a more robust planning process needs to be done with BC Hydro to minimize the conflicts and impacts.
- A: *Cam Matheson*: Thank you for your input I encourage you to include that in your feedback form.
- Q: *Rosemary Croteau*: When you mention California, I feel that then BC Hydro is going the same route as Enron. It can't of all have been faulty accounting. There had to have been a mindset for the purchasing of power to be toast. I presume BC Hydro has safeguards to not go down that route.
- A: *Cam Matheson*: BC Hydro is a system, Enron was a trading arm and they aren't the same.
- Q: *Sterling Campbell*: My concern with building for export is, with all of those states that want our power, they under value their government services, how do you guarantee the price stability is there?
- A: *Cam Matheson*: I think the idea of having us look at this is are the conditions right. Once you create that condition and sign a long term contract then you have created obligation for those parties.
- Q: *Sterling Campbell*: If contracts are long term, what is the guarantee that you will be paid?
- A: *Cam Matheson*: That is a good question. Part of electricity trade has those risks. The buyer is taking the risk that the seller will have the power, and the seller is taking the risk that the buyer will pay. In this case the provincial government would be taking the risk that they will get paid.
- Q: *Bob Dice*: If you build to capacity now is this not above BC's capacity for export power. We are going to build extra power?
- A: *Cam Matheson*: Yes, that's what it is.
- 4. Feedback Forms**
Participants of the meeting were thanked for participating and were encouraged to complete and submit feedback forms. Participants were also encouraged to attend one of the upcoming open houses (dates, times and locations listed in the consultation workbook).
- 5. Closure**
The meeting ended at 3:00 p.m.

Integrated Resource Plan Appendix 7C-2

**BC Hydro Integrated Resource Plan
Vancouver - Multi-Stakeholder
Meeting**

SFU Morris J. Wosk Centre
for Dialogue

580 West Hastings Street,
Vancouver, BC.

MEETING DATE MARCH 15, 2011 9:00 A.M. – 11:00 A.M.

PURPOSE	Meeting notes from a multi-stakeholder group meeting with stakeholders BC Hydro staff on March 15, 2011 at SFU Morris J. Wosk Centre for Dialogue, 580 West Hastings Street Vancouver, British Columbia
FACILITATOR	Judy Kirk, Kirk & Co. Consulting Ltd.
PRESENTER	Randy Reimann, BC Hydro
MULTI-STAKEHOLDERS PRESENT	Gwen Barlee Ablaza Brosseau John Calvert Jeff Carmichael Sherry Carroll Sammy Chow Marjorie Cohen Marie Crawford Warren Duke David Formosa Ali Grorue Jeremy McCall Ron McFee Ken Miller Jeff Norman David Rafael Selina Robinson Michelle Tung Mike Urbas Ryan Wainwright
STAFF ATTENDEES	Brandee Clayton, BC Hydro Susan Danard, BC Hydro David Ince, BC Hydro Kathy Lee, BC Hydro Mike Savidant, BC Hydro Meghan Clarke, Kirk & Co. Consulting Ltd. Lisa Santos, Kirk & Co. Consulting Ltd. Susan Campbell, Kirk & Co. Consulting Ltd. , Recorder
AGENDA	1. Welcome and Review Agenda 2. Consultation Workbook Overview 3. Discussion 4. Closing Remarks
KEY THEMES	

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1. **Conservation and Efficiency** - Participants said that commercial and industrial energy users should be subject to higher rates and regulations to require that they increase their conservation efforts. (For example, participants mentioned that some office buildings and malls in Metro Vancouver keep too many lights on overnight and should be required to reduce the use of lights overnight).
2. **Electrification** – Participants questioned the feasibility of implementing a proactive approach to electrification citing the relatively low cost of gas and the challenge of supplying a significant transition to electric cars without using nuclear power.
3. **Export** – Participants commented that hydro customers may not bear the risks of the potential direct costs of export, but said that taxpayers could bear the risk of additional costs associated with export.

DISCUSSION

1. Judy Kirk - Welcome and Introductions

Judy Kirk welcomed participants to the stakeholder meeting, explained the format of the meeting and introduced the consultation workbook and feedback form. Roundtable introductions followed. Judy emphasised the five consultation topics and the feedback form at the back of the consultation workbook.

2. Randy Reimann – Consultation Workbook

Randy Reimann reviewed the format of the consultation workbook and explained the processes and factors BC Hydro considers when energy planning. Cam explained the difference between demand side options and supply side energy options and how BC Hydro factors this into the balancing the options when developing a long-term plan.

(Abbreviations will be used and mean: Q: Question, A: Answer, and C: Comment)

Q: *Jeremy McCall:* The graph implies that there is a supply and demand in balance at the moment and there has been a lot of discussion about that - can you confirm that supply and demand is in balance at the moment?

A: *Randy Reimann:* So the red dotted line there, if we have Demand Side Management programs come, then we will pretty much be there but we are getting close to supply and demand balance again. We have been undertaking quite a number of calls in the last while and have some pretty aggressive DSM programs. So we are pretty close to being in balance.

Q: *Dave Formosa:* Are we close to demand balance because of the calls that have come in the last 5-years? I.e. some wind projects and some run-of-river projects is that why we are close to the demand balance?

A: *Randy Reimann:* So, there is something that we will talk about later on in the consultation relative to self-sufficiency and the government has wanted us to plan to have enough electricity even in a dry water year; and, so we were on target to meeting that in 2016 and what has happened in the meantime is the economic downturn has had an impact. So load dropped off and we did have a number of pretty significant DSM programs and then with the Independent Power Producers, wind, small hydro, run-of-river, all of those contributed to getting us to where we are pretty close now.

Q: *John Calvert:* I note that the BC Hydro supply declines somewhat, and I am wondering if you can explain why that is?

A: *Randy Reimann:* So there are a couple of reasons for that, one of the reasons is that as we move to self-

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sufficiency historically we used to rely on heritage hydro non-firm energy backed up by market purchases. As of 2016 we are to become self-sufficient so that market reliance falls off the table and we take it out of our stack. The other reason that some of the supply goes down is we have certain of the IPP contracts and specifically wood waste ones when those come to end-of-life there is uncertainty about the fuel supply for those - so those drop off as well.

Q: *Jeff Norman:* The forecast and supply does this include some of the upgrades at Revelstoke and Mica or Site C?

A: *Randy Reimann:* That wouldn't have Site C in it, this is anything that we have actually committed to and said that we are actually doing it at this point. Revelstoke, that you mentioned we do have - so there is kind of an energy view of the world and a capacity energy work for the year capacity is at any one point in time. Revelstoke 5 is a capacity unit it adds very little energy but Revelstoke 5 would be in here.

Q: *Gwen Barlee:* With the present economic downturn how much has demand eased off?

A: *Randy Reimann:* That is a good question – I think that it dropped probably around 1,500 gigawatt hours (GWh) and our load today is about 55,000 so there was probably a 5% bump at its depth but our current load forecast actually is showing that there is, probably most people are aware, a reasonable shake off that is happening in the forestry sector but that now we are seeing in our forecasts that is being off-set by a lot of activity in the mining and activity in the gas sector. So we are now starting to show that our load forecast is coming out and it is recovering.

Q: *Jeremy McCall:* You also talk about the British Columbia Utilities Commission and what is the present position under the Clean Energy Act?

A: *Randy Reimann:* The government created the Clean Energy Act and what they were looking for was the ability for the government to give us policy direction as a first step. What the Act says is that once government approves the plan then the BCUC must consider that and be guided by it so it then falls to the Commission what is the most effective way in which BC Hydro would then meet those broad policy objectives so a good example are the DSM programs and we will target and see what the right DSM programs are that the government would like us to commit to and we would then go back in July of this year for an expenditure request with the Commission to say so what areas do we target specifically and how much money should we be spending to get there.

Q: *David Rafael:* Is that information available (IRP)?

A: *Randy Reimann:* Yes, there is an IRP link on BC Hydro's home website and as information becomes available it will be posted on the BC Hydro website. We also have a Technical Advisory Committee (TAC); it is one of our strings of consultation that reviews the material in depth. Usually that is the first place that the material shows up so you will see most of the data there. Some of the reports are due to come out in the next couple of weeks.

C: *Judy Kirk:* If you go to the website there is also an enquiry email there that is available for the public to post questions which BC Hydro will respond to within five days.

Q: *Jeremy McCall:* I see that you are proposing a stepped domestic consumption rate but how complicated would it be to have a graduated consumption increase rather than a huge step which obviously a lot of people are upset about? If it was graduated for domestic - rate steps graduated for usage to make it a bit fairer and you are just one side or the other of a big hump?

A: *Randy Reimann:* That is a good question but it is more complicated and I think that a lot of people don't spend a lot of time on their bills anyhow in general but to add multiple steps would add confusion. Having said that I don't know that it is not a good idea - we will take the comment.

Q: *Selina Robinson:* Thank you – a lot of this is about getting people to change their behaviour and their

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choices which is always really challenging when you are trying to do it on such a large scale and right now there really is no feedback mechanism to really understand our true consumption, we just sort of consume without really paying attention a whole lot of the time until the bill comes in and I am wondering if there is a plan to give us a better sense of how much energy we are using at what points of the day so that we can make better choices. Because, I think this is sort like the medical system because we don't know exactly how much it costs we just sort of go and it gets taken care of and I am wondering if that is all part of the plan?

A: *Randy Reimann:* That is a whole other topic but we have got a program to introduce smart meters into our system that you have probably read about and those smart meters would give you information and depending on how you wanted to use it you could then see your consumption by time, you could see it real time, it would give you the tool to do that.

Q: *Selina Robinson:* Will that be part of this conservation plan?

A: *Randy Reimann:* It will be linked in.

Q: *Jeff Carmichael:* I am wondering about the government regulation aspect of this. Is BC Hydro in a position where they can commit to programs they can't directly influence? I am from Metro Vancouver and we face this and these actions would largely be outside of Hydro's scope in the development of new regulations.

A: *Judy Kirk:* So when you say these actions I think you are referring to the greater conservation efficiency – the idea of more codes and standards and those kinds of things – okay.

Q: *Jeff Carmichael:* Yes, specifically those relating to government regulations everything from municipal building codes to federal standards.

A: *Randy Reimann:* Yes and that is a good point and we do have it within our overall DSM targets to include codes and standards and I think our historical approach has been to introduce technologies to get people to gain acceptance and start to turn the market and as the market turns then work with governments to get the codes and standards made official but programs that are not directly under our control are part of the risk of these programs. We can try and push that way and obviously we will only be doing this to the extent that at least the Provincial Government agrees with us that this is something they would like to pursue. There is a question of how you would action this and how quickly you would move but ultimately you would have to get a number of levels of government and federal government working with you to drive these sorts of actions.

Q: *Marjorie Cohen:* But isn't that a built in contradiction between DSM programs and encouraging export and will people buy into greater restrictions on use of electricity when they know that is really basically going to be for export?

A: *Randy Reimann:* As long as export is economically beneficial to the province then it would give a clean supply of electricity for export. I am just saying there would be economic benefits if you had job stimulation in the province and it would then have a clean supply of electricity for the export market but that question is a good question.

C: *Judy Kirk:* But if I could, your comments are about trade-offs and is exactly the kind of thing that we would like to see in the feedback form. The whole thing that BC Hydro wants to hear from people, they have heard before in many, many venues that people want more conservation. What this guide sets for you and what Randy (Reimann) is explaining is how much more, what are people willing and desiring by way of aggressive action on conservation. I suggest that you go to the Feedback Form and you are thinking about some of these trade-offs understanding why you are answering on the agree scale of support or not support would be very good for BC Hydro.

A: *Randy Reimann:* Thanks, that is helpful. I am not trying to advocate a particular position rather I am responding to your questions and all the comments we will be very happy to receive.

Q: *Jeremy McCall:* The thing that bothers me is seeing an office building at night totally lit up and it seems to me there must be an inequity there on that rate that business is being charged, like that office building, and

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- the homeowners who, I think generally speaking, do a pretty good job of conserving their own consumption – what is the relative cost of those two electricity fees to the big real estate, office tower owner and the domestic customer?
- A: *Randy Reimann:* So, we have tried to get two-tiered rates into all customer segments, we started with the large industrial and the commercial habits so their rate is a little more complicated but it tries to give them 90% of their historic consumption at the old rate and then the incremental rate at a higher rate and BC Hydro is working to keep all of those rates up-to-date with our most recent acquisition process in terms of the price signal – so generally speaking they all have them and they are all fairly comparable but clearly there is a failure to get people to act if it is all lit up.
- Q: *John Calvert:* On the conservation side, with respect to the expansion of demand on new mines and the gas sector and so on, is the assumption that they will get the industrial rate if they are triggering additional demand and I am talking about new mines say up Highway 37 and so on? Is that going to be the rate at which they will be charged if they put new demand on the system?
- A: *Randy Reimann:* This applies to everyone in the province existing or new consumers you consume at the same average rate that everybody pays. We don't say that anyone new to the province has to pay the new marginal rate of supply.
- Q: *John Calvert:* So then in terms of conservation and the policy to stimulate economic development which in turn will stimulate much more demand for electricity how does that sit with the desire to control or limit the growth of energy consumption?
- A: *Randy Reimann:* Probably the best way that I heard it put to me is that the objective for the province is to use as much clean electricity as possible and use it as efficiently as possible and so you don't have undue impacts, you still do have economic health and hopefully reduced Green House Gas emissions.
- C: *Dave Formosa:* To the point of the previous speaker, you know you look at the big office buildings or a mall and you see all these lights on at night and you wonder what the heck. If every one of them dimmed them down 80% but had enough light for the janitors and the people that are milling around, security, and I think one of the reasons why we don't see that is because the landlord doesn't pay for that - the landlord bills out the electrical use to each and every tenant and leasehold or triple net rent and that is the issue and that is where you would need a mandated ruling maybe by BC Hydro, for example, to say offices must turn down their evening consumption by 70% period and then you can follow that and penalize those that don't because they are overusing. That is the problem – they are billing the tenant so they are not paying.
- C: *Warren Duke:* On the same topic – I have worked for many large corporations over the years and they are mostly controlled and situated in Toronto and we don't have the ability to control it here.
- Q: *Ron McFee:* Looking at Page 14 and talking about cost ranges in the extreme right-hand column - does those costs include capital costs or are they life cycle costs or are they a combination of both? Are they life cycle cost versus renewals and whatever costs you would need to get you to the point when that facility was no longer functioning or capable? What about Site C?
- A: *Randy Reimann:* These are resources that we characterize in our resource options report and so we look at capital and operating costs, when you say life cycle? So, yes, in short, we try to model them over the life of a project up until it would have to undertake significant refurbishment and it is all those costs.
- Q: *Ron McFee:* You have indicated here that Site C is based on a 100-year operating window yet the dams of Ruskin and John Hart, which are at about 70-years now, are being renewed or upgraded and are those costs built into this cost model that is in the extreme right-hand column?
- A: *Michael Savidant:* Yes, definitely for Site C the unit energy costs includes capital cost, the operating cost, water rental and sustaining capital which is what you are talking about to refurbish the plant on a regular basis.

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- Q: *Jeff Carmichael:* The tables show the cost per unit indicate that biomass, municipal solid waste and geo-thermal are also fairly cost competitive but they are not mentioned here, I was wondering if that is for simplicity or is it that they are explicitly ruled out of these portfolios?
- A: *Randy Reimann:* Again, ultimately when we buy these resources, we run or have to date run open clean calls and the resources that we see must frequently bid in are small hydro and wind. We have had some biomass wood waste projects and we have run some specific calls for those but they have come in through that process they haven't come through open call processes. Geo-thermal is one thing we have scratched our heads about – when we go through the cost estimates it appears to be very cost-effective and has good capacity so it appears on the face of it to be a very good resource but the problem is the drilling for these things and to prove out the geological formations that you are drilling into is very expensive and risky and BC Hydro has been working with government to try and explore how we could get some of these things happening and maybe prove some of it out but it is a tough exercise. The key issue is when you put water down into the geo-thermal and you want the steam to come off of it how much water do you actually lose in the ground just dissipating and that can be a problem - heat and water retention. So far we haven't seen any geo-thermal being built or bid into our calls.
- Q: *Jeff Carmichael:* But, you are open to the possibility relative to biomass because this is very important to us on the municipal side and would have good capacity for electricity.
- A: *Randy Reimann:* Those facilities all have good capacity and we would be happy to have them. Yes, but my answer was based on reality and what was bid-in as a result of a call.
- A: *Judy Kirk:* But I think to reinforce the point here, this has come up at other meetings and is a really important point. When BC Hydro is looking at planning for 20-years part of what they are looking at is what is actually coming into the market not what we would wish is in the market but what is actually coming into the market. Is that a fair characterization?
- A: *Randy Reimann:* Particularly when we are determining what our next call might be and if it is a near action and near for us means five to ten years and when we start thinking out twenty and thirty years and we are hoping that some of the other technologies that are under development will become available and will compete and help give us low cost resources.
- Q: *Gwen Barlee:* Earlier you were saying that BC Hydro can't absorb all the energy during freshets and you do give some rough idea how much energy you can absorb during freshet and what the percentage is and it is my understanding that run-of-river energy is about 60% comes during freshet?
- A: *Randy Reimann:* I am not sure that I am going to be able to quote you and maybe that is something we could get back to you on with respect to that question. What we did with our last acquisition process was put a 25% cap on the amount of firm energy that a small hydro could bid into our call.
- Q: *Gwen Barlee:* I have a follow-up to that to.
- A: *Randy Reimann:* And it is mentioned there in the manual that it is there on a multi-year basis.
- Q: *Gwen Barlee:* Okay, because you call that energy intermittent and undependable and I always find it kind of surprising when it is called firm.
- A: *Randy Reimann:* Yes, so firm energy to us is something that we know will be there on an annual basis, you just can't say when in the year it will show up. And, if it is like small hydro and you can design small hydro facilities to different design criteria, if you design it to take the highest water flow you get ever on a particular water body you might get all the freshet energy but most of that we can't use for our system so we export it.
- C: *Gwen Barlee:* But I can follow up with you guys later about what the percentage is.
- A: *Judy Kirk:* Absolutely.
- Q: *John Calvert:* With respect to transmission impacts, is that included?
- A: *Randy Reimann:* Yes, so if you have a whole bunch of wind farms or small hydro you might have a whole lot more transmission lines running to it so you have a wider spread.

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- Q: *Ablaza Brosseau:* I am surprised that you don't talk about solar; shouldn't big business be having solar panels on their roof to keep their costs down in their building?
- A: *Randy Reimann:* We are looking at that in some of DSM programs, solar in the industry, California/Arizona, places like that, are looking at that, large scale solar and they are hot, intense sun places and they are starting to get to the point where they are economic compared to other clean resources but those large ones not so much in BC. So then you can do solar on buildings, I think the main benefit that we think you can out of that might be heating water and using it for maybe building heat or for building hot water supply. Photovoltaics, where you produce electricity with it, are very expensive. So far, it is not a technology that has come down to a range where it competes with the alternatives here.
- C: *Judy Kirk:* I would like to refer you to the Feedback Form on Pages 29, 30 and 31 of the Consultation Workbook are the questions that BC Hydro is asking for feedback on regarding these electricity generation options and note they are asking for comments. It is not necessarily asking you to choose on the agree scale but to tell BC Hydro on a finer-grain what you think about it and your reasons.
- Q: *Jeremy McCall:* With respect to increasing capacity and Site C – Site C is obviously a capacity increasing project. Are there any other places in the province for large hydro projects where it could be where you could use the same water twice?
- A: *Michael Savidant:* There are some potential sites but the Clean Energy Act says Site C is the last large hydro project in BC and basically it says we have a two-river policy, in BC, the Columbia and Peace Rivers, for hydroelectric dams in British Columbia and Site C will be the last large hydro project developed. We have reviewed other large hydro sites and there is another site downstream from Site C and another site close to the border and the U.S. but we are not looking at those sites because of the government's policy directive. We would have to look at all the impacts and we think Site C is the cheaper option and that is why we are pursuing that right now and they have taken those other ones off the table.
- A: *Judy Kirk:* If you felt that there were other sites that should be looked at then put it in the additional comment sector of the Feedback Form.
- Q: *Judy Kirk:* (To the meeting participants) - Do you think electrification is a given in society or are you having to think about what this means?
- C: *Marjorie Cohen:* No, I don't think electricity is a given and I think particularly now with respect to the nuclear power melt downs that we are seeing in Japan and that the possibility for wide-spread nuclear in Canada probably is not going to be very attractive and particularly not in the west and that really is the only way that we can huge amounts of electricity that you would need for whole scale electrification – it requires a lot of electricity. Ontario couldn't do it and BC can't. I can't it happening here.
- Q: *Judy Kirk:* Is that true that BC couldn't?
- A: *Randy Reimann:* Well we will try to answer that question once we are done the analysis of the IRP.
- C: *Marjorie Cohen:* If you are saying we'll all have electric cars, I don't know where you will get the electricity.
- C: *David Formosa:* I think you are probably right. If it happens, it will be more likely to happen in urban centres and less likely in rural centres. But you are right; if you don't get the big production it will be tricky.
- C: *Jeff Carmichael:* Just a comment. There is a combination of legal constraints and changes that are necessary for some of these like encouraging ground source and heat pumps together with the economics and the natural gas market as it looks like it is going to be for the next ten years may slow progress on a number of these initiatives. I wouldn't say it is a given that they are going to jump in. All things would have to be taken in consideration however I wouldn't say it was a given.
- Q: *Ron McFee:* The current world-wide glut in the natural gas market is going to have an impact on

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electrification and I find it difficult to believe that we can force electrification without reacting to the global glut in the market place whether it be natural gas or otherwise. I think in that sense a responsive approach to electrification of being reactive is a much more prudent approach than attempting to socially engineer forward without taking into consideration global impacts of resources that in many cases we have no control over. How can you force electrification when natural gas is cheaper? My question is how do you intend to deal in the northeast of BC with the explosion in the oil shale development that is currently occurring?

A: *Randy Reimann:* So one of the electrification issues that we are analyzing and assessing in the IRP and that is electrification in the northeast sector and whether that is feasible and what it looks like but we are aware even the gas up there has a 12% carbon dioxide content in it as well as the drivers to compress and ship the gas. So it is a pretty significant volume of GHGs up there – so, we will look at alternatives and whether or not it makes sense and I think that a lot can be dealt with just by requiring the developers to deal with the carbon dioxide on the gas to either use it or re-inject it and electrification can take you another step to have low GHG energy to drive that but we will be looking at it. It is something the government is considering.

Q: *Gwen Barlee:* When you are building spurs to a private power projects what percentage of the costs are broken down between the private power developer and BC Hydro? What is the cost for a power spur to developers?

A: *Randy Reimann:* Right now if they bid into a call it is their responsibility to get into the system (transmission system). If we started looking at clustering, if we then were to proactively build a larger line we would need to be building that by then and the expectation would be that we would get cheaper generation as a result of that so that overall there is a net benefit.

Q: *Marjorie Cohen:* Where are you talking about increased exports and transmission for exports because I don't see anything?

A: *Randy Reimann:* We would as well contemplate worlds in which expected load growth – we have got a couple of electrification scenarios that we have done to stress the system and then we will be contemplating what exports in addition to either of those, what that would look like. And so, if additional transmission is needed and if the export market assessment comes out as looking fruitful then there may be some transmission that might be advanced for that as well. I guess that I would add that within this proactive approach I think there is a question of degrees and if one recognized that there is a particular corridor that was going to be needed with a fair bit of likelihood a lot of times transmission projects, I mean the reason we are worried about this is that it can take us 10-years sometimes longer to get a path approved and a line built and so part of what we are contemplating at least get it through, if we think it is likely to be needed, get through the route selection, permitting approvals and get to the point just before you spend the big capital dollars that it is ready to go and then you do a check in at that point and say so are we still in that world where this is needed, so we think in fact depending on how you implement this you could get a lot of benefits without necessarily spending all the dollars until you are more certain that it is going to be needed.

Q: *Gwen Barlee:* When you are talking about future need people think oh that is about future need for BC but you are talking about exports in that and you just need to be careful of your wording.

A: *Randy Reimann:* Right and that does preface a little bit the export market piece and they have asked us to keep those costs separate.

C: *Judy Kirk:* I hear you loud and clear in terms of the expression of that.

Q: *David Formosa:* Where are the potential resources – is the information available on the website?

A: *Randy Reimann:* There is a draft Resource Options Report on the BC Hydro website, final version in the next couple of weeks and maps are also available.

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- Q: *Gwen Barlee:* Would BC Hydro be considering, with the self-sufficiency requirement, we would be having additional electricity that could potentially be for export and would BC Hydro be engaging or entering into long-term contracts with electricity for self-sufficiency and insurance requirements?
- A: *Randy Reimann:* There is a section of the Act and I am not going to be able to quote which one it is but it does say if we find ourselves, once we get to self-sufficiency, it is pretty certain that we are going to be surplus in that we don't see a domestic likely in the near horizon, whatever that might mean, five – ten years, there is ability, after receiving government approval, to enter into long-term contracts. But, we need to get explicit government approval for that as it is now we tend to move that into the shorter-term markets.
- Q: *Gwen Barlee:* But under the Clean Energy Act BC Hydro can't pass costs onto ratepayers and from my perspective it seems very difficult for BC Hydro to agree to an export strategy just because California is not interested if the energy is not clean and despite the high cost of Columbia River power and the market not being interested in paying that price right now are you also including Site C, a portion of the reason for it being built, potentially being built is to firm and shape private power so are you saying that it is a \$10 billion or \$11 billion project would you assess some of those costs towards export?
- A: *Randy Reimann:* No, Site C is being considered in our domestic portfolio.
- Q: *Gwen Barlee:* So even though it is going to be shaped potentially for export?
- A: *Randy Reimann:* Right and so there needs to be some sort of an assessment – so any surplus that might be in the system we already trade it in the market for the benefit of the ratepayers and if instead of trading it into the market to optimize it we used it to shape resources in BC rather than shape U.S. resources then the ratepayers should be kept whole for the lost shaping revenue. So I think that the domestic ratepayer should come out indifferent.
- A: *Michael Savidant:* When you talking about firm and shape the power for export it would be firming and shaping energy use in the domestic system in the traditional idea of exports if it actually did anything for this additional exports that we are looking at in Portfolio 2, the ratepayer would be kept whole but that is not part of the rationale for why we are building Site C.
- Q: *John Calvert:* You mentioned earlier the 3,000 MegaWatt hours surplus that we have to have – I am not sure if that is in low water years or just an average water year?
- A: *Randy Reimann:* It is incremental to planning on low water years.
- Q: *John Calvert:* Is that just too constantly have a surplus to export, we are going to plan for that? Is that 3,000 MW hour surplus part of this calculation or is it separate – is the costing of that within the domestic supply?
- A: *Randy Reimann:* That is within the domestic supply. Self-sufficiency is what we are to create for the domestic consumer.
- Q: *John Calvert:* So, the other exports would be in addition to that basic thing?
- A: *Randy Reimann:* Yes that is correct.
- C: *Ron McFee:* Just to add to that point, that presumes economic development at a particular rate and using again the more recent example of the demand in the northeast (British Columbia) could very easily, through high energy prices, completely outstrip that straight line and I think that the extra capacity obviously has to take that into consideration – there has to be a buffer built in for that development and a great example is the oil shale development in and around Dawson Creek. It is a very well-kept secret that that development will go and when it does I would suggest that your northeast projections are going to have to be relooked at.
- Q: *Jeff Carmichael:* I think perhaps that it is a bit disingenuous to try and separate out the impact on ratepayers to the impact upon the province which is to say we as taxpayers in the province. For example, to say that losses would not be experienced by BC Hydro's ratepayers but they would be experienced by the province – all of us in the room qualify as BC Hydro ratepayers but also as provincial taxpayers so to presume, it makes it sound as though there were no burden but we would just bear that in a different way and that is still a risk it is just not going through the agency of BC Hydro and I understand that we are in a hydro box right now

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- but holistically that is probably not a great picture to draw.
- Q: *Judy Kirk:* Is it the difference between direct and indirect? I am genuinely asking that as a follow on to your suggestion.
- A: *Jeff Carmichael:* Yeah, I think that is probably a fair way to state that and I understand that hydro needs to draw the box and say look from our perspective we are safe, our ratepayers are safe but I think it is enforceable if it is working out in a larger holistic perspective that could, that there would be significant or some contingency risk to the taxpayers of BC that should be flagged.
- A: *Randy Reimann:* I agree there are risks in there and they would fall to taxpayers and I think the reason we put the ratepayer piece in there is that there is a group of large electricity consumers that are very interested that it not show up in the electricity rates.
- Q: *John Calvert:* If there is a significant demand in the northeast sector relative to the oil and gas development and the new energy that we would be getting would be at the marginal prices of \$100-\$110 MW hour but the impact would be spread among all ratepayers if there isn't any special arrangement for the new people that are buying the energy in the northeast sector to pay extra, right? So there is some way that all of us will be affected by that development if it needs to have to buy a lot more expensive energy that is spread among all our rates whether it be residential, commercial or whatever, is that a fair comment?
- A: *Randy Reimann:* Yes, that right. There is provision for large customers anybody over a 150 MW in a single site pays the incremental costs of generation so I don't know how this whole thing is going to work out but certainly our normal principle is that all customers pay the same rates whether they are new or existing and so incremental supply.
- Q: *John Calvert:* I am sort of making a point in the record that maybe we are all going to be subsidizing through hydro rates the oil and gas development and that seems to be the way that goes.
- A: *Randy Reimann:* I mean I think that is true for all new customers across the province regardless of whether they are industrial or other.
- Q: *Gwen Barlee:* Will the recommendations that BC Hydro is putting forward, I guess to cabinet, will those be made public?
- A: *Randy Reimann:* So we have a draft plan that we intend to make public in the fall, in the summer/fall, and then consult on that so that part will be public and then it will be filed with government and then I think it is...
- Q: *Gwen Barlee:* Will the final recommendations to government be made public?
- A: *Randy Reimann:* I am not sure when the final, the expectation is it will; when it goes public I am not sure.
- Q: *Gwen Barlee:* Just that in the past when they are reporting directing to cabinet that those recommendations aren't made public and I have to get them from FOI.
- A: *Judy Kirk:* I think that Randy (Reimann) probably can't comment on what a cabinet document would be, this is a little bit beyond my purview here but I am not sure that Randy (Reimann) could comment on the public availability of a cabinet document but the draft plan will be public and will be consulted on.
- C: *Gwen Barlee:* And you anticipate that the draft plan and the final cabinet document will be quite similar.
- A: *Judy Kirk:* Wouldn't speculate on that.
- C: *Gwen Barlee:* Because I think that people would want to know if they are participating in a process what the fine points listed in the cabinet request are.
- A: *Judy Kirk:* Absolutely, absolutely, I have asked the same question and been assured that it will - in other words, that the respectful consideration of this consultation will be indeed reflected.
- Q: *Jeff Carmichael:* I am assuming that this would go through BCUC; the draft plan would then submitted to BCUC or just go straight (to government)?
- A: *Randy Reimann:* I think that the way the process would likely shake out is once the government approves the plan, in whatever shape it is, then the Commission is to consider and be guided by that so then the

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- question is when would the next time that we would be in front of the Commission to be looking for approval, I think it would likely be filed then as a contextual document and then it would be on the record in that process.
- Q: *Jeff Carmichael:* Is this the Ministry of Environment that this would be submitted?
A: *Randy Reimann:* It is with the Ministry of Energy and Mines.
- Q: *Jeremy McCall:* My question is about any restrictions that might be placed on the definition of clean in California for instance, or there any questions arising from that when you are considering exports?
A: *Randy Reimann:* We are looking at the export market definitions so there are renewal portfolio standards in each jurisdiction and they have a slightly different take on it and certainly we faced issues with small hydro run-of-river in terms of qualifying and so as we are building out our portfolios we are asking ourselves if we built that resource and it was a surplus would it qualify in someone else's RPS market and if so would there be an additional value you could earn by selling that. Well if you don't get it for this resource and you do get it for that resource it might indicate that there may be resource preference or at least some premium you might want to pay and in this case maybe wind over small hydro depending on how they qualify. And so we looking at that within the analysis of the IRP – we haven't concluded anything yet. Ultimately depending upon what we see and what direction we get in the approval of the plan where you would expect to see that manifest itself is in future acquisition processes. So we would presumably if, wind was something you felt there was market for surplus and there wasn't for small hydro that you might put in your acquisition some premium that you would be willing to pay wind.
- Q: *Jeremy McCall:* Is the status of small hydro established in any of our main export markets as to whether it is clean or not?
A: *Randy Reimann:* Washington and Oregon generally don't like small hydro and wouldn't qualify into their RPS - the biggest market out there really is California and we have been working with them or at least our export arm Powerex has been in terms of indicating to them what our run-of-river facilities look like, trying to educate them and try to get them to modify their position. As of right now, I think, the run-of-river doesn't qualify in California.
- A: *Judy Kirk:* But it sounds as though there isn't a black and white answer which is what Jeremy (McCall) asked:
A: *Randy Reimann:* Right.
- C: *Gwen Barlee:* Although it is black and white that it doesn't qualify right now.
A: *Judy Kirk:* Fair enough.
- Q: *Jeremy McCall:* It actually raised the question, why go to all that effort to export power if people aren't going to want it anyway?
A: *Judy Kirk:* It goes to short and long term, does it not?
C: *Jeremy McCall:* Yes, right.
A: *Randy Reimann:* And we are for this export question doing an assessment of the export markets to see what that looks like and where the economic benefits would be there if any.
- Q: *Jeff Carmichael:* I have a rather detailed question and we would like to know whether electricity generated from municipal solid waste is considered clean – what portion is considered clean and could that be in fact part of a future power call and in multiple discussions with multiple ministries and with BC Hydro there has been a lot of finger pointing so I just want to flag this for your process that it would be important to our programs. I presume that you don't have an answer to this because no ministry that I have spoken in the last month has. This would be important to provide us with some certainty.
C: *Judy Kirk:* I would encourage you because I am going to make a segue to the Consultation Summary Report, I would encourage you and Metro Vancouver to provide a written submission to the process on that point or on other points because I think it is probably a good thing to have in the record, this is a good record but some elaboration on that.

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Q: *Jeremy McCall:* I feel and I am looking forward to talking to Mike (Savidant) after the meeting about capacity building, obviously nuclear is out because it is precluded by the Clean Energy Act, are there any other areas where the IRP is being constrained if you like by the legislation that has been passed in the past few years? Is this really as an open-ended a process as we are being lead to believe – are there any other constraints? Constraints to your planning?

A: *Judy Kirk:* You should have a further conversation with Randy Reimann about it after the meeting. You will recall right at the beginning of the meeting, on Page 4, Randy (Reimann) talked about what went into low growth but it was also about the Clean Energy Act, on Page 8 (Consultation Workbook) - the bullets on Page 8 you might characterize as constraints, certainly they are guidelines, they are more than guidelines they are directives with respect to the Clean Energy Act so that is the first answer to your question, if you will, and if you would like more detail I am sure that Randy (Reimann) is prepared to elaborate.

4. Feedback Forms

Participants of the meeting were thanked for participating and were encouraged to complete and submit feedback forms. Participants were also encouraged to attend one of the upcoming open houses (dates, times and locations listed in the consultation workbook).

5. Closure

The meeting ended at 10:50 a.m.

Integrated Resource Plan Appendix 7C-2

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PURPOSE	Meeting notes from a multi-stakeholder group meeting with stakeholders BC Hydro staff on March 15, 2011 at SFU Morris J. Wosk Centre for Dialogue, 580 West Hastings Street Vancouver, British Columbia
FACILITATOR	Judy Kirk, Kirk & Co. Consulting Ltd.
PRESENTER	Randy Reimann, BC Hydro
MULTI-STAKEHOLDERS PRESENT	Manuel Blaschuk Stephen Cheeseman Martin Clarke Stephen Cruseman Jack Davidson Megan Dickinson Elaine Golds Andy Green Richard Harper Meaghan Hennessy Eugene Hodgson Shahzad Islam Caroline Jackson John Lawson Mary McWilliam Alison Morse Kim Needham Gaetan Royer Greg Samchek Larry Schofield Jennifer Shaw Greg Smacher David Stroud Ron Van Ord Daan Wynberg
STAFF ATTENDEES	Brandee Clayton, BC Hydro Susan Danard, BC Hydro Kathy Lee, BC Hydro Mike Savidant, BC Hydro Arlene Shwetz, BC Hydro Meghan Clarke, Kirk & Co. Consulting Ltd. Susan Campbell, Kirk & Co. Consulting Ltd. , Recorder
AGENDA	1. Welcome and Review Agenda 2. Consultation Workbook Overview 3. Discussion 4. Closing Remarks

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KEY THEMES	
<ol style="list-style-type: none"> 1. Conservation and Efficiency – Participants said that BC Hydro should pursue the “greater conservation and efficiency approach” in the draft Integrated Resource Plan adding that harmonization of codes and standards, particularly between the provincial government and local governments, would be needed to eliminate barriers to more conservation. 2. Electricity Generation Options - Participants said that BC Hydro should carefully balance the economic trade-offs associated with preferred portfolios, adding that portfolio 1, which has relatively more renewables may not be as beneficial to British Columbians because it represents relatively more private power production rather than public power production. Other considerations regarding a portfolio with relatively more Independent Power Producer’s such as portfolio 1, included concern about a perceived lack of incentive for good maintenance of IPP electricity generation facilities and concern that BC Hydro should own the residual rights to IPP’s, once contract terms are completed. 3. Electrification – Some participants were supportive of BC Hydro including a more proactive approach to electrification while others expressed a concern that electrification would increase electricity demand so much that BC would require significant additional supply with attendant additional costs and environmental impacts. 4. Transmission – Participants said that BC Hydro should engage in better, longer-term planning regarding transmission requirements including consideration of the benefits of creating transmission regions; some focused on gas which may need relatively less transmission and others focusing on electrification which may need relatively more transmission. Participants asked BC Hydro to consider both local and provincial interests when planning transmission. 	

DISCUSSION	
1.	<p>Judy Kirk - Welcome and Introductions Judy Kirk welcomed participants to the stakeholder meeting, explained the format of the meeting and introduced the consultation workbook and feedback form. Roundtable introductions followed. Judy emphasised the five consultation topics and the feedback form at the back of the consultation workbook.</p>
2.	<p>Randy Reimann – Consultation Workbook Randy Reimann reviewed the format of the consultation workbook and explained the processes and factors BC Hydro considers when energy planning. Cam explained the difference between demand side options and supply side energy options and how BC Hydro factors this into the balancing the options when developing a long-term plan.</p> <p><i>(Abbreviations will be used and mean: Q: Question, A: Answer, and C: Comment)</i></p> <p>Q: <i>Kim Needham:</i> How do you define a BC Hydro customer? Does that include export customers? A: <i>Randy Reimann:</i> It includes some contribution to, we have a Seattle City light contract that is a long-time historical contract that is in there, we don’t yet have any long-term export contracts that we supply on a</p>

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- long-term basis.
- Q: *Kim Needham:* So essentially it is the people of BC.
- A: *Randy Reimann:* Yes, we will get into exports and I guess that it is something to be proven out but in the future if we do have export requirements we will need to keep those separate but I think we will have to plan for those. That is not in there now but it is a future potential.
- Q: *Gaetan Royer:* Do you count the Burrard Thermal Plant capacity as part of the supply?
- A: *Randy Reimann:* The Clean Energy Act has asked us to no longer plan on it for energy or capacity but we do have a direction that allows us to rely on it until replacement facilities are in place.
- Q: *Gaetan Royer:* Just to provide some scale, where would we be if you added that capacity on the graph?
- A: *Randy Reimann:* Okay, that is a good question – so the graph that is shown here is the energy that customers would need in the supply, there is no energy from Burrard included in that graph, I think that Burrard is rated at 6,000 gigawatt hours that could be added but Burrard almost never ran and we no longer count on it for energy but it is a 6,000 GWh number.
- Q: *Kim Needham:* I don't see export in there (on the graph)? Does it fall into any of those categories?
- A: *Randy Reimann:* No, so there is an export piece that we will come in (topic) 5 but export could add to this - that is right. It is not in there at this point but it is something that we are looking at it.
- Q: *Caroline Jackson:* Why does the supply line go up and down on the graph?
- A: *Randy Reimann:* So the supply goes up as we have bought additional IPP contracts and these are coming on line. In 2016 and fiscal 2017, I will mention this again later, but the Clean Energy Act asks us to plan the system to critical water or low water conditions to be self-sufficient in the province. Historically there was 2,500 GWh that we relied on the market and heritage hydro non-firm and that comes out of the stack and that is part of it. The other is that there are some IPP projects, because of the uncertainty in fuel we don't assume that those will roll over and so that energy from those projects comes out.
- Q: *John Lawson:* Do the figures on the graph include Fortis or Columbia Power generation and service customers? Or are these just BC Hydro?
- A: *Randy Reimann:* This isn't BC this is BC Hydro, yes.
- Q: *John Lawson:* And the plan is similarly BC Hydro, not BC?
- A: *Randy Reimann:* Correct.
- Q: *Kim Needham:* Going back to the graph on Page 5 – there is a significant supply gap, right, just based on filling the future needs of the residents of British Columbia, right, but then even though we have that supply gap the government is asking that BC Hydro try and build the export market so that would mean filling the supply gap plus?
- A: *Randy Reimann:* That is correct. One of the things we will be looking as we create the IRP is there an adequate amount of resources in the province and capability in our system to manage both loads in BC and export markets and are those export markets economic.
- A: *Judy Kirk:* I would also point out that the Feedback Form at the back of the Consultation Workbook asks what do people think of that (export) and what they want BC Hydro to know about that and I would encourage participants to provide their comments.
- Q: *Elaine Golds:* With regard to Burrard Thermal, what are the current regulations under which it operates, it is no longer being used to meet peak demand, is that correct, it is only used to meet emergencies?
- C: *Gaetan Royer:* The Burrard Thermal Plant was working today.
- A: *Randy Reimann:* The Clean Energy Act stated that we weren't to plan on it for energy or capacity and that it was only available for emergencies and system support but it actually doesn't run for system support but we

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- couldn't eliminate it from our stack until we had an alternate supply that could get to the lower mainland. So we have a regulation that was issued that says until the interior to lower mainland transmission line is built, two additional capacity units Mica 5 and 6 and a third transformer at the Meridian Substation, when those three things are complete then we fall back to the Clean Energy Act. Up until then we can use Burrard for capacity as the last thing available to us.
- Q: *Elaine Golds*: So you are not using it to meet peak demand periods?
- A: *Randy Reimann*: So peak demand or times when we have outages so if we have issues in the system, down time, maintenance, repairs go on longer, any time that we are short of capacity and we need it to meet the load.
- Q: *Elaine Golds*: But can you distinguish between using it under emergency conditions and using it to meet peak demand?
- Q: *Judy Kirk*: You mean peak demand on a daily basis?
- Q: *Elaine Golds*: Yes, all during cold periods and so on.
- A: *Randy Reimann*: So, we are not just using for it for emergency now, the Act says that is what happens after we have replacement capability for now we are using it as a capacity resource, as we need it, to meet the domestic load. That is what the regulation is.
- Q: *Elaine Golds*: So are you using it to meet peak demand?
- A: *Randy Reimann*: Yes.
- Q: *Elaine Golds*: Yes you are and is it operating under a special directive right now from the government?
- A: *Randy Reimann*: Yes. There is a directive, I don't recall the number.
- Q: *Judy Kirk*: When you say operating, do you mean like literally operating?
- A: *Elaine Golds*: No, because it does operate from time-to-time over the winter but I am wondering under what conditions you are actually allowed to generate because it has become quite stringent in recent years. I would like more information on that special directive.
- Q: *Richard Harper*: Is there a possibility of getting an extension or update of the supply/demand graph on Page 5 because it seems that is rather short. I would like to see more historic data going back a few decades that would highlight periods of recessionary periods and also highlight the period of demand where hydro has started the power smart program and just highlight those on a graph. This graph is not similar to other long-term supply graphs that I am familiar with in other large organizations like Metro Vancouver and Capital Regional District?
- A: *Randy Reimann*: The historical one we will have to take a look and I think we can create that and perhaps post it on our website. I will point out there is a Technical Advisory Committee (TAC) and there is a number of graphs in there about the load forecast and I think that has a bit of where we have been but it has different explanations of what is available so if you go to our website there is a link to the IRP on the front page and within that if you go to TAC any of the materials that we go through with that group, gets into a lot more depth than we are able to do in these sessions. So there is present load forecast in there but we could look for the historical.
- C: *Richard Harper*: That would be nice.
- C: *Judy Kirk*: I would also point out there is an email address if you want additional information.
- Q: *Mary McWilliam*: Have you guys looked at the impact of increased rates. I am with BC Non-Profit Housing Association and when I look at our members across the province they are significantly at risk from your rate increases and I think that they are adversely affected more than most people. What kind of programs or initiatives or consideration has there been to the impact upon low income families, or low income residents, across the province because of this your Demand Side Management strategy and the potential rate increases and the different rate structures that are being considered under this are really quite scary actually for that portion of the population?
- A: *Randy Reimann*: That is something that both government and BC Hydro are interested in addressing and we have a low income program for DSM to try and help people be more efficient in their use of electricity and

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- load consumption.
- Q: *Mary McWilliam:* But your rate increases far exceed, when I look at the projections of the rate increases, they far exceed what we can achieve with conservation. There are a lot of properties across the province with electric base board heating because it was very affordable to build and we can't do enough to fix those properties to conserve, right within their budget, so what kind of consideration has there been to the impact on this portion of the population with the rate increases?
- A: *Randy Reimann:* Outside of encouraging or trying to help people to use less electricity I am not sure of anything else that is being done on the rate side.
- C: *Judy Kirk:* And, in fairness what I should let the group know and it is a good time, Randy (Reimann) is a Senior Planner, I hope I have said that right Randy (Reimann) I might not be characterizing it quite correctly but with the energy planning group and he is not with their rates group, that said, it is a good comment and I think I want to make sure that any comments like that on this last page in the Discussion Guide or Workbook please, you won't see a question on rates in this electricity planning but please make sure that you put that in here, it is an important comment and they have committed to looking at it.
- C: *Mary McWilliam:* Okay because that is part of the demand side management structure, strategy – there are incentives and rates and are part of that.
- A: *Randy Reimann:* So there is a two-tier rate that was done to give an incremental price signal so the rate design itself didn't change the average bill and the trailing step provided a greater signal to incent people to reduce their consumption at least for that rate design then if there were issues with low income I think that where it came from.
- C: *Judy Kirk:* That is a good question and I think you haven't had it really answered, if you will, in terms of the fullness of the answer so it might be something that we could mark for some follow up but I would encourage your input in the additional comments.
- Q: *Gaetan Royer:* When you talk about government regulations as being one of the targets I think it is an important one. I just finished designing and building a sustainable home and I hit a number of obstacles where I had to argue against building codes that force you to do certain things but one aspect that you don't talk about, which I think is really important - dealing with provincial codes. On the demand side there is a lot of industries out there that are also obstacles; the deck is stacked against people trying to do the right thing. Banks will present obstacles for people that do try to finance a green project, there is the insurance industry that needs to be educated, and they just don't want to take chances with things that are a little bit outside of the norm. The home warranty system is a compulsory system, anybody who builds has to use that system - they need to be educated, they need to have new rules as well. Appraisers and the home warrantors need to learn how to deal with these kinds of systems and I don't see that anything in your home reading that you sent and I don't see anything on this page and I think it is an important aspect to get the message out, and have industry change the rules.
- C: *Judy Kirk:* To facilitate more conservation, make it easier to facilitate more conservation.
- C: *Gaetan Royer:* That's right because they are presenting obstacles. They don't want to insure a green roof for example; they don't want to do certain things that are important; we need to change.
- A: *Randy Reimann:* I think you are right there are a number of areas where I think BC Hydro could help play a role in driving those things.
- C: *Jennifer Shaw:* I come from the home builders association and I would agree. We spend a lot of time educating our builders and training our builders to build green and to help contribute to this conservation side but I would agree there are a lot of obstacles when it comes to building officials, realtors, the whole gambit that Gaetan (Royer) just mentioned - the builders there are a lot of them that want to do the right thing, provide the right product for the consumer but there is a lot of obstacles and hurdles. We too work with the provincial government to make sure that we are kind of on the same page but more education from those other sides is really an important factor.

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- Q: *Kim Needham:* I totally agree with that and I think that there needs to be more harmonization at this stage in the game. I mean, really we shouldn't even be having this discussion, right; everything should be built green and should be as efficient as it could be. Where I live I can't be incentivized anymore to reduce my consumption so I think we need be working with people writing the BC Building Code to have all new construction – all new construction should have some sort of smart switch so that when you walk out the door you can flick a switch and everything gets shut down to whatever the optimal level is. So I mean I think BC Hydro has a big role to play because really for a lot of us that is the only thing left to do, there isn't really much more in terms of reducing demand. The other thing was I going to ask -s was there talk at all about feed-in tariffs doing like what Germany has?
- A: *Randy Reimann:* So the government did have a section in the Act about feed-in tariffs and they are looking at it. There have been some experiences in some other jurisdictions where there have been quite high costs for feed-in tariffs and it spawned an industry and then the industry ended up failing. I think they were worrying about that and I think what they are looking at, for feed-in tariffs, in BC, is to try and see if there are technologies in BC that we could work on and develop sort of a technology hub here where we would be leaders and could then develop that technology and move it into other jurisdictions. A feed-in tariff is where typically what a jurisdiction will do is that they will look at a particular technology, solar feed-in tariffs and they will give a specified price for that in advance that can be at quite a high level. The intent of the high level is to get that technology established. So it is really subsidizing the technology until it gets a foothold and then hopefully spawns off into an industry.
- C: *Kim Needham:* Basically, we are incenting IPPs with a significant price differential so why not look to incentive home owners to do the same to add energy to the grid. I think you could get a big bang if you start looking at householders.
- A: *Randy Reimann:* I think that we are trying to encourage home owners. We have a net metering tariff and I think sometime within the last year we adjusted the price you receive for net energy that comes in the net metering program so we are trying to encourage people to do things in their home. That said the government has had a fairly big focus on reducing GHGs - so far they have been reluctant to look at thermal systems that increase GHGs what may have efficiency benefits.
- Q: *Kim Needham:* I was thinking more like geo-thermals, solar, heat pumps, at some point in BC?
- A: *Randy Reimann:* So heat pumps and geo-thermal for heating and that – those would fit well with our DSM programs if you are actually generating electricity and you may actually inject back into the system that would come under our net metering tariff.
- Q: *Martin Clarke:* I don't see why we can't incentive solar PV on homes more than we do. You have heard now that the economics for a solar PV is absolutely ridiculous in BC but yet it seems to me that it is such a good solution as opposed to building a huge dam or anything because your transmission lines don't exist. What if every home had a solar PV on it, what impact would that make on our energy needs but we will never get that because the economics are ridiculously poor – so incentive that - has BC Hydro done that trade-off between the cost of incentivizing solar PV for homes versus building a huge electrical generation like Site C?
- A: *Randy Reimann:* I think you are right that there could be some benefits in that the transmission costs are reduced. Transmission tends to about 10% of the overall system costs and so it is not the biggest part but I think just the economics haven't landed and so can we clean and maintain our rates as much as possible going to some of those options and I think they will evolve probably eventually get there but they are expensive, so it is a tough one to push.
- C: *Michael Savidant:* We are taking a look at cost and specifically we know that solar heating is fairly cost effective but solar homes - solar photovoltaic is a much, much higher cost than really any other resource option including Site C. The amount of incentives provided is such that they must come from somewhere and rates would have to go up and that is part of the trade-offs when you are talking about Site C.
- C: *Judy Kirk:* I would like to draw your attention to Page 28 of the Consultation Workbook and the kind of commentary some of you have expressed here is very important to be captured as feedback on the

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- Q: *Richard Harper:* With respect to DSMs, has any thought be given to the potential impacts if you can't achieve your targets because you have got a very high target that you are trying to achieve and if you can't meet it then you have got a problem and you have to take that into consideration in terms of if you have to go to new generation you are talking possibly a five to ten window to bring that new generation on target?
- A: *Randy Reimann:* We have within our resources plans both what we call a base resource plan and a contingency resource plan and the base resource plan is what happens if everything goes well. The contingency resource plan then says what happens if the load forecast is higher and DSM is lower how would we would make up the difference and it is one of the things that we are contemplating in this IRP - how far do you go and what does recovery from that look like if you don't get it but the DSM programs are not an all or nothing, it is a question of how much you are going to get.
- C: *Richard Harper:* How much you are going to get, I know but if you are trying to achieve 79% but you are finding you, in terms of your load forecast, you are only getting 50% or 60% then you have got a problem that you are going to run into down the road in a hurry and like I said and I am thinking about in terms of your options of bringing in new sources or other contingency to bring in.
- Q: *Gaetan Royer:* There are two categories, a fixed price Site C I understand that you have fixed knowledge, but also coal-fire, can you explain why?
- A: *Randy Reimann:* I will let Mike (Savidant) speak to Site C in a second. In terms of the coal – when we classified the range of prices for the other resources we didn't necessarily look at the uncertainty about the cost estimate but rather the quality or how good the wind was – so it varied by location even around those price ranges there is uncertainty. With the coal, there is a lot of coal in the province, the big trick with it is that in BC we need to capture that carbon and sequester it somehow. So there could be a huge supply but the technology is not really there right now so it is not a realistic option at this time but it is sort of the expected cost estimate and most of the sites would come in at a similar price but then there is a band of uncertainty around that.
- Q: *Gaetan Royer:* But, are there fluctuations in the actual price of coal?
- A: *Randy Reimann:* Not a lot, you build a coal plant next to a mine and you get a 20-year contract for it. Some people buy coal as a commodity on the market and they might see some variability not typically that much - we did model a mine.
- A: *Michael Savidant:* Just to confirm that the reason we have the prices is because it is an identified as opposed to these other projects that are a range of sites across the province.
- A: *Randy Reimann:* But there is uncertainty around that as well.
- A: *Michael Savidant:* Yes and we are looking at updating the cost of design and that is noted in a footnote in the Consultation Workbook.
- Q: *John Lawson:* Are they installed costs or projections?
- A: *Randy Reimann:* They include operating, maintenance and fuel if required.
- Q: *Caroline Jackson:* I noticed that biomass was included as a potential resource and it does say the potential varies with the availability of the fuel source and that there is some uncertainty in there in regard to the availability and somewhat dependent upon the state of the forest industry. And you also commented before on the Page 5 graph about some of the IPPs being at the end-of-life and I am trying to piece that information together, could you comment a little more about the biomass fuel issue?
- A: *Randy Reimann:* Specifically with wood there is the Mountain Pine Beetle and how long that would be available and there was a desire to harvest that and use it for generating electricity before the wood rotted. Once we get through that I think that will decrease the supply. The other uncertainty is what are the alternative uses for fiber? So you could potentially be harvesting trees for power but is that better used for lumber or pulp or pellets, etc. The allocation of fiber and there is uncertainty. How far would you go to

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- harvest trees to make electricity? And if you green field harvesting and hauling logs to produce electricity it gets expensive very quickly.
- Q: *Caroline Jackson:* Does BC Hydro have a study looking at those issues, some of the ecological issues or supply issues that were included as background to this?
- A: *Randy Reimann:* So we did as part of the resources options report a study on the wood waste and Kathy Lee did that for us.
- A: *Kathy Lee:* That report, I will give you the link to that report after the meeting.
- Q: *Caroline Jackson:* So that report focused more on the supply issue?
- A: *Kathy Lee:* Yes, the supply and competing demand.
- Q: *Caroline Jackson:* Are there any reports that you are aware of that focus on the ecological aspects?
- C: *Judy Kirk:* You know Caroline (Jackson) can I ask you to do as a side after the meeting because you know what; you want to make sure that you get that information. I am just a little bit concerned in the interests of time around the topics and I wonder Kathy (Lee) if you could follow up on that.
- Q: *Elaine Golds:* I am wondering why you have such a low ball estimate for some run-of-river, I mean there is a very broad range there as well but why \$58 and what is that based on and is that a realistic cost to build a new facility?
- A: *Kathy Lee:* So all of the run-of-river estimates are based on a desk top study so based on looking at maps and engineering - we have identified a small amount of potential at some very low costs.
- A: *Randy Reimann:* We are trying to consider as we do our analysis whether or not we could actually expect those very low prices to show up in an acquisition process to the extent that people felt that they would get more for it. So we have started to think about whether it would skew results and should we be actually assuming that there would be some higher bid price on – we are looking at that in the analysis part but we didn't want to change the actual physical results that we got from the technical studies so we reported as it was.
- Q: *Elaine Golds:* Natural gas looks quite expensive but if you were to turn on Burrard Thermal, I mean that is a plant that would have to be built, what is that cost, it is going to be quite a bit lower, is it not?
- A: *Randy Reimann:* Yes, somewhat, the capital costs if you built gas-fired for energy, you build a combined cycle gas turbine so they are ones that are on all the time and they pretty efficient, 6,500 heat rate, so the energy through those could be quite inexpensive but then there is more capital. Burrard's heat rate, if that means anything to people, but it is up over 10,000 so it is a relatively inefficient and ultimately, we never did when we planned on Burrard it rarely ran for energy purposes it was always capacity because there are other gas-fired generation in the markets that are more efficient plants that you could buy to displace them.
- Q: *Gaetan Royer:* Do you have a protocol when you are meeting peak loads, do you use coal first or gas first?
- A: *Randy Reimann:* So we don't have any coal in the province but...
- Q: *Gaetan Royer:* But you purchase?
- A: *Randy Reimann:* So we generally have enough capacity to meet our own needs – it is not very frequently that we would buy market capacity from import markets to meet on peak loads, it tends to be expensive we would rather trade more economically. So most of the peaks are made, we have some gas plants and our hydro, we have base-load hydro, IPP capacity, thermal and then all the peaking gets done with hydro facilities.
- Q: *Kim Needham:* I feel like what is sort of missing from this is when you talk about portfolio 1 there would be no ownership of assets, no public ownership of assets, at the end of the contract terms so what this isn't showing is what actually do we (BC people) actually have under the development of the scenarios. It also doesn't speak to the contracts that would be based on whether it is public or private ownership so that would be reflected in the cost to BC Hydro ratepayers as well, right? I do know some run-of-river projects have fixed rate terms for long periods of time at significantly higher rates to the ratepayers than our public assets.

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- A: *Randy Reimann:* Hydro, in terms of developing resources in the province, we build the larger hydro and focus on the two-river system and so Site C is actually the last large hydro facility that we as a company, under the Clean Energy Act, are permitted to build. I think that the government didn't want to see anymore large dam construction after that one so all the incremental supply, after that, we will be buying will be bought from IPPs.
- Q: *Kim Needham:* So that is basically out of BC Hydro's hands, at this point - that was a government decision?
- A: *Judy Kirk:* But, I think that the point here, of this consultation, one of the many things we are gathering input on, if there are things that are concerning you there such as how you articulate that the consideration of what the IPP contract is, the rate that is being paid, these are all things that would be of interest, right?
- Q: *Kim Needham:* Yes, I mean there will always be a trade-off but ultimately in 40-years' time, if I think ahead, what are the ratepayers left with and what kind of rates, what kind of assets do we have and what rates are we left with and what kind of independence we have over our resources?
- A: *Michael Savidant:* I think that Randy (Reimann) answered quite clearly, I mean Site C has been committed to and it is a long-term asset and that is one of the trade-offs. Short fixed term contract and afterwards you have to renegotiate and that is one of the trade-offs we would look at in the portfolios.
- Q: *Andy Green:* Are you referring to just stored water and more import – on the description it explains the number of wind turbines, run-of-river, IPPs and backup is?
- A: *Randy Reimann:* A capacity unit – so the capacity can come from – there are large dams in the province that when they were built they didn't put all their turbines in and you could add extra turbines in and can get more electricity out when you need it. There is no more energy but you can run it harder that is one form of capacity. Gas plants – ones that you can turn on when needed and then turn off when you don't and so you will cycle thermal units up and down depending upon whether wind is blowing or the water is running.
- Q: *Andy Green:* So these are new backup?
- A: *Randy Reimann:* Right and we are also looking at pump storage – pumping up to one reservoir and then draining again.
- C: *Judy Kirk:* Input can be gathered from the public but it would be a mistake to think that portfolio 1 is just renewals, just wind and run-of-river because it has to have that backup and that is why Randy (Reimann) is making the point.
- C: *Jack Davidson:* With respect to the private sector owning generation capacity I think that there should be some consideration that maintenance is kept up and so that when they have paid themselves off they don't let the facility run down so we can continue to have dependable power from those sources. And, that when they turn over again so I thought that most of them were signed up where the asset reverted back to Hydro at the end of the contract.
- A: *Randy Reimann:* There are no residual rights in the contract.
- Q: *Elaine Golds:* Downstream benefits from the Columbia? They don't seem to in here anywhere, are you just assuming that government is more interested in the money they generate than the potential?
- A: *Randy Reimann:* They don't qualify as generated in BC – so they are specifically excluded. We do store water and the one place we do contemplate the Canadian entitlement and downstream benefits is in a contingency plan if things go sideways on us that is one of the resources that we consider that could carry us through in the short term until we get to self-sufficiency.
- C: *Michael Savidant:* One caveat on that, with respect to the downstream benefits - the Columbia River Treaty can expire by 2024 so we can't rely on it for the entire time frame.
- Q: *Gaetan Royer:* When you think about transporting energy across the province, say from Peace River down to the Okanagan, how much natural gas would we lose on the way and how much electricity do we lose on the way? Which means how much gas we would burn producing line loss?
- A: *Randy Reimann:* If you had the gas in the Peace River region versus gas in the lower mainland would it be

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cheaper to ship the gas and burn it in the lower mainland – yes, it is more efficient to transport gas than it is electricity. Lower loses.

C: *Jack Davidson:* But our air shed is more susceptible – so do it somewhere else.

C: *Judy Kirk:* The feedback questions are on Page 29, 30 and 31 of the Consultation Workbook and are the most substantial questions in the material – BC Hydro wants to know where you are on the agree scale and your reasons.

C: *Kim Needham:* Has Hydro done a chart similar to the chart on Page 5 showing impacts on electrification? I can imagine if the whole BC fleet flows over to electrical or a significant amount of the fleet went over to electric vehicles these lines on the chart are going to go up quite dramatically. Has that been done, that assessment?

A: *Randy Reimann:* This is a work in progress, we have an assessment that a consultant did for us and I don't think it is public yet but it probably will be shortly and that study will be reviewed by the TAC in depth. I think that the curves are out there in a presentation that we did in January 27th and 28th and it is on the website and I think that it shows the electrification potential and then there will be a report that says if you want to meet GHG reduction goals what might need to happen and what might the role of electrification be. So we are working through that.

Q: *Kim Needham:* If we do significantly electrify all the numbers on this chart, all the little wind turbines and run-of-river icons are going to, the numbers will increase so it is hard to look at these issues in isolation?

A: *Judy Kirk:* With respect to the increase in demand driven or created by electrification is a trade-off that BC Hydro is interested in hearing from you about. In other words, if you think, the last group (stakeholder group that met earlier this day) expressed concerns about the proactive approach as well, for the very reasons you are identifying, believing that it might drive demand too high. But, you know, these are things BC Hydro is interested in hearing because they are trade-offs, obviously GHG trade-offs against higher demand and more supply.

C: *Kim Needham:* Maybe you are asking a more simplified question but I am sort of suggesting that it is difficult to answer the question about whether BC Hydro should be pursuing greater electrification without knowing how it will impact the chart (Page 5 of the Consultation Workbook) – what does the number look like, does it mean we need a Burrard Thermal type of unit, does it mean we need another Site C, what is the supply gap that will be created?

A: *Randy Reimann:* So we are going to be out again, so this consultation is about the topics and they are sort of general topics and feelings and when we draft the plan we will be looking at electrification impacts and what that might look like and there will be some examples in the draft IR and there will be opportunity to comment on that in the fall.

C: *Andy Green:* If the greater overall goal is to reduce GHGs, BC Hydro should be pushing electrification. I mean I work on the waterfront and we consume millions of liters of diesel every month and if we could plug in all our cranes we won't be consuming those liters. Also if we can plug in our cranes our efficiency will be much, much greater because we have dozens of cranes sitting there waiting for containers to drive underneath them and they are running the whole time. But, if they are plugged in they will run at a highly efficient rate rather than just idling the diesel away – we are going to be actually plugged in and will just be consuming what is needed. In that instance it would be more efficient if your vehicle is plugged in and you are not going to be requiring those millions of liters of diesel however we are going to need more turbines, more IPPs and maybe a second Site C but your efficiency and your GHGs are overall going to be going down. Diesel is highly inefficient.

C: *Jack Davidson:* Hydro's job would be to prioritize what sort of sources would be electrified. I think that yours might be secondary to the cruise ships – plugging them in first because they burn the dirtiest diesel;

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- they have the bulk heavy oil. We have gravel pits all over the country that burn dirty diesel too but because they are out in the middle of nowhere but if you are looking at GHG reduction they might be prioritized compared to someone who is burning gas or higher level fuel.
- C: *Elaine Golds:* It would be useful to have some information about whether you reduce GHGs if you electrify and but then you would have to rely on some of that from a gas-fired plant, what is the trade-off there? Are you achieving efficiencies by doing that? I don't know the answers to that but I am hoping that you will have that available because it needs to be there in order to make the right decision.
- C: *Jack Davidson:* Any diesel would be way worse than a gas-fired plant where they have scrubbers and cleaners to capture the carbon.
- C: *Andy Green:* Turn on Burrard Thermal and then just clean out every diesel on the waterfront to run cranes and maybe the GHGs would be far, far less. Just in the inner harbour here we got 35-cranes burning diesel plus we have all the vessels coming and if you turn on Burrard Thermal you might be able to plug in every vessel and electrify every crane but it is a higher profile and more visible and it is a hot topic but overall it might be far more beneficial.
- C: *Judy Kirk:* To summarize, part of what you are hearing from people is that also, in addition to these larger trade-offs between increased electrification and how that might drive demand and therefore increase supply there may be a finer grain approach you could take to look at what certain sectors or dirtier fuels rather than the more macro, in other words a more micro approach.
- C: *Randy Reimann:* Hydro is working on both fronts. We are trying to understand the big picture and the 20-year plan and we also trying to understand what actions could happen in the short term. I am sure that everyone is aware of some of the things we are hearing here today like I haven't heard about cranes on the docks before but we have heard about the cruise ships. I think that we have some ship power for the cruise ships and that was a big winner. In terms of gas, if you are burning gas to avoid gas in the home, if it is steady gas generated for gas heat it is probably not a winner but if you use gas as a peaking capacity unit but is mostly clean energy then it is good so all of this speaks to is that you do need to go through it in somewhat a granular fashion and we are working with the government to say what are the technologies we can employ and how does that fit against a carbon abatement curve, what is the cost of each of these units of GHGs and should we be picking off the cheap ones first and then working your way up the curve - so that is an on-going discussion with the government and I am not sure how far in we will get in our draft IRP but we are heading in that direction.
- C: *Jack Davidson:* I don't think that should be part of this – I think that is a different discussion for government and if government wants to buy the hydro to replace dirty diesel for the environment – that is a separate environmental discussion.
- C: *Gaetan Royer:* With respect to diesel engines, Metro Vancouver is in the process of introducing a bylaw to regulate diesel consumption used by commercial vehicles, that is construction cranes, and that is in the process of happening and the contribution of GHGs in the lower mainland coming from cargo ships is pretty phenomenal and there is pressure, by various groups, to get cargo ships to move them to shore power the same way that the cruise ships have moved to shore power so that will increase demand and is for, a lot of people, think a good reason.
- C: *Richard Harper:* Port Metro Vancouver has an electrification program that I haven't seen reflected yet in any DSM and it is a northwest port strategy (Tacoma and Seattle and Vancouver) to go through to electrification and that goes to the cranes, ship-to-shore power and even some of the transportation facilities coming in and out and their goal is to reduce their emissions by 2025 or maybe 2030 - they are actively working on it

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- right now and in discussions with BC Hydro.
- C: *Andy Green:* Yes, they are spending money. Prince Rupert is involved as well. The challenge is how far do you push the shipping lines, because you want them here, without driving them away?
- C: *Randy Reimann:* Just on a last point but electric lawn movers are a clear winner over gas lawn movers.
- C: *Kim Needham:* I think that we should be avoiding stranded assets wherever possible and I think that if we planned out the whole IPP rollout a little bit better we won't have to be worrying so much about the patchwork quilt of transmission and I am wondering if there is a possibility of doing some planning around that so that you can plan transmission.
- Q: *Andy Green:* Is there any coordination with say Fortis, for example? Geographically planning transmissions so that BC Hydro will start getting power into one region while gas distribution is going into another region rather than trying to service both of them; for example, at Whistler they put in a new gas line and encouraged everyone to switch over to natural gas furnaces, stoves, etc. appliances in their houses and focus on giving bigger rebates to another area where we have power close by and we can give bigger rebates to upgrading to more efficient appliances on electricity. So rather than running into Whistler and trying to upgrade the transmission into Whistler because they just put the gas line in there so maybe we don't need to upgrade that transmission because we can provide rebates with Fortis to alleviate and reduce demand on kilowatt hours by using gas. You are competing for the same customer.
- C: *Randy Reimann:* That is an interesting thought. I don't think that we have been that well-coordinated. It is an interesting comment.
- C: *Andy Green:* Gas is in that region and very close by and maybe if we can get everybody to move to gas appliances we don't have to upgrade transmission going into that region.
- C: *David Stroud:* I work for Apex Industrial Motors and we have spent the last 30-years moving BC Hydro's transformers and water wheels, etc. around the province and talking about being proactive one of the things I am really finding in the last few years is with the changing metropolitan area here. We are having a major change in the infrastructure of our transportation systems so if we think of our three main substations in Vancouver: Dal Grauer, Cathedral Square and Murrin and soon to be Mount Pleasant - they are practically becoming inaccessible for us. We are losing our large access because of development along the waterfront on False Creek and we used to have three or four barge landings there and those have all been gone, taken out for the Olympic Village and right now the only place for access, to bring a major transformer into the Vancouver area, is right near the Planetarium and that is not a very good spot. I would like to see some kind of coordinated effort between Vancouver, BC Hydro and people from industry to develop a few places around the city where we could fill the bulkheads say and turn it into a park but not put a block of condominiums in the way so we can have access to VGH, access to the major substations for delivery. I am focusing on barging particularly and rail is a separate issue, I am focusing on barging because in the event of the earthquake here you have the ocean, you always have that and you are not going to have railways and bridges but you will have access by barge (water access). I think that you need to get together and do something.
- C: *Judy Kirk:* Please put that feedback in the additional comment section of the Feedback Form - very good point.
- Q: *Elaine Golds:* With regard to trying to be more proactive, you would have to undertake a strategic level planning, right, and I think that was tried and it was brought to a dead halt – so, are you suggesting that we go back to do that?
- A: *Randy Reimann:* Is this the British Columbia Transmission Commission section 5 – what we have been asked to do with the Clean Energy Act is to complete that work – it is maybe a slightly different approach to what

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- was done but it is answering the same questions so are trying to think our way through what is out there and what does it mean, how would we react to it but we are interested in getting your thoughts in advance of making those recommendations.
- C: *John Lawson:* I have been following this consultation process and this is the fourth stakeholder meeting and we clearly hearing in another forum that the discussion around transmission changes (differences) between metropolitan areas and the more rural regions because that is where the generation is and that is where people are much more concerned about the impact level of transmission.
- A: *Judy Kirk:* We can't say that yet out of this process but fair enough.
- C: *John Lawson:* Here in the metropolitan area we are dealing mainly with demand or load but the rural areas deals with transmission and generation. The bigger question behind that is when the strategies are developed how much emphasis is on the good of the province overall or the regional sensitivities.
- A: *Judy Kirk:* John (Lawson) and something you are pointing out when you are doing sophisticated planning in the interests of British Columbians in a province like this you are always trying to balance local interests and provincial interests and that is an important consideration.
- Q: *Jack Davidson:* Shouldn't we get a benefit?
- A: *Randy Reimann:* That will be part of the business case that we are assessing.
- Q: *Jack Davidson:* If you are selling electricity south, can the government use it for carbon credits?
- A: *Randy Reimann:* If the intent was to sell clean electricity into the U.S. that would be both emissions clean and GHG clean so that those jurisdictions would get the benefit of it so I don't think that we could claim the GHG benefits and if did strip off GHG benefits we would get a lot less for the product.
- C: *Jack Davidson:* It is going to cost us a lot of money to get GHG neutral so if this was a cheaper way of doing it, that would be good.
- C: *Kim Needham:* I am just failing to see how given this gap and this major supply gap, how are we going to get ourselves into a position of being able to have substantial exports without, you know, covering the place with wind turbines and putting every river in play? We don't have the information, I think, to make this decision, there isn't a chart showing the numbers of turbines and the numbers of IPPs that would be required, or the number of megawatt hours that we are going to require to get ourselves in a position to export – we need that information. I think that there is a significant environmental footprint that also would need to be shown in order to convince me that it is a good idea to become an energy exporter. I mean it sounds like a great idea in theory but I think in practice there have to be a whole lot of numbers provided and a lot more information in order to make a determination but I am guessing – given all the numbers you are showing to try and get to energy self-sufficiency, I think those numbers would be huge in order to be sufficient exporters.
- Q: *Elaine Golds:* I think that we need to have more information on where the export markets might be and whether we could actually meet them? Because some of our IPPs here would not meet California standards and so and probably for good reason they have very stringent environmental standards about what is renewal energy. So I look to see some analysis of that potential and in most cases I think you would have very high cost electricity to sell and probably no one that wants to pay the price.
- A: *Randy Reimann:* We are undertaking an assessment of the export markets to see what they are, what is the opportunity, what are they buying and what are the restrictions and we are contemplating and analyzing. You will see some of that detail in the draft IRP that is coming out in the fall.
- C: *Judy Kirk:* We have captured these comments and they are really good ones, all of them, and the point about exports and I would also encourage you, because this is an early stage of consultation, to provide that feedback on export section with caveats, in other words if it meant this then that, because that would be very useful.

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- C: *Jack Davidson:* We are very much in favour of exporting electricity; one because we would be building capacity for our future and you could probably do it at the right time rather than when you have to – so when a deal comes along and you had permission you could do that. We have a couple of concerns: one that you collect the money because we are a little worried about California not paying their bill yet and the other one is that the contracts that you write are not so long-term that we can't get the power back for our own use, our own use in the future has to be the priority.
- C: *John Lawson:* Are there any trade agreements that would impact exporting power?
- C: *Randy Reimann:* Our understanding of the North American Free Trade Agreement (NAFTA) is that if you have exported clean energy that you then need to continue to offer it on an equivalent term to what you are offering in the province, so you can't say like if there is a shortage then cut them off, cut off your exports and consume it all at lower cost.
- C: *John Lawson:* That is a big impact to supply in another jurisdiction and still need to use for ourselves.
- Q: *Judy Kirk:* This speaks to Jack's (Davidson) question about whether a contract can be a term or sign on-going, what is the answer to that question?
- A: *Randy Reimann:* There is a price risk trade-off, if you give it somebody a long- term firm contract you get more value for it, if it is a short-term with recall provisions then you get a lot less for it. So there is a trade-off there somewhere.
- Q: *Kim Needham:* Are you suggesting that is notwithstanding the free trade agreement – doesn't NAFTA trump any individual deals?
- A: *Randy Reimann:* You know I am not a free-trade expert so I have probably exceeded my knowledge of this topic already but I think what you have to do is offer or people can all buy it on an equivalent price and as long as you are willing to pay for it and consume it here then I think you get the electricity. But it is different than a long-term contract.
- Q: *Kim Needham:* Start exporting and I think you are bound to the average of the last three years and that same volume has to be committed for future trade. Don't quote me but I believe that is how it basically works.
- A: *Judy Kirk:* This needs to be checked and reported back on.
- C: *Randy Reimann:* And to me 3-years is probably the shorter-term, I think that people are looking to buy contracts 5 and 10 plus years.
- C: *Arlene Shwetz:* I would just like to address the question about not getting paid for power, after the California issue a few years ago the arrangement we have now with California is that they pay in advance. So that means they have to pay a credit and then once that credit is used up they have to pay in advance. So that is the arrangement that we have now with them, those companies that we were trading within California. It functions like a debit card – once you are down to a certain amount you have to actually put money in the bank so to speak and when that is run out they have to add it in. So it is not like where they were using the power and then we were billing, it is the other way.
- Q: *John Lawson:* This issue is one that needs to be looked at a bit further and I want to ask if there is a way to get feedback to people because this portionality issue under NAFTA is really fundamental to the assessment and it is a huge issue and if there is a way to get some clarification out to participants it would really help people in their answers or their feedback.
- A: *Judy Kirk:* We have got everyone's information here so we may well try and do that but I can't commit to that but we will do everything we can to try and do that. I have asked that it be marked on the record.
- Q: *Jack Davidson:* I am just curious, was the morning session similar to this – same vein or on a different track?
- C: *Judy Kirk:* You what, it was similar in that people are very engaged and obviously well-informed on

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electricity use but every meeting so far, and this is our fourth, has had different, some different issues were raised so that is why we never recommend doing one. By the time we have 14-stakeholder meetings we will see layers of information – so some similarities and but also some real differences and Vancouver Island was quite different again in terms of issues and reliability and those kinds of things.

