

SUMMARY

December 8, 2010 Time 9:00 A.M. – 3:30 P.M.

TYPE OF MEETING	Technical Workshop
PRESENTERS – in order of the presentations	<p>Anne Wilson, Integrated Resource Planning Cam Matheson, Director, Integrated Resource Planning Nadja Holowaty, Team Lead for Resource Options Update John Duffy, Manager, Strategic Planning, Power Smart Kathy Lee, Integrated Resource Planning Ellen Feng, Integrated Resource Planning Magdalena Rucker, Integrated Resource Planning Alex Tu, Chief Technology Office Sanjaya De Zoysa, Integrated Resource Planning Goran Sreckovic, Integrated Resource Planning Michael Savidant, Site C Project Bruce Henry, Integrated Resource Planning Amir Amjadi, Integrated Resource Planning Warren Bell, Economic and Business Development Randy Reimann, Manager, Resource Planning Kenna Hoskins, Manager, Responsible for Consultation and Business Planning</p>
FACILITATOR	Anne Wilson
ATTENDEES	<p>Approximately 60 people attended the session comprising resource options knowledge experts including representatives from independent power producers, consultants, government, environmental organizations and First Nations.</p>
PURPOSE & AGENDA	<p>Purpose: For BC Hydro to present the draft technical data assembled for the 2010 Resource Options Update that describes the resource potential in B.C. and to seek final, written comment on this data.</p> <p>Agenda:</p> <ul style="list-style-type: none"> • Draft Results for the 2010 Resource Options Update

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- ROU Draft Results Introduction
- Demand-Side Management Resource Options
- Supply-Side Resource Options
- Biomass – Wood-Based
- Biomass – Biogas (Land Fill)
- Biomass – Municipal Solid Waste
- Wind (on/offshore)
- Geothermal
- Thermal – Natural Gas-Fired
- Thermal – Coal-Fired with Carbon Capture & Sequestration
- Hydro – Pumped Storage
- Hydro – Run-of-River
- Hydro – Site C
- Ocean – Wave
- Ocean – Tidal
- Hydrokinetic (in-stream)
- Solar
- Transmission
- Hydro – Resource Smart
- Storage Technologies
- Miscellaneous Distributed Generation
- ROU Draft Results Summary
- Update on Environmental Attributes
- Update on Economic Development Attributes
- Next Steps for the Integrated Resource Plan
 - Portfolio Analysis
 - Consultation Process
- Closing Remarks

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MEETING SUMMARY

1. WELCOME AND OVERVIEW

Anne Wilson, Moderator

The 2010 Resource Options Update draft results workshop was hosted by BC Hydro in response to the commitment on September 14, 2010, at the 2010 Resource Options Update launch, to report back on draft results before year-end. The Moderator welcomed everyone to the meeting and reviewed the safety exits from the building.

The Moderator noted that a power point presentation augmented the speakers' comments and that a hard copy of the power point presentation was available for everyone at the meeting and would be available on the BC Hydro website.

Introduction – Cam Matheson

Cam provided the broad context of this session, noting BC Hydro is in the final stages of the resource options update with the end of the data collection, and into the final stages of associated consultation and feedback. Cam clarified this resource options update is not about selecting resources and that there are separate acquisition processes and environmental approvals and at this point we are looking for broad range options only for planning purposes.

2. DRAFT RESULTS - INTRODUCTION AND DEMAND-SIDE MANAGEMENT
RESOURCE OPTIONS**Introduction - Nadja Holowaty**

Nadja described the work undertaken so far on the resource options update, including the updating of the resource options and their associated technical, financial, environmental and economic development attributes. The draft Resource Options Report (ROR) will be available on the website and participants are asked to scrutinize the report and provide feedback until the end of December 2010; and the report will be finalized and prepared for release at the end of January 2011.

Nadja introduced the structure of the individual resource options presentations which would be following a consistent format, starting with demand side management options and then moving to supply-side resource options.

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Demand-Side Management Resource Options – John Duffy

John presented the demand-side management options. More detail is available in the draft Resource Options Report – the power point presentation is intended to be a high level overview only.

