

## **Haida Gwaii Community Electricity Plan**

### **June 1<sup>st</sup>, 2007 Working Group Meeting**

#### **Preliminary Electricity Supply & Demand Side Management Bundle Assessment**

#### **FINAL REPORT**

Prepared by:

M. Harstone & G. Long

Compass Resource Management Ltd.

200-1260 Hamilton Street

Vancouver, BC Canada V6B 2S8

For:

The Sheltair Group

#205 – 1525 West 8<sup>th</sup> Ave

Vancouver, BC Canada V6J 1T5

August 2007

---

## Table of Contents

<b>1. Overview .....</b>	<b>3</b>
Purpose of this Report .....	3
Background .....	3
<b>2. Preliminary Information Assembled for the Working Group Meeting .....</b>	<b>4</b>
Preliminary Evaluation Criteria .....	4
Preliminary *Mock* Electricity Supply and DSM Bundles .....	5
Estimating the Performance of the Mock Bundles .....	6
<b>3. June 1<sup>st</sup>, 2007 Working Group Meeting in Masset.....</b>	<b>8</b>
Overview .....	8
Ranking Exercise – Direct Ranking.....	8
Ranking Exercise – Swing Weighting.....	9
Comparing the Results between the Exercises.....	12
Discussing the Results.....	13
Four New Bundles Developed by the Working Group.....	14
Next Steps.....	16

## 1. Overview

### **Purpose of this Report**

On June 1<sup>st</sup>, 2007 Compass Resource Management facilitated an assessment and discussion with Working Group members on their preferences related to (1) a number of fictitious or \*mock\* electricity supply and demand side management (DSM) bundles and (2) the characteristics that defined those bundles in terms of their performance. This brief report summarizes (a) the information developed to support the discussions and (b) the results and observations made by the Working Group.

### **Background**

The Council of the Haida Nation (CHN) and BC Hydro commissioned the development of a Community Electricity Plan (CEP) for Haida Gwaii/Queen Charlotte Islands (hereafter referred to as Haida Gwaii). A CEP addresses both the supply and the use of electricity. It identifies ways to conserve electricity and use it efficiently, and recommends preferred characteristics related to any new electricity supply options. The plan for the islands will be developed with input from the island communities and will include residents' expressed values and goals.

The Sheltair Group was contracted by the Council of Haida Nation to carryout the work in collaboration with community input and direction from a Working Group that was established. In mid-April, The Sheltair Group sub-contracted Compass Resource Management to assist with carrying out the decision analysis for a preliminary assessment of bundles and their characteristics with the Working Group during one of their meetings. This was one step in the many step community resource planning process for the Haida Gwaii Community Electricity Plan.

The June 1<sup>st</sup> Working Group meeting was really focused on two priority areas identified by the Working Group to be involved in: choosing (and confirming) needed criteria for evaluating bundles, and identifying preferred characteristics for electricity supply and DSM bundles.

The remainder of this report describes the preliminary information used to help frame discussions (Section 2) and provides a summary of the assessment and feedback collected during the 1 June 2007 Working Group meeting (Section 3).

## 2. Preliminary Information Assembled for the Working Group Meeting

In the lead up to the June 1<sup>st</sup> Working Group meeting, the consulting team of Sheltair and Compass assembled some preliminary information to help frame the assessment of some \*mock\* bundles. This information included the development of several representative evaluation criteria, the creation of a number of diverse mock bundles, and an evaluation of the consequences of the mock bundles (basically estimating the performance of the bundles). This section summarizes this preliminary information.

### Preliminary Evaluation Criteria

Sheltair and Compass helped translate the previously identified interest areas<sup>1</sup> into representative and measurable evaluation criteria based on the available information. In cases, criteria were developed on qualitative judgments (constructed scales 0=best, 10=worst) and in other cases on quantitative information from BC Hydro<sup>2</sup>, literature reviews, and industry standards. In all cases, they were meant to provide a meaningful way to compare the performance of bundles in a relative sense according to what had been expressed as important.

For a summary of the preliminary evaluation criteria see Table 1.