4. Feedback Forms
Participants of the meeting were thanked for participating and were encouraged to complete and submit feedback forms. Participants were also encouraged to attend one of the upcoming open houses (dates, times and locations listed in the consultation workbook).

5. Closure
The meeting ended at 3:00pm.

Integrated Resource Plan Appendix 7C-2

**BC Hydro Integrated Resource Plan
Abbotsford - Multi-Stakeholder
Meeting**

Clearbrook Community
Centre

101-2825 Clearbrook
Rd Abbotsford, BC.

MEETING DATE MARCH 16, 2011 1:00 P.M. – 3:00 P.M.

PURPOSE	Meeting notes from a multi-stakeholder group meeting with stakeholders BC Hydro staff on March 16, 2011 at the Clearbrook Community Centre, 101-2825 Clearbrook Road Abbotsford, British Columbia
FACILITATOR	Judy Kirk, Kirk & Co. Consulting Ltd.
PRESENTER	Basil Stumborg, BC Hydro
MULTI-STAKEHOLDERS PRESENT	<p>Stu Barnetson Stella Chu Steve deMelt Pauline Favero Tara Friesen Ian Fitzpatrick Erick Hoogenraad Andre Isakov Roberta Lindsay Tom Louie Bill McGregor ZoAnn Morten George Peary Tanis Peereboon Frank Pizzaro Steven Reid Dan Robinson Patricia Ross Brent Schmitt Rose Schroeder Charlie Scott Rod Shead Stewart Swingle Mick Thiessen</p>
STAFF ATTENDEES	<p>Brandee Clayton, BC Hydro David Ince, BC Hydro Kathy Lee, BC Hydro Craig Simmons, BC Hydro Arlene Shwetz, BC Hydro Meghan Clarke, Kirk & Co. Consulting Ltd. Susan Campbell, Kirk & Co. Consulting Ltd. , Recorder</p>
AGENDA	<ol style="list-style-type: none"> 1. Welcome and Review Agenda 2. Consultation Workbook Overview 3. Discussion 4. Closing Remarks

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KEY THEMES

1. **Conservation and Efficiency** – Participants said BC Hydro should take a more proactive approach to conservation and efficiency including a balance of incentives, and codes and standards. They cautioned BC Hydro against encouraging too many additional codes and standards preferring that BC Hydro provide greater incentives for people to conserve electricity.
2. **Electricity Generation Options** - Participants suggested BC Hydro put more emphasis on air shed impacts when considering electricity generation options. In relation to Site C, the notion was expressed that the Fraser Valley produces the majority of British Columbia food; therefore it could be reasonable to expect that another region, such as the Peace River, could supply the majority of British Columbia’s electricity.
3. **Electrification** – Participants expressed concern that a proactive approach to electrification could significantly increase demand for energy, which would require significant new supply of energy such as hydro, wind, run-of-river and other generation resources with their attendant costs and environmental impacts.
4. **Transmission** – Participants said that planning ahead using the proactive approach to transmission is worth considering so that BC Hydro could benefit from cheaper land acquisition costs for transmission rights-of-way.
5. **Export Potential** – Participants cautioned BC Hydro against pursuing export market potential over and above the current approach citing concerns that the economic benefits may not compensate for the additional environmental and social costs of building new electricity generation to meet new export requirements. In addition, some said they are concerned that competing demands for water such as hydro vs. agricultural and domestic use may restrict hydro development for export purposes.

DISCUSSION

1. **Judy Kirk - Welcome and Introductions**
Judy Kirk welcomed participants to the stakeholder meeting, explained the format of the meeting and introduced the consultation workbook and feedback form. Roundtable introductions followed. Judy emphasised the five consultation topics and the feedback form at the back of the consultation workbook.
2. **Basil Stumborg – Consultation Workbook**
Basil Stumborg reviewed the format of the consultation workbook and explained the processes and factors BC Hydro considers when energy planning. Cam explained the difference between demand side options and supply side energy options and how BC Hydro factors this into the balancing the options when developing a long-term plan.

(Abbreviations will be used and mean: Q: Question, A: Answer, and C: Comment)

Q: *Mark Heieis:* Just going back to Page 5 that demand chart, I am curious why that forecast year 2014 to 2016 shows an increase in supply then it drops off again - why does demand drop in 2020, it dips then comes up? What is happening to supply in 2014 and 2016 and what is happening again in 2020?
Q: *Tom Louie:* That was my question as well - why is supply trending downwards?
A: *Basil Stumborg:* So the vertical blue bars refer to our existing sources of supply and as they trend down that

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- is just some of the energy that we bought from our Independent Power Producers coming on line – so we have contracted with them and then they are coming on line over time. The dip down is slightly different, the government through its Clean Energy Act, has laid out what it means for BC Hydro to meet its electricity needs and in particular it has said that BC Hydro must be energy self-sufficient. Up until 2016 we have allowed 2,500 GigaWatt hours of electricity to come from the market and we have called that market entitlements and as of 2016 we have to be self-sufficient in energy production so we can no longer count those market entitlements, which might come from outside the province in our supply stack so that dip in 2016 is us taking that out of the planning stack.
- Q: *Tom Louie:* So that supply is outside of BC or outside of BC Hydro’s asset?
- A: *Kathy Lee:* If I may, we are talking about 2,500 GWh which is a mixture of firm energy and variable and that includes a certain amount that we can depend upon all the time. 2,500 GWh – is a mixture of two products for BC Hydro and backstopped by outside supply.
- Q: *Judy Kirk:* Tom (Louie), I think your question was about trending demand, was it or was it supply?
- A: *Tom Louie:* Supply.
- Q: *Judy Kirk:* Did you get an answer?
- A: *Tom Louie:* Not really.
- A: *Kathy Lee:* The overall trending from 2016 downwards is looking at contracts, from the IPPs, some of the contracts like biomass and for those we assume given the risk of fuel security those contracts may not be continued forever so as the contract ends we assume that those projects are gone so the total energy from those contracts are considered gone.
- Q: *Tom Lee:* I thought these maybe your fixed assets?
- Q: *Mark Heieis:* It still doesn’t say why the dip in demand, in the red and green drops and then goes up, so dip in demand before conservation? 2020 what is happening there, I would assume it would be straight growth?
- A: *Basil Stumborg:* At a high level there is our forecast for energy demand and currently so we are going through a recession right now and over the coming years we are saying as we are climbing out of the recession there will be a rebound in energy consumption – that is the high level answer.
- A: *Dave Ince:* In referring to 2020 – 2021 where the red line is dipping down, BC Hydro constructs a load forecast and we look at our big industrial customers and try and project individually and add them up. That dip in 2020 is Highland Valley Cooper and its announced shutdown of their big copper facility, south of Kamloops, in that timeframe. So they have announced that is when they are going to close down that mine and at this point, they are the biggest single customer in the province.
- C: *Judy Kirk:* To Mark (Heieis) and Tom (Louie) and others that have really detailed questions around demand and those kinds of things what I would ask is that you speak to David Ince, who just gave that answer, after the meeting for a more detailed discussion – this is intended to be high level and we need to move on.
- C: *Tom Louie:* I think that your Power Smart program needs to demonstrate more recognition of the behaviour changes by its consumers that are supporting its Power Smart Program. Currently they don’t recognize the savings and I know that at the school district we have gone to tremendous lengths to educate the children with respect to energy conservation so we have demonstrated our commitment but still have not been recognized.
- Q: *Steve Reid:* With respect to conservation and developing transit there is no rapid transit or rail lines or anything here in the Valley and people have blown their wads on cars again - has BC Hydro been coordinating with government to create more efficiency and getting people out of their cars, etc.?
- A: *Judy Kirk:* As far as conservation is a culture, whether it is conserving drinking water or thinking about shifting to transit rather than cars, it is all part of conservation but BC Hydro’s mandate only extends to electricity so really the questions here are about electricity and there is not much else that we can do.
- A: *Basil Stumborg:* With respect to your comment regarding vehicles we will touch on that when we discuss Topic 3, electrification, of the Consultation Topics and BC Hydro is working with government to switch fuel

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- sources.
- Q: *Steve Reid:* I was just wondering if government supports you and if there was a coordinated effort between government and BC Hydro?
- C: *Basil Stumborg:* BC Hydro is working with government looking for ways we can move the transportation section from using fossil fuels to electric fuel.
- Q: *Andre Isakov:* On the business side of conservation programs, my understanding is that BC Hydro focuses mostly on larger businesses – are there any thoughts of focusing on smaller businesses – like you used to have the energy audit program but that has been cancelled for smaller businesses? Any thoughts around bringing that back? The broader question is why is the focus on larger businesses and not on smaller businesses that form a big portion of our economy?
- A: *Judy Kirk:* Arlene Shwetz, from BC Hydro, who has currently stepped out of the room, will answer your question later but participants should remember that the people you have here, from Hydro, are electricity planners looking out 20-years and they are not so much involved in the current day-to-day programs.
- A: *Basil Stumborg:* BC Hydro is working with large businesses first and you can put one energy manager into a large industrial plant and get a lot of load reduced and slowly the Power Smart group is working their way down and trying to figure out how to get that level of information and assistance into the smaller and smaller businesses as well but the challenge as you get into the smaller businesses is that they are more diverse, Mom and Pop stores, the Laundromats so we have to get creative and find a better way to contact larger numbers of groups for small amounts of power saving but we are definitely thinking about it.
- C: *Judy Kirk:* The question to consider here is should BC Hydro continue with its current plan for essentially voluntary conservation programs or should it move to a greater conservation program that has more mandatory components to it including much tougher codes and standards and if people are saying more conservation how much of a trade-off between voluntary and mandatory are you comfortable with? This is a very real question that BC Hydro wants to elicit your comments and questions about and for those of you representing local government, what do you think your citizens would think about a more mandatory approach?
- C: *Tom Louie:* I think that the big stick approach is not the way to go; if that is the approach you could have done that a long time ago. For example, change all the light bulbs and we have done that but you must find the right balance. I suggest that you use the rate structure – use that as a tool because people recognize that as they pay and I don't think you have gone far enough and there is just not enough meat in that to do more because my savings is minimal and that is where we need to do more.
- C: *ZoAnn Morten:* This big business, I can understand why you do big business because to see that one mine close and it actually made a dip on your map (graph) that is something, I hadn't realized that the copper mines used so much power. I knew they used other things I didn't realize they used so much power. Are they paying the same dollar that I am for a kilowatt hour because I think they might switch their ways?
- A: *Basil Stumborg:* The different segments of customers within Hydro – so the large industrial, the commercial and residential. When we do our rate design we make sure that we are recovering the costs it takes to serve them. When we translate that into how much they are paying for kilowatt hour though it is cheaper to serve the larger customers so they end up paying a lower rate in general. For each of those customer segments we are redesigning the rate so that at the margin if they are thinking of using a little bit more energy or using a little bit less energy we are trying to show them as a price signal, for conservation, this is what it costs BC Hydro if we need to go out and get more energy so we are tying them to the same price signal and we are working towards that.
- C: *ZoAnn Morten:* I work in the field of water and I find that if I buy a bottle of water it is way more expensive than if I have a extract out of the ground or something they seem to get for much cheaper than I do but when there is that much of a dip from one organization my neighbours and I can turn off all our lights and light candles every night but that conservation is not going to have the same effect.

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- Q: *Judy Kirk:* But residential users taken together are a very significant part of BC Hydro's demand, is that true?
- A: *Basil Stumborg:* The breakdown for the BC Hydro customer base is approximately one-third residential, one-third commercial and one-third large industrial.
- C: *Mark Heeis:* I think that behaviour needs to be supported by technology – you just can't expect people to do it just because and there has to be changes in the infrastructure whether that be pricing or technology and method of delivery has to go together because you can't rely on one or just the other.
- C: *Patricia Ross:* How do you go about that with respect to an increased rate structure because I was always in favour that but what we are starting to see now is the ramifications of that are that a lot of people are bypassing that and putting in wood burners for heat and this has a huge environmental impact in terms of air quality and health impacts and the air shed. So you can raise rates but people will stop using that source and go to a far more polluting source. Last week, I attended an air quality conference, in Vancouver, and the conference highlighted the huge detrimental health concerns that we have from air quality. So that is my worry with using that and wood burner sales for homes and greenhouses are going through the roof - there are other ramifications which are serious.
- C: *Mick Thiessen:* You have talked about the soft approach and the hard approach and I think that BC Hydro needs to find something in the middle between the cost to customers and other impacts and you need tools such as economic incentives to use energy efficient products. For example, LED lights are costly and you need to provide more education about how things will reduce our costs and explain how long the payback period is and while some information is out there the critical mass buy-in from the public hasn't occurred.
- C: *George Peary:* I understand that BC Hydro is switching to smart meters so there is potential there for demand management. I will give you an example; I have a relative in Finland that programs her laundry to come on at 2:00 a.m. because she gets a much better rate on her electricity at 2:00 a.m. than she does when everyone else is using electricity and that is conservation. I think a judicious mix of sticks and carrots is going to be required. Christmas lights are another example, they look wonderful, but has the time come when black should be beautiful? Should that be done by rates or by regulation? There are things that could be done and if Hydro is serious and obviously you are and I commend you for this - put it all on the table and let people see the options seriously being considered and at the end of the day consumers will adjust their behaviour patterns and work with BC Hydro because right now the electricity is far too inexpensive and people don't see it as a big cost but as prices climb as they will with the new generation capacity coming on line there is an opportunity for BC Hydro to encourage people to change behaviour and conserve energy.
- C: *Judy Kirk:* Referred participants to Page 28 of the Feedback Form and encouraged them to provide their comments.
- Q: *Dan Robinson:* I am looking at Portfolio 1 and that would have no Site C or no gas so would that be either pump storage or use of existing BC Hydro assets as back up, is that right? It says no gas under the description.
- A: *Basil Stumborg:* Yes that is right – pump storage or natural gas as extra capacity additions. So we wouldn't be building gas plants that are designed to produce energy over long periods of time probably peak plants where you flip them on and flip them off.
- C: *Judy Kirk:* The important message for lay people in energy to understand is that Portfolio 1, with the renewal mix showing wind and run-of-river, would still need something to back it up so that would either be gas, pump storage, or some existing capacity that BC Hydro has so it would be a mistake for people to think it would only be wind and river. That is the important thing for people to understand.
- Q: *ZoAnn Morten:* Wouldn't it be important to write that in?

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- C: *Judy Kirk:* That was what we were trying to show with the battery symbol but thank you for that comment that is a good point.
- Q: *Stu Barnetson:* On Portfolio 3 – why no coal-fired option, is that because the technology is not there to capture the carbon?
- A: *Basil Stumborg:* The government has said that BC Hydro can consider coal but any new coal plants when they are built they have to have carbon sequestration on site, so you have to capture the carbon emissions on site, that technology is being developed but no utility around North America is actually doing it. So what we have said when we looked at these resources options is that we will only be considering ones that are proven on a utility scale for now and that is why there is no coal plants in this portfolio.
- C: *Stu Barnetson:* When it comes to the environmental effects, the assumptions seems to be that a lot of small projects scattered far and wide might have a smaller footprint but I am not sure that I agree. I have some experience with small run-of-river projects and they can involve significant disruption to small water sheds and there is a lot construction activity and one may find there aren't secluded parts of the province left with development everywhere versus one big footprint like Site C.
- Q: *Mark Heieis:* Is it gas fired in Portfolio No. 3, is that new or are you referring to Burrard Thermal Plant?
- A: *Basil Stumborg:* It is not the Burrard Thermal Plant, that would be a new gas plant.
- Q: *Mark Heieis:* So you have replaced Burrard Thermal?
- A: *Basil Stumborg:* So the government, through its legislation, has said that BC Hydro can't rely on Burrard Thermal for energy.
- Q: *Mark Heieis:* So that is why I am kind of confused, you are talking about gas but you are taking away a gas plant– so what is the difference?
- A: *Basil Stumborg:* Some of the differences, Burrard Thermal is an older gas plant so these gas plants are newer gas plants and newer technology and different location.
- Q: *Patricia Ross:* My concern is about the modeling and you talk about the environmental impact but it doesn't specify how things happen and I think that it is important to differentiate that because they often go hand-in-hand and it is important to point that out. Especially how because what you might save on one side you will spend on increased health care costs with this other option so it would be more. You have presented three options for the whole province but I think that it needs to be location specific. Each different area has its own challenges. The Lower Mainland is one of the most unique and sensitive air sheds in the world so our biggest challenge is air quality so we need to reduce emissions from the air shed and not add to them. At the recent World Clean Air Congress held in Vancouver in September (2010) and this other conference that I was just at last week and they recommended no more combustion sources because it is increasing GHGs. I have a concern calling biomass GHG neutral because it is not and there is a lot of scientific debate on that and it depends on how the calculation is done because it is only GHG neutral if you replace all the trees that you are using which is not happening so it is not really GHG neutral and it is not environmentally friendly, they are not testing it accurately to reflect the emissions and biomass tends to have, when you do an in-depth analysis, it has got far more emissions than natural gas. I know in theory, the idea to have smaller power sources that are close to the source that is actually using it sounds really nice in theory but again if you look realistically at the challenges of the location and people say you are using power in the lower mainland you need to have a power source there. But, if you look realistically, the Fraser Valley grows most of the food for the province, 60% of the food is grown right here in the Fraser Valley and we suffer the environmental impacts of that and we are fine with that and we get it but on the same token it is okay to ask another area to take a power plant because we are taking our fair share already – you have to take some of the load. So why should we have to take the full load of all these environmental effects to supply all the major areas.
- C: *Judy Kirk:* Different regions have different views and that is why this consultation is going into five distinct regions in the province because it is important to hear from a cross-section of British Columbians. I would

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encourage you to add those comments on your feedback form.

- Q: *Steve Reid:* What about tidal generation – I don't see it in the Consultation Workbook and I know that it is a developing technology, are you not considering it, it is supposed to be fairly consistent and doesn't need as much back up and maybe that is a good direction to go in rather than wind farms or run-of-river because they are not very dependable either as they freeze up or dry up?
- A: *Basil Stumborg:* If you go to Page 15 (Consultation Workbook) tidal is listed as source of energy however from a planning point of view we want to plan on technologies that meet the needs on a utility scale across North America and we know that this is coming on the horizon and we are keeping an eye on it and I think that there are some pilot projects around Vancouver Island.
- C: *Steve Reid:* Well all I know is that BC had one and it was successful and then the government took away their funding and Nova Scotia took it up – I think it would be a better direction than these unreliable sources of energy that also pollute the air with wind and the run-of-river projects can be pretty dramatic.
- C: *Pauline Favero:* I think that this is a juggling act and it is about assessing the appropriate balance and mix because there is less environmental footprint that having one single larger project but then I assume there are also transmission losses associated with localizing where that is in the province and try to distribute that around the province. So there is probably like a tipping point or a balance point between having local sources and having larger sources and the savings you get from trying to reduce transmission losses and the environmental footprint.
- Q: *Patricia Ross:* I am uncomfortable being asked to try and comment on Site C because I am not as familiar as I would like to be to see whether I like that concept or not - unless you actually live there how can you comment?
- A: *Judy Kirk:* We have heard that, not a lot, but from some people. Everyone should do what they are comfortable with. BC Hydro has to make these planning decisions so we can make sure we have electricity for the next 20-years and you can see that they are trying to show you, in a representative way, some of the trade-offs that they are grappling with and to their credit they are coming out and asking people what they think. I would encourage you to comment on your feedback form and not feel badly about what you are thinking. We will be speaking directly to participants in Fort St. John, Dawson Creek and the Prince George area and are directly in the area where Site C would be – over the past 3-years there have been 120-meetings like this to talk to them about the proposed Site C. There is extensive consultation with the local area in addition to what is being done on this electricity plan.
- C: *ZoAnn Morten:* I don't know about the diagrams, what they actually – you told me that the little batteries illustrate back-up from existing processes that we have now but in Portfolio 3 you don't need it does that mean you will open Alouette and not use it anymore?
- A: *Basil Stumborg:* Under Portfolio 3 the energy sources that are coming in there is enough capacity so they have the ability to produce the energy whenever we need and when we need it. So we don't need to add anything extra to the system when we bring those on.
- Q: *ZoAnn Morten:* But each of these ones is already taking into consideration the infrastructure that we already have?
- A: *Basil Stumborg:* That is right.
- Q: *ZoAnn Morten:* So on that, how many IPPs of run-of-river do we have now?
- A: *David Ince:* 70.
- Q: *ZoAnn Morten:* We already have 70, so why would we take some out?
- A: *Judy Kirk:* Remember this is looking at future demand, demand growth, this is looking at the future demand, not existing demand.
- Q: *ZoAnn Morten:* So you are looking at 70 we already have, plus another 43. I kind of heard a little bit saying that once the contracts run out that they may not be renewed.

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- A: *Kathy Lee:* That was my earlier comment - when the structure is already in place it will be renewed but with biomass projects the assumption is, because of fuel uncertainty, that it won't be renewed.
- C: *ZoAnn Morten:* I will have to go back and change the notation I made at the time because I actually made a notation that it doesn't look like the IPP contracts are going to be renewed. That is what I heard you say.
- A: *Judy Kirk:* And, that wouldn't be correct.
- C: *ZoAnn Morten:* That is what I heard you say though and that is what I wrote down and I thought we have done all this damage.
- A: *Judy Kirk:* We have got the record actually ZoAnn (Morten) and we can review it if you like but it was to do with biomass – she was talking about that uncertainty in supply. Right.
- C: *ZoAnn Morten:* That is not what I heard and it is very difficult to hear everything and that is not what I heard and I am very glad that I asked but that was to do with 70 plus 43. And, on the dollar value for things I was noticing that the Site C dollar value on Page 14 is from 30-years ago and today's pricing is sometimes different than 30-years ago so in the spring of 2011 when this gets updated how will that come out to all of us to say that this is not a reliable number?
- C: *Craig Simmons:* That number in the document is based on 2007 dollars and it is being updated to current dollars but we are updating it because the design is changing and it is being modernized. Basically things like seismic standards have changed since 30-years ago so the design is being updated and once that is completed then we will have to update the costs.
- Q: *ZoAnn Morten:* So the 2007 amount - that is not what it says so thank you for that. It says it is being done by a 30-year historical design but it doesn't say anything about the budget being 2007.
- A: *Judy Kirk:* To the later part of your question, in the fall, what Basil (Stumborg) referred to when the draft plan will come out for further comment, it is anticipated that the updated cost estimate for Site C will be in there. The next consultation phase for this plan will have an updated number.
- Q: *ZoAnn Morten:* These dollar values, these financials included infrastructure costs to bring the power to the only place that really matters sorry I go to meetings in Fort St. John as well but just had to say it, does that include infrastructure to bring much more power because the lines we have now probably can't take the amount of energy that needs to come down here without line loss?
- A: *Basil Stumborg:* And that is why we look at things from a portfolio point of view, the portfolio is all-in cost of everything to get that whole system to work together so it would include any upgrades that are needed by adding power out here and needing it down here.
- C: *Judy Kirk:* I would refer participants to Page 18 – the costs include transmission but are not included in the table on Page 14.
- Q: *ZoAnn Morten:* For those of us that have big power lines in our backyards are we going to end up with two lines? I already have one, so I was wondering if I was going to another one?
- A: *Judy Kirk:* I am not sure they can answer that question – this is a 20-year plan not what is happening in any one location.
- Q: *Andre Isakov:* Do you have the technology to allow the consumers to consume green energy or not? Is there something available so that I could say I want to only purchase green power? May be this could be available in the future and allow consumers to make a choice?
- A: *Basil Stumborg:* In some jurisdictions outside of BC there is an option to separately buy the green attributes as opposed to the energy so doing exactly what you said. I don't think that is available right now that is not a tariff, an option for customers right now in BC.
- Q: *Andre Isakov:* Has BC Hydro explored it?
- A: *Basil Stumborg:* We can note it down, it is an interesting question.
- A: *Judy Kirk:* It doesn't sound like it is but very good question. I would assume because the table shows renewals such as wind and run-of-river being relatively a bit more expensive that kind of choice consumers would be choosing to pay a little bit more as you might at a grocery store with organics. Maybe that is a silly example.
- C: *Andre Isakov:* I would also like to comment on full cost accounting and the

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- government could have an opportunity to put out a tax on dirty polluting.
- C: *Tara Friesen:* I am from the City of Chilliwack and we are very cognizant of our unique and sensitive air shed and will you be taking into account environmental considerations and there will be challenges applying the appropriate weightings to each of those components against air quality and GHGs and I think there will be significant differences when you move from one location to the other how the communities feel that weighting should be applied.
- Q: *Eric Hoogenraad:* On the alternate portfolios is the implementation of a smart grid applied to those numbers, applied to those portfolios evenly – is that even an aspect?
- A: *Basil Stumborg:* The implementation of the SMI (Smart Grid and Smart Meters Initiatives) that is an independent project going forward and it will be a common backdrop for all portfolios.
- Q: *Eric Hoogenraad:* Technically, can you control where your power comes from because it is all going to the same grid so there is no way a consumer could have a choice of pulling from green versus a non-green source as it all comes from the same source so I am not sure how could you figure that out? Great idea but I am kind of at a loss as to how it could work?
- C: *Judy Kirk:* What you are hearing is that Basil (Stumborg) is not sure but that is a good comment and will be considered.
- A: *Basil Stumborg:* Having a system in place like that does require an extra level of auditing as to where power is being produced and you have to line consumers that are signing up versus producers who are producing and it is an auditing similar to GHG emissions trading that you really have to have control over. It is not a trivial task.
- Q: *Eric Hoogenraad:* My concern is that you would need a multiple distribution system and a parallel distribution system may even be required if you are going to try and control?
- A: *Basil Stumborg:* In terms of the physics, the electron that you get through your plug and electron that Andre (Isakov) gets through his plug we don't know where it came from so it is more of an auditing exercise so that if you are signing up for power here that we are increasing the power on the supply side here and those two have to match to say that these are green electrons produced and consumed. But, you are right the actual electron is a big pool.
- Q: *Mark Heieis:* How much electricity is generated by each portfolio, what is the output?
- A: *Basil Stumborg:* These portfolios are designed to meet a gap of 10,000 GWh for each – so they are meeting the same gap. That is approximately one million homes (see note at the bottom of Page 18).
- C: *Patricia Ross:* I am a little uncomfortable only talking about GHG because there is a full range of pollutants, of air pollutants, that impact health and are equally important and I would prefer you spoke of the full range and not specifically GHGs.
- Q: *Steve Reid:* Electrification is included in all the cost options so do we have a different set of options – what does electrification do to demand?
- A: *David Ince:* It depends on the degree of electrification and where you electrify. So I will give you an example, at BC Hydro's load right now of 60,000 GWh if every passenger vehicle on the road got transferred it would add an extra 11,000 GWh so that is an increase of 1/6th over the current demand. So if people with their furnaces converted gas to electricity that would add even more - we have electrification scenarios where potentially the load doubles.
- Q: *Steve Reid:* What is the efficiency conversion; is it better? Put in new plants that burn natural gas instead of burning fossil fuels?
- A: *David Ince:* That is a good question, for example, if we asked people to convert over to space heating from natural gas we would have to build gas plants to produce electricity to heat their homes there would be a net loss of efficiency. It is more efficient to burn natural gas in homes to generate heat but there are lots of

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- emissions. But if you are building a clean resource so run-of-river or wind you have no emissions that is a primary example to reduce emissions so you can replace the smoke stack emissions from houses with clean electricity but there is a cost impact.
- Q: *Steve Reid:* We are presented with three options for capacity but we haven't got the whole package and mix of electricity to minimize impacts.
- A: *Judy Kirk:* Right, here is what BC Hydro is doing, it is gathering input around these topics and they are complex topics and then BC Hydro will do a draft plan and bring that draft plan out again for comment and it is then that you would see the impact on a portfolio and then you could base your comments on that impact. Yes, it would be nice to have it now but that would have required an assumption and BC Hydro is not willing to make that assumption yet.
- Q: *Steve Reid:* You have restricted three options to existing capacity and it doesn't look like you are mixing all three to maximize production and two reasons - what about someone building a coal plant at the border and if 11% of demand or 1/6th is unknown but depends on the renewal section rather than gas generation sector that would impact my decision on the options.
- A: *Judy Kirk:* That is good feedback, if in supporting the notion of a more proactive electrification approach it increased demand so much that you had to do too much additional generation and it wasn't the right mix you would be uncomfortable with it. You need to say that. It says to BC Hydro be careful about this electrification thing.
- C: *Eric Hoogenraad:* Page 5 – the projected demand doesn't include the electrification options and is it possible to introduce a third line on the graph that shows projected demand with electrification. That is kind of missing from the graph.
- Q: *Dan Robinson:* As you go down the electrification road with only renewal resources, other than Site C, are there any other large storage projects proposed?
- A: *Craig Simmons:* The government legislated that Site C would be the last large hydro dam.
- C: *ZoAnn Morten:* I am thinking that when you come to infrastructure for electricity that you don't have to do all by yourselves because for example a parking garage could have electric plug-ins and get a new client base. You don't have to build a whole building just for it. Businesses could do it themselves and please don't do it on my BC Hydro dollar to do it when business can do it.
- Q: *Steve Reid:* You are not just talking about cars alone you are talking about using more power and electric cars, etc.
- C: *Judy Kirk:* Right, we are talking about the whole system.
- C: *Tara Friesen:* With respect to your comment in the Consultation Workbook around air and ground source heat pumps I would add a word of caution that BC Hydro should work with local government about promoting those because in Chilliwack we have a very sensitive aquifer that is our sole water supply.
- C: *ZoAnn Morten:* That is a pretty immense question to ask a bunch of people that showed up for an afternoon. That is immense, absolutely immense. I do have a comment here to myself to look and see if BC Hydro has already put in place for a mine site that may or may not go ahead and it will give me an idea whether the mine site is going ahead if it already had infrastructure.
- A: *Judy Kirk:* On the point of it is a big question. It is but I would remind people here that BC Hydro has a technical program and an economic program analysis and this input will be considered along with that. We are not intending to ask people to provide comment on things they feel uncomfortable with, rather we asking that you consider them over a longer period, this is a two-month consultation, and then if you feel comfortable answer them.
- C: *ZoAnn Morten:* This is still a big question. Just looking at my neighbourhood and the way things are going

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- and the changes to development – we are developing quite a bit and we are not leaving any room for any infrastructure so being cautious that you will go in somewhere and there is no room and you have your right-of-ways but that is kind of all you have and you have noticed how much it costs to buy up an area so to leave it any later means that prices will go up when you have to buy private land.
- Q: *Eric Hoogenraad:* Is there an alternative option from overhead towers? I know there are pipelines going across Alaska. Recently my wife and I looked at a house a few months back that was close to an overhead transmission line and at the end of day I wondered why I considered it when you think of all the health concerns.
- A: *Basil Stumborg:* Given current technology if we are generating in one place and consuming in another we are going to have to push it along wires. Now do the wires have to be overhead and can they be underground is pretty much the only choice you are left with at that point. But that is why when BC Hydro is looking at meeting the gap conservation is always the first thing we look at because that is the one way that we can avoid building these new projects and having to push the energy along the wires.
- Q: *Eric Hoogenraad:* Are there any studies on energy loss one way or the other - overhead or underground?
- A: *Basil Stumborg:* Pushing along a wire is pushing along a wire and we do know what the losses are between point-to-point and we do take that into account. It is a factor and the further away our sources of generation are from demand the larger the losses are.
- Q: *Mick Thiessen:* With respect to the response to meet demand, is there a saturation point where you say that is as far as you are going? And then unnecessary uses of electricity and you talk about always meeting the needs and there are a lot of wants happening out there. Lights look pretty and other uses that people have for electrical power but do you get to the point to say this is the maximum and then that forces people to start considering. It looks like you always trying to meet that demand and you call it needs and you need to start looking at the 'want' aspect.
- A: *Basil Stumborg:* BC Hydro has an obligation to serve the population, that is one of the rules that governs us so we actually do have to meet the need but I think we are starting to bump up against that first topic where conservation goes from us encouraging to us working with governments to make it mandatory – starting to bump up against that question of what is nice to have and what is voluntary conservation versus mandatory. We would like you to consider that as well.
- C: *ZoAnn Morten:* Building on what that previous speaker said and I am thinking about a weighting factor of air quality, fish, habitat, farm lands for electricity you always use that altruistic goal that we need electricity or we'll die. But we use a lot of electricity poorly and I have a very small sort of swimming pool and I only turn the pump once and only turn one light on at night and it is that thing and we always look at the altruistic need of food, shelter, clothing things to keep us alive whenever we do a weighting factor against air quality, fish, habitat and farm land and I think that is unfair. I think that we need to stop looking at frivolous uses for electricity against what we actually need.
- C: *Bill McGregor:* As I have listened to the references to demand, supply and demand, and I hear that you want to create another market to sell into whether it is domestic or international you are creating greater consumption. It is very evident throughout world economies that we need to ask the question when is enough, enough? When are we going to unsnap if we continue to feed the voracious monster that we are trying to feed. I just wonder if that philosophical perspective is embedded in this. Who makes the decision to make the markets bigger and bigger until you can't meet the demand anymore in the U.S. and what is the recoil effect?
- Q: *Mark Heiis:* There is considerable irony here in terms of shutting of our water and bringing in electricity and while you say clean energy there is no guarantee of that. Bring in clean energy but then when importing that it is not necessarily clean. The other point of irony is that I am all for profit, making and putting that

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- back into assets but one of our biggest problems is the low cost of energy, electricity and to pump that profit back into keeping low cost seems counter-intuitive to what we are trying to do.
- A: *Basil Stumborg*: The plan is that we would produce extra electricity here and we would export it. Our electricity would be clean and we would be sending it south or east to displace fossil fuel generation.
- C: *ZoAnn Morten*: I want to note exporting electricity to others versus using the landscape for ourselves. The other one is this taking into consideration the change of flow rates. I go to the Water Act meeting and they are saying that you can't have as much water as you had before on your water licenses and if BC Hydro starts putting it behind the dam and the people of the Peace and the rest of us kind of need some of that flow to make it all the way because farmers need it here - it is the same water that we are talking about. The water behind the dam is just a little more private than the water that is in the landscape for all of us to use and so there are a few of us who are having the same conversation about water and saying wait a second maybe we can't have it all up behind a dam that is built for hydro use when we actually need it for farmers to water their fields and for other uses. I do have some concern about the idea of servicing others when we think we have a lot of water but actually we don't have as much water as people think we do. A lot is standing water, we don't have as much mobile water as people think – we actually have a water shortage in BC and they are talking about holding back a whole bunch of water that they won't release that is needed by others.
- C: *Patricia Ross*: Further to that last comment from Basil (Stumborg) about would only produce clean energy for export and it made me wince because what is clean and it depends upon your definition of clean and some people are saying biomass is clean and I think it is ludicrous. Biomass is the new gold rush, it is not an infinite supply and we going to set up the infrastructure that is going to run out and we are already seeing increased costs for waste wood and you may not be aware of that our agriculture costs have quadrupled because of the greenhouses and the demand for biomass so the greenhouses are paying less for their fuel but farmers are paying triple for bedding. So it is already starting. It might be cheap now but not for the future and as we start to run out of supply the prices will go through the roof and it won't be cheap anymore and we will be left holding the bag and it is not clean like they say so it kind of makes me wince when you say that because it depends upon what you call clean and how you qualify that.
- A: *Basil Stumborg*: You are right and part of the first step is to look at the export markets and ask what their requirements are and different jurisdictions have different definitions. For example, California doesn't accept run-of-river and part of it is understanding what the different rules are.
- Q: *Patricia Ross*: I don't think there is a fair playing field when comparing gas and oil and the truly clean ones like wind, solar and geo-thermal because they are so expensive and that is why they are not taking off. Are there any thoughts to have more fair incentives so to level the economic planning field and enable them to take off - economically it is out of reach right now?
- A: *Basil Stumborg*: In terms of incentives I don't know of any right now but one of the major incentives is that the provincial government said that 93% of sources of energy have to be clean. So they are setting a wall and saying you have to buy from green producers – small hydro, wind - so we are specifically excluding others from that portion of the pie.
- C: *Judy Kirk*: The comments are well taken and I would add this is why electricity planning is complex and you can see how many trade-offs there are. With more subsidization come higher rates for generating electricity which produces higher rates and we already know that there are concerns about higher rates from people on fixed incomes and others. These are good things and it all about trying to get what people think are appropriate trade-offs.
- C: *Mick Thiessen*: That is what I was talking earlier about having choices for consumers including districts and I work for the District of Kent and I know that it is a small community but we all have street lights and yet LED light technology is out there but it is not economically feasible and even the technology isn't quite there yet. So a lot of these things, like Patricia Ross was talking about, are all ways for the consumer to finally see the

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	light – what is the tipping point and that comes with marketing and understanding the payback period and all of those things.
Q:	<i>Rose Schroeder:</i> With respect to the chart on Page 26 financials and that \$200 million, can you explain that? Why is it going back to the province and not to research?
A:	<i>Basil Stumborg:</i> Those are rules that were set up by government years ago – if there is a profit made by Powerex the first \$200 million goes back to the ratepayer and after that the surplus goes to government and then it is up to the government to decide how it spends that.
Q:	<i>Rose Schroeder:</i> Is it part of the planning process to get that number changed or get some of that money comes back to BC Hydro to make improvements so we don't have to pay for it?
A:	<i>Basil Stumborg:</i> The finances are definitely going to be part of how we look at the different options and so keeping costs low is one of the objectives highlighted by the Clean Energy Act and when we talk to people they want to keep their rates low as well. This \$200 million benchmark is not part of the consultation – we are assuming it part of the context.
C:	<i>Judy Kirk:</i> I would add that this should be captured on feedback form
C:	<i>Arlene Shwetz:</i> I would just like to qualify that the \$200 million is determined by an order of the government and in terms of percentage it is not negotiated.
A:	<i>Pauline Ross:</i> With respect to exporting elsewhere because they are having challenges finding clean sources and it is seen that we are doing a service to them and globally by giving options for energy generation that has less emissions however we might also be doing a disservice to them because by continuously giving them a source we are not causing them to find other options within their own jurisdiction. Maybe there should be more of a push to have them develop their own self-sufficiency.
C:	<i>Judy Kirk:</i> If you export in another jurisdiction yes it would help on the global warming side but you would perhaps be creating a dependence upon another jurisdiction rather than saying you should become self-sufficient in producing clean power.
C:	<i>ZoAnn Morten:</i> They can't do some of the run-of-river projects that we do in Washington and Oregon because their Coho is endangered.
Q:	<i>Mick Thiessen:</i> Unlawful or unauthorized use of power – is that a big issue? You hear this on the news?
A:	<i>Arlene Shwetz:</i> There is a big portion of power theft that we hope to address through the smart meters. In Abbotsford and Chilliwack there has been a problem. It is a challenge for BC Hydro.
Q:	<i>Mick Thiessen:</i> Is that a top priority to reducing demand on power?
A:	<i>Arlene Shwetz:</i> The grow ops are basically stealing power. So with smart metering available we will be able to determine where there is an over and cut out unlawful sources and that will help pay for smart meters and we want to get back the dollars owed.
Q:	<i>Mick Thiessen:</i> Does BC Hydro have a program to recoup charges?
A:	<i>Arlene Shwetz:</i> We do take individuals to court but it is difficult and we do work with the RCMP and local governments but I am not sure of the percentage.
4.	Feedback Forms Participants of the meeting were thanked for participating and were encouraged to complete and submit feedback forms. Participants were also encouraged to attend one of the upcoming open houses (dates, times and locations listed in the consultation workbook).
5.	Closure The meeting ended at 3:00 p.m.

Integrated Resource Plan Appendix 7C-2

**BC Hydro Integrated Resource Plan
Kamloops - Multi-Stakeholder
Meeting**

Kamloops Ramada

555 West Columbia
Street, Kamloops, BC

MEETING DATE MARCH 17, 2011 1:00 P.M. – 3:00 P.M.

PURPOSE	Meeting notes from a multi-stakeholder group meeting with stakeholders BC Hydro staff on March 17, 2011 at Kamloops Ramada, 555 West Columbia Street, Kamloops, BC.
FACILITATOR	Judy Kirk, Kirk & Co. Consulting Ltd.
PRESENTER	David Ince, BC Hydro
MULTI-STAKEHOLDERS PRESENT	Michelle Allen Arnie Budd Valerie Cameron Geri Collins Lou Cooke Mike Fennell Patrick Flanagan Gary Forsyth Patricia Gray Jim Gudjonson Isabell Hadford Bernie Hart Barb Jackson Delphine Jacob Mel Jasman John Kryski Rob Lamont Audrey LeBlanc Max Lentz Jessoa Lightfoot Pablo Lopez Heather MacKnee Matt Noble Tim Pennell Brett Renard Marg Spina Jim Steele John Sternig John Taylor Denis Uralsh Wayne Volkraih Bert Walker Denis Walsh
STAFF ATTENDEES	Kenna Hoskins, BC Hydro Dag Sharman, BC Hydro Nan Di, BC Hydro Tim Lai, Kirk & Co. Consulting Ltd. Emilie Yee, Kirk & Co. Consulting Ltd. , Recorder

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AGENDA	<ol style="list-style-type: none"> 1. Welcome and Review Agenda 2. Consultation Workbook Overview 3. Discussion 4. Closing Remarks
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KEY THEMES

1. **Electricity Choice and Rates** – Participants expressed concern about increasing electricity rates noting that customers in the North Thompson region do not have access to alternatives such as natural gas and therefore have higher energy costs than more urban areas such as the Lower Mainland. Other Participants said that the recently introduced two-step conservation rate is improving conservation because the payback is higher improving the business case for conservation.
2. **Conservation & Efficiency** – Participants suggested that BC Hydro should be cautious about including the more proactive approach to conservation and efficiency in the Integrated Resource Plan because it put a proportionately higher burden on rural communities that do not have alternative energy choices. In addition, they expressed concern about the additional costs of additional codes and standards, particularly in the building industry.
3. **Electricity Generation** – Participants expressed mixed views about private ownership of power generation; for and against. Several participants expressed the view that residential customers should not have to pay more for electricity per kilowatt hour than industrial users
4. **Electrification** – Some participants said that BC Hydro should pursue a more proactive approach to electrification as long as the Integrated Resource Plan also includes greater incentives for consumers to reduce their use of high-consumption appliances and electronics. While other participants thought BC Hydro should continue to be responsive to electrification. Many participants reinforced that rural customers may not have the same opportunities to use electric cars or otherwise engage in electrification of the economy because of the nature of the agricultural sector and the nature of smaller more dispersed communities.
5. **Transmission** – Participants said that BC Hydro should take a more proactive approach to transmission rather than a responsive approach, including more consideration for “over-building” transmission to encourage economic development in rural areas.
6. **Export** – Participants said that BC Hydro should be cautious about pursuing clean generation for the purpose of exporting given the potential environmental effects of the required additional electricity supply. Participants acknowledged the potential economic and social benefits of exports, but reinforced the need to meet domestic needs first.

DISCUSSION

1. **Judy Kirk – Welcome and Introductions**
Judy Kirk welcomed participants to the stakeholder meeting, explained the format of the meeting and introduced the consultation workbook and feedback form. Roundtable introductions followed.

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Judy emphasised the five consultation topics and the feedback form at the back of the consultation workbook.

2. David Ince – Consultation Workbook

David Ince reviewed the format of the consultation workbook and explained the processes and factors BC Hydro considers when energy planning. David explained the difference between demand side options and supply side energy options and how BC Hydro factors this into the balancing the options when developing a long-term plan.

(Abbreviations will be used and mean: Q: Question, A: Answer, and C: Comment)

Q: *Geri Collins:* Are you going to increase the supply and will you upgrade the grid?

A: *David Ince:* Yes, we do have to upgrade the grid. Depending on where the new supply is located, you have to connect it to the grid.

Q: *Valerie Cameron:* Do the supply projections include climate change scenarios?

A: *David Ince:* We have a goal set by the province to reduce carbon levels by 2020. If you depend on our electricity system to meet those goals, it requires a lot of electrification.

Q: *Valerie Cameron:* I was wondering about how the water supply will be reaching the reservoirs?

A: *David Ince:* The higher the temperature the less the load. If the temperature increases with climate change, our load is reduced.

Q: *Mike Fennell:* BC Hydro is planning new turbines at Mica 5 and 6 Dams. How much will that fill the gap?

A: *David Ince:* They are at least 100 megawatt hour turbines.

Q: *John Taylor:* Are you offering any incentives for industries to move closer to the source of the generation. If you do attract industry closer to the point of generation you'll save some power.

A: *David Ince:* BC Hydro's line loss is 7% and that's a good suggestion. BC Hydro has postage stamp rates, like the mail system. You can post a letter from point A to B for the same price. I am weary because that suggestion could open up a lot of issues.

Q: *Josh Sternig:* We have concerns that while all this stuff sounds great we are don't agree with the water fluctuations. With the increased generation from Mica Dam, is it going to be as wild as it is now?

A: *Dag Sharman:* We had public consultation into committees to review the possible impacts of Mica 5 and 6 Dam's and I can get you a report. The fluctuation in the reservoirs is very much a factor of the Columbia River Treaty as well.

Q: *Denis Walsh:* Why is the supply dropping over this period of time?

A: *David Ince:* The government has asked BC Hydro not to rely on the outside market. To meet BC's needs, we have removed those markets. We also have some IPP's that are reaching their end of life and we have removed them from the supply stack. Contracts that BC Hydro has signed already are included in the supply stack, but we still have a gap.

Q: *Jim Steele:* Regarding forecast demand, what is the dip in 2020?

A: *David Ince:* We have our biggest single customer, Highland Valley Copper that might drop. The other effect is from new oil and gas load. Those are the two biggest sources of load growth.

Q: *Jim Gudgjonson:* How much do we import?

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- A: *David Ince*: We import about 5%.
- Q: *Matt Noble*: By 2020 are you not going to import anymore?
- A: *David Ince*: The price margin goes up and down. BC Hydro has a great system and has the amazing resource for storage. We were buying power at \$300/ megawatt hour and selling at \$500/megawatt hour during the California power crisis.
- Q: *Brett Renard*: How much do you end up collecting?
- A: *David Ince*: We collected about \$1.1 billion.
- Q: *John Taylor*: Once you have the infrastructure are you going to reduce the rates back?
- A: *David Ince*: BC Hydro is under some serious cost pressures and we are trying to keep the rates low.
- Q: *Tim Fennell*: You have encouraged conservation with a two tier system. With no natural gas available, it's very cumulative. We don't have the option to go to a lower cost option in these small towns. For us the cleanest energy is electricity, but it's contradictory to saving on greenhouse gases because it costs too much. In the prairies we heated with electric but this system doesn't make sense.
- A: *David Ince*: I must say this is the biggest challenges we face; different rates for different areas of the province is very complex.
- C: *Kenna Hoskins*: That's exactly the kind of feedback we would like.
- Q: *Tim Fenell*: If you say conservation, then you want to switch to electric vehicles.
- Q: *Geri Collins*: Can you explain why it's so difficult?
- A: *David Ince*: You can have different prices around the province but it can be unfair.
- Q: *Tim Fennell*: It's about the availability thought. We don't have the system available. If it was my choice, but I don't have that choice unless I want to spend a lot of money. We literally have no choice.
- Q: *Brett Renard*: You said the higher the temperature, the less electricity we use. The two tiered system for rural BC, they are two different products. We are penalized to live.
- A: *Tim Fennell*: and we are closer to the source of the power as well.
- C: *Judy Kirk*: To be clear, you think there should be different rates in terms of distance is essentially what you are saying?
- C: *Tim Fennell*: Yes.
- Q: *Josh Krynski*: BC Hydro says there are 300,000 street lights in BC. Right now there is the technology out there to reduce the power by putting in some new kind of street light. Saskatchewan is investing in this technology. What is BC Hydro doing?
- A: *David Ince*: Please put that down in your form and we will get in touch with the Power Smart folks.
- C: *Dag Sharman*: We are constantly looking for ways thank you for bringing that up.
- Q: *Denis Walsh*: I think for new construction, there should be a set of guidelines to shut off all the stuff on standby and maybe even a place to put a meter outside. The smart meters are going outside the house right? If there was something inside your house that you can look at that would be better.
- A: *David Ince*: The smart meters will have the option for the in house display.
- C: *Dag Sharman*: That hasn't been finalized, but it sounds like there will be an incentive to purchase.
- A: *Denis Walsh*: Is it \$100 million you are spending on smart meters?
- A: *David Ince*: It's more like \$900 million.
- Q: *Denis Walsh*: Wouldn't it be better to spend money on converting the streetlights?
- A: *Dag Sharman*: If that makes business sense then that might be a good idea and we would encourage you to put that in your feedback sheet.

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- Q: *Denis Walsh:* Smart meters are a done deal?
- A: *Judy Kirk:* If you would like to have your say about smart meters then please do write it in your form, but this is regarding electricity planning.
- Q: *Rob Lamont:* If we had something in our house that would be great. If it costs a certain number of dollars to build new plants, could we not get a read out of everything that you conserve?
- C: *Judy Kirk:* That's a good idea.
- Q: *Tim Fennel:* The new designs in housing have to be efficient. If Smart Meters are too high of a cost you are going to hamper new hamper development.
- A: *David Ince:* In California, surveys show that they are in low compliance with the building codes.
- Q: *Jessoa Lightfoot:* For a long time I've looked at the proposal for electric vehicles, and you might need to look at government to stop centralizing the services for rural communities. I think that we need to realise that small hubs of activity are better. High users of power should be located closer to the generation to minimize loss.
- Q: *Max Lentz:* I read an article that the advent of the LED bulbs is being used in homes but the lack of heat that is generated is adding to greenhouse gases.
- A: *David Ince:* During the summer, you don't want more heat load in the house, you don't want extra heat.
- Q: *Jim Gudjonson:* I am curious because the Power Smart program has been a long for some time if the projections from 5 years ago on track?
- A: *David Ince:* We have to look at what they promised to do and what they are delivering and they are on track. There are remedial actions they take if they fall behind.
- C: *Jim Gudjonson:* With the change in rate structure our administration has really been listening to the business case for the first time and helping us to meet our energy goals. I can't say enough good things about it. Increasing the base rate is also a good idea.
- A: *David Ince:* Great, thank you.
- Q: *Geri Collins:* Why can't you build storage for run of river projects?
- A: *David Ince:* A lot of storage is needed and we are going to get to that.
- Q: *Lou Cooke:* Is BC Hydro going to build any wind farms?
- A: *David Ince:* We have a couple that will be starting up soon or have already started.
- C: *Kenna Hoskins:* The energy policy in 2002 really set that up.
- Q: *Brett Renard:* On the previous page under types of power, Site C's footnote is based on a 30 year old design. How far away are you from an actual number?
- A: *David Ince:* It is coming very soon.
- C: *Judy Kirk:* BC Hydro will be coming out with a draft Integrated Resource Plan and by that time there will be a new cost estimate and you'll be able to see that.
- Q: *Matt Noble:* Where does biomass fit into this plan? So often, these are fuels that are going to release fuels anyway.
- A: *David Ince:* On page 14, it's the top option. You're right you might as well extract energy from it.
- Q: *Denis Walsh:* We already have a portfolio, right now, when you say there is 15% increase. If we already have a portfolio, the power is only costing us \$3-\$20.

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- A: *David Ince*: Before that becomes a problem, the reason for that is because transmission customers get their power right from the grid. When we design rates, we have equitable rate distributions. That \$35 is the cost to supply those customers. Industrial rates are lower around the province. The reason why residential rates are higher is because the cost to get the energy to houses.
- C: *Judy Kirk*: Across the system, it sounds like it's different.
- C: *Dag Sharman*: It's not just wires its transformers, poles, rights-of-way, crews to maintain power outages, etc. That is a lot less expensive to serve our customer off the transmission lines.
- Q: *Matt Noble*: I was going to add, all rates are based on cost causation. Industry would pay their fair share and those costs are comprised of various activities like cost generation or transmission.
- Q: *Jessoa Lightfoot*: Regarding industrial and residential conversation, the residential costs it's a one-time cost. A house has a much longer life doesn't it? The homeowners pay to have their home hooked up initially when it's under construction. That's the cost of supplying the electricity.
- A: *Dag Sharman*: The cost of maintenance is quite expensive. It's not like you can leave the wire along for 30-40 years. The system is regulated and why we have crews that regularly maintain and upkeep. It's very heavy on the distribution side. It's much more than just installing a wire.
- Q: *John Taylor*: Highland Valley Cooper is probably subsidizing the cost of power to BC Hydro because I've heard that they pay a lot less for power.
- A: *David Ince*: I don't know about that.
- Q: *John Taylor*: Can we use the pump storage right now?
- A: *David Ince*: Not yet.
- Q: *Jessoa Lightfoot*: This is additional power supply?
- A: *Judy Kirk*: This is too start to fill that gap.
- Q: *Jessoa Lightfoot*: The additional components, what would that percentage be in the overall package?
- A: *David Ince*: This package is 1/6 of our total requirements.
- Q: *Jessoa Lightfoot*: The other 5/6 has storage capacity?
- A: *Kenna Hoskins*: Yes.
- Q: *Matt Noble*: What is your install capacity formula?
- A: *David Ince*: It's about 11,000 megawatts.
- Q: *Matt Noble*: With wind power you have to have backup. For every unit you built, you have to build an equal capacity unit to provide backup for when there is on wind. On average what is the equivalent?
- A: *David Ince*: I think we should take that offline and give you the information you need.
- Q: *Tim Fennell*: Looking at the three portfolios, my first thought is number three. How much of an impact is the greenhouse gas changes? Is it significant as far as the provincial goals are concerned?
- A: *David Ince*: In order to meet our climate change targets, we need everything in terms of meeting those targets and they would be offset, like planting trees to make up for it.
- C: *Tim Fennell*: I think they may be a little unrealistic.
- Q: *John Sternig*: It seems that in the discussion on page 18, biomass is such a small contributor is that it doesn't show here. Does the use of biomass play a large or small role in contributing to portfolio two and three?
- A: *David Ince*: Biomass is a good resource because it is fairly steady. I encourage you to put that comment in there.

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- Q: *Jim Gudjonson*: In addition, it is a type of storage as well and it saves the 80% of wind, etc.
- Q: *Marg Spina*: Why would you not choose to own the wind turbines? We would have no ownership of assets?
- A: *David Ince*: Provincial policy is that all new generation will be developed by the private sector.
- Q: *Marg Spina*: How does that protect the public?
- A: *Kenna Hoskins*: The risk is around the price.
- Q: *Marg Spina*: Some of the countries I've been to that rely on private power sources find themselves in difficult situations when the price goes up quickly. It's hard on rural areas. I find it difficult to support a non public owned project.
- Q: *Denis Walsh*: Can't we comment about changing that legislation?
- A: *Judy Kirk*: Absolutely. Any comment about public policy is fair game. On page 29, you will see that for every question on these portfolios, there are feedback questions. BC Hydro is very serious about knowing why.
- Q: *Rob Lamont*: Regarding the IPP's, do they pay a water licensing fee?
- A: *Nan Di*: Yes, they do.
- Q: *Rob Lamont*: Do the wind companies license the wind?
- A: *Nan Di*: They don't have a license, but the government collects for however many megawatt hours.
- Q: *Rob Lamont*: So, even if the IPP's are independently owned, can't we increase the rates of the water?
- A: *Dag Sharman*: That is government policy and while it could occur we can't really answer that on behalf of the provincial government.
- Q: *Geri Collins*: With the IPP's, BC Hydro makes their money off of them as well. Right now, if we didn't have IPP's, we would have a lot less power than we currently have. The other thing is, in terms of Mark's concern, our government has checks and balances.
- Q: *Max Lentz*: How much does it cost to run an electric vehicle compared to a gas powered vehicle.
- A: *David Ince*: About \$200 per year.
- Q: *Denis Walsh*: There should be an incentive to the consumer to buy less power consuming electronics.
- C: *Geri Collins*: This whole support for electric vehicles, I would like to see one pull a 30 foot trailer. Our lifestyle in this area doesn't support that. We are kind of held ransom for some of these things that are feasible in the metro areas but it doesn't work for us. Even with some of the things that are happening with alternative fuels.
- C: *Judy Kirk*: Very fair comment.
- Q: *Jessoa Lightfoot*: I don't see electrification as being better, because the production of vehicles is huge. Changing systems is expensive. Stop centralizing everything maybe. There is a huge break between fossil fuel in rural and metro areas. This is just my personal opinion, when you tank a jet liner and fill it half full it's just ridiculous. How much are we really doing?
- A: *Judy Kirk*: What we are hearing generally, is people need to be cautious about this proactive approach to electrification.
- Q: *Valerie Cameron*: What you're saying is should we pursue more electrification and enable other opportunities, and then the other side of that is in metro areas they can deal with the power uses that can be spread around.
- C: *Judy Kirk*: When choice is being diminished, Canadians start to get uncomfortable. We hear there is concern around that. I encourage you to after this discussion, look at the choices, and give BC Hydro a sense of

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where you are on that degree scale. BC Hydro isn't saying yes or no, they want you to understand that these are more difficult than that and they want a sense of where you are on the choices and tradeoffs so they can draft a plan informed on what you're thinking.

- Q: *John Sternig*: Let's say every car in BC is electrified. What is BC Hydro's current capacity without electrification of cars and what would it half to provide if everyone is in electric vehicles so we can see the scope.
- A: *David Ince*: Our load would increase by 1/6. However, it is cheaper to run the fuel, but the batteries are very expensive. We aren't going to do this at all costs, we compare how much the savings is and how far do you want to go on that cost. We want your feedback on how aggressively we should go.
- Q: *Mel Jasman*: BC Hydro and most other businesses don't get what we are saying in rural areas. Rural areas have a different approach to energy planning that won't be reflected in your report if all the communities are melded together.
- C: *Judy Kirk*: There will be overall results. We are looking for your name and address, including what town you are from so we see a regional breakdown as well.
- C: *Dag Sharman*: There are sessions in other rural areas.
- Q: *Rob Lamont*: If a mining project comes up, wouldn't it make more sense to just put a turbine where that project is and not worry about transmission.
- Q: *Tim Fennell*: With two mining projects on the go right now, we have significant infrastructure demand in the future. The grid is almost maxed out. These mining projects need significant dollars in order to receive transmission lines. When you are dealing with a grid near max capacity, I would like to suggest is that we maximize on that investment from the mining industry. We should overbuild so that we are ready in the future. We would have significant savings and it won't double the cost. We have an industrial site that you just can't run anymore.
- A: *David Ince*: That's a great comment. If the load doesn't show up, then that's a failure on our part. If we have an obligation, then we will serve them.
- Q: *Patrick Flanagan*: You shouldn't miss the point that BC Hydro can't just move ahead spontaneously. It takes some convincing for BC Hydro to see that point of view.
- Q: *Mike Fennell*: Recently, our minister said that if China starts to take all the wood that we expect, then we will have to run our mills in three shifts. Have you taken that into account?
- A: *David Ince*: That is one of my responsibilities. We see recovery in the forestry side. When we do our forecast, we look at how much wood is available.
- Q: *Max Lentz*: Currently, BC Hydro doesn't allow communications companies to run their lines to supply rural communities with internet, on BC Hydro's lines. BC Hydro really needs to open up this policy so that rural communities have access to the internet. It's very important.
- Q: *Patrick Flanagan*: When it comes to shortage supply your priorities go out the window. There is caution that exports are a good money maker, but the taxpayers are going to go without.
- A: *David Ince*: BC Hydro has been mandated to build domestic need and we will meet that need. What you say is true, if there is a crisis then who has the power?
- Q: *Jessoa Lightfoot*: Please tell me about export around Site C and the tar sands. Have there been preliminary discussions?

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- C: *Judy Kirk*: Are you asking if Site C power would be exported to Alberta Tar Sands?
- A: *Dag Sharman*: Site C power would be used for domestic use. Site C helps us toward closing that gap.
- Q: *Jessoa Lightfoot*: The excess power from Site C will be directed towards the tar sands.
- A: *Dag Sharman*: It would go into our portfolio.
- Q: *Mel Jasman*: You are going to get power from somewhere else. If Site C is for domestic use, then you are using power to go to export. The answer really is that it will go into the grid and then exported eventually if we have a surplus.
- A: *Dag Sharman*: Yes, it goes into the grid for the rest of the province.
- Q: *Tim Fennell*: I have no problem with making a profit and keeping our rates lower, but it comes at a cost. You've mentioned the cost and impact. How significant is that cost. Are we selling the farm? That is a big player in this.
- A: *David Ince*: It depends on what you pick and where your supply is coming from. You look at these tables and that is what the impact is.
- C: *Kenna Hoskins*: We've been asked to assess the market potential. You'll get our understanding of what the demand is before you can associate it.
- Q: *Tim Fennell*: There are places like California that don't pay their hydro bill...
- A: *Dag Sharman*: There is a degree of risk in trade, and I can get back to you on the numbers. You have to look at it as a whole to assess the worthiness and we think that it is worth it.
- C: *Judy Kirk*: To clarify, in a couple of other sessions, California has not paid British Columbia before and the answer was the payment method used is a three pronged approach. If they can afford, then they can buy some on credit. If not they have to buy upfront.
- Q: *Mike Fennell*: For your export market, BC Hydro has made millions buying at peak. How much of that money does BC Hydro put into the infrastructure? BC Hydro get's to keep up to \$200 a year over that it goes to the government. How much has gone into general revenue for the government?
- A: *David Ince*: That would be about \$1.2billion approximately.
- Q: *Denis Walsh*: Until we change the legislation then we take all the risk with no reward. IPP's are guaranteed we buy the power. We continue to encourage IPP's but they don't take any risks. I don't think it makes sense.
- Q: *John Taylor*: We expect people who buy from us to pay us. Is there a penalty if we can't supply the power?
- A: *David Ince*: We have to develop enough resources so we can satisfy the agreement.
- Q: *Rob Lamont*: A few years ago, didn't BC Hydro and the BC Utilities Commission separate? And now are they back together again?
- A: *David Ince*: That's right, they are fully integrated again.
- Q: *Rob Lamont*: Because of the transmission lines, if Alberta wanted to make a deal with California they could use our lines anyway?
- A: *David Ince*: Yes, as long as there is capacity and they can pay.
- Q: *Max Lentz*: Regarding conservation, if we stay on day light savings time all year then we save that extra hour.
- Q: *Geri Collins*: It says here on the consultation workbook that you had input from selected First Nations and stakeholders. Is there a forum or a separate for the other First Nations because I only see two at this meeting including me?

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A: *Kenna Hoskins*: There are nine First Nations workshops being held around the province. There was one last week in Kamloops.

4. Feedback Forms

Participants of the meeting were thanked for participating and were encouraged to complete and submit feedback forms. Participants were also encouraged to attend one of the upcoming open houses (dates, times and locations listed in the consultation workbook).

5. Closure

The meeting ended at 3:00 p.m.

Integrated Resource Plan Appendix 7C-2

**BC Hydro Integrated Resource Plan
Terrace - Multi-Stakeholder Meeting**

Terrace Sportsplex

3320 Kalum Street,
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MEETING DATE

MARCH 22, 2011 1:00 P.M. – 3:00 P.M.

PURPOSE	Meeting notes from a multi-stakeholder group meeting with stakeholders BC Hydro staff on March 22, 2011 at Terrace Sportsplex, 3320 Kalum Street Terrace, British Columbia
FACILITATOR	Judy Kirk, Kirk & Co. Consulting Ltd.
PRESENTER	David Ince, BC Hydro
MULTI-STAKEHOLDERS PRESENT	Derek Baker Betty Barton Sherry Bojcew Lynn Christensen Terry Collins Annalee Davis Brian Downie Randy Halyk Julia Hill Alfred Reufeldsterz Frank Shane Margo Van der Touw Evan Van Dyk Andrew Webbe Steve Wilson
STAFF ATTENDEES	Dave Mosure, BC Hydro Ginny Kenmuir, BC Hydro Magdalena Rucker, BC Hydro Anne Wilson, BC Hydro Lesley Wood, BC Hydro Don Bradley, Kirk & Co. Consulting Ltd. Susan Campbell, Kirk & Co. Consulting Ltd. , Recorder
AGENDA	1. Welcome and Review Agenda 2. Consultation Workbook Overview 3. Discussion 4. Closing Remarks
KEY THEMES	
<p>1. Conservation and Efficiency – Participants suggested that BC Hydro should include a more proactive approach to conservation and efficiency in its Integrated Resource Plan, including additional codes and standards.</p> <ul style="list-style-type: none"> • Some participants suggested that conservation would be enhanced by building electricity generation closer to regional demand to reduce the need for transmission lines and the loss of power from long transmission lines. <p>2. Electricity Generation Options – Some participants asked if BC Hydro could improve incentives to encourage regional production of independent renewable power projects.</p>	

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- Some participants said that BC Hydro should generate more electric supply while others said BC Hydro should provide more incentives to encourage greater electricity supply by independent power producers.
- 3. **Electrification** – Some participants expressed concern that a proactive approach to electrification could increase the electricity supply gap creating the need for more electricity generation and transmission with attendant expanded environmental footprints.
- 4. **Transmission Planning** – Most participants said that BC Hydro should take a more proactive approach to transmission planning, which would reduce the environmental footprint through better planning and avoidance of unnecessary lines.
 - Others said that BC Hydro should continue with a responsive approach to transmission planning because a proactive approach would subsidize independent power producers at a higher cost than BC Hydro-produced energy.
- 5. **Export Market Potential** – Some participants said that BC Hydro should produce the maximum power possible to maximize revenue benefits for BC Hydro customers and British Columbians. Some said that the provincial government was prohibiting BC Hydro from maximizing public power production, which produces energy at lower cost.
 - Some participants said that BC Hydro should continue with its' current approach to export which includes giving BC Hydro the ability to produce energy surplus to domestic needs for the purpose of exporting to generate revenue.

DISCUSSION

1. **Judy Kirk - Welcome and Introductions**
Judy Kirk welcomed participants to the stakeholder meeting, explained the format of the meeting and introduced the consultation workbook and feedback form. Roundtable introductions followed. Judy emphasised the five consultation topics and the feedback form at the back of the consultation workbook.
2. **David Ince – Consultation Workbook**
David Ince reviewed the format of the consultation workbook and explained the processes and factors BC Hydro considers when energy planning. Cam explained the difference between demand side options and supply side energy options and how BC Hydro factors this into the balancing the options when developing a long-term plan.

(Abbreviations will be used and mean: Q: Question, A: Answer, and C: Comment)

Q: *Randy Halyk:* You obviously export, is that part of the formula, part of the export power that is required - so you are exporting power yet we still need some more so we are importing as well?

A: *David Ince:* Let's address that right now. That is a very important topic. BC Hydro exports power nearly every day and it imports power almost every day; and so what happens at 6:00 p.m. when power is very expensive and electricity is the most, the most volatility priced commodity on the market, in that at 6:00 p.m. you may have prices that are three times than what they are 2:00 a.m. So, we are exporting hard at 6:00 p.m. when prices are highest and then we are bringing in power from Alberta and the Pacific Northwest hard at 2:00 a.m. On the net, the balance, we are bringing in more power than we are sending out and we are making on average about \$150 million a year in doing that. So that is called arbitrage – where we are buying low and selling high. Powerex does that, our trading affiliate. If we weren't doing that it would actually cause reliability issues not only for ourselves and the rest of the system but actually we would forego that \$150 million a year.

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- A: *Judy Kirk:* Export is one of the five topics, export opportunities, in this together with conservation, electricity generation options, electrification and transmission – so it will be one of the topics that we get right into.
- Q: *Randy Halyk:* If I may continue on this, I read a study two years ago that UBCM students did to determine how much power we didn't need and that study proved that we didn't need the power that Hydro suggests we need. At one other meeting, two years ago, I brought that up to the individual that was presenting and he sort of just pushed it off to the side and said oh well maybe the students don't know what they are talking about. Further to that, I went online and found that report and sent it off to Hydro and again never got a response. But at least you guys have it so can you tell me why that report is wrong.
- A: *David Ince:* I have not personally read that report but if you will send it to me, I will review it and send a response back to you.
- C: *Randy Halyk:* I have heard that story before.
- A: *David Ince:* No, you have my guarantee.
- C: *Judy Kirk:* That said David (Ince) in just a few moments, I think you are going into the supply that BC Hydro has in terms of electricity and the gap and I think you should do that and now we will carry on.
- Q: *Randy Halyk:* So why is there a reduction of supply over that term when we are now talking about Site C and Independent Power Producers and yet it shows a reduction in supply – I, am not understanding this? How about the IPPs?
- A: *David Ince:* Site C is not in this, so that is one of the questions and one of the projects that we want to talk about, we haven't reflected Site C in the blue bars, and it is an option. The IPPs are another option so we do have our existing IPPs in this blue bar but we may need, still need, more to fill up that orange red gap.
- Q: *Andrew Webber:* Why is the line trending downward, are we dumping some nasty energy producers?
- A: *David Ince:* Most of this is because of contracts expiring so we do have about 100-contracts already with IPPs of various sizes and as they reach end-of-life we are assuming bio-energy projects, that are contracted to us, have a certain life and after their life they are taken out of this.
- A: *Anne Wilson:* There are a couple of other things too and this is a planning projection as well and so within our existing plans there has been a certain allowance to buy on the market but with the Clean Energy Act saying as of 2016 you can no longer buy on the market you (BC Hydro) need to be self-sufficient. There is a little drop right there and that means that we can no longer plan for that energy market for domestic needs. That is one reason. The other piece is Burrard, we used to be able to rely on Burrard Thermal and we are not going to be able to rely on Burrard after a certain period of time so that drops off as well.
- Q: *Randy Halyk:* Is there a chart that shows what we actually produce now with hydro's assets or is that something else?
- A: *David Ince:* I could tell you the numbers – we do have a scale on the left hand side of this supply and demand (graph). So in a critical water year, which means it is a very dry, drought-like year, and of course most of our generation is hydro generation and it is 42,600 – so you can look this up against the left hand axis and so in an average water year you add about 4,000 to that so around 46,000. In addition to that, in these blue bars, you have IPPs and a certain amount of gas-fired generation. That is a fairly close break-down.
- Q: *Earl Munroe:* You stated by 2016 we had to be self-sufficient with our energy, how will this affect the exporting?
- A: *David Ince:* That is an excellent question – BC Hydro has to be self-sufficient by 2016. That has been a government mandate and so that means that under a critical water year, under drought-like condition, we have to have enough energy such that we are domestically self-supplied. In an average water year that means, and the difference between the minimum and the average is 4,000 – that means in an average year we will be exporting 4,000. So that means that a certain amount of our transmission will be loaded and the power will be going south and to the east.
- Q: *Earl Munroe:* And, if we can't meet our own demands?

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- A: *David Ince:* Since we will be self-sufficient to critical water, so a drought-like condition, I think that we will be very secure – there are very few circumstances that I can see in which we will be importing at that point.
- Q: *Rob Goffinet:* I don't understand the last 10-years, in the news Hydro has been instructed, by the present government, I hear on the news that they can't on their own produce any more generation capacity - how does that fit into lowering the BC Hydro supply? Am I incorrect that Hydro actually cannot go out in the last 10-years and build new generation? With Site C, if it was being constructed almost 80% of the electricity comes from large hydro installations, the Peace and the Columbia River, what would happen to that 80% with Site C, so two questions?
- A: *David Ince:* With respect to BC Hydro building – we can expand our existing facilities - so the government mandate is that new projects, totally new projects, have to be IPPs but BC Hydro can do Site C if it receives environmental approval and it is the right thing to do. And we can also expand existing facilities, so for example, we have a facility called Ruskin and it is in the lower mainland, and will see a seismic upgrade and at the same time we are replacing things so that we can get more power out of it. So we are not prohibited from getting more power out of our existing facilities but newer incremental facilities will be provided by the IPPs. So Site C, is the third dam on the Peace River – we have two major hydroelectric facilities on the Peace River already, near Hudson Hope and Site C would be the third one, so it is cascading from the previous two ones, 900 MegaWatts and around 4,000 GigaWatt hours per year, so in terms of the scale here you can see that this is fairly significant and so that would be a major addition and would do a substantial good in terms of reducing this gap.
- Q: *Judy Kirk:* But the point of the question was in terms of the 80% of the power produced by Site C - was it not Rob (Goffinet)?
- Q: *Rob Goffinet:* If it was added what would happen to the total number, total generation?
- A: *David Ince:* We may have to do the math off line but it would add 4000 to our existing stack here.
- Q: *Randy Halyk:* With respect to the renewal energy scenario, I guess what we are talking about here, the IPPs, all of these run-of-river things and so on, they are not firm energy, right; they are soft, they are not firm because they don't generate all year round so they are not classed as a firm energy source? Are those energy sources going to be totally exported because they are useless and because they are generated at the wrong time of the year? So, what is happening with that?
- C: *Judy Kirk:* So let's take one question at a time because I want to make sure that we get it on the record. The first question was - is wind and run-of-river, are they firm or are they soft?
- A: *David Ince:* So different types of resource generation. Wind, for example, it produces when the wind blows, solar when the sun shines and so those are not firm resources, right. So you can't depend upon them 100% of the time, to a large extent you have to back them up with something. So, if we were to export large quantities of bulk power into the U.S., for example, and typically these deals are based upon a fixed amount of power 7 X 24-hours – so you know a fixed block of energy being developed 24-hours a day so in order to take wind power and export it you would have to basically use the BC Hydro system to shape it so that it is a firm, fixed block of energy or you would have to back it up with something else like natural gas-fired generation.
- Q: *Alfred Reutelsterz:* Why not go to government and say conservation must be part of a new law and that a factory must have 6% more efficiency or whatever. Then you can calculate on it. In 2016 everybody will be using energy efficiently. I think we need stronger legislation.
- A: *David Ince:* Yes, that is called codes and regulations. I will be the devil's advocate, in you take a look at California they have got codes in place in which they have 30% compliance on residential construction. So, there is also a compliance risk.
- A: *Judy Kirk:* So what I heard you say, notwithstanding the BC Hydro's devil's advocate here, what I heard you say was that you think there should be stronger legislation in BC which presumably would have you supporting the idea of stronger codes and standards. So, if that is your view, I would want, and we have it reflected here in the record but for the purposes of everyone understanding what we are doing here I would want you to put that in your feedback form as well and perhaps describe why.