Questions and Answers

The following provides a summary of key discussion themes from the question and answer period following this presentation.

TRANSPARENCY AND MODELLING

Question was raised as to where and when the public would be able to see the analysis and the modelling methodology in developing the DSM options. The resource options report currently does not have this level of detail and BC Hydro will consider this request.

TIME BASED RATES

There was a further request to see the energy savings purported through the shifting of the time of electricity consumption, and when the public would be able to look at this analysis.

BC Hydro clarified that the estimated cost of \$25/kW/year does not include the cost of installation of meters needed to implement the program. There was a concern regarding smart meters, and this participant wanted to see smart meters removed from BC Hydro's plans.

LOAD FORECAST

It was clarified that the DSM savings estimates are based on the 2009 Load Forecast, and as well, BC Hydro will be looking at the 2010 Load Forecast to see how this data will shift, and that BC Hydro will be conducting a P90 estimate (looking at uncertainty bands around the estimated data).

UNCERTAINTY LEVELS

It was clarified that the electricity savings uncertainty levels and the cost uncertainty levels identified on slide 17 are not based on numeric data. Rather, they are a high level risk assessment. For example, with respect to the medium risk that has a certain level of confidence and the chance is that it could be less or higher. More information on uncertainty levels will be included in the report.

CAPACITY

A question was raised about using Revelstoke and Mica capacity options, and whether any new capacity savings would be needed over and above these options? It was clarified that part of the purpose of the IRP is to answer that question and analysing the options will provide answers and costs.

NEW CUSTOMERS

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There was a question as to what BC Hydro was looking at in terms of DSM for new customers. It was clarified that BC Hydro is looking at existing customers and providing incentives to them to reduce their load and as well, there is a program to help new customers make their new plants as efficient as possible.

3. DRAFT RESULTS - SUPPLY-SIDE RESOURCE OPTIONS***Power Point Presentations:***

- **Supply-Side Resource Options – Nadja Holowaty**
- **Biomass – Wood-Based – Kathy Lee**
- **Biomass – Biogas (Land Fill) – Ellen Feng**
- **Biomass – Municipal Solid Waste – Magdalena Rucker**
- **Wind (on/off shore) – Magdalena Rucker**

Questions and Answers

The following provides a summary of key discussion themes from the question and answer period following these presentations.

MUNICIPAL SOLID WASTE

A question arose about whether the municipality would sell electricity to BC Hydro at a lower cost if it fits in with a larger waste disposal plan. It was clarified that at this point, we are just undertaking an inventory of resource options, and this question is more appropriate much later in the process

BIOMASS

A question was raised as to whether the cost projections include the cost of diesel to move the biomass fuel around, and what inflation factor is being used for petroleum costs. It was clarified the forecast used a real dollar analysis and inflation was accounted for but not in the escalation of fuel prices.

A question was raised as to whether annual allowable cut was used in the assessment of potential resource and about the pine beetle infested wood. It was clarified that work was undertaken with the Ministry of Forests on allowable cuts as well as on pine beetle infested wood. BC Hydro also considered the economic grade of the log and how long the wood was infected. More details are available in the report.

 BIOGAS

A question arose as to whether BC Hydro looked at the trend at the municipal level to move toward digestion of food waste – was it considered, and as well, what about sewer, using liquid waste to generate biogas? It was clarified that this update only focussed on landfill gas and the rationale was that the other options were more distributed and smaller in size.

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PROTECTED AREAS

There was a question as to what percentage of British Columbia fell within legally protected areas. There was some indication that it was perhaps about 14%, however, this figure was uncertain, and it may be useful at some point to calculate the percentage.

FIRST NATIONS INTERESTS

There was also a question as to whether, in determining exclusion zones, consideration was given to the work that First Nations have done with land use planning. It was noted that this was a good suggestion, for this inventory legally protected areas are being excluded noting that the exercise is not a land use planning exercise and BCH will be consulting with First Nations through the IRP.