**Table 1. Evaluation Criteria Developed to Assess the Mock Bundles**

Interest Area	Evaluation Criteria	Units	What's Better
Cost	Unit Energy Cost	\$/MWh	L
Service Quality	Index	#	H
GHG Emissions	CO2 equivalent emissions	kilotons/yr CO2e	L
Local Air Emissions	PM10	tons/yr (PM10)	L
Land Area	Land Area	m2 (000)	L
Aquatic Area	Aquatic Area	m2 (000)	L
Jobs	Construction Jobs	Person-years	H
Jobs	Permanent Jobs	FT equivalent	H
Noise	Noise Scale (0=Best, 10=Worst)	Scale (0-10)	L
Visual Impacts	Visual Impact Scale	Scale (0-10)	L
Food Harvesting Impacts	Food Harvesting Impact Scale	Scale (0-10)	L
Innovation / Leadership	Innovation Scale	Scale (0-10)	H
Sustainability	% Dependable Peak By Renewables	%	H

Note that Service Quality Index refers to the reliability of any new resource type and provides an indication of the overall quality of the electricity supplied.

<sup>1</sup> Originally identified during the Feb/March public meetings and later confirmed during the Working Group's April 27, 2007 meeting.

<sup>2</sup> Primarily from BC Hydro's Resource Options Report (2005).

## Preliminary \*Mock\* Electricity Supply and DSM Bundles

Sheltair and Compass developed a number of representative preliminary electricity supply and demand side management bundles for discussion by the Working Group. This work was informed by a brainstorming session held on 3 May 2007 with representatives from CHN and BC Hydro. The brainstorming session identified a number of concepts for feasible bundles, and these were meant to illustrate a variety of ways that different electricity supply and demand options could be grouped together. In all, 7 mock bundles were developed prior to the June 1<sup>st</sup> meeting, as summarized in Table 2.

**Table 2. Key Features of the Mock Bundles**

Bundle ID	1 – Energy Plan	2 - FBAU	3 – Mix 3	4 – Mix 4	5 – Mix 5	6 – Connect grids	7 – Offshore wind
<b>Rationale</b>	To meet the min requirements of the BC Energy Plan	Future business as usual (FBAU) for BC Hydro; meeting their environmental & social policies	Diverse mix of renewable supply options			Connect grids together and stabilize with biomass plant in between	Single offshore wind project (not connected to mainland)
<b>Key Features</b>	50% renewables No net GHG emissions	90% clean energy target More emphasis on DSM				Upgrade distribution system in order to connect grids	
<b>DSM</b>	0% of existing 50% of growth	40% of existing 50% of growth	40% of existing 50% of growth	40% of existing 50% of growth	40% of existing 50% of growth	40% of existing 50% of growth	40% of existing 50% of growth
<b>New Supply Options</b>							
Small hydro	4 MW	2 MW		2.5 MW			
Biomass		2 MW	2.6 MW		3.1 MW	3.3 MW	
Land-based Wind			2 MW	1 MW			
Offshore Wind							4.3 MW
Tidal		1 MW		1.5 MW	1 MW		
<b>Diesel Use (% of forecast energy demand)</b>	47%	16%	17%	33%	16%	16%	32%

The process for building the bundles consisted of meeting the future growth scenario demand-supply gap after conservation savings (demand side management) were taken into account. Therefore, new supply options were sized to fill the gap with consideration of each resource type's capacity factor (see Table 3). For example, small hydro can only be relied upon approximately 50% time (on an annual basis) compared to diesel and biomass which are above 90%.

**Table 3. Capacity Factors for the Different Resource Types**

	Diesel	DSM	Existing Small Hydro	Small Hydro	Biomass	Land-based Wind	Offshore Wind	Tidal
Capacity Factor	0.91	1.00	0.50	0.50	0.91	0.30	0.44	0.20
Dependable Capacity Factor	1.00	0.80	0.25	0.25	1.00	0.08	0.12	0.05

In addition, each bundle was assumed to require a certain amount of diesel supply for voltage stability and dependable capacity requirements. In general, the lower the dependable capacity factor, the higher the likelihood that diesel would have to be used to provide emergency back-up and to meet any instantaneous demand requirements through the year.

During the development of the bundles, a number of other assumptions were used, as follows:

- The future demand forecast was based on the high growth (or dream) scenario<sup>3</sup> at Year 20 (i.e. Peak Capacity = 23 MW; Energy Demand = 113,100MWh)
- New electricity supply options were not location specific
- No sequencing was considered for when or which new supply option would be added within the bundles
- Constant energy prices
- No allowance for technological improvements
- Each bundle would meet the minimum requirements as defined in the 2007 BC Energy Plan (e.g. 50% of future growth from DSM, no net GHGs)
- The existing small hydro facility (5.7 MW) is included in every bundle
- The new diesel generators (already ordered) are assumed to be installed and used to varying degrees (including to support voltage stability requirements and emergency back-up needs)
- That there is the available supply listed in the bundles for each resource type
- The connecting grids bundle assumed a capital investment of \$25 million to upgrade and link the two grids together. In addition, a biomass plant was built into this bundle as a requirement to better meet voltage stability needs.