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- C: *Julie Hill:* I agree and I think in reading what is outlined that there is more that could be done on the conservation side to ensure that it is not as risky, in that respect, and while it would never go away, right, rather it is a tiered billing system for energy usage, energy usage caps, something legislated would certainly be effective not just \$25-rebates for providing an energy efficient dishwasher.
- Q: *Randy Halyk:* A couple of questions if I may. First off, right at the start you said trade-offs and there were a number of things and different issues and then just now you said well we have to determine how much we can do with conservation – well that is part of the strangest scenario I think. You still didn't answer the question about firm and soft power and I would really like to know where you guys are coming from there? And also on the environmental and conservation side of it, why is BC Hydro not using the best equipment they can to reduce energy costs – that is something that is really high on my concern list. So there are a number of things.
- C: *Judy Kirk:* Okay, so let us take the last question first and you know what, if you feel like your first two questions weren't answered I am going to ask in the interests of time that you deal with that off line with David (Ince) after the meeting, but let us deal with the last question first.
- Q: *David Ince:* So what about the specifics of what type of equipment?
- Q: *Randy Halyk:* We know that they are making Light Emitting Diodes across the world right now and LED lights and so on, they produce as much lumens as everything else is and they have it all down to a science and they are less of a problem environmentally, they cost less to run and they last longer – there are so many value-added features to a LED bulb and so forth. I asked the question at UBCM last year, at one of your booths, and I asked why you weren't using them and a gentlemen there said well they don't work. Well that is not true. In most of Europe and Asia they are using them already so why aren't you using them? Why isn't BC Hydro using LED lights and using the swirl lights instead which are both bad and bad?
- A: *David Ince:* With respect to BC Hydro's own facilities I can't speak to that, maybe it is Canadian Standards Association requirements or some other technical requirements. Just as an aside, I ride my bicycle to work every day and I do have a LED light and it casts shadows a block away and often cars will pull off onto the side on residential streets because they think I am a semi-trailer truck coming up. So anyway I can attest that LED lights are immensely efficient and they are the next thing. I think they are going to be the next wave of technology. However, I can't speak to BC Hydro's facilities but you are specifically talking about encouraging the government, BC Hydro encouraging the government to transform people by putting in place codes and standards such that people have to buy LED lights, that is a good comment.
- Q: *Randy Halyk:* And you don't want to answer that question about firm power?
- A: *Judy Kirk:* I tell you what, I think that he did answer and I am going to ask him to try again and then we are going to move on.
- A: *David Ince:* Okay, firm power is a block of power that is reliable. Actually could we hold it to the generation discussion and then I will talk about it in terms of the next subject which is generation then I will talk about firm versus non-firm.
- C: *Alfred Reutelsterz:* Increase the power price by 50% and everybody will look at it then.
- A: *Judy Kirk:* Increase the cost of power to encourage conservation.
- Q: *Annalee Davis:* I was just curious with the population growth, in British Columbia, how do you determine how much you are saving by conservation? It seems like it would be pretty difficult to figure that out.
- A: *David Ince:* One of my peers is a manager who is responsible for doing the studies to make sure that what we promise on conservation is delivered. So measuring the efficiency of the programs – so I can say that I am on that committee that helps measure how much savings we have and we are doing a good job in terms of conserving energy.
- Q: *Annalee Davis:* But what criteria do you use to measure that savings? The Power Smart program – how can you measure how much you save since that started by using Power Smart? How much individual savings?
- A: *David Ince:* It is a variety of techniques and it is mainly, this guy has got a PHD in Economics, and so basically it is looking at facilities and how much they consume after the Power Smart savings were implemented

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versus before. Yes, a lot of it is individual but a lot of it is at the customer level so an entire residential class looking at before and after metered savings. So there are residential, commercial and industrial customers and there are different metrics for every one of those and different ways of determining how much Power Smart savings you have got. It is a real art and science.

- Q: *Andrew Webber:* I am not sure where this fits into the conservation end of things but we have a system where you have generation at the top end of the province and the consumption at the bottom end and we hear about line losses. What is the technical power goal or opportunity there to reduce line losses without having to displace a whole bunch of people?
- A: *David Ince:* That is a great comment in that most of the big generation in this province is remote so it is in the Peace and Columbia River areas and 70% of the load is in the lower mainland and Vancouver Island and there are 7% losses. So this is just transmission losses and overall they are 7% of the total generation. When you transmit electricity over wires the wires heat up and then you lose the power. So it is a real issue and the question is should we have generation close to load? But, then you have got the trade-off in that as you can see with Burrard Thermal there may be some generation that isn't welcome close to the load.
- C: *Alfred Reutelsterz:* But the more you build them the cheaper they get, that is proven in Europe and other countries. So if you have 95-200 it will probably go down to under a \$100 because that is the price in Europe.
- C: *Judy Kirk:* So economies of scale can be developed in any industry.
- Q: *Randy Halyk:* The technology for turbines at the dams has developed far away from when they were built but I think on an on-going basis, I am not sure, but it would seem reasonable that Hydro has been upgrading those as we go, is that not the case?
- A: *David Ince:* That is the case – so the hydroelectric facilities are getting more efficient and if it makes sense we will retrofit our existing facilities with more modern equipment.
- Q: *Brian Downie:* It is my understanding that the slow growth of proposals for bio-mass or for run-of-river, one of the reasons from this part of BC, is the discounting of price that a proponent is faced with I think to reflect line loss but the contracts are assuming that the power is delivered to Vancouver. You start out by saying, and I think as a result of discussions with Derek (Baker) and Evan (van Dyk), that there is an economic demand/growth up here through large projects and I am wondering whether you have looked at that demand for power and in fact wouldn't the power produced here theoretically stay in this area and then so how valid is that? I am thinking that there is a disincentive for bio-mass energy?
- A: *Judy Kirk:* For the record but correct me if I am wrong, we were just in Kamloops where they said something similar, which was - could BC Hydro create regions where power generated in the region could be used in the region. Is that the kind of thing you are talking about?
- C: *Brian Downie:* It is a policy issue but that might be a solution.
- A: *Judy Kirk:* I am not saying it is possible I just want to make sure that I understand what Brian (Downie) is saying.
- A: *David Ince:* BC Hydro's run a number of competitive acquisition calls in the last few years so it has gone out to the market and asked IPPs what can you produce and it is a competitive process. So, whoever meets the qualifications, and the environmental qualifications, gets the contract at the lowest price and in that process if the power is remote from the load, so the further away it is from the load, which is assumed to be the lower mainland (electricity demand), the lower the price that BC Hydro is willing to pay. And, so I can't completely defend that metric but you are right if the power is remote from the lower mainland it will be discounted.
- Q: *Brian Downie:* My question is - what is the logic there when the power produced in northern BC could stay in at least northern BC?
- A: *Judy Kirk:* So I think what you are doing is to encourage BC Hydro to think again about that discount.
- C: *Brian Downie:* So to look at ways of creating incentives to take away the disincentive.

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- Q: *Alfred Reutelsterz:* But with wind power you can fill the reservoirs and have power whenever you need it – hydro energy?
- A: *David Ince:* Yes, you can use the BC Hydro existing flexibility but BC Hydro is running into limits in terms of that flexibility. So for example, during the spring when all our water comes down off the mountains we may be faced with situations where we don't have any storage left. We are flush and if we have to spill water there are serious environmental consequences to fish. There are also times in December – so you have to understand that BC Hydro's requirements in December are the first two weeks of December when there is extended shopping hours, all the lights are on and Christmas lights – that is when we need the power - that is our peak demand period. So 6:00 p.m. on December 14th that is when we need the power. So you have to use storage in that case if you are using solar or wind power, for example, so there are all these trade-offs. To Randy's (Halyk) original point, firm power is a very precious thing, me as an engineer if I were to design the system perfectly I would want something that is free, zero fuel costs, had no capital costs and was dispatchable and as soon as you pressed the button it immediately came up, so it didn't have a ramp-up time. A coal-fired plant takes 4-hours to get going from the point where you pressed the button and all the steam starts to come out. That is curtailable – you press the button and then it stops and so that is perfect generation. But you won't find any of it here so gas-fired generation, for example, is firm, dispatchable and curtailable but it produces Green House Gasses and it has a high fuel cost sometimes.
- Q: *Alfred Reutelsterz:* Wood gasification in a big system takes a start-up time about half an hour or 45-minutes and you can shut it down in pretty much the same amount of time – so why is that not done, burning all the wood piles?
- A: *David Ince:* So I think we have a space for that, bio-mass, the first one on the right hand side that covers that broad category.
- Q: *Randy Halyk:* That is a good explanation but my concern is that on your list there are a couple of areas where you could get firm power but it seems like people don't want it may be. Geo-thermal for instance, someone brought it to this region and it was rejected and I am just wondering if there are any other firm areas that BC Hydro knows about? I don't think anybody, after Japan, wants to have nuclear power but is there anything else that Hydro has looked at as far as firm?
- A: *David Ince:* These are pretty; this is pretty much a comprehensive range except for nuclear and nuclear is prohibited in BC under legislation.
- Q: *Rob Goffinet:* Because this is a BC Hydro consultation, you are taking our questions, right? My question to BC Hydro is on Topic 2, we have 10-options generated. The hydro option, BC Hydro that you are working for, your option is on the bottom of Page 14 - large hydro like Site C. I read over on the bottom that the Clean Energy Act prohibits BC Hydro with the exception of one thing Site C from any future large hydro projects. To me as a consumer and basically a citizen of BC that has a relationship with BC Hydro if you prohibit BC Hydro from doing their thing, which is large hydro dams with a storage facility to get this firm power out of it, in effect by prohibiting what BC Hydro can do, which is large hydro, you are facilitating the nine other generation options and this is why there is so much problem, right? By restricting yourselves in your area of expertise you have created an opportunity for nine more complex, variable, tremendously expensive options and somebody will have to pay for all of this.
- A: *Judy Kirk:* That is a very reasonable comment and one that is germane to the mix of options that are going to be discussed in terms of portfolios.
- Q: *Rob Goffinet:* How does BC Hydro explain to a consumer like me, why did you ever enter into an agreement like this as BC Hydro?
- A: *Judy Kirk:* I am not sure that David (Ince) can answer that question because really I think as you have said yourself it is more a question of government policy than it is BC Hydro – so I am going to, we have got your point and it is a good point and I would encourage you to put that in your Feedback Form and to perhaps build on it in reference to these portfolios that are being asked about next.
- Q: *Steve Wilson:* The notion that all of the power going to the lower mainland and Vancouver Island and anything that is beyond Hope is discounted is based on economics doesn't really acknowledge the fact that

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- if you do a project outside of the lower mainland what you are doing is you are facilitating the displacement of electricity and to penalize a group of people that want to develop IPPs by that kind of disincentive is nuts. It is an archaic way of seeing things through this is our market over here but the reality is not to displace electricity and to use it in the area that it is generated and actually create better value yet you are penalizing people by discounting the rates. The other aspect of it that isn't taken into any consideration is the actual cost of electricity - has the cost been factored for the cost of aboriginal rights, titles and infringements? It has only been in recent terms that BC Hydro signed any agreements with First Nations for resolving past differences. So until you actually have that mixed into the equation and you make it fair and equitable it is going to be an artificial rate anyway.
- A: *David Ince:* BC Hydro, every few years, runs a competitive process for power acquisition and the terms and conditions of those are not set forever, they can be changed.
- Q: *Randy Halyk:* So Site C is the only dam proposed and the only upgrades available to Hydro at this point?
- A: *David Ince:* Yes and small facilities such as Ruskin that I mentioned earlier, can be upgraded for more efficient operation.
- Q: *Randy Halyk:* Hasn't it been upgraded already for four years?
- C: *Magdalena Rucker:* It would be worthwhile adding that extra generation is being added to the Mica and Revelstoke facilities – so when the facilities were built not all the turbines were put in and right now Revelstoke 5, a fifth turbine is going into Revelstoke, and then two more turbines into the Mica facility.
- Q: *Randy Halyk:* And, that is included in your total? Or is that extra afterward?
- A: *David Ince:* See those blue bars; it is included in the total, in the blue bars.
- Q: *Brian Downie:* Page 18 – with the three portfolios, is there some sort of analysis that shows if the heritage rate is \$16 for residential and you added a chunk of renewals and some gas-fire what that rate would be?
- A: *David Ince:* We have relative cost rankings on this page and so you look at the columns and the fourth one over are financial.
- Q: *Brian Downie:* So the question I have is that even though when you looked at the nine options for generating power and there were some ranges – those are just costs per MW hour for that individual project without knowing the blended price in terms of your cost to consumers?
- A: *Judy Kirk:* That is right but this begins to look and shows you a blend.
- A: *David Ince:* Page 18 – a blended price. Look at Portfolios 1, 2, 3, in the left hand columns and then the financial relative ranking so it is the relative number of dollars and the renewal portfolio, because it contains on average higher cost resources is the most expensive, so you can see the four dollar symbols. I can't tell you the dollars to the dollars but these are relative rankings. The second one is the renewals plus Site C and is somewhat less expensive. The least expensive is including the gas - gas prices right now are fairly low and you might have heard of the shale gas in northeast BC and it is a very prolific long-term resource for this province and gas-fired generation could be a very attractive resource going forward due to those low gas prices.
- Q: *Alfred Reutelsterz:* The cost on Portfolio 3 has GHG emissions and what is the cost for that? Are they included in the cost before because they are going to go up quite a bit over the next years?
- A: *David Ince:* So that is not included, GHG costs are not included in these portfolios
- Q: *Alfred Reutelsterz:* But the others are much lower and the costs would be off-set then.
- A: *Judy Kirk:* That is a good point.
- A: *David Ince:* It depends upon how you value GHG costs and how high they go. It is a risk as are gas prices a risk too.
- Q: *Steve Wilson:* In terms of the ability of BC Hydro to undertake big projects like Site C but are not Site C that restriction - would that apply to private individuals that would design something and particularly First Nations because if you looked at Section 15 to the Constitution you would be able to find a way around that if you know what you are doing? Mind you most people don't know what aboriginal relations are about?
- Q: *Judy Kirk:* So Steve (Wilson) is your question; could Site C purchase a large project?

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- Q: *Steve Wilson:* No, that is not what I said. What I said is that you stated, under the Clean Energy Act, that BC Hydro cannot undertake any more projects like Site C anywhere else but my question is can someone else?
- A: *David Ince:* I am not an expert on the Clean Energy Act but I don't think it is precluded. The Clean Energy Act prohibits BC Hydro from undertaking any large scale hydroelectric facilities after Site C. So any other major systems, there is a lot of hydroelectric potential here and on the Liard Stikine Rivers, but those are prohibited.
- A: *Judy Kirk:* It is better to take up that the question outside of the room because it is a very particular question, it is a good question and if you would like us to follow-up on it we can take it separately and do so.
- A: *Steve Wilson:* I will work on it.
- Q: *Annalee Davis:* Did you say that large energy projects could be built for export?
- A: *David Ince:* Yes and we will discuss that in the export section shortly. That is the theme should we will be building for export?
- Q: *Randy Halyk:* So we know hydroelectric is a concern too because there are problems with the environment and we understand that there are concerns environmentally with gas-fired and yet it shows on your charts that it is less expensive than a lot of others. We are concerned about soft energy not being available when we want it and so we have to try and save it somehow in the meantime. How about, and maybe I am going off on a tangent but I am trying to understand why, and I know and I have seen it around when I drive around back in the prairies, where every little community, every little farm has their own wind generator and here there are lot of creeks and so on and I know because I asked back in my twenties and maybe it has changed but can I put a generator on the creek and light my own home? I was told back then that no that Hydro has the exclusive rights to produce energy, is that the case still? Could a homeowner put his own little generating plant on a creek if he could get Department of Fisheries and Oceans to approve it, I guess.
- A: *David Ince:* Absolutely yes, we have something called a feed-in tariff, so you can actually not only produce it for your own use but feed it back into the grid and sell back to BC Hydro. It is relatively new.
- Q: *Julia Hill:* Even on a creek that has a license pending for an IPP?
- A: *David Ince:* I am not sure about that maybe it depends on where on the river.
- Q: *Julia Hill:* So the example I am thinking of, a home on a small creek, but there is a proposal for a run-of-river upstream of that and I have always thought that I would love to produce my own energy on a creek but it has a license pending.
- A: *David Ince:* I am sorry - you will have to check with the Environmental Assessment Office on that.
- C: *Judy Kirk:* So to the broader question that you brought up Randy (Halyk) is it would be subject to permitting, but it is not BC Hydro that would preclude that kind of feed-in. I don't know who it would be, it could be DFO, could be provincial, Water Act, a number of things, could be commercial.
- Q: *Earl Munroe:* You could also sell back to BC Hydro and feed back into the grid and depending upon how far away you are from the grid would BC Hydro pay to pick up energy from?
- A: *David Ince:* That is a good question, I think the feed-in tariff – there is no price differential depending upon where you are and I think, when we were talking earlier about price differential to the lower mainland, I think it was large generation under a long-term contract. I don't think the feed-in tariff discriminates between regions.
- Q: *Brian Downie:* Could you just explain the three portfolios that are laid out – those are just by way of example and they are not intended to exclude other forms of renewals? So those could be within the renewal mix?
- A: *David Ince:* Yes, that is a key message. Yes, these are samples for discussions.
- A: *Magdalena Rucker:* These were picked because they responded to the last call for power that we had. It was primarily run-of-river and wind. It is just using renewal energy sources that are prevalent right now.
- C: *Judy Kirk:* So the clear answer is no it doesn't preclude and the second part is the reason that these

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- examples were chosen was because that was what showed up in the last BC Hydro call for power. In other words what showed up in the last bidding process.
- Q: *Derek Baker:* As a follow-up – the Port of Prince Rupert will be electrified, I am not sure of what year but that is obviously some good news. But, in terms of electrified vehicles and just the way we talked about the supply gap, it is already projected? What would electrifying vehicles do to that gap?
- A: *David Ince:* Great question in that here is the trade-off because you are adding that new and first of all to answer the question in terms of numbers to electrify the entire vehicle passenger fleet in BC would add around 10,000 GWh or 1/6th of the load so it is actually a surprisingly a small number and when I first did the math I thought it would be a lot bigger but that is because electric motors are so efficient. But nonetheless it creates a big extra load and then BC Hydro has to be build the generation around that. It has to build the transmission ultimately to get the power to the vehicles and of course that electrification causes environmental impacts because you are building this stuff and it causes rate impacts. So as I mentioned earlier BC Hydro’s rate for customers is lower than the cost of any of the new generation stuff that would be required to build it. So the rates would go up for customers as a result of this electrification. Those are the trade-offs –it would be a green source, low emissions or no emissions and yet it would cost new generation and new transmission requirements around the province and it would cause economic development so it could spawn a whole new industry in terms of jobs and service station attendants completely changing over their jobs and new charging stations around the province.
- A: *Judy Kirk:* But these are the very trade-offs that BC Hydro is trying to get your feedback on.
- Q: *Alfred Reutelsterz:* Would you have a number of how much it would cost per kilometer to drive a vehicle?
- A: *David Ince:* I do, your average passenger vehicle on gasoline is \$1,500 a year on gasoline and BC Hydro’s first tariff rate, tier-one is \$200 a year for an electric car for the same distance. So, that is a huge savings but I will give you the flip side in that the batteries cost is about \$1,000.00 per kilowatt hour and you need about a 16,000 kilowatt an hour battery to get any kind of reasonable range. So you are talking a \$16,000 battery, currently.
- C: *Randy Halyk:* We really look at the electric car as the costs you have calculated but what about the cost of producing the new electric motors and the cost of retooling and all that. There are some costs that are always involved and no one ever looks at that. I think that is important because that is using clean energy or green energy to do it. So there are so many anomalies involved with this, I like the idea of green electric cars and so on but there are some other things we have to look at.
- C: *Alfred Reutelsterz:* But the only way to get around it is and some countries are doing it now; everything you produce will get a carbon footprint so then when you are buying a car we know how much goes into the atmosphere to produce that vehicle and in the long-term you won’t switch in a year so it will take time and it is only moving industry to a different place.
- A: *Judy Kirk:* These are important trade-offs and the trade-offs that BC Hydro is putting before you here are real and present trade-offs around climate change, GHG emissions, electrification and what it would take to move a system to electrification and so hence the neediness and length of the workbook – and we do really hope you take the time to please provide your thoughts.
- Q: *Randy Halyk:* I have a real concern with both of them because I would have expected if these guys produce power and sell it to BC Hydro that they should provide the line themselves – why would we provide them a line to help them sell power to us? It makes better sense for them to provide the power to our line not for us to pay for their road? Are you saying that BC Hydro would actually produce the lines for these guys? Even though they are the ones that want to sell the power to us. That doesn’t make a lot of sense to me as a business, as a past businessman, I don’t get that because I would have expected that I would have to, in fact, if I build a house I would have to put the line in to the house.
- A: *David Ince:* So you are saying they among themselves should somehow get coordinated so as to build the assets on the right hand.

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- A: *Magdalena Rucker:* Just to clarify, so this example, it would be BC Hydro that would build the transmission line but the IPP they would have to build the line that connects to the substation and that has always been the case and will always still be the case. This is just building the large scale transmission line not the distribution line.
- Q: *Randy Halyk:* So the double line?
- A: *Magdalena Rucker:* The IPP would be responsible for the single line.
- Q: *Brian Downie:* So the comparison might be the Northwest Transmission Line as being the proactive approach and then the IPP connecting into – so it enables the development of power generation by that infrastructure?
- A: *David Ince:* Yes.
- Q: *Rob Goffinet:* But when you do that isn't the lower cost producer BC Hydro connecting via a new power line into a source of higher cost power – like BC Hydro has got a system cost of \$65 MW and if you put a power line into the northwest what is the contract cost of that power to enter a \$65 MW system? Is it higher or lower than \$65 MW? It is much higher isn't it? Why would you expend public money to access a higher cost producer? Like - none of this makes sense to me.
- A: *David Ince:* I am not going to automatically say that BC Hydro can produce at a lower cost – I think the reason why our rates are so low currently is because again it is an older asset and it has been depreciated. So we can't produce anything more for \$65 MW hour.
- Q: *Rob Goffinet:* So you say in here you can do it for \$85 that is what is in your estimation is that Site C is \$85 firm and the rest are up to \$200.
- A: *David Ince:* So Site C is an attractive resource but it is not enough to completely fill the gap.
- Q: *Evan van Dyk:* The black squares are called substations so what are the life of the substations? So if you were to be proactive at the risk of these IPPs moving out would that not increase the risk of IPPs moving in?
- A: *David Ince:* Yes, it would - if that facility goes away, the generation goes away, substations have a very long life and we have had substations within place for 50-years plus and if someone new came along you could put them in there.
- Q: *Evan van Dyk:* Having a substation built might that not pay for a feasibility study for other IPPs?
- A: *David Ince:* Having a substation in place would be highly attractive and might enable more IPPs in that region.
- Q: *Randy Halyk:* So then could we not have the IPPs that plan to access the substation on the right in the picture - invest in that substation as well so now the IPPs are providing the highway to the city as opposed to us providing that highway for them - so that there would be more value for individuals, for citizens?
- A: *David Ince:* It is a question of investment policy and to what extent BC Hydro pays for those portions of the assets and it is a balancing act between the two.
- A: *Judy Kirk:* I want to understand what you are saying here so I can make a stab at it and I could well be wrong – I think what you are saying is that if the IPPs provided their linkage, the transmission line to link up into BC Hydro's system, they are creating an electron highway and I think that you are saying that would benefit British Columbians because that electron highway is produced, is that correct?
- C: *Randy Halyk:* Well no I was saying it would benefit the IPPs.
- A: *Judy Kirk:* Okay that was what I wanted to ask - you are saying that would benefit perhaps disproportionately the IPPs not British Columbians generally. Okay.
- C: *Andrew Webber:* I don't know if you can design a transmission system strictly on this kind of economic encouragement I think that you have to look at it as impact on the land. I drive from Terrace to Kitimat and I see huge swaths of corridor taken up in multiple transmission lines - now does that reflect a lack of planning, maybe. Northwest Transmission Line – our northwest transmission line may see a parallel line running to the Valley, a single corridor. So I don't think, obviously what you lean to is a proactive approach but I don't think what is informing is strictly an economic argument I think it is impact on the land to

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minimize that.

Q: *Rob Goffinet:* I know British Columbia Transmission Corporation was peeled away from BC Hydro right and broken up in three spots?

A: *Judy Kirk:* Now back together.

Q: *Rob Goffinet:* So the two of the components are back together, Hydro now produces and distributes the electricity.

A: *David Ince:* And transmits over the transmission lines.

Q: *Rob Goffinet:* When did the two parts get re-integrated?

A: *Magdalena Rucker:* BCTC was integrated in July 2010.

Q: *Randy Halyk:* On the numbers, for exporting it will cost X amount of dollars and on the domestic side it is costing us X amount of dollars - have you put that together to determine whether or not if we didn't export what that \$150 million would do? How much are we spending to produce that power to sell? I am just trying (to understand).

A: *David Ince:* That is net - that is taking into consideration all the costs domestically – that is the profit. So it is appropriately allocated costs per, trading is allocated into that bucket and the costs for the domestic customers are in another bucket but it is \$150 million net. And, if you remember back to the so-called California energy crisis we made \$1.5 billion net. So notwithstanding the fact that during the winter of 2000-2001 we were net importers, so we were bringing in more power than we sent out; we made \$1.5 million in trade that winter.

Q: *Rob Goffinet:* A lot of the times, if you look at the quantity of energy that is coming in that is a false indicator, like if you load the province with 100 MW at night it is cheap. It is like comparing apples and oranges. You could make money on importing electricity if you have an integrated system and know when to export, right, so we could be a net importer of electricity that sounds really bad, we are vulnerable. We are not vulnerable the people we trade with are vulnerable and we only import during the night and export whatever during the day, right you told us that. What I am worried about is at the beginning of the session we are kind of scared – we are a net importer, bad, now that can be good it is when are we importing the energy and when are we exporting it and can we make money by being a net importer. We think that we are vulnerable by being a net importer. No, it can be the best business case. If you want to lose money don't import more energy. It is counter-intuitive. At the beginning of this session importation is a bad thing no it can be good - we have used it to our advantage to import it, it is not a liability and it is not a weakness it can be strength - if you are integrated. I am kind of concerned that this whole thing is that Hydro, if it is truly integrated would not be prohibited from doing what is in its' interest which is producing the maximum amount of power at the lowest cost to create the best environmental profit mode. I am really concerned that you are prohibited as a company from doing what you could say is in your best business sense for Hydro – you are prohibited from doing that. Why is Hydro, which can produce low power, is prohibited from doing so? I, as a consumer am a little trepidations that might be to benefit a higher cost producer that can't get into an integrated market. So what you do is you break your integrated market so outside IPPs can get in and make money. To me, as a stockholder of BC Hydro, I would say that is insane because I don't want you prohibited from doing anything that is in the best interests of me as a shareholder of BC Hydro. I would say give Hydro total freedom to exercise its control over its integrated operation for my interest which is a lot of power, lowest price that you can give me so I don't waste though tier-one and tier-two pricing, but now we have topic 5 and rather than being scared of this we are going to now create a system where we export or get rid of energy. I like the current approach, traditionally – give Hydro the flexibility to produce a surplus, sell it at the highest price which is in their interests to generate a profit from surplus – surplus to my needs which is as a shareholder of BC Hydro. So I would say unfetter Hydro, let them really compete in the market place. My whole thing is that I am jaded, I think this whole thing for the last ten-years is to restrict the ability of Hydro to do what it is really designed to do which is it can out compete any private producer in western North America and that is a bad thing for some people; but for me, it is a darn good thing.

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- A: *David Ince:* We are a net importer. We import and export everyday but on average we bring in more power than we send out and there gets a point, in terms of the imports, that it becomes a real risk. So California, for example, imports 25% of their electricity on average and you saw what happened in the winter of 2000-2001 where they had rotating black outs and they spent \$60 billion extra on electricity costs that winter and it cost, and an Austrian bodybuilder managed to get elected as a result of the corresponding fall-out. So, things got really weird there, so it comes to a point at which BC Hydro could become so constrained in terms of electricity supply if you let it go on that it becomes a real reliability risk and a real cost risk. So for a big net importer then we are dependent upon the market and market prices on electricity are a lot more volatile than anything including gasoline prices or natural gas or anything. So we appreciate your comments but me as a planning engineer, I get really nervous when we start to get really short on energy.
- C: *Randy Halyk:* I thought that Rob had suggested unfettering Hydro, in other words maybe there are some big projects other than these little things that are happening that could be done so that there would be a value-added for the province and I think that is something that is really important and I know that you said it is government policy but maybe it is time to change government policy.
- Q: *Brian Downie:* Could you clarify, there are two approaches here – the current approach adding clean generation, does the Clean Energy Act restrict Hydro from building to export?
- A: *David Ince:* It asks BC Hydro to investigate partially through this process, through this consultation, whether or not, first of all is it is publicly desirable, then also investigate the costs of it and if there are markets. So we have to see if there is a market, if it is going to be cost-effective to make sure that it is not a burden on the domestic customers. The government has clearly expressed that they don't want this to be a money losing venture and must meet domestic demand first. It must meet domestic demand first before looking at others.
- Q: *Brian Downie:* My question is about, potentially for a consumer, if we were to take \$150 million in net revenue and increase it we could produce more and we could afford to buy expensive forms of power off-set by the value of the export and that is possible under the Clean Energy Act?
- A: *David Ince:* Yes.
- Q: *Randy Halyk:* This is off-the wall I guess, we have a dam in our region, Kemano and I know that it was, it had been planned to be opened and producing power but there was something political – any comments on that, has there been any communication with the industrial company that halted that or is that sort of something that is on the books or in the planning stages?
- A: *David Ince:* You are referring to the Kemano Completion project, I haven't heard; that was cancelled and I understand Alcan received compensation as a result of that cancellation but that was many, many years ago and I haven't heard anything subsequent to that that would indicate that the completion is going ahead.
- C: *Steve Wilson:* Without having the government be a big part of the solution here it doesn't really matter what goes into this because at the end of the day there are a lot of other fluid pieces that need to be addressed and you can't do this without those pieces being part of the equation. Unfortunately, in this area, we don't have very good leadership; in fact we don't have any leadership at the Member of Parliament or Member of Legislative Assembly level. You need to be able to sit there and take a look at the pieces, in here, then draft the kind of policy and legislation that are going to create the natural linkages to the other pieces in the puzzle that need to be put in place. So, without the government being involved and going through a very similar consultation it is always going to be fragmented. And, until consultation and accommodation of First Nations is dealt with Kemano II is never going to happen. That is probably on a scale of a Site C and could have a lot of benefit but you are dealing with a company that in the interior doesn't know how to treat First Nations very well. Only recently BC Hydro has just started to learn what aboriginal relations really means and you know it is just starting to see some things but you are far from being looked at as having some really good relationships where these kind of issues are going to go away and I don't think it is your problem but having said that BC Hydro argued successfully in the Supreme Court that you are the Crown and exempt from First Nations taxation. So it is like okay so what are you? Are you a Crown

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corporation, or are you a corporation? Unfortunately when you made that argument, not you but when BC Hydro made that argument that you are the Crown and you became exempt from First Nations taxes, you are part of the Crown and you have a legal obligation to consult and where appropriate accommodate. So within that mix you have got a lot of layers that need to be worked out.

C: *Derek Baker:* I think it is important that we note a lot of proposed industrial projects could be taking place in the near future; in Prince Rupert we have the electrification of the Port of Prince Rupert and we could be seeing a doubling or tripling of capacity through an expansion there as well, and there are more regional mining projects as well. So it is important to take those factors into consideration when determining the supply gaps you have talked about today.

C: *Evan van Dyk:* I know there is the Alcan modernization, the modernization will guarantee significantly more power where they will sell most back to the grid to BC Hydro as they are not using all of it for their own plant, there is the Kitimat Liquid Natural Gas and other projects in the area; and, so proper planning over the next few years is definitely going to be an important concern.

A: *David Ince:* Thank you and any feedback that customers have or you have as development reps to our local community folks and also our key account representatives at BC Hydro - we are always trying to proactively work with our customers and stakeholders to make sure that the power is there. We can be surprised sometimes by these projects that come along and their huge loads and then we have to scramble to sort of catch-up in terms of transmission and generation but any advance warning we have of these things would be greatly appreciated.

A: *Rob Goffinet:* To that point, even Kitimat has been surprised in last few months that the liquefaction process over at the Kitimat LNG plant is not the burning of the product pipeline but gas with a turbine and they have just announced it, a couple of months ago, that it is all electrical liquefaction and there is only one other plant, I think in Finland, that liquefies the natural gas by means of electricity and its load is 400 MW, if they build both trains. So that is a concern for us as that is a huge load going into Kitimat because as you have just observed Alcan is probably going to use most of its 800 MW for their modernization. So we are concerned about that, that is transmission right.

A: *David Ince:* That is a concern. So a lot of these proposals are still in the very early stages but liquefied natural gas could potentially be a huge load in this part of the world.

4. Feedback Forms
Participants of the meeting were thanked for participating and were encouraged to complete and submit feedback forms. Participants were also encouraged to attend one of the upcoming open houses (dates, times and locations listed in the consultation workbook).

5. Closure
The meeting ended at 3:00 p.m.

Integrated Resource Plan Appendix 7C-2

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PURPOSE	Meeting notes from a multi-stakeholder group meeting with stakeholders BC Hydro staff on March 23, 2011 at the Ramada Prince George, 444 George Street, Prince George, BC.
FACILITATOR	Nancy Spooner, Kirk & Co. Consulting Ltd.
PRESENTER	Basil Stumborg, BC Hydro
MULTI-STAKEHOLDERS PRESENT	<p>Dan Adamson Greg Anderson Clara Appleby Holly Armstrong Bill Arnold Dave Barasso Lara Beckett Marisa Cuenker Tom Dall Sylvain Gauthier Tom Greenaway Robert Guy John Illes Cheryl Jahan Stephan C. Jobs Sotirios Korogonas Tim McEwan Adrian Mohareb Kerry Morton Janine North Dan Rogers Diane Smith Jarl Sundave Rick Thompson Rosalind Thorn Warren Wilson</p>
STAFF ATTENDEES	<p>Brandee Clayton, BC Hydro Dave Conway, BC Hydro Nan Di, BC Hydro Kevin Marshall Tim Lai, Kirk & Co. Consulting Ltd. Emilie Yee, Kirk & Co. Consulting Ltd. , Recorder</p>
AGENDA	<ol style="list-style-type: none"> 1. Welcome and Review Agenda 2. Consultation Workbook Overview 3. Discussion 4. Closing Remarks

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KEY THEMES

- 1. Conservation and Efficiency** – Participants were supportive of greater incentives for conservation but expressed concern about affordability of measures that might be enforced through legislation.
 - Participants expressed support for Smart Meters as one way to encourage greater conservation.
 - Industry representatives encouraged BC Hydro to use rate design or financial solutions to encourage conservation rather than legislation.
 - Participants were supportive of rate incentives but asked that BC Hydro include geographical considerations to reflect seasonal conditions.
- 2. Electricity Generation**
 - Some participants suggested that geothermal energy and Biomass should be considered by BC Hydro as an alternative to other technologies.
 - Some participants encouraged BC Hydro to explore opportunities for distributed generation and feed-in tariffs.
 - Participants expressed a desire for BC Hydro to consider offsetting transmission costs by locating generation closer to the load.
- 3. Electrification** – Some participants felt there is a contradiction between government’s desire to promote energy conservation and its interest in promoting electrification.
 - Some participants warned BC Hydro about the impracticality of promoting electrification for transportation (vehicles) in the north, given the distances travelled.
- 4. Transmission** – Most participants were supportive of BC Hydro pursuing a proactive approach to planning and building transmission lines to encourage the development of renewable energy projects.
 - Some participants encouraged BC Hydro to develop a more integrated trade market within Western Canada to take advantage of existing facilities.
- 5. Export Potential** – Participants were generally in favour of BC Hydro pursuing electricity generation for the purpose of export as long as the environmental and social impacts on taxpayers are not prohibitive.

DISCUSSION

- 1. Nancy Spooner – Welcome and Introductions**

Nancy Spooner welcomed participants to the stakeholder meeting, explained the format of the meeting and introduced the consultation workbook and feedback form. Roundtable introductions followed.

Nancy emphasised the five consultation topics and the feedback form at the back of the consultation workbook.
- 2. Basil Stumborg – Consultation Workbook**

Basil Stumborg reviewed the format of the consultation workbook and explained the processes and factors BC Hydro considers when energy planning. Cam explained the difference between demand side options and

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supply side energy options and how BC Hydro factors this into the balancing the options when developing a long-term plan.

(Abbreviations will be used and mean: Q: Question, A: Answer, and C: Comment)

- Q: Clara Appleby: I am assuming you mean smart meters going on the houses?
- A: Basil Stumborg: we have a Smart Meter Initiative which will form a backstop.
- Q: Clara Appleby: I would like to say the lower mainland has more options than the North does when it comes to transit and the ability to use less fossil fuel. The other thing, is be careful what you legislate like the new light bulbs that contain mercury. You can't take them back to the store, and there is no recycling for them up here. They will be thrown in the trash. The light bulbs that work in the lower mainland also don't work here where it is -20 degrees.
- Q: John Illes: In general, I am support of energy conservation. I switched from natural gas to geothermal but now my rates are higher. I don't know how that matches with electrification?
- A: Basil Stumborg: I think that is a difficult one. Electrification makes us move away from things we are comfortable with. That being said, if we want to reduce green house gases then we want to do I the most efficient way we can. Our load will increase and the costs will increase. Our first approach to that is energy conservation.
- Q: Tom Dall: For northern rural communities, I would like to see BC Hydro come up with a plan to take out the old wood stoves and replace them and a program for that would help. My house is heated with wood heat and I spend \$450 on my heating bill. I think that would be a good method to help clean the air and environment. A funding program would be helpful.
- Q: Bill Arnold: I'm concerned about the statement that conservation is more efficient and less expensive. My question is whether you are talking about less expensive for BC Hydro or the average home owner. If we have to renovate, there are lots of people in this country who cannot afford to retrofit. Is it more economical or just shifting the cost to improve BC Hydro's bottom line.
- A: Basil Stumborg: when we look at costs we look at how much it will be to get from IPP or from our own systems. When we do that, we are aware that the average costs glosses over the distribution for users and we take a close look at that. One of the demand side management programs are especially designed for lower income customers.
- Q: Sotirios Korogonas: Regarding increased government regulation, I am not a proponent of additional regulation, we would be more comfortable with stronger rate signals rather than having things mandated for the greater good. The risk for us is that mandatory regulation makes it so that our company can't stay competitive.
- A: Basil Stumborg: Thank you for that comment.
- Q: Kerry Morton: Personally I believe this is a societal change because it does impact the industry here. As a resident we are very much tied to the liability of the industry in Mackenzie of the DSM. There are citizens who will struggle to change their demand. Rate structure provides the incentive and makes it fair to all.
- Q: Warren Wilson: Currently you have a two step program for rates and some people in rural areas they are exempt. It's harder to conserve for others and I hope you keep that in mind when it comes to rate changes. For example, they have to keep water thawed for cattle and various other things so it's harder to conserve.
- Q: Tom Greenway: I have two meters at my place. One of which is a two step and the other, on the

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- Farm, is a single step on the farm. The rate is higher for the farm. The cost of burning stock waters are expensive. I don't see why the rate on the farm should be higher than my house.
- A: Basil Stumborg: I don't know the specifics, but with the other rate classes when we moved from a flat rate, under the regulations we can only collect so much money. We have to remain revenue neutral. So the flat rate will look lower than the two tier rate.
- Q: Warren Wilson: I am talking about if you don't have farm status, you have a two step rate. If you have a farm status, your rate stays at the flat rate. Tom has something different from what I have.
- Q: Sotirios Korogonas: is there any appetite for geographic consideration for baseline? In the north, the proximity to triggering the step two rates is seasonal. The people in the lower mainland don't have that same variation. There is no geographic consideration due to seasonal issues we face in the north. That should be considered in terms of conservation efforts.
- Q: Greg Anderson: We value the Power Smart program. On the residential side, I think it's possible to take it a few steps further to help them lower their energy usage. One thing that is missing is the ability to access the equipment to monitor your energy usage minute to minute. On the topic of northern use of power, is there any way that it could be reflected that the northern people are closer to the actual power source? If that is the case, then that would allow you to lower the rates.
- Q: Clara Appleby: Can you explain the cost? Is it the building cost or?
- A: Nan Di: We use a levelized concept to make the calculation. We get the information from IPP or technical experts. They provide the capital cost estimates and then we levelized that cost over 20 years for wind projects, for example. That includes the connection costs to bring the energy from the generation point onto the grid.
- Q: Adrian Mohareb: Firstly, can you explain OMA?
- A: Nan Di: Operations, maintenance and administration.
- Q: Adrian Mohareb: What if you hear from the majority from this province they want Site C? And the residents of FSJ are dead against.
- A: Basil Stumborg: Site C is one of the options. They are currently updating the PDR and from a cost perspective it is looking attracted. There are some technical aspects to it. Ultimately, BCH will put this info together and take it to government. The government wants to know both sides and that there is a full consultation process.
- Q: Tom Dall: One of the unique things is geothermal power in the VAILMPONT. Companies are taking about putting a 10-50 megawatt plant which would be an important project. It costs a lot for BC Hydro to get to us. It creates reliable power and attracts industry and it has a small footprint. I think it needs its profile raised because of the greenness of the power. It would be one of the first major power produces in the project and it would be a good message to send out and open up the doors for future plants.
- Q: Lara Beckett: I wanted to ask about these projects. How many of these other projects, like Site C, will they be built and owned by BC Hydro?
- A: Basil Stumborg: One of the outcomes from IRP will tell us how much we will need from DSM and then determine from that the size and nature of our next calls for power. Under current legislation, this is all that BC Hydro can do to increase its own supply of power. Other than that we need to turn to IPPs.
- Q: Lara Beckett: What is the cost to the public of these IPP's as opposed to investing into public ownership of these potential projects?
- A: Basil Stumborg: We are not really looking into that with the IRP. We are taking the government policies as a

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backdrop.

- Q: Tim McEwan: One of the things that I'm not clear about is how natural gas and the long term pricing demonstrates risk which is on the downside? I know BC Hydro did estimates a few years ago.
- A: Kevin Marshall: The price range has a range of all the natural gas outcomes. You can also have to account that all natural gas has to be purchased. You see a lot of shale gas but there is a lot of waste water issues which you would need to clean up. That means you have to double the costs so there is a lot of upswing for natural gas costs.
- Q: Tim McEwan: Some large industry is suggesting that the long term price for natural gas is the 5-7 dollars. What is your price suggesting?
- A: Kevin Marshall: When we do the modelling we have 3 different ranges that we use. BC Hydro looks at what the best situation would be in each scenario.
- Q: Tim McEwan: In terms of looking 5-10 years out, what is your forecasting saying about natural gas?
- A: Kevin Marshall: The low one starts to trend up at a constant rate.
- Q: Jarl: I have a question regarding the water levels at Williston. It may have a large impact on zoning below the level of 2160 metres; we cannot deliver wood to the mill. Is there any way to come to an agreement as to how much far you can draw down the reservoir?
- A: Bob Gammer: I think the short answer is under the current water use plan, there is an agreement that we can draw down as low as 2147 metres with permission from the comptroller. All people at the table agreed to this. With further permission from the comptroller it could be drawn further.
- Q: Tom Greenway: I feel that biomass should move to the top of the table. With all of the dead pine out there, the lifespan is almost done and they will be falling over and wasted. All the brush piles were burning and there was poor air quaintly. The landfill in the regional district is the biggest cost. This stuff can be burnt. Why don't we take the landfill and the waste and bring them together?
- A: Basil Stumborg: Thank you for your comments.
- Q: Sotirios Korogonas: When you talk about the portfolio, I think the question has to be broader. If you are looking for a portfolio you need a control system. Is BC Hydro considering the control system?
- A: Basil Stumborg: That is why you need to put it in your portfolio.
- Q: Sotirios Korogonas: You need to find your lowest cost and maximize your energy capacity.
- Q: Dan Adamson: I wanted to ask around the micro projects, and the consideration around feed and tariff's.
- A: Basil Stumborg: Under the Clean Energy Act there is a requirement from the government. It's under consideration right now.
- A: Nan Di: BC Hydro is working with the government on this.
- Q: Dan Adamson: Is that considered too small and too risky to be included in the mix?
- A: Basil Stumborg: We have considered other projects and that has been included as a potential resource option, like the Ontario solar power, for example.
- Q: Dan Adamson: In 20 years there might be a considerable change in technology.
- Q: Tom Dall: I want to go back to geothermal power. That is 100% proven. I realize we live at the end of Kim Basket Lake and I know they play around with those two lakes. Natural gas will offset those concepts so we don't have to draw out the lake. I think these power projects, like geothermal, are better because they run 24/7.
- Q: Adrian Mohareb: I just wanted to ask something regarding option three. Will thermal generation no longer provide base load capacity?

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- A: Basil Stumborg: Under the Clean Energy Act, BC Hydro can allow thermal to account for 7%. Burrard Thermal is not to be considered anymore however it is available for emergency only.
- C: Kevin Marshall: That 7% also includes energy from IPP's.
- Q: Marisa Cuenker: The efficiencies of the existing Hydro electric dams. When you look at Site C, there is new technology. Is there room to improve the existing plans?
- A: Basil Stumborg: Currently, we have a program called Resource Smart. Site C, the existing plans are from the 1980's so the Site C team is looking at new technology out of a new design. Again, that is being updated as we speak.
- C: David Conway: Is there the available to add new generators? At the existing facilities, there is no room to add new generators. At Mica and Revelstoke there is and we are underway with doing that.
- Q: Marisa Cuenker: What is the lifespan of the turbines at Williston?
- A: David Conway: They have about 40 year span and we are reaching the end of the lifespan. Peace Canyon has been done.
- C: Bob Gammer: We are changing some of the turbines and we are using better technology. There are some bottlenecks in the chain that restrict us from using that capacity.
- Q: Clara Appleby: When you look at these packages are you looking at the job creation? Biomass is the only one that includes ongoing jobs. We have a loose association in McBride with a potential biomass customer and run-of-the-river IPPs. That association will allow us to run one line instead of having a bigger line to run capacity.
- A: Basil Stumborg: Yes, the government through the CEA has asked us to create jobs and we recognize that with large projects. Our planning process recognizes that biomass creates more jobs.
- Q: Adrian Mohareb: Would you be willing to use the existing legacy sites that you have as pump storage power plant if you chose portfolio number one?
- A: Basil Stumborg: we are exploring the possibilities. Some would be new and some would be existing generation sites, so it will be a mix.
- Q: Sotirios Korogonas: Are you considering off-set transmission costs? Off-setting transmission costs are an economic consideration.
- A: Nan Di: That will be included in the financial results so yes we do include that.
- Q: John Illes: I favour the proactive approach as opposed to electrification. When we talk to our investment managers, I think that's where we have to go. As a province we need to take that risk.
- Q: Kerry Morton: I am having trouble matching up promoting electrification while we are looking for supply. It doesn't make sense to me.
- A: Basil Stumborg: That picture that we looked at regarding the supply and demand gap does not include electrification. It would be a substantial bump up.
- Q: Kerry Morton: What if you gained in the end; I'm just struggling with that.
- A: Basil Stumborg: The only way it would make sense is if we get it with clean resources.
- Q: Kerry Morton: So it directs you right to option one or two.
- Q: Greg Anderson: What about electric cars? Does it make real sense?
- A: Basil Stumborg: We are looking at what the demand profile looks like and how fast we could get those cars. We need to infrastructure as well as an education program to make it make sense.
- Q: Marisa Cuenker: Is there room for public transit to be electric or is that too big of a vehicle?
- A: Basil Stumborg: That is a bit beyond my level of knowledge but I know people are working on it.

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Ramada Prince George

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- Q: Marisa Cuenker: If that government supports it, then there are a lot of vehicles in the lower mainland.
C: Kevin Marshall: Ballard Power had a fuel cell bus and they did do some tests on that so there is some technology.
- Q: Tom Dall: For those of us who live in rural communities, electrification is not going to work for us unless you come up with something totally different. Electric cars are not reliable for us.
- Q: Warren Wilson: These capacity stations, what do they do?
A: Kevin Marshall: I think it does help to power the rest.
- Q: Adrian Mohareb: My question is with the availability of wind, geothermal, hydro maps, etc. Wouldn't that risk be reduced? Isn't that a way to mitigate the costs why not build the potential?
A: Basil Stumborg: that is the path that we've taken, where they are richly concentrated. If we have a call for power, are there IPP's willing to take the risk and bring those resources to marketing.
- Q: Sotirios Korogonas: If you were to do portfolio three, if you were going to get into gas generation wouldn't it make sense to consider expanding our horizons like the Albertans that have build gas and coal? Then only incurring the cost of transmission? With your demand growth in the north, wouldn't it make sense? Alberta is growing in the northwest and our green resource would help them as well.
A: Nan Di: We import or export with our neighbours. Our Integrated Resource Plan is long-term planning but The Clean Energy Act created a policy that we are self-sufficient policy by 2016.
- Q: Tom Dall: Over the past two years, the province of British Columbia, Alberta and Saskatchewan have been working in a more integrated way. I would encourage that kind of thinking around the Western Canadian energy market.
- Q: Clara Appleby: I would like to say that we can be self sufficient and not use our own hydro. The size of the line shouldn't be under or over built. That can be a bit of an issue. If you made loop lines then you can swing the power around and you wouldn't have to upgrade the station around the way. We are taking about the production of hydro but why don't we build the lines for sale in addition to generation?
- Q: Tom Dall: I am not trying to push geothermal but we know it's a constant resource. Regarding transmission lines, if we can satisfy the local areas with power then it has the ability to send power back to the grid. That would allow all of the IPP projects to fire it back so you keep the power locally.
- Q: Marisa Cuenker: My comment builds on Toms. Would BC Hydro consider a partnership with IPPs whether they be geothermal or wind, etc? Maybe it would get small business going in communities would be more independent?
- Q: John Illes: If you do the proactive approach you attract more IPPs. I think the Northwest Transmission Line is a good example of that.
- Q: Bill Arnold: The conception to the competition of a hydro project is set at approximately 5-7 years. On the other hand, transmission lines take much longer than that. Transmission line planning has to be done aggressively and it also has higher risks. If the transmission line isn't there the IPPs aren't able to go ahead with their projects. It's very critical.
- Q: Dan Adamson: There is a group up here of 14 mayors and they do have a strategy on their website regarding infrastructure and energy that I think you should look at.

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- C: Bill Arnold: Firstly, setting a goal to produce power for export, if we do that, are we getting ourselves in a position as the soft wood lumber agreement? On the plus side, if we increase our production for export, it also increases our need for transmission which helps support the building of transmission lines and then we'll have them there when we need them ourselves.
- Q: Lara Beckett: To move to looking at export in a new direction than traditionally, we spoke a bit about financial accounting. But when it comes to green house gases, if you aren't counting the logging and flooding I'm not sure that we are really gaining a whole lot with IPP. The footprint they have might offset.
- Q: Kerry Morton: I am not opposed but my caution is if it comes at the expense at the water level, the other industries in Mackenzie have lived there for three years without industry. It not only impedes the industry but also the liveability of the community itself.
- Q: Adrian Mohareb: I want to make sure that i understand. I think John mentioned if "you build it they will come" if we develop extra capacity and say electrification comes in, will we be stuck or can we return to using that energy capacity for our own demand.
- A: Basil Stumborg: The government has suggested we will only build if we can find it with contracts. Once you've signed the contract then you can't sell to local consumers. If this is based on water or wind flow you are selling firm energy, but generally once you've signed you can't resell.
- Q: Rick Thompson: does that mean exporting could affect the availability to local consumers?
- A: Basil Stumborg: The idea is that you wouldn't sign a contract unless you could link with a new source of supply. There is also the question about our existing facilities. There is some interaction between the sources and that is an important part of BC Hydro's role.
- Q: Rick Thompson: I like the concept of economic development.
- Q: Sotirios Korogonas: BC Hydro has a monopoly but if there was a benefit to the rate payer to buy low and sell high, what would the negative be?
- A: Basil Stumborg: PowerEx trades quite a bit already and they already buy low sell high. The government says that Site C will be the last power project of its kind.
- Q: Dan Rogers: Is the policy area broad? Is this an area that can be pursued for the benefit of rate payers or is that an open ended question. If you pursue generation, where would those benefits flow?
- A: Basil Stumborg: The CEA laid out the frame work for who pays and who benefits. The first \$200 million goes to the rate payer and the rest goes to the province. We have to track costs separately.
- Q: Dan Rogers: One would think that less reliance on global systems would be a trend or maybe that is addressed through the contract and the need.
- A: Basil Stumborg: There is a trend for small projects so you don't have those long transmission lines. You can take advantage of the load characteristics so it's kind of a bit of a mix. The USA has been driving this trend. They produce most of the energy with coal so they need to get other energy from somewhere.
- Q: Lara Beckett: What happens with feedback addressing larger policy?
- A: Basil Stumborg: we are accepting all feedback and if you look at the back there is an additional comments section so please feel free to add them there.
- C: Nancy Spooner: We are also accepting written submissions as well.

Integrated Resource Plan Appendix 7C-2

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4. Feedback Forms

Participants of the meeting were thanked for participating and were encouraged to complete and submit feedback forms. Participants were also encouraged to attend one of the upcoming open houses (dates, times and locations listed in the consultation workbook).

5. Closure

The meeting ended at 3:00 p.m.

Integrated Resource Plan Appendix 7C-2

**BC Hydro Integrated Resource Plan
Fort St. John -
Multi-Stakeholder Meeting**

Quality Inn
Northern Grand

9830 100th Avenue
Fort St. John, BC

MEETING DATE MARCH 24, 2011 1:00 P.M. – 3:00 P.M.

PURPOSE	Meeting notes from a multi-stakeholder group meeting with stakeholders BC Hydro staff on March 24, 2011 at Quality Inn Northern Grand, 9839 100 th Avenue, Fort St. John, British Columbia
FACILITATOR	Judy Kirk, Kirk & Co. Consulting Ltd.
PRESENTER	Cam Matheson, BC Hydro
MULTI-STAKEHOLDERS PRESENT	<p>Andy Ackerman David Bell Arlene Boon Doug Boyd Vern Boyle Colleen Brown Bruce Christensen Diane Culling Dan Davis Larry Evans Jennifer Fernandes Grace Fika Marcie Fofonoff Tara Forest Ken Forest Larry Fynn Valerie Gilson Dwayne Hart Gwen Johansson Deb Kunz Roberta Kuropatwa Jim Little Bruce Low Ryan Lux Clarence Mineault Travous Quebell Malcolm Suernault W Sentanick Victor Shopland Ruth Thompson Craig Thomson Grant Timmins</p>
STAFF ATTENDEES	<p>Steve Vanagas, BC Hydro Randy Reimann, BC Hydro Anne Wilson, BC Hydro Lindsay Fane, BC Hydro Amir Amjadi, BC Hydro Dave Conway, BC Hydro Bob Gammer, BC Hydro Kate O’Neill, BC Hydro Cindy Verschoor, BC Hydro Nancy Spooner, Kirk & Co. Consulting Ltd.</p>

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	<p>Tim Lai, Kirk & Co. Consulting Ltd. Emilie Yee, Kirk & Co. Consulting Ltd. , Recorder Max Tobias, Kirk & Co. Consulting Ltd.</p>
<p>AGENDA</p>	<p>1. Welcome and Review Agenda 2. Consultation Workbook Overview 3. Discussion 4. Closing Remarks</p>
<p>KEY THEMES</p>	
<p>1. Conservation and Efficiency – Participants said that BC Hydro should include the more pro-active approach to conservation in its Integrated Resource Plan, suggesting that increased application of mandatory codes and standards and additional use of higher electricity rates to encourage conservation would be useful in increasing conservation.</p> <ul style="list-style-type: none"> • Participants expressed support for Smart Meters as one way to encourage greater conservation • Some Participants said BC Hydro should restructure industry rates to encourage more conservation. <p>2. Electricity Generation Options – Some participants strongly opposed inclusion of Site C in any resource portfolio included in the Integrated Resource Plan.</p> <ul style="list-style-type: none"> • Some participants suggested that natural gas could be a superior alternative to Site C given it’s abundance in the Peace River Region and it’s relatively low cost • Others suggested that geothermal energy should be developed by BC Hydro as a superior alternative to Site C. • Participants expressed a desire for publically developed and owned energy generation and said that the Provincial Government to expand BC Hydro’s mandate to include responsibility for development of electricity generation options such as geothermal, solar, wind, biomass and other renewable energy options. • Participants expressed a desire for BC Hydro to do more to develop electricity generation closer to where the energy is consumed. • Participants said they think there is a contradiction in government policy between the desires to reduce the use of fossil fuels while planning to encourage exploitation of natural gas in the Peace River Region by providing electricity for natural gas extraction. <p>3. Electrification – Some participants expressed concern that pro-active electrification could increase demand for electricity, increasing the likelihood of developing Site C, which these participants strongly oppose.</p> <p>4. Transmission – Participants were divided regarding whether BC Hydro should pursuing a proactive approach to planning and building Transmission lines; some said they should respond to transmission needs as they arise and reduce the need for long transmission lines by developing electricity generation closer to</p>	

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energy demand centres. Others said BC Hydro needs to proactively plan and build transmission lines to encourage the development or renewable energy projects.

5. Export Potential –Participants said they were not in favor of BC Hydro pursuing electricity generation for the purpose of export because they don't think the revenue and low-carbon benefits are worth the impacts to rivers and agricultural land by developing resources needed to generate the electricity.

DISCUSSION

1. Judy Kirk – Welcome and Introductions
Judy Kirk welcomed participants to the stakeholder meeting, explained the format of the meeting and introduced the consultation workbook and feedback form. Roundtable introductions followed. Judy emphasised the five consultation topics and the feedback form at the back of the consultation workbook.

2. Cam Matheson – Consultation Workbook
Cam Matheson reviewed the format of the consultation workbook and explained the processes and factors BC Hydro considers when energy planning. Cam explained the difference between demand side options and supply side energy options and how BC Hydro factors this into the balancing the options when developing a long-term plan.

(Abbreviations will be used and mean: Q: Question, A: Answer, and C: Comment)

Q: *Jim Little:* In terms of transmission, are we still using the old method? Europe is using direct current and that is much better for long distances like from the Peace Region to the Lower Mainland. There is difference in what we lose and that will make a difference in your planning.

A: *Amir Amjadi:* HVDC (High-Voltage Direct Current) is more appropriate for moving bulk power across long distances in the range of 500-600 kilometres. For BC Hydro, we do consider HVDC if we are considering bulk transmission of power. That will be one of the options that we consider as there may be other alternatives. It will depend on which option we choose and that is why we are engaging with you so we can see what you think is the best solution.

Q: *Jim Little:* Thanks, as long as it's considered.

Q: *Andy Ackermann:* Do you have a research facility for new technologies? For example, the provincial government banned the regular light bulb but now we are discovering there are many issues with the new CFL light bulbs. Do you have a place where you can look at this stuff so you can say this actually works and as part of the long term conservation initiative it works? For example, if there is a problem with mercury content then we've created a problem.

A: *Cam Matheson:* We have a subsidiary called Power Tech Laboratories who look at these issues with us. We are not doing this in isolation. It is occurring across the western world and pooling our resources with other utilities to determine what the impacts are.

C: *Judy Kirk:* Were you wondering if BC Hydro would guarantee or certify these products?

A: *Andy Ackermann:* We've been forced into a new product and now that Plan A is gone, the government is caught behind the eight ball. The first thing my wife and I did was look to see where the new bulbs were made and we see that there are disposable issues. There has to be a responsibility from BC Hydro if you are going to convince us that we need to make this switch. The long term negative impacts were not really looked at. What are we going to do?

Q: *Colleen Brown:* Does BC Hydro think 66% conservation estimate realistic? I sat on a panel review and we

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- didn't consider new technologies like electric vehicles or any of the new demand in the north. It just wasn't on our radar back then. How is BC Hydro thinking internally on those changes?
- A: *Cam Matheson:* We are looking at it all the time to see if it is going to succeed. In each of the three areas there is a lot of complexity. We were looking at our success rate over time and we are revising our thinking over time. The new demand, the demand that we couldn't have foreseen is an important feature on what we will be discussing. If we move to electrifying our economy, using BC Hydro's clean system we look to how that will impact the 66% target. If the economy moves by 2020 to electrification, you are going to have a larger demand than you thought you would.
- Q: *Dan Davies:* The Smart Metering project looked very promising but now I see that that has changed. I wonder exactly where BC Hydro is standing on that program. I certainly see the benefits regarding usage and conservation. It would be a shame if it was cancelled.
- A: *Cam Matheson:* We are still moving ahead with smart meters per the legislation from the provincial government. The new government will do their due diligence to see if it's still viable. They will want to make sure we are doing what we can to make sure rates are as low as they can be. Provincial government deals with this in the Clean Energy Act and none of that has changed. For us it's still moving forward.
- Q: *Dan Davies:* But what is the progress?
- A: *Bob Gammer:* In July 2011 they should start getting installed in homes.
- Q: *Diane Culling:* I have a concern with the long term projects and the feedback into rate increase. There are many variables in long term projections in my opinion. For the future, people don't understand that demand will be increasing but there is the potential because technology. This article features technology and clean tech companies. These are technologies that are on the horizon and they are viable. There is a California company that is changing air conditioning to make them 80% efficient. According to this article, 30% of American residential demand is used for air conditioning and with global warming that percentage will increase. That is just one example. We don't need to think that demand will increase. The Japanese won't be able to walk away from nuclear but we have to get a handle on our electricity use. When you start saying you need Site C right now, I think that is a dangerous thing. As you say Cam, around the globe very bright people are looking to increase electricity efficiency.
- A: *Cam Matheson:* It is a very good point and we do an annual demand forecast. We don't wait till 3-4 years. We follow these technological changes that you speak of. Right at the time when people in the western world were questioning how much electricity per capita, British Columbia is at the top of high users so there is a lot of room to go, while we are following that. People are dropping their per capita use right at the same time and have pressures to have emitting or uses that are depended on fossil fuels on the electrical system. We have to watch both of those things so we have reliable electricity.
- Q: *Tara Forest:* I'm wondering if there are any plans to improve the ease of which private residents can connect to the grid.
- A: *Cam Matheson:* Yes, and people can do it now but it's not occurring on a mass level. This is the biggest change in electricity as an industry. The idea that consumers are not just taking but actually putting supply back. The plan for us is to develop a feed and tariff by which consumers can think of themselves as suppliers to offset the cost.
- Q: *Arlene Boon:* I've got a copy of the 2008 LTAP and it shows the energy generation and the prediction of the use in 2028. On this graph here, the comparison is at 65,000 gigawatt hours but the graph you just came out with is a lot lower. How did you go from the high prediction to low prediction?
- A: *Cam Matheson:* The graph you are looking at is on page 5 of the workbook. In 2028 we are saying demand is 80,000 gigawatts.
- C: *Lindsay Fane:* Not being able to see that graph I can't tell you what it is. Can I have a look at that document and we can we talk offline?

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- Q: *Bruce Low:* BC Hydro has done a good job of educating customers in BC about the need to conserve. Does BC Hydro work with our export customers in teaching them conservation? I travel quite a bit in the United States and there is no conservation down there. If we helped them it would help us. Do we have a plan?
- A: *Cam Matheson:* We work together and share technology. We work together to answer some of the same questions we deal with. California by and large is a major exporter of power and one of the few jurisdictions that are ahead of us.
- Q: *Larry Evans:* In Vancouver they don't seem to be conserving any energy. You may be shifting the charge for time of use. Are you going to charge more at night or day? In this room alone, I've noticed that there are ten or twelve lights on that don't need to be. You look around town and there are businesses with their lights on at night. I just started to notice it and yet one is telling them to shut them off. Are they going to charge higher rates at night?
- A: *Cam Matheson:* That is generally in the area of Time of Use Rates because of the peaking element of energy use. There is no plan right now, but my view is that it will come.
- C: *Randy Reimann:* I just wanted to let you know that the Eco Depot will recycle your CFL bulbs along with Canadian Tire and Home Depot.
- Q: *Diane Culling:* On the topic of California energy, I believe that they have flat lined over the last few decades. This is from May 2000 and it's a paper done out of UCLA. We examined the growth in electricity demand. One of the main conclusions was that the electricity use in California in the 1990's did not grow explosively. In absolute terms it was higher in the 1980's than the 1990's. My point is that it's reflecting technology again. When we look at these graphs, all of it is the unanticipated advances that we have to consider.
- Q: *Lindsay Fane:* To get back to Arlene's question, the graph you are looking at here is the outcome of our old Integrated Resource Plan work in 2008 called the Long-Term Acquisition Plan (LTAP). The difference is that the supply gap we show in the workbook shows a gap between supply and demand. In Arlene's graph, the gap filled with future potential resources that we were looking at in our 2008 LTAP. Without having the exact numbers, it's hard to tell you what makes up the missing supply. The reason you get up to 60,000 gigawatt hours in 2028 that is what you can fill the gap.
- A: *Arlene Boon:* That doesn't include Site C, though.
- C: *Cam Matheson:* We are just saying we need future additions.
- C: *Lindsay Fane:* We could fill that gap without Site C. But it was one of the potential options that we considered to fill that gap. We can talk about this later if you want to talk about it.
- Q: *Participant:* I agree that we need to do more. The City of Fort St. John is a good example of what we did with our water policy. We are saving 750 million litres of water a year and that shows that people have shifted automatically to conservation. Are we actually reducing demand because the population is going up? We live in a province, including in the lower mainland, it gets dark early. However, I don't like to see downtown Vancouver lit up like a Christmas tree in the evening. That is where BC Hydro needs to get tougher on conservation. I think we need to make some mandatory moves and smart metering is a good one and we need to move quickly. When it hits the pocket book it sinks home with most people.
- A: *Cam Matheson:* We see competing elements on the same system. The system demand will grow in BC and we've seen that for 50 years. We think we will see that in the future coming from immigration, growth and new industry. We are seeing a great example of that in the mining, pulp paper and oil and gas industries. At the same time, we are having an impact with Power Smart and the overall saving we get through saving and energy efficiency. We will see additional demand on the system over time.
- Q: *Tara Forest:* In terms of the use of lighting in Vancouver, in Calgary there are blackouts on every second floors in old buildings. I'm wondering if there is some policy work with local government.

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- Q: *Craig Thomson*: BC Hydro has three large sectors, my question is shouldn't we target our conservation by sector. What a pop can do they can have some control. There are better incentives for industry to change to time of use rates. We don't have the option as the public.
- A: *Cam Matheson*: We actually do that already.
- Q: *Diane Culling*: My question is whether there is going to be a restructure of industrial rates to promote conservation?
- A: *Cam Matheson*: I think rates will go up for all sectors over time. I can't tell you what that will be nor when but there is a push-pull on this one. The provincial government for many years have seen low electricity rates as main competitive advantages. They are reluctant to move off of that. There is a balancing act that has to be found. It's a bit of an art.
- C: *Diane Culling*: The increasing industrial rates become a driver to become more efficient and it's good for bottom line.
- C: *Randy Reimann*: The industrial rate does currently have a two tier rate so when the higher consumption does have a higher rate and it's been there for many years.
- Q: *Bruce Low*: What is the process that happens when a community wants to use biomass within their jurisdiction? Tumbler ridge was excited that biomass would become an economy driver because of the pine killed forest. But recently they've been told it's not happening. Who sets that regulation?
- A: *Cam Matheson*: When we have demand on the system, we have choices around how we would gather that. Our government said in the plan of 2002 that BC Hydro's job was not to be the builder of new resources; we would go to IPP's and gain resources. For 7-8 years we've been acquiring on an as needed bases with calls to power. They will actually bid into these projects that they would like to build and we would select what one is the best for our ratepayer. I'm not familiar with the Tumbler Ridge situation but it would have gone through a process and it must not have made the cut. You're right; it is BC Hydro's call.
- Q: *Ken Forest*: I like electricity. I built a place on the Peace River and I need a lot of electricity. I'm not an advocate for the new Site C dam. The costs that you have listed on page 14 are monetary costs. But, there are social costs as well. The people in Vancouver are going to be happy with the extra electricity. Vancouver and the Alberta Tar Sands will be happy. Arlene Boon won't be happy as she watches her livelihood and heritage get bulldozed down. Another cost is agriculture. Climate change will happen if we like it or not. If it goes up by 3 degrees, we'll see mass immigration. There are environmental costs and then the availability of hydro will not be stable. When wind and solar don't work, you can rely on hydro. How about 50 years from now? You could run into brown outs because of draught. Look Pakistan last year or even Australia with massive floods? Could all Williston or Site C hold all of that? Is BC Hydro going to be firm energy? Why not, geothermal? Why not be a leader and push for that? We sit on the ring of fire, like Japan. We know of spots that we can bring up steam and it's green and clean. It's never mentioned. You have two options with site c and two with run of river, gas and biomass. That is slanted towards site C. I believe those are 30 year old costs. I have trouble with this direction. The biggest one for me is climate change. If Japan has 90% of energy coming from nuclear then why would we not want to diversify?
- A: *Cam Matheson*: I think we do need to think about that whether if we want to put all our eggs in to Hydro projects. Geothermal hasn't come up because we haven't had bids for geothermal but that's not to say we couldn't develop ourselves but we need a change in policy.
- Q: *Ken Boon*: Geothermal is firm and I would say it's competitive because it's a firm energy source.
- Q: *Andy Ackerman*: There are companies that are shipping natural gas to their oil sands to meet demand. I hear concerns about greenhouse gas but the province has been pushing natural gas vehicles for years. We also have a lot of companies saving on electricity because they are going to co-generation. Warren Buffet said the biggest thing to save energy would be to turn their trucks to natural gas as an alternative. You have to remember, when we speak of the economy that natural gas is a huge generator of income for this region.

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- We should look at it more and my friends from Spectra would be pushing it hard. Lastly, maybe BC Hydro needs to change its name to get away from being associated with water so that they can look at other options. I think the city of San Francisco powers itself with geothermal and that's a really big city. I think that you hear criticism and the province has been pushing it forever. I think that maybe BC Hydro needs to go back to the politicians and change the mandate of BC Hydro and get more into looking at alternatives.
- Q: *Gwen Johansson*: So far, the conversation has been about provincial policy. It seems to me there are contradictions in BC's energy policy. The government restricts BC Hydro but on the other hand, your big growth in industrial demand is oil and gas and mining, industries filled with greenhouse gas emissions! It seems to me in oil and gas the province give great incentives. They are not fussy about how they are powered. They talk about the demand for thermal coal will go up because of the situation in Japan. It's time that the province looks at the contradictions on their policy. If you take it out of the ground here why don't we use it here?
- Q: *Diane Culling*: It feels like BC Hydro gets beat up by us but I understand it really is a government problem. BC Hydro has looked at geothermal before. I've got with me a green energy study for British Columbia from 2002. Prior to their mandated change, BC Hydro was looking at all of these options. We need security of energy supply and there are two components; diversity to the source and diversity of location. On the geothermal section, you have identified 16 sites and they supply on the high end range of over 1070 megawatts. I talked to Western Geothermal and asked what's the greatest impediment was transmission.
- A: *Randy Reimann*: We have looked at geothermal as a resource option. The problem is that it's all about drilling holes into the ground; you get a hot spot and then hope the water comes back to you. We have been working with the government to get some alignment and we tried to see some additional people interested to develop some of these sites. Its high risk and you might not get anything out of it. I don't think the resource potential mapped out for the Meager Creek. Lastly, we need to change BC Hydro mandate back to what it was. We know about drilling in north-eastern BC and it would be economic.
- Q: *Colleen Brown*: I am not familiar with the potential energy options, but I've got a concern about the cost ranges. We know the appropriate ranges associated with wind, for example. I know that in terms of large Hydro would. My concern is looking at the comparables. It's not necessarily apples to apples including all of the other impacts. The numbers are not matching here in this book.
- Q: *Dwain Hart*: We are building the Centre of Excellence. Looking at page 13, I agree with Ken around the fact that you are missing the social impacts like social and environmental. David Suzuki was saying today that when he dies, he wants to look at his grandkids and say, "we did the right thing". The social aspect is missing from your plan because it's too focused on economics and finances. We've been talking about our community and when we go back to how W.A.C. Bennett saw things and we need to look at alternatives.
- C: *Cam Matheson*: Good comments, thank you.
- Q: *Gwen Johansson*: We want more detail on pump storage.
- A: *Arlene Boon*: I went onto the WREZ (Western Renewable Energy Zones) Website which is an American program and it appeared that British Columbia is in their strategic plan; Gordon Campbell is represented by Les McLaren. North eastern BC is a big zone that they are looking at and they know the total for BC is 21,000 megawatts. Are we building for export and losing a valley for this? What you are doing right now?
- A: *Cam Matheson*: No, we are not.
- Q: *Arlene Boon*: Why is the United States looking at how much power we are going to have?
- A: *Cam Matheson*: What you are talking about is the energy potential in BC and it hasn't been extracted. It's just a number that is shown to be the potential for energy resources. It's an initiative to look at how North America will meet energy demand. Right now that is basically all it is. They are seeing if there are things that can be done to strengthen the grid so that clean energy can be traded between those jurisdictions. We are

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not overbuilding to export at this point.

Q: *Diane Culling:* You didn't mention geothermal, since the capacity factor is high, geothermal plants are ideally suited because they have the same features of large hydro. Further to that, the actual cost of Site C is not reflected in this book.

A: *Cam Matheson:* We put a footnote that the cost is currently being updated this spring.

Q: *Diane Culling:* In the new estimate, last spring Dave Conway said you had to go back to the board with designing it to get to a better seismic standard.

A: *Dave Conway:* The cost range is using 2007 numbers based on the 30 year old design. We have taken the high end as an example. With the final design, we will take into account the seismic and safety features and environmental standards and then there will be a new project cost.

Q: *Diane Culling:* The original didn't include going into pine pass.

A: *Dave Conway:* Back then we didn't have some of the materials and location of those materials for dam fills.

Q: *Diane Culling:* In this section I feel like the cards are stacked against us. BC Hydro is clearly selling us down the river.

Q: *Gwen Johansson:* We need more information about pump storage. The wind folks talk about the possibility about wind pumped in and I was surprised it wasn't in your options. Two gas companies have bid to get water from our reservoirs and that's not going through. We don't build dams for the oil and gas sector. Who designed the portfolios?

A: *Cam Matheson:* We did here in the energy planning department.

Q: *Margo Boyle:* I have concerns about the Peace Valley and I am not a public speaker so bear with me. The damage to our property is devastating. My uncle was an outfitter for many years and he always told me that the Peace River is a moving breathing entity it will never be still. What will happen when Site C is built? We watch our land fall into the river constantly. I look at the lights in Vegas and other places and as a small private landowner I feel that no one cares. I would like you to address my concerns. When I was eleven years old I talked to Mr. W.A.C. Bennett and he said we would provide recreation to us folks and to this day no one has done so. Bobby told me don't listen to BC Hydro because they won't tend to your needs.

Q: *Craig Thomson:* We are dealing with north to south initiatives on the same time zones. If we had the ability to shift west to east so we could take advantage of having different peak time zones then you could take advantage of that to offset those peak demands.

A: *Cam Matheson:* We are interconnected to the south but not with east in terms of our existing transmission lines. Actually, most grids run north south. California is a summer peaking load because they use air-conditioning in the summer and spikes their electricity demand. We are winter peaking but generally the movement is done on a daily basis and that is really one of the questions in these five topics that I hope we will get to because that is a consideration of ours.

Q: *Diane Culling:* The Pacific Energy Company out of California's website says that they are looking at the technology to design electric vehicles so that cars themselves would act as a battery and store things like wind energy. Being proactive when we don't understand where the ball is going is a problem. I have a big question with the oil and gas industry when you talk about a transmission to Horn River Basin. Why doesn't the oil and gas industry create its own facility? I guess the rate payers should pay it since oil and gas industry is so heavily subsidize. Clark Lake is a hotspot east of Fort Nelson. Thus, they don't need our power up there because they can actually generate it themselves.

Q: *Andy Ackerman:* I have a real concern that this province is going to look like the north east. If you live up here you know what I am talking about. In the oil and gas industry, these lines are almost invisible. My solution to that is instead of building transmission lines, you move to cogeneration plants located where

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they are needed instead of massive lines. People wanted to build gas mines and put pipe in before anything was even approved. I think that we are getting better with technology and we need to ask if we need the transmission lines. Maybe we need to build more site specific lines. We need to get the province off the fact they don't want to use natural gas rather than have transmission lines all over the place. I don't want to tell my grandkids that my legacy was hydro lines.