It was clarified that First Nations representatives invited to the Sept 14th workshop were known to have technical expertise and they were in turn invited to participate in the working groups. At this point BCH is unaware of any individuals who participated in the working groups.

There was a question as to whether the costs included in this resource options updated included accommodation costs for First Nations. It was clarified that costs are based on operational and capital costs and there is no cost built in for the engagement and consultation processes required – that will happen at the acquisition phase when there is a call for proposals, where the project costs will be presented as part of the competitive process. This was a suggestion that costs should be built in for First Nation accommodation. There was a point of clarification, for Site C, there is a BC Hydro estimated cost of consultation with First Nations and mitigation costs factored in - it is included in the capital costs.

OFFSHORE WIND

Participants noted wide cost ranges associated with offshore wind, and wondered how transmission costs factored into the costs and cost ranges. It was thought that the highest unit energy cost without transmission were about \$250 per megawatt hour, however that would need to be confirmed.

4. DRAFT RESULTS - SUPPLY-SIDE RESOURCE OPTIONS CONTINUED

Power Point Presentations:

- **Geothermal – Alex Tu**
- **Thermal – Natural Gas-Fired – Sanjaya De Zoysa**
- **Thermal – Coal-Fired with Carbon Capture & Sequestration – Sanjaya De Zoysa**
- **Hydro – Pumped Storage – Sanjaya De Zoysa**
- **Run-of-River – Goran Sreckovic**
- **Site C – Michael Savidant**

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Questions and Answers

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NATURAL GAS

A question as to what price was assumed for the unit energy costs. It was clarified that a 20-year levelized price was used which was close to \$60 but would need to be confirmed. It was also clarified that the GHG offset cost was assumed to be \$33/tonne.

BURRARD THERMAL

It was clarified that BC Hydro can rely on the Burrard Thermal Plant for capacity but only until Mica 5 and 6 are on line and then BC Hydro is no longer able to rely on Burrard.

There was a question as to whether Burrard Thermal would be included in the percentage allowable 'non-clean' generation. It was confirmed that Burrard generation does contribute to the non-clean percentage. There was further discussion regarding the Clean Energy Act 93% clean generation requirement and how much flexibility BC Hydro has in planning with 'non clean' resources. It was indicated that not much flexibility exists, however, the amount of flexibility will depend on load growth.

COMPARING OPTIONS

A concern was raised about comparing options as they stand now, for instance coal may come out to be most favourable and there was a concern that this was not a fair assessment. It was clarified that the planning and evaluation stage will take other planning factors into consideration; and as well adjusters which are discussed at the end will provide some comparative considerations.

It was further clarified that these are just options and not what will go ahead. This is an inventory and it is not the intent to think ahead about how it will all fit in - when evaluations start that will gauge where there is room for new resources and what will fit.

A comment arose regarding what is being missed in the options is firmness and that the best source is dispatchable power and the value of Site C with its 900 megawatts of dispatchable power should be acknowledged. Dispatchable sources are valuable and essential. It was confirmed that adjusters which take into consideration the ability to provide firm energy will be looked at later on and applied to the options.

In terms of costs, there was a question as to whether it is worth looking at options when the cost is going up to \$600 and a suggestion was made to place a cap because at a \$600 unit energy cost, the option would never be developed.

GEOHERMAL

A participant highlighted that geothermal costs are low however it was noted that

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significant up front exploratory costs to prove the site exist and there was a suggestion that these be included in the overall assessment.

SITE C/LARGE HYDRO

There was a question as to whether costs included transmission to the lower mainland. It was clarified that all costs are reported to the point of connection and it is expected that the transmission will be to the Peace Canyon substation however it is not expected that new transmission lines will be required to the lower mainland although updates may be required to existing facilities.

There was further discussion regarding the make up of the costs for Site C, anticipated currently at \$85 dollars and wondering what is included in that cost. For example, are water rentals included? It was clarified that the overall cost includes a levelized life cycle cost to the rate payers and includes water rentals. Specifically, unit energy cost takes into consideration the following: capital, operating (plant and water rentals, grants in lieu), financing and return on equity.