### Estimating the Performance of the Mock Bundles

Sheltair provided the information to estimate the impacts (performance) of the bundles. In general, estimating the impacts was based on the amount of energy (or capacity) provided by each resource type (in each bundle) multiplied by a unit rate of impact per MWh (or MW). These unit rates were based on industry averages, known impacts of comparable projects, and information provided by BC Hydro. Table 4 provides a summary of the unit impacts for each resource type.

**Table 4. Unit Impacts by Resource Type**

		Diesel	DSM	Existing Small Hydro	Small Hydro	Biomass	Land-based Wind	Offshore Wind	Tidal
<b>Attributes per Unit Capacity or Energy</b>									
Unit Energy Cost	\$/MWh	210.5	60	140	200	130	175	200	200
GHG Emissions	kg/MWh	812	0	0	0	0	0	0	0
Air Emissions	kg/MWh PM10	0.43	0	0	0	0.8	0	0	0
Land Area Impacted	m <sup>2</sup> / MW	0	0	0	7,423	1,000	1,000	833	0
Aquatic Impacts	m <sup>2</sup> / MW	0	0	0	1,885	0	0	1,000	20,000
Construction Jobs	Person-years / MW	0	13	0	9	16	1	1	7.6
Permanent Jobs	FT equivalent / MW	0	15.6	0	0.5	3	0.5	0.5	0.5
Noise	Scale 0-2 (0 is good, 2 is bad)	2 - high	0 - n/a	0 - n/a	0 - low	1 - medium	0 - low	1 - medium	0 - low
Visual	Scale 0-2 (0 is good, 2 is bad)	0 - low	0 - n/a	0 - n/a	1 - medium	1 - medium	2 - high	2 - high	0 - low
Food harvesting areas	Scale 0-2 (0 is good, 2 is bad)	0 - low	0 - n/a	0 - n/a	1 - medium	0 - low	1 - medium	2 - high	1 - medium
Sustainability / innovation	Scale 0-2 (0 is bad, 2 is good)	0 - low	1 - medium	0 - n/a	0 - low	0 - low	1 - medium	1 - medium	2 - high

<sup>3</sup> Representing a future population of 12,500 in Year 2027, which translates into approximately 54,600 MWh/yr (as described in the Growth Scenario Report: Haida Gwaii CEP (Sheltair)).

It should be noted that with some of the qualitative criteria (noise, visual, food harvesting, and innovation/leadership) the actual impacts would be greatly dependent on where a project is located. And since the CEP does not define specific locations for new electricity supply options, it is difficult to say with any certainty what some of the impacts will be. Accordingly, most of these qualitative measures need to be considered in this light. For example, when assessing food harvesting impacts for different options, a higher value (0 to 10) should be interpreted as a greater likelihood that there could be an impact<sup>4</sup>, rather than there will be an impact (and recognizing that even if there was an impact, it doesn't mean that it could not be mitigated as a condition of its regulatory approval).

From the Unit Impact Table (4), the overall impacts for each bundle were calculated by summing the contributions from each resource type (according to its energy and multiplied by the above unit rates). This resulted in the following consequence table (Table 5) which summarizes the performance of each bundle.

**Table 5. Consequence Table for the Preliminary Mock Bundles**

Attribute	Direction	Units	BC Energy Plan Min.	FBAU	Mix 3	Mix 4	Mix 5	Connect Grids	Offshore Wind
<b>Unit Energy Cost</b>	L	\$/MWh	\$ 149	\$ 114	\$ 108	\$ 124	\$ 108	\$ 118	\$ 124
<b>Service Quality Index</b>	H	no	Constant	Constant	Constant	Constant	Constant	Constant	Constant
<b>CO2 equivalent emissions</b>	L	kiloton/yr CO2e	31	8	8	16	8	8	16
<b>PM10</b>	L	ton/yr (PM10)	16	17	21	9	24	25	8
<b>Land Area</b>	L	m2 (000)	30	17	5	20	3	3	4
<b>Aquatic Area</b>	L	m2 (000)	8	24	0	35	20	0	4
<b>Construction Jobs</b>	H	Person-years	75	119	105	96	119	114	66
<b>Permanent Jobs</b>	H	FT equivalent	49	81	83	76	84	84	76
<b>Noise Scale</b>	L	Scale	7	3	4	4	4	4	5
<b>Visual Impact Scale</b>	L	Scale	2	2	3	1	2	2	3
<b>Food Harvesting Impact Scale</b>	L	Scale	2	1	0	1	0	0	3
<b>Innovation Scale</b>	H	Scale	0	0	0	1	0	0	1
<b>% Dependable Peak By Renewables</b>	H	%	12%	22%	23%	12%	25%	26%	11%