Q: *Ken Boon:* I agree with having transmission and energy close to the source. If you cut off the arm of a starfish, it still functions because of the network. If you take the head off the head of an animal, you're dead. If you build so many energy systems down 1-3 transmission lines then you are facing more problems. We have wars all over the world and we could find ourselves short of oil across north America and suddenly energy is at a premium. On the other side, we have things like Williston that almost break. Diversification and close to source is better than a single dam up here.

Q: *Dwaine Hart:* I've been watching companies get frustrated in Tumbler Ridge and Chetwynd because there are geothermal, wind and biomass energy options available and what was BC Transmission Corporation is refusing to put transmission down there. If we are going to create new resources, then we need to do some pre planning. The grid is already there and it's just a short distance to the grid. Let's focus on where the resources are.

Q: *Jim Little:* My question is why is the Northwest Transmission Line not included in your plan? It's still a proposal and it's been approved. The Federal government has given money hasn't it?

A: *Cam Matheson:* It's actually not a given that it will get built yet.

Q: *Diane Culling:* Previous to my earlier comment to Japanese looking at alternatives. We don't talk about tidal and wave power and we are right on the ocean. If the technology for those sources really makes sense but we've overbuilt transmission. I think we need to not be too proactive.

Q: *Arlene Boon:* What is the long term for Burrard Thermal?

A: *Cam Matheson:* I'm not 100% sure, but Burrard Thermal is less controversial now than it was in the past. The Provincial government stepped in and said that BC Hydro would no longer rely on Burrard Thermal and that no capacity from it would be included in our planning. That means that it will rarely run and only when we can't meet the demand on the Lower Mainland. That's the current role. How long can Burrard go given its age and inefficiency and the money it takes to operate? There is no answer.

Q: *Ken Boon:* I'm not in favour in developing export if it means destroying our rivers and our province. We have 20% of arable land in the Peace Region that we will need 10-15 years from now. As climate change happens, there are going to be places that will run out of the ability to feed themselves. If you could find and develop massive geothermal, I wouldn't see a problem with that. You can't destroy farmland for a dam that will last 70 years because then it's gone for good.

Q: *Gwen Johansson:* One point I'd like to make is have you researched the California buffet?

A: *Cam Matheson:* There is still a legal battle. Inevitably, whenever you get into a buy sell agreement over the long term you take on risk that one party will do something that they aren't supposed to do. The risk is both ends.

Q: *Craig Thomson:* One of the markets we haven't developed enough is the ability to curtail industry. We were part of that a few years ago and it worked well. There are economic factors that could be part of the long term plan.

A: *Cam Matheson:* Yes that is still part of our program. Craig is saying we should be looking further to curtail industry at peak times. That is a feature of our Power Smart program and customers will increasingly be

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willing to take production down and get compensation for that. If you do that on a long scale then you have to think about economic things.

Q: *Jim Little:* We have a big contract to sell to the states and the downstream benefits for the Columbia Power. My concern about export is the fact that we the people in BC will share an average cost so that we can sell cheaply down to the states.

Q: *Diane Culling:* We are talking \$300 million that California still owes us. Selling energy was a great system for our surplus but developing energy just to sell it to our neighbours is synonymous with selling raw logs. We don't want to export our jobs, too.

C: *Participant:* How about oil and gas should we export that too?

Q: *Doug Boyd:* I get a sense today that there are still those that are using and those that are concerned about supplying power. I think there should be a provincial forum with people all over the province to talk about this very issue. We have two groups opposing each other but we are not putting them in the same room to talk about long term planning. We need dialogue because meetings down here and meetings down there are two different conversations. I heard that there was a big run of the river north of Vancouver and people down there are against it.

C: *Judy Kirk:* BC Hydro will post the opportunity for a webinar, and that is one opportunity for across the province. That's not a substitute I just wanted to let you know about it.

Q: *Doug Boyd:* We need a day long forum and get down to the nubs of long term planning. I think that we need this conversation to be face-to-face.

4. Feedback Forms

Participants of the meeting were thanked for participating and were encouraged to complete and submit feedback forms. Participants were also encouraged to attend one of the upcoming open houses (dates, times and locations listed in the consultation workbook).

5. Closure

The meeting ended at 3:00 p.m.

Integrated Resource Plan Appendix 7C-2

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PURPOSE	Meeting notes from a multi-stakeholder group meeting with stakeholders BC Hydro staff on March 24, 2011 at Quality Inn Northern Grand, 9839 100 th Avenue, Fort St. John, British Columbia
FACILITATOR	Nancy Spooner, Kirk & Co. Consulting Ltd.
PRESENTER	Randy Reimann, BC Hydro
MULTI-STAKEHOLDERS PRESENT	Lori Ackerman Andy Becker Arlene Boon Karen Brady Brian Churchill Diane Culling Montana Currie Horatio Galanti Heather Hannaford Don Irwin Sandra Lemmon Merlin Nichols Marty Paradine Ross Peck Linda Sewell Lorn Shallock
STAFF ATTENDEES	Cam Matheson, BC Hydro Steve Vanagas, BC Hydro Anne Wilson, BC Hydro Lindsay Fane, BC Hydro Amir Amjadi, BC Hydro Dave Conway, BC Hydro Bob Gammer, BC Hydro Kate O’Neill, BC Hydro Cindy Verschoor, BC Hydro Judy Kirk, Kirk & Co. Consulting Ltd. Tim Lai, Kirk & Co. Consulting Ltd. Emilie Yee, Kirk & Co. Consulting Ltd. , Recorder Max Tobias, Kirk & Co. Consulting Ltd.
AGENDA	1. Welcome and Review Agenda 2. Consultation Workbook Overview 3. Discussion 4. Closing Remarks
KEY THEMES	
<p>1. Conservation and Efficiency – Participants suggested that more education and greater incentives are required to encourage energy conservation, particularly in areas of the province that do not experience the direct impacts of generation projects.</p>	

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- Some Participants said BC Hydro should restructure industry rates to encourage more conservation.
2. **Electricity Generation Options** – Some participants strongly opposed inclusion of Site C in any resource portfolio included in the Integrated Resource Plan.
 - Some participants suggested that natural gas could be a superior alternative to Site C given it’s abundance in the Peace River Region and it’s relatively low cost
 - Some participants encouraged BC Hydro to explore distributed generation options that would enable individuals and small business to generate their own energy.
 3. **Electrification** – Some participants expressed concern that pro-active electrification could increase demand for electricity, increasing the likelihood of developing Site C, which some participants strongly oppose.
 4. **Export Potential** – Some participants said they were not in favour of BC Hydro pursuing electricity generation for the purpose of export because they are uncertain about the real benefits to taxpayers when weighed against the environmental impacts.
 - Some participants were doubtful about BC Hydro’s ability to ensure that the Heritage assets (including Site C) will only be for the benefit of British Columbia taxpayers.

DISCUSSION

1. **Nancy Spooner – Welcome and Introductions**
Nancy Spooner welcomed participants to the stakeholder meeting, explained the format of the meeting and introduced the consultation workbook and feedback form. Roundtable introductions followed. Judy emphasised the five consultation topics and the feedback form at the back of the consultation workbook.
2. **Randy Reimann – Consultation Workbook**
Randy Reimann reviewed the format of the consultation workbook and explained the processes and factors BC Hydro considers when energy planning. Cam explained the difference between demand side options and supply side energy options and how BC Hydro factors this into the balancing the options when developing a long-term plan.

(Abbreviations will be used and mean: Q: Question, A: Answer, and C: Comment)

Q: *Brian Churchill:* Why are the blue bars declining over time?
A: *Randy Reimann:* Two reasons, one is that historically we have relied upon the market and our heritage non-firm energy. In different years you have different snow pack and electricity available. I’ll mention that the Clean Energy Act has a legislation that has asked us to plan to have our system to be self-sufficient to meet our own demand in the province even in dry water conditions. There are some IPP contracts like biomass and when those come to end of life we don’t assume they will be renewed.

C: *Arlene Boon:* In 1982, BC Hydro predicted we’d be having brownouts by now. You’ve been off before and you might be again.
A: *Randy Reimann:* Economic downturns have an impact and that can knock down the load.
Q: *Arlene Boon:* So the upgrades to Williston and other dams won’t that help make this graph or has it flat lined?
A: *Randy Reimann:* The Williston Reservoir turbines are replacing the old ones in the dam. Since the 1960’s, they have been designing them to work more efficiently and that is reflected here. The projects that were developed in 1980’s, most of the utilities there was non-stop load growth and then we hit the economic

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downturn which was very significant. The rate growth changed to about 1.5%. We are never going to go to nothing but certainly there are economic conditions that can change our load forecast.

Q: *Linda Sewell:* Can you identify the demand? I sit coming from the United States or around the province?

A: *Randy Reimann:* These curves are showing BC Hydro's domestic load plus some from Seattle city light. Nothing in here addresses export and we will get to that.

Q: *Brian Churchill:* Can you break it down by commercial and industrial demand?

A: *Randy Reimann:* 40% comes from residential, 25% from large transmission customers and 35% comes from commercial customers. Some of the increases are also coming from mining and oil and gas development. I don't have any more breakouts than that.

Q: *Ross Peck:* You said there was an additional 3000 gigawatt hour surplus, can you explain that?

A: *Randy Reimann:* As the Clean Energy Act asks us to be self-sufficient; the provincial government is looking for us to build in a 3000 gigawatt hour surplus.

Q: *Brian Churchill:* What were you saying about the First Nations resources?

A: *Randy Reimann:* The Clean Energy Act asks BC Hydro to explore and build clean energy resources for other jurisdictions, like for First Nations economic development, when it is economic to do so.

Q: *Brian Churchill:* Can I go back for a second? The Northeast Pipeline from Fort St. John, how does that fit in?

A: *Randy Reimann:* I can't answer your question in terms of the load on the pipeline. We are looking at it in terms of an option.

C: *Amir Amjadi:* We are considering different options of supply of electricity. I think that we anticipate the load growth is 500 megawatts.

Q: *Diane Culling:* I want this to be in the public record. Marty work for the city and he presented an initiative for solar hot water heating for this city. That to me is a clean energy project. Calling Site C is not. Site C is a 60 meter high, kilometre wide dam on a major river valley. Around the province people will not understand the impacts and we need to stop calling it a clean energy project.

Q: *Marty Paradine:* In terms of the embodied Co2 being released from, how are those factors put in with you calculations in your clean calculations in British Columbia?

A: *Randy Reimann:* We do have some estimates for greenhouse gas levels and a lot of it depends on whether you log it out before flooding or not.

Q: *Brian Churchill:* If I'm going to put a wind mill on my roof and generate electricity, is that included in Power Smart?

A: *Randy Reimann:* We do have a net metering tariff that allows you to sell to our grid. There is that and a standing offer program for up to 15 megawatt projects.

Q: *Brian Churchill:* Which of these is it categorized under?

A: *Randy Reimann:* This is shown in the supply stack. We haven't seen a lot but we have seen about 6 standing offer in the pipe. These are preliminary estimates.

Q: *Brian Churchill:* That is the largest potential out there and certainly when I hear people talking about that they'd like to get into it. I'm talking about individual residential not small community.

A: *Randy Reimann:* We've been looking at this and someone at BC Hydro is looking at distributive generation. It's very expensive and so one of the things, going back to the Clean Energy Act, one of the bullets is asking us to ensure that our rates among the most competitive in North America. All of these things must be balanced.

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- Q: *Diane Culling*: I have a small home-built turbine and that's what my HP Printer printed this piece of paper with. My comment is there is a huge potential and it's not actually that expensive. It's accessible and not nearly expensive as you think. When you are looking at modelling your rate increase, are you looking at an integrated perspective? That is a huge driver and the appetite for people to generate their own power. Those rate increases haven't kicked in yet. Are you considering that?
- A: *Randy Reimann*: Yes, we are trying to. Rate increases will make Power Smart and home based supply side options more economic and if people are willing to do that, then that's great.
- Q: *Brian Churchill*: How are things like net metering and individual generating power is an expensive option for BC Hydro? It should be a freebie.
- A: *Randy Reimann*: The net metering tariff allows the customer to sell it back when they don't need it. BC Hydro and the government think that was a worthwhile thing to do. You don't pay for the distribution lines because it's just there when you need it. Not that many people are doing net metering. However, if people dropped their consumption then that would be great. But people are looking for us to pay the marginal cost of the new supply. A lot of the small supply side resources can be double or quadruple that price.
- Q: *Ross Peck*: I think we agree that conservation and efficiency is the way to go but how do we get there. Majority of consumers are exposed to the direct effects. If it's not in your face, there is no reason to shut your light off. We have to look at telling the people that use the power that there is a good reason for them to reduce their use. If you take away Burrard Thermal, then there is no incentive because it's not in your face.
- Q: *Horacio Galanti*: At city hall, we are going through a net metering process right now. It's a small project. I think BC Hydro should run more incentives. We are managing this project but it's not that big to influence the general public. Also, they should get an economic incentive to expand this program. We run the numbers it's really low.
- Q: *Heather Hannaford*: On the same theme, I'm looking at the Hydro logo here, where it says "For Generations". It used to say, "At Low Cost", but that's been changed which I'm happy about. The incentive has to be high price, not low price. If we are sincere, the only way to do it is charge the way people think about houses twice the size of those we need, big flat screen TV's and so on. There are priorities here. Another thing to do is to do with the economic development piece on page eight. Having not read the Clean Energy Act, is it a direct demand that BC Hydro encourages economic development. When I was young, we lined up in the street for food, and we turned off the light. This looks at 2031, by that time I'll be 90 years old, and many of you will not be living in this style. We have to change the way we think towards sustainable living and providing jobs for people. To live in the ability of the earth can provide. Is that the way the government is going to proceed in determining economic activity in this province?
- A: *Randy Reimann*: The way the act has been set up is there are 16 energy objectives. Some say we have to consider and some are mandated. 93% clean is one we have to meet. We need to use clean resources to reduce emissions and to be self-sufficient. What we need to do in the Integrated Resource Plan is seriously consider and let them know how we have addressed it.
- Q: *Linda Sewell*: If the price of energy is not high enough, then we are not going to conserve. So that encourages people to consume less or pay less at off peak hours.
- A: *Randy Reimann*: Yes, that is being considered. For all rate classes we have two-step rates. Right now, people get 90% of their consumption at a low rate and then the rest at the cost of new supply. We are talking about taking that a little bit further so that people have even more of a significant incentive to participate.
- Q: *Diane Culling*: Site C hinders long term economic development. That's 900 megawatts of capacity and you're

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not even talking about loss through transmission. Looking into the future, I'd say we need to start saying we need to endow our four major universities and they will find more than 900 megawatt hours of electricity. If we look hard, we can develop the technology to get what we would from Site C at less of a cost to our environment.

Q: *Ross Peck:* The target of 79% that we are looking at, the Clean Energy Act has been raised from 66% to 83%? Is 83% a potential target?

A: *Randy Reimann:* I think the 66% is the range we can do with the options we looked at. And 79% is what we can count on from our current approach.

Q: *Brian Churchill:* If you were to go out and assist people to do net metering, you could possibly reduce that demand.

A: *Nancy Spooner:* That is the crux of the question. Do people have an appetite for that kind of push and do they think it's the right thing to do?

Q: *Participant:* Do you not own Meager Creek?

A: *Randy Reimann:* No we sold that.

Q: *Arlene Boon:* On page 14, is that the unit energy cost?

A: *Randy Reimann:* Yes.

Q: *Arlene Boon:* In the 2008 LTAP, the unit cost was \$59. Why is this one on the high range?

A: *Randy Reimann:* That was one specific project. Since then it hasn't proven. We tried to look at the geographic formations and here is what the potential could be.

Q: *Arlene Boon:* It's a wild guess.

Q: *Ross Peck:* You don't have a range for Site C? I think that it's been bumped up now from previous costs. I think there are potential design problems that many large hydro projects face. It's very misleading.

A: *Dave Conway:* It's actually not that misleading because we've placed an asterisk that says that it is currently being updated. When we put out the 2007 LTAP we had a range from \$60-\$90 range. We will have a new price in the spring.

A: *Randy Reimann:* The resource options that have ranges here is depending on where you build them. So it's not the capital uncertainty but the fundamental energy source is invariable.

Q: *Ross Peck:* Should you be talking about the delivered cost to the consumer in Vancouver as opposed to here in the north.

A: *Randy Reimann:* We tried to keep this workbook at more of a high level, but in our resource options report we put in an adjusted cost. You'll see the price ranges in there.

Q: *Linda Sewell:* I noticed that natural gas generation has a range and that's based on the price of natural gas. We have lots here in the north and I'm wondering if that is not a possible alternative. There are emissions but you are planning on also flooding a valley that would also have emissions as well. They can produce their own energy with natural gas especially in Fort Nelson.

A: *Randy Reimann:* There are different technologies out there but the advent of shale gas has changed the gas world a lot. The government has asked us to be 90% clean because they are worried about climate change. More information is on our website; I think the range is \$5-\$7.

Q: *Brian Churchill:* I think you assume here that natural gas producers want you to supply with electricity you will do it. That scenario you are looking at with the Northeast Transmission Line with the natural gas infrastructure. Why aren't you generating your own power?

A: *Randy Reimann:* The issue the government is dealing with is the Green House Gas reduction targets. There is a lot of CO2 in the Horn River Basin and there are lots of costs. Are you going to be able to meet Green

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- House Gas targets and that's the question.
- C: *Lori Ackermann*: It amazes me we can't purchase coal power but we can ship it and someone else will burn it. It doesn't make any sense to me.
- Q: *Ross Peck*: At the energy conference up here, it seems that north-eastern BC is wondering what they are going to do all of this natural gas. Natural gas is an ideal transition fuel to get us off the coal to get to cleaner things. I think that is how we need to look at it. They have missed that though. They've gone to coal to Site C and they need a serious look at natural gas.
- Q: *Diane Culling*: Do you know as a fact that south Meager capability wasn't what they wanted. What you've said is basically despite the 2002 report talking about our potential. You said something that dismissed what you said. The climate in British Columbia has not been very welcoming to geothermal energy. I think it's important that we don't know that south Meager wasn't viable. All we know is that it was bought by an American company that they might not be pursuing it.
- A: *Randy Reimann*: I don't want to dismiss geothermal as an option. We are working with the government to see how it's available and we are still looking at that. If we could get geothermal we would love it but it has to make sense.
- Q: *Diane Culling*: This is not a BC Hydro issue this is a policy issue in Victoria. We need a public discussion about where we develop our energy.
- Q: *Arlene Boon*: I think this place has great storage but with the oil companies they are taking it out. I have a problem with you wanting to build another dam when you are allowing oil and gas companies to take water that was put there for storage. The tax payers are getting the brunt.
- A: *Randy Reimann*: BC Hydro doesn't control the water rights.
- C: *Linda Sewell*: With the abundance of natural gas in the province, we should encourage the use of natural gas for heating. In the south there is a lot of electrical energy to heat homes. If we could encourage heating with natural gas that would reduce the demands. It goes back to a provincial issue that should be discussed in Victoria. We can reduce the demand of electricity to encourage the use of natural gas for heat consumption.
- Q: *Heather Hannaford*: Has BC Hydro taken into account the depletion of the snow pack? The amount of water that is in the lake now might not be sustained?
- A: *Randy Reimann*: We have thought about that and we have undertaken climate change studies. The water systems push to the north but we don't know if that ends up as water is not clear yet. Nothing as given us any indication of where this is going to go.
- Q: *Heather Hannaford*: I submit that all over the world glaciers are melting and we aren't exempt. Has hydro taken into account the emissions it takes to build this big project and going into the atmosphere. As well as the emissions from the jobs in the north with more heating, electricity consumption which would negate the whole business of taking the emissions out?
- A: *Randy Reimann*: I can speak to the load forecast, but we haven't taken into account the population side, right Dave?
- C: *Dave Conway*: On the construction side we have done that study, but I have to check out the population study. We've done some modelling around this because we did it in Stage 2 but I just have to check if population increase was there was well.
- Q: *Brian Churchill*: To clarify on page 16, you said calls to power are evaluated by dollars only? I know of one wind project that didn't meet your call that was larger than Site C.
- A: *Randy Reimann*: They have to be clean projects to begin with. We do a risk assessment and whether or not they can follow through on construction.
- Q: *Brian Churchill*: I don't know about the backup. If you had a whole bunch of wind, you would have a backup.

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- We have the largest back up in the world, our hydro system. In fact, the more wind you have the less back up you need because you are more likely to have wind blowing somewhere all the time. The more wind the less back up you need. It doesn't compute the way it's presented.
- A: *Randy Reimann*: There are regional diversity impacts. We've looked to see if it's better to awarded contracts and what you can count on. It's a risk assessment and one of the events that we've been looking at from Alberta and south of us is the cold snaps and all wind seems to be down. The FRIC is getting a regulatory process so people are looking at it but it's too early to bank and then not meet customers' needs. We are not prepared to go there yet but there may be some efficiency issues.
- Q: *Brian Churchill*: On the last cold snap, to get to the wind belt, on peak load day, 60% of the windmills were on idle. Some were working, and some were not going. There was huge extra capacity.
- A: *Randy Reimann*: When you see them turning you don't know what they output is.
- Q: *Brian Churchill*: Lindsay this is a nice chart. It identifies the number of individual turbines and the number of run-of-river projects is the most useful thing in the document. Thank you for that.
- Q: *Ross Peck*: My concern is with the trade-offs. I think an important one that is missing is security of supply. In light of climate change, we asked the water controller to lower levels on the Peace River because the shortage of water. Natural disasters and what we are seeing them in the news right now just highlights this. We have 800 miles of transmission lines that could be broken at any place. Not to mention security, terrorism and everything else. We need to maintain security.
- Q: *Linda Sewell*: I don't see solar being recognized as an option. I understand that wind energy that it would require \$6 natural gas before wind would be efficient. There is no recover unless gas is \$6 and right now it's \$4. Wind is a waste right now and solar would be good because we have a lot of sunshine. I wonder what the costs are.
- A: *Randy Reimann*: We have looked at solar and we have that on page 15. It's much more economically sensible in places like California and in the deserts. The one place where it makes sense is in hot water heating.
- Q: *Diane Culling*: What about passive solar? We could put panels on the number of commercial buildings? If the small proportion had solar on the roof then I think we have to stop thinking about these huge solutions like another hydro dam and say, yes, solar is not the absolute but it's a piece of the answer. Also, in terms of the geographic diversity of supply, perhaps BC Hydro should look variable rates where it's tied to regional generation. If power is generated in that region then there is a discount on that to drive other regions to pick up load so it's not all on the northeast.
- C: *Lori Ackermann*: I think that BC Hydro needs to look at natural gas. The idea that we are going to electrifying vehicles is a huge impact on our demand. President Obama has been told that if he switches just the 18-wheelers there will be a 95% less greenhouse gas emissions. I think it's irresponsible to even consider EV for big rigs. We just talked about homes should be switched from electricity to natural gas. The province has not recognized the industry and they need to wake up. There is a lot that is being lost as a result. This stuff is coming out of the ground and we are selling it off. We could be using it here in our own community. The greenhouse gas is going to go somewhere anyways.
- Q: *Arlene Boon*: The Clean Energy Act prohibits large hydro in BC after Site C. Why have they said that? Do they know that large hydro is wrong?
- A: *Randy Reimann*: I can't speculate why they included that in the act, but you're right there is a section that Site C will be the last large hydro project.
- Q: *Arlene Boon*: So one more screw up and then we'll be good, I guess.
- Q: *Brian Churchill*: Regarding electrification, looking at the oil and gas sector, I'm trying to figure out what

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- proportion of the supply gap forecast is attributed to the oil and gas sector. I'm trying to get the magnitude of that. We have a gas industry here that is capable of producing its own energy. All of a sudden we want to electrify because it's cheaper. I want to know how much of the energy gap in the graph on page 5 is attributable to electrification of oil and gas facilities and I want you to get back to me.
- A: *Randy Reimann*: I can't tell you what the size of that load is right now, but that is in the load forecast. I will get back to you about that.
- Q: *Ross Peck*: Would that be an example of a proactive approach?
- A: *Randy Reimann*: That opens up the opportunity to have mines developed and access to clean resources.
- C: *Ross Peck*: The difference is that BC Hydro isn't the only player. I don't know how realistically you can plan for those resources.
- A: *Randy Reimann*: There is some forecast uncertainty around that, yes.
- Q: *Diane Culling*: Where are we at for the line from the Peace down to Kelly Lake? Are we near capacity on the existing lines?
- A: *Amir Amjadi*: The line still has some unused capacity? I think the proportion is in the range of 500-600 megawatts but don't quote me on that. That line is good for 4-5 thousand megawatts.
- Q: *Diane Culling*: If Site C is 900 megawatts, and then we have to upgrade to accommodate Site C.
- A: *Amir Amjadi*: Yes, but that doesn't mean you have to add another line. We can provide reactive power support between GMS and Kelly Lake. We could add something like 600-1200 megawatts of additional capacity.
- Q: *Diane Culling*: But with some of the additional IPP's that will be tied in over the next few years, they will also be looking to tie into those lines?
- A: *Amir Amjadi*: IPP's are not going to be connected directly. There will be IPP's in the area that will be transferred down south on the Peace River transmission system.
- Q: *Diane Culling*: When you run at capacity, with resistance what is your line loss or range between GMS and Kelly Lake?
- A: *Amir Amjadi*: I can't give exact numbers but it's in the range of 3-4% of the flow on those lines.
- Q: *Ross Peck*: Somewhere in the Clean Energy Act we've been told that Site C is not for export. Is that a legislative requirement?
- A: *Dave Conway*: What the Clean Energy Act says is that the heritage assets of BC Hydro which includes Site C and all of the benefits are for the domestic ratepayer.
- Q: *Andy Ackermann*: What is the anticipated benefit of exploring the export market for rate payers? I'm asking because I don't know where the revenue goes.
- A: *Randy Reimann*: It goes to the provincial government. If we undertake the buy and delivery, then we would have to give that back to the provincial government.
- Q: *Brian Churchill*: What you are saying is there is no room for a loss? Who would get that loss?
- A: *Randy Reimann*: Any business venture has the potential to take a loss. The message that we are giving here is that the commission is not to allow the recovery of expenditures for exports. The loss doesn't go to the rate payers, and the benefit doesn't go to the rate payers.
- Q: *Brian Churchill*: Right now the IPP are averaging what?
- A: *Randy Reimann*: Our last call was \$124 a megawatt hour.
- Q: *Brian Churchill*: What's the cost for green energy export?
- A: *Randy Reimann*: Depends on who you get a contract with. Whether or not we are competitive is under investigation.
- C: *Dave Conway*: It's not \$125 it's lower than that for the clean power call for those that are presently producing. Cam can provide that answer. The ones that we've just done are lower than now.

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- Q: *Brian Churchill:* I'm wondering if it's worth developing an export market that is neutral for rate payers and if it has potential losses for the province and why are we doing this? Why would we consider doing this?
- A: *Randy Reimann:* We are still working our way through that and it's an excellent Stage 3 question.
- Q: *Sandra:* For those who don't know, I'm the Economic Development Officer for the region. My comment is to your question and your comments and I have a concern about contracts going south to the United States and will BC Hydro put in a risk management plan if catastrophic events happen. Will there be assurance that more dams don't go up to manage that. I'm concerned about the risk to the tax payers. You really need a risk management.
- A: *Randy Reimann:* We haven't worked our way through all of those issues.
- Q: *Marty Paradine:* My comment is we are privileged to have cheap electricity. People in Alberta have coal and we have a wind turbine in our back yard. It's putting forward how complex the issue and we can't think in isolated terms.
- Q: *Linda Sewell:* I want to suggest that any export of hydroelectricity is on a spot basis not on a contract. We reserve that right to use it if we need it.
- A: *Randy Reimann:* That is what it is at currently.
- Q: *Lori Ackermann:* I'm all about buying low and selling high. It needs to go into the innovation of diversification. Where it says that domestic demand has crept up, why are we talking about putting electric vehicles all over the province? How much has PowerEx made over the years?
- A: *Dave Conway:* The average is \$120 million a year.
- Q: *Heather Hannaford:* I would like to ask, how much impact does 1 or 2 or 3 of us have on your recommendations to the government? How is that balanced with larger communities around us? There are many who believe the economic development is simply not sustainable. If you have had comments, in the minority how is that accepted?
- A: *Nancy Spooner:* The public consultation is going around the province to make sure we get representation from all. We are encouraging as many people to come with advertising and the web. Not a whole lot of the general public comes but we are trying to build that interest. This is planning for all of us. Once we gather that input from this meeting, that is being into consideration in this report and then BC Hydro looks at that information with their teams in developing this plan. How much weight, there are some key themes emerging and ideas and passion. That is being reflected and BC Hydro is taking that into consideration.
- Q: *Heather Hannaford:* The minority opinion? If no one in Vancouver comes forward about what we are saying then how is that balanced?
- A: *Nancy Spooner:* It's not the numbers, it's the ideas and how the integrated into the plan. My understanding is that BC Hydro has been given specific criteria. Within that, they want to hear from BC and not just responding in these meetings but online as well, that draft plan comes out for further input. At the end of the day report will be approved by government.
- Q: *Brian Churchill:* I think in the history of this province we created energy into the Pacific Northwest market and created a demand. We haven't done any innovation in electricity because we have a surplus. Huge advances in Europe have been made. We see in the automotive and the average gas consumption was 50 miles to the gallon and here it's 10 miles! It's about innovation and money. The more you put into that market the less innovation there is going to be. I appreciate over the years the current system has put surplus into the spot market and that has been financially beneficial to me because I am a tax payer. If we change that and go to long term contracts we are going to create demand. I want to see the money going to our parks. I don't want to see any development for export. The other thing is that you are concerned about risks. The city council tells you about risks and I understand that. I participated in 2008 and I am again

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because it changes. I think we need to de-emphasis of demand side management and increase our input and achieve more.

Q: *Diane Culling*: I was at the meeting in Victoria and went to the SMI meeting there as well. It was standing room only that wanted blood over smart meters. My concern is that politics and the masses will get in the way of doing what is right. Whatever metering we need to do to encourage demand side management and that isn't palatable for those who don't see the entire picture. That is the result of politics getting in the way of what's doing right.

4. Feedback Forms

Participants of the meeting were thanked for participating and were encouraged to complete and submit feedback forms. Participants were also encouraged to attend one of the upcoming open houses (dates, times and locations listed in the consultation workbook).

5. Closure

The meeting ended at 5:00 p.m.

Integrated Resource Plan Appendix 7C-2

**BC Hydro Integrated Resource Plan
Vernon - Multi-Stakeholder Meeting**

Best Western Vernon
Lodge

MEETING DATE

MARCH 29, 2011 1:00 P.M. – 3:00 P.M.

3914 - 32nd Street,
Vernon, BC.

PURPOSE	Meeting notes from a multi-stakeholder group meeting with stakeholders BC Hydro staff on March 29, 2011 at Best Western Vernon Lodge, 3914 – 32 nd Street Vernon, British Columbia
FACILITATOR	Judy Kirk, Kirk & Co. Consulting Ltd.
PRESENTER	David Ince, BC Hydro
MULTI-STAKEHOLDERS PRESENT	<p>Ted Bacibabopo Pat Beaver Doug Callaha Michael Curd Denis Delisle Don Dobson Jim Edgson Patti Ferguson Shirley Fowler Laura Frank Peter Gigluitti J. Green Andreas Grtz Judy Ibuki Graeme James Robert Kerr Laura Latter Robin LeDrew Barb Makota Grady MacDonald Richard MacKenzie Mike MacNabb Deborah McLean Brooke Marshall Judy Matola Lori Mindnich Brad Minnes Chris Pieper Elvia Picco Rasike Rajopakse Shan Rogopatyhe Steve Robinson Harold Schook H. Tronson Pete Withers Carol Zanon</p>

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<p>STAFF ATTENDEES</p>	<p>Brandee Clayton, BC Hydro Kevin Maxwell, BC Hydro Dag Sharman, BC Hydro Meghan Clarke, Kirk & Co. Consulting Ltd. Susan Campbell, Kirk & Co. Consulting Ltd. , Recorder</p>
<p>AGENDA</p>	<p>1. Welcome and Review Agenda 2. Consultation Workbook Overview 3. Discussion 4. Closing Remarks</p>
<p>KEY THEMES</p>	
<p>1. BC Hydro and Fortis BC – Some participants expressed concern with the lack of reliability of their electricity, particularly along Westside Road along Okanagan Lake. Participants suggested that BC Hydro and Fortis BC should work more cooperatively to improve reliability.</p> <p>2. Conservation and Efficiency – Some participants supported the use of electricity rates and tools such as smart meters to encourage conservation while others opposed the new two-step residential rate and proposed smart meters.</p> <ul style="list-style-type: none"> • Participants expressed cautious support for BC Hydro including a more proactive approach to conservation into the draft Integrated Resource Plan saying they want more conservation of electricity, but are concerned about the higher costs that mandatory codes and standards could pass on to individuals and businesses. <p>3. Electricity Generation Options – Participants said that they would like BC Hydro to plan for and support more local, distributed generation so that electricity is generated closer to where it is used.</p> <ul style="list-style-type: none"> • Some participants said that BC Hydro should plan for the development of more geothermal electricity or biomass, and most expressed concern about the number of proposed run-of-river projects on British Columbia’s rivers. • Participants said they’re not supportive of BC Hydro planning for more gas generation, citing concerns about greenhouse gas emissions. • Some participants said it would make sense for BC Hydro to use Site C as a low-cost, reasonable option before other generation options. <p>4. Electrification – Some participants supported BC Hydro including a pro-active approach to electrification in the Integrated Resource Plan while others said it was not BC Hydro’s mandate to promote electrification.</p> <ul style="list-style-type: none"> • Participants expressed concern that electric cars do not yet have a long enough range to be practical for rural use. <p>5. Transmission Planning – Participants reinforced their desire that BC Hydro plan a system including local service areas where generation is developed closer to demand, reducing the need for very long transmission lines.</p>	

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- Participants generally supported BC Hydro including a more proactive approach to transmission planning.
6. **Export Market Potential** – Participants said they would support electricity generation for export as long as British Columbia’s domestic needs are met first.
- Some participants said that BC Hydro should be cautious about exporting our electricity and ensure that North American Free Trade Agreement requirements don’t limit BC Hydro’s ability to meet provincial needs first.
 - Participants asked if California had paid its’ outstanding bill for power purchased in the 90’s.

DISCUSSION

- 1. Judy Kirk - Welcome and Introductions**
Judy Kirk welcomed participants to the stakeholder meeting, explained the format of the meeting and introduced the consultation workbook and feedback form. Roundtable introductions followed. Judy emphasised the five consultation topics and the feedback form at the back of the consultation workbook.
- 2. David Ince – Consultation Workbook**
David Ince reviewed the format of the consultation workbook and explained the processes and factors BC Hydro considers when energy planning. Cam explained the difference between demand side options and supply side energy options and how BC Hydro factors this into the balancing the options when developing a long-term plan.
- (Abbreviations will be used and mean: Q: Question, A: Answer, and C: Comment)*
- Q: *Mike Curd:* So really, when you say that Revelstoke has just gone through an update and is the last major upgrade isn’t it important to recognize that there have been upgrades at other facilities?
A: *David Ince:* There have been incremental upgrades – so it is a matter of degree in terms of how big is big.
Q: *Mike Curd:* Do we know the future capacity of all the dams in BC if we were allowed to fully use what they were designed for?
A: *David Ince:* Well, we have space at Revelstoke, Mica and we are going to talk about Site C but that is a new incremental facility on the Peace River. There is the Ruskin facility which is the subject of our next capital plan – so there is not much actually – I am thinking about 10%.
- Q: *Robin LeDrew:* It looks as though supply is dropping and is there a reason?
A: *Dave Ince:* Yes. The blue bars are the supply and the legend on the left hand is in Giga Watt hours and the red line is demand (projection) and the green line is projection demand after conservation. So I will use the term Demand Side Management (DSM) or conservation and we also call that Power Smart. See how the red line is reduced to the green line level as a result of these conservation measures but still we have a gap - that red line is still increasing over time and we are net importers and that position will grow if we don’t do anything more. In the blue we have Independent Power Producers - these are bio-mass facilities and so these are facilities that basically burn wood and waste to produce electricity and when their contracts expire we are taking them out of the supply stack. That is one reason. The second reason is between 2016 and 2017 (fiscal years ending March 31st for BC Hydro) and you see that drop – the government has allowed us up to this point to assume a certain amount of import towards supply called market allowance and that has been removed by legislation and so that is why the line has dropped.
- Q: *Peter Withers:* From Lake Country. I am right on the border of BC Hydro’s supply area and Fortis BC and have you taken the supply of Fortis BC into account for some British Columbians and to what extent are you

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- going to feature that?
- A: *Dave Ince:* Not extensively – you see on the legend that it is BC Hydro supply so this presentation is specific to BC Hydro and we do have some supply obligations to Fortis BC in that we have to supply up to 200 Megawatts to Fortis BC for their customers out of our system. It is a long-standing contractual agreement that we have had for many, many years.
- Q: *Jim Edgson:* I live on west side of Okanagan Lake and is there any issue, the Fortis BC issue, that has taken into account any power coming in from Fortis BC; and perhaps some thoughts to link up to Fortis BC. How much of this is straight BC Hydro, with all their contracts and that sort of stuff, and how much is potential for Fortis BC gaps?
- A: *Dave Ince:* There is not a lot of additional supply from the Fortis BC area and if it is it is a relatively small quantity of energy. I can't speak for Fortis BC but I know they have growing demands as well. It will be an issue for them for their supply. With respect to specific issues I will ask Dag (Sharman) to respond.
- A: *Dag Sharman:* If you are referring to the Duck Lake project – we have a project in which we are changing the supply route to Lake Country and to the west side because of the underground cable it is all the same. So, that project is currently underway and we will decommission the line that now runs from Vernon to Lake Country, when complete and the power when this project is complete by the end of this year, the power will come from a new Fortis BC Substation that is just on the Kelowna side and we will get power from that substation under agreement from Fortis BC and that will feed Lake Country and the west side.
- Q: *Ted Bacibabopo:* How much of the total of electricity is produced in BC by BC Hydro and how much of the total energy is exported then we buy it back? How much is total production exported? How much of BC Hydro's is imported? How much does BC Hydro buy back?
- A: *Dave Ince:* Within 5%, 85%-95% is produced by BC Hydro. The other significant players are Fortis BC, Alcan (Kemano) and the Columbia Power Corporation. With respect to the issue of export - BC Hydro is a net importer of power, and we export and import almost every day. At 6:00 p.m. we are exporting power out to the United States and Alberta if the price supports it. The pricing for electricity is very volatile and so power in the middle of the night is about one-third to one-half of what it is in the peak period at 6:00 p.m. So what BC Hydro does, through its trade affiliate Powerex, is that we buy power in the middle of the night and then sell it to our adjacent neighbours at 6:00 p.m. during the high price period. Again, we are net importers. If we were to cut off that trade activity we would forego \$150 million a year. So it is a very lucrative business. We are a net importer, BC Hydro, by about 10% over the last six or seven years – I think all but two or three years in the last 10-years we have been net importers.
- Q: *Carol Zanon:* District of West Kelowna. That west side road doesn't help the District of West Kelowna, the lake is very, very long and the west side is very, very big and we have concerns that we have expressed in the past about emergency power because we have been prone to several forest fires and we are serviced by a single radio transmission line – we are extremely vulnerable and we have asked for emergency power and if something happens can it be supplied by Fortis BC? This is where the Fortis BC question comes in or is there another solution?
- A: *Dag Sharman:* I should apologize – I was referring to Westside Road on the Merritt side as you well know. The issue of emergency generators, in the case of forest fires and that sort of thing is run by Provincial Emergency Program and if there was an emergency it would be PEP that would make the decision on the deployment of generators - we would support them, absolutely, but it is their decision.
- Q: *Carol Zanon:* So Fortis BC is not in the picture?
- A: *Dag Sharman:* I can't speak for Fortis BC.
- Q: *Laura Frank:* So why the two-tiered bills that the residents get and you pay so much for, I think in our case, roughly 1,300 kilowatts a month or every two months and then anything over and above that you pay an additional charge? Whereas about two years ago, we never had that, this is something new?
- A: *Dag Sharman:* That is a conservation measure; it is a price trigger to incent conservation. That went through the British Columbia Utilities Commission; it was a public process and we had interveners say their

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- piece through the process and the BCUC modified the original plan and the result is technically called a residential declining block. So you are right, when you use power up to a certain level you pay less than you do for the power you use beyond that level. The point of that is to try and get people to try and stay as close to that level as possible. When we brought that in it was revenue neutral, as governed by the BCUC, and we couldn't take any more money from that pool of bills than we currently did (revenue neutral) so it didn't change the amount of money we were getting it just changed the structure of the billing in order to encourage conservation.
- Q: *Laura Frank:* For example, with the implementation of Smart Meters, but really it seems to me Smart Meters are not a very viable cost savings - the only savings that you are going to have is from the corporation side where basically you would eliminate your meter readers because now it can all be done centrally but it doesn't help conserve energy at all.
- A: *Dag Sharman:* So there are other benefits, Smart Meters for one thing help theft detection and we estimate we lose over \$100-million a year to grow ops through electricity theft. This would help eliminate that and as well there are operational efficiencies and the system is more efficient when you have Smart Meters in place and there is also the fact that people can have the option of knowing in real time how much power they use like when you are filling up your car with gas.
- Q: *Laura Frank:* All they have to do is go out and read their own meters and other provinces, for example Ontario, have found that Smart Meters are not a cost saving measure.
- A: *Judy Kirk:* In the feedback form this is perfect example and we are taking your comments here too but if you think that Smart Meters are not a good conservation measure, either financially or effectively, that is exactly the kind of feedback that we would like on the feedback form as well as here.
- A: *Dag Sharman:* There is a net benefit in the long-term because rates will be lower with Smart Meters than they would be in the long-term without them.
- Q: *Deborah McLean:* With respect to the two-step - I was told that it would only be in areas where there was an alternate fuel source and we don't have natural gas and we don't have an alternative fuel source as is recognized in the Lower Mainland. So I would like to know why we are being criminalized in a way by being charged extra for something that we can't have any control over.
- A: *Dag Sharman:* There was never an alternative fuel source that was not part of the program - it is across the board. So whether you have an alternative fuel source or you don't have one the residential customer still has the same rate structure. The rate is to encourage conservation and if you disagree it would be good to write it down.
- Q: *Jim Edgson:* I applaud Smart Meters for eliminating the grow ops - reading through the plans are you going to include discussion later on natural gas and how does BC Hydro balance competing policy objectives because I am concerned about BC Hydro's business to sell power to customers and that is a competing objective to conservation.
- A: *Judy Kirk:* Right and in the topic of electrification and even in electricity generation options which we need to get to - some of these balancing of competing policies is exactly what we will be discussing.
- Q: *Pat Beaver:* My comment related back to Smart Meters and how aggressive with billings we want to get - I understand the concept but does it also provide peak load period information that could target and increase the rates at a particular time?
- A: *Dave Ince:* Yes and BC Hydro could have, through Smart Meters, a fairly fine resolution in terms of what your load is - we could see it on at least an hourly level resolution. There is Critical Peak Pricing, say there is an emergency in the system and BC Hydro is stretched perhaps there could be a rate structured where we pay customers who are willing to curtail their load to do that and then they get a rebate on their bill on that basis. With our current meters that is impossible.
- Q: *Pat Beaver:* In Europe don't they do that and have higher rates around dinner time and people might make that conscious decision of using that energy either before or after to reduce their costs. Is that viable?
- A: *David Ince:* Yes that is the stick part of the equation and we talked about the carrot part but we are not suggesting at this time that they be implemented.

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- A: *Dag Sharman:* Time and use rates and it does give us the ability to do that and we would go before the BCUC before we introduced it.
- Q: *Barb Makota:* With respect to the new lights it is my understanding that they have mercury and if they blow in the home that the home needs to be evacuated and I am wondering what consideration Hydro has taken into the impact on health and the environment and where do we dispose of these light bulbs?
- A: *Dag Sharman:* They can be disposed at quite a number of retailers, for example, Home Depot.
- Q: *Barb Makota:* What consideration has been taken into the impact on the environment and health?
- A: *Dag Sharman:* The bulbs and I am not an expert, the bulbs themselves while operating there is no impact.
- Q: *Barb Makota:* They do have a tendency to blow much more frequently.
- A: *Dag Sharman:* If a bulb broke then airing out room is what you should do and then there are steps you should take and they are on the web site. It is valuable information and there are a lot of things have some misunderstanding around them.
- Q: *Andreas Grtz:* My question was around the definition of more aggressive in terms of your incentives or disincentives to conserve? What does more aggressive mean – define that?
- A: *David Ince:* Right now the current plan is to reduce our load growth by one-third of what it would have been ordinarily and I can't define it more than that, it could be flat lining our load. Keep in mind the population is growing about 1.5% to 2% a year and so if we were to flat line the load, our per customer consumption would actually be dropping.
- Q: *Andreas Grtz:* The question was around what measures would you put in place to more aggressively or increasingly more painful – increasingly more mandatory measures?
- A: *Judy Kirk:* That was why in summarizing it I said at its most macro level as BC Hydro customers whether we like a voluntary approach to conservation which by in large is what we have today or are we prepared to support perhaps with some caveats a more mandatory approach which would include things like codes and standards for homes, which might include greater conservation rates or other measures that other levels of government might bring in. We don't know specifically what some of those might be.
- Q: *Deborah McLean:* What types of studies have been done on the environmental issues in regards to the Smart Meters - I have serious environmental allergies and I am quite concerned about this being attached to my home and emitting on a regular basis. There are countries that have abandoned it and Germany is one and they won't allow Smart Meters, it is unhealthy. Is there going to be an alternative for someone like me that has these allergies? It does affect me so will there be an alternative for people like me?
- A: *Dag Sharman:* Well Health Canada and the World Health Organization have done studies and they don't agree. These are radio waves and the reason I say this is because they are not microwaves and as you know there are many parts of society and they will emit very infrequently. You and I should connect afterward and I can connect you with our Smart Meter people.
- Q: *Peter Withers:* Can you elaborate on the rationale for using two different planning horizons 20-year and 30-year? A 20-year for the plan and a 30-year one for transmission.
- A: *David Ince:* 30-years for transmission - generally it takes a longer period for transmission to get built, so it is a lengthier time frame and some transmission can take over a decade to build. Generally generation options are faster to build. In order to specify exactly where the transmission route should be it could be a very lengthy process – consultation and accommodation.
- C: *Harold Schook:* I really think that if you can't measure it you can't manage it and yes you can read the Smart Meter but I don't think it is adequate for how our generation is and how future generations look at devices. I do think looking at the Smart Meters with their Smart Phones is a better device that what you currently have now.
- C: *Laura Latter:* Provided you are in an area that has Smart Phones or cell phones and our area doesn't.
- C: *Harold Schook:* My understanding is that through radio frequencies or some other ways they can communicate with each other. The conservation component within commercial buildings, a system thinking

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- approach should be taken, take natural gas and if you replace with heat pumps you will increase loads and cost because you are at a higher step rate and BC Hydro should encourage people to reduce their footprint within their means by switching from natural gas to electricity.
- Q: *Peter Withers:* My question is slightly broader, you have five separate customers if you include exports – residential uses electricity differently from the others and to what extent have you taken those different uses and the differential rates and taken those into account in the plan?
- A: *David Ince:* Conservation programs are made highly specific to each class. The details are not covered in the workbook. We have dozens and dozens of different programs specific to each of these classes and they are targeted at the specific class to wring out the most amount of effect.
- Q: *Peter Withers:* How much is 66% - what is in each class?
- A: *David Ince:* All of them – BC Hydro’s load is roughly one-third, one-third and one-third between residential, commercial and industrial and I think that the commercial and residential is over weighted in terms of the conservation but I would have to research the numbers.
- C: *Peter Withers:* I think municipalities use electricity differently than the former three.
- Q: *Patti Ferguson:* Page 28 – the question and talking about conservation and in the middle of that page it gives a reason why we are doing this and that is BC Hydro won’t have enough adequate supply. It seems odd that the goal is to meet legislated self-sufficiency requirements, I don’t understand that?
- A: *Judy Kirk:* The feedback form is only asking about a more aggressive approach. The issue of the commentary on Paragraph Two that you just mentioned was to highlight the fact, if you think, that BC Hydro should pursue a more aggressive approach to conservation it is making sure that people understand there is some risk in achieving that – that is the issue.
- A: *David Ince:* Self-sufficiency – BC Hydro is a net importer most years and so the government has put in legislation that BC Hydro will be self-sufficient during a very dry water spell to have energy produced within BC to meet our requirements and we will do that by fiscal 2016. We can do that two ways; conserve more to push the load down or build more or a combination of both.
- C: *Ted Bacibabopo:* On Page 14 - The generation options list the five different potential sources and have you identified site specific or geographic locations that are best suited for those and what percentage of potential, what percentage of current and future needs can be generated or produced by these options? There seems to be a lot of focus on run-of-river and there are what about 600 or more potential sites – it seems to be heavily focused on that. Can you speak to the site specific geographic suitability for those five options; what percentage can they produce to meet current and future demands?
- A: *David Ince:* So BC Hydro, as part of this IRP, has something called the Resource Options Report and it is on the website and there is an extensive amount of material in the planning part.
- C: *Ted Bacibabopo:* With all due respect, I don’t want to do the research and I came here hoping you would have answers and with due respect to the process, I appreciate the opportunity to be here but I am really struggling with the process that we are undergoing right now. I have not had an opportunity to read this and we are being asked to comment, in very short order, there are about forty or fifty people here and it is really, it is a poor process.
- A: *Judy Kirk:* So let me try and help with that and you are the first person in all the places we have been to that feels frustrated by this and I have heard it loud and clear. The first point is you have until April 30th to provide any feedback and that is no. 1. That is very important. There is a lot of information here and that is no. 1 and it is very important – there is a lot to take in. The report that David (Ince) just mentioned is on the website and it is a more technical report if you are interested in more detailed information it is in there. With respect to your feedback today we will take everything on the record as we are but we accept written submissions anytime between now and the end of April and your feedback form any time between now and the end of April. I just don’t want you to feel pressured to do it all here today.
- Q: *Ted Bacibabopo:* I am frustrated because a lot of what we are asking today we haven’t really had the opportunity to prepare for so we may not be asking all the pertinent or the right questions and we are getting fragmented responses and I find that really frustrating because this is a really, really important issue.

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- A: *Judy Kirk:* I agree with you and tell you what Ted (Bacibabopo) I am going to let David (Ince) try again and I have been in a few meetings with David (Ince) and he is trying his best to provide as much information as he can and I know that he will continue to try to and he will try and answer your question and then if you are not satisfied let's talk later and see if we can get you more information.
- C: *Ted Bacibabopo:* Okay, good enough.
- A: *David Ince:* So with respect to BC Hydro's needs and how much we can supply from different types of resources - for each of these categories we could probably supply most of BC Hydro's needs within each of these individual categories. Now you notice we have a price range, on each of these, and the reason for that price range is that the lowest cost ones are the low hanging fruit right so there is a cost curve with every one of these resources that you pick off the lowest cost, the best resource first and then the further you go along the more expensive it becomes. Within BC Hydro's Resource Options Report we have a full set of cost curves for every one of these resources and that will tell you the first block of energy is going to cost this and then the further you go up and you go to a huge amount of energy then it is going to become a huge cost as with everything.
- A: *Judy Kirk:* I think your first question was does BC Hydro know the geographical location of each of these options?
- A: *David Ince:* Yes and that is in the Resources Options Report - specific locations.
- Q: *Chris Pieper:* On Pages 14 and 15 we have 10 options for hydro generation and in the last three weeks we heard an awful lot about a different kind of power generation that failed in Japan, is there any nuclear research done by BC Hydro or any possibility of having it in BC? Any clue what it would cost to generate?
- A: *David Ince:* According to the legislation nuclear is prohibited in BC. You would be looking at about \$80 to \$150 MW hour.
- Q: *Laura Frank:* On your website I noticed two things specifically; geo-thermal and run-of-river, geo-thermal was basically down in the Arrow Lake/Slocan area and I am assuming because of the hot springs and that sort of thing. Run-of-river you said about 600-sites in BC and I noticed on the website it blanketed the entire province with run-of-river. With run-of-river isn't it quite hazardous to fish producing streams and fish habitat especially to very sensitive eco-systems?
- A: *David Ince:* It depends on the water course. If you have a very steep water course in which there are no fish that could be very attractive so the attributes are steep, high volume, lots of flow and if that is the case then you don't have a lot of fish issues.
- Q: *Laura Frank:* But in our area specifically there are quite a few different streams that have been targeted for run-of-river granted maybe up here there is no fish up here but down below there is?
- A: *Kevin Maxwell:* As I understand in the Resource Options Update – when they did the run-of-river study all fish bearing streams were removed. Most of the run-of-river projects are at high elevations which don't have fish issues.
- A: *Judy Kirk:* But to the point - part of the feedback the form is looking for is if you have concerns about run-of-river which you are expressing now and you want to flag that on Portfolio 1 what you felt and why and that is very valuable information for BC Hydro to get in this planning exercise.
- Q: *Robin LeDrew:* What exploration has been done by BC Hydro regarding small scale, residential co-generation and for example solar panels on roofs of house? I know in parts of the United States people actually feed excess power into a grid and it can be done cost effectively. I don't know how doable that is in our climate but has it been explored?
- A: *David Ince:* Yes, through a feed-in tariff in which customers can sell generated feedback to BC Hydro.
- Q: *Robin LeDrew:* Is that supported economically or is it part of this plan and encouraged – what part of the program supports that?
- A: *David Ince:* Yes it is encouraged. BC Hydro has had this in place for, I think, about four or five years now and if you feedback you will get a rate and yes that is definitely part of the plan.
- Q: *Steve Robinson:* In Germany there is a state law that the price of electricity that is generated from

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- residential or from farms for that matter they pay a premium for that. I think it is an excellent idea and have new construction wired to that. It is a huge source to off-set residential even some commercial loads. At Okanagan College we have put that in at Penticton where have got 250 kilowatts and the price has dropped significantly because of that.
- A: *David Ince:* Despite my comments regarding solar, solar technology is advancing rapidly. So in the United States, particularly in the southwest, it could be a real serious contender to traditional forms of generation.
- C: *Andreas Grtz:* No. 1 – this process isn't happening in a vacuum and you have to look at the changes in the Water Act that are happening and when you talk about options and IPPs you have to be aware that when you privatize water you are running afoul or running into some problems with General Agreement for Trades and Tariffs and so on that would make it very difficult for us to control our environment and that needs to be talked about.
- Q: *Mike Curd:* Site C – what is the line loss from distribution because it seems to me that it is fairly high and we have a remote Site C and we want to bring that power down to the Lower Mainland, what percentage makes it?
- A: *David Ince:* You mentioned distribution so I am going to have to be precise in my language in that distribution is typical for low voltage wires that go to the house. So transmission loss is about 7% and that is a very important number so between the time we generate up north and it gets to the load it is 7% of the electricity that is lost. You have seen a wire that has had electricity go through and know that it tends to get warm and that generates heat and that energy is dissipated. So 7% of the energy from between the time it goes from the north to the Lower Mainland is lost in terms of losses. In addition, in the distribution system, in all the houses around us, there is another 4% of electricity that is lost.
- Q: *Jim Edgson:* I am really concerned when you start talking about gas generation and the publicity on it right now and we have all heard about gas fracturing and the truth of the matter is that with gas production there is a steep decline and you know that. I really have a problem taking natural gas from elsewhere, that is no. 1. No. 2 it is rather amusing to me in a way, prairie folk if you will, and I am a chemist and you are going to be talking about electric cars and all that other fun stuff and batteries are getting better and is this figured into your long-term plans for storage?
- A: *David Ince:* Yes, so battery technology is getting better and we can talk about electric cars right now because one of the biggest obstacles in terms of storage for electrical uses and vehicles is that battery technology is expensive and it is not there yet but at some point it may get there and we'll talk about that in the electrification section.
- Q: *Andreas Grtz:* I have a question about cost, you specified costs as being higher or lower, but I don't know if you are using true cost accounting and you look at higher Green House Gas emissions I think it should be part of the costs. I find this misleading and the cost to Hydro is what you are talking about and not generally to the cost to society. These are not really good representations on what the actual costs are.
- A: *David Ince:* So it all depends on how you value GHGs - is it the value of flooded land area or the value of running a new transmission line into an area - often people have different views in terms of the trade-offs and the costs involved.
- A: *Judy Kirk:* That is a very fair comment and I think that other people have sometimes called them social impacts and they aren't necessarily articulated here. You see on Page 18 in a way we could have the discussion, such as we are having here today, the financial and environment, and economic development considerations and what you are saying is look at total cost accounting because it is broader than that.
- C: *Andreas Grtz:* The thing is when you characterize someone that is a social cost – that is a soft science and it needs to quantify things that are not included here.
- Q: *Graeme James:* I am looking at the chart here and confused on what you call back-up. I thought Site C was back-up and we should have natural gas generation.
- A: *David Ince:* So for example in Portfolio 1 there is no Site C and so you would have to have some other type

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- of back-up to make that work, for example, natural gas-fired units waiting until you had a spike.
- Q: *Graeme James:* In Portfolio 3 you don't have it as back-up? Just put natural gas in as a back-up or Site C? To say back-up you need to have to do that. So in Portfolio 1 you need to have natural gas or Site C?
- A: *Judy Kirk:* No, natural gas or pump storage.
- Q: *Graeme James:* Pump storage is very costly – it is a huge cost.
- A: *Judy Kirk:* But your question with respect to Site C and capacity which is what David (Ince) has been talking about in terms of backing up; intermittent, wind and run-of-river but Site C also has energy, correct?
- A: *David Ince:* It is a resource that has lots of energy and it is its own back-up. It is dispatchable, when you press the button it runs, so when it is needed it can go.
- A: *Judy Kirk:* And, this might be helpful because I am no energy expert that is for sure - is that energy is what flows through the pipe and capacity is the size of the pipe; if that helps, by way of metaphor, to talk about energy and capacity.
- C: *Graeme James:* One more comment and I am looking at this and isn't it just common sense to pick all the low hanging fruit first? I think of Site C and I know there is going to be environmental damage there but Site C is basically the low hanging fruit for the next 20-years.
- A: *David Ince:* That is a good comment but I will play the devil's advocate and coal-fired generation could be the very most lowest cost option and that brings with it obviously particulates in the air and mercury emissions and lots of carbon dioxide.
- C: *Graeme James:* The low hanging fruit with environmental impact.
- Q: *Harold Schook:* There is difference then versus gas-fired and coal-fired generation and when talking about gas-fired it is natural gas-fired versus taking coal and turning it into a gas and start burning it because I would hate to have a plug-in hybrid that would plug into a wall knowing that some plant, a coal-fired plant, is charging up the battery when I could be burning natural gas at a lower GHG rate.
- A: *David Ince:* Excellent, yes. What we are referring to here is gas-fired generation so natural gas goes into a turbine so it is basically a jet engine mounted on the ground and that jet engine basically drives the generator so they spin together and that creates electricity.
- Q: *Jim Edgson:* Let us not fool ourselves when you burn natural gas you get carbon monoxide and if you burn natural gas it must be clean and it is not a panacea.
- A: *Judy Kirk:* We need to move along but I would highlight Pages 29, 30 and 31 for feedback and what BC Hydro is trying to do here is to demonstrate that each portfolio is a demonstration of what BC Hydro is looking and includes trade-offs and these are things that they are interested in getting feedback from you to see what you think about some of these trade-offs.
- Q: *Peter Withers:* Do the large hydro projection provide for climate change? How much water comes down from the dam?
- A: *David Ince:* No – there is the possibility in the future if we have changes to the climate it could increase or decrease the amount of water coming in. I have seen both and we don't have a definitive answer on what might happen. Certainly if there is climate change and it gets warmer BC Hydro's load will go down because it is largely a winter peaking utility.
- Q: *Rasike Rajopakse:* When you think of the amount of hydro that is being used right now that can be used for back-up – is any of that available for that? It is my understanding that these are additional projections and current hydro can be used as back-up and is that included in here for generation as back-up?
- A: *David Ince:* So BC Hydro has a significant amount of storage and hydroelectric potential that is being used right now to service customer needs. If we were to bring on incremental renewals or intermittent we would have to develop incremental back-up because our system is getting stretched to the point where in December it is getting very tight in terms of getting close to capacity and during the freshet period, spring run-off, we are reaching our limits in terms of how much run-of-river hydro we can absorb.
- Q: *Andreas Grtz:* Will you speak to non-treaty storage and how that will affect planning?

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- A: *David Ince:* I am not a strong expert on that, those are negotiations that are going on and they are very lengthy and controversial and complex process. My apologies, I can't speak to that issue.
- C: *Carol Zanon:* I was listening to the news driving up here and BC Hydro wasn't going to get the \$6-billion that they were looking for however it also reported on the new car show that is going on in Vancouver via some experts and their comment on the electrical vehicles, residential at this point, is that they haven't really changed – the problem is the range of the electric vehicle has not advanced at all and it is still 80-kilometers or 80-miles. Secondly, there has been no thought given to the huge cost of infrastructure required to charge up those vehicles and nobody has turned their mind to it and you have got to have stations all over the place otherwise it is strictly for a downtown, run to the local shopping center or local golf course or whatever but it is not a viable personal transportation option until a lot of thought is given to assigning the infrastructure to go with these vehicles.
- Q: *Robin LeDrew:* I know that the electric cars are private and that seems to be the only focus here. We don't see any mention of public transportation as part of the mix and what BC Hydro is doing to promote the use to improve and create electric public transportation? Other countries have it, Europe has it, it is really well set-up; China is working on getting it, why not us?
- A: *Judy Kirk:* On pages 20 and 21 some of the images without getting into all of the words – electrification of shipping, so having ships actually on shore power rather than running on diesel or other fuels, the idea of moving trucking fleets to electricity and the idea of having a proactive approach is what BC Hydro is asking people about in this consultation. Do you think they should be more proactive or do you think they should be responsive and wait until for example electric cars come along or other things happen? That is the very question.
- A: *David Ince:* To create the distinction – if some customer comes to us and they have got an electric car and they want to connect up – yes, they are a customer and we have the obligation to serve them – the more proactive approach would be for BC Hydro to work with the Provincial Government to try and make these things happen. Put in place programs and spend some money on it.
- C: *Graeme James:* I am torn because the hybrid vehicle hasn't been well-accepted, it has been around for ten years and the general population hasn't accepted it very much, like taxis and commercial operations have. The general population hasn't accepted that. But I still think that BC Hydro should promote and move in that direction because it is the way to be in the future. I know the cost is prohibitive but the general population can't afford it and it is fine for someone that can afford to spend that \$40,000 or \$30,000 on a car to get around town but the general population just can't afford it but I really think that BC Hydro should be promoting that use still because it is going to take some years to bring it about but it is worthwhile.
- Q: *Pat Beaver:* I wonder if that is Hydro's mandate though and if we invest in promoting alternate fuels and electric cars that all comes back to us doesn't it and we pay increased rates – does Hydro have a mandate to that?
- A: *David Ince:* No, not currently and that is why this feedback goes into the Energy Plan and helps direct government.
- A: *Dag Sharman:* And, you are right these things come with trade-offs and costs. Just for information purposes, Carol (Zanon) when you were talking about electric cars and infrastructure, BC Hydro does work with industry and has expert engineers who are working with industry on codes and standards for electric cars.
- C: *Steve Robinson:* On the electric car, the range is about 80-kilometers or 80-miles and when you sit down and look at what you drive your car each day 80-miles is probably enough. If everyone has a second electric car that was cheap a lot of time it would work. I don't envy you at all – there is no magic bullet, there is no one technology out there. BC has the cheapest and cleanest power in the world – we are so fortunate and how do we do that because it is a combination of conservation, smart meters and education. We are energy pigs and we want clean, electricity whenever we want it and there is going to be changes coming up so I

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don't know what the answer is, I guess it is a combination of things but there are big changes coming.

- C: *Jim Edgson:* First off when I see the 80-kilometers that is okay if you live in the city, I drove 50-kilometers here and will drive 50-kilometers back so sorry folks but until such times as the range goes a little higher but by the same token I look at ICBC and their promotion and I agree that BC Hydro should be part of that. I am happy with BC Hydro and they went out to our area and they went through a long process of listening to people, thank you very much. I do agree with education. My conservation is keeping a vehicle for 20-years until it falls apart because the cost to replace a vehicle is far more expensive than it is actually spending the money on the fuel, figure it out. And, finally, I am smiling because I don't see something in here - I have a 4700 square foot log house, way too big I know, but it is heated by wood, by a very efficient wood system and I can't get natural gas out there and I have to use propane and use electricity as back-up. I have learned how to use wood better and for us living in a rural area and you see all those dead trees - they do burn well. The urban area is the area you must be concerned with, I agree, but I think you should start looking at wood burning and make it friendlier to the atmosphere. It emits carbon dioxide; it is as bad as coal dust but really gets that going and makes local authorities undertake the changes.
- C: *Harold Schook:* This is a comment around BC Hydro's mandate – maybe not so much on electric cars but it is an opportunity and opens the door to get into a good say on what type of batteries electric cars should have. So that as we were talking about storage and the lack of capacity and those options you have for storage in that you either pump it up the hill and let it drain back down again and if BC Hydro had a mandate to specify a battery and use the excess battery capacity storage at peak times and release back to grid through the Smart Metering system through a logic component in areas where demand is there and charge later when cost is less then it makes viable sense and that would be a mandate that I could support.
- C: *Judy Matola:* My only comment is regarding transportation and I would like to see an electrical train system in the valley like in Chile and they have amazing electrical trains that transport the people back and forth - I was totally blown away because they were clean and had wires and you could get from A to B in minutes and go over 50-kilometers in less than half an hour and they had three train compartments. I was totally amazed and it would cut down on the unnecessary use of vehicles.
- Q: *Harold Schook:* If you had the 2015 person making an application for a transmission line and then you were the 2020 person putting in a projected line what would the cost be for running one double or two singles transmission lines – what is the increase, the cost differential between the two lines?
- A: *David Ince:* A lot of the cost of building transmission is actually getting the right-of-way, signing agreements, and First Nations accommodation and then clearing the right-of-way. So a lot of the cost is the same irrespective whether it is largely distance-based. So even if you have a high voltage wire on some piece of property it maybe not that different from a lower voltage transmission solution.
- C: *Harold Schook:* So it is really not a huge impact cost-wise, a proactive approach first rather than getting four separate lines to a main line that you are thinking of tying into - better off to go for the holistic approach because regardless you can say the cost of getting the property is going to be a lot.
- Q: *Peter Withers:* Wouldn't there be a third scenario which is that the proactive approach results in double lines going from here to there and now you know that you can feed into it in various places and the province is a huge place but you can sort of predict where future things/generation and capacity is and so it is pretty logical to say with a probability rate of 80% that is where our major lines will be and we will all feed in there and it is the same sort of way that they generate highways, any conduit, generate major pipes for water, etc. You are doing nothing different from that so you are just trying to predict into the future where the likelihood is for the demand or supply in the future and you have enough tools in your tool bag I sure to be able to do that with a reasonably high degree of certainty.
- A: *David Ince:* Reasonably high but I can provide some contrary examples in that perhaps a major mine – so the same way that these white dots could be generation they could also be load, so new customers. There have been many cases in utilities around the world in which customers said they were going to produce a

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- very large facility and take a lot of load, BC Hydro or the utility has to run a wire out to them and then for some reason the facility doesn't get constructed so there is a substantial risk of major losses as a result of that load not going ahead.
- Q: *Peter Withers:* If you are talking consumers, that is a different issue than if you are talking supply?
- A: *David Ince:* Actually it still results in the same stranded investment and the same cost to the consumers.
- C: *Dag Sharman:* I think there are two different things here, there is normal growth that is much more predictable and that you do load forecasts for and then there are spot loads such as David (Ince) was saying, a big mine and then it doesn't happen so there are two different things.
- Q: *Carol Zanon:* Going back to Ted's comments earlier, I feel that I am ill-equipped to answer these questions today because there is too much there but I did dig out some stuff that I worked on before which I had mostly forgotten about. It is the South Interior Transmission System and this was in 2008 and not much has changed in West Kelowna and they still have a 138 KV single radiant transmission line and between us and the surrounding communities it serves about 55,000. It is totally out of sync with modern times and I not angry about it but I am just saying that with the responsive approach, you need it – we are so far behind on developing these power highways and making the highway more efficient to the people who need the service right now. Who will build a road that goes to the middle of nowhere in this kind of economy with the investment of time and energy? I will say that we were told - this was 2008 and we incorporated in 2007 and still we were told that the BCUC has to give approval to do the plan and I think that maybe the plan is somewhere there and then stage one, two, three – these plans take years to provide the infrastructure and are in the hundreds of millions of dollars that are required to implement them. So to this question, it is the only one that I feel anywhere competent to answer and I will say that with 100% at this moment, I would say that the responsive approach is what is needed.
- A: *David Ince:* Building transmission is sometimes an exercise that takes 10-years and so you really have to have your crystal ball as a planner to try and anticipate where load is going to go over time because BC Hydro has to go through many steps in terms of environmental approvals and First Nations and dealing with landowners affected along the way and as you know this is getting more and more challenging all the time. So, it is hard to build transmission.
- C: *Jim Edgson:* Any municipality and I can sympathize with myself in the regional area because we have a thing called local service parity and looking at the responsive approach I am going to have to disagree. But, here is the kicker, who pays for building the transmission lines - we set up a water system in the rural area for the regional district and if anyone wants to get into that water system they pay right back to the beginning and I agree with that. I paid for that 20-years ago and I am not giving someone a free ride and I object to a free ride and people taking advantage of infrastructure real cheap.
- C: *Andreas Grtz:* If you look at the evolution of systems architecture in energy and as we evolve as a species we imitate the more efficient system as we evolve in society. The latest iteration of that is the internet so look at BC Hydro's architecture and it should imitate because that is best case. We talked about 10-years ago when one of the topics was security and if you have big transmission lines that go to hubs and something happens to that it wipes the entire system out whereas if you have a multiplicity of systems that interconnect in different ways it is like the internet or our brains and it a more efficient system and not reactive just monolithic.
- Q: *Robin LeDrew:* So that kind of contract would it guarantee provision of hydro to the customer in the face of our own shortfall, like BC's consumers shortfall?
- A: *David Ince:* I am pretty sure it would, BC Hydro we would insist upon that.
- C: *Mike Curd:* We have NAFTA and some are viable and I would suggest that a contract might be subject to a higher level than just saying well we have domestic needs and the contract has to be cancelled because we have needs. So I would be extremely cautious if I was going in that direction and to some extent Trade Investment and Labour Mobility Agreement is similar. It is a requirement to allow competitive bids from

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- other provinces and once you open up those doors you won't necessarily have control – so I would just exercise caution.
- Q: *Harold Schook:* I have to agree with the caution component because right now we think of BC Hydro as BC-owned and BC-run but if we open up to export how quickly that could be changed to US companies buying BC Hydro lock, stock and barrel with all its assets and one asset would be exporting power. I think a big caution on export – who pays for export; do the ratepayers have to pay for that extra capacity?
- A: *David Ince:* To be clear the Clean Energy Act was introduced this last summer and it was clear that BC Hydro customers would not be disadvantaged as a result of the export business – it would only be an upside. The commercial terms would be written in such a way that the takers of the electricity would pay for any incremental requirements such as additional transmission costs or the risk of default.
- Q: *Harold Schook:* Did we ever receive a check from California?
- A: *David Ince:* In the winter of 2000/2001 California got into some trouble and despite the fact that we were a net importer during that winter we made \$1.5 billion on the electricity trade and the reason we did that is that we were selling for very high prices at 6:00 p.m. and buying some of that same power back at 2:00 a.m. So despite the fact that we were net importers we made \$1.5 billion but \$400 million of that bill is still outstanding.
- C: *Andreas Grtz:* Make no mistake there is a political agenda here that was determined by Gordon Campbell's government and he was sadly mistaken on a number of things. This IPP thing and the privatization of water runs afoul of section 11 of GATT and so if you are trading in water which is the sale of power you will lose control of your water and if you get a lot of IPPs which are in private hands you have already run afoul of that and you need to think about that because you are already there in some places. The first case that came up in that happened in Nova Scotia and they are suing the Canada government for impairment of trade because they didn't allow them to take their hydroelectric generation when they stopped their plant and sell the power to the States. That is the first one, that case.
- C: *Ted Bacibabopo:* I appreciate the fact that you are consulting the public and local governments but I find this a very complex process and when I look at the mix of options, all components, it is really for professionals and there may be some here but most of aren't and I think largely what you will finally get is best guess, or assumptions and largely emotional responses. That is where I am coming from because I am not an expert to weigh all the impacts of all the options combined because it can be like a lottery, you know, you take six numbers and you have how many options in Lotto 649 you have millions of options, I can't possibly give you a practical response.
- A: *Judy Kirk:* I think that I share some of your frustrations. Certainly in helping BC Hydro write this workbook, it is complex information, this is a serious resource plan, with serious trade-offs. I think that the point you are bringing up which I haven't yet reinforced is that the input into the draft plan includes technical analysis and includes very professional world-class analysis as well as financial analysis as well as a Technical Advisory Committee of experts also goes into this in addition to public and stakeholder input. I think to BC Hydro's credit they are also seeking stakeholder and public input from local government, from citizens and we are doing at an open house this evening, from business, from environmental organizations and they are going to take all of that input and look at it and do a draft plan and then come out and ask you again in October what you think of the plan. So it is two-steps, I can tell you from my 28-years of doing this work it is very consistent with best practice in consultation and this is the first time BC Hydro has done it.
- Q: *Ted Bacibabopo:* Given the number of open houses you are having you might have 500 or 1,000 people - what weight does that input carry in the decision-making process?
- A: *Judy Kirk:* There will be a Consideration Memo done at the end of the process to tell you how input was used and what input couldn't be used but as to weighting there has not been a criteria of weighting, they are going to look at all the input, Kirk and Co. is going to write an independent report – they will consider that in the drafting of the plan but there is no pre-determined weighting.
- C: *Andreas Grtz:* To Jim, as you have done a lot of work on this we should get together as the next government to you on the Shuswap. I have been working on this for over 10-years so we should set the date and meet.

Integrated Resource Plan Appendix 7C-2

**BC Hydro Integrated Resource Plan
Castlegar - Multi-Stakeholder Meeting**

Castlegar & District
Recreation & Aquatic
Centre

MEETING DATE

MARCH 30, 2011 4:30 P.M. – 6:30 P.M.

2101 - 6th Avenue
Castlegar, BC.

PURPOSE	Meeting notes from a multi-stakeholder group meeting with stakeholders BC Hydro staff on March 30, 2011 at Castlegar & District Recreation & Aquatic Centre, 2101 - 6th Avenue Castlegar, British Columbia
FACILITATOR	Nancy Spooner, Kirk & Co. Consulting Ltd., Facilitator
PRESENTER	Cam Matheson, BC Hydro, Presenter
MULTI-STAKEHOLDERS PRESENT	Gene Anderson Ed Beynon Bert Crockett Svend Dahl-Jensen Gord DeRosa Bill Duncan Steve Drew Don Duclos Norman Fields Brent Hancock Alex Love Mike Lynn Glen MacIntyre Gerry Nellestijn Jim Nelson Ray Postniroff Lawrence Redfern Audrey Repin Tony Sandrin Andy Shadrack Elroy Switlishoff Grant Trower Griff Welsh Bob Westcott
STAFF ATTENDEES	Dave Conway, BC Hydro Mary Anne Coules, BC Hydro Lindsay Fane, BC Hydro Anne Wilson, BC Hydro Max Tobias, Kirk & Co. Consulting Ltd. Susan Campbell, Kirk & Co. Consulting Ltd., Recorder
AGENDA	1. Welcome and Review Agenda 2. Consultation Workbook Overview 3. Discussion 4. Closing Remarks
KEY THEMES	

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1. **Conservation and Efficiency** – Participants suggested that more aggressive approaches to conservation should be considered such as limiting available power or imposing regulations to limit frivolous use of power - particularly in areas of the province that do not experience the direct impacts of generation projects.
2. **Electricity Generation Options** – Participants encouraged BC Hydro to consider all costs of supply options, with greater consideration given to the environment. Some participants expressed concerns that restoration and compensation for impacts on fish and recreation had not been provided.
 - Some participants suggested that a turbine on the Duncan Dam should be considered in planning supply options.
 - Some participants encouraged BC Hydro to explore distributed generation options that would enable individuals and small business to generate their own energy and feed into the grid.
3. **Export Potential** – Some participants said they were not in favour of BC Hydro pursuing electricity generation for the purpose of export because they are uncertain about the real benefits to taxpayers when weighed against the environmental impacts. Other participants were concerned about entering into long-term contracts that may limit our access to power in later years when we need it ourselves.
 - Some participants were willing to consider generation for export but only if there was restoration and compensation for fish and wildlife.