It was further clarified that the costs of Site C are based on stage 1 report developed in 2007 and these costs are currently being updated.

A question arose as to the possibility of other large hydro sites along the Peace and Columbia Rivers, specifically the historically proposed Sites E and H on the Peace River. It was clarified that the Clean Energy Act has ruled out further development on the Peace River with the exception of Site C and that it is expected that new regulations will be issued that will define storage.

NUCLEAR POWER

One participant indicated a lower potential cost for nuclear power, and was wondering if BC Hydro was considering presenting to government on the value of nuclear power? It was clarified that BC Hydro is not considering nuclear given the provincial policy against the use of nuclear power.

5. DRAFT RESULTS - SUPPLY-SIDE RESOURCE OPTIONS CONTINUED

Power Point Presentations:

- **Ocean Wave – Alex Tu**
- **Ocean Tidal – Alex Tu**
- **Hydrokinetic (in-steam) – Alex Tu**
- **Solar – Bruce Henry**
- **Transmission – Amir Amjadi**
- **Hydro – Resource Smart – Nadja Holowaty**
- **Storage Technologies - Nadja Holowaty**
- **Miscellaneous Distributed Generation - Nadja Holowaty**

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Questions and Answers

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TRANSMISSION

It was asserted that that transmission planning must be undertaken first and it has been heard that there is enough transmission for Site C but a participant wondered how much transmission is available for wind generated power coming from the Peace River district. Given the necessary 10 year lead time, the transmission constraint is an important consideration with the resource options. It was confirmed that if Site C is built, there will be upgrades to the transmission system; and as well it was affirmed that transmission is important and making sure incremental transmission capacity for incremental resources.

With respect to the Cheekeye-Dunsmuir transmission line, there was a question regarding the economic life of the cables and whether there is replacement plan in the planning horizon. It was confirmed the lifetime of the Cheekeye-Dunsmuir cables is in the 30 to 40-year range and as we approach the end of their useful life options to replace the cables or upgrade to another line will be considered. For example, with reference to the HVDC line to Vancouver Island, when it came time to renew that it was done in such a manner as it was replaced on time.

With respect to the transmission export portion of the presentation – there was a comment that as an exporter a portion of the BC Hydro business has to be segregated from the domestic portion of Hydro business, and a question arose as to what extent BC Hydro is planning a segregated process for transmission export? It was acknowledged that any potential power to service demand in California could come from all over the province, and further consideration to this issue would be needed.

SOLAR

There was a question as to whether there was any hope for solar technology being produced at a utility scale here in BC. It was confirmed some decline in price over the next few years is expected but it wasn't expected to keep declining. Some of the new technologies have promises of lower costs.

RESOURCE SMART

There was a question as to whether other resource smart projects were considered, or just Revelstoke 6. It was clarified that there are four energy focuses and other energy focused options but not reported out on at this point. It was further clarified that Revelstoke 6 is an existing dam structure and penstock and all that is required is to drop in a new turbine and with our other infrastructure it would be quite expensive however we are looking at all of our facilities. The earliest in-service dates were also questioned.

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FORT NELSON

A question arose as to what the in service date was for a transmission line to Fort Nelson. It was clarified that the transmission line is an option if load increases, and there is no commitment to an in-service date and BC Hydro is building a substation in anticipation of the large load growth in the area

RESOURCE OPTIONS IN SERVICE DATES

There was a question as to whether the methodology is consistent with determining the earliest in service dates. It was clarified that technical leads looked at time, resources and permitting. A question arose regarding solar, and it was clarified that a solar plant would go on an already developed site so that it wouldn't have the same footprint, and as well it could go in very quickly. It was also pointed out that some wind proponents may have their projects and approvals and may be ready to go.

6. DRAFT RESULTS - SUMMARY, ENVIRONMENTAL AND ECONOMIC DEVELOPMENT ATTRIBUTES AND NEXT STEPS

ROU DRAFT RESULTS SUMMARY – Nadja Holowaty *Power Point Presentation*

Questions and Answers

The following provides a summary of key discussion themes from the question and answer period following these presentations.