It should be noted that Service Quality Index – *which characterized system reliability and the quality of the electricity supply* – was considered constant across all the bundles. It was assumed that any new electricity supply option would meet BC Hydro's standards for power factor and equipment, and this would be built into any contracts (electrical purchase agreements) stipulating the number of hours of electricity production. For this reason, the service quality was considered equal among all resource types and, therefore, constant across the bundles in the consequence table.

<sup>4</sup> An offshore wind project could be associated with a higher probability of food harvesting impact as compared to a diesel generator, which has a lot more flexibility for where it would be located.

### 3. June 1<sup>st</sup>, 2007 Working Group Meeting in Masset

At the June 1st meeting, Working Group members reviewed the preliminary information described in Section 2 and participated in two ranking exercises – *direct ranking and swing weighting*. The results from these exercises led to a facilitated discussion about members' preferences and ideas for creating new bundles that could be used to help elicit feedback during the next round of public meetings (scheduled for the end of the month).

#### Overview

During the review of the preliminary information, it was observed that **Bundle 6 – Connect Grids** was outperforming (or dominating) **Bundle 5 – Mix 5**. In other words, for each of the evaluation criteria **Bundle 6** was either better or equal to the values for **Bundle 5**. Accordingly, the Working Group agreed to drop **Bundle 5** from further consideration during the ranking exercises.

It was also observed that the Quality Service Index was not helping to differentiate between bundles (since it was constant) and so it was not included during the swing weighting exercise.

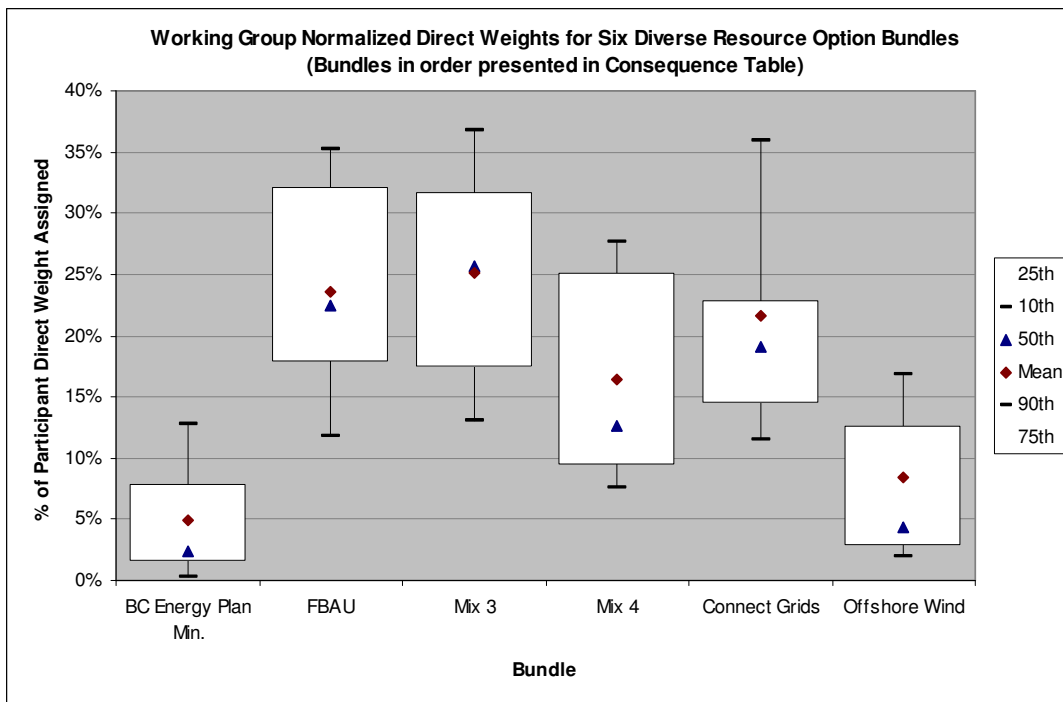
#### Ranking Exercise – Direct Ranking

Working Group members were asked to weight each of the remaining 6 \*mock\* bundles directly according to the following directions:

- a) Rank the bundles based on 'gut' preference from 1 (most preferred) to 6 (least preferred).
- b) Assign 100 points to the most preferred bundle.
- c) Assign a number (between 100 and 0) to the second most preferred that represents the degree of difference in preference between 1 and 2. For example, '95' would suggest almost indifference to the bundles ranked 1 and 2; '50' would suggest that the top ranked bundle is preferred 'twice as much'.
- d) Repeat c) for each bundle in declining rank order, each time using the 100 for rank 1 as the benchmark. The number assigned in each case should be smaller than the one before it.