DISCUSSION

1. Nancy Spooner - Welcome and Introductions

Nancy Spooner welcomed participants to the stakeholder meeting, explained the format of the meeting and introduced the consultation workbook and feedback form. Roundtable introductions followed. Judy emphasised the five consultation topics and the feedback form at the back of the consultation workbook.

2. Cam Matheson – Consultation Workbook

Cam Matheson reviewed the format of the consultation workbook and explained the processes and factors BC Hydro considers when energy planning. Cam explained the difference between demand side options and supply side energy options and how BC Hydro factors this into the balancing the options when developing a long-term plan.

(Abbreviations will be used and mean: Q: Question, A: Answer, and C: Comment)

Q: *Gord DeRosa:* What percentage of the load is residential?

A: *Cam Matheson:* Residential takes approximately 30% of the load. The next class is commercial customers and this facility, for example, would be classed as commercial and that would take us right up to universities and hospitals and all the small businesses, large businesses and all the businesses in between would all fall into that category and again that is roughly 33% - 35% of the overall system as it stands today. The final segment is a relatively small number of very large users, industrial customers, this is the industrial sector of the system and they take about 38% and this would be companies like pulp and paper, and so on – very electricity intensive operation where electricity is a major operational cost and again they are small in number, very large in terms of the overall take on the system itself. So we have to understand each one of those sectors independently, figure out the expectations of their growth over time before we can have a really decent view about what we think our demand will be out over that time.

Q: *Ed Beyson:* Does that include Independent Power Producers? I wonder about the economics there because

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- I think that the cost will be so high?
- A: *Cam Matheson:* Please hold that thought because there is a good place later in the meeting where we can talk about this more.
- C: *Andy Shadrack:* Director, Area D, Regional District of South Kootenay. I am really glad you are here but with respect to your development to date it hasn't been very strategic or well-thought out - for example, Glacier Houser was proposing to ship power to Invermere when there was actually a deficit in the valley where the power was going to be generated. The project itself was sitting right next to the Duncan Dam that has no generators so I am hoping that through this process we are actually going to look at what we can generate with the existing dams without damming more sites. We have got a lot of dams in this region; let's improve the generation capacity of those dams instead of damming sites. When you say integrated, I agree, it should be social, environmental and other impacts.
- C: *Brent Hancock:* Just a follow up comment – the integrated aspect is crucial and particularly here because of generation capacity. It has been quite a problem here in getting a viable system here.
- C: *Tony Sandrin:* I represent the Friends of the Arrow Lake Society and we became a society when BC Hydro was working on getting the Water Use Plan in place and some of the values that I looked at were the social aspect, recreational, which is something that I don't think that BC Hydro addressed very well. Environmental issues existing on your lakes here - I noticed on the IRP it spoke of the potential for exporting power and I found this offensive, why are we even looking at exporting when you are developing power for your future down the road – that doesn't make sense other than dollars. I have left a brief at the registration desk regarding this issue.
- A: *Nancy Spooner:* There is a topic regarding export and we will get to that point during this meeting.
- Q: *Bill Duncan:* I see that you are going out with consultation and then a plan but I think that it is already made out with the Clean Energy Act.
- A: *Cam Matheson:* There is a lot of discretion – the Clean Energy Act - if you had the world to pick from in terms of options the Clean Energy Act might narrow them and then you have got a big band in the middle where you still have a lot of optionality and this is what we are here to talk about. We are not here to debate the merits of the Clean Energy Act, we are here to talk about the options that it leaves us with and there are still very many of those.
- Q: *Svend Dahl-Jensen:* We have a forest that could be used to make energy because they took our land away from us and it is important to use all energy and clean energy to use the waste wood and to make the energy plan out of. There are millions of pieces of waste wood that could be used.
- A: *Cam Matheson:* One of the supply options we have are bio-energy projects that we could continue to build. We have had three bio-energy calls over the last few years but one of the options, the supply options and we will get into that in a minute, would continue to be some bio-energy plants where we can make use of that waste wood.
- C: *Svend Dahl-Jensen:* Talking about the Keenleyside Dam, all the spill water that goes off the dam, wouldn't it be possible to have a generator sitting there and using that spill water in the same way as the Columbia Power does to use the water and don't waste it because that is clean energy.
- C: *Andy Shadrack:* I am a Fortis BC customer and for over the past six years we have reduced our household consumption by 42% - we invested \$3,500 in changing over our appliances so I strongly encourage you to go further down that route. But, I think that many households are strapped in terms of trying to buy them so you need some kind of low-interest loan or no interest loan program to help people put low cost energy efficient appliances onto the power grid and allow people to pay off over a set period of time. You need to look at ways with land – you need to be creative and get into household power generation like solar, which you can put back into the grid, and I know that you have a program but you need to incent us.

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- Q: *Gord DeRosa:* Columbia River Treaty member and City of Trail. Is there any advantage to transmitting power DC over AC other than line loss?
- A: *Cam Matheson:* All I can tell you is that the transmission planners are looking at that when we go to add new transmission components I know that they are looking at whether it makes sense to move to DC over AC and I can't tell you much more because I am not an expert on transmission planning.
- C: *Gord DeRosa:* I have been to many, many workshops and there is a lot of creativity out there however when I look at the demand side I see what I call frivolous use of power. When I bought my house it had 30 amp service, I went to 60 amp service, I went to 100 amp service and then 200 amp service and I stayed there. I think the British Columbia Utilities Commission should have heard this but why are we allowing 600 amp services in high load centers for residential? I don't understand that – do we need hot tubs, swimming pools, do we need such frivolous use of power and does everyone need all these things because it is just a frivolous use of power and getting back to the BCUC I think they should say 200 amps in a residential building and you choose the toys you want to use. That would solve the whole issue.
- Q: *Griff Welsh:* What percentage, you have been in Power Smart for 20-years, and is it a big percentage? You don't see?
- A: *Cam Matheson:* No, and it is nothing like what we are planning now.
- Q: *Griff Welsh:* Your next move would be Smart Meters and the laundry would be done at 11:00 p.m. while I am sleeping. Is this how you are going to aggressively expand power?
- A: *Cam Matheson:* Well Smart Meters would help us but the plan we have in place right now is not dependent upon Smart Meters being installed to reach the targets that we have set. Right now, to give you a relative sense of this, the BC Hydro system demands roughly 60,000 gigawatt hours a year of electricity and the Power Smart program we have in place by the year 2020 we are targeting about 10,000 GWh, so it would be roughly a fifth or a sixth of the overall system - so it is pretty sizable. In this year, as we are ramping up towards the year 2020, we will be roughly 2,300 on Power Smart, so we are still taking fairly small steps towards a much bigger target but we are starting to ramp it up pretty considerably. While Power Smart has been a feature of the company and our system over the past 20-years it has been small relative to the overall size of the demand but that will have to change if we are going to meet these targets.
- C: *Grant Trower:* From out by the Duncan Dam. I am pleased with the direction of conservation and residential stuff but I have real concerns about the industrial users and when I go to Vancouver, I live in a rural area and we don't have street lights, and when I go to Vancouver and see the office lights I think we need to get serious and shut them down and then the big industrial users who get cheap block funding and are forced to use power even though they don't necessarily need it at that time, so that is another question I have concerns about in terms of conservation.
- C: *Gerry Nellestijn:* Looking at 30% residential, 30% commercial and 38% industrial and what is Power Smart doing for commercial and residential and to what degree are they successful? We can do all we want to cut half of our use in the residential sector but without the accommodating like-minded cut in commercial and industrial?
- A: *Cam Matheson:* For many years the industrial customers that we have been dealing with and again these are a relatively small number of high electricity using operations where electricity is a major operating cost for their businesses. They hire professional energy managers to represent their interests and we have been working with them for many years prior to Power Smart even beginning and we've made huge headway before we even put in place programs for residential consumers for instance. So we have a long track record of working with them. Their tariff rates are so low on the industrial side, these are entities that take energy straight off the transmission grid unlike the residential customers that have that power stepped down to a distribution level and an entirely separate distribution network at a very high cost has to be put in place in order to deliver the small amounts of power we require in our homes and offices. These customers are so large they don't need any of that stepping down; they take it straight off the transmission network as they

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are taking such high voltage so they don't have the same degree of cost as the rest of us have. But because their tariff rates are so low they reach a point where they are no longer incented to put capital upgrades into their facility because it doesn't make sense and we have been working with them to come up with creative ways, programs, where we can do a supply and a demand side agreement where we will take service from them, surplus service where they are self-generating and then use that to incent them to make the capital upgrades and that is the kind of thing we are having to do because we have got these tariff restrictions.

Q: *Gerry Nellestijn*: Has Hydro measured that success?

A: *Cam Matheson*: Yes, BC Hydro has been very successful getting as far as we can and now we are just within of a couple of years now of working on creative ways with industrial customers. I think they are very successful and we will see nothing but increases with that in the future.

C: *Bill Duncan*: I have been in the environmental field for 30-years and I have watched people's behaviour in general and I don't see how you will get real change in behaviour unless you do smart metering. If there was an incentive to do laundry in the evening I would do it, people will do what is meaningful that is what people will do and if there is a cost they will do it.

C: *Norman Fields*: Why not have solar panels on every house in BC? I have six roofs and if I had solar power in the summer it would be free and if it was these new efficiency solar panels that they have now, I understand that they can generate power even if it is cloudy. So having watched David Suzuki for a long time, and I watched him travel Europe and saw what he saw, I asked, why are we so backward here? Why are we destroying farm land, why are we even contemplating Site C when you have got every house in BC that needs solar panels. If you had solar panels on every house and every house was putting it back into the grid, that is cheap - how much power would you get from that?

A: *Cam Matheson*: Right and please hold thought for the next section when we will talk about supply options and some of the considerations that we will have to make but you right this is happening in Europe to a much greater degree than it is happening in BC and we should be doing more of that. I think it will come, we are putting in feed-in tariffs and the big difference here compared to Europe is that electricity in Europe is four to five times as costly as it is here. In Europe it makes sense to buy a solar panel and put it on your roof, take energy from it however economically it is much more difficult case to make here in BC because electricity rates are so low and that is an impediment that we have to think about over time. One option is to use electrical rates to incent more of that type of behaviour and reduce costs over time and use rates to conserve energy. There are three features to the Demand Side Management program: behavioural programs, rates to incent conservation and those are conservation options and here there is controversy. People don't like it, they want low electrical rates and there is a real push/pull going on. The third area where we can affect conservation is an area called codes and standards and getting all levels of government to put in place restrictive measures that force onto people the use of more efficient things (windows in your homes, light bulbs, appliances that are mandatory, etc.) and the more we do of that the more we can get people to conserve electricity but that comes with a cost and that is freedom to choose. So when people say ramp up conservation what they are really saying is that they are prepared to pay higher rates for electricity, prepared to accept the fact that representative governments will put in place measures that will reduce their own choice and they will be incented on the program side to change the way they behave including the use of Smart Meters.

C: *Lawrence Redfern*: Can you elaborate on the choices that you think would be restricted? The reason I ask is that I have lived in Europe and Japan quite recently and I didn't feel that I was missing out on any of the conveniences.

A: *Cam Matheson*: Building codes – so a developer want to build a new building and through provincial codes and standards and regulations the choices that they might have to pick less expensive products but less efficient are gone – that is an example. Light bulbs are another example. However, that is a very good point because often with codes and standards these things are somewhat invisible to consumers – they are

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- passed at the wholesale level so manufactures and builders and those folks are the ones that are more aware that their choices are restricted and then we as the ultimate consumer are just seeing what the results of that are.
- C: *Lawrence Redfern:* The idea that it is less expensive for a builder to put something in place is true but that is because it is subsidized by British Columbians that are giving up something else.
- C: *Gerry Nellestijn:* We live in the area that supplies a huge amount of power for the rest of the province and we are looking at options of large capital projects like Site C and feeling that BC Hydro hasn't really adequately explored other mechanisms that would alleviate pressures on Site C, like the feed-in tariff. To look at a comprehensive outlay of what a feed-in tariff could bring in terms of other constituencies as in Europe or Ontario or other areas I think is really a responsible thing to do.
- C: *Bert Crockett:* We have got more of an environmental push/pull because we keep pushing for electric cars and yet we already have hybrid cars. What is Hydro's stand on that as far as going to electric cars? Is that on your demand here, does it push that down the road because it would be just be overwhelming for the grid? So you are going to want more of a hybrid-type car that is self-contained, self-efficient.
- A: *Cam Matheson:* This has been a topic of discussion for the past number of years especially in front of the BCUC and we have begun to forecast probably a relatively small number of electrical cars coming onto the system ten years from now and ramping up a little bit over that period of time. We aren't saying it won't accelerate faster than that or come this way, we do annual demand forecasts every year so we will get a kick at it and look out at the system. There is a section; one of the topic areas is on electrification, so I think we can come back to that in more detail then.
- C: *Bill Duncan:* This is probably out of your purview but I have a 24-inch gas line that goes by my house but I don't have access to it, I have to heat with electricity. I would prefer to use gas and I think that the Clean Energy Act could have said that people have access gas lines.
- A: *Cam Matheson:* That is a reverse element that we will be talking about as part of the electrification question – should BC Hydro or other utilities, like Fortis BC, be incenting customers away from natural gas as a result of Green House Gases that occur? Let's hold that thought and we can come back to that.
- C: *Andy Shadrack:* I hope that when you look at projects that you look at costs beyond the cost of building. Every year we spend approximately \$1 million to fertilize the lake behind the dam to keep the fisheries alive as a result of the dams and every year we lose \$1 million out of the forest industry behind the Duncan Dam from lost revenue and if you start adding up lost revenue from the dams that were built in the Kootenays, people in the province are paying for that through their taxes. They are not paying for it in their hydro bill but they are paying for it in other ways and we have to quantify that dollar cost and make sure people understand that it is part of the overall cost of the project. Fish and wildlife compensation programs year-in-year out, \$500-million that is half a billion and that is the cost to the taxpayers. Please factor that cost in when talking about Site C and other benefits so that people living in Vancouver know about that.
- C: *Brent Hancock:* We are guilty right now – the lights are on.
- C: *Lawrence Redfern:* When is the trough seasonally?
- A: *Cam Matheson:* The troughs are in the spring and fall.
- Q: *Gord DeRosa:* What about pumping water once it is through the dam and put it through a second time?
- A: *Cam Matheson:* It is a consideration and it is a resource called pump storage and we haven't seen it as a resource option up until a few years ago. The reason is quite simple, with a pump storage scheme you are spending more energy getting the water back up above the reservoir then you are generating electricity which is actually fine because pump storage is not meant as a firm energy resource through the year it is a pure capacity resource. So what you are doing is pumping water back up into the facility to generate during

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- peak period. Because the BC Hydro system was effectively overbuilt by the mid-1980s it took 20-years for growth to catch up with demand and we haven't really considered it as a resource option up until now but particularly in a load center like Vancouver, where you don't have a lot of options but you have these pronounced peaks during the afternoon evening period, we will increasingly consider pump storage as an important resource option.
- Q: *Gord DeRosa*: The reservoir at Valemont has been drained so there is a capability there of having storage water inside a dam - any consideration of pumping water up there?
- A: *Cam Matheson*: I am not aware of it, if there is I am not aware of it.
- Q: *Bill Duncan*: People have to understand what the trade-offs are and wind produces power at the wrong time and there is a trade-off that you have to spill water and that causes fish issues so now they are looking at the right to basically shed power because it comes at the wrong time and so while solar and wind power have some benefits – nothing is free.
- A: *Cam Matheson*: Right and looking at wind, small hydro and solar and of the features about those things is the attribute that they don't emit GHGs and they have a relatively small environmental footprint although they are small in size you have to think of them collectively. You can't replace the energy volume you get at Site C by thinking about a couple of windmills, we are not talking about the same order of magnitude and we will get into that. That is one attribute is that they don't emit GHGs but one of things they bring is that by in large they are very expensive so they are more costly than the other typical resources that you could build that have a lot of capacity and firm energy elements in them and then accumulatively as well because they have to be placed all over a large area and get interconnected with transmission so the accumulative impacts from them is a consideration. There are trade-offs depending upon what is important to you.
- C: *Gerry Nellestijn*: My comment is on accumulative impacts because they are not recognized in the reference. It is a great piece of terminology and all understand it intuitively but I don't see it being recognized in practice. We talk about impacts and in this area we have lost salmon, we are desperately trying to increase sturgeon, we have lost steelhead in my watershed and maybe bull trout directly attributed to the dams. So if we are going to talk about impacts – we are not talking about species lost with other forms of power creation - we are talking about hydro both large and small and in this area it is large and increasingly people are sensitive to that and want to see some payback for this and make sure that the areas of concern we have now are recognized and that Hydro is participating. My watershed, the Salmo Watershed, we contribute that water to power production in the 7-mile which I understand is an extremely efficient power producer and downstream the Waneta which is not noted in here but is largely a hydro dam but we have absolutely no recourse, no help at all, from Hydro, to bring those impacts to some kind of remedial conclusion.
- Q: *Brent Hancock*: With respect to a couple of the options and the rate of change of power generation compared to wind - this can be subject to great changes on the system and is proving to be limited feature.
- A: *Cam Matheson*: The question is how much intermittency can you absorb into your system before you are paying additional costs? On a large hydroelectric system the cost is that as you add increasing amounts of intermittency what you eventually have to do when all that energy comes on line and you don't expect it because you get a giant wind storm and if the reservoirs are too full and you don't need the generation you are actually spilling water and then there are environmental impacts. The way to avoid that is to be more conservative about how you operate reservoirs and then you are foregoing generation and rates go up as a result. So things are all interconnected in that way and it is a very good point.
- C: *Brent Hancock*: The problem in California is wind drops and that is a problem.
- Q: *Grant Tower*: I am up at the Duncan Dam and for eight months of the year there is a massive amount of water overflow and there are no turbines unfortunately so when we were asked to comment on the run-of-river up there at the Glacier Houser development we had 1,100 people come out in Kaslo opposed to it. One of the reasons is that we don't have any turbines on the Duncan Dam so why would we risk damaging

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- more, more impacts with small run-of-the-river projects when we are not even taking advantage of the potential for generating power on Duncan Dam?
- A: *Cam Matheson:* That is a very good comment and we hear that a lot but not here. One of the things that people need to be aware of if you are not already aware of is that in 2002 the first of the current government's energy plans was produced and that energy plan said BC Hydro will no longer be a builder of electricity resources other than Site C which has been an available option on the BC Hydro system and it is not clear if Site C were to go ahead if that wouldn't also be a private/public partnership but the energy plan basically said BC Hydro will now be a buyer of electricity from the public sector. So when we need resources we will have a call process and invite bidders into that call process and that it is not an option for BC Hydro to propose to build a new generator at the Duncan Dam, at least not under the current policy.
- Q: *Grant Trower:* We realize that and that is why we are fortunate to have Columbia Power Trust because they could come and build the electricity component to it plus half the revenue from those reservoirs and the generation of electricity would actually stay in our communities for a change. So we have a really good option there with Hydro's support. We know the limitations of that legislation but we do have an opportunity to put generators on the Duncan Dam just as we have done on the Brilliant and Waneta expansion and it is long overdue. Has Hydro thought of pilot projects and the alternatives like geo-thermal, wind, do you guys have pilot projects?
- A: *Cam Matheson:* Wind is a commercial resource. We actually have wind connected to the system so we don't need to do a pilot there. We have tried to work with private developers and we had one close to being serviceable at Meager Creek near Pemberton but it didn't go unfortunately but we are hopeful it will continue and we will be able to look at geo-thermal. The feed-in tariff is the way we can incent developers to come and look at near commercial technology, wave and tidal are two other examples that I hoping we will be able to see piloted and get some experience as other utilities are doing in Europe and other places.
- Q: *Grant Trower:* What is the planning outreach in terms of renegotiating the treaty, in terms of flows, amount of electricity created? Has there been an analysis of that?
- A: *Cam Matheson:* The treaty expires in 2024 and 10-years prior either of the two entities Canada or the United States entity need to formally trigger the re-negotiation of the treaty in 2024. We are already doing a lot of work between Canadian and American counterparts to talk about what that looks like. We believe that the American entity will want to trigger the renewal of the treaty or the re-negotiation. The US may believe they are getting the raw end of the stick on the Canadian entitlement or downstream benefits and that is what will be behind the re-triggering of it. It is hard to say what it will result in but that it is what it will be, it is hard for me to imagine we will change the way water flows out of the three treaty dams but what will be on the table will be value of foregone energy that we in Canada experience. Possibly fish flows, as well.
- Q: *Griff Welsh:* BC Hydro is not supposed to start building dams other than Site C but the Columbia Power Corporation and Columbia Power Trust have a good track record doing that and how do we work around to get the Duncan turbine?
- A: *Cam Matheson:* One of the ways is to make the comment if you think there is a reasonable opportunity to generate electricity at Duncan and to be honest I am not aware of the engineering of it. I don't know why it hasn't been developed but one way is to make your comments to this.
- C: *Andy Shadrack:* Correct me if I am wrong but I understand that Duncan is a heritage site and not on the prohibited list for being developed and we have Columbia Power Trust and Columbia River Power and you have to do it because you are already walking with Fortis BC - surely you can find partners in this region. Fortis BC is supplying power and they are claiming they are running out of power and yet Fortis BC is supplying the power for the people who are living here and we have a power problem down to New Denver. The power you need is available at the Duncan Dam at 35 KV. So let's get on with it and do it and create some self-sufficiency in our whole region.
- Q: *Brent Hancock:* IPPs, run-of-river, are a major concern. I mean Glacier Houser is an example, it is going to

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Castlegar - Multi-Stakeholder Meeting**

Castlegar & District
Recreation & Aquatic
Centre

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- the Environmental Assessment and it doesn't look credible and how do you go about assessing a IPPs proposal and decide before you take on the commitment? What assessment do you use to select IPPs and sign energy purchase agreements?
- A: *Cam Matheson:* When we have an open call process for power we have a matrix of needs and again we will assess intermittency, firm energy, and so we will ask the producers to submit a bid that has a profile of the resource, whether wind or small hydro, what monthly energy deliveries are and then we will have an expectation that they can satisfy any requirements we have about agreements with local First Nations, get their environmental permits in place, dealt with any social considerations – so we look at all of that and then finally we will obviously look at cost. Then we will compare the various bids we get and select the ones that that have a very good opportunity of getting into service having met all those other requirements.
- Q: *Brent Hancock:* Is there a technical review as to competency?
- A: *Cam Matheson:* Yes, we do that.
- Q: *Brent Hancock:* At Glacier Houser they looked at existing impacts and did not look at the practicality of the IPP.
- A: *Cam Matheson:* Correct me if I am wrong but Glacier Houser no longer has a project with the company.
- C: *Andy Shadrack:* They are continuing on with the Environmental Assessment and we can't get anyone to stop that - that is an absolute waste of taxpayers' dollars. I wrote to the Chairman of Hydro as well as others and haven't got a response back. We wrote to the Minister of Environment, Minister of Energy and BCUC.
- A: *Cam Matheson:* We don't have an agreement with Glacier Houser.
- Q: *Andy Hancock:* I understand that but why is the Environmental Assessment, a branch of the Provincial and Federal Government, proceeding with the environmental assessment for this project? It is ludicrous.
- A: *Cam Matheson:* What do you want from Hydro?
- C: *Andy Shadrack:* I think if you know people in the environmental ministry that you should tell them to shut the process down until there is an agreement. One of the things is that we could find no one in this province who agreed with the technical assessment of this project.
- C: *Brent Hancock:* When you look at the project itself it is an existing 101 and you don't connect a 25 Megawatt machine to a 240 KV network.
- C: *Grant Trower:* There have been two feasibility studies by Hydro, one in 1986 and 2001, on the merits of putting turbines into the Duncan Dam and basically the feedback from those was that the transmission line would be too costly to do yet two small run-of-rivers were built and they built a transmission line yet BC Hydro couldn't do that. The feasibility studies have been done.
- Q: *Elroy Switlishoff:* Run-of-river for \$58?
- A: *Cam Matheson:* In each of these there is a range of costs and what we do is we talk to developers from around the province, we did this during the past fall, where we take feedback from them about the projects they are developing and then we create a range of unit energy costs and yes there are cheap run-of-river projects that are available.
- Q: *Elroy Switlishoff:* There are resources under \$75 available – really? What kind of volume are we talking about?
- A: *Cam Matheson:* Not necessarily talking about a high volume and not suggesting that the preponderance of resources are at the \$58 range all we are saying is this is an unit energy cost range we are taking from the professional developers out there in the field.
- C: *Elroy Switlishoff:* With reference to Table 2 on Topic 2 potential energy resources – I offer a suggestion that there should be a fifth column representing volume available whether it is unlimited or whether there is a cap on the particular volume being generated. If you had wind at \$10 you still couldn't accept more than 12% to 15% - show a volume available on that particular type of technology, as it may be helpful.
- C: *Bill Duncan:* I actually am a biologist and I think that a full-life cycle should be looked at in the portfolios because they are not as a sweet a deal as you think they are. You are basically trading birds and bats for fish

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- and then when you get to Site C on the third portfolio I would like to see more gas-generation because then the people in Vancouver, that use all the power, pay for the costs. Think about the transmission losses out of the Peace – there are large transmission losses.
- A: *Cam Matheson:* You are right there is about a 7% transmission loss taking energy from the Peace.
- C: *Gerry Nellestijn:* It is great and we are talking about supply and we have got three portfolios here but there is probably a fourth portfolio and that is a policy portfolio and the feed-in tariff has worked really well in Europe and could work well here. I have not seen the word environment very often and know that it is about supply but there are other consequences to supply and there is no reference to mitigation and compensation, set of criteria, evaluation process, or community feedback - I feel that it should be in the planning structure and clearly laid out so that we are all aware of the consequences of our supply and demand needs.
- Q: *Andy Shadrack:* We have been mandated to recapture the landfill sites and there is a potential there to generate heat, I don't know how much it is. The Fraser Valley has a manure problem why can't we do bio-gas; they do it in Europe all the time. A wood waste study was just finished to generate energy. I think there are small regional partners and I agree with Bill, let the people in lower mainland figure it out to generate some of their own energy instead of destroying the outlying parts of this province.
- A: *Cam Matheson:* From an electricity system planning standpoint you have got a highly concentrated center of demand in a province all tucked away in the southwest corner and large resources that generate the majority of electricity that is utilized in that southwest corner area and interconnected by a small number of high voltage transmission lines. One real issue for an electricity system is all the things that can go wrong as you are bringing electricity into that demand center on those relatively small number of transmission lines. We have the Burrard Thermal Plant and it is very controversial and some want to close it down while others understand that you may need it for reliability purposes and I would appreciate you making comments about that because natural gas is still an important potential option for us because it can be sited in the demand area and you can utilize it there and yes it has air issues but as you say if that is where people are consuming the product maybe that is one of the trade-offs that has to be made. I would very much appreciate any written comments about that.
- C: *Mike Lynn:* So a word to the IPPs and wood waste and bio-mass. At Celgar we have just finished a major upgrade and we are one of your IPPs. I see in the north that pellet plants are increasing, my concern is at Celgar we take a residual from the sawmill, which then becomes pulp, which then we take electricity out of. When you go to a pellet-type plant or some of these "waste wood facilities" they take what we could use to make pulp and take it right through to the electricity stage by burning wood fibre. Whereas, we can make an intermediate step and I hope you guys will consider that before you go to pellet-type plants, wood-waste plants that wood is made available to the forest industry first before it is directed into electricity. We can get three steps out of it if it is going to a refining facility first. We are seeing real opportunities and there is an upcoming fibre shortage for all the pulp mills and sawmills as annual cuts drop. Supply and demand is what it is and we have been through a couple of tough years. It is on the increase right now and our pulp has been on an increase for the last two-years and our pulp, North American pulp, is the best pulp in the world.
- Q: *Alex Love:* In conversations you have mentioned a concern about transmission reliability from Peace Valley to the lower mainland and you have many years of historical data - is reliability a problem?
- A: *Cam Matheson:* It is and there is one path in particular that is problematic in terms of a constraint and that is the section of transmission between Merritt to Coquitlam (the Interior to Lower Mainland Transmission Line) – that is highly constrained and we have to add a new line in order to upgrade it - it is really not only from the Peace River it is ultimately from the Columbia River as well. Particularly, when there are additional units that can be built at the Mica and Revelstoke facilities, to be able to get the benefit of having built those you need additional transmission into the lower mainland particularly on that path but of course the

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other thing to point out is the more generation you are able to affect inside that load center the less reliant you are on transmission to bring it in from outside and that is where the natural gas question comes in again.

C: *Grant Trower:* I think that it is right and we missed the opportunity with natural gas, we have got natural gas going everywhere but you can't go anywhere in the lower mainland and fill up your vehicle.

C: *Glen MacIntyre:* I would ask that the IRP for this region look at the possibility of creating electrical data centres or server farms and there are many attributes associated favourably with all those server farms. There is ample water and benign climate and these things are growing about 20% a year. Just think of Google. It is sort of a little bit of a twist to the electrification but I would ask that you look at it seriously.

Q: *Gord DeRosa:* Does it look like nuclear plants?

A: *Cam Matheson:* I don't think so there has been a long-standing prohibition in the province and I don't see it being lifted. We are lucky in that we have other options, a lot of jurisdictions don't.

Q: *Gord DeRosa:* Can they ramp up and down quickly??

A: *Cam Matheson:* Nuclear power – no they can't, they need to operate.

C: *Jim Nelson:* With the vast supply of shale gas, in the northern BC, it just makes sense to utilize that gas and make it into power.

C: *Gerry Nellestijn:* No, you shouldn't build it out proactively – it presupposes a whole suite of factors that we know absolutely nothing about and to me is a strange question.

A: *Cam Matheson:* The Clean Energy Act requires this question be asked and it is largely for economic development considerations.

C: *Gerry Nellestijn:* I see that but even that one there really seems nebulous to me that we build a superstructure because we might go there. I think about two things when I think of your capacity question and one is reliability and largely we are spoiled and we are so lucky but elsewhere else in the world there are scheduling aspects to when, how and how much power we receive and maybe that is a planning issue for BC Hydro – when, how and how much? The other thing I wonder about is storage, storage of the finished product, is Hydro looking at storage (electricity) possibilities?

C: *Audrey Repin:* Columbia Power. I am very pleased to see BC Hydro going through this public consultation phase and I would like to see what comes out of the consultation. With respect to pre-building - you are talking to the community that needs economic development. If you consult and go directly to that community there is a lot that can happen. It is when we presume, or impose our own ideas on a community and haven't taken time to consult and I have to say that we have struggled and that is one of the big factors that we have learned.

C: *Bill Duncan:* I think we do have to look at economic development and putting power into the northwest corner of the province – don't they deserve the power? Meager Creek, I have issues with that but the lower mainland needs to pay for all those high rises.

C: *Tony Sandrin:* The answer is definitely one word and it is no, we shouldn't be developing. The reason is to go into long-term exports you have to go into contracts and commit that power for a certain amount of time. Obviously if we require that power ourselves it will be tied up. Each one of the options to produce power in BC has impacts and we don't want to build extra because of economics – the environmental impacts that I see and I observe them all the time around here even though the Arrow Lake is a storage facility with a small generating plant on it causes a lot of problems with the fish. Fish is one of my passions. We have to consider this when we develop. There is a gas bubble trauma that happens down at the dam, I see it all the time and all the seagulls going around having a good time because the spawning fish can't get

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into the channels. In the big picture we can see we are developing power for our industrial, commercial, residential and those people way up in the Kootenays - there is not that many people up that will be disrupted and that is an attitude that has been, in my view, complacent with BC Hydro and we have to change that, we have these meetings and have ideas, do something with them.

C: *Andy Shadrack:* No. I wish you had been there in Kaslo - people were angry and they lost control of the meeting. People get really angry when they think you want to export power to Americans. It is one thing to say let's do something for the province but don't ask people in this region where the economic, environmental and social damages have happened and to dam more rivers to export the power to somewhere else in North America is no.

C: *Grant Trower:* I concur with the earlier comments – one of my big concerns with integrated resource planning is that a big component is missing and it should be the sixth one and that is fish and wildlife and their habitats that have been impacted. We all benefit greatly from hydroelectric power as people but there isn't a single benefit for our fish and wildlife population. There is nothing green and nothing clean. You go behind the Duncan Dam and there are 28-miles of reservoir at low pool and we have lost massive amounts of habitat. Hydro has not stepped up to the plate, we have a small compensation program but it needs to be expanded dramatically and there is the Smart Meters and \$6-billion for aging infrastructure and we need billions of dollars for restoring the damage done to the fish and wildlife. We have 19-dams in the Columbia basin and we don't have a single fish ladder, I mean it has been 42-years on the Duncan Dam and there are fish that are blocked that should be getting up into the habitats. We need proper fish ladders.

C: *Alex Love:* I have a bit of a different point of view than my friends before me but in terms of energy exports, I think there is potential there because it basically could reduce the cost of capital infrastructure and then it becomes a heritage asset for the province. I wouldn't go so far as to say any project is a good project but it deserves consideration if it is good for that economic revenue from say a mine or forestry if is not insignificant environmental impacts.

C: *Gerry Nellestijn:* Maybe, depending upon a whole suite of contractual negotiations that work in our favour. I am going to put something else on the table because you are talking about exports but regionally we wonder if we should be exporting this power out of region – that is a serious consideration and you need to note it because there are a lot of sensitivities around that issue here in the upper basin, we have paid a lot of cost and we have not seen the payback regardless of your comments. Those issues are being ignored and there is no comprehensive planning situation that reflects anything that looks like restoration.

C: *Jim Nelson:* If we do it the right way you only need to look at Quebec and Newfoundland – they are building power for export and they are doing very well.

4. Feedback Forms

Participants of the meeting were thanked for participating and were encouraged to complete and submit feedback forms. Participants were also encouraged to attend one of the upcoming open houses (dates, times and locations listed in the consultation workbook).

5. Closure

The meeting ended at 6:45 p.m.

Integrated Resource Plan Appendix 7C-2

BC Hydro Integrated Resource Plan
Fort Nelson - Multi-Stakeholder
Meeting

Woodlands Inn
3995 - 50 Avenue South
Fort Nelson, BC.

MEETING DATE MARCH 31, 2011 1:00 P.M. – 3:00 P.M.

PURPOSE	Meeting notes from a multi-stakeholder group meeting with stakeholders BC Hydro staff on March 31, 2011 at the Woodlands Inn, 3995 – 50 Avenue South Fort Nelson, British Columbia
FACILITATOR	Don Bradley, Kirk & Co. Consulting Ltd., Facilitator
PRESENTER	John Rich, BC Hydro, Presenter
MULTI-STAKEHOLDERS PRESENT	June DiMaggio Les Hobenshield Bev Vandersteen Roakr Cyrk Doug McKee James Childs Jeremy Cote Angela White Gord McCleary Georgie McLennan
STAFF ATTENDEES	Bob Gammer, BC Hydro Kenna Hoskins, BC Hydro Magdalena Rucker, BC Hydro Tim Lai, Kirk & Co. Consulting Ltd. Emilie Yee, Kirk & Co. Consulting Ltd., Recorder
AGENDA	1. Welcome and Review Agenda 2. Consultation Workbook Overview 3. Discussion 4. Closing Remarks
KEY THEMES	
<ol style="list-style-type: none"> 1. Overarching Theme – Without exception, participants attending the stakeholder meeting in Fort Nelson expressed no concerns whatsoever verbally during the session around high profile and controversial BC Hydro issues including proposed rate increases, SMI, Site C or other. 2. Conservation and Efficiency – Participants appear supportive of BC Hydro’s current commitment to conservation, and are concerned about the potential financial investment BC Hydro might make to do more – given the level of perceived risk. 3. Electrification/Transmission – Participants appeared generally supportive of the Northeast Transmission Line, but some encouraged BC Hydro to explore efficiency improvements in its transmission network system-wide to reduce the current rate of power loss (during transmission) estimated to be approximately 7%. 	

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4. **Export Market** – The only key concern expressed by participants was with respect to the implications on BC Hydro’s ability to best meet domestic electricity requirements, if also committed to export surplus power procured through IPPs.

DISCUSSION

1. Don Bradley - Welcome and Introductions

Don Bradley welcomed participants to the stakeholder meeting, explained the format of the meeting and introduced the consultation workbook and feedback form. Roundtable introductions followed. Judy emphasised the five consultation topics and the feedback form at the back of the consultation workbook.

2. John Rich – Consultation Workbook

John Rich reviewed the format of the consultation workbook and explained the processes and factors BC Hydro considers when energy planning. Cam explained the difference between demand side options and supply side energy options and how BC Hydro factors this into the balancing the options when developing a long-term plan.

(Abbreviations will be used and mean: Q: Question, A: Answer, and C: Comment)

Q: *June DiMaggio:* When you speak about regulations what do u mean?

A: *John Rich:* In your case it would be more stringent building codes.

Q: *June DiMaggio:* It wouldn’t have to be environmental regulations; it’s more to build more, right?

A: *Kenna Hoskins:* An example is the CFL bulbs and they are standard on the markets.

C: *Don Bradley:* BC Hydro is looking for your input about additional savings on the current plan.

Q: *Gordie:* How much more does BC Hydro want to spend to ramp up the conservation strategy as opposed to building a new generation plants. I’m an insurance broker and this isn’t a good strategy, there are too many variables. Why not build the plant now and keep the conservation where it’s at. I would feel safer that way. I don’t want to import power.

A: *Kenna Hoskins:* I think that captures the risk pretty well. John said the actual cost we spend on conservation is less compared to the new conservation strategies.

C: *Magdalena Rucker:* Even with a more aggressive approach to conservation, the costs for those measures are still \$60 per megawatt hour compared to \$85 per megawatt hour for Site C. Compared to IPP’s, the power would be even more expensive. Even if you go with a more aggressive approach it’s still cheaper than the other options but it’s increasingly risky.

C: *John Rich:* You make those expenditures, but then you are left with not having enough supply or you spend the money and don’t see the savings. It’s similar to what you face in the insurance business. In equivalent dollars, it’s \$60 versus \$85. Conservation is always less expensive than any new generation add, but the trade-off is that new build is greater certainty of what will be achieved.

Q: *Bev Vandersteen:* How much power is lost if most of your plants are up north and you ship down to the Lower Mainland?

A: *Magdalena Rucker:* The loss is about 7% I believe.

Q: *Bev Vandersteen:* Where is BC Hydro at getting your own transmission more efficient? Like your own plants and transmission lines?

A: *John Rich:* Losses are actually calculated in our long term energy planning and it shows up as a benefit in a portfolio with more efficiencies. There is always ways to make our facilities more efficient as we replace and upgrade transmission lines and generating stations. If you actually twin a line, you reduce transmission losses. There are lots of different ways and we are always looking at that to improve.

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Q: *Jeremy Cote:* There are limited opportunities to generate power and there are only so many places you can build dams. If you generate energy and it's cost effective, one would assume it is cost effective to sell locally. If you build for export, does that mean that it can't be used locally as well?

A: *Magdalena Rucker:* The export market is based on supply from IPP's. Site C is considered for domestic need and looking at our self-sufficiency requirement by 2016. We also require a 3000 megawatt hour buffer as insurance.

Q: *Jeremy Cote:* What are IPP's?

A: *Magdalena Rucker:* IPP's are private companies that build energy generation projects like wind or solar, for example.

Q: *Jeremy Cote:* Theoretically, those are not facilities that BC Hydro builds for the province. One of the things I'm trying to say is, since it's IPPs that are doing it, they won't be competing with BC Hydro for areas that BC might want to use. Long term it won't affect our ability to generate power.

A: *John Rich:* I guess there would be competition, but we have a huge resource potential so there should be enough for both. It's not to say that after the service agreement, that resource couldn't be used for BC Hydro's use.

4. Feedback Forms

Participants of the meeting were thanked for participating and were encouraged to complete and submit feedback forms. Participants were also encouraged to attend one of the upcoming open houses (dates, times and locations listed in the consultation workbook).

5. Closure

The meeting ended at 2:15 p.m.

Integrated Resource Plan Appendix 7C-2

**BC Hydro Integrated Resource Plan
Cranbrook - Multi-Stakeholder
Meeting**

Prestige Rocky Mountain
Resort and Convention
Centre

MEETING DATE

APRIL 7, 2011

1:00 P.M. – 3:00 P.M.

209 Van Horne St. S,
Cranbrook, BC.

PURPOSE	Meeting notes from a multi-stakeholder group meeting with stakeholders BC Hydro staff on April 7, 2011 at the Prestige Rocky Mountain Resort and Convention Centre, 209 Van Horne St. South, Cranbrook, British Columbia.
FACILITATOR	Judy Kirk, Kirk & Co. Consulting Ltd., Facilitator
PRESENTER	Dave Ince, BC Hydro, Presenter
MULTI-STAKEHOLDERS PRESENT	<p>Gary Anderson Marc Barrette Bill Bennett Christina Benty Wendy Booth Alan Burt Bob Cutts Connie Dobson Bonnie Dobson Stan Doehle Carla Fraser Bill Green Larry Hall Chris Hambruch Scott Holt Wayne Jones Tom Kirk Chris Lague J Maletta Suzanne McCrimmon Aaron McDonald Ken Miller Bruce Mollison Tom Muir Ron Oszst Greg Ross Susan Ross Llyod Sharpe Jeanette Sissons Laird Siemens Heath Slee Wayne Stetski Bob Wetham Dan Wigle Joe Zarowny</p>

**BC Hydro Integrated Resource Plan
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Prestige Rocky Mountain
Resort and Convention
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209 Van Horne St. S,
Cranbrook, BC.

MEETING DATE APRIL 7, 2011 1:00 P.M. – 3:00 P.M.

STAFF ATTENDEES	Bob Gammer, BC Hydro Kenna Hoskins, BC Hydro Magdalena Rucker, BC Hydro Tim Lai, Kirk & Co. Consulting Ltd. Emilie Yee, Kirk & Co. Consulting Ltd., Recorder
AGENDA	1. Welcome and Review Agenda 2. Consultation Workbook Overview 3. Discussion 4. Closing Remarks
KEY THEMES	
<ol style="list-style-type: none"> 1. Conservation and Efficiency – Participants said they support BC Hydro including the existing conservation approach in the Integrated Resource Plan rather than the greater conservation approach. <ul style="list-style-type: none"> • Participants were cautious about potential additional costs to customers that the more proactive conservation approach could create. 2. Electricity Generation Options – Participants expressed a strong desire for BC Hydro to enhance its support for distributed generation rather than large-scale electricity generation. <ul style="list-style-type: none"> • Participants said BC Hydro should encourage regional electricity generation, establishing regional generation targets, supported by incentives to develop regional solar energy, for example. • Some participants expressed concern that wind and run-of-river projects create too much environmental impacts, while others said that wind and run-of-river are preferred by developers because they're more cost effective. 3. Transmission – Some participants said BC Hydro should introduce a cost-recovery model similar to local governments so that large operations that require new transmission pay the incremental cost of providing the electricity. <ul style="list-style-type: none"> • A few participants said that BC Hydro should pay tax to local government for the land used for transmission lines because that land could be used by forestry or other commercial uses producing tax revenue for local government. 4. Export – Participants were generally supportive of BC Hydro pursuing clean generation for export as long as domestic customers didn't subsidize the additional electricity generation capacity. <ul style="list-style-type: none"> • Some participants said BC Hydro's export potential could be limited unless the provincial government negotiates a broader definition of clean and renewable electricity in some US Jurisdictions. 	

DISCUSSION	
1.	Judy Kirk - Welcome and Introductions Judy Kirk welcomed participants to the stakeholder meeting, explained the format of the meeting and

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Prestige Rocky Mountain
Resort and Convention
Centre

MEETING DATE

APRIL 7, 2011

1:00 P.M. – 3:00 P.M.

209 Van Horne St. S,
Cranbrook, BC.

introduced the consultation workbook and feedback form. Roundtable introductions followed. Judy emphasised the five consultation topics and the feedback form at the back of the consultation workbook.

2. David Ince – Consultation Workbook

David Ince reviewed the format of the consultation workbook and explained the processes and factors BC Hydro considers when energy planning. Cam explained the difference between demand side options and supply side energy options and how BC Hydro factors this into the balancing the options when developing a long-term plan.

(Abbreviations will be used and mean: Q: Question, A: Answer, and C: Comment)

Q: *Chris Lague:* Can you explain why the supply goes down in 2014?

A: *Dave Ince:* There are two effects. The first is we have IPPs that are based on biomass. When those projects end their end of contract life, we assume the supply is over. Secondly, around 2016 you see a bigger drop and that is the market allowance. We used to use a small amount of imported energy but the government has removed it after 2016. We have to have the resources in the province to meet the supply gap. It's a change in provincial legislation.

Q: *Wayne Jones:* One thing we hear is that BC Hydro will continue to export. How does that work?

A: *Dave Ince:* We export power every day and we import every day on a net bases. At 2am there is power coming in. It all depends on supply and demand. We import power in order to not have to use the water in our own dams. At 6pm, we are selling out to the market on net bases and we are bringing in more power than we are putting out. If we stopped export, we would be forgoing \$150 million a year. The storage and system flexibility is unmatched. The ability to sell high and buy low allows us keep your rates low.

Q: *Laird Siemens:* The two reasons you gave could both be unrealized. Legislation could be changed, and other projects might not all dry up.

A: *Dave Ince:* That is true. But in the grand scheme of things, you will still have a gap there.

C: *Judy Kirk:* I just want to remind you that BC Hydro is working on their 20 and 30 year plans, so it's not a short term thing.

C: *Dave:* Large scale generation could take 10 years or more so that is why we are looking ahead.

Q: *Lloyd Sharpe:* In your calculations, are you considering that Site C might be coming in?

C: *Judy Kirk:* To clarify you are asking whether Site C is included in the supply on this page and the answer is no it's not.

Q: *Bruce Mollison:* On the supply gap, I get the impression that buying low and selling high is a pretty good plan for BC Hydro and you pretty much approve of that.

A: *Dave Ince:* The trade revenue goes to reduce rates. It will go on but we need to make sure we aren't congesting the tie lines. If we are balanced between supply and demand, then the trade situation works better.

Q: *Bill Green:* In regards to the Clean Energy Act, on page 5 the conservation increment is what you get from current programs?

A: *Dave Ince:* It's 66% should be more aggressive than that.

C: *Judy Kirk:* The red line is demand before conservation, the green is demand after current conservation and the current conservation is 66%.

C: *Magdalena Rucker:* It's actually about 79% because that is what the demand side management program is right now.

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Prestige Rocky Mountain
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- C: *Dave Ince*: I think we'll need to speak with you offline.
- Q: *Bruce Mollison*: Just getting back to page 11 regarding conservation, efficiency and transmission, the word efficiency tends to pop up a lot. How much room do you have to improve the efficiency now and will transmission planning be part? Where is BC Hydro at today?
- A: *Dave Ince*: We are leading utility in this country along with Manitoba and Quebec. We have an aggressive conservation program. California electricity rates are 3 times ours and most others are well behind us. One important thing is that we don't make net revenues on incremental sales. Every time we add new load, it's not a profit, it costs a lot more than we can recover our rates. That's why conservation is so important.
- C: *Bruce M*: My question is how much more efficient can the existing dams become?
- A: *Dave Ince*: You can change some parts but you can't make them much more. I don't think you can get more than 10%.
- Q: *Wayne Jones*: Does BC Hydro have a position on nuclear power?
- A: *Dave Ince*: Well the provincial government does and there is a prohibition on nuclear power in BC.
- Q: *Tom Kirk*: Does the industrial sector have conservation programs?
- A: *Dave Ince*: It's mostly on the residential side, but we have programs for commercial, industrial and residential. For every category we have over 200 programs targeted to conserve.
- C: *Judy Kirk*: It's useful for the group to know that it's about 1/3 each between how demand is spread.
- A: *Dave Ince*: Yes that's right. In terms of conservation, the residential side is more heavily weighted.
- Q: *Bob Wetham*: Has there been any assessment on geothermal energy?
- A: *Dave Ince*: Yes, we'll be talking in just a second about that.
- Q: *Chris Lague*: What of the three classes is growing the fastest?
- A: *Dave Ince*: It will be the industrial side due to mining, oil and gas industries.
- Q: *Greg Ross*: I didn't see anything about solar energy options. Is there anything in the planning for solar in certain portfolios?
- A: *Judy Kirk*: That will be reviewed in the next few sections.
- Q: *Laird Siemens*: If you increased conservation and planned for new gen, then you would get what you want. Why can't it be both?
- A: *Dave Ince*: The spot market for electricity is fairly low cost; you'd be consistently losing if you just put that on the spot market. It's best to set up a long term contract.
- Q: *Bill Bennett*: Did you guys get into the Clean Energy Act before I got here? So everyone realizes this process is mandated by government. I believe that the Clean Energy Act only allows for the creation of new export production in a way that has no impact on domestic rates. It was a way to protect the consumer associated with export. That's an important one.
- A: *Diane Tammen*: You're referring to our heritage assets.
- Q: *Scott Holt*: How did you get 79%?
- A: *Dave Ince*: We have a detailed process to look at all of our customers. We looked at costs of each of those and generated a cost curve. So you stack them all up and then you have a cut-off point. If you have an aggressive program, you go higher and there comes a point where it becomes more effective to go to

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generation.

Q: *Greg Ross:* Does BC Hydro have any programs for promoting scientists and engineers in making new equipment?

A: *Dave Ince:* We do have a feed and tariff program where people who produce power can get it onto the grid.

Q: *Greg Ross:* At the start, part of this graph changes as technology gets better, so does BC Hydro promote or fund research and development?

A: *Magdalena Rucker:* Not at this time.

Q: *Suzanne McCrimmon:* Have you looked at the Ontario power act that has been around for years? I think it's something you could model BC Hydro's policy on.

A: *Dave Ince:* I have not but that's a great comment.

Q: *Joe Zarowny:* The range you get is the cost of producing it but not deliver?

A: *Dave Ince:* That's right; it doesn't include the transmission cost. There is transmission and then also the distribution costs or low voltage. Distribution costs are the most expensive part of the service.

Q: *Wayne Jones:* Cranbrook is the sunniest city in BC, so could BC Hydro invest in Cranbrook for solar energy?

A: *Dave Ince:* Well, let's look at the solar in the next section. Solar is dropping the fastest in cost and the cost curve is coming way down. Currently, the cost is very expensive. BC Hydro as a whole is a winter peaking facility. Even if it was the sunniest place in Canada, it might not be the best option. The United States are summer peaking.

C: *Judy Kirk:* On your feedback form there is a section for additional comments so we'd encourage you to put that feedback in that section.

Q: *Larry Hall:* A couple of things in the wildlife community have concerns about generation. One is wind power. Our understanding is that wind power kills a lot of birds. The run of river projects have huge impacts on the fisheries in that water system. I think that the efforts of BC Hydro in generating power is you should be looking at tidal power but also generating plant will operate in water. There would be some significant engineering but it make more sense than blocking a river to prevent passage of fish. That way you solve problems.

Q: *Suzanne McCrimmon:* I think one of the things we need to consider is the flicker affect that it has on the birds and livestock. Studies have been done in Germany and Spain. Is there an option if someone wanted to do a coop wind farm, would there be payback to them?

A: *Dave Ince:* Thank you.

Q: *Ken Miller:* Further to way, I am amazed at the solar lights. Why are we not using these solar lights?

A: *Dave Ince:* We are looking at lighting technology because 20% of consumption is lighting. I must add, if you have solar powered lights so you have storage so you could last for months. It's still a challenge.

Q: *Bruce Mollison:* I was going to say that these potentials are pretty viable and politically correct. My question is about nuclear power?

A: *Dave Ince:* We operate within the Clean Energy Act and nuclear is not analysed in the IRP because it is prohibited by the provincial government.

Q: *Joe Zarowny:* I don't see why we aren't considering coal fired stuff?

A: *Dave Ince:* Coal emissions emit triple the amount of carbon compared to gas. It is a heavy producer of Green

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House gases. Under the Clean Energy Act, coal emissions need to be fully sequestered and that is very expensive.

Q: *Chris Lague:* Of all these options you have listed, is that cost for coal captured because it looks really low?

A: *Dave Ince:* The cost that is shown is before the sequestration cost so it would be higher than that.

Q: *Chris Lague:* This portfolio one has biomass generation. Why don't we have it in the list?

A: *Dave Ince:* This is a sample, it's just for the sake of discussion and it could have some biomass.

C: *Magdalena Rucker:* When we do the actual analysis, we do hundreds of portfolios and they would include biomass.

Q: *Suzanne McCrimmon:* Did you do an in-depth study on the jobs, are they long or short term?

A: *Dave Ince:* There is a study, I don't have the results. For a lot of these projects there is a lot construction so that's short term jobs.

Q: *Tom:* Is it necessary to create a large wind farm to create wind energy? Or if you put some windmills around dams that already have turbines?

A: *Dave Ince:* Yes, but you still these number of turbines to meet the 10,000 gigawatt supply, so you need a lot of surface to extract energy.

Q: *Greg Ross:* Is there only one kind of turbine?

A: *Magdalena Rucker:* there are three blades and you can also get vertical but they tend to produce less energy. That was a concept that came out 20-30 years ago, and in terms of getting energy out of the wind they aren't as efficient.

Q: *Suzanne McCrimmon:* On the vertical wind turbines, in Ontario a lot of the commercial buildings are putting vertical wind turbines on.

A: *Magdalena Rucker:* those are built by IPPs so they are quite different from if you own a house or building. The vertical axis design is better for buildings, but you can't put an 80 metre structure on a building.

Q: *Susanne:* There are multiple vertical turbines so they can use it as a conservation method.

A: *Magdalena Rucker:* Yes, so that would be connected to our feed and tariff program.

Q: *Jim:* Every water system in the municipality has the potential for generating power. The peak production coincides with the peak demand of power, but it has potential. There has got to be multiple pressure reducing valves?

A: *Dave Ince:* Yes, that is a good idea. Natural gas distribution companies also use this technique.

Q: *Heath Slee:* with respect to wind, i know it's not feasible to have wind all over the place, and I wonder why you don't have solar on here. Europe has solar panels everywhere. Farmers were generating income by having panels on their buildings. Why are we so far behind?

A: *Dave Ince:* These are sample portfolios to get the discussion going. It would increase the overall costs. At this state, it is very expensive. 70% of the load is in the lower mainland so it's hard to integrate solar because of our climate.

C: *Magdalena Rucker:* when we look at the portfolios, we look at large generation projects. If every household has a solar panel, that's more on the distributive generation. BC Hydro is working in a feed and tariff to address that.

C: *Judy Kirk:* Why were wind and run of river chosen as renewable. The explanation was is that BC Hydro sees that most in way of bids to RFP's.

A: *Dave Ince:* Every year we have a Clean Call for power. Geothermal should be a good resource but we've

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never seen an IPP bid so we haven't included it here.

Q: *Gary Ross:* If we are talking large scale generation projects, if you take 500,000 homes with solar, even if the sun isn't shining they would still work. That conservation measure could be very large parts of the equation.

Q: *Jeanette Sissons:* My observation is that if you have a call for power, and you get run of river and wind that indicates that is the most viable elements. That makes sense for businessman. I understand that for solar you need very large panels and how that affects you environmentally.

Q: *Bob:* Going back, we have a lot of opportunity for small scale generation and all of those are potentially located where you don't have to add capacity. I can see geothermal for instance but that won't work small scale. The wind might work better by not putting huge projects out there but where they are needed.

C: *Wayne Jones:* There is a neat clip on YouTube where they are making highways in the United States into solar panels.

Q: *Scott Holt:* When you said earlier that 70% of the load is in the lower mainland. Is it fair that 70% of the generation occurs outside the area? I'd like to see more from the lower mainland. It's not really right that the Peace Region has to give up their rivers.

Q: *Wayne Jones:* Has BC Hydro ever thought about setting generation targets by region? Vancouver is the draw.

Q: *Larry Hall:* One of my comments about coal fire is that one of the things is if you burn wood with coal you reduce the emissions. Every fall, you can look around here and you can see huge columns of smoke where the forest industry is burning landing tops. By combining burning the coal you increase emissions but if you burn the wood then you are utilizing the carbon that is going out anyways. I think you need to look at that in the Elk Valley.

Q: *Greg Ross:* Was that 7% or 70% demand in the lower mainland that you mentioned?

A: *Dave Ince:* Yes, that's 70% and it includes Vancouver Island.

Q: *Stan Doehle:* Personally I have geothermal in my home and I am penalized because I have extra. You penalize and it's no different plugging your car into your household current. Is there anything in the works to offset the greenhouse gases but you get penalized.

A: *Dave Ince:* We have a stepped rate and if we had a lot of this electrified our customers would be pushed into tier two. So that's a great point, you should include that in your form.

C: *Judy Kirk:* That is a great example. Should BCH be responsive or should they take a more proactive approach?

A: *Dave Ince:* BC Hydro has the obligation to serve our customers but the question is should BC Hydro be facilitating this?

Q: *Chris Lague:* Is electrification part of the Clean Energy Act? What is BC Hydro doing to mitigate the increased load from generators? You are asking someone to switch gas to geothermal but then you are putting more gas out there?

A: *Dave Ince:* Right now BC Hydro has to pay for the carbon tax, but then your question is whether that is that enough? Well, that's a good question.

C: *Judy Kirk:* In some other communities, maybe BC Hydro has to be more cautious for electrification because it would increase load.

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- Q: *Tom Kirk*: Electrification, for vehicles for example, demand are low overnight and smart meters will help you figure out when people are using the most.
- A: *Dave Ince*: If we do electrify the vehicle fleet, if people come home at 5pm and plug in that is BC Hydro's worst nightmare so we still have to figure out how that will work.
- Q: *Tom Kirk*: If you put a solar panel on your house, the utility gives you a reduced rate or a rebate. Is BC Hydro considering that?
- A: *Dave Ince*: I haven't seen that but it's a good comment?
- Q: *Scott Holt*: Where is the incentive because my home is completely electric because I already am, and I'm still getting penalized?
- Q: *Stan Doehle*: I would like to comment, every time you phone in about that subject they refer you to the BCUC, which board would be the one to make those decisions.
- A: *Dave Ince*: BC Hydro proposes tariffs and then we put that in front of BCUC and we've been turned down before. There are a lot of hurdles to getting new rates introduced. We've never had a use specific rate before.
- Q: *Stan Doehle*: Geothermal takes care of your hot water.
- Q: *Jeanette Sissons*: The solar panel might charge your electric car.
- Q: *Bob*: I'm not sure the proactive approach is enough. When people tie in there is a cost. It's a financial structure. If you plan over the long term, they can contribute to the cost of the offsite improvements. It's more of a financial conversation.
- Q: *Joe Zarowny*: I wonder about using direct current (DC) for long term transmission.
- A: *Dave Ince*: Right now BC Hydro loses about 7%. Direct current is a long lead time item. My understanding that underground transmission is about 4 times the cost and the installation and the protection is the reason for that.
- Q: *Wayne Jones*: Are you saying that if you are in favour of #5 it would result in new transmission lines?
- A: *Dave Ince*: For any large scale transport, we would have to build new lines. Right now we are bottled up. Our first priority would be to build our existing lines up.
- Q: *Jeanette Sissons*: If we create clean generation for export, we can reduce our environmental impacts. That could benefit us on a larger scale than just looking at our neighbourhood close by.
- A: *Dave Ince*: In Alberta we have 70% coal fire generation and other places are the same. It would help the world in the long run.
- Q: *Ron Oszst*: Does Alberta have any rules or will they purchase any kind of energy because some of the states will only purchase clean renewable energy. Hydro is about 29% and in a number of states you can't generate 35 megawatts because then it doesn't qualify as clean energy. I see a challenge generating energy for the pure purpose of exporting.
- A: *Dave Ince*: There is only one tie line in the south of the province. It is pretty much bottled up. But in terms of policy, Alberta isn't preventing BC from I don't think there are any requirements. A lot of the talk in Alberta is that they want to be self-sufficient as well. The second part is regarding US and there are some challenges there. That is an issue.

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- Q: *Bill Bennett:* We helped get a bill through their house of representatives and we had the majority but they have this strange custom where at midnight all bills not passed just die. The story is, those kinds of laws get passed by politicians for various reasons. The overriding factor in the market is going to be price going forward. In my opinion, whether it's classified as green. We can provide green power in BC better than anyone else but transmission is an issue. Natural gas, wood, minerals, and if we can generate electricity in a safe way, and not have the cost of that electricity generation, then why wouldn't we just add electricity as an export commodity.
- Q: *Ron Oszst:* I am hearing that there has been some work on the restrictive policies. We effectively need a new line to get any volume down to the US and unfortunately it will cost billions of dollars.
- Q: *Bruce Mollison:* Do the trade agreements we have with the US, the electricity that is sold is it sold at a cheaper rate than what it's sold to BC customers? For example, if citizens pay for the cost of building the new dam, the rate going to the US doesn't change but it does change for us.
- A: *Dave Ince:* there may be cases where in the middle of the night it might be cheaper, but we are selling at prevailing market prices getting a profit.
- Q: *Judy Kirk:* Were you asking if BC Hydro were to generate clean energy and export it, would BC Hydro sell at less than British Columbians.
- A: *Dave Ince:* We deal with short term agreements, less than months. If we sign a long term deal, it may leave BC at a loss in case of draught or things like that. The table we saw earlier gives the costs of long term generation. The purpose of the legislation is to help save the province money. We recover those prices if we enter a long term sales agreement. We sell at about \$62 per megawatt hour.
- C: *Judy Kirk:* So it would be the other way around.
- Q: *Wayne Jones:* Some places will only accept clean energy.
- A: *Dave Ince:* Yes, it's a very spotty market. Some states want certain kinds of generation, but there is a demand for clean energy. It's a premium product.
- Q: *Greg Ross:* Is it an urban myth that California didn't pay their bill?
- A: *David Ince:* California had an energy crisis. We sold them power and we kept their lights on. We imported more that winter than we exported. We had a draught situation. Despite that we got \$1.2 billion in profit. Of that we didn't collect \$400 million. We were net importers and we collected. The great benefit is the BC Hydro system. We sold at \$500/megawatt hour and bought at \$300 making a \$200 profit margin.
- Q: *Stan Doehle:* On the financial part, the first 200 million goes to the rate payers and anything above goes to the province. What are you doing about that?
- A: *Dave Ince:* The first \$200 million goes to the rate payers, above that goes to the government. We haven't changed that here in either scenario.
- Q: *Jeanette Sissons:* when we talk about transmission lines, is there focus on creating private partnerships? Is that the idea?
- A: *Dave Ince:* We have envisioned that but we haven't thought about it yet in this scenario.
- Q: *Larry Hall:* Since you brought Site C, the transmission line that would be needed is a tremendous amount of land that is taken. Is that loss of productivity calculated?
- A: *Judy Kirk:* there is an existing transmission line, but I don't think there is any more needed but you may need to reinforce parts of it.
- Q: *Ron Oszst:* My understanding is that the power generation is provincially owned. There is no taxation on

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transmission lines. That land will need to have a fair share arrangement paid by the proponent whether it's private enterprise or BC Hydro. But that present they don't pay taxes on the existing lines.

A: *Larry Hall:* In the long run it is costing us jobs.

Q: *Ron Oszst:* The government needs to pay to local communities and governments when they use our land and resources. BC Hydro needs to pay some taxation to local governments that have been impacted by those projects. That needs to be addressed with some of the existing sites.

Q: *Bill Bennett:* When we decided to have BC hydro do this, we thought it was a good idea. Two hours is clearly not enough to hear all you want to say. One thing I noticed is that this is done from a BC Hydro perspective not the provincial government. There were some answers that could have come from the provincial government. Really quickly, I wanted to give you some other information. The Clean Energy Act is superior to the Ontario legislation because the philosophy is that we are protecting the rate payer. It takes a lot of time to get where you want to go. In Ontario they have subsidized building solar and farmers put them up and it's driven up the cost of their electricity. Our rates are the third lowest in North America. Whatever we do, we have to try and protect the rate payer. It's not that we won't invest in research and development; if you go on the Ministry of Energy website you can read the Clean Energy Act and you can see what we are doing around solar. I want to mention there is a program I think anything up to 10 megawatt hours, if you can meet the price point, then you can get your permits and do solar, run of river etc. It's called Net Metering program and it's a standing offer up to 15 megawatts. Again, that is as long as you can meet the price point. The combination of smart meters and time of use approach, which we haven't gotten to yet but I believe it will happen, if you want to do your washing at 10pm at night then you pay less. You combine smart meters and time of use and you let people partake in feed and tariff they will come. I think BC Hydro and the province are doing great work and we aren't far behind in most ways. That's just my input.

4. Feedback Forms

Participants of the meeting were thanked for participating and were encouraged to complete and submit feedback forms. Participants were also encouraged to attend one of the upcoming open houses (dates, times and locations listed in the consultation workbook).

5. Closure

The meeting ended at 3:00 p.m.

Open House Question and Answer Session Meeting Notes

**BC Hydro
Integrated Resource Plan**

**Consultation Summary Report
Appendix 4**

Integrated Resource Plan Appendix 7C-2

**BC Hydro Integrated Resource Plan
Fort St. John -
Open House Q & A**

Quality Inn
Northern Grand

9830 100th Avenue
Fort St. John, BC

MEETING DATE MARCH 24, 2011 6:00 P.M. – 9:00 P.M.

PURPOSE	Meeting notes from an open house Q&A session with stakeholders and BC Hydro staff on March 24, 2011 at Quality Inn Northern Grand, 9839 100 th Avenue, Fort St. John, British Columbia
FACILITATOR	Judy Kirk, Kirk & Co. Consulting Ltd.
PRESENTER	Cam Matheson, BC Hydro
MULTI-STAKEHOLDERS PRESENT	Lori Ackerman Andy Ackerman Renee Ardill Sean Assor Tony Atkins Gail Bildeau Arlene Boon Ken Boon Rita Churchill Brian Churchill Lee Ciuffreds Jim Collins Diane Culling Brad Culling Tim Davis Brian Derfler Susan Durban Trent Folk Karen Goodings Arthur Hadland Fred Jarvis Jim Kennedy Wim Kok Daryl Kroeker Dennis Large Janice Large Irene Larson Claude Larson John Locher Lynn Locher Mac Manning Charlotte McLeod Roy Mimby Ken Nash Betty Ponto Bauen R. Vincent Rodriguez Nelly Rodriguez Patricia Strebbling Alan Strebbling B. T. Tom Wolsey

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STAFF ATTENDEES	<p>Steve Vanagas, BC Hydro Randy Reimann, BC Hydro Anne Wilson, BC Hydro Lindsay Fane, BC Hydro Amir Amjadi, BC Hydro Dave Conway, BC Hydro Bob Gammer, BC Hydro Kate O’Neill, BC Hydro Cindy Verschoor, BC Hydro Nancy Spooner, Kirk & Co. Consulting Ltd. Tim Lai, Kirk & Co. Consulting Ltd. Emilie Yee, Kirk & Co. Consulting Ltd. , Recorder Max Tobias, Kirk & Co. Consulting Ltd.</p>
AGENDA	<p>6:00pm – 8:00pm – Public & Stakeholder Open House</p> <p>8:00pm – 9:00pm – Q&A Session</p>
KEY THEMES	
<p>1. Demand for Electricity and the Supply Gap – Some participants expressed concern about the way BC Hydro is expressing the gap between electricity supply and the forecasted demand for electricity over the next 20 years. It was suggested that the energy produced by the Columbia River should be included in the supply, which would reduce the gap and therefore reduce the need for additional supply such as Site C to fill the gap.</p> <p>2. Electricity Generation Options – Some participants strongly opposed inclusion of Site C in any resource portfolio included in the Integrated Resource Plan.</p> <ul style="list-style-type: none"> • Some participants suggested that natural gas could be a superior alternative to Site C given it’s abundance in the Peace River Region and it’s relatively low cost • Others suggested that geothermal energy should be developed by BC Hydro as a superior alternative to Site C. • Participants expressed a desire for publically developed and owned energy generation and said that the Provincial Government to expand BC Hydro’s mandate to include responsibility for development of electricity generation options such as geothermal, solar, wind, biomass and other 	

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renewable energy options.

- Participants expressed a desire for BC Hydro to do more to develop electricity generation closer to where the energy is consumed.
- Participants said they think there is a contradiction in government policy between the desire to reduce the use of fossil fuels while planning to encourage exploitation of natural gas in the Peace River Region by providing electricity for natural gas extraction.

3. **Transmission** – Participants said BC Hydro should respond to transmission needs as they arise and reduce the need for long transmission lines by developing electricity generation closer to energy demand.
4. **Export Potential** – Participants said they were not in favour of BC Hydro pursuing electricity generation for the purpose of export because they don't think the revenue and low-carbon benefits are worth the impacts to rivers and agricultural land of developing resources needed to generate the electricity, especially Site C.
5. **Conservation and efficiency** – Participants said that BC Hydro should provide more incentives to encourage greater conservation.

DISCUSSION

The Q&A session started at 7:45pm.

(Abbreviations will be used and mean: Q: Question, A: Answer, and C: Comment)

- Q: *Diane Culling:* Earlier it was mentioned that there are emerging themes from these meetings. Can you summarize some of those themes?
- A: Nancy Spooner: Those themes will be reported on at the end of the consultation.
- Q: *Diane Culling:* I understand that but what are other people saying?
- A: *Cam Matheson:* I've been to three or four of the meetings so I can tell you what I've heard at those but remember these are not definitive because we are still developing a report. Some of the things I've heard are people are interested in local generation, that the grid is modernized and able to accept energy coming and going from residential and commercial customers. What about you, Randy?
- A: *Randy Reimann:* I've heard good support for our demand side management programs and that they think it should be more of a requirement.
- C: *Judy Kirk:* Diane, people in some meetings are saying BC Hydro need to be more proactive and some people say they are not sure and they are concerned about that. One thing is not everyone has the same view of things. Some people on Vancouver Island felt strongly that Smart Metering was bad but here we are hearing that they feel Smart Metering is good. That's not a universal theme yet, but on export what we've heard is as long as you can look after domestic need then exporting surplus is good but some feel it might drive demand.
- Q: *Andy Ackerman:* Regarding smart meters, have you thought of an incentive program for home and businesses like the Eco Energy program. The solar programs are dead and the last time I heard solar companies present they said it would cost everyone \$2,500 bucks. I'm thinking that if we want to talk about conservation then maybe there has to be a suite of incentives for people to move that way. In Ontario, there was a \$25,000 loan that allowed you to convert your house to solar and it would be smart metered. The pay back for that loan would take 10 years and after that you would be making money. Maybe that's what we need to start looking at because someone from Ontario said it's great. We need to talk about that

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- to get people to that point. People need to see the cash.
- A: *Randy Reimann*: On the demand side management side, we are looking at whether you can attach the demand side management what would BC Hydro would have to pay so people can do those kinds of long term investments.
- C: *Andy Ackermann*: The energy manager here is thinking of a bylaw to make it mandatory for new homes to have these systems so that they are solar ready. All you would have to do is plug it in and there you go. Or you can force builders to ask new buyers while they are building if they want them installed now. They don't think about that kind of stuff, they think about the paint colors and stuff like that. We need to get builders thinking this way.
- Q: *Tony Atkins*: On the graph behind you, does that mean we are going to producing less energy in the future?
- A: *Cam Matheson*: What you see on this chart are the bars that characterize our current system. We used to plan to take a certain amount of energy from the markets until we achieve self-sufficiency in 2016. Our bio-energy contracts typically run for 10 years, right Lindsay?
- C: *Lindsay Fane*: That's correct.
- Q: *Ken Boon*: On that chart where it says firm energy, does that include wind energy as well?
- A: *Cam Matheson*: Yes, it does.
- C: *Randy Reimann*: Some of the bump ups are from a couple of wind farms that we have in place now.
- Q: *Participant*: On the gap you show there, the one part of the equation that is missing is the Columbia River Treaty power and that's about 1,200 megawatts. I'm not sure why that's not included. The current contract ends in 2024, aren't we going to keep it?
- A: *Cam Matheson*: What is going on there is the downstream benefits refer to the return on this energy that is being foregone so that it can be used in the United States. That's an international treaty between two federal governments. Prior to 2024 it needs to be renegotiated.
- Q: *Participant*: My point is you don't have it in your package of power right now. We are getting money instead. Why isn't that part of the planning process? I think that's hypocrisy. Natural gas is an excellent way to go. I think you need to plan and be asked the question.
- A: *Cam Matheson*: The downstream benefits are not available for BC Hydro to use as a tool. One reason is because the province of British Columbia thinks this is a provincial resource not a BC Hydro utility so they decide if it will be sold financially or put back in the energy system. If we get into winter peak and we are worried, we will reserve it on a day by day basis and we pay for it.
- C: *Participant*: I think it's not clear to all of us who are owners.
- A: *Cam Matheson*: Right now we have a policy called self-sufficiency and we don't quality that as a resource that can be used.
- Q: *Participant*: I'm a farmer and right now in BC we are importing 52% of our food according to Ministry of Agriculture and actually that would take us just a bit over. What's more important food or electricity?
- Q: *Lori Ackerman*: Firstly, I really appreciate you putting the second session today because if you didn't a lot of us wouldn't have been able to make it. Secondly, I wonder about how much power Vancouver Island produces?
- A: *Cam Matheson*: For BC Hydro? They do not produce not very much.
- Q: *Lori Ackerman*: Would the conversations you hear in these meetings be weighted towards the regions who are feeling the impact?
- A: *Cam Matheson*: Yes, Vancouver Islanders expressed the idea that we need more transmission so they are capable of producing more resources where we don't have enough existing transmission lines.
- Q: *Lori Ackerman*: The North Peace Economic Development just did a study on major projects that happen and what those gaps are. This region feels that they have no voice. I would like to say to BC Hydro as you plan,

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that if it really does impact this region then we should have the same voice. Just look at the BC Liberal just did; every riding is worth 100 points and it's equal.

Q: *Renee Ardill*: I think that generation should be closer to the load and I think natural gas is a good way to go. The generation stations could be closer to where you need them. Also, if you have all your dams on the same river, the whole outfit would be down if something happened on the Peace River.

Q: *Participant*: What standard is the Bennett dam built to seismic upgrades?

A: *Cam Matheson*: I can't tell you what the standard is because I don't know it, but we will find that out for you.

Q: *Participant*: And regarding the amount of water coming out of Williston for the oil and gas companies, how many houses would that light up? Do you have a number?

A: *Cam Matheson*: I keep hearing that water is being taken out, but my understanding is that BC Hydro and the government has given us a water use license for electricity purposes so that idea to me just doesn't make sense.

C: *Andy Ackermann*: You should ask the oil and gas commission.

A: *Cam Matheson*: I don't know what the process is, would you as the water controller?

C: *Dave Conway*: The water controller would have proof in the paperwork and we presently have the licence going into the reservoir and the tributaries. I've heard that there are two companies taking water.

C: *Arlene Boon*: There are two 14 inch pipes coming out of the reservoir right now, one for each company.

Q: *Participant*: According to your graph, the population is going to increase by 25% over 20 years, yet in the same period of time electricity demand is going to increase 40%. The current forecast expansion has the potential to increase the amount of electricity. A lot is coming from industry and not from home owners. Most of the stuff that BC Hydro has done, like Power Smart and all of the publicity, has been to get residents to cut back and save and use power more wisely. Industry is going to take whatever we don't use. Is there a similar incentive for industry to conserve?