ADJUSTERS

It was clarified that the five adjusters used are: GHG offset costs; cost of incremental firm transmission (CIFT); capacity credit; peak load line loss; and, intermittent resources.

Update on Environmental Attributes – Anne Wilson *Power Point Presentation*

Questions and Answers

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There was a question as to whether the report would be available for public comment. It was thought at this point that the final report would be ready, however it was noted that there is a desire to see the draft report.

With respect to windmills, there was a question as to whether there has been any consideration of bird strikes as a species. It was commented that it was not so much birds but rather that it was bats however, some bird areas may be listed within the marine valued ecosystem components and would need to confirm what is included.

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It was clarified that sea water effluent from the pumped storage plants is not considered in the environmental attributes, that the focus has been on physical footprint, rather than water quality changes.

A question arose about how to capture run of river impacts because they vary so much, for instance the fisheries indicator. It was confirmed that this is a high level indicator and we are just looking at species where data is provincial in scope, and priority species that are part of the conservation framework database.

Update on Economic Development Attributes – Warren Bell
Power Point Presentation**Questions and Answers**

The following provides a summary of key discussion themes from the question and answer period following these presentations.

SPENDING EFFECTS

A question arose that if DSM was at \$50 and supply was at \$100 then there would be \$50 left over, will that be captured? It was clarified that this would be captured.

FIRST NATIONS

There was a question around BC Hydro building relationships with First Nations. Specifically, where in the economic attributes could that be assessed, for example, having specific goals around First Nations' peoples getting jobs and revenue generation. It was acknowledged that this is an important issue, and this is a high level economic model, and for this to be addressed a First Nations labour model would be needed. It was indicated that this question would be addressed in the procurement phase. There was a concern that this would be missed further down the process. It was acknowledged that this is a start and there will be ways to improve the approach going forward. It was also clarified that through consultation with the First Nations it is hoped to receive input on the First Nations views on clean energy development.

MEASURING ECONOMIC IMPLICATIONS

There was a concern that by only comparing portfolio differences there would be economic costs that would be missed. For example, if all portfolios are valued at \$140 and are selling at \$30 there is no economic attribute that would show this loss.

There was a question around the energy objective of job creation and who would be receiving those benefits. It was clarified that the stats Canada input/output model being used does not look at distributional effects across consumer groups. It was further clarified that the demand-side management includes investment covering all customer sectors and programs and rate structures that apply to all three classes.

There was some discussion regarding the application of demand side management in

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the economic model. It was clarified that there will be cost savings from all classes of customers which will equal a reduced bill thus putting more money in the customers pocket and stimulating the economy.

It was clarified that the portfolio modelling would not be able to determine whether if one portfolio is more costly than another that it would have a depressing effect on economic activity. However, it is possible to look at higher costs which would be taking money away from businesses that can't be spent on other activities and this would be included in the analysis.

There was a question as to whether BC Hydro had been speaking with people in the industry to get a sense of the costs of construction involved. It was clarified that the model numbers are relying on financial results on the resource options, and checked that they are acceptable. There was a suggestion that BC Hydro look at employment figures and discuss these with industry.

There was a question as to whether there has been an assessment of the 'ability to pay' across the rate classes. It was clarified that an assessment such as this would not be included in a high level analysis of this type.

NEXT STEPS FOR THE PORTFOLIO ANALYSIS

- **Portfolio Analysis – Randy Reimann**
- **Consultation Process – Kenna Hoskins**
Power point presentation

Questions and Answers

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IRP IMPACT ON RATES

There was a question regarding whether the IRP analysis will show the implications on rates and what customers will have to pay. It was confirmed that the long term rate forecast will be produced. It was also understood that there is a desire to see the implications on residential rates over the plan horizon.

Closing Remarks – Nadja Holowaty

Nadja thanked everyone for their participation and valuable input in this process, which started in September. It was mentioned that the draft Resource Options Report and appendices are available on the website and while some of the appendices are not complete they will be updated. As well, the deadline for comments to the draft Resource Options Report is Dec. 31, 2010.

Conclusion:

The event concluded at 3:15 p.m.