The results from the exercise are summarized in Chart 1. The box plots highlight the degree and range of Working Group members' preferences for each of the bundles: *the length (or net height) of each box illustrates the range of support (between the 10<sup>th</sup> & 90<sup>th</sup> percentiles); and, in general, the higher the box plot, the more it was collectively supported (more accurately represented by the red mean (♦) diamond).*

**Chart 1. Normalized Working Group Rankings – Direct Ranking Exercise**



### Ranking Exercise – Swing Weighting

Working Group members then participated in a swing weighting exercise. The swing weighting technique is different in two ways from the direct ranking exercise. First, because participants are asked to weight the importance of the range of difference in the evaluation criteria across the available options under consideration, the technique yields information on the relative importance of changes that can be made within the given decision context. Second, by multiplying the weights associated with each attribute by the normalized performance of each bundle, a preferred bundle can be inferred for each participant.

Working Group members were asked to weight the evaluation criteria according to Table 6 and the following instructions:

**Table 6. Swing Weighting Table**

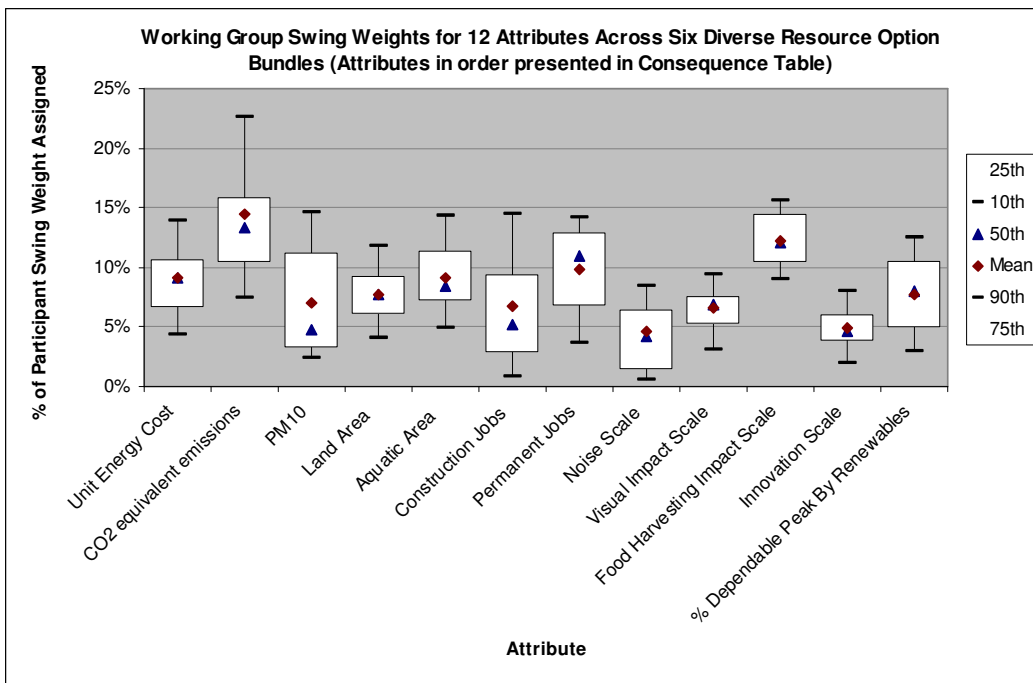
Evaluation Criteria	Direction	Units	Worst	Best	Rank	Weight
Unit Energy Cost	L	\$/MWh	\$ 149	\$ 108		
CO2 equivalent emissions	L	kilotons/yr CO2e	31	8		
PM10	L	tons/yr (PM10)	25	8		
Land Area	L	m2 (000)	30	3		
Aquatic Area	L	m2 (000)	35	0		
Construction Jobs	H	Person-years	66	119		
Permanent Jobs	H	FT equivalent	49	84		
Noise Scale	L	Scale	7	3		
Visual Impact Scale	L	Scale	3	1		
Food Harvesting Impact Scale	L	Scale	3	0		
Innovation Scale	H	Scale	0	1		
% Dependable Peak By Renewables	H	%	11%	26%		