A: *Randy Reimann*: There is an incentive for industry to conserve and get them to use power efficiently. I think generally economic growth is a positive thing in the province, though.

C: *Participant*: You have to strike a balance, but it also seems not right that we should be producing electricity to sell to oil and natural gas companies, to use overseas rather than use it for ourselves. We won't use coal because it's bad for the environment, and we must be able to do that in an environmentally friendly way. It's hypocritical of us to mine it and sell it but not to use it ourselves.

A: *Randy Reimann*: All of the consultation record will be part of our plans and it will all get submitted to the government so that's good feedback.

C: *Cam Matheson*: We've heard that a lot as well.

Q: *Arthur Hadland*: The duration of the dam for the proposed production period is 70-100 years. I'm trying to make the point that the reserves we have in natural gas are projected to be around 200 years. It would seem to me that we should focus on using our natural gas. We need the food lands, so why don't we save the valleys and food land and look at natural gas? There is one capital corporation that has a 300 megawatt plant and I don't hear any problems with that one. I'm not sure who is polluting what. Open your minds up to this as an honest option. Oakville Ontario was going to build that for \$1.2 billion but we have Site C but it has to be getting up around \$10 billion not including the loss of the river valley.

Q: *Ben*: How much confidence do you have in the demand forecast?

A: *Cam Matheson*: It's always tricky and the farther you go out the harder it is. I think we do a good job particularly in years 1 through 5. I think we have a good sound methodology and we do it independently and we don't get pushed or pulled by other interests. We try to keep it fair.

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- C: *Randy Reimann*: You have to do a forecast out far enough so that if you have to build transmission lines. We try to leave the options open for the future.
- C: *Cam Matheson*: Our forecast is one of the most contentious issues when we take our application to the commission in the past. We get a very rigorous look at how we do forecasting and I think we get a good detailed oversight.
- C: *Participant*: Have you looked at your forecast from the past? I remember in 1991 being in this room when the Site C application was examined. The industry forecast was torn to shreds. They were included as firm demand. When you build forecast on those assumptions it becomes a loose one and leaves us with large variations.
- A: *Cam Matheson*: Well, we don't do that now.
- C: *Randy Reimann*: We have looked and there are periods when economic growth is high and low but they've averaged about 1.5% a year and it is that trend. We avoid committing resources for the future.
- Q: *Renee Ardill*: In the 1980's you said that we would have massive blackouts without a doubt and you've had it wrong before.
- A: *Cam Matheson*: As Randy said, nowadays we are looking at 1000 gigawatt hours per year or 1.5% that's more than what we've seen. It never goes in a straight line, it goes like the consumer price index and trends up and that's how we see it.
- C: *Randy Reimann*: We talked about this in the afternoon session and in the 1980's this was an issue across North America. Electricity was going up and I know Alberta had the exact same issue. Everyone got caught with a huge downturn in the 1980's. No one foresaw that downturn and people become way more aware of efficiency and demand side management.
- A: *Cam Matheson*: The modern electricity generation fleet at BC Hydro was the Revelstoke Dam in 1984 and most of that was surplus. That plant itself was surplus and as a result BC Hydro's system sat dormant for 20 years between 1984 and 2005. It took that long for load growth to catch up to the surplus. By the time we got hit, it was the first time we were going to have to build new resources. That's what brings us here tonight.
- C: *Randy Reimann*: What we are trying to do is look at demand side management and target aggressive numbers. We are trying to make sure the load is high.
- Q: *Andy Ackermann*: This afternoon there was a lot of discussion about other kinds of resources. I made a suggestion that BC Hydro changes its name and there was a feeling that BC Hydro should expand. I'm not trying to insult anyone but, when you create a report for government, and you make a recommendation that we should grow and change its name, is there something in this process that proves a neutral look? So that it's coming from someone else who isn't biased? There were really good suggestions but they weren't specific to hydro power. Is there a process to make sure those recommendations are included?
- A: *Judy Kirk*: There will be Consultation Summary Report and that will be a stand alone report. This will be available including the meeting minutes. It's one of the reasons why I've been pointing out the additional comments page so that it will show up in the record.
- Q: *Ken Boon*: You mentioned the utilities commission will take a close look, but we all know that BC Utilities Commission won't look at Site C. It's just wrong that that's what they have to do. I think that message should go back that it has to be reinstated.
- C: *Bruce S*: I have to tell a story. I got here when I was eleven years old and my dad brought me up and gave me back my .22 gun. I shot some chickens and gave me a freedom. This whole area is about freedom and choice. When I was 15, WAC Bennett the guy who brought my dad here, said it was his dream to open up the agriculture country here and it allowed my family to buy land for a dollar an acre. The land was unviable because the frost comes in July and left in April. At 15 I went to the dam and W.A.C. Bennett was standing

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up there and I looked at him and thought, gee. He told me what he was going to do with the dam. I swore he looked at me in the eye and told me what he was going to give us as a community. He's got balls, vision and he loves us up here in the north. I have to tell you, none of it came true. I am a bit of a dreamer, but I'm a worker and I like to win. I haven't seen northeast British Columbia win lately. I haven't seen northeast British Columbia win in terms of the W.A.C. Bennett Dam, because then he died. Everything he promised didn't happen. I'm here to tell you that that's what occurred. I love industry; that is what we all love and we love to make money. Heaven knows we do because we send 70% of BC's income to Vancouver. It's no big deal; I want to be a hero anyway. My point is, do you know where all of our energy income is going right now? At least 60% of the energy goes to Alberta and the rest, about 40%, goes to Victoria. That is a problem for me. I've been here for 47 years. I used to go to Crescent Beach in March! But I like it up here and I want to tell BC Hydro Bill W.A.C. Bennett said this is what we are going to see for you. I haven't seen that yet and I said to Anne, here is what we could do: From Chetwynd, build a four lane highway direct across the dam. If you do it right for a change and build a connection from Fort St. John to Prince George, not another Taylor, BC. The provincial government is going to rebuild the Taylor hill. They are rebuilding because you truckers don't know how to shift gears. They screwed it up so bad. Now we can't shift! It's such an engineering screw up they gave themselves an award. My point is if you want do it do it right, don't short change us up here because all of our people are paying all of our wages and that's my argument.

Q: *Diane Culling*: On the page that compares the cost, the small asterix says the Site C cost will be revised. I want it written in there because the cost is difficult for people to understand. We can't make a decision because we really don't know what Site C will even cost. Even with the new projections, I don't think that includes decommissioning plans and it's a requirement of building. The other issues of Site C being situated in the Peace River Valley with all of the siltation issues. It says in the Stage 2 Report that if Site C were to proceed, the sediment contributed from the newly regulated area would be trapped in the reservoir at approximately 3 million tonnes a year. Over decades, this would be huge. You start looking down the road and you have a huge issue of a reservoir silting in. Decommissioning needs to be reflected and I want to see Site C graphs that show the most effective way to go. Secondly, whether or not we should be looking at if we should build for export. California is the export target, but they owe use \$300 million that they haven't paid. We have to look at California's legislation. You might say you use IPP power to export to California but if you are backstopping with large hydro then that might not fly with California legislation either. There is a lot out of our control.

Q: *Tony*: Following up on Diane's question about the three portfolios that you've got, I remember that the last time I saw four portfolios they ranged from the dirtiest and the worst to the nicest and the cleanest. The nicest and cleanest didn't include Site C and the difference in power was 5% difference. That is a small price to pay. I don't know whether those prices have changed or what because they just have dollar signs and I don't know if that scenario has changed and if it has then how can we determine in 5 years this won't change as well.

A: *Randy Reimann*: We will be doing analysis and creating a draft plan. We have another consultation process coming up once we have the draft plan that will look at different resource mixes.

C: *Tony*: I want rather than the most expensive I want a percentage difference to see if it's worth paying the extra. It will still make us the cheapest in North America.

Q: *Cam Matheson*: Once we get through this round of consultation we will get back and run them through the models and draft the plan. You will get a chance to see that.

Q: *Dennis L*: Regarding business sense, if someone owed me \$300 million I wouldn't do business with them anymore.

A: *Cam Matheson*: We are not planning on doing that. The question is should we build resources to export? The Clean Energy Act asked us to consider that question in our plan. Your point of view is valid and we will

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try to reflect that in our report.

C: *Randy Reimann:* The \$300 million was when the prices were crazy. We were able to shape the energy we produced and that was beneficial. We were buying low and selling high. Subsequently we found out someone was fiddling with the prices in the energy markets. There has been a long complex legal battle. That year, we bought \$7 worth and sold \$8 billion, so we collected \$1 billion that year. We didn't collect \$300 million of it but it was still a good year for BC Hydro and the province as well. I think in order to complete some of those legal proceedings; we left some of that behind. I wanted to leave people with that impression.

Q: *Lori Ackerman:* I'm not sure why California would have an issue with that since buy low and sell high is their mantra. We sold them electricity. If they had an issue with the price they should have let us know not whine about it later. We've dealt with the softwood lumber issues and mad cow. We should export to anyone *but* them.

Q: *Diane Culling:* You had a deal right? They might have said that BC Hydro was gouging but they were the ones that made the deal. My other point is that their economy is imploding and the idea of exporting to the USA is something we should be wise before we get too engaged.

A: *Randy Reimann:* Looking at counter party risk is a component of the plan.

Q: *Participant:* The court case was down there?

A: *Randy Reimann:* Yes. We were selling to them so it was in their jurisdiction.

Q: *Ken Boon:* The Clean Energy Act dictates the need for export. What's the future in that?

A: *Cam Matheson:* It's right to say that it dictates us. We need to report back on what we think the opportunity is and what we hear from the public. I encourage you to reflect that here or in the workbook so we can report back to the government in our report. The opportunity is going south because the demand in the states is drying up. It's looking as though the opportunity isn't there but it's important to make the point so we can reflect that as well. There is no plan, we are taking comments so we can recommend to government.

Q: *Ken Boon:* The Clean Energy Act wants the surplus so we can export.

A: *Cam Matheson:* Should we build specifically for long term sale to the USA or to Alberta? Surplus on the system is a different issue. It can't be sold long term because then it's not available for domestic consumption and that's always been the case.

Q: *Susan I:* I came in at the end so excuse me if my question was already asked, but there are so many people that are for or against Site C because of the power. This region has been marketed as the prime place if you want to build a solar home. Has BC Hydro looked at that?

A: *Cam Matheson:* The amount of solar we would need to build to get the same volume as something like Site C is quite large.

Q: *Susan I:* We are down in Las Vegas and there is a section of land that is miles and miles of just solar panels. Is that not something we could do as well? We have so much open land here.

A: *Randy Reimann:* We do a solar assessment. What we've seen here is that it's too pricey. I'm not saying it's not good for a desert region like California but it doesn't really make economic sense for us here.

Q: *Participant:* Along with the change of name I think what we need is to go to the government and need restored the capacity to generated and put back on the grid. I want you to look at all the alternatives because it really annoys me that the government said you can build Site C but you're not allowed to build other dams. I would like to think that the last big dam has already been built.

A: *Cam Matheson:* Yes, that was a feature of the Clean Energy Act.

Q: *Participant:* The government can change anything they have in front of them at the stroke of the pen. I think

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BC Hydro should still have the capacity to build solar, tidal, wind as well as allowing the IPP's to compete as well. I don't like the idea that BC Hydro sits back and just buys from IPP's.

Q: *Susan I:* What are we doing to actively educate about how to conserve their energy? Up here we are unique because a lot of people are living in old mobile homes that don't qualify to be energy efficient. A lot of people have hot water on demand. When I replaced my furnace, I paid for three years on a monthly plan with PNG. Instead of using electricity to heat a hot water tank all day for that one shower we take.

A: *Cam Matheson:* We do have a lot of programs including Power Smart which includes educating the public about how to use electricity.

Q: *Susan I:* Hot water on demand is an expensive thing to go to for a lot of people but PNG gas did a good thing. It was like a loan but it was interest free. It would help in energy consumption, no?

A: *Randy Reimann:* It's a good idea. BC Hydro is considering it.

Q: *Participant:* BC Hydro does not provide any incentives, I haven't received a dime and I've replaced all my appliances out of my pocket. That would have been awesome if BC Hydro did what PNG did for that lady.

Closure

The Q&A session ended at 9:00pm.

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**BC Hydro Integrated Resource Plan
Castlegar -
Open House Q & A**

Castlegar & District
Recreation & Aquatic
Centre

2101 - 6th Avenue
Castlegar, BC

MEETING DATE

MARCH 30, 2011 6:00 P.M. – 9:00 P.M.

PURPOSE	Meeting notes from an open house Q&A session with stakeholders and BC Hydro staff on March 30, 2011 at Castlegar & District Recreation & Aquatic Centre, 2101 – 6 th Avenue, Castlegar, British Columbia
FACILITATOR	Nancy Spooner, Kirk & Co. Consulting Ltd.
PRESENTER	Cam Matheson, BC Hydro
MULTI-STAKEHOLDERS PRESENT	<p>Enrick Jeff Bailey Jim Banker Jim Barrel Carole Bell Alyssa Bearclan Tyrone Blake Anne Champagne Eloise Charet Chuck Chatten Lawrence Chernoff Fran Croteau Ray Croteau Chris D’Arcy Ben Demoskoff Eric Drebinger Steven Drew Norbert Dverichen Dan Egolf Bob Evans Eric Faulks Norman Fields N Gray Dave Harman Kathleen Hart Terry Hartman Brent Haruch Rebecca Hatch Henry Hutter Mark James Art Joyce Len Kichard Jamie King Mark Kitsinger Arthur Konkin Lillian Laarz Alex Louc Bob McKnight Judith Mertz Zerry Nellesttjw Rich Noxeak Yvonne Patterson Walter Pereverzoff</p>

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	R Postnikoff Jody Potter Audrey Repin Connie Roberts Coralee Roberts Donald Scarlett Tim Sokocholf Grant Trower Chuck Vidamour Paul Wilkinson Bob Yetter Nathan Ziegler
STAFF ATTENDEES	Dave Conway, BC Hydro Mary Anne Coules, BC Hydro Lindsay Fane, BC Hydro Anne Wilson, BC Hydro Max Tobias, Kirk & Co. Consulting Ltd. Susan Campbell, Kirk & Co. Consulting Ltd., Recorder
AGENDA	6:00pm – 8:00pm – Public & Stakeholder Open House 8:00pm – 9:00pm – Q&A Session
KEY THEMES	
<ol style="list-style-type: none"> 1. Conservation and Efficiency - Several participants encouraged a more comprehensive approach to conservation, including a review of energy waste by municipalities. <ul style="list-style-type: none"> • Street lights were cited as an example of potential savings through reduced hours or coverage. One participant worried that regardless of the incentives and pricing programs, people with means will not participate in conservation initiatives. 2. Electricity Generation Options - Several participants encouraged BC Hydro to consider adding generating capacity to the Duncan Dam. 3. Export Potential - Participants asked for more information about potential generation for export, and wondered if the Free Trade Agreement would oblige BC Hydro to continue to sell power regardless of market conditions and local requirements. Some participants were willing to consider generation for export but only if there was restoration and compensation for fish and wildlife. 4. Smart Meters - Although BC Hydro is not the service provider in the region and will therefore not be installing Smart Meters, several participants expressed concern about the program being imposed on residents without consultation or consent. 	

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DISCUSSION

The Q&A session started at 7:45pm.

(Abbreviations will be used and mean: Q: Question, A: Answer, and C: Comment)

- Q: *Art Joyce:* With the Valley Voice newspaper. We were curious about the Smart Meter Program – from the research that we have done on Smart Meters from other jurisdictions, particularly with California, PG&E and Connecticut and Ontario, Toronto Hydro, and a number of other jurisdictions. Toronto Hydro is on record as stating that so far what they are finding with the Smart Meter Program is that although the bills for their customers are going to definitely go up, for about 80% of them, they are not seeing any real conservation gains. So I am just wondering, given that other jurisdictions are not having a really particularly successful time installing Smart Meters whether BC Hydro is committed to re-examining that billion dollar commitment to that program?
- A: *Cam Matheson:* I am not an expert on Smart Metering but my view is that we don't, the other jurisdictions that have Smart Meters, you can't look at the experience that they had so far and be able to draw conclusions like that. They haven't been in place long enough. We are just now seeing the inception of these things on a mass level and we are not even there yet. PG&E has some customers, the majority are not on Smart Meters; and, the majority of Ontario Hydro's are not on Smart Meters they are just putting them in now, so to say they are a failure to me is not right.
- Q: *Art Joyce:* Just to qualify that in Connecticut they did pre-market testing, an evaluation of Smart Meters, the hydro authority and they determined based on testing that they would never recover their money. So that approach has a more prudent fiscal approach of actually testing before doing a mass institution – why not do a pilot program to test it out first and see?
- A: *Cam Matheson:* We did have a pilot; we ran the pilot two-years ago for a sample set of customers with putting Smart Meters in their homes or something approximating that. I can't comment on Connecticut, I don't know.
- C: *Art Joyce:* Well, the point being that is just a prudent example of doing some careful pre-market testing before spending a billion dollars.
- Q: *Jim Barrell:* The results of the pilot, where can they be found?
- A: *Cam Matheson:* The pilot we did, I think it is on our web site.
- C: *Mary Ann Coules:* If there are specific questions about Smart Meters that we can't answer tonight I will give you my card, I am the community relations rep for the area, and I can track that information down for you.
- Q: *Terry Hartman:* When it comes to the Smart Meter issue – is it not being forced by government legislation? They have done the Clean Energy Act - that is not you people is it?
- A: *Cam Matheson:* *What the Clean Energy Act says about Smart Meters is that BC Hydro can build a program and install the meters without having to have prior approval of the British Columbia Utilities Commission.*
- Q: *Terry Hartman:* Well that is not quite what it says here they make it sound like they are telling you by 2012 everybody will have a Smart Meter.
- A: *Cam Matheson:* That is right; they have set a timeline for installing the Smart Meters.
- Q: *Terry Hartman:* So if we do not wish to have Smart Meters then we must go to government – as the Kootenays, provincial people. Are you not a middleman here? Or are you the person that is actually in charge of this thing. If I don't want a Smart Meter do I attack Victoria or do I attack you? Who is actually forcing, promoting and stimulating this issue?
- A: *Cam Matheson:* I am not the expert on Smart Meters, I don't work in the area of Smart Meters, and I do long-term planning for the company. BC Hydro developed a business case for Smart Meters and felt as a

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company that it was a good idea to have a business case over the long haul that recoups those billion dollar costs over a 20-25 year period of time and felt it was the right thing to do. The provincial government enshrined it in legislation, to the extent it said that BC Hydro will no longer have to go to the BCUC and get approval to go ahead and do the program. And, by the way we want you to accelerate what you are doing so that they are installed by the end of 2012.

Q: *Terry Hartman:* So BC Hydro sent a lobbyist to Victoria, on their behalf, and got the legislation that is giving it to us. So in other words, you both stand in line for this?

A: *Cam Matheson:* The idea that we have a lobbyist, we are a crown corporation and I don't think we need a lobbyist, if we want to have a meeting with people in Victoria, we will have a meeting, we don't need a lobbyist.

Q: *Enrick:* I see on Portfolios 1, 2 3 production, Portfolio 1 you have got renewal mix with 827 wind turbines and 72 run-of-river - why is the wind generation dropped in Portfolio 3 to 438 as opposed to 827.

A: *Cam Matheson:* What we tried to do with those portfolios – they are not literal portfolios, we are not saying this is what we are going to do and this one is better than the other one, what we have done is develop three example portfolios to show people that there is a mix of resources that we can put into the system as we need new energy supply. What we are trying to do in creating those portfolios is get your opinions about which ones you think are better for the system as opposed to the other ones – they are supposed to be illustrative, so they are not literal, but they are intended to draw from you what you think is the better portfolio and hopefully why you think it is better. That is helpful to us as we develop the plan.

C: *Enrick:* Keep up wind generation and drop destructive IPPs on pristine creeks all around the province, for example – that is my idea.

C: *Nancy Spooner:* I just want to remind participants that the deadline for the Feedback Forms is April 30, 2011.

Q: *Jim Barrell:* April 30th not December 11th?

A: *Cam Matheson:* April 30th for the input on this round of consultation. We are developing a draft plan, after this round of consultation, based upon what people say and the analysis of what we are doing and we will use that draft plan to come out for the second phase of the consultation process in the fall once we hear back and then we will finalize the plan and file it with the provincial government by December of this year.

Q: *Jim Barrell:* These portfolios, are they billing portfolios?

A: *Cam Matheson:* They are supply portfolios, the same ones that you and I talked about at the presentation boards.

Q: *Jody Potter:* This is a different topic from water meters – I wanted to know about construction in BC for run-of-river dams, do we have anything? I know you are working on Waneta and Mica. Is there anything else that is proposed right now that will go on for sure that is proposed for construction in BC?

A: *Cam Matheson:* What you are talking about are additions to already existing dams but they are not run-of-river, they are storage. There is a difference, run-of-river is when you put a turbine in a creek or river and the flow of water creates electricity with a dam it creates a storage reservoir and you have got a big volume of water and you can run that water when it suits you or you can store it when it suits you and you have got all this flexibility. There is quite a big difference. Mica, there is two additional generating units that were created but not installed when the facility was originally built in 1973 and now we are going to put those additional turbines, two additional turbines at Mica, in. Then with Waneta – it always had the ability to expand and create more capacity and energy and that is very recently going ahead.

Q: *Jody Potter:* Do you see anything in the future for dams or run-of-river?

A: *Cam Matheson:* One of the big questions in this particular long-term plan is what is the value of Site C? Site C is the third generating station on the Peace River in the northeast and it has very high volume of energy and capacity values on the system and one of the questions, in this portfolio of the three portfolios, is Site C worth doing? The portfolios that have Site C in it are they better portfolios from your point of view than the one that doesn't?

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Recreation & Aquatic
Centre

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- Q: *Jim Barrell:* Waneta has shareholders, am I right? Who is involved in Waneta's expansion?
- A: *Cam Matheson:* The original Waneta facility was owned by Teck Cominco and then BC Hydro bought one-third of it about a year and a half ago and that is the original Waneta. The expansion is owned by the Columbia Power Corporation, or developed, but they don't have service customers and to build it, to justify building it, they had to get buyers for it, so Fortis BC is buying the capacity from the expansion and BC Hydro is buying the energy.
- Q: *Jim Barrell:* And, the facility will be owned one-third by BC Hydro?
- A: *Cam Matheson:* No, the facility will be owned, the expansion itself will be owned by the Columbia Power Corporation but BC Hydro will buy the energy and Fortis BC will buy the capacity. BC Hydro owes all of Mica.
- Q: *Mark James:* I heard a little about major investments near Vancouver that was getting upgraded as far as generation goes and but I wanted to know more about other components – like line rehab and how it breaks down between distribution and transmission and lines being developed as part of the IRP or if it was just rehabbing the system facilities?
- A: *Cam Matheson:* No, the rehabilitation of existing facilities isn't part of the plan - if we need to do it, we do it. But one of the features of the plan, topic 4, asks the question does it make sense to build transmission into areas that doesn't have any or enough transmission already existing either to extract potential resources from that area or to affect economic development?
- Q: *Mark James:* So going to a Smart Meter program you would have to invest in distribution systems above and beyond the Smart Meters, right. Will you need a communication network to run the Smart Meters because they are too big - can you run the communications over the existing wire?
- A: *Cam Matheson:* Generally that's right. I am not sure that we understand each other on communication network – Smart Meters will us on a much more granular level and help us understand the way our customers are using our product so that we can make choices and decisions about how we operate the system and if that is communications then yes.
- Q: *Mark James:* I just hadn't imagined that they were going to install Smart Meters everywhere I thought they would just focus on urban centers and it would be hard to make the case for rural development but don't they still need a communication network? Wouldn't you still need a meter reader to come by and collect information?
- A: *Cam Matheson:* Not really, we already have a distribution network right, a distribution network that feeds electricity to your home whether you are rural or urban as long as you are on the grid and so a Smart Meter can go in by virtue of the existing distribution network that is already there. With respect to your question on a meter reader, no you would take a reading in the system with the Smart Meter you can read through the system so you don't have to have someone come and read the meter.
- Q: *Mark James:* So the communication would be through the distribution system?
- A: *Cam Matheson:* Yes.
- C: *Nancy Spooner:* That might be the kind of thing that if you want more detailed information you could follow up with the community rep.
- Q: *Art Joyce:* I am wondering about, with these scenarios that you are developing and how much of the existing energy agreements i.e. California or other American buyers of power, how much of that factors into developing the IRP - I imagine that is because you have certain contractual obligations, correct?
- A: *Cam Matheson:* We hardly have any contractual obligations long-term with California or anybody else. We buy and sell electricity on the spot market every day which is day ahead trading but we don't have long-term agreements. Topic 5 asks the question about export.
- Q: *Art Joyce:* So that is definitely a factor in other words, in the development of the IRP?
- C: *Nancy Spooner:* It is the question that we are asking British Columbians – do you think it is the right thing to do and people are giving us their opinion in these meetings, on line and everywhere.

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- Q: *Jim Barrell:* On that topic, I come from the oil and gas side of things and with propane, for example, we are obligated, in the industry, to supply our domestic use first before export – so there is a great deal of survey that goes on an annual basis to find out what Canada’s demand is and ensure they are satisfied. Does any part of the Smart Metering process answer that, supply BC first and then whatever extra you can sell on the spot market?
- A: *Cam Matheson:* Yes, that is right, we built the system to meet customers’ needs and then in the event at periods of time, high water years and we have a surplus and then we will sell that into the market – our domestic customers don’t need it so we sell it.
- C: *Jim Barrell:* Is that domestic demand mandated in that heritage act?
- A: *Cam Matheson:* Right.
- Q: *Jim Banker:* I am curious – I noticed there is no mention of Keenleyside Dam in your diagrams and so, does that head straight to the States or are we getting any benefit out of it?
- A: *Cam Matheson:* There is a small generating station on Keenleyside, it is actually pretty small relative to the other things but it is there for domestic purposes – it goes onto the grid.
- Q: *Eric Faulks:* You are selling, you sell the excess electricity on spot market but we are also part of the free trade agreement with the United States and once we sell we are obliged to continue, so it is like a long-term contract to me? Can you explain that?
- A: *Cam Matheson:* Sure, there are periods of time when we don’t sell into US markets because it suits us to buy from the American markets instead and no the free trade agreement doesn’t allow people to say – aha yesterday you didn’t sell into the American markets and you must. No, it doesn’t do that. Well we have a system, right now, that goes through ebbs and flows in terms of water supply and it is very valuable for us (BC Hydro ratepayers and largely the people of the province through electricity rates) to buy and sell surplus electricity when it suits us to sell into expensive markets and to buy when cheap. So the idea that we would stop doing that is hypothetical and not worth talking about because we will always do it as long as we have this system that we have. Obligated to supply – no, I personally do not agree with that. If we stopped selling could someone sue us and say that you must continue to sell, I don’t agree with that, I am not a legal expert on North American Free Trade Agreement but we have never seen that and you would think if that was a real issue it would have come up by now and it hasn’t.
- C: *Alyssa Bearclan:* From New Denver. I am curious at the wording around Smart Meters and how can you consider something so smart that it is going to make the people pay more for and everything; and, it seems like it is controlling and it is at people’s peak period when they eat, they come home from work and they are being punished in that case. How often have I seen the little common people punished for the consumption of big corporations that have taken so much? And, then on top of it to come for our creeks when the world is running out of water and how can you justify this type of stats and your way of educating us, like we are ignorant and we don’t know anything. Do you ever think to yourself that this can be imposing on people, that it can be a sort of dominate attitude when you are telling people they can only consume to a certain point or you come in with these ideas of IPPs and become these mega projects. Where is your concern for the little people, for the earth, even the fact that you are coming into everyone’s home to put this whatever metal meter and extract that metal from the earth and more out of the environment so you can watch everybody’s consumption – do you ever feel uneasy about that kind of role you are playing in this world that is already in a time of crisis?
- Q: *Mary Ann Coules:* Are you talking about peak hours, is that your concern?
- A: *Alyssa Bearclan:* Well just that at peak hours is when a lot of people are consuming electricity and it just seems that would be where we would be punished in a sense.
- Q: *Mary Ann Coules:* Are you concerned about time and use rates, is that it?
- A: *Alyssa Bearclan:* No, I have a concern about life itself, you know what I mean, and the fact that you police us and that we were never given respect of trying ourselves to cut down on ourselves on our energy

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consumption, trusting us, respecting us, respect for the little people that we can make an effort. I would rather have something whirling on my house that I don't have to pay someone else for my hydro. I would like to see more micro things happening not macro.

Q: *Nancy Spooner:* Have you recorded these thoughts?

A: *Alyssa Bearclan:* I have recorded, I even wrote to the President of BC Hydro and nobody answers back. We are the little people, we are meaningless.

A: *Nancy Spooner:* But that is why we are here today and why we are in Fort Nelson tomorrow and Cranbrook next week and Campbell River and Prince George. So that is why we are here and why we are furiously taking notes because this is actually...

Q: *Alyssa Bearclan:* I want my question answered.

Q: *Nancy Spooner:* Can you clarify your question, is the question are you feeling you are being punished by Smart Meters because somehow they are going to tell where...

Q: *Cam Matheson:* Would you mind restating the question?

A: *Alyssa Bearclan:* It is just about the little person and how they feel when you come in with this whole agenda and we feel that we are being imposed upon, I am just asking about how you feel about this kind of attitude, having to police people at prime time and how can you come out with this kind of attitude without even consulting with us before this even came about. Like IPPs, they are already drilling in the mountain and we are like whoa what is happening here and no one informed us and the government is similar. We just feel left out of whatever process and when you do have a process like this we don't feel our voices are heard, I have never once heard anything concerning the environment at whatever meetings I have gone to over all these years. I just think that you guys are in ivory towers or offices and we are living out by the creeks here and we are really worried because the dams have already taken the arteries here and all we have left is our creeks and please don't take the source of life from us – that is all I am saying and I am just asking you about how you feel in your positions in BC Hydro about policing people in their homes and marking everything and bills and all that and we should be encouraged to be sustainable in our homes and not pay you all the increase that you are going to get over the years to facilitate your agenda.

A: *Mary Ann Coules:* Can I jump in here, I know that the project team is here for today for their consultation so my job, I work at Castlegar here and my job is ensure that I am available to and I can take your concerns back to BC Hydro. So I am concerned that you didn't get a response back so if you have questions please contact me directly and I will follow up and make sure you get a response.

C: *Nancy Spooner:* Thanks and I would also, I appreciate your comment and I would appreciate it if you would write it down but I am also hearing, from what I know of Smart Meters and I am not a specialist either, that there may be some misunderstanding about what Smart Meters are meant to do and how they will work so I would encourage you to get the facts.

C: *Alyssa Bearclan:* The facts, of course, that is exactly what I wanted to hear, I am so sorry, so sorry for whatever is left of life on this planet.

Q: *Jim Barrell:* I would imagine that Smart Meters, the idea, may have come from Accenture, is it true they handle the billing, what is Accenture's role in BC Hydro?

A: *Cam Matheson:* Accenture is the service provider – so a lot of the administrative functions that go into running a big utility like BC Hydro, billing dealing with those sorts of things.

Q: *Jim Barrell:* So they do all the billing?

A: *Dave Conway:* HR, billing, meter reading – those are all functions performed by them.

A: *Cam Matheson:* So those functions had been employed within the company and then Accenture created a service contract where we were able to put those out into a long-term contract – outsource it.

Q: *Jim Barrell:* Was it somehow segregated in that contract let to them?

A: *Cam Matheson:* Employees that do the work are actually working for Accenture not BC Hydro and Accenture bills BC Hydro for the services they provide for those things.

C: *Jim Barrell:* So they were BC Hydro jobs that went to there?

A: *Cam Matheson:* Yes.

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Q: *Art Joyce:* I guess the Duncan Dam comes up a lot with people that live in that area and especially given that the IPP contract was let to a corporation and meanwhile they have Duncan Dam sitting there without any generation facilities. I haven't had a chance to go over your documentation in detail here so I am just wondering if adding some power generation to Duncan Dam is a possibility for one of these scenarios you are developing?

A: *Cam Matheson:* It could be, we haven't dealt with it specifically here – we are talking here about a strategic directional level so we are staying away other than Site C which is an obviously big resource option that we can't ignore as an individual project. Everything else is more of a conceptual level. It could be, not reason why it couldn't be but we haven't mentioned it specifically.

Q: *Judith Mertz:* Is it next year that the Columbia River Treaty comes up for re-negotiation or is it the following year?

A: *Cam Matheson:* It is 2024 but by 2014 the two entities (American and Canadian) one has to trigger its intention to renew or renegotiate 2024.

Q: *Bob Yetter:* I was in here earlier and I want to follow up on the Duncan Dam question - why were there never any turbines put on Duncan Dam? It is a BC Hydro operation.

A: *Cam Matheson:* I don't know the exact answer but I do know it was one of three Columbia River treaty storage reservoirs. So there is Duncan, Keenleyside and Mica and I am not sure why Duncan was never developed with a power house and generating station in it. It is likely it could have been, at the time, that it wasn't needed, there was enough generating capacity coming out of Mica and Revelstoke eventually and then the facilities on the Peace River. Once those were all in place by 1985 the BC Hydro system went into a period, a 20-year period, of surplus energy so it may be tied to the fact that it was not needed. You might recall that Mica and Revelstoke each had provision for six generating units in them and four in each facility were actually developed for exactly the same reason. So, I am not a 100% percent sure about Duncan but I have a feeling it may have had something to do with that.

Q: *Judith Mertz:* What percentage of energy generated by BC Hydro is sold to the US every year?

A: *Cam Matheson:* That is very hard to say because the BC Hydro system fluctuates with water up to 40% from one year to the next so if you have a high water year you can do a lot of surplus sales to the United States depending upon the markets. And, in a low water year you don't have as much. Conversely you can get years where electricity prices so very, very high and we will run the reservoirs differently to try and sell energy into those markets to keep rates low for our ratepayers and then in other years you will see very low energy prices, like you are seeing this year and last year on electricity markets and so you won't see us selling as much, in fact you will see us buying more from those markets when the prices are low.

Q: *Judith Mertz:* I can understand from a sort of practical sense about all that stuff but it strikes me as very peculiar that BC Hydro would not in a financial sense know how much electricity it sells to the US every week?

A: *Cam Matheson:* We do know, I just can't tell you, I can't give you an individual number, it goes up and down, it fluctuates greatly but we absolutely could tell you down to the electron what we sell to the United States or sell into the power markets and what we buy. We net out usually most years about even. The last number of years we have fallen into net buying as opposed to net selling. So most years, out of the last 10-years, we have been buying more than we have been selling.

Q: *Judith Mertz:* What is the source, like who would you buy from, the California spot market?

A: *Cam Matheson:* There is an openly traded market called mid-Columbia and that is generally where we buy and sell our energy from. That comes from all over western and northern America, we are an interconnected grid. The electricity grid in BC is interconnected to the broad electricity grid in western North America.

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- Q: *Enrich:* Additional turbines put in Revelstoke and one came into production just now and it is due for another one and the same thing up at Mica - what percentage would that cover of domestic consumption?
- A: *Cam Matheson:* Those units are pure capacity, they don't provide any more additional annual energy so that you can use those facilities for greater peaking – which means when the demand for electricity rises in the province you can use the greater capacity of those facilities to push the system to meet that demand. The capacity on our system is about 11,000 MW of demand – instantaneous peak demand during the highest peak hour on the system and each one of those units...
- Q: *Enrich:* That brings me back if you could put additional turbine at Duncan Dam that would increase then, availability of power or not, since it is stored water that is never used as producing power?
- A: *Cam Matheson:* Yes, it would. The difference at Duncan though compared to Mica and Revelstoke is that they have already got transmission and a power house already exists on both those facilities and all you actually need to do is put in an additional generating unit – everything else has already been built and put in place. So naturally you would do that first and then you would go ahead and build new transmission and a new power house at Duncan if you were doing it specifically for the BC Hydro system. To answer the question, you asked me, what portion of the overall system are you getting with these additional units at Mica and Revelstoke? One of those additional units is about 500 MW and the overall capacity, or peak demand on the system, is about 11,000. One of the things we are concerned about, as system planners, is meeting that peak because that is the part that grows on your system, you know if you think of an electricity system as having a baseline then every so often you get these peaks during the day, or month, or season, you are always worried about should you build up the system just to meet that peak period because the rest of the time you don't really need it now you can sell it into other markets and make some money back but there are trade-offs that go with that so you are always worried about that ability to hit those peaks and that is what you get with these capacity units at Mica, Revelstoke. We are blessed here because other utilities would kill to have the ability to build peaking units like that for the kind of money it is going to cost us to build those things. They are the cheapest most high capacity units available to anybody in North America.
- Q: *Enrich:* I know my friend he runs all those things and he occasionally has to run Burrard (Thermal Plant), when the demand is there you know in high winter and cool temperatures and everybody needs electric power, so would that additional generating capacity eliminate or reduce Burrard?
- A: *Cam Matheson:* Yes.
- Q: *Judith Mertz:* How old are the Mica and the Revelstoke Dams?
- A: *Cam Matheson:* Mica came into service in 1973 and Revelstoke came into service in 1984.
- Q: *Jody Potter:* How much, how many MW per hour, do wind turbines produce into the grid? One that is constantly running, just to give an example of how much energy they actually produce?
- A: *Lindsay Fane:* The example we have here is based on 2.3 MW hours but I think it can range from 1 to 3 MW. We have modeled these examples on 2.3 MW which would produce over the year about 6 GWh.
- Q: *Jim Barrell:* The energy policy of 2002 - did it or did it not state that all new sources of electricity in this province come from private sources?
- A: *Cam Matheson:* Yes.
- Q: *Jim Barrell:* Then how did Mica and Revelstoke come about, here they already planned before?
- A: *Cam Matheson:* They were built for six generating turbines at each facility but at the time the system didn't demand that much so only four were built. When you think about Mica and Revelstoke you are really just adding something onto a facility that has already largely been built. The energy plan of 2002 was really talking about green field sites. If new sites are going to be developed for generating electricity then BC Hydro is no longer going to do it is going to have to buy it from the private sector but that didn't include something that was already there like Mica, Revelstoke.
- Q: *Jim Barrell:* Those statistics, she was asking for, to say what percentage, or how many MW we sell per year

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- into the foreign market, where can they be found?
- A: *Dave Conway:* All percentages are in the annual report it is available online. It is in there with regards to what we buy and what we sell into the market place.
- Q: *Jim Barrell:* So Powerex, the people that sell the power for BC Hydro, their annual report?
- A: *Cam Matheson:* BC Hydro's annual report.
- Q: *Art Joyce:* Just getting back to renewals again, a couple of years ago we installed a solar hot water heater in our home and so when you talk about power concentration it does get too much better because even where we are in the mountains, Valhalla, we still pretty much run ourselves on free hot water, or at least hot water that is heated by our solar system from May to September and on a good year from late April to well into October. I am wondering if that could be part of the mix for power conservation and providing incentives, I know that at the time we got on board it was a federal incentive and provincial incentive so it eased the cost of building that system on your home.
- A: *Cam Matheson:* I think you are absolutely right, it is coming and so local community supply on the distribution network rather than the big system will be the order of the day, out in time. We are not there yet but it will come.
- Q: *Art Joyce:* So could that take the form of either a rebate from BC Hydro or payback from the system?
- A: *Cam Matheson:* Yes, there are schemes out there, Florida Power and Light has a scheme like that where they will essentially subsidize the solar panel because even in Florida where obviously it gets very hot and the sun shines a lot it still isn't cost effective without the subsidy. So they have a scheme where they will provide a payback subsidy over a period of time.
- Q: *Art Joyce:* Essentially you figure say eight months of the year where somebody is not using hydro to get hot water, which is a fairly major portion of a hydro bill is heating your hot water tank and that is huge conservation gains right there if say even 10% or 25% of the BC population had those.
- A: *Cam Matheson:* I really think that this is coming and again Smart Meters will enable people to manage electricity use in their homes and by complicating what they do by having a supply option in their homes and then having different appliances like hot water heaters that use the demand side of the equation. Smart Meters is a way to interface between the two.
- C: *Art Joyce:* We are already doing that without Smart Meters.
- Q: *Enrich:* Smart people and I mean we already know about the peaks and we shouldn't be using power then and there are places where you get enumerated for not using power at that time. The country where I grew up, Switzerland, they have had Smart Meters for eons of time and different rates for different times of day.
- A: *Cam Matheson:* That is because of peaking and you build a system to get that little one hour peak so if you can get people not to use electricity instead of having to build new supply to meet that peak.
- Q: *Judith Mertz:* I was on a bit of a campaign about a year and half ago about street lighting and just noticing that the lighting in our Village of Silverton is really excessive, I mean one street light will blind anyone in their yards and shine in everyone's bedroom windows and to get anyone in Hydro, and believe me I tried, to provide any kind of a shade that somewhat limits the directionality of lights so people don't feel like their houses and yards are being invaded at night by this excessively bright light. I tried for months and there were no programs available and only if you had a particular commercial parking lot could you buy a shade. It is power conservation issue around these street lights, why can't they be motion sensitive for instance?
- A: *Cam Matheson:* With efficiency, the florescent bulbs could be put to use there, I don't know.
- C: *Bob:* Listening to what Art said about his hot water system I also have done everything to make my house and in my life to make my electricity bill low and my power usage minimal. I remember being a kid in the '70s and people saying turn down the thermostat and here it is many years later and they are still saying the same thing. People who choose to act do that and people who cannot afford do not act and everybody else does what they do. So raising the amount of money, specifically designed electricity rates via Smart Meters

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it won't hurt those that have money, they will go so what. My sense is, it is people who have lots of money who are mostly wasting electricity and they are not going to care if you put the price up. Just like gasoline prices aren't going to affect rich people. Those of us living close to the earth so to speak stopped travelling as much. All the conservation stuff is directed at people at the bottom of the financial pyramid here and so those of us that are already doing what we can why not have an incentive program for people at the bottom instead of punishing people for using it at a certain time. You should know by now that punishment is not an effective way to get people to change.

C: *Jody Potter:* I would like to reiterate the question on street lighting and I think that Castlegar recently implemented some kind of control or they are trying to implement, where they can dim the lights at certain hours and brighten at times.

C: *Judith Mertz:* I was told that it really goes back to the Village or municipality. I cannot as an individual pursue this; it has to be pursued by a municipality. Thank you for that.

Q: *Jim Barrell:* What you are saying about people in a pyramid getting penalized and I am wondering, as residential customers do we pay a different KW hour rate than the stakeholders that you were with previously next door?

A: *Cam Matheson:* No. Don't forget that this is not a BC Hydro area. You are Fortis BC.

Q: *Jim Barrell:* Can I come to BC Hydro and negotiate a better rate?

A: *Cam Matheson:* Within our demand profile there are residential, commercial and industrial customers and each one has a separate tariff rate and there is no negotiating.

Closure

The Q&A session ended at 9:00pm.

Webinar Meeting Notes

**BC Hydro
Integrated Resource Plan**

**Consultation Summary Report
Appendix 5**

**BC Hydro Integrated Resource Plan
Webinar**

MEETING DATE APRIL 4, 2011 11:30 A.M. – 1:00 P.M.

PURPOSE	Meeting notes from a webinar with stakeholders and BC Hydro staff on April 4, 2011.
FACILITATOR	Judy Kirk, Kirk & Co. Consulting Ltd.
PRESENTER	Cam Matheson, BC Hydro
MULTI-STAKEHOLDERS PRESENT	Ofelia Gunlao Jeff Fitzpatrick-Stilwell Chad Giles Dan James Steven Krause Carlos Marin Kelly Matheson Catherine Ponsford Ted Spearin Elroy Switlishoff
STAFF ATTENDEES	Kenna Hoskins, BC Hydro Lindsay Fane, BC Hydro Brandee Clayton, BC Hydro Tim Lai, Kirk & Co. Consulting Ltd. Emilie Yee, Kirk & Co. Consulting Ltd., Recorder
AGENDA	1. Welcome and Review Agenda 2. Consultation Workbook Overview 3. Discussion 4. Closing Remarks
KEY THEMES	
<ol style="list-style-type: none"> 1. Future Growth and Demand Reduction – A primary question of the IRP is how BC Hydro will meet the gap between future growth and future demand. Participants inquired about the process by which future growth is forecasted and whether demand reduction targets are achievable. 2. Greenhouse Gases – As one of the main objectives of the Clean Energy Act, participants asked BC Hydro to elaborate on B.C.’s greenhouse gas emission targets and how the growth of natural gas powered project would affect those targets. 3. Cost – British Columbians enjoy some of the lowest electricity rates in North America and the electricity costs are an important factor for consideration. Participants asked whether an older cost estimate for Site C could hinder its construction and how BC Hydro would deal with the price volatility of natural gas. 	

BC Hydro Integrated Resource Plan
Webinar

MEETING DATE

APRIL 4, 2011

11:30 A.M. – 1:00 P.M.

DISCUSSION

1. Judy Kirk - Welcome and Introductions

Judy Kirk welcomed participants to the webinar and explained the format of the meeting. She then introduced the consultation workbook, emphasised the five consultation topics and the feedback form at the back of the workbook.

2. Cam Matheson – Consultation Workbook

Matheson reviewed the format of the consultation workbook and explained the processes and factors BC Hydro considers when energy planning. Cam explained the difference between demand side options and supply side energy options and how BC Hydro factors this into the balancing the options when developing a long-term plan.

(Abbreviations will be used and mean: Q: Question, A: Answer, and C: Comment)

Q: *Catherine Ponsford: Why is supply falling, albeit slightly?*

A: *Cam Matheson: Supply that is characters till 2016, fiscal 2016-2017, is the supply we have prior to being self-sufficient where previously we are allowed to rely on energy from the market. But the Clean Energy Act asks us to be self-sufficient by 2016 and so the 2,500 gigawatt hours from external markets has to come out in 2016. In addition, there are certain IPP contracts that will expire during that period and they will come out as well.*

Q: *Catherine Ponsford: Regarding BC's greenhouse gas emission targets, I believe Cam referred to them as economic targets. Can he please elaborate?*

A: *Cam Matheson: These are Green House Gas reduction targets that the provincial government has set for the province. Since BC Hydro has such a critical role in the provincial targets, then we have to set those targets. The clean electricity system will have to be used in order to move some certain sectors like oil and gas that use fossil fuels to move onto the electricity system. That's what I was referring to.*

Q: *Carlos Marin: Could you describe generally the process you will be going through to estimate future industrial demand growth?*

A: *Cam Matheson: We do a bottom up approach with the industrial sector of the economy. We are in touch with the industrial customers on the system and we are all well aware with what the demand will be and the capital program that a specific customer has in place to ramp up or reduce energy. We call this a bottom up forecast. We talk to people on the ground and get that information and then roll it up to the overall forecast level. We also compare with what's going on in that industry across the country and in the world to see what might happen as well.*

Q: *Elroy Switlishoff: Why are the First Nations meetings not being held as a public forum? Can members of the public attend First Nations focus sessions?*

A: *Cam Matheson: We do a separate stream of consultation because we are required to by law. The courts have said that First Nations have rights and titles that distinguish them from any other user and we need to specifically consult with them so that's why we have separate meetings. I don't really know if you can attend, I think the First Nation group would have to be comfortable if that's the case but I can't give you more specifics.*

Q: *Carols Marin: Do you foresee growth in natural gas powered generation in future and still meet your greenhouse gas targets?*

A: *Cam Matheson: That's a good question and I think that when we get to that in topic #2 you'll see there is limited room for using natural gas. We are constrained by the 93% target we need to reach because it prohibits the use of natural gas. We think that there is still small room for contribution beyond what we*

BC Hydro Integrated Resource Plan
Webinar

MEETING DATE

APRIL 4, 2011

11:30 A.M. – 1:00 P.M.

already have and we'll be discussing those with you.

Q: *Catherine Ponsford*: To what extent can BCH develop codes? Is this a provincial responsibility?

A: *Cam Matheson*: We don't have the ability to make laws and commit the people in this province to codes and standards. It comes from provincial and even the federal government.

Q: *Carlos Marin*: You said that you have an estimate that you will be at 79% demand reduction. How confident are you in that number in terms of probability?

A: *Cam Matheson*: We are confident, but we also try to remind people that this is a new element generally in North America so we carefully watching and mindful how we track towards our targets. We've hit our targets of 2,300 gigawatt hours for this year but we need to continue to watch it for our customers. The other thing generally speaking is that conservation and energy efficiency on a unit basis, another attribute to conservation and efficiency because new resources have some level of impact. Depending on how much you do, you could find yourselves in a more costly situation so we are trying to hit the right level.

Q: *Catherine Ponsford*: The target is 93% clean energy, where are we today relative to this?

A: *Cam Matheson*: We are at 93%. When the provincial government created the Clean Energy Act, they asked where the BC hydro system was right now and since we've been keeping tabs for some time we were able to say we are at 93%. Thus, they said that that is what our baseline would be.

Q: *Kelly Matheson*: Portfolio's two and three are listed as lowest cost, but appear to rely on an older cost estimate of \$85 per megawatt hour for Site C. Would a higher cost for Site C affect these portfolios? Is there a cost above which Site C would or could not be built?

A: *Cam Matheson*: We are undergoing producing a new estimate of Site C which will be coming out this spring. Our view is that it won't be enough to change the fundamental picture. We think that portfolio two will still be less expensive than portfolio one. Portfolio one requires two additional capacity resources. Any portfolio with Site C in it has the unit energy cost and the back-up required.

Q: *Carlos Marin*: Natural gas is firm generation but it does have price volatility. Would BC Hydro be locking in prices for a natural gas fired unit?

A: *Cam Matheson*: Any natural gas has volatility and I don't think that major industry like electricity generation is locking in prices at this time. I think the prices will be short term, not long term. One of the draw backs is that you have to live with the fuel risk associated with that.

Q: *Catherine Ponsford*: How would BC Hydro set priorities if going the anticipatory route?

A: *Cam Matheson*: We take the demand forecast that we have and then we have regional demand forecast. We look at the growth on the system or region and we set that against the current capacity. Given that growth and given the demand can we still reliability move electricity to the degree it is consumed. That is how we figure out where we will put our money.

Q: *Carlos Marin*: How does BC Hydro today decide to run a new transmission line?

A: *Cam Matheson*: Fundamentally we always look at the reliability to our customers. We look at demand where it is occurring on our system but also in the markets on a daily basis because our system allows us to successfully buy and sell so we can keep rates low.

C: *Catherine Ponsford*: Thank you. Great session

4. Feedback Forms

Participants of the webinar were thanked for participating and were encouraged to complete and submit feedback forms.

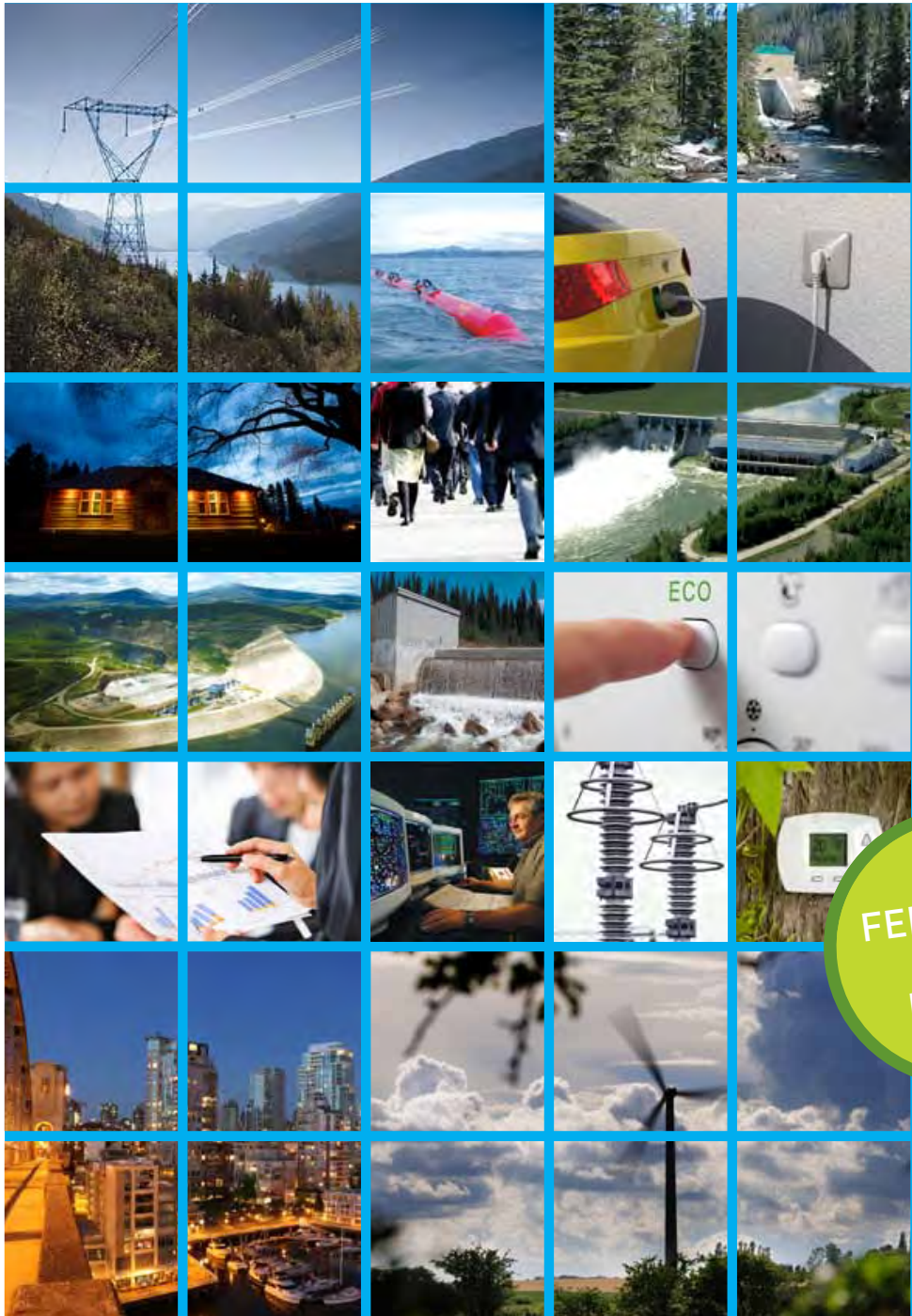
5. Closure

The meeting ended at 1:00 p.m.

Consultation Workbook and Feedback Form

**BC Hydro
Integrated Resource Plan**

**Consultation Summary Report
Appendix 6**



2011 INTEGRATED RESOURCE PLAN

PLANNING FOR A CLEAN ENERGY FUTURE CONSULTATION WORKBOOK

MARCH 1 – APRIL 30, 2011



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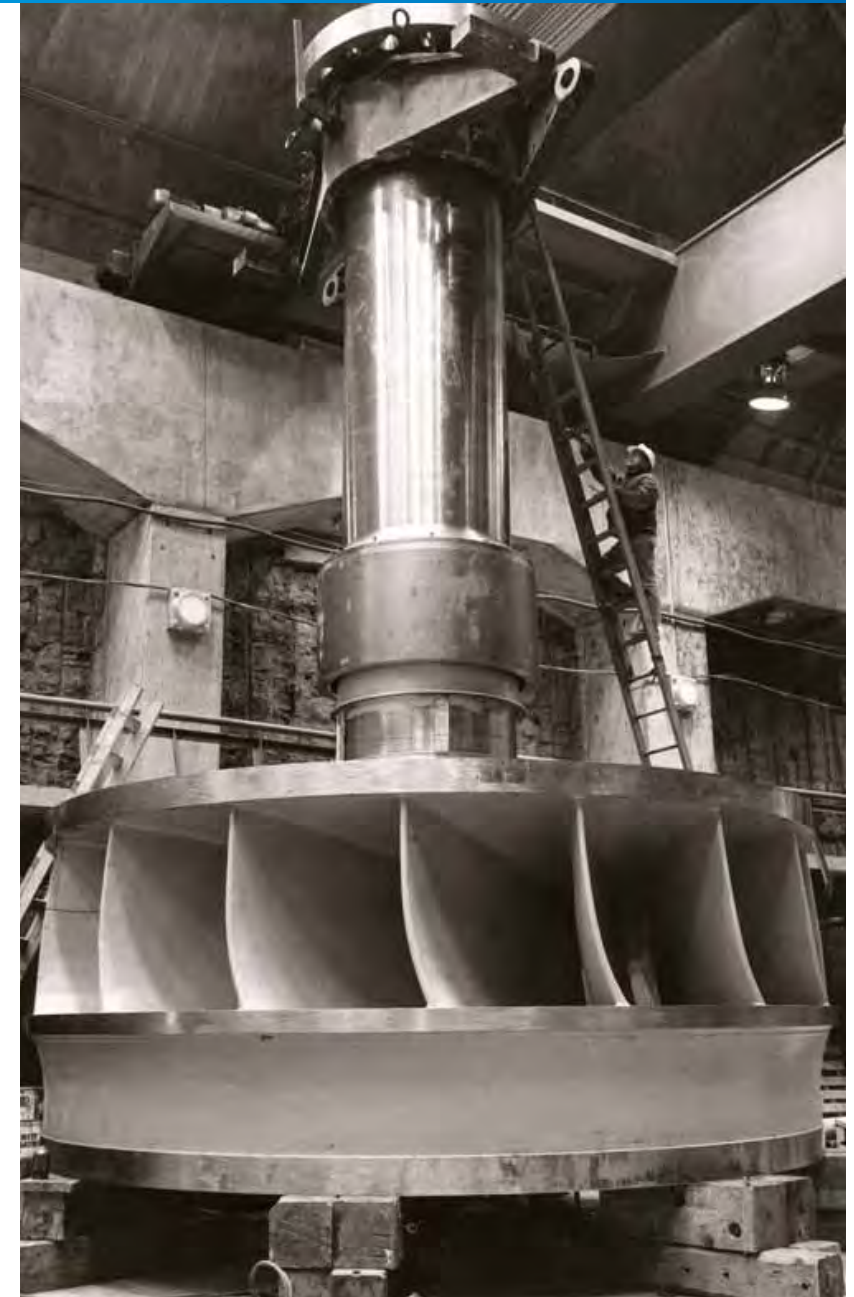
BC HYDRO OVERVIEW

Fifty years ago, BC Hydro was created as a Crown corporation to deliver electricity to homes and businesses throughout much of the province. Investments in dams, generating stations, transmission and distribution networks, and programs to encourage conservation have provided a reliable supply of electricity for generations of British Columbians at some of the lowest rates in North America.

Currently, BC Hydro serves 1.8 million customers in an area containing more than 94 per cent of British Columbia's population. The third-largest electric utility in Canada, BC Hydro provides electricity to its customers through an integrated grid. BC Hydro generates the majority of its power from large hydroelectric stations on the Columbia and Peace rivers. The remainder of its domestic electricity supply comes from smaller BC Hydro-owned generating stations and purchases from Independent Power Producers (IPPs).

In years when domestic requirements have exceeded domestic supply, BC Hydro has also imported some of its total net annual supply from other jurisdictions. Facing a growing population with an increasing appetite for electricity-driven technology and signs of new growth in the energy-intensive industrial sector, BC Hydro is forecasting that demand for power will increase by approximately 40 per cent over the next 20 years, before accounting for savings that can be achieved through promoting energy efficiency and conservation.

On its 50th anniversary, BC Hydro is looking back on its legacy in helping to develop the province, and it is examining the challenges that await British Columbians in the next 50 years. To ensure that future generations will continue to enjoy the competitive advantage of clean, reliable power, BC Hydro must plan ahead to upgrade and expand its heritage facilities, secure new supplies of renewable energy, build new transmission and distribution lines, encourage conservation, and integrate new technologies to modernize the system.



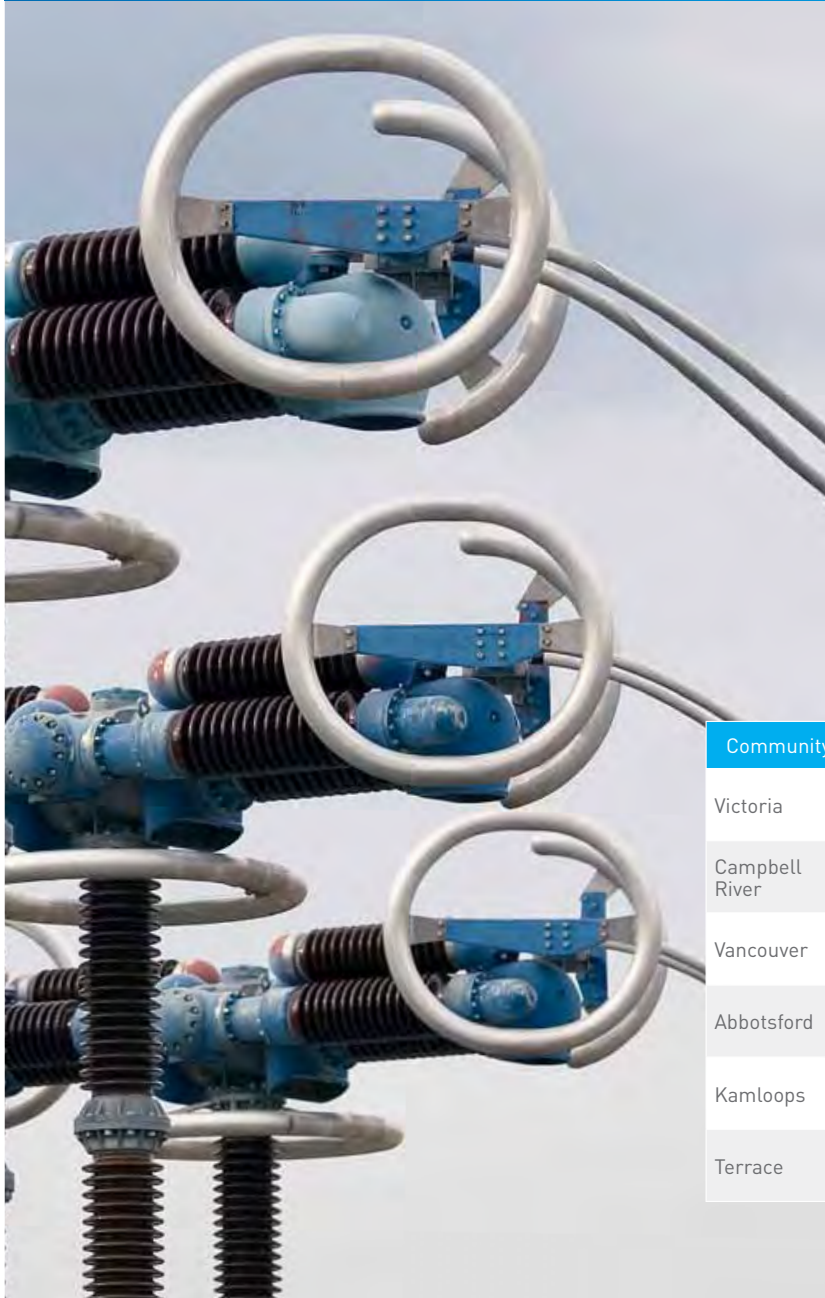


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BC Hydro wants to hear from British Columbians as it develops its Integrated Resource Plan. To add your voice, attend a [public open house](#) in a community near you.

Community	Date	Time	Location
Victoria	Wednesday, March 9	6:00 – 9:00 p.m.	Hotel Grand Pacific
Campbell River	Thursday, March 10	6:00 – 9:00 p.m.	Coast Discovery Inn & Marina
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Kamloops	Thursday, March 17	6:00 – 9:00 p.m.	Ramada Kamloops
Terrace	Tuesday, March 22	6:00 – 9:00 p.m.	Terrace Sportsplex

Community	Date	Time	Location
Prince George	Wednesday, March 23	6:00 – 9:00 p.m.	Ramada Prince George
Fort St. John	Thursday, March 24	6:00 – 9:00 p.m.	Quality Inn Northern Grand
Vernon	Tuesday, March 29	6:00 – 9:00 p.m.	Best Western Vernon Lodge
Castlegar	Wednesday, March 30	6:00 – 9:00 p.m.	Castlegar & District Community Complex
Fort Nelson	Thursday, March 31	6:00 – 9:00 p.m.	Woodlands Inn
Cranbrook	Thursday, April 7	6:00 – 9:00 p.m.	Prestige Rocky Mountain Resort and Convention Centre

Please check bchydro.com/irp for schedule updates.

1. INTRODUCTION

INTEGRATED RESOURCE PLAN

POWER FOR OUR HOMES AND WORKPLACES

It can seem like a bit of magic: you flick a switch and whatever gadget or appliance you choose jumps to life. You get heat, you get light. You get music or entertainment. All this electrical “fuel” arrives at our homes or workplaces safely, silently and consistently. It leaves no smell, and there is never any left over when you finish. You just turn it off and it stops. It all seems so simple.

Of course, it’s not. The electricity that powers our lives comes in the form of a strictly controlled current of electrons. Most of the actual electricity is generated in the far corners of the province and carried over thousands of kilometres of transmission and distribution lines to reach the bulk of us who live in the province’s southwest corner. Along the way, it passes through a range of landscapes, habitats and communities before it arrives at our homes and places of business.

The tricky part is that electricity doesn’t actually “go away” when you turn off the switch. Once generated, it has to be used or it can overload and crash the system. Accordingly, BC Hydro must anticipate how much people will want at any given time of the day or year and introduce exactly that amount into the network. BC Hydro continually monitors the entire system to ensure that they estimated correctly or to adjust the flow accordingly.

Over the longer term, BC Hydro must also anticipate future demand. It can take five to seven years to build a new generation facility and even longer to build transmission, so BC Hydro must plan carefully – and well into the future – to ensure that it has encouraged conservation and acquired the right mix of generation and transmission resources to meet its customers’ needs.

Whether it’s our homes, communities, businesses or industries, we depend on affordable, reliable electricity when and where we need it. It’s essential that BC Hydro understands customers’ needs and meets the demand for electricity now and for years to come. It’s also essential that we consider the consequences of our decisions from a broad range of perspectives – for example, on our pocketbooks, on our economy, and on the people and the environment where our electricity is generated and transmitted.

**THE INTEGRATED RESOURCE PLAN**

The Integrated Resource Plan – the IRP – is BC Hydro’s long-term plan for acquiring the resources to meet customers’ needs for the next 20 years. It is guided by the government of British Columbia’s new *Clean Energy Act*, which came into effect in June 2010 and sets specific new energy objectives for BC Hydro with respect to its long-term electricity plan (see page 8). Notably, long-term electricity planning is not a once-every-20-years exercise. Over the course of its history, BC Hydro has renewed its long-term plan at regular intervals. Most recently, it developed an Integrated Electricity Plan in 2006 and a Long-Term Acquisition Plan in 2008. Once developed, BC Hydro will renew the Integrated Resource Plan periodically.

Integrated electricity systems are inherently complex and capital-intensive, and most new resources require significant lead times to develop. As a result, electric utilities must plan ahead to be sure that the required resources will be in place when needed. And implementation of long-term electricity plans require a staged and flexible approach to account for changes in everything from the economy to technology.

Notably, BC Hydro’s IRP does not, by itself, lock the utility into any of the specific projects identified over the planning horizon. Rather, the plan, if approved by government, will set out a path for BC Hydro and will require key actions to be taken over the next few years that will ensure customers’ needs can be met over the next 10 and 20 years. Any specific project that is later developed in response to the IRP – whether a transmission line, a generation project, a power call or a conservation plan – will have its own individual design, consultation, permitting and approval process.

INTEGRATED RESOURCE PLAN 2. INTEGRATED RESOURCE PLANNING

As BC Hydro considers how to meet B.C.'s electricity needs over the next 20 years, it asks three basic electricity planning questions:

1. How much electricity will British Columbians need over the next 20 years? This depends on a host of issues, some that may increase demand on the system, and some that may reduce demand. The demand must also be understood in two ways: how much energy will be required on an annual basis, and how much energy might be needed at any given point in time to meet peak demand and to ensure that we can "keep the lights on", even on the coldest days in winter.

2. What is the gap between existing supply and forecast electricity demand? What electricity generation and transmission assets does BC Hydro currently have that can continue to be relied upon going forward, and how much electricity can it source from its existing contracts with B.C.-based Independent Power Producers?

As well, to what degree can current conservation and efficiency measures such as conservation rates be relied upon to reduce demand?

3. How can BC Hydro close the gap? What blend of additional conservation measures and generation and transmission resources will be needed to meet demand, reliably and cost-effectively?

As BC Hydro examines how to close the gap, it considers:

- How much savings can be achieved from conservation and efficiency
• What portfolio of electricity generation options it should plan on
• How much electrification will contribute to growth in electricity demand
• What the transmission requirements will be
• What the export market potential may be



CLEAN ENERGY SUPPLY AND TRANSMISSION

The majority of B.C.'s electricity demand is located in the Lower Mainland and on Vancouver Island, while the overwhelming majority of supply is remote and must be moved over very long distances across rugged terrain and through a relatively small number of transmission lines.

More than 93 per cent of BC Hydro's electricity supply is renewable, and creates little or no greenhouse gas emissions, making it desirable at a time when the world faces climate change. BC Hydro's energy supply comes from a combination of its own heritage resources (see below) and power purchases from Independent Power Producers who generate their energy from a range of sources, including hydro, biomass and wind.

BC Hydro is regulated by the BC Utilities Commission and governed by the BC Hydro and Power Authority Act, the Utilities Commission Act and the B.C. Clean Energy Act. Collectively, this legislation ensures that BC Hydro will continue to provide clean, reliable and cost-effective electricity to its customers.

BC HYDRO GENERATION



HOW MUCH ELECTRICITY WILL BRITISH COLUMBIANS NEED OVER THE NEXT 20 YEARS?

BC HYDRO'S ELECTRICITY LOAD FORECAST

The annual long-term load forecast provides planners with an understanding of how much electricity will be required 10 and 20 years from now. Trends that influence future electricity needs include economic growth and population growth, as well as predictions on how electricity use will change as a result of changes in lifestyle, electricity rates, legislation and technology.

The 2010 Electricity Load Forecast indicates that demand will increase by approximately 40 per cent in the next 20 years before accounting for savings that can be achieved through conservation and efficiency.

The demand forecast is developed by examining BC Hydro's three customer classes: residential, commercial and industrial. The primary drivers for future increased electricity consumption among residential customers include population growth and housing starts. Drivers for the commercial sector are general economic activity, which includes gross domestic product (GDP) and retail sales, and employment. The industrial sector's demand is the most volatile year over year, and it is the most challenging to forecast, as it is sensitive to the unpredictability of international commodity prices, economic cycles, natural disasters (e.g., mountain pine beetle), regulatory approvals and labour disputes.

WHAT AFFECTS LOAD GROWTH?

Population – The B.C. population is expected to grow to nearly 5.8 million people over the next 20 years, an increase of almost 25 per cent over the current population of 4.6 million.

Conservation – Programs, such as BC Hydro's award-winning Power Smart, have been effective in helping people use electricity more efficiently and reduce the amount of energy they use, through everything from turning out the lights, to turning down the heat, to improving home insulation.

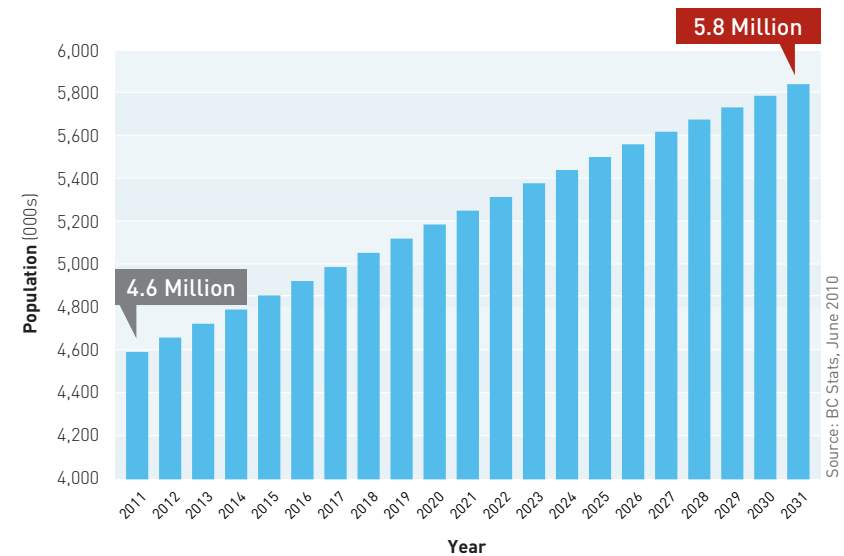
Consumption – The increased popularity of computers, larger televisions and other consumer products has greatly increased the demand for electricity in individual homes.

Efficiency – Manufacturers are consistently producing conventional goods (washers, dryers, refrigerators, compact fluorescent light bulbs) that use much less electricity.

Electrification – The rising price, environmental impact and threatened shortage of fossil fuels may drive people to choose electricity to power everything from home heating to automobiles.

Economic Activity – The current forecasted expansion in the mining and the oil and gas industry has the potential to significantly increase electricity use in B.C.

B.C.'S PROJECTED POPULATION GROWTH 2011 – 2031



INTEGRATED RESOURCE PLAN 2. INTEGRATED RESOURCE PLANNING

WHAT IS THE GAP?

A LOOK AT EXISTING RESOURCES COMPARED TO FORECAST DEMAND

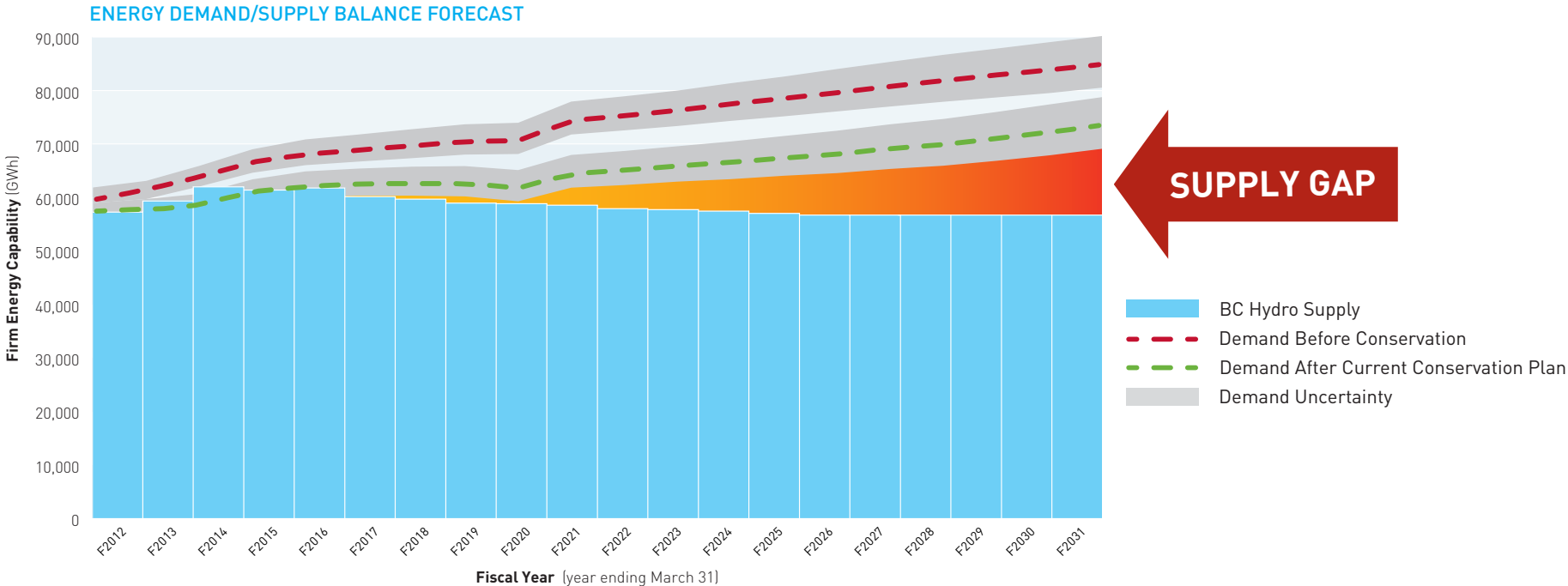
Before BC Hydro can assess the future gap between supply and demand, it first must assess how much electricity it can produce and rely upon from its current generating facilities, its existing contracts with Independent Power Producers and its current conservation plan.