- a) Consider the significance of the range of difference between the best and worst performing bundles according to the evaluation criteria
- b) Assign a rank of 1 to the evaluation criterion you would most like to 'swing' from its lowest value to its highest value.
- c) Continue to rank until all attributes have been ranked.
- d) Assign 100 weighting 'points' to the attribute with the most significant swing.
- e) Assign a number (between 100 and 0) to the second highest ranked attribute's swing in a way that represents the degree of difference in preference between 1 and 2. For example, '95' would suggest almost indifference to the importance of 'swinging' the attributes ranked 1 and 2; '50' would suggest that the top ranked attribute swing is preferred 'twice as much'.
- f) Repeat e) for each attribute swing in declining rank order, each time using the 100 for rank 1 as the benchmark. The number assigned in each case should be smaller than the one before it.

The results from the exercise are summarized in the normalized scores shown in Charts 2 & 3.

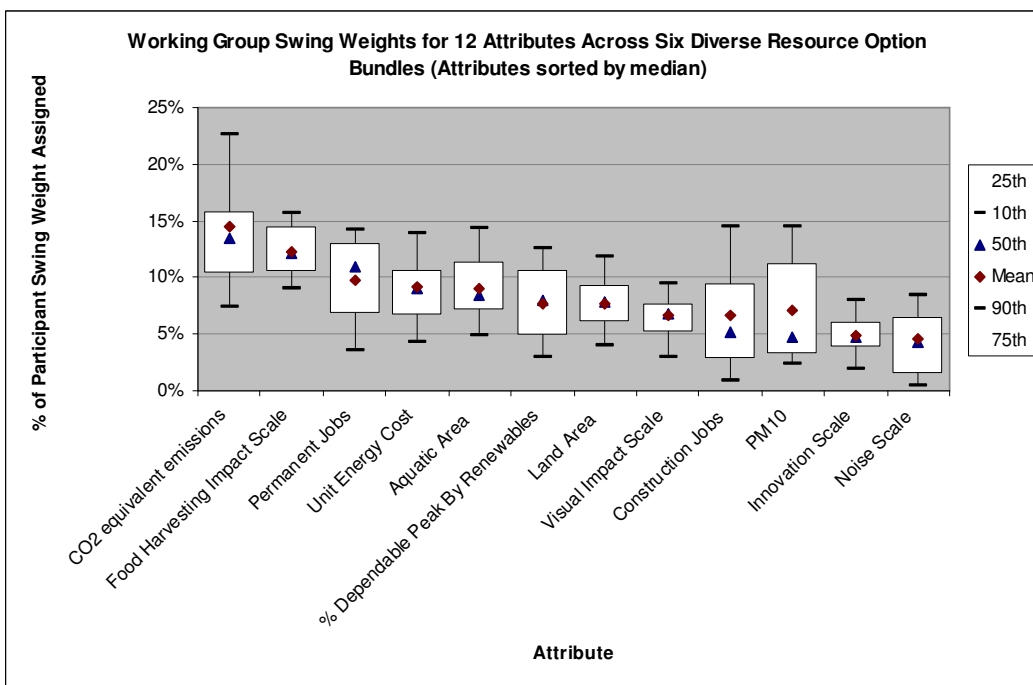
Chart 2 indicates the relative importance of weights that Working Group (WG) members placed on the net improvements across the evaluation criteria. Within the decision context (i.e. across the 6 \*mock\* bundles), the box plots represent a summary of the most important bundle characteristics. In general, the higher box plot, the more preferred the net change in criterion is (from its worst to best value).