Approximately 85 per cent of domestic supply comes from generation resources owned and operated by BC Hydro; the remaining 15 per cent of electricity need is met with power purchased from Independent Power Producers in B.C.

Of the electricity produced by BC Hydro, almost 80 per cent comes from its large hydroelectric installations in the Peace and Columbia river basins.

BC Hydro currently has more than 100 electricity-purchase agreements with Independent Power Producers, some of which date back to the 1980s. Sixty-five of these purchase agreements involve projects that have reached commercial operation. While the majority of these projects generate electricity from run-of-river hydro plants, there are also a number of wind and biomass generating plants. In wind alone, BC Hydro has purchase agreements with Independent Power Producers that represent a total of 700 megawatts (MW), of which 100 MW has reached commercial operation as of January 2011.

As the "gap" diagram below illustrates, even after the increase in demand for electricity is adjusted to account for savings from BC Hydro's current conservation and efficiency plan, an energy gap between future electricity needs and current resources still exists, particularly after 2020. The planning challenge begins with the task of how best to fill the gap.



2. INTEGRATED RESOURCE PLANNING

INTEGRATED RESOURCE PLAN

HOW CAN THE GAP BETWEEN FUTURE ELECTRICITY NEEDS AND EXISTING RESOURCES BE CLOSED?

FUTURE RESOURCE OPTIONS

After identifying the gap between forecasted demand and current supply, planners look at possible new sources of electricity, or resource options. These include additional conservation and efficiency measures, supply-side options such as new generating resources (supplied by BC Hydro or Independent Power Producers), and the necessary transmission options to ensure that the energy from these resources can be optimally brought to customers.

BC Hydro periodically updates its inventory of potential future resources, most recently in the *2010 Resource Options Report*.

ADDITIONAL ELECTRICITY CONSERVATION AND EFFICIENCY

Encouraging electricity conservation and efficiency is called demand-side management (DSM). This can be voluntary, as when BC Hydro encourages its residential, commercial and industrial customers to use less electricity by, for example, adopting efficient technology options such as ENERGY STAR® windows, or it can be regulated, as when governments pass regulations that, by similar example, mandate low-emissivity windows. BC Hydro can also design electricity rates that encourage conservation, for example, by charging more for power at certain times of the day in an attempt to shift the time of use and lower the peak demand. There is potentially more to gain from

conservation (a reduction of up to 79 per cent under the current plan) than what is mandated under the *Clean Energy Act*.

Power Smart is BC Hydro’s branded program encompassing all of its demand-side management programs. Power Smart uses a wide range of approaches, including information programs, incentives specific to particular enterprises or homes, and rebate programs to assist customers in paying for conservation or efficiency measures.

Overall, demand-side management helps to keep rates low, as saving electricity is lower in cost than new generation.

GENERATION AND TRANSMISSION OPTIONS

For an overview of generation options and their potential implications, see the table on pages 14–15. For a discussion on approaches to transmission planning, see pages 22–24.

ENERGY, CAPACITY AND CUSTOMER DEMAND

Electricity consumption varies by customer type, by day, and by year. Some customers, such as large industries, need a steady amount of electricity delivered. Others consume in short bursts. Residential customers, for example, draw most of their energy in the early evening when they are preparing dinner, using appliances and watching TV. Over the whole year, demand is highest in November, December and January, when people use more electricity for heat and light.

To meet the demand for electricity, a utility must have:

- **Firm Energy** – refers to electricity that is available at all times. Resources typically providing firm energy include large hydroelectric dams, bioenergy, geothermal and natural gas.
- **Dependable Capacity** – the maximum amount of electricity that all of the generating stations combined can reliably produce in any one instant, usually measured in megawatts (MW)
- **Adequate Generation Reserve** – sufficient additional capacity to cover forecast uncertainties, unscheduled outages, and system fluctuations



WHICH BLEND OF FUTURE RESOURCES WILL BEST MEET ELECTRICITY NEEDS?

To effectively compare resource portfolios (bundles of different resource options), BC Hydro uses characteristics to evaluate at a high level the reliability, cost, economic development and environmental implications of different portfolios. Characteristics include:

- **Technical:** How much dependable capacity can it provide? In the case of conservation, how much energy or capacity savings can it offer?
- **Financial:** What are the estimated costs of the resource options? The costs associated with developing additional generation facilities, including building new roads and transmission lines or undertaking more conservation, ultimately affect the cost of electricity to consumers.
- **Economic Development:** What are the characteristics of different resource options to support economic development? For example, employment and gross domestic product impacts.
- **Environmental:** What are the environmental characteristics of the different resource options? For example, what is their greenhouse gas emissions profile?

The characteristics listed above are appropriate for comparing a wide range of resource options across a range of environments located throughout the province.

COMPARING ALTERNATIVE PORTFOLIOS

There are many combinations of resource options that could be used to fill the gap between future demand and the current supply. These combinations, or bundles, are described as “portfolios”. It is important to look at resources in combination, because the limitations of some resources can be balanced by the strengths of others. For example, some resources are intermittent and must be backed up by a dependable supply of power. As well, the sequence or timing of acquiring or developing new resources is important to ensure that supply is available, to avoid unnecessary costs, and to ensure reliable power.

Later on in this workbook, we examine several portfolios for the purpose of seeking input on the draft plan. Planners examine the performance of many portfolios to understand the consequences of different mixes of resource options.

Risk management also is a central focus in resource planning. A robust portfolio consists of electricity resources that will ensure that customer needs are met cost-effectively, reliably and at low risk.

INDEPENDENT POWER PRODUCERS

Since the 1980s, Independent Power Producers (IPPs) have been helping BC Hydro meet its customers’ electricity demand. Currently, IPPs provide BC Hydro with approximately 12,000 GWh/year of electricity, equal to about 15 per cent of BC Hydro’s total supply. IPPs include independent power companies, municipalities, First Nations and customers, working alone or in partnership.

BC Hydro has 100 electricity purchase agreements with IPPs, 65 of which have reached commercial operation. Electricity comes from a range of sources including wind, run-of-river hydro, and biomass.

BENEFITS OF IPP POWER

IPPs identify, design and build innovative clean renewable power projects that help BC Hydro meet customers’ electricity needs and achieve electricity self-sufficiency at competitive prices. Through the development and operation of their projects, IPPs are responsible for securing all necessary regulatory approvals and permits. IPPs take on the financial, development, construction and operating risk associated with their projects while delivering electricity at secured prices over the life of the contract with BC Hydro.



3. IDENTIFYING AND ASSESSING FUTURE NEEDS

INTEGRATED RESOURCE PLAN

WHAT IS THE PLANNING CONTEXT?

BC Hydro’s electricity plans and planning processes are shaped by government legislation and policies, by changing market structures and conditions, and by new developments in technologies.

On June 3, 2010, the government of British Columbia passed the *Clean Energy Act*, legislation that changes the approach that BC Hydro must take to planning. The Act reaffirms the requirement that BC Hydro must achieve electricity self-sufficiency by 2016 and each year after.

The *Clean Energy Act* also sets out several new or updated objectives, including:

- Generate at least 93 per cent of all electricity in British Columbia from clean or renewable sources and build the infrastructure necessary to transmit that electricity
- Use renewable power potential to help achieve the provincial government’s greenhouse gas (GHG) reduction targets
- Meet at least 66 per cent of any increase in demand through conservation and efficiency
- Include an assessment of anticipated transmission requirements over the next 30 years as part of the Integrated Resource Plan
- Encourage economic development
- Explore and pursue, subject to Cabinet approval, the opportunity to develop and sell clean energy into the interprovincial and international markets
- Foster the development of First Nations and rural communities through the use and development of clean and renewable resources

PROVINCIAL GREENHOUSE GAS TARGETS

The government of British Columbia has ambitious targets for reducing greenhouse gas emissions. Having always delivered most of its power from hydroelectric sources, BC Hydro has one of the smallest “carbon footprints” of any major utility in Canada or the U.S. It is BC Hydro’s intention – and responsibility under the provincial *Clean Energy Act* – to maintain and improve upon that position by concentrating on development in clean, renewable sources of energy while maintaining reliability and low cost. B.C.’s low-carbon electricity can play a key role in reducing emissions by offering customers a low-emission alternative to fossil fuels for vehicles, homes, businesses and industry.



INTEGRATED RESOURCE PLAN

3. IDENTIFYING AND ASSESSING FUTURE NEEDS

WHAT'S IN THE PLAN?

The Integrated Resource Plan will provide an analysis and outlook that can guide BC Hydro operations for two decades and beyond. It will include:

- A 20-year Base Resource Plan that sets out a mix of demand reduction and generation and transmission options that are able to fulfill the forecasted demand
- Contingency Resource Plans that address the uncertainties inherent in long-term planning, such as higher than expected demand. Contingency resource plans put forth a range of alternate resource options that would be relied upon if conditions change significantly.
- A 30-year transmission plan

These plans will include addressing key questions, such as:

- How much further can demand be reduced by conservation?
- How can the Site C Project help meet future demand?
- When should the next call for power from Independent Power Producers be made? Should it include natural gas?
- What are the transmission requirements?
- How does BC Hydro balance competing policy objectives?

The IRP will also include a consideration of:

- The potential to use electrification to reduce greenhouse gas emissions in B.C.
- The opportunity to develop revenue-earning clean energy exports, and the potential associated costs of building capacity to serve such a market

The planning process includes consultation with the public, First Nations and other stakeholders. An account of those consultations and a thorough review of stakeholder feedback will form part of the final Integrated Resource Plan when it is submitted for government consideration by early December 2011.



4. PUBLIC, STAKEHOLDER & FIRST NATIONS CONSULTATION PROGRAM

INTEGRATED RESOURCE PLAN

PUBLIC, STAKEHOLDER & FIRST NATIONS CONSULTATION PROGRAM

BC Hydro will consult with First Nations, stakeholders and the public as it develops an Integrated Resource Plan that responds to its service obligations, B.C.'s energy objectives and its obligations as set out in the *Clean Energy Act*. The process for developing the Integrated Resource Plan includes three phases:

TECHNICAL REVIEW AND FOUNDATION FOR INTEGRATED RESOURCE PLANNING (FALL 2010)

In the first phase of developing the IRP, BC Hydro focused on assembling key pieces of technical data necessary to construct a plan, and sought input from selected First Nations and stakeholders with regard to the design of the consultation process. BC Hydro also worked with its Electricity Conservation and Efficiency Advisory Committee as it constructed conservation plan options for energy conservation. During this phase, BC Hydro also updated its forecast of future electricity demand to establish the "gap" between future demand and existing and committed energy resources.

An IRP Technical Advisory Committee was established that will assist BC Hydro in creating a plan through detailed technical advisory input and feedback. This advisory input is in addition to input provided by the public, First Nations and stakeholders through the province-wide consultation process.

CONSIDERING OUR CLEAN ENERGY FUTURE – ASSESSING AND EVALUATING OPTIONS (WINTER/SPRING 2011)

In the second phase of developing the IRP, BC Hydro is using the technical data prepared in the fall to compare alternative ways of meeting growing demand and associated clean energy objectives. BC Hydro is asking the public, First Nations and stakeholders to consider relevant topics being addressed in the IRP. These topics include the approach to conservation and efficiency, electricity generation options, electrification, approaches to planning transmission, and export market potential. As part of this phase, and considering resource alternatives, BC Hydro is examining the Site C Clean Energy Project, a potential third dam and hydroelectric generating station on the Peace River in northeastern B.C. Input received through consultation will be considered, along with technical, financial, environmental and economic development input, as BC Hydro evaluates alternatives and drafts the Integrated Resource Plan.

REVIEWING THE DRAFT INTEGRATED RESOURCE PLAN (FALL 2011)

In this final phase, First Nations, the public and stakeholders will be invited to provide their feedback on the draft Integrated Resource Plan. BC Hydro will consider this feedback as it prepares its final draft IRP for submission to government in early December 2011, after which government will review the plan and decide whether to approve it.

BC Hydro wants to hear from British Columbians as it develops its Integrated Resource Plan. To add your voice, attend a [public open house](#) in a community near you.

IRP PUBLIC OPEN HOUSE SCHEDULE*

Community	Date	Time	Location
Victoria	Wednesday, March 9	6:00 – 9:00 p.m.	Hotel Grand Pacific
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Kamloops	Thursday, March 17	6:00 – 9:00 p.m.	Ramada Kamloops
Terrace	Tuesday, March 22	6:00 – 9:00 p.m.	Terrace Sportsplex
Prince George	Wednesday, March 23	6:00 – 9:00 p.m.	Ramada Prince George
Fort St. John	Thursday, March 24	6:00 – 9:00 p.m.	Quality Inn Northern Grand
Vernon	Tuesday, March 29	6:00 – 9:00 p.m.	Best Western Vernon Lodge
Castlegar	Wednesday, March 30	6:00 – 9:00 p.m.	Castlegar & District Community Complex
Fort Nelson	Thursday, March 31	6:00 – 9:00 p.m.	Woodlands Inn
Cranbrook	Thursday, April 7	6:00 – 9:00 p.m.	Prestige Rocky Mountain Resort and Convention Centre

*Please check bchydro.com/irp for schedule updates.

CONSULTATION TOPICS

Through this Consultation Workbook and Feedback Form, BC Hydro is seeking input on the following consultation topics:

- 1. Conservation and Efficiency
- 2. Electricity Generation Options
- 3. Electrification
- 4. Transmission Planning
- 5. Export Market Potential

A brief description of each of the consultation topics is provided below.

1. Conservation and Efficiency The first and best way to meet our future electricity needs is to reduce demand through conservation and energy efficiency. Conservation occurs when customers change their behaviours, business operations, equipment purchases, or capital investment decisions in ways that reduce electricity use. Methods of conservation include programs, electricity rates and government regulations designed to encourage or require customers to conserve electricity. The current conservation and efficiency plan is designed to reduce the forecast growth in demand by 79 per cent by 2020. This is above the new *Clean Energy Act* target of 66 per cent. One of the important questions in the IRP is whether BC Hydro should target additional savings from conservation and efficiency over and above our current significant plan to reduce growth by 79 per cent by 2020.

- 2. Electricity Generation Options** While British Columbians are doing more than ever to conserve electricity, electricity use is expected to continue to increase over the coming decades due to growth in population and among energy-intensive industries. BC Hydro will develop and analyze various portfolios (sets of resource options) that may be used to meet future electricity needs and clean energy objectives. Potential resource generation options include run-of-river hydro, biomass, wind, large hydroelectric with storage (Site C), natural gas, and emerging technologies, such as tidal and wave.
- 3. Electrification** Electrification describes the process of switching from other fuel sources to electricity. For example, switching vehicles from petroleum to electric or switching household heating or large industrial processes from natural gas. Efficient electrification is one way of supporting the province’s greenhouse gas emission reduction targets. The Integrated Resource Plan will consider how potential electrification can affect electricity demand over time and what measures BC Hydro may need to take to serve its customers.

- 4. Transmission Planning** The transmission system, the essential link between electrical generators and energy consumers, is planned and designed to deliver energy efficiently and reliably. Because transmission lines require long lead times to plan and construct, the Integrated Resource Plan will assess the demand forecast and the transmission options that will most effectively meet those demands over the next 30 years.
- 5. Export Market Potential** While BC Hydro currently trades electricity when it has a short-term surplus, the B.C. *Clean Energy Act* includes the objective that the province be a net exporter of clean or renewable power. The Integrated Resource Plan will assess the export market potential, including the share of the clean energy market that B.C. could expect to capture, and make recommendations to the provincial government about what actions, if any, are required now.



TOPIC 1: CONSERVATION AND EFFICIENCY

The latest forecasts show that demand for electricity in B.C. will grow by approximately 40 per cent over the next 20 years. That’s the equivalent of adding the energy demand of five more cities the size of Vancouver to our system, before accounting for savings that can be achieved through conservation and efficiency. Conservation is the cleanest and least expensive way to meet demand.

Conservation – often referred to as demand-side management (DSM) – is BC Hydro’s first strategy for closing the gap between future electricity demands and existing resources. Conservation options include programs, specifically designed electricity rates (e.g., residential inclining block rate), and government regulations.

From a planning perspective, however, it is difficult to guarantee a particular volume of conservation over time – dependent as that is on customers’ behavioural response.

To be sure that it can reliably meet future demand, BC Hydro must evaluate conservation plans in a way similar to new generation options. Key questions include:

- How much additional electricity can be saved, in particular above the current plan, to reduce growth in demand by 79 per cent?
- By when can the electricity be saved?
- How certain are the savings in the existing conservation plan? How much risk is associated with extending that target? How persistent are the savings?
- What is the cost to create these savings?

Depending on what combination of conservation and efficiency measures is undertaken, BC Hydro can target different levels of savings. For this IRP, BC Hydro is evaluating a range of options that could provide savings of between 66 per cent and 83 per cent of the gap between current resources and anticipated demand.

GREATER CONSERVATION AND EFFICIENCY

To achieve significantly higher energy savings from current targets, BC Hydro would have to:

- Expand its Power Smart programs
- Send stronger signals through specially designed electricity conservation rates
- Request that the provincial and federal governments commit to bring in new conservation regulations

These measures combined would be expected to change societal norms and energy consumption patterns throughout the entire provincial electricity market. They might include making all buildings net zero consumers of electricity, meaning they produce as much electricity as they consume over the course of a year. This would require super-efficient building envelopes, widespread integration of district energy systems and small distribution generation, and more community densification, as well as best practices in construction and renovation. Every British Columbian would have to make energy efficiency a personal responsibility beyond what we currently do.



BC Hydro 
powerSmart

The table below compares BC Hydro’s current plan to an approach that could achieve greater conservation and efficiency:

CONSERVATION (DSM) APPROACH	DESCRIPTION	TECHNICAL	FINANCIAL	ENVIRONMENTAL	ECONOMIC DEVELOPMENT
Current Plan	Combination of initiatives that include government regulations, conservation rates and Power Smart programs for all classes of customers (see sidebar).	Targets reducing 79 per cent of future load growth by 2020. Moderate uncertainty that expected electricity savings will materialize.	Less costly than buying or building new electricity supply.	Avoid environmental footprint because BC Hydro would not need to build new generation and transmission.	Moderately more jobs relative to new electricity generation options.
Greater Conservation and Efficiency	Increase in mandatory government regulations on energy efficiency. Send stronger rate signals through conservation rates. Expanded Power Smart programs to help consumers find savings.	Could achieve more savings than current approach above. Significant uncertainty that electricity savings will materialize.	Less costly than buying or building new electricity supply.	Avoid greater environmental footprint because BC Hydro would not need to build new generation and transmission.	More jobs relative to current plan and more jobs relative to an equivalent bundle of electricity generation options.



CURRENT CONSERVATION AND EFFICIENCY PLAN

BC Hydro is currently implementing a 20-year conservation and efficiency plan from the 2008 Long-Term Acquisition Plan that targets reducing the forecast growth in demand by 79 per cent by the year 2020. It contains four main strategies:

- 1. Government regulations:** The introduction of approximately 30 new federal and provincial government regulations and building code standards aimed at making buildings and equipment more energy efficient, including water heaters, windows, electronic equipment, lighting, appliances, motors, building code standards, and commercial and industrial equipment.
- 2. Conservation rates:** These rates, in place for more than 90 per cent of BC Hydro’s customers, encourage conservation by delivering a specially designed higher price signal for a portion of customers’ consumption. The rates are revenue neutral, in that BC Hydro collects the same amount of revenue as the original standard rate.
- 3. Power Smart programs:** Approximately 20 programs aim to help customers improve their energy efficiency and conserve electricity. Programs target residential, commercial and industrial customers and range from collecting old or second refrigerators to ensuring that new industrial plants are as energy efficient as possible.
- 4. Supporting initiatives:** These initiatives focus on things like public awareness, community engagement, and technology innovation and provide a foundation for the other three main strategies.

In the fiscal year ending March 31, 2010, BC Hydro spent \$135 million on conservation and efficiency measures for its 1.8 million customers.

For more information about BC Hydro’s Power Smart programs, go to bchydro.com/powersmart.



BC Hydro 
powersmart






5. CONSULTATION TOPICS

INTEGRATED RESOURCE PLAN

TOPIC 2: ELECTRICITY GENERATION OPTIONS






While conservation can meet at least two-thirds of growth in our future electricity needs, BC Hydro must still consider other made-in-B.C. power supply options to meet anticipated demand. B.C. is fortunate to have a wealth of potential clean resources, including hydroelectric generating stations, biomass facilities and wind projects. The provincial *Clean Energy Act* requires that at least 93 per cent of B.C.'s electrical supply comes from clean or renewable sources, which allows for a limited amount of gas-fired generation to serve transmission-constrained areas and/or help meet peak loads. When considering these options, BC Hydro weighs key trade-offs including technical, financial, environmental, and economic development characteristics.

Options under consideration include a combination of BC Hydro projects, such as a hydroelectric dam, reservoir and generating station at Site C on the Peace River, as well as electricity purchases from potential projects representing a range of resource types.

POTENTIAL ENERGY RESOURCES	DESCRIPTION	RESOURCE POTENTIAL	Cost Range (\$F2011 / MWh)
 <p>Biomass:</p> <ul style="list-style-type: none"> • Wood-Based • Municipal Solid Waste • Biogas (Landfill) 	<ul style="list-style-type: none"> • Electricity generated by burning wood residues from the forest industry • Biogas from landfills or municipal solid waste • Provides reliable supply with both dependable capacity and firm energy 	<ul style="list-style-type: none"> • Potential varies with availability of fuel source • Some uncertainty may arise with regard to long-term fuel availability • Wood-based biomass availability varies with the state of the forest industry • Project developers face costs of emissions mitigation • Identified within BC Clean Guidelines and may be certified as green energy 	\$77-\$200*
 <p>Wind</p>	<ul style="list-style-type: none"> • Electricity generated from onshore or offshore wind farms using large wind-powered turbine generators • Provides intermittent supply with low dependable capacity 	<ul style="list-style-type: none"> • Potential located across the province • Identified within BC Clean Guidelines and may be certified as green energy 	\$95-\$200*
 <p>Geothermal</p>	<ul style="list-style-type: none"> • Electricity generated from high temperature naturally occurring gaseous or liquid water at a depth of up to 3000 m used to drive conventional power generation technologies • Provides reliable supply with both dependable capacity and firm energy once geological formation is discovered and proven 	<ul style="list-style-type: none"> • Potential varies with geological formations • Large and uncertain initial capital investment related to exploration phase and confirmation of resource potential • Identified within BC Clean Guidelines and may be certified as green energy 	\$71-\$200*
 <p>Run-of-River</p>	<ul style="list-style-type: none"> • Electricity generated from water temporarily diverted from a stream (i.e., not significant storage reservoir), passed through turbines and returned to the stream • Provides intermittent supply with low dependable capacity 	<ul style="list-style-type: none"> • Potential located across the province • Identified within BC Clean Guidelines and may be certified as green energy 	\$58-\$200*
 <p>Large Hydro (Site C)</p>	<ul style="list-style-type: none"> • Electricity generated from water released from a storage reservoir and passed through turbines on a river • Would typically involve the construction of a dam • Provides reliable supply with both dependable capacity and firm energy • Dispatchable with storage 	<ul style="list-style-type: none"> • Large hydro projects often require long lead times – 10 years or more – and require early evaluation and study • Proposed Site C dam on the Peace River would optimize upstream storage and regulation by taking advantage of water already stored in the Williston Reservoir • <i>Clean Energy Act</i> prohibits, with the exception of the proposed Site C project, future large hydro projects in B.C. 	\$85**

* Prices capped at \$200/MWh to reflect what might be acquired over the planning horizon.

** Cost is based on Site C's 30-year-old historical design, as per Scenario G in the Site C Stage 1 Report (\$6.6 billion). An updated cost forecast is expected by spring 2011, based on an upgraded design for the proposed project.

POTENTIAL ENERGY RESOURCES		DESCRIPTION	RESOURCE POTENTIAL	Cost Range (\$F2011 / MWh)
	Natural Gas-Fired Generation & Cogeneration	<ul style="list-style-type: none"> Electricity generated from high-efficiency gas-fired turbines Provides reliable supply with both dependable capacity and firm energy May be situated on existing industrial sites Dispatchable 	<ul style="list-style-type: none"> Project developers face long-term fuel availability/price risks and cost of greenhouse gas emissions 	\$79-\$109
	Coal-Fired Generation with Carbon Capture and Storage	<ul style="list-style-type: none"> Integrated Gasification Combined Cycle (IGCC) process gasifies coal into a synthetic gas that is burned in a combined cycle generator to produce electricity Provides reliable supply with both dependable capacity and firm energy 	Emerging Technology: <ul style="list-style-type: none"> Large-scale greenhouse gas capture and sequestration technology not yet commercially available Project developers face long-term fuel availability/price risks and cost of greenhouse gas emissions, sequestration 	\$81
	Wave	<ul style="list-style-type: none"> Electricity generated from waves Provides intermittent supply with low dependable capacity 	Emerging Technology: <ul style="list-style-type: none"> Technologies at early stages of commercial development 	\$480-\$824
	Tidal	<ul style="list-style-type: none"> Electricity generated from tides Predictable intermittent supply with low dependable capacity 	Emerging Technology: <ul style="list-style-type: none"> At early stage of tidal current technologies Limited total extractable resource owing to technical limitations and environmental considerations 	\$227-\$850
	Large-Scale Solar	<ul style="list-style-type: none"> Electricity is generated from sunlight using photovoltaic cells. Provides intermittent supply with low dependable capacity 	<ul style="list-style-type: none"> Potential varies with length of day and availability of sunlight. Throughout the year, power generation fluctuates with cloud cover. 	\$351-\$410

SITE C PROJECT DESCRIPTION



BC Hydro is proposing to develop a dam and hydroelectric generating station on the Peace River in northeast B.C. The Site C Clean Energy Project (Site C) would involve the construction and operation of a third dam and hydroelectric generating station on the Peace River, downstream from the existing Williston and Dinosaur reservoirs and the respective BC Hydro generating facilities at G.M. Shrum and Peace Canyon.

If approved, Site C will provide approximately 900 megawatts (MW) of capacity, and produce an average of 4,600 gigawatt hours (GWh) of electricity each year – enough to power more than 400,000 homes. Site C would be publicly owned and become a heritage asset for BC Hydro. Compared to conventional or renewable alternatives, Site C would have higher up-front capital costs but lower long-term operating costs, and it would provide a clean and renewable source of firm and reliable electricity for more than 100 years.

SITE C PUBLIC AND STAKEHOLDER CONSULTATION

Site C is currently in Stage 3 (Environmental and Regulatory Review). This stage will include consultation with the public, communities and property owners, as well as with the Province of Alberta and the Northwest Territories. In addition, BC Hydro and First Nations communities are engaged in a continuing consultation process.

The following public and stakeholder consultation will be included:

- Local Government Liaison
- Property Owner Consultation
- Environmental Assessment and Regulatory Processes
- Preliminary Design Consultation

A range of consultation methods will be utilized, including the Fort St. John and Hudson’s Hope Community Consultation Offices, stakeholder meetings, open houses, print and online feedback forms, and written submissions.

For more information on Site C, visit bchydro.com/sitec.

COMPARING RESOURCE ELECTRICITY GENERATION OPTIONS

Here are three example portfolios that could serve the additional electricity needs of our customers. These portfolios have different blends of electricity generation options and the associated backup that may be required to meet customer needs at all times of the year.

The example portfolios contain different combinations of potential wind and run-of-river projects from Independent Power Producers, the Site C project and gas-fired generation (up to 7 per cent, based upon the 93 per cent Clean Energy Act target).

Depending on the amount of intermittent resources like wind and run-of-river in a portfolio, more backup generation may be required. Backup options include additions at existing BC Hydro large hydroelectric generating facilities, or new pumped storage facilities or gas-fired generation.

Each portfolio is described in terms of the resources it would contain and the associated technical, financial, environmental, and economic development characteristics.

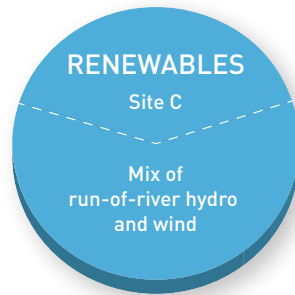
These portfolios are offered as examples to illustrate key trade-offs that arise between various electricity generation options.



PORTFOLIO 1 – RENEWABLE MIX

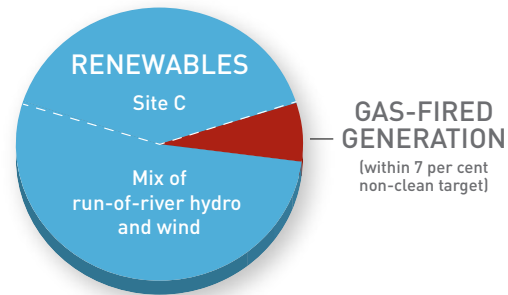
This portfolio includes a mix of renewable resources such as wind, run-of-river and biomass from Independent Power Producers. The Site C Project is specifically excluded. Given that wind and run-of-river hydro are intermittent resources, this portfolio requires backup resources when the intermittent sources are not available. These backup resources would generally consist of additions at existing BC Hydro generating facilities, or new pumped storage facilities or gas-fired generation. This portfolio has low greenhouse gas emissions, with a geographically widespread environmental footprint. The cost of renewable resources and the need for backup resources make this the most expensive portfolio of the three.





PORTFOLIO 2 – RENEWABLE MIX WITH SITE C

This portfolio includes a mix of renewable resources that include Site C along with wind, run-of-river and biomass projects from Independent Power Producers. Site C is included to provide system storage and capacity to back up intermittent resources, but ongoing additions at existing BC Hydro generating facilities and additional capacity and storage still may be required if a large amount of intermittent resources are added. This portfolio has the lowest greenhouse gas emissions, with its environmental and social footprint concentrated in the Peace region. This portfolio will have a lower cost than Portfolio 1.



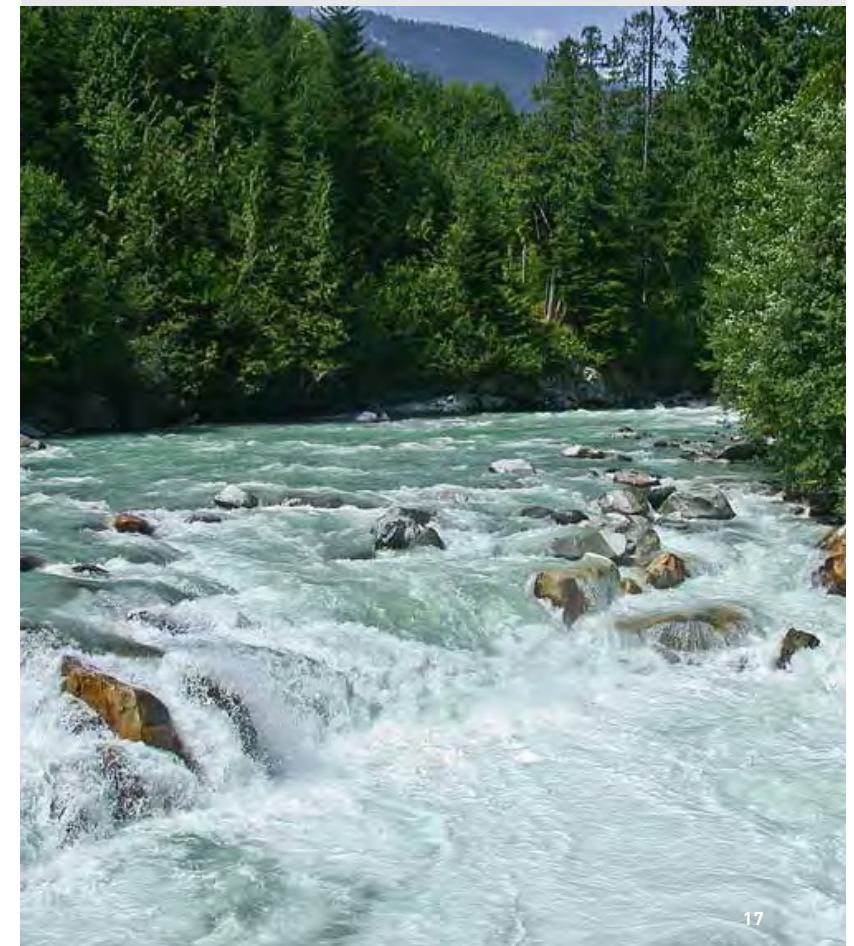
PORTFOLIO 3 – RENEWABLE MIX WITH SITE C AND GAS-FIRED GENERATION (WITHIN 93 PER CENT CLEAN ENERGY ACT TARGET)

This portfolio includes Site C, other potential renewable resources such as wind and run-of-river from Independent Power Producers, and gas-fired generation allowable under *Clean Energy Act* limits. Both Site C and gas-fired generation are available to back up intermittent resources. This portfolio has higher greenhouse gas emissions than Portfolios 1 and 2 due to its reliance on natural gas-fired generation, and has a more concentrated environmental footprint in the Peace region. It has the lowest cost if the price of natural gas remains low but, again, this is subject to uncertain natural gas and carbon emission prices.

POLICY CONTEXT FOR PORTFOLIOS

The *Clean Energy Act* specifies limits for what can be included in a portfolio:













- Future development of specified large-scale hydroelectric storage projects on river systems in B.C. is limited to Site C
- No nuclear resources
- No coal resources without the capture and storage of carbon dioxide



5. CONSULTATION TOPICS

INTEGRATED RESOURCE PLAN

The table below highlights different characteristics and trade-offs associated with each electricity generation portfolio:

ELECTRICITY GENERATION PORTFOLIO	DESCRIPTION	TECHNICAL	FINANCIAL	ENVIRONMENTAL	ECONOMIC DEVELOPMENT
PORTFOLIO 1 Renewable Mix	Renewable mix. No Site C. No gas. Base Energy: 827  72  Backup: 	Requires backup generation. Reduces the electricity system's flexibility to respond to changes in demand.	Higher cost. No ownership of assets at end of contract term with Independent Power Producers. \$\$\$\$	Lower GHG emissions. Geographically widespread environmental footprint.	Geographically widespread jobs. Same GDP and tax revenue.
PORTFOLIO 2 Renewable Mix With Site C	Renewable mix including Site C. No gas. Base Energy: 496  43  1  Backup: 	Increased system flexibility to respond to changes in demand. Requires less backup generation than Portfolio 1.	Lower cost of clean resource. Lower long-term price risk. Larger up-front single capital cost but low operating costs. Public ownership of a 100-year expected life asset. \$\$\$	Lower GHG emissions. More concentrated/localized footprint in the Peace region.	More job-intensive capital project and concentrated jobs in the Peace region. Same GDP and tax revenue.
PORTFOLIO 3 Renewable Mix with Site C and Gas-Fired Generation (within 93 per cent <i>Clean Energy Act</i> target)	Renewable mix with wind, Site C and gas within 93 per cent <i>Clean Energy Act</i> target. Base Energy: 438  38  1  1  Backup: 	Requires no backup. Highest flexibility of system to respond to changes in demand.	Lowest cost of the three. \$\$\$	Higher GHG emissions. More concentrated/localized footprint in the Peace region.	More job-intensive capital project and concentrated jobs in the Peace region and wherever the gas plant is sited.

Note: The symbols provide a general reference tool to compare the three sample portfolios. They represent resource requirements for a 10,000 GWh and 1,800 MW sample portfolio, and relative portfolio costs.

 WIND TURBINES  RUN-OF-RIVER PROJECTS  GAS PEAKING PLANTS  LARGE HYDRO (SITE C)  BACKUP  COST

TOPIC 3: ELECTRIFICATION

WHAT IS ELECTRIFICATION?

Provincial greenhouse gas (GHG) reduction targets will require making deep cuts in GHG emissions in the coming decades. One way to reduce those emissions is by switching from fossil fuel energy to electrical energy derived from clean generation sources. This is referred to as electrification. BC Hydro's clean electricity supply therefore has a key role to play in BC's Climate Action Plan by helping the province reduce GHG emissions.

The *Clean Energy Act* includes, as an energy objective for B.C., "to encourage the switching from one kind of energy source or use to another that decreases greenhouse gas emissions in British Columbia".

WHERE MIGHT ELECTRIFICATION OCCUR?

Fuel switching to clean electricity could occur across the economy. The transportation sector is the largest source of GHG emissions in B.C., and replacing vehicles that use gasoline and diesel with electric vehicles could be one of the most significant long-term actions B.C. could take to reduce emissions.

Many of the large automakers are bringing electric vehicles to market in the near future; key models include the Chevy Volt and the Nissan LEAF. The impact of electric vehicles will depend on availability, price and customer acceptance.

Successful introduction of electric vehicles will require that consumers are able to charge their vehicles, and that any charging infrastructure is smoothly integrated into the grid. BC Hydro has an obligation to be ready to serve electric vehicles' electricity requirements, should our customers decide to embrace the technology.

Also in the transportation sector, the provision of shore power can enable ships to avoid running generators while in port. The cruise ship terminal in Vancouver and the container terminal in Prince Rupert already have shore power.

Air and ground source heat pumps can be extremely efficient sources of energy for heating and cooling homes and buildings. Switching from oil or natural gas to efficient heat pumps can significantly reduce residential and commercial GHG emissions and can lower overall energy consumption.

In the industrial sector, electrification options include the use of electric compressors to replace those fuelled by natural gas in the growing number of natural gas fields in northeastern B.C. Electricity can also be used to replace diesel generators and to drive mining conveyor systems that replace diesel trucks.

Given that economic growth, energy prices and other factors are already driving electrification, BC Hydro includes all reliable new demand in its load forecast. The 2010 Electricity Load Forecast incorporates some electric vehicle take-up and also some industrial conversion from fossil fuels, particularly in the oil and gas sector.

ELECTRIC VEHICLES

A long-term benefit of electric vehicles is the potential to reduce GHG emissions, as 38 per cent of B.C.'s emissions are attributed to transportation. A move to plug-in vehicles will also reduce the cost of fleet operations and reduce reliance on fuel imports.



A potential fuel switch of this magnitude presents a number of issues for the provincial electricity grid, including:

- Long-term impacts to transmission and generation (the rate of load growth from electric vehicles is expected to be gradual and well within BC Hydro's planning cycles)
- Near-term impacts on distribution infrastructure
- Impacts on the relationship with customers and their expectations of BC Hydro as a transportation energy supplier

To prepare for this possibility in the next five to 20 years, BC Hydro has undertaken numerous initiatives over the past few years to learn more about how plug-in vehicles will interact with the hydroelectric system, including:

- The creation of charging infrastructure guidelines
- Participation in a provincial working group
- Implementation of agreements with manufacturers to demonstrate different models of plug-in vehicles in B.C.

5. CONSULTATION TOPICS

INTEGRATED RESOURCE PLAN

WHEN MIGHT ELECTRIFICATION OCCUR?

Electrification requires equipment changes that normally occur over the short, medium or long term. In some sectors, equipment is replaced fairly frequently; for example, vehicle fleets will turn over several times by 2050. In other cases, infrastructure is replaced slowly; most of the 2050 housing stock has already been built.

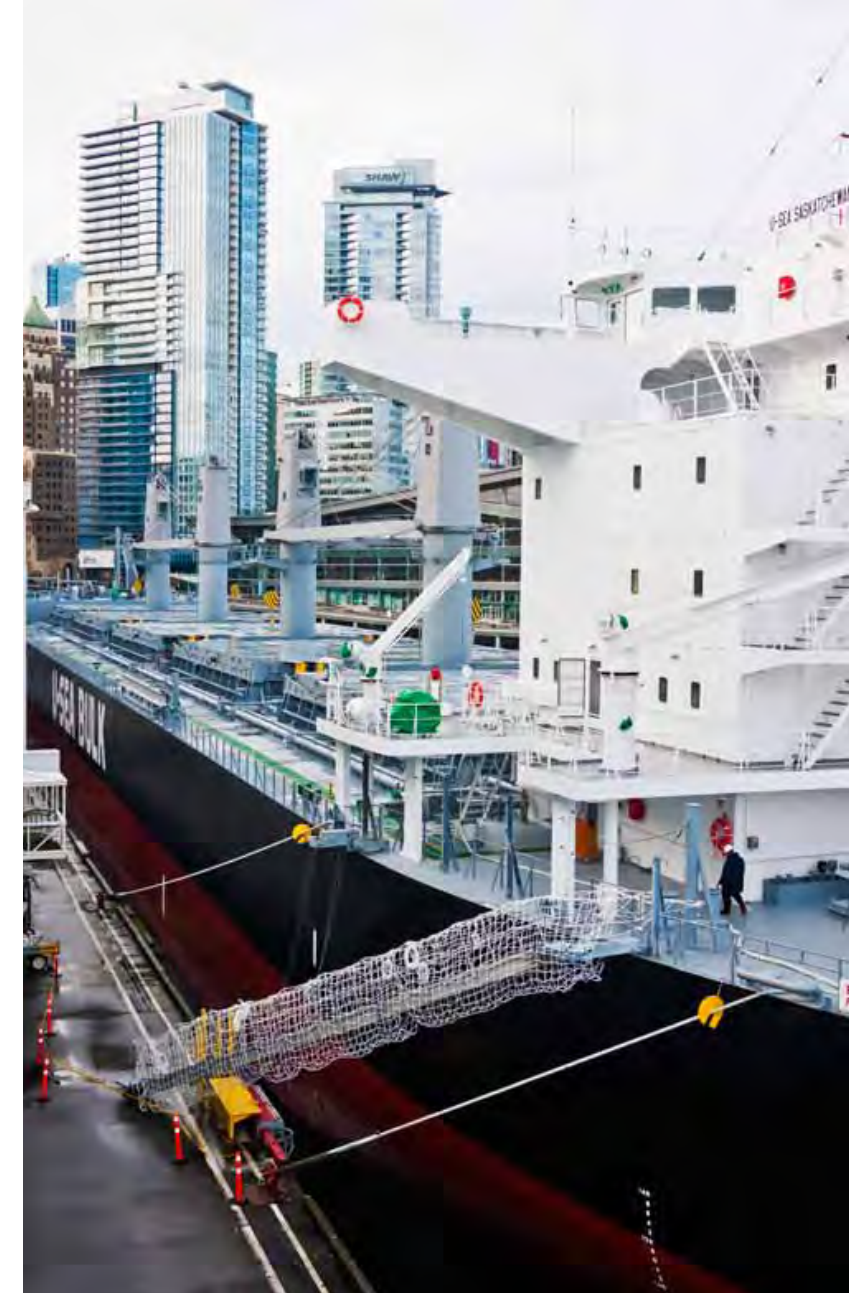
Electrification also depends on the rate of commercialization and acceptance of new technologies. For example, electric vehicles will not likely gain wide acceptance until the purchase costs are closer to conventional vehicles and consumers are satisfied they will have reliable places to recharge.

Government and BC Hydro actions can also influence the timing and nature of new investments in energy-using equipment, as well as the commercialization of new technologies, and therefore influence the rate at which electrification occurs.

APPROACH TO ELECTRIFICATION

Under its current responsive approach (outlined on the next page), BC Hydro does not encourage fuel switching; rather, it forecasts and responds to the fuel switching that occurs naturally. As part of its obligation to serve, BC Hydro will ensure that, as electric vehicles arrive in B.C. and as customers request electricity services, the generation, transmission and distribution systems are able to meet that demand.

In a proactive approach, BC Hydro would work with government and other partners to promote and encourage efficient electrification to benefit customers and to reduce greenhouse gas (GHG) emissions. Under this approach, BC Hydro could support the development of charging infrastructure in advance of significant electric vehicle sales in B.C., thereby encouraging consumers to purchase electric vehicles. BC Hydro could also introduce programs to encourage electrification in other market sectors, such as industry and port operations. BC Hydro can also expand its transmission and distribution systems, providing electricity service to new customers. The wider availability of clean electricity will not only reduce emissions but may also spur new investment and economic activity. In this approach, BC Hydro would work to ensure that new electricity consumption is as efficient as possible.



INTEGRATED RESOURCE PLAN 5. CONSULTATION TOPICS

The table below highlights different characteristics and trade-offs associated with each electrification approach:

ELECTRIFICATION APPROACH	DESCRIPTION	TECHNICAL	FINANCIAL	ENVIRONMENTAL	ECONOMIC DEVELOPMENT
RESPONSIVE APPROACH TO ELECTRIFICATION	BC Hydro responds to electrification driven by customers' needs, and works to ensure electricity is used efficiently as part of its obligation to serve customers' needs.	Increased electricity supply required to support this level of electrification is already being considered by BC Hydro.	Natural electrification included in current rate forecast.	Modest long-term reductions in GHG emissions in B.C. from displaced fossil fuel use. Modest reductions in air pollutants. Environmental footprint from additional electricity supply.	Modest increase in clean energy sector economic development/jobs. This would result in redistribution of economic resources to clean energy sector from other parts of the economy.
PROACTIVE APPROACH TO ELECTRIFICATION	BC Hydro works with government and other partners to facilitate and encourage increased efficient electrification.	Requires additional electricity supply beyond what BC Hydro is currently considering. Most electrification growth would occur after 2020.	Increase in utility costs to supply electricity and promote electrification. Financial risk if electrification does not occur as forecasted.	Significant reductions in GHG emissions in B.C. Significant reductions in air pollutants and human health impacts. Additional environmental footprint from additional electricity supply.	Moderate increase in clean energy sector economic development/jobs. This would result in shifting economic resources to clean energy sector from other parts of the economy. Expansion of the electricity grid could spur new economic activity.



Courtesy of Port Metro Vancouver



Courtesy of Port Metro Vancouver

5. CONSULTATION TOPICS INTEGRATED RESOURCE PLAN

TOPIC 4: TRANSMISSION PLANNING

The system that delivers electricity to British Columbians is divided into two major infrastructures: the transmission system, which carries high-voltage electricity from where it is generated to the cities, towns and industrial centres where it is consumed, and the distribution system, which delivers lower voltage electricity to individual customers. The IRP will examine the high-voltage province-wide transmission system by analyzing the investments that may be needed to ensure the system can meet future electricity requirements. The IRP will also examine regional transmission requirements in areas such as Fort Nelson, where new transmission may be an option for an area that is facing potentially significant demand growth from the oil and gas sector. The IRP will also examine regional transmission requirements needed to connect clusters of new generation resources to the bulk system.

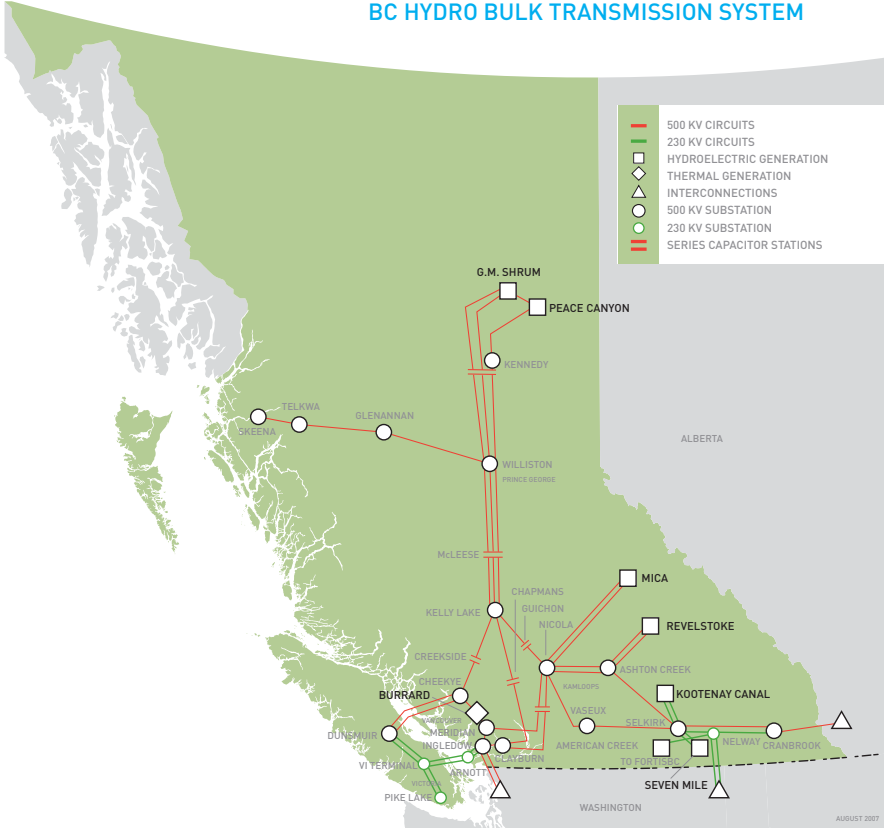
As a result of the Clean Energy Act, which integrated BC Hydro with the former BC Transmission Corporation, BC Hydro's IRP will now include a description of transmission infrastructure demands 30 years out, which is a reflection of the long lead times required for planning, siting and constructing transmission lines.

When assessing future bulk transmission system requirements, planners need to consider the following:

- The need to maintain an optimal level of reliability for customers
• Growth in demand by geographic area
• Potential location and size of new generation resources
• The need to minimize electricity losses that occur when electricity is carried over long distances
• The expected retirement or refurbishment of existing transmission resources

In recent years, the provincial government and utilities have become increasingly concerned about timely development of transmission infrastructure. In the past, transmission systems have been planned in response to generation projects and demand growth that were expected to occur. This approach increasingly poses the following risks:

- Generation projects may be completed before transmission lines are ready or may need to be delayed until lines can be finished
• Generation projects might develop in a way that leads to a spiderweb of intersecting transmission lines that are inefficient and have avoidable adverse environmental impacts (see diagrams on page 23)
• New demand for electricity may occur sooner than transmission lines can be built to provide the service



INTEGRATED RESOURCE PLAN 5. CONSULTATION TOPICS

Planners are now looking farther into the future to anticipate where the largest potential exists for generation options and consumer needs. Rather than responding to individual projects, this process identifies where clusters of projects could appear across the province (i.e., regions with a combination of run-of-river, wind and biogas potential). This allows planners to lay out transmission systems in an optimal way. However, a key risk is that a transmission investment might be stranded if generation resources do not develop as expected.

Other considerations in this longer term planning regime include the following:

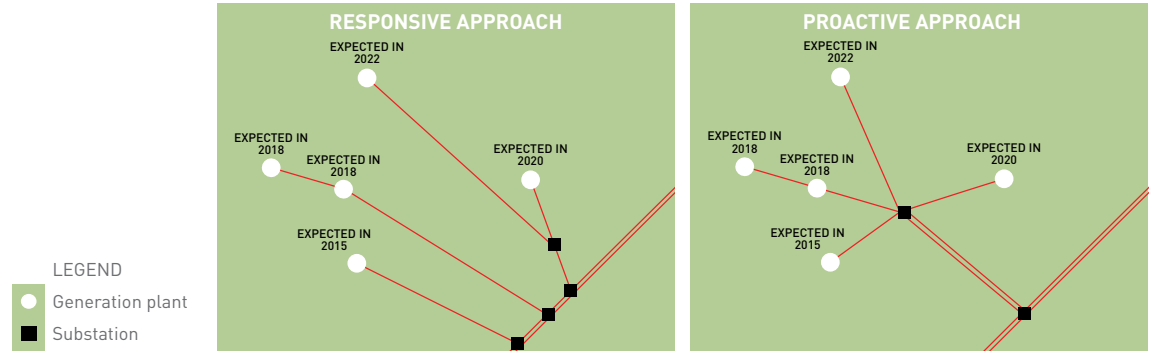
- Potential for transmission lines to spur regional economic development
- Potential cost savings and environmental benefits from avoiding multiple transmission lines
- Potential to facilitate the use of clean or renewable electricity rather than GHG-intensive fuels; for example, by targeting transmission for the oil and gas sector in the province’s northeast

The critical question is the extent to which BC Hydro should consider, plan and build transmission lines in anticipation of need. Two broad and distinctly different approaches are described for consultation purposes:

RESPONSIVE APPROACH: BC Hydro develops transmission plans in response to forecast need.

PROACTIVE APPROACH: BC Hydro develops long-term transmission plans in anticipation of potential future need over a 30-year horizon.

While BC Hydro is likely to use both approaches going forward, emphasis can be placed on one or the other.



5. CONSULTATION TOPICS

INTEGRATED RESOURCE PLAN

The table below highlights different characteristics and trade-offs associated with each transmission planning approach:

TRANSMISSION PLANNING APPROACH	DESCRIPTION	TECHNICAL	FINANCIAL	ENVIRONMENTAL	ECONOMIC DEVELOPMENT
RESPONSIVE APPROACH	BC Hydro develops transmission plans in response to forecast need.	Higher reliability risk if transmission delayed. May lead to suboptimal build of the transmission system in the long run.	Lower transmission costs in the short term but risk of higher costs in the long run due to suboptimal system build.	Lower transmission footprint in the short term, but higher in the long term due to suboptimal system build.	May constrain economic development in certain regions or communities, as there may not be enough transmission.
PROACTIVE APPROACH	BC Hydro develops long-term transmission plans in anticipation of potential future need over a 30-year horizon.	Lower reliability risk. Leads to larger transmission projects.	Higher transmission costs in the short term. Lower costs in long term due to optimal system design if growth materializes. Risk of stranded investment if need does not materialize.	Higher transmission footprint in the short term but lower in the long run if need materializes.	May facilitate economic development in certain regions or communities, as transmission has been planned and built to facilitate this.



TOPIC 5: EXPORT MARKET POTENTIAL

ENERGY EXPORT

BC Hydro, through its wholly owned subsidiary Powerex, has a long and successful track record of trading electricity. As discussed in the sidebar, BC Hydro’s reservoirs and the connectivity of its integrated bulk transmission system to Alberta and the western United States have enabled electricity trading that has provided a range of benefits for BC Hydro and its customers. For example, it has provided power and system stability when British Columbians have needed it, and it has enabled BC Hydro to keep rates lower by taking advantage of imported electricity when it is inexpensive. In the future, these transmission links could open up markets for new clean electricity generated by producers in B.C. to support economic development in regions across the province.



WHAT IS NEW?

In the new *Clean Energy Act*, one of B.C.’s energy objectives is that B.C. should be a net exporter. The Act directs BC Hydro to assess the potential export market for clean resources. BC Hydro may also acquire, subject to Cabinet approval, renewable energy from Independent Power Producers in B.C. for the sole purpose of exporting to Alberta or the U.S. Importantly, the Act protects existing BC Hydro ratepayers from the cost risks associated with energy purchased solely for export. It stipulates that the benefits derived from the existing BC Hydro system are to continue to flow to ratepayers and that the costs of building or acquiring renewable energy solely for the purpose of exporting are not to be recovered from ratepayers.

For planning purposes, it is important to distinguish between two different types of potential export activity:

- **Current Approach – “Traditional” Exports:** these are exports of surplus energy during times when BC Hydro has excess water in the hydroelectric system, including energy that is acquired to achieve the legal requirement of self-sufficiency by 2016 with an additional 3,000 GWh of “insurance” by 2020
- **Clean Generation for the Purpose of Export:** these are exports that would come from the aggregation of renewable energy from Independent Power Producers in B.C. for the sole purpose of long-term export contracts

For purposes of the IRP, the latter new approach to considering export is the focus of this Consultation Topic: Export Market Potential.

IMPORTING AND EXPORTING ELECTRICITY HAS BENEFITS

Exports and imports are a natural part of integrated electricity systems. In regions that are dependent on hydroelectric power, as is the case in B.C. and the Pacific Northwest of the United States, trade in electricity helps utilities address natural variations in water supply (wet years and dry years) that change by season and year. Similarly, trade can be beneficial when different regions have different electricity usage depending on the season – for example, in winter, when usage is highest in the Pacific Northwest, it is lower in the desert regions of the southwest.



While electricity exports happen in every year, just as imports do, it is the difference between the two that determines whether a utility is a net exporter or importer. For many years, BC Hydro sold more energy than it bought. However, as domestic demand has crept up, BC Hydro has found itself becoming a net importer – in some years, purchasing more than 10 per cent of B.C.’s total annual electricity consumption.

BC Hydro, through its wholly owned subsidiary Powerex, has had a long and successful track record of importing and exporting energy for the benefit of British Columbians. Originally established in 1988 to market the province’s surplus electricity, Powerex’s trading activity has evolved and now much of Powerex’s trading activity is not directly linked to the BC Hydro system. Powerex has enabled BC Hydro to make the best use of its resources and has ensured a stable electricity supply while generating revenue that has helped keep rates low for customers.

BC Hydro’s bulk transmission system has connection points both to Alberta and the western United States. A key ingredient in BC Hydro’s electricity trade is the flexibility created by the large reservoirs behind its major dams. These reservoirs enable BC Hydro to make economic decisions about when to use the water to generate electricity and when to take advantage of the other sources. For example, when water levels in B.C. are high, or demand in the market is high (during peak periods of the day or the year), Powerex can export electricity at a premium. And if water levels are low or import prices are attractive (in non-peak periods), Powerex can purchase electricity from our neighbours in Alberta and the western United States.

5. CONSULTATION TOPICS

INTEGRATED RESOURCE PLAN

CLEAN GENERATION FOR EXPORT

The *Clean Energy Act* requires BC Hydro to prepare an IRP by December 2011 (and every five years thereafter). Among other things, the IRP must include:

- An assessment of demand for renewable energy in markets that BC Hydro can serve
- An estimate of the market share that BC Hydro might capture
- An estimate of the expenditures that will be required to undertake exports beyond traditional exports

Upon reviewing the IRP, the provincial government may direct BC Hydro to begin acquiring energy from Independent Power Producers in B.C. explicitly for export. The government has stated that it will only begin this process if there is a clear business case demonstrating that such exports will provide a benefit to British Columbians.

BC Hydro will consider a number of factors when examining export market opportunity, including:

- Current and potential federal, provincial and state energy and environmental policies
- The estimated size of the renewable electricity market under current and potential policies

- The amount of existing clean or renewable generation capacity
- The competitiveness of B.C. resources and the market share that B.C. could expect to capture
- The transmission infrastructure needed to optimize power generation to satisfy self-sufficiency with insurance requirements
- The transmission infrastructure necessary to enable long-term electricity exports
- Public, First Nations and stakeholder input

The table below summarizes the differences between the current approach – “traditional” exports – and an additional approach - clean generation for the purpose of export:

EXPORT APPROACH	DESCRIPTION	TECHNICAL	FINANCIAL	ENVIRONMENTAL	ECONOMIC DEVELOPMENT
CURRENT APPROACH – “TRADITIONAL” EXPORTS	Sell the surplus capability (system) including that which arises from achieving self-sufficiency by 2016 and insurance by 2020.	System reliability maintained at planned levels.	First \$200 M of net income from trade goes to ratepayers. Any losses and any net income above \$200 M goes to the Province.	The transmission system will only be expanded to maintain reliability, to meet domestic load, and to comply with the requirement of self-sufficiency/insurance.	Sources of attractively priced power may provide economic development benefits to B.C.
CLEAN GENERATION FOR THE PURPOSE OF EXPORT	Acquiring additional renewable energy produced in B.C. for the sole purpose of export. This will cause additional Independent Power Producers generation projects to be built in B.C.	System reliability maintained at planned levels.	Additional revenues for the Province to the extent that sales of renewable energy exceed the costs involved in delivering electricity to other jurisdictions.	Additional environmental footprint in B.C. and elsewhere due to building additional clean generation resources and additional transmission in B.C. to deliver electricity to markets in the U.S.	Potentially more jobs, GDP and tax revenue than current approach. (Will lead to additional clean electricity generation construction and generation jobs in the regions.)

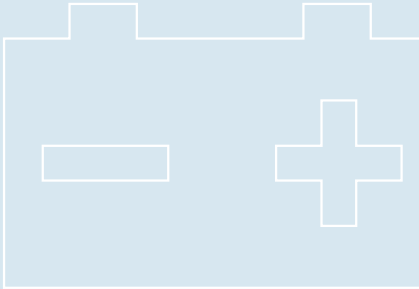


2011 INTEGRATED RESOURCE PLAN



PLANNING FOR A CLEAN ENERGY FUTURE
CONSULTATION WORKBOOK
MARCH 1 – APRIL 30, 2011

FEEDBACK FORM



INTEGRATED RESOURCE PLAN 6. FEEDBACK FORM

ELECTRICITY GENERATION OPTIONS

These portfolios are offered as examples to illustrate key trade-offs that arise between generation options.

Refer to pages 14-18 for more information

PORTFOLIO 1: RENEWABLE MIX

This portfolio includes a mix of renewable resources such as wind, run-of-river and biomass from Independent Power Producers. The Site C Project is specifically excluded. Given that wind and run-of-river hydro are intermittent resources, this portfolio requires backup resources when the intermittent sources are not available. These backup resources would generally consist of additions at existing BC Hydro generating facilities, or new pumped storage facilities or gas-fired generation. This portfolio has low greenhouse gas emissions, with a geographically widespread environmental footprint. The cost of renewable resources and the need for backup resources make this the most expensive portfolio of the three.

Here are some trade-offs and other factors to consider:

- More diverse mix of renewable resources
• More dispersed regional jobs
• Lower greenhouse gas emissions and more dispersed environmental footprint
• Requires additional backup (capacity) resources
• Costs more than other portfolios

Base Energy: 827 [wind icon] 72 [wave icon] Backup: [battery icon] [battery icon]

Cost: \$\$\$\$

Q2.1

Please indicate your level of agreement with Portfolio 1 – Renewable Mix. In developing your response, please consider the summary to the left, including the trade-offs and other factors that have been provided.

(please check one box only)

- [] Strongly Agree
[] Somewhat Agree
[] Neither Agree nor Disagree
[] Somewhat Disagree
[] Strongly Disagree

Please provide any comments in the space provided below to explain the reasons for your agreement or disagreement.*

Multiple horizontal lines for providing feedback and comments.

*For privacy reasons please do not provide opinions about identifiable third parties.

INTEGRATED RESOURCE PLAN 6. FEEDBACK FORM

PORTFOLIO 3: RENEWABLE MIX WITH SITE C AND GAS-FIRED GENERATION (WITHIN 93 PER CENT CLEAN ENERGY ACT TARGET)

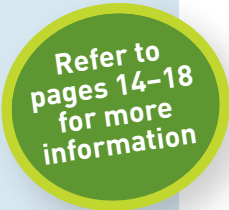
This portfolio includes Site C, other potential renewable resources such as wind and run-of-river from Independent Power Producers, and gas-fired generation allowable under Clean Energy Act limits. Both Site C and gas-fired generation are available to back up intermittent resources. This portfolio has higher greenhouse gas emissions than Portfolios 1 and 2 due to its reliance on natural gas-fired generation, and has a more concentrated environmental footprint in the Peace region. It has the lowest cost if the price of natural gas remains low but, again, this is subject to uncertain natural gas and carbon emission prices.

Here are some trade-offs and other factors to consider:

- Fewer renewable resources and relatively higher greenhouse gas emissions
• High degree of operating control (as a result of lower intermittency) and no backup resources required
• Lower initial cost, but higher risk of higher future costs due to volatile natural gas prices and greenhouse gas emissions offset cost

Base Energy: 438 [wind icon] 38 [wave icon] 1 [solar icon] 1 [fire icon] Backup: [battery icon]

Cost: \$\$\$



Q2.3

Please indicate your level of agreement with Portfolio 3 – Renewable Mix with Site C and Gas-Fired Generation (within 93 per cent Clean Energy Act target). In developing your response, please consider the summary to the left, including trade-offs and other factors that have been provided.

(please check one box only)

- Strongly Agree
 Somewhat Agree
 Neither Agree nor Disagree
 Somewhat Disagree
 Strongly Disagree

Please provide any comments in the space provided below to explain the reasons for your agreement or disagreement.*

Horizontal lines for text input under Q2.3

Q2.4

Do you have any other comments about electricity generation resource options to meet customers' future electricity needs? (please provide any comments in the space provided)*

Horizontal lines for text input under Q2.4

*For privacy reasons please do not provide opinions about identifiable third parties.

INTEGRATED RESOURCE PLAN 6. FEEDBACK FORM

TRANSMISSION PLANNING

PROACTIVE APPROACH: PLAN TRANSMISSION TO ANTICIPATE FUTURE NEED

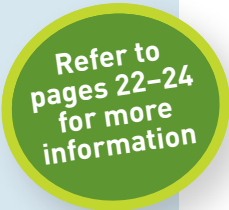
This approach plans the transmission system in anticipation of future need.

This planning process involves identifying and considering opportunities for developing the transmission system in the following ways:

- Building bulk transmission based on anticipated need over a 30-year time horizon rather than responding to need over a 20-year time horizon
• Building regional transmission to serve an area with significant generation resource potential rather than individual generation projects under development
• Building regional transmission to serve an area with significant economic development potential (e.g., mines, natural gas) rather than responding to individual requests for service as they arise

Here are some trade-offs and other factors to consider:

- Higher short-term cost, but potentially lower long-term cost if new generation and load materialize
• Higher stranded investment risk if need does not materialize
• Increased ratepayer cost, but significant potential benefits from reduced transmission footprint, more concentrated generation footprint
• May facilitate economic development in certain regions or communities, as transmission has been planned to facilitate this



Q4.

Please indicate your level of agreement with this proactive approach to transmission planning. In developing your response, please consider the summary to the left, including the trade-offs and other factors that have been provided.

(please check one box only)

- Strongly Agree
 Somewhat Agree
 Neither Agree nor Disagree
 Somewhat Disagree
 Strongly Disagree

Please provide any comments in the space provided below to explain the reasons for your agreement or disagreement.*

Form area containing 15 horizontal lines for providing responses and comments.

*For privacy reasons please do not provide opinions about identifiable third parties.

6. FEEDBACK FORM

INTEGRATED RESOURCE PLAN

HOW INPUT WILL BE USED

Input received through consultation will be considered, along with technical, financial, environmental, and economic development input, as BC Hydro evaluates alternatives and drafts the Integrated Resource Plan.

A Consultation Summary Report summarizing input received through consultation, will be posted on BC Hydro’s website at bchydro.com/irp.

FEEDBACK DEADLINE:

Please submit your feedback by **APRIL 30, 2011**.

Please provide your contact information *(optional)*:

Name: _____

Address: _____ Postal Code: _____

Phone: _____ Email: _____

Consent to Use Personal Information

I consent to the use of my personal information by BC Hydro for the purpose of contacting me and keeping me updated about future consultations on integrated resource planning. For the purposes of the above, “my personal information” includes name, mailing address, telephone number, and email address, as per the information I provide.

Signature: _____ Date: _____

BC Hydro is collecting information with this form for the purpose of its Integrated Resource Plan in accordance with BC Hydro’s mandate under the *Hydro and Power Authority Act*, the BC Hydro Tariff, the *Clean Energy Act* and related Regulations and Directions. If you have any questions regarding the information collection undertaken on this form, please contact the IRP Project Team Administrator at 1 888 747-4832.

For further information or to submit your feedback form:

BC Hydro Integrated Resource Plan
 Email: integrated.resource.planning@bchydro.com
 Web: bchydro.com/irp
 Mailing Address:
 P.O. Box 2850
 Vancouver, B.C. V6B 3X2



INTEGRATED RESOURCE PLAN

7. GLOSSARY (IN ALPHABETICAL ORDER)

- **ALTERNATIVE TECHNOLOGIES** Non-conventional electricity generation methods such as fuel cells, tidal current, solar, wind and wave energy sources.
- **ATTRIBUTE** A characteristic that describes a resource option or portfolio, used to assess its performance in meeting the planning objectives.
- **BASE LOAD** An amount of electricity committed or available over a period of time at a steady rate.
- **BLACKOUT** Loss of all electrical load in a given area.
- **BC TRANSMISSION CORPORATION (BCTC)** The Crown corporation created by the government of B.C. in 2003 to plan, operate and maintain BC Hydro's high-voltage transmission system. The 2010 *Clean Energy Act* consolidated BC Hydro and BC Transmission Corporation.
- **BC UTILITIES COMMISSION (BCUC)** An independent regulatory agency of the provincial government operating under and administering the *Utilities Commission Act*. The BCUC regulates BC Hydro's domestic supply and rates and the safety and reliability of the BC Hydro system, as well as operating, management and administrative costs, and also assesses concerns from ratepayers regarding BC Hydro's service.
- **BULK TRANSMISSION** The transfer of electricity on the major high-voltage transmission system that carries the majority of power from the generators to the lower-voltage distribution systems.
- **CAPACITY** The instantaneous power output or electricity demand at any given time, normally measured in kilowatts (kW) or megawatts (MW). A transmission facility's ability to transmit electricity at any instant.
- **CLEAN OR RENEWABLE ENERGY** is defined by the *Clean Energy Act* as including biomass, biogas, geothermal heat, hydro, solar, ocean, wind or other prescribed resources.
- **COGENERATION** The simultaneous production of electrical or mechanical energy and useful heat energy from a single fuel source.
- **COLUMBIA RIVER TREATY** A treaty signed in 1961 between Canada and the U.S. that enabled storage reservoirs to be built and operated in British Columbia to regulate Columbia River flows to the U.S. for power production and flood control.
- **CONSERVATION** Reducing the level of energy service to reduce energy consumption. For example, turning off unused lights.
- **CURTAILMENT** A reduction in demand as a result of demand-side management.
- **DEMAND** Customers' requirement for electric power.
- **DEMAND-SIDE MANAGEMENT** Actions, programs and initiatives aimed at modifying or reducing energy consumption through conservation, energy efficiency and distributed generation.
- **DEPENDABLE CAPACITY** The amount a plant can reliably produce when required, assuming all units are in service, measured in megawatts (MW). Factors external to the plant affect its dependable capacity. For example, steamflow conditions can restrict the dependable capacity of hydro plants and fuel supply constraints can impact thermal plant dependable capacity. Planned and forced outage rates are not included. The dependable capacity used for long-term planning is the maximum capacity that a plant/unit can reliably provide for three hours in the peak load period of week days during two continuous weeks of cold weather.
- **DISPATCHABLE** A resource whose output can be adjusted to meet various conditions including fluctuating customer demand, weather changes, outages, market price changes and non-power considerations.
- **DISTRIBUTION SYSTEM** Electrical lines, cables, transformers and switches used to distribute electricity over short distances from substations to the customer, generally at voltages lower than 69 kV.
- **EFFICIENCY** The effective rate of conservation of a natural resource (e.g., electricity) to usable energy; the effective rate of conversion of electricity to an end use (e.g., heating).
- **ELECTRICITY** is a type of energy fuelled by the transfer of electrons from positive and negative points within a conductor.
- **ELECTRICITY PURCHASE AGREEMENT (EPA)** The contract that defines the terms and conditions by which BC Hydro purchases electric energy from Independent Power Producers.
- **EMERGING TECHNOLOGIES** Technology at the first stages of development or demonstration. Not readily available in commercial markets and not in commercial use, as evidenced by at least three generation plants generating energy for a period of not less than three years, to a standard of reliability generally required by good utility practice.
- **ENERGY** The amount of electricity produced or used over a period of time, usually measured in kilowatt hours, megawatt hours and gigawatt hours.
- **ENERGY CAPABILITY** is the amount of energy that can be generated under specified conditions by a generating unit or by the electric system over a period of time, typically expressed in GWh/year.
- **FIRM ENERGY** refers to electricity that is available at all times. Resources typically providing firm energy include large hydroelectric dams, bioenergy, geothermal and natural gas.
- **GREEN ENERGY** Energy produced from a green power project. BC Hydro uses the EcoLogo standard to determine green projects.
- **GREENHOUSE GASES (GHG)** Gases that contribute to global climate change, or the "greenhouse effect," including carbon dioxide (CO₂), carbon monoxide (CO) and methane (CH₄).
- **GRID** A network of distribution or transmission lines.
- **GWh** stands for gigawatt hour, a unit of electrical energy equal to one billion watt hours.
- **HERITAGE CONTRACT** A 49,000 gigawatt hour per year contract between BC Hydro's generation and distribution lines of business to ensure BC Hydro customers benefit from the existing low-cost hydroelectric and thermal resources in the BC Hydro system.
- **INDEPENDENT POWER PRODUCER (IPP)** A non-utility-owned electricity-generating facility that produces electricity for sale to utilities or other customers.
- **INTEGRATED RESOURCE PLAN** The document describing BC Hydro's long-term plan to meet customers' needs using existing and new resources and demand side management.
- **INTEGRATED SYSTEM** An interconnected network of transmission lines, distribution lines and substations linking generating stations to one another and to customers throughout a utility's service area. Excludes customers located in remote locations who are connected via non-integrated generating plants.
- **INTERMITTENT** Electricity supply that fluctuates or is not available at all times. For example, wind energy only produces power when the wind is blowing.
- **LARGE HYDRO (SITE C)** Site C is a proposed third dam and hydroelectric generating station on the Peace River in northeast B.C.
- **LOAD** The amount of electricity required by a customer or group of customers.
- **LOAD FORECAST** The expected amount of electricity required to meet customer needs in future years.
- **MW** stands for megawatt, a unit of electrical power equal to one million watts.
- **OUTAGE** A planned or unplanned interruption of one or more elements of an integrated power system.
- **PEAK CAPACITY** The maximum amount of electrical power that generating stations can produce in any instant.
- **PEAK DEMAND** The maximum instantaneous demand on a power system. Normally, the maximum hourly demand.
- **PORTFOLIO** A group of individual resource options to be acquired in a sequence over time to fill customers' future electricity needs.
- **POWER** The instantaneous rate at which electrical energy is produced, transmitted or consumed, typically measured in watts, kilowatts (kW), or megawatts (MW).
- **POWER SMART** BC Hydro's demand-side management initiative to encourage energy efficiency by its customers. Originally launched in 1989, Power Smart includes a full range of DSM programs aimed at BC Hydro's residential, commercial and industrial customers.
- **RATE** Term used for a utility's unit price of service.
- **RATE STRUCTURE** Represents the set of rates paid by a class of customers (e.g., residential) for use of electricity.
- **REINFORCEMENT** Improvements in the transmission system to maintain or increase reliability and security of supply.
- **RELIABILITY** A measure of the adequacy and security of electric service. Adequacy refers to the existence of sufficient facilities in the system to satisfy the load demand and system operational constraints. Security refers to the system's ability to respond to transient disturbances in the system.
- **RESERVE** System generating capacity beyond that required to meet peak demand, ensuring sufficient generation is available if some generating units are not available; necessary to meet reliability criteria for planning and operation.
- **RESERVOIR STORAGE** The volume available in a reservoir to hold water for power generation or flood control.
- **RESOURCE OPTION** A source of electricity that is available to help meet or reduce electricity demand, including generation, purchases, demand-side management and transmission facilities.
- **RUN-OF-RIVER** A hydroelectric facility that operates with no significant storage facilities.
- **SCENARIO ANALYSIS** A set of planning assumptions to test the long-term performance of a portfolio.
- **TRANSMISSION SYSTEM** Electrical facilities used to transmit electricity over long distances, usually at voltages greater than 69 kV.
- **VOLTAGE** The strength of electromotive force (EMF).

bchydro.com/irp

For more information, please visit: bchydro.com/irp

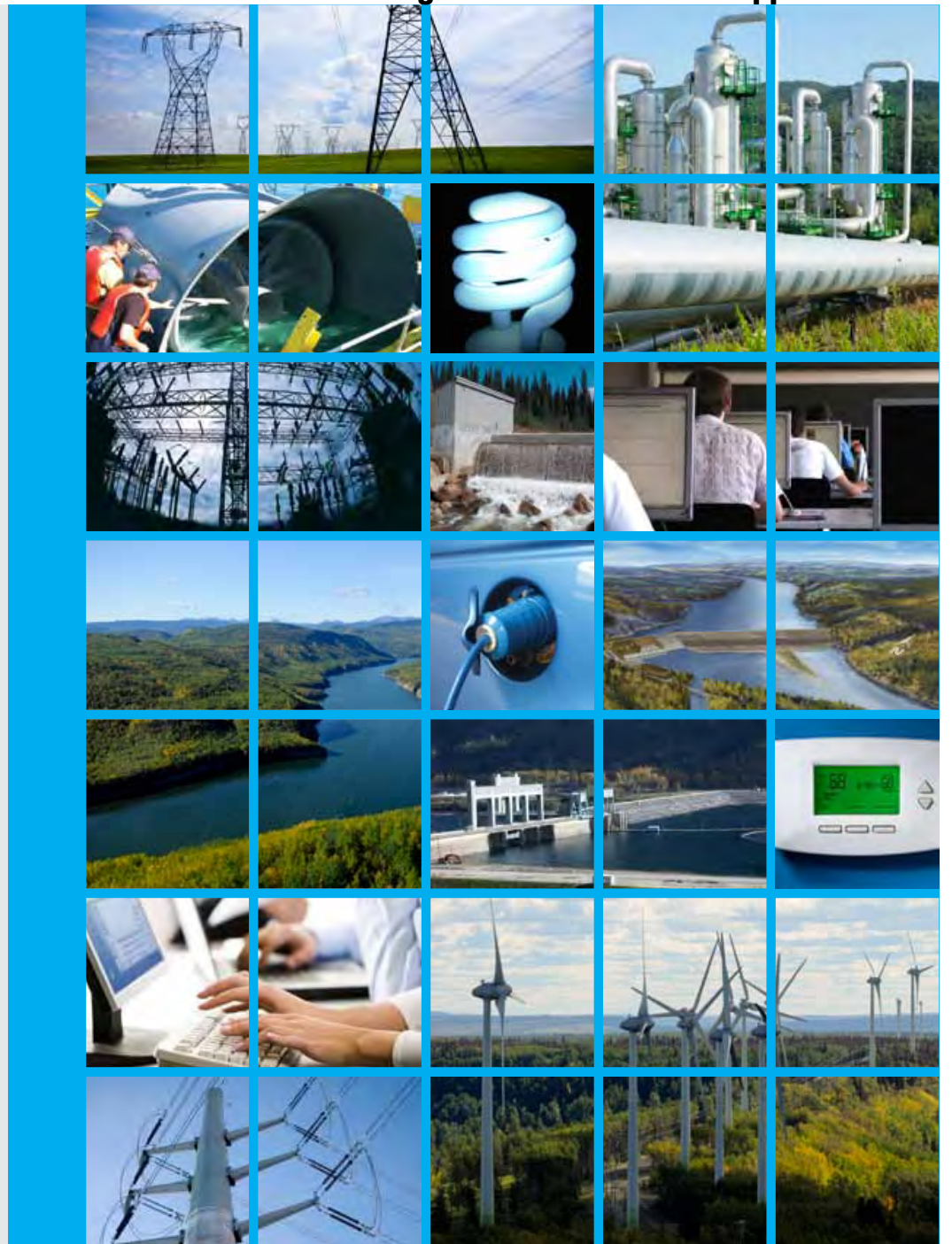
You can also provide feedback and learn more about the Integrated Resource Plan by:

- Attending a public open house: bchydro.com/irp
- Online feedback form: bchydro.com/irp
- Written submissions: integrated.resource.planning@bchydro.com or P.O. Box 2850, Vancouver, B.C. V6B 3X2
- Toll-free phone: 1 888 747-4832

Integrated Resource Plan



 Printed with vegetable-based inks on paper made with 100% post-consumer waste. Please recycle.