**Chart 2. Normalized WG Rankings across the Evaluation Criteria – Swing Weighting Exercise**



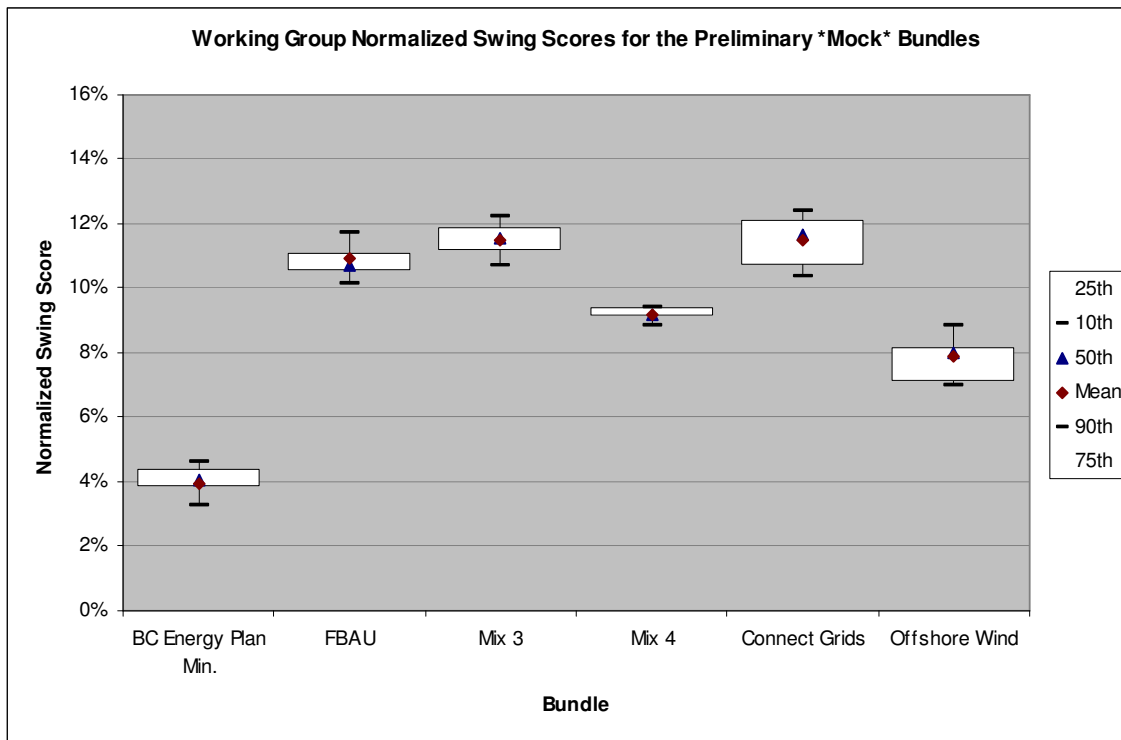
This chart can be re-sorted to better highlight the most to least preferred swing weightings of the Working Group (see Chart 3).

**Chart 3. WG Rankings Prioritized for the Evaluation Criteria – Swing Weighting Exercise**



From the swing weighting results, the priority of the \*mock\* bundles can be inferred for each Working Group member. Chart 4 illustrates members' inferred most preferred bundles according to this method.

**Chart 4. Normalized Working Group Bundle Rankings – Swing Weighting Exercise**



The higher the box plot, the better that bundle is performing collectively for the Working Group as a whole, according to their rankings.

### Comparing the Results between the Exercises

A comparison of results was made between the two exercises. Table 7 summarizes each Working Group member's normalized scores for both exercises. The colour coding highlights each members' two most preferred (green) and least preferred (red) bundles for each exercise.

**Table 7. Comparison of WG Members' Rankings between the Exercises**

		BC					
		Energy	FBAU	Mix 3	Mix 4	Connect	Offshore
		Plan Min.				Grids	Wind
<b>DIRECT</b> <b>WEIGHTING</b>	Member #1	-	0.07	0.13	0.33	0.20	0.27
	Member #2	0.02	0.34	0.38	0.09	0.15	0.02
	Member #3	0.02	0.14	0.23	0.09	0.46	0.06
	Member #4	0.03	0.31	0.28	0.25	0.09	0.03
	Member #5	0.14	0.20	0.19	0.16	0.19	0.13
	Member #6	0.00	0.38	0.36	0.04	0.19	0.02
	Member #7	0.12	0.25	0.13	0.25	0.12	0.13
	Member #8	0.06	0.19	0.30	0.10	0.32	0.03
		BC					
		Energy	FBAU	Mix 3	Mix 4	Connect	Offshore
		Plan Min.				Grids	Wind
<b>SWING</b> <b>WEIGHTING</b>	Member #1	0.08	0.17	0.21	0.14	0.21	0.19
	Member #2	0.04	0.23	0.21	0.17	0.23	0.12
	Member #3	0.08	0.19	0.21	0.17	0.22	0.13
	Member #4	0.06	0.19	0.23	0.13	0.23	0.15
	Member #5	0.07	0.20	0.21	0.17	0.20	0.15
	Member #6	0.07	0.20	0.22	0.15	0.22	0.14
	Member #7	0.08	0.19	0.21	0.16	0.21	0.15
	Member #8	0.07	0.20	0.23	0.14	0.24	0.13

For the direct ranking exercise, **FBAU Bundle** and **Mix 3 Bundle** appear to be the two most popular. The swing weighting exercise indicates that almost everybody (except Member #2) would prefer the **Connect Grids Bundle** and the **Mix 3 Bundle**.