Stakeholder Email Invitation

**BC Hydro
Integrated Resource Plan**

**Consultation Summary Report
Appendix 7**



Notice of Public Consultation in March 2011 for the BC Hydro Integrated Resource Plan

BC Hydro is inviting the public, First Nations and stakeholders to participate in the upcoming consultation on development of its Integrated Resource Plan. As BC Hydro prepares to celebrate 50 years of providing British Columbians with clean, reliable electricity, we want to hear from you about how we set the course for a clean energy future. While British Columbians are doing more than ever to conserve electricity, B.C.'s overall electricity use is expected to continue to increase as a result of projected population growth and increased demand in the industrial sector.

Public, First Nations and stakeholder consultation is being undertaken from March 1 to April 30, 2011, to gather input on development of the draft Integrated Resource Plan.

You are invited to attend the following multi-stakeholder meeting to provide your input:

DATE: Wednesday, March 9, 2011

TIME: 1:00 pm - 3:00 pm

LOCATION: Hotel Grand Pacific, Pender Island South (463 Belleville Street, Victoria, BC)

*To confirm your attendance, please e-mail integrated.resource.planning@bchydro.com or call 1 888-747-4832 by **February 21, 2011**. Please leave your name and phone number. Attendance is determined on a first come first served basis.*

A **consultation workbook** and **feedback form**, along with other related materials will be available online beginning March 1, 2011.

You can also provide feedback and learn more by:

- Attending a public **open house** (visit www.bchydro.com/irp to view schedule)
- **Online feedback form:** www.bchydro.com/irp
- **Written submissions:** integrated.resource.planning@bchydro.com or P.O. Box 2850, Vancouver, B.C. V6B 3X2
- **Toll-free Phone:** 1 888-747-4832
- **Fax:** 604-528-1738

For details on the Integrated Resource Plan and consultation program, visit www.bchydro.com/irp> Get Involved.

We look forward to hearing your voice on the Integrated Resource Plan.

Cam Matheson
Energy Planning and Procurement, BC Hydro

Newspaper Advertisements/ Social Media Notification/ Bill Insert

**BC Hydro
Integrated Resource Plan**

**Consultation Summary Report
Appendix 8**

PUBLIC NOTICE

OF CONSULTATION FOR BC HYDRO'S INTEGRATED RESOURCE PLAN

MARCH 1–APRIL 30, 2011

We Want to Hear From You

As BC Hydro prepares to mark 50 years of providing British Columbians with clean, reliable electricity, we want to hear from you about how we set the course for a clean energy future. While British Columbians are doing more than ever to conserve electricity, B.C.'s overall electricity use is expected to continue to increase as a result of projected population growth and increased demand in the industrial sector.

Planning for a Clean Energy Future

BC Hydro is inviting communities, stakeholders, First Nations and the public to participate in the upcoming consultation on development of its Integrated Resource Plan.

To add your voice, attend a public open house in a community near you.*

Community	Date	Time	Location
Victoria	Wednesday, March 9	6:00–9:00 p.m.	Hotel Grand Pacific
Campbell River	Thursday, March 10	6:00–9:00 p.m.	Coast Discovery Inn & Marina
Vancouver	Tuesday, March 15	6:00–9:00 p.m.	SFU Harbour Centre
Abbotsford	Wednesday, March 16	6:00–9:00 p.m.	Clearbrook Community Centre
Kamloops	Thursday, March 17	6:00–9:00 p.m.	Ramada Kamloops
Terrace	Tuesday, March 22	6:00–9:00 p.m.	Terrace Sportsplex
Prince George	Wednesday, March 23	6:00–9:00 p.m.	Ramada Prince George
Fort St. John	Thursday, March 24	6:00–9:00 p.m.	Quality Inn Northern Grand
Vernon	Tuesday, March 29	6:00–9:00 p.m.	Best Western Vernon Lodge
Castlegar	Wednesday, March 30	6:00–9:00 p.m.	Castlegar & District Community Complex
Fort Nelson	Thursday, March 31	6:00–9:00 p.m.	Woodlands Inn
Cranbrook	Thursday, April 7	6:00–9:00 p.m.	Prestige Rocky Mountain Resort & Convention Centre

*Please check bchydro.com/irp for any potential revisions to this schedule.

Dates are subject to change without notification.

For details on the Integrated Resource Plan consultation program, and to provide feedback, visit bchydro.com/irp

BC Hydro 
FOR GENERATIONS

2684

Integrated Resource Planning – Social Media Activation

Channel	Copy	Date & time
Twitter	Public consultation on Integrated Resource Planning until Apr 30. Open house in Victoria tonight. More dates & details: http://ow.ly/4aZXA	Wed March 9 – 9:20am
Twitter	Visit the IRP open house in Campbell River at the Coast Discovery Inn & Marina, 6-9pm today. More info online http://ow.ly/4b0Kj	Thurs Mar 10 – 12:15pm
Twitter	Get involved in clean energy planning. Attend an open house near you. Tues Mar 15 in Vancouver. More dates: http://ow.ly/4czaQ	Fri Mar 11 – 1:25pm
Twitter	Public consultation on Integrated Resource Planning is on until April 30. Check out our website for info & dates. http://ow.ly/4e4Ee	Mon Mar 14 – 4:45pm
Twitter	IRP open house in Abbotsford tonight, Clearbrook Community Centre 6pm-9pm. More dates & details: http://ow.ly/4f1Hg	Wed Mar 16 – 8:30am
Twitter	We'll be in Kamloops tonight for Integrated Resource Planning open house, 6pm-9pm at Ramada Inn. Info & dates: http://ow.ly/4gwFo	Thurs Mar 17 – 9:05am
Twitter	We'll be in Terrace tonight from 6pm-9pm for the Integrated Resource Planning open house. More dates & info: http://ow.ly/4iOxx	Tues Mar 23 – 8:30am
Twitter	Join us at the Integrated Resource Planning open house in Prince George tonight, 6pm-9pm at the Ramada. Info: http://ow.ly/4kLUG	Wed Mar 23 – 8:45am
Twitter	Get involved in clean energy planning - Integrated Resource Planning open house tonight in Fort St. John, 6pm-9pm. Info: http://ow.ly/4lzGg	Thurs Mar 24 – 8:30am
Twitter	We want to hear from you! Submit your feedback on the Integrated Resource Plan online. http://ow.ly/4lAq6	Thurs Mar 24 – 4:30pm
Twitter	Submit your feedback on clean energy planning - use our online feedback form. Submit now: http://ow.ly/4nSWJ	Mon Mar 28 – 3:10pm

Integrated Resource Planning – Social Media Activation

Twitter	We're in Vernon tonight for the Integrated Resource Planning open house. Come by, 6pm-9pm. Info & more dates: http://ow.ly/4oLnF	Tues Mar 29 – 9:15am
Twitter	Integrated Resource Planning open house tonight in Castlegar, 6pm-9pm. Help plan BC's clean energy. Info & dates: http://ow.ly/4pAve	Wed Mar 30 – 12:05pm
Twitter	Come to the IRP open house in Fort Nelson tonight & have your say in clean energy planning. 6pm-9pm. Info: http://ow.ly/4qnNw	Thurs Mar 31 – 11:35am
Twitter	Want to get involved in clean energy planning? Have your say with our online feedback form. http://ow.ly/4qody	Thurs Mar 31 – 12:10pm
Twitter	Help plan BC's clean energy future - fill out a feedback form for our integrated resource planning: http://ow.ly/4sHN4	Mon April 4 – 9:45am
Twitter	Thoughts on clean energy planning? Fill out our online feedback form & let us know. Get involved in BC's energy future! http://ow.ly/4tz7a	Tues April 5 – 8:55am
Twitter	Tomorrow night is the final Integrated Resource Planning open house in Cranbrook, 6pm-9pm. Details: http://ow.ly/4ur5V	Wed April 6 – 9:15am
Twitter	You can still participate in clean energy planning - online feedback forms accepted up to Apr 30: http://ow.ly/4wgsb	Fri April 8 – 4:15pm
Twitter	You can still get involved in clean energy planning - fill out online feedback form until April 30. http://ow.ly/4I80	Wed Apr 27 – 8:25am
Twitter	April 30 is the last day to submit feedback on clean energy planning using our online form. Take part now: http://ow.ly/4IYco	Fri April 29 – 8:15am



AS WE SET THE COURSE FOR B.C.'S CLEAN ENERGY FUTURE, WE WANT TO HEAR FROM YOU.

Electricity demand is forecast to grow by as much as 40 percent over the next 20 years. Despite British Columbia's growing commitment to electricity conservation, additional conservation as well as generation and transmission resources are still needed to meet customers' requirements.

Determining the electricity requirements of our customers over the next 10 to 20 years, and how we meet those requirements, will be the subject of BC Hydro's integrated resource planning efforts. In support of B.C.'s new Clean Energy Act, we are preparing a long-term plan to submit to the Ministry of Energy by November 2011. This long-term Integrated Resource Plan will establish our plan for conservation and set the course for acquiring sufficient generation and transmission resources to reliably and cost-effectively meet customers' anticipated future electricity needs over the coming decades.

[Integrated Resource Plan](#)

BC Hydro 

FOR GENERATIONS

bchydro.com/irp



As we develop the Integrated Resource Plan (IRP), we are consulting with our customers, First Nations and stakeholders across the province. To participate and be notified of upcoming consultation activities, please visit bchydro.com/irp, or email us at integrated.resource.planning@bchydro.com, or call us at 1 888 747 4832.

Public open houses are being held in communities across the province beginning March 9, 2011 and continuing through March 31, 2011.

For more information on the Integrated Resource Plan and to get involved visit bchydro.com/IRP.

[Integrated Resource Plan](#)

BC Hydro 

FOR GENERATIONS

A10-686

Display Boards

BC Hydro Integrated Resource Plan

Consultation Summary Report Appendix 9

PUBLIC NOTICE

OF CONSULTATION FOR BC HYDRO'S INTEGRATED RESOURCE PLAN

MARCH 1–APRIL 30, 2011

We Want to Hear From You

As BC Hydro prepares to mark 50 years of providing British Columbians with clean, reliable electricity, we want to hear from you about how we set the course for a clean energy future. While British Columbians are doing more than ever to conserve electricity, B.C.'s overall electricity use is expected to continue to increase as a result of projected population growth and increased demand in the industrial sector.

Planning for a Clean Energy Future

BC Hydro is inviting communities, stakeholders, First Nations and the public to participate in the upcoming consultation on development of its Integrated Resource Plan.

To add your voice, attend a public open house in a community near you.*

Community	Date	Time	Location
Victoria	Wednesday, March 9	6:00–9:00 p.m.	Hotel Grand Pacific
Campbell River	Thursday, March 10	6:00–9:00 p.m.	Coast Discovery Inn & Marina
Vancouver	Tuesday, March 15	6:00–9:00 p.m.	SFU Harbour Centre
Abbotsford	Wednesday, March 16	6:00–9:00 p.m.	Clearbrook Community Centre
Kamloops	Thursday, March 17	6:00–9:00 p.m.	Ramada Kamloops
Terrace	Tuesday, March 22	6:00–9:00 p.m.	Terrace Sportsplex
Prince George	Wednesday, March 23	6:00–9:00 p.m.	Ramada Prince George
Fort St. John	Thursday, March 24	6:00–9:00 p.m.	Quality Inn Northern Grand
Vernon	Tuesday, March 29	6:00–9:00 p.m.	Best Western Vernon Lodge
Castlegar	Wednesday, March 30	6:00–9:00 p.m.	Castlegar & District Community Complex
Fort Nelson	Thursday, March 31	6:00–9:00 p.m.	Woodlands Inn
Cranbrook	Thursday, April 7	6:00–9:00 p.m.	Prestige Rocky Mountain Resort & Convention Centre

*Please check bchydro.com/irp for any potential revisions to this schedule.

Dates are subject to change without notification.

For details on the Integrated Resource Plan consultation program, and to provide feedback, visit bchydro.com/irp

BC Hydro 

FOR GENERATIONS

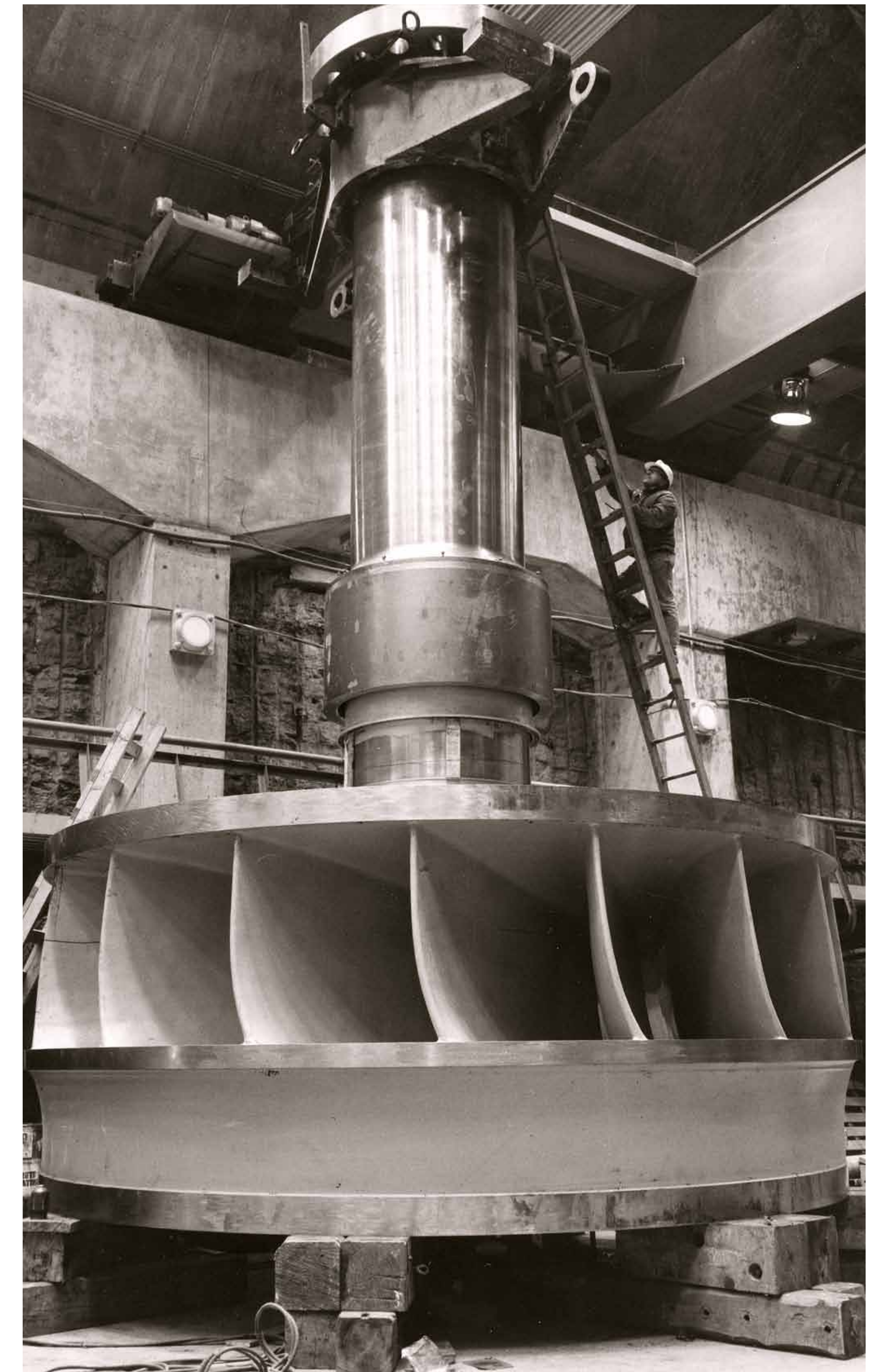
BC HYDRO OVERVIEW

2011 INTEGRATED RESOURCE PLAN

Fifty years ago, BC Hydro was created as a Crown corporation to deliver electricity to homes and businesses throughout much of the province. Investments in dams, generating stations, transmission and distribution networks, and programs to encourage conservation have provided a reliable supply of electricity for generations of British Columbians at some of the lowest rates in North America.

Currently, BC Hydro serves 1.8 million customers in an area containing more than 94 per cent of British Columbia's population. The third-largest electric utility in Canada, BC Hydro provides electricity to its customers through an integrated grid. BC Hydro generates the majority of its power from large hydroelectric stations on the Columbia and Peace rivers. The remainder of its domestic electricity supply comes from smaller BC Hydro-owned generating stations and purchases from Independent Power Producers (IPPs).

On its 50th anniversary, BC Hydro is looking back on its legacy in helping to develop the province, and it is examining the challenges that await British Columbians in the next 50 years. To ensure that future generations will continue to enjoy the competitive advantage of clean, reliable power, BC Hydro must plan ahead to upgrade and expand its heritage facilities, secure new supplies of renewable energy, build new transmission and distribution lines, encourage conservation, and integrate new technologies to modernize the system.



The Integrated Resource Plan – the IRP – is BC Hydro’s long-term plan for acquiring the resources to meet customers’ needs for the next 20 years. It is guided by the government of British Columbia’s new *Clean Energy Act*, which came into effect in June 2010 and sets specific new energy objectives for BC Hydro with respect to its long-term electricity plan. Notably, long-term electricity planning is not a once-every-20-years exercise. Over the course of its history, BC Hydro has renewed its long-term plan at regular intervals.

Integrated electricity systems are inherently complex and capital-intensive, and most new resources require significant lead times to develop. As a result, electric utilities must plan ahead to be sure that the required resources will be in place when needed. And implementation of long-term electricity plans require a staged and flexible approach to account for changes in everything from the economy to technology.

As BC Hydro considers how to meet B.C.’s electricity needs over the next 20 years, it asks three basic electricity planning questions:

- 1. How much electricity will British Columbians need over the next 20 years?**
- 2. What is the gap between existing supply and forecast electricity demand?**
- 3. How can BC Hydro close the gap?**

As BC Hydro examines how to close the gap, it considers:

- How much savings can be achieved from conservation and efficiency
- What portfolio of electricity generation options it should plan on
- How much electrification will contribute to growth in electricity demand
- What the transmission requirements will be
- What the export market potential may be



See page 3
of the IRP
Consultation
Workbook



HOW MUCH ELECTRICITY WILL WE NEED OVER THE NEXT 20 YEARS?

2011 INTEGRATED RESOURCE PLAN

BC HYDRO'S ELECTRICITY LOAD FORECAST

The annual long-term load forecast provides planners with an understanding of how much electricity will be required 10 and 20 years from now. Trends that influence future electricity needs include economic growth and population growth, as well as predictions on how electricity use will change as a result of changes in lifestyle, electricity rates, legislation and technology.

The 2010 Electricity Load Forecast indicates that demand will increase by approximately 40 per cent in the next 20 years before accounting for savings that can be achieved through conservation and efficiency. The demand forecast is developed by examining BC Hydro's three customer classes: residential, commercial and industrial.

WHAT AFFECTS LOAD GROWTH?

Population – The B.C. population is expected to grow to nearly 5.8 million people over the next 20 years.

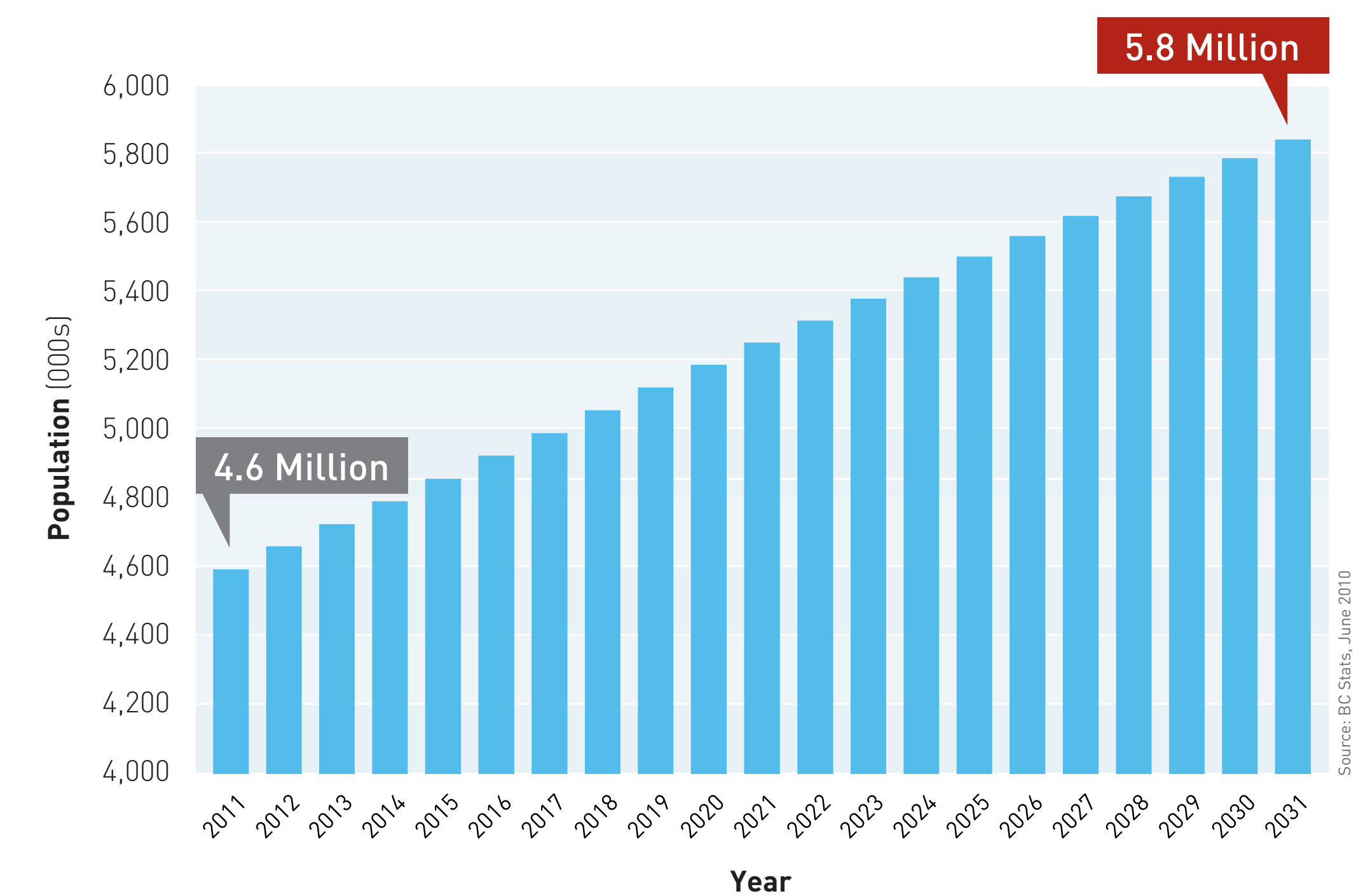
Conservation – Programs, such as BC Hydro's award-winning Power Smart, have been effective in helping people use electricity more efficiently and reduce the amount of energy they use.

Consumption – The increased popularity of computers, larger televisions and other consumer products has greatly increased the demand for electricity in homes.

Efficiency – Manufacturers are consistently producing conventional goods (washers, dryers, refrigerators, compact fluorescent light bulbs) that use much less electricity.

Electrification – The rising price, environmental impact and threatened shortage of fossil fuels may drive people to choose electricity to power everything from home heating to automobiles.

Economic Activity – The current forecasted expansion in the mining and the oil and gas industries has the potential to significantly increase electricity use in B.C.



See page 4 of the IRP Consultation Workbook

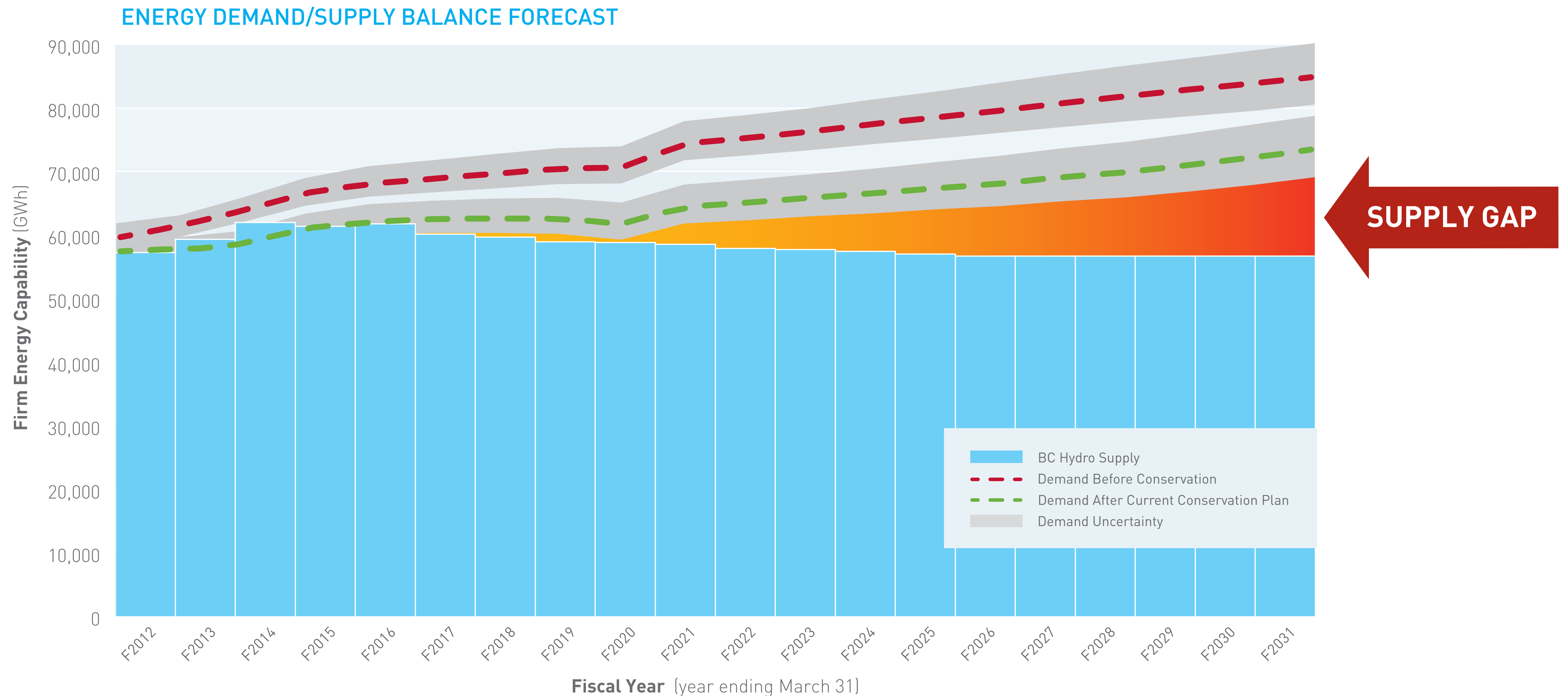
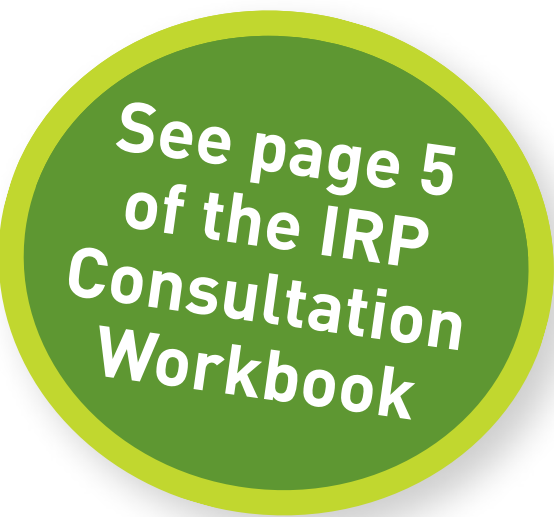
WHAT IS THE GAP?

2011 INTEGRATED RESOURCE PLAN

A LOOK AT EXISTING RESOURCES COMPARED TO FORECAST DEMAND

Before BC Hydro can assess the future gap between supply and demand, it first must assess how much electricity it can produce and rely upon from its current generating facilities, its existing contracts with Independent Power Producers and its current conservation plan.

As the “gap” diagram illustrates, even after the increase in demand for electricity is adjusted to account for savings from BC Hydro’s current conservation and efficiency plan, an energy gap between future electricity needs and current resources still exists, particularly after 2020. The planning challenge begins with the task of how best to fill the gap.



CURRENT BC HYDRO SUPPLY

2011 INTEGRATED RESOURCE PLAN

Approximately 85 per cent of domestic supply comes from generation resources owned and operated by BC Hydro; the remaining 15 per cent of electricity need is met with power purchased from Independent Power Producers in B.C. Of the electricity produced by BC Hydro, almost 80 per cent comes from its large hydroelectric installations in the Peace and Columbia river basins.

BC Hydro has 100 electricity purchase agreements with IPPs, 65 of which have reached commercial operation. Electricity comes from a range of sources including wind, run-of-river hydro and biomass.

CLEAN ENERGY SUPPLY AND TRANSMISSION

The majority of B.C.'s electricity demand is located in the Lower Mainland and on Vancouver Island, while the overwhelming majority of supply is remote and must be moved over very long distances across rugged terrain and through a relatively small number of transmission lines.

More than 93 per cent of BC Hydro's electricity supply is renewable, and creates little or no greenhouse gas emissions, making it desirable at a time when the world faces climate change.

BC HYDRO GENERATION



CURRENT CONSERVATION AND EFFICIENCY PLAN

2011 INTEGRATED RESOURCE PLAN

BC Hydro is currently implementing a conservation and efficiency plan that targets reducing the forecast growth in demand by 79 per cent by the year 2020. It contains four main strategies:

- 1. GOVERNMENT REGULATIONS:** The introduction of approximately 30 new federal and provincial government regulations aimed at making buildings and equipment more energy efficient, including water heaters, windows, electronic equipment, lighting, appliances, motors, building code standards, and other commercial and industrial equipment.
- 2. CONSERVATION RATES:** These rates, in place for more than 90 per cent of BC Hydro's customers, encourage conservation by delivering a specially designed higher price signal for a portion of customers' consumption. The rates are revenue neutral, in that BC Hydro collects the same amount of revenue as the original standard rate.

3. POWER SMART PROGRAMS:

Approximately 20 programs aim to help customers improve their energy efficiency and conserve electricity. Programs target residential, commercial and industrial customers and range from collecting old or second refrigerators to ensuring that new industrial plants are as energy efficient as possible.

- 4. SUPPORTING INITIATIVES:** These initiatives focus on things like public awareness, community engagement, and technology innovation and provide a foundation for the other three main strategies.

For more information about BC Hydro's Power Smart programs, go to bchydro.com/powersmart.



See page 13
of the IRP
Consultation
Workbook

HOW CAN THE GAP BE CLOSED?

2011 INTEGRATED RESOURCE PLAN

FUTURE RESOURCE OPTIONS

After identifying the gap between forecasted demand and existing supply, planners look at possible new sources of electricity, or resource options. These include:

- Additional conservation and efficiency measures (beyond the current plan)
- Supply-side options such as new generating resources (supplied by BC Hydro or Independent Power Producers)
- Transmission options necessary to ensure that the energy from these resources can be optimally delivered to customers



It is important to look at resources in combination, because the limitations of some resources can be balanced by the strengths of others. For example, some resources are intermittent and must be backed up by a dependable supply of power. As well, the sequence or timing of acquiring or developing new resources is important to ensure that supply is available, to avoid unnecessary costs, and to ensure reliable power.

ENERGY AND CAPACITY

As BC Hydro considers how much electricity its customers will need going forward, it forecasts not only how much energy customers will require, but also how much capacity its customers will require.

As it examines potential future resources, BC Hydro studies their ability to provide both **firm energy** and **dependable capacity**.

Firm Energy refers to the electricity that is available year by year. Resources that provide firm energy include small hydro, large hydroelectric dams, bioenergy, geothermal, natural gas and wind. Firm energy is measured in gigawatt hours (GWh).

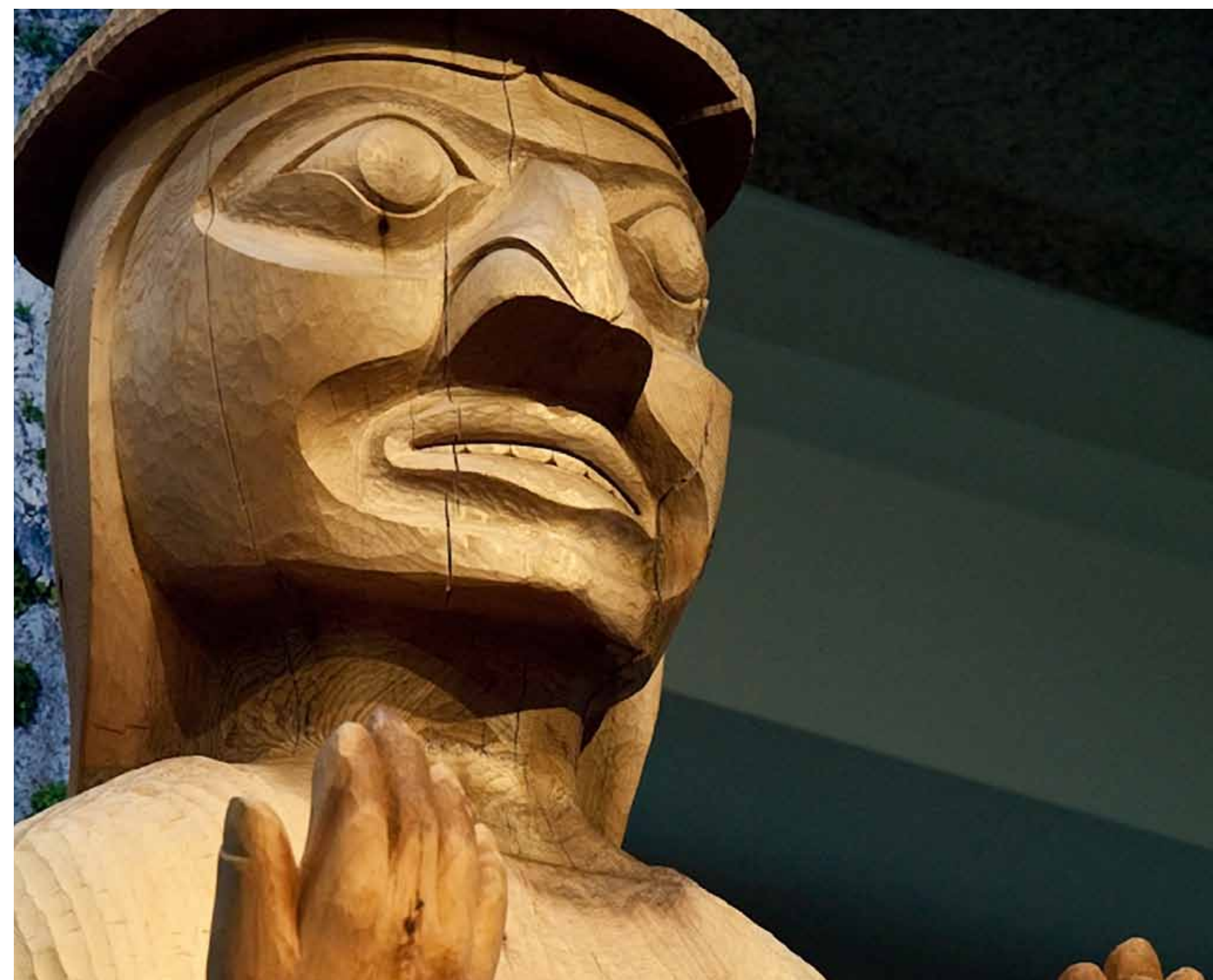
Dependable Capacity refers to the amount of electricity that generators can reliably provide at any one instant. Electricity consumption varies by customer type, by day, and by year. The system must be prepared to meet customers' needs on the coldest day of the year when everyone turns on their lights and turns up their heat when they get home from work. Capacity is measured in megawatts (MW).

See page 6
of the IRP
Consultation
Workbook



WHAT IS THE PLANNING CONTEXT?

BC Hydro's electricity plans and planning processes are shaped by government legislation and policies, by changing market structures and conditions, and by new developments in technologies. On June 3, 2010, the government of British Columbia passed the *Clean Energy Act*, legislation that changes the approach that BC Hydro must take to planning. The Act reaffirms the requirement that BC Hydro must achieve electricity self-sufficiency by 2016 and each year after.



The *Clean Energy Act* also sets out several new or updated objectives, including:

- Generate at least 93 per cent of all electricity in British Columbia from clean or renewable sources and build the infrastructure necessary to transmit that electricity
- Use renewable power potential to help achieve the provincial government's greenhouse gas (GHG) reduction targets
- Meet at least 66 per cent of any increase in demand through conservation and efficiency
- Include an assessment of anticipated transmission requirements over the next 30 years as part of the Integrated Resource Plan
- Encourage economic development
- Explore and pursue, subject to Cabinet approval, the opportunity to develop and sell clean energy into the interprovincial and international markets
- Foster the development of First Nations and rural communities through the use and development of clean and renewable resources

2011 INTEGRATED RESOURCE PLAN

WHAT'S IN THE PLAN?

The Integrated Resource Plan will include:

- A 20-year Base Resource Plan that sets out a mix of demand reduction and generation and transmission options that are able to fulfill the forecasted demand
- Contingency Resource Plans that address the risks and uncertainties inherent in long-term planning, such as higher than expected demand. Contingency resource plans put forth a range of alternate resource options that would be relied upon if conditions change significantly.
- A 30-year transmission plan



See page 8
of the IRP
Consultation
Workbook

PUBLIC, STAKEHOLDER & FIRST NATIONS CONSULTATION PROGRAM

2011 INTEGRATED RESOURCE PLAN

BC Hydro will consult with First Nations, stakeholders and the public as it develops an Integrated Resource Plan. The process for developing the Integrated Resource Plan includes three phases:

TECHNICAL REVIEW AND FOUNDATION FOR INTEGRATED RESOURCE PLANNING (FALL 2010)

In the first phase of developing the IRP, BC Hydro focused on assembling key pieces of technical data necessary to construct a plan, and sought input from selected First Nations and stakeholders with regard to the design of the consultation process. During this phase, BC Hydro updated its forecast of future electricity demand to establish the “gap” between future demand and existing and committed energy resources.

CONSIDERING OUR CLEAN ENERGY FUTURE – ASSESSING AND EVALUATING OPTIONS (WINTER/SPRING 2011)

In the second phase of developing the IRP, BC Hydro is using the technical data prepared in the fall to compare alternative ways of meeting growing demand and associated clean energy objectives. BC Hydro is asking the public, First Nations and stakeholders to consider relevant topics being addressed in the IRP. Input received through consultation will be considered, along with technical, financial, environmental and economic development input, as BC Hydro evaluates alternatives and drafts the Integrated Resource Plan.



REVIEWING THE DRAFT INTEGRATED RESOURCE PLAN (FALL 2011)

In this final phase, First Nations, the public and stakeholders will be invited to provide their feedback on the draft Integrated Resource Plan. BC Hydro will consider this feedback as it prepares its final draft IRP for submission to government in early December 2011.



IRP PUBLIC OPEN HOUSE SCHEDULE*

Community	Date	Time	Location
Victoria	Wednesday, March 9	6:00 – 9:00 p.m.	Hotel Grand Pacific
Campbell River	Thursday, March 10	6:00 – 9:00 p.m.	Coast Discovery Inn & Marina
Vancouver	Tuesday, March 15	6:00 – 9:00 p.m.	Simon Fraser University Harbour Centre
Abbotsford	Wednesday, March 16	6:00 – 9:00 p.m.	Clearbrook Community Centre
Kamloops	Thursday, March 17	6:00 – 9:00 p.m.	Ramada Kamloops
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Fort St. John	Thursday, March 24	6:00 – 9:00 p.m.	Quality Inn Northern Grand
Vernon	Tuesday, March 29	6:00 – 9:00 p.m.	Best Western Vernon Lodge
Castlegar	Wednesday, March 30	6:00 – 9:00 p.m.	Castlegar & District Community Complex
Fort Nelson	Thursday, March 31	6:00 – 9:00 p.m.	Woodlands Inn
Cranbrook	Thursday, April 7	6:00 – 9:00 p.m.	Prestige Rocky Mountain Resort and Convention Centre

*Please check bchydro.com/irp for schedule updates.

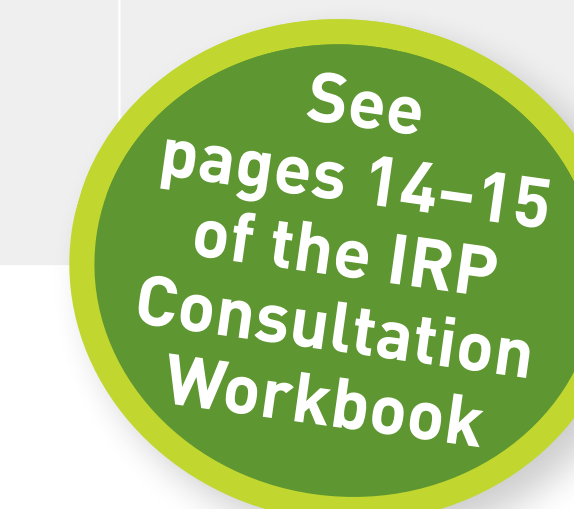
FUTURE ENERGY RESOURCES

2011 INTEGRATED RESOURCE PLAN

POTENTIAL ENERGY RESOURCES	DESCRIPTION	RESOURCE POTENTIAL	Cost Range (\$F2011 / MWh)	POTENTIAL ENERGY RESOURCES	DESCRIPTION	RESOURCE POTENTIAL	Cost Range (\$F2011 / MWh)
 <p>Biomass:</p> <ul style="list-style-type: none"> • Wood-Based • Municipal Solid Waste • Biogas (Landfill) 	<ul style="list-style-type: none"> • Electricity generated by burning wood residues from the forest industry • Biogas from landfills or municipal solid waste • Provides reliable supply with both dependable capacity and firm energy 	<ul style="list-style-type: none"> • Potential varies with availability of fuel source • Some uncertainty may arise with regard to long-term fuel availability • Wood-based biomass availability varies with the state of the forest industry • Project developers face costs of emissions mitigation • Identified within BC Clean Guidelines and may be certified as green energy 	\$77-\$200*	 <p>Natural Gas-Fired Generation & Cogeneration</p>	<ul style="list-style-type: none"> • Electricity generated from high-efficiency gas-fired turbines • Provides reliable supply with both dependable capacity and firm energy • May be situated on existing industrial sites • Dispatchable 	<ul style="list-style-type: none"> • Project developers face long-term fuel availability/price risks and cost of greenhouse gas emissions 	\$79-\$109
 <p>Wind</p>	<ul style="list-style-type: none"> • Electricity generated from onshore or offshore wind farms using large wind-powered turbine generators • Provides intermittent supply with low dependable capacity 	<ul style="list-style-type: none"> • Potential located across the province • Identified within BC Clean Guidelines and may be certified as green energy 	\$95-\$200*	 <p>Coal-Fired Generation with Carbon Capture and Storage</p>	<ul style="list-style-type: none"> • Integrated Gasification Combined Cycle (IGCC) process gasifies coal into a synthetic gas that is burned in a combined cycle generator to produce electricity • Provides reliable supply with both dependable capacity and firm energy 	<p>Emerging Technology:</p> <ul style="list-style-type: none"> • Large-scale greenhouse gas capture and sequestration technology not yet commercially available • Project developers face long-term fuel availability/price risks and cost of greenhouse gas emissions, sequestration 	\$81
 <p>Geothermal</p>	<ul style="list-style-type: none"> • Electricity generated from high temperature naturally occurring gaseous or liquid water at a depth of up to 3000 m used to drive conventional power generation technologies • Provides reliable supply with both dependable capacity and firm energy once geological formation is discovered and proven 	<ul style="list-style-type: none"> • Potential varies with geological formations • Large and uncertain initial capital investment related to exploration phase and confirmation of resource potential • Identified within BC Clean Guidelines and may be certified as green energy 	\$71-\$200*	 <p>Wave</p>	<ul style="list-style-type: none"> • Electricity generated from waves • Provides intermittent supply with low dependable capacity 	<p>Emerging Technology:</p> <ul style="list-style-type: none"> • Technologies at early stages of commercial development 	\$480-\$824
 <p>Run-of-River</p>	<ul style="list-style-type: none"> • Electricity generated from water temporarily diverted from a stream (i.e., not significant storage reservoir), passed through turbines and returned to the stream • Provides intermittent supply with low dependable capacity 	<ul style="list-style-type: none"> • Potential located across the province • Identified within BC Clean Guidelines and may be certified as green energy 	\$58-\$200*	 <p>Tidal</p>	<ul style="list-style-type: none"> • Electricity generated from tides • Predictable intermittent supply with low dependable capacity 	<p>Emerging Technology:</p> <ul style="list-style-type: none"> • At early stage of tidal current technologies • Limited total extractable resource owing to technical limitations and environmental considerations 	\$227-\$850
 <p>Large Hydro (Site C)</p>	<ul style="list-style-type: none"> • Electricity generated from water released from a storage reservoir and passed through turbines • Would typically involve the construction of a dam on a river • Provides reliable supply with both dependable capacity and firm energy • Dispatchable with storage 	<ul style="list-style-type: none"> • Large hydro projects often require long lead times – 10 years or more – and require early evaluation and study • Proposed Site C dam on the Peace River would optimize upstream storage and regulation by taking advantage of water already stored in the Williston Reservoir • <i>Clean Energy Act</i> prohibits, with the exception of the proposed Site C project, future large hydro projects in B.C. 	\$85**	 <p>Large-Scale Solar</p>	<ul style="list-style-type: none"> • Electricity is generated from sunlight using photovoltaic cells • Provides intermittent supply with low dependable capacity 	<ul style="list-style-type: none"> • Potential varies with length of day and availability of sunlight • Throughout the year, power generation fluctuates with cloud cover 	\$351-\$410

* Prices capped at \$200/MWh to reflect what might be acquired over the planning horizon.

** Cost is based on Site C's 30-year-old historical design, as per Scenario G in the Site C Stage 1 Report (\$6.6 billion). An updated cost forecast is expected by spring 2011, based on an upgraded design for the proposed project.



TOPIC 1: CONSERVATION AND EFFICIENCY

2011 INTEGRATED RESOURCE PLAN

WHAT IS CONSERVATION AND EFFICIENCY?

Conservation – often referred to as demand-side management (DSM) – is BC Hydro’s first strategy for closing the gap between future electricity demands and existing resources. Conservation options include programs, specifically designed electricity rates (e.g., residential inclining block rate), and government regulations.

Conservation is the cleanest and least expensive way to meet demand.

From a planning perspective, however, it is difficult to guarantee a particular volume of conservation over time – dependent as that is on customers’ behavioural response.



GREATER CONSERVATION AND EFFICIENCY

To achieve significantly higher energy savings from current targets, BC Hydro would have to:

- Expand its Power Smart programs
- Send stronger signals through specially designed electricity conservation rates
- Request that the provincial and federal governments commit to bring in new conservation regulations

These measures combined would be expected to change societal norms and energy consumption patterns throughout the entire provincial electricity market.

See page 12 of the IRP Consultation Workbook

The table below compares BC Hydro’s current plan to an approach that could achieve greater conservation and efficiency:

CONSERVATION (DSM) APPROACH	DESCRIPTION	TECHNICAL	FINANCIAL	ENVIRONMENTAL	ECONOMIC DEVELOPMENT
CURRENT PLAN	Combination of initiatives that include government regulations, conservation rates and Power Smart programs for all classes of customers.	Targets reducing 79 per cent of future load growth by 2020. Moderate uncertainty that expected electricity savings will materialize.	Less costly than buying or building new electricity supply.	Avoid environmental footprint because BC Hydro would not need to build new generation and transmission.	Moderately more jobs relative to new electricity generation options.
GREATER CONSERVATION AND EFFICIENCY	Increase in mandatory government regulations on energy efficiency. Send stronger rate signals through conservation rates. Expanded Power Smart programs to help consumers find savings.	Could achieve more savings than current approach above. Significant uncertainty that electricity savings will materialize.	Less costly than buying or building new electricity supply.	Avoid greater environmental footprint because BC Hydro would not need to build new generation and transmission.	More jobs relative to current plan and more jobs relative to an equivalent bundle of electricity generation options.

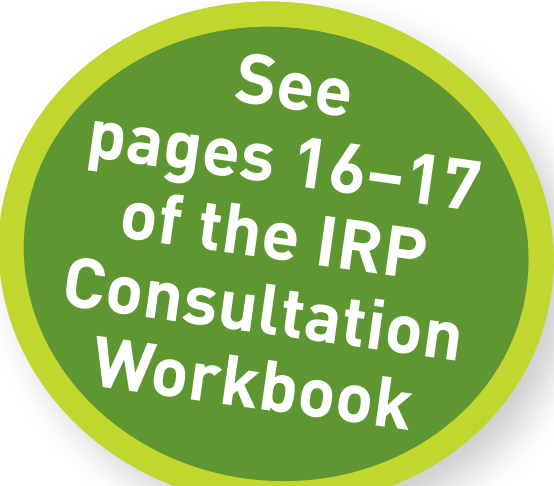
While conservation can meet at least two-thirds of growth in our future electricity needs, BC Hydro must still consider other made-in-B.C. power supply options to meet anticipated demand. B.C. is fortunate to have a wealth of potential clean resources.

Here are three example portfolios that could serve the additional electricity needs of our customers. These portfolios have different blends of electricity

generation options and the associated backup that may be required to meet customer needs at all times.

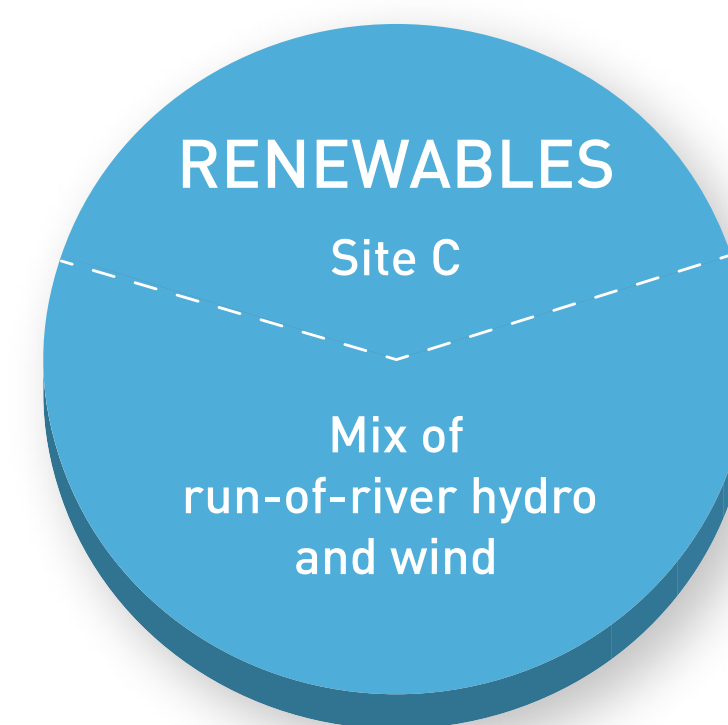
Depending on the amount of intermittent resources like wind and run-of-river in a portfolio, more backup generation may be required.

Backup options include additions at existing BC Hydro large hydroelectric generating facilities, or new pumped storage facilities or gas-fired generation.



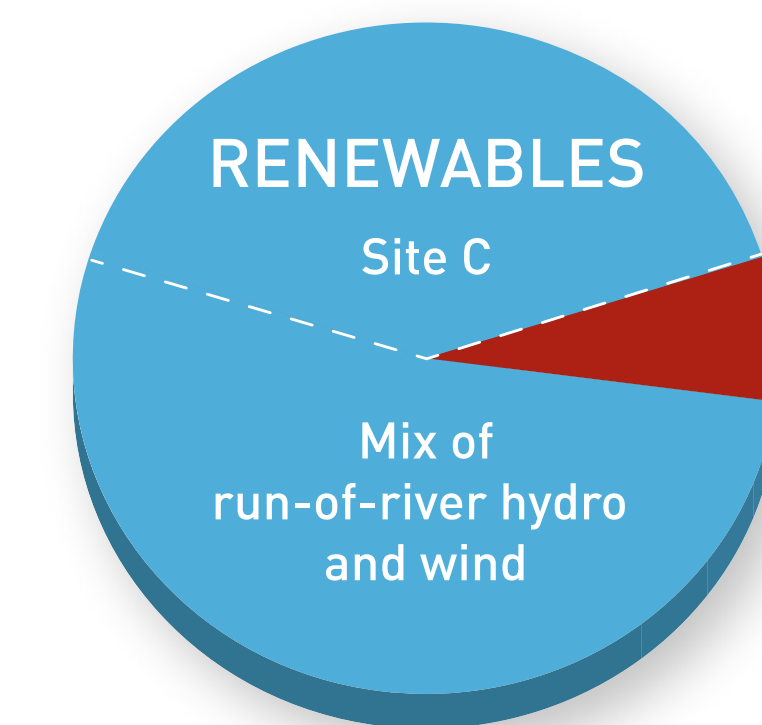
PORTFOLIO 1 – RENEWABLE MIX

This portfolio includes a mix of renewable resources such as wind, run-of-river and biomass from Independent Power Producers. The Site C Project is specifically excluded. Given that wind and run-of-river hydro are intermittent resources, this portfolio requires backup resources when the intermittent sources are not available. These backup resources would generally consist of additions at existing BC Hydro generating facilities, or new pumped storage facilities or gas-fired generation. This portfolio has low greenhouse gas emissions, with a geographically widespread environmental footprint. The cost of renewable resources and the need for backup resources make this the most expensive portfolio of the three.



PORTFOLIO 2 – RENEWABLE MIX WITH SITE C

This portfolio includes a mix of renewable resources that include Site C along with wind, run-of-river and biomass projects from Independent Power Producers. Site C is included to provide system storage and capacity to back up intermittent resources, but ongoing additions at existing BC Hydro generating facilities and additional capacity and storage still may be required if a large amount of intermittent resources are added. This portfolio has the lowest greenhouse gas emissions, with its environmental and social footprint concentrated in the Peace region. This portfolio will have a lower cost than Portfolio 1.



PORTFOLIO 3 – RENEWABLE MIX WITH SITE C AND GAS-FIRED GENERATION (WITHIN 93 PER CENT CLEAN ENERGY ACT TARGET)

This portfolio includes Site C, other potential renewable resources such as wind and run-of-river from Independent Power Producers, and gas-fired generation allowable under *Clean Energy Act* limits. Both Site C and gas-fired generation are available to back up intermittent resources. This portfolio has higher greenhouse gas emissions than Portfolios 1 and 2 due to its reliance on natural gas-fired generation, and has a more concentrated environmental footprint in the Peace region. It has the lowest cost if the price of natural gas remains low but, again, this is subject to uncertain natural gas and carbon emission prices.

TOPIC 2: ELECTRICITY GENERATION OPTIONS

2011 INTEGRATED RESOURCE PLAN

See page 18 of the IRP Consultation Workbook

The table below highlights characteristics and trade-offs associated with each electricity generation portfolio. A portfolio is a group of individual resource options to be acquired in a sequence over time to fill customers' future electricity needs.

ELECTRICITY GENERATION PORTFOLIO	DESCRIPTION	TECHNICAL	FINANCIAL	ENVIRONMENTAL	ECONOMIC DEVELOPMENT
PORTFOLIO 1 Renewable Mix	Renewable mix. No Site C. No gas. Base Energy: 827 72 Backup:	Requires backup generation. Reduces the electricity system's flexibility to respond to changes in demand.	Higher cost. No ownership of assets at end of contract term with Independent Power Producers. \$\$\$\$	Lower GHG emissions. Geographically widespread environmental footprint.	Geographically widespread jobs. Same GDP and tax revenue.
PORTFOLIO 2 Renewable Mix With Site C	Renewable mix including Site C. No gas. Base Energy: 496 43 1 Backup:	Increased system flexibility to respond to changes in demand. Requires less backup generation than Portfolio 1.	Lower cost of clean resource. Lower long-term price risk. Larger up-front single capital cost but low operating costs. Public ownership of a 100-year expected life asset. \$\$\$\$	Lower GHG emissions. More concentrated/localized footprint in the Peace region.	More job-intensive capital project and concentrated jobs in the Peace region. Same GDP and tax revenue.
PORTFOLIO 3 Renewable Mix with Site C and Gas-Fired Generation (within 93 per cent <i>Clean Energy Act</i> target)	Renewable mix with wind, Site C and gas within 93 per cent <i>Clean Energy Act</i> target. Base Energy: 438 38 1 1 Backup:	Requires no backup. Highest flexibility of system to respond to changes in demand.	Lowest cost of the three. \$\$\$	Higher GHG emissions. More concentrated/localized footprint in the Peace region.	More job-intensive capital project and concentrated jobs in the Peace region and wherever the gas plant is sited.

Note: The symbols provide a general reference tool to compare the three sample portfolios. They represent resource requirements for a 10,000 GWh and 1,800 MW sample portfolio, and relative portfolio costs.

WIND TURBINES RUN-OF-RIVER PROJECTS GAS PEAKING PLANTS LARGE HYDRO (SITE C) BACKUP COST

TOPIC 3: ELECTRIFICATION

2011 INTEGRATED RESOURCE PLAN

WHAT IS ELECTRIFICATION?

Provincial greenhouse gas (GHG) reduction targets will require making deep cuts in GHG emissions in the coming decades. One way to reduce those emissions is by switching from fossil fuel energy to electrical energy derived from clean generation sources. This is referred to as electrification.

WHERE MIGHT ELECTRIFICATION OCCUR?

Fuel switching to clean electricity could occur across the economy. The transportation sector is the largest source of GHG emissions in B.C., and replacing vehicles that use gasoline and diesel with electric vehicles could be one of the most significant long-term actions B.C. could take to reduce emissions. Also in the transportation sector, the provision of shore power can enable ships to avoid running generators while in port.

In the industrial sector, electrification options include the use of electric compressors to replace those fuelled by natural gas in the growing number of natural gas fields in northeastern B.C.

WHEN MIGHT ELECTRIFICATION OCCUR?

Electrification requires equipment changes that normally occur over the short, medium or long term. Electrification also depends on the rate of commercialization and acceptance of new technologies. Government and BC Hydro actions can influence the timing and nature of new investments in energy-using equipment, as well as the commercialization of new technologies, and therefore influence the rate at which electrification occurs.



APPROACH TO ELECTRIFICATION

- **UNDER ITS CURRENT RESPONSIVE APPROACH,** BC Hydro does not encourage fuel switching; rather, it forecasts and responds to the fuel switching that occurs naturally. As part of its obligation to serve, BC Hydro will ensure that, as electric vehicles arrive in B.C. and as customers request electricity services, the generation, transmission and distribution systems are able to meet that demand.
- **IN A PROACTIVE APPROACH,** BC Hydro would work with government and other partners to promote and encourage efficient electrification to benefit customers and to reduce greenhouse gas (GHG) emissions. BC Hydro could also introduce programs to encourage electrification in other market sectors, such as industry and port operations. BC Hydro can also expand its transmission and distribution systems, providing electricity service to new customers.

See pages 19-21 of the IRP Consultation Workbook

The table below highlights different characteristics and trade-offs associated with each electrification approach:

ELECTRIFICATION APPROACH	DESCRIPTION	TECHNICAL	FINANCIAL	ENVIRONMENTAL	ECONOMIC DEVELOPMENT
RESPONSIVE APPROACH TO ELECTRIFICATION	BC Hydro responds to electrification driven by customers' needs, and works to ensure electricity is used efficiently as part of its obligation to serve customers' needs.	Increased electricity supply required to support this level of electrification is already being considered by BC Hydro.	Natural electrification included in current rate forecast.	Modest long-term reductions in GHG emissions in B.C. from displaced fossil fuel use. Modest reductions in air pollutants. Environmental footprint from additional electricity supply.	Modest increase in clean energy sector economic development/jobs. This would result in redistribution of economic resources to clean energy sector from other parts of the economy.
PROACTIVE APPROACH TO ELECTRIFICATION	BC Hydro works with government and other partners to facilitate and encourage increased efficient electrification.	Requires additional electricity supply beyond what BC Hydro is currently considering. Most electrification growth would occur after 2020.	Increase in utility costs to supply electricity and promote electrification. Financial risk if electrification does not occur as forecasted.	Significant reductions in GHG emissions in B.C. Significant reductions in air pollutants and human health impacts. Additional environmental footprint from additional electricity supply.	Moderate increase in clean energy sector economic development/jobs. This would result in shifting economic resources to clean energy sector from other parts of the economy. Expansion of the electricity grid could spur new economic activity.

TOPIC 4: TRANSMISSION PLANNING

2011 INTEGRATED RESOURCE PLAN

WHAT IS TRANSMISSION PLANNING?

The system that delivers electricity to British Columbians is divided into two major infrastructures: the transmission system, which carries high-voltage electricity from where it is generated to the cities, towns and industrial centres where it is consumed, and the distribution system, which delivers lower voltage electricity to individual customers.

The IRP will examine the high-voltage province-wide transmission system by analyzing the investments that may be needed to ensure the system can meet future electricity requirements. The IRP will also examine regional transmission requirements needed to connect clusters of new generation resources to the bulk system.

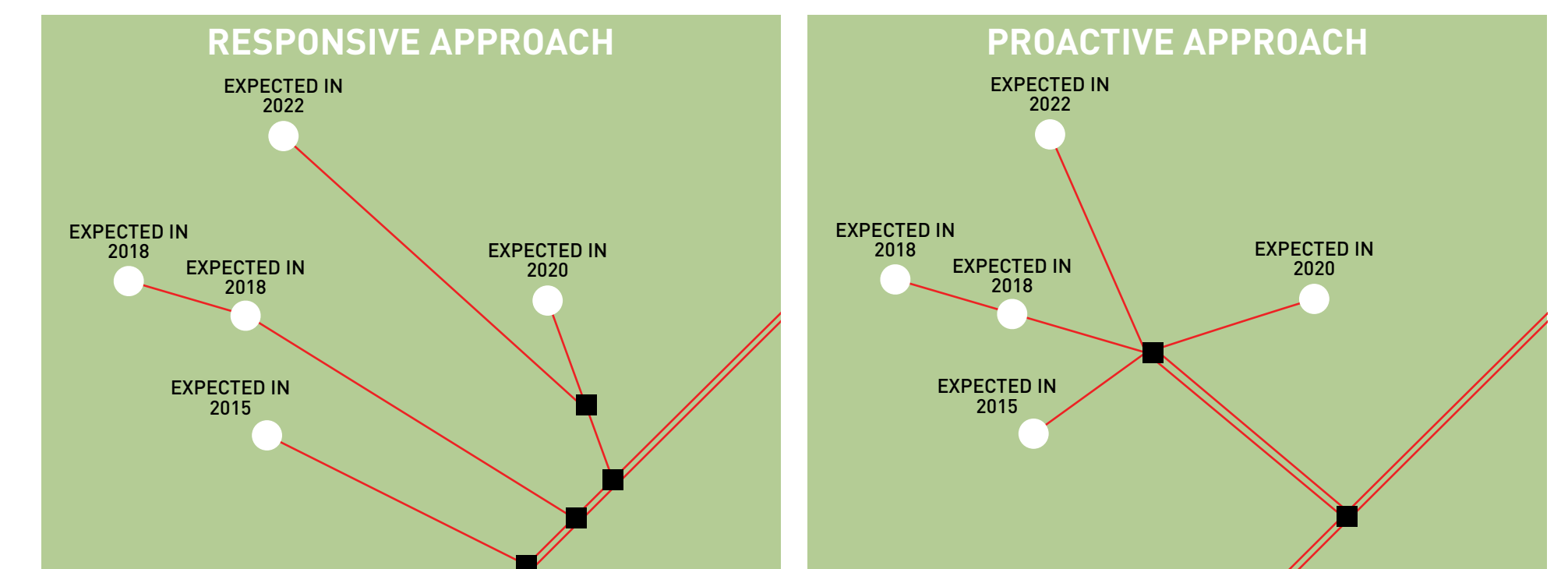
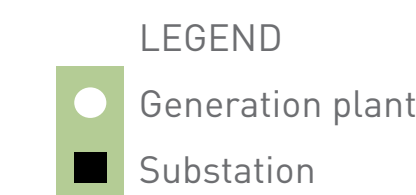
The table below highlights different characteristics and trade-offs associated with each transmission planning approach:

APPROACH TO TRANSMISSION PLANNING

In the past, transmission systems have been planned in response to generation projects and demand growth that were expected to occur. Planners are now looking farther into the future to anticipate where the largest potential exists for generation options and consumer needs. Rather than responding to individual projects, this process identifies where clusters of projects could appear across the province (i.e., regions with a combination of run-of-river, wind and biogas potential).

Two broad and distinctly different approaches are described for consultation purposes:

- **RESPONSIVE APPROACH:** BC Hydro develops transmission plans in response to forecast need.
- **PROACTIVE APPROACH:** BC Hydro develops long-term transmission plans in anticipation of potential future need over a 30-year horizon.



TRANSMISSION PLANNING APPROACH	DESCRIPTION	TECHNICAL	FINANCIAL	ENVIRONMENTAL	ECONOMIC DEVELOPMENT
RESPONSIVE APPROACH	BC Hydro develops transmission plans in response to forecast need.	Higher reliability risk if transmission delayed. May lead to suboptimal build of the transmission system in the long run.	Lower transmission costs in the short term but risk of higher costs in the long run due to suboptimal system build.	Lower transmission footprint in the short term, but higher in the long term due to suboptimal system build.	May constrain economic development in certain regions or communities, as there may not be enough transmission.
PROACTIVE APPROACH	BC Hydro develops long-term transmission plans in anticipation of potential future need over a 30-year horizon.	Lower reliability risk. Leads to larger transmission projects.	Higher transmission costs in the short term. Lower costs in long term due to optimal system design if growth materializes. Risk of stranded investment if need does not materialize.	Higher transmission footprint in the short term but lower in the long run if need materializes.	May facilitate economic development in certain regions or communities, as transmission has been planned and built to facilitate this.

TOPIC 5: EXPORT MARKET POTENTIAL

2011 INTEGRATED RESOURCE PLAN

WHAT ARE ENERGY EXPORTS?

BC Hydro, through its wholly owned subsidiary Powerex, has a long and successful track record of trading electricity. In the future, transmission links could open up markets for new clean electricity generated by producers in B.C. to support economic development in regions across the province.

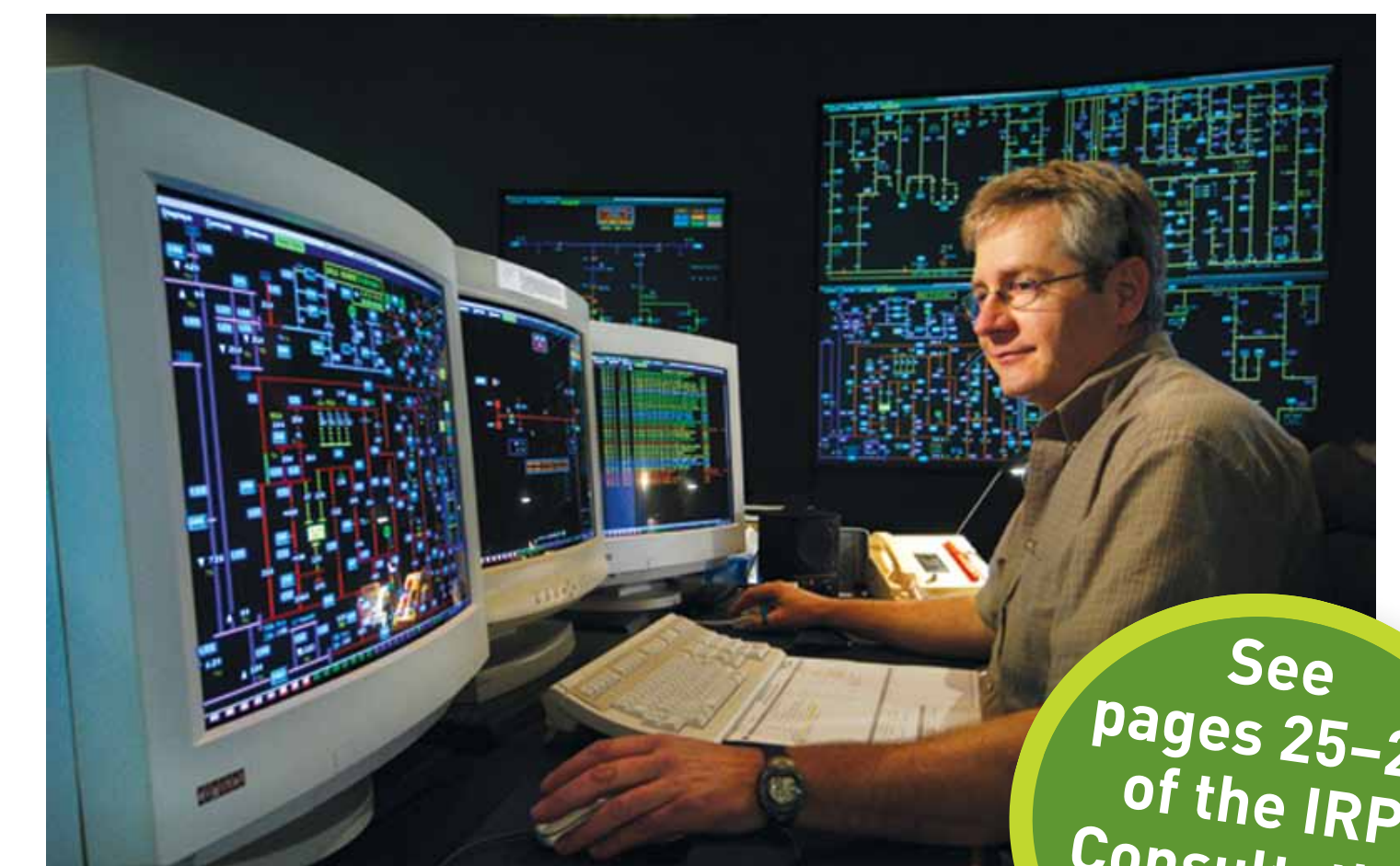
WHAT IS NEW?

In the new *Clean Energy Act*, one of B.C.'s energy objectives is that B.C. should be a net exporter. The Act directs BC Hydro to assess the potential export market for clean resources. BC Hydro may also acquire, subject to Cabinet approval, renewable energy from Independent Power Producers in B.C. for the sole purpose of exporting to Alberta or the U.S. Importantly, the Act protects existing BC Hydro ratepayers from the cost risks associated with energy purchased solely for export.

APPROACH TO ENERGY EXPORTS

For planning purposes, it is important to distinguish between two different types of potential export activity:

- CURRENT APPROACH – “TRADITIONAL” EXPORTS:**
 These are exports of surplus energy during times when BC Hydro has excess water in the hydroelectric system, including energy that is acquired to achieve the legal requirement of self-sufficiency.
- CLEAN GENERATION FOR THE PURPOSE OF EXPORT:**
 These are exports that would come from the aggregation of renewable energy from Independent Power Producers in B.C. for the sole purpose of long-term export contracts.



See pages 25–26 of the IRP Consultation Workbook



The table below summarizes the differences between the current approach – “traditional” exports – and an additional approach – clean generation for the purpose of export:

EXPORT APPROACH	DESCRIPTION	TECHNICAL	FINANCIAL	ENVIRONMENTAL	ECONOMIC DEVELOPMENT
CURRENT APPROACH – “TRADITIONAL” EXPORTS	Sell the surplus capability (system) including that which arises from achieving self-sufficiency by 2016 and insurance by 2020.	System reliability maintained at planned levels.	First \$200 M of net income from trade goes to ratepayers. Any losses and any net income above \$200 M goes to the Province.	The transmission system will only be expanded to maintain reliability, to meet domestic load, and to comply with the requirement of self-sufficiency/insurance.	Sources of attractively priced power may provide economic development benefits to B.C.
CLEAN GENERATION FOR THE PURPOSE OF EXPORT	Acquiring additional renewable energy produced in B.C. for the sole purpose of export. This will cause additional Independent Power Producers generation projects to be built in B.C.	System reliability maintained at planned levels.	Additional revenues for the Province to the extent that sales of renewable energy exceed the costs involved in delivering electricity to other jurisdictions.	Additional environmental footprint in B.C. and elsewhere due to building additional clean generation resources and additional transmission in B.C. to deliver electricity to markets in the U.S.	Potentially more jobs, GDP and tax revenue than current approach. (Will lead to additional clean electricity generation construction and generation jobs in the regions.)