### Discussing the Results

After a review of the results, there were a number of comments and observations made by Working Group members:

- The most popular (or frontrunning) bundles were **FBAU**, **Mix 3** and **Connect Grids**.
- In general, the more a bundle relied upon innovative and new resource technologies that were more intermittent (tidal and wind, in particular, and to a lesser extent small hydro), the heavier the reliance on diesel or biomass would be to better meet dependable capacity requirements.
- Biomass was not being characterized with transportation costs associated with the delivery of wood waste to the plant. Some members pointed out that there could be considerable noise, aesthetic, and additional emission impacts with the biomass based bundles as a result of considering the impacts of transporting the material.
- The **Minimum BC Energy Plan – Bundle** was the least preferred by everyone according to both exercises.
- Interconnection, while the connect grids bundle was a frontrunner during the exercises, this was somewhat misleading because it was really saying people liked biomass: since biomass was the only new resource addition in the bundle. It was also observed that there was no net benefit from a reliability perspective of tying the grids together. A pure biomass bundle would have performed even better without an interconnection, as it would not have included the \$25 million capital investment to upgrade the distribution network and therefore the unit energy cost for the bundle would have been less.

During the discussion, the Working Group was interested in exploring some new bundles to see how well they might perform to meet their electricity supply needs. Four new bundles were created and reviewed during the meeting.

### Four New Bundles Developed by the Working Group

The Working Group developed four new bundles:

- Big Wind Bundle** This bundle included a single new land-based wind project (6 MW) plus demand side management (DSM) initiatives to reduce existing demand by 40% and future growth by 50%, and it included the existing small hydro project (5.7 MW).
- Big Tidal Bundle** This bundle included a single new tidal project (9 MW), plus the same DSM and small hydro as Big Wind.
- Hydro Plus Bundle** This bundle included an additional small hydro project (3.5 MW) to meet the demand-supply gap, plus the same DSM and keeping the existing small hydro project.
- Ultra DSM Bundle** This bundle would rely entirely on DSM to meet future growth by targeting a 60% reduction in existing demand and a 75% reduction in future growth. This bundle would still maintain the existing small hydro project.

The impacts of the new bundles were estimated and reviewed. The new bundles were compared against the 3 frontrunning preliminary \*mock\* bundles – **FBAU, Mix 3 & Connect Grids**. See a comparison in the colour-coded consequence table (Table 8) that highlights the **Ultra DSM Bundle** against the other bundles (*if an adjacent column is red, it means that Ultra DSM is better; if it is white, it is the same (or within 10%); and if it is green, it means Ultra DSM is worse for that evaluation criteria*).

**Table 8. Consequence Table Showing the Newly Proposed Bundles**

Attribute	Direction	Units	FBAU	Mix 3	Connect Grids	Big Wind	Big Tidal	Hydro Plus	Ultra DSM
Unit Energy Cost	L	\$/MWh	\$ 114	\$ 108	\$ 118	\$ 132	\$ 136	\$ 136	\$ 116
CO2 equivalent emissions	L	kilotons/yr CO2e	8	8	8	17	17	17	8
PM10	L	tons/yr (PM10)	17	21	25	9	9	9	4
Land Area	L	m2 (000)	17	5	3	6	0	26	0
Aquatic Area	L	m2 (000)	24	0	0	0	180	7	0
Construction Jobs	H	Person-years	119	105	114	68	130	93	92
Permanent Jobs	H	FT equivalent	81	83	84	77	78	76	111
Noise Scale	L	Scale	3	4	4	4	4	4	2
Visual Impact Scale	L	Scale	2	3	2	3	0	1	0
Food Harvesting Impact Scale	L	Scale	1	0	0	1	1	1	0
Innovation Scale	H	Scale	0	0	0	1	3	0	0
% Dependable Peak By Renewables	H	%	22%	23%	26%	10%	10%	13%	9%

(Please Note. Table 8 was corrected after the WG meeting. During the meeting, the % Dependable Peak by Renewables values for the new bundles – Big Wind, Big Tidal, Hydro Plus and Ultra DSM – were all 100%. This gave the impression that for this one criterion the new bundles were performing better than they should have).

Table 8 highlights that for the most part, the new **Ultra DSM Bundle** effectively dominates the other bundles assuming:

- (a) that permanent jobs are more important than temporary person-years of work,
- (b) that DSM may be viewed quite innovative, and
- (c) that the unit costs are confirmed for Ultra DSM as there was some uncertainty associated them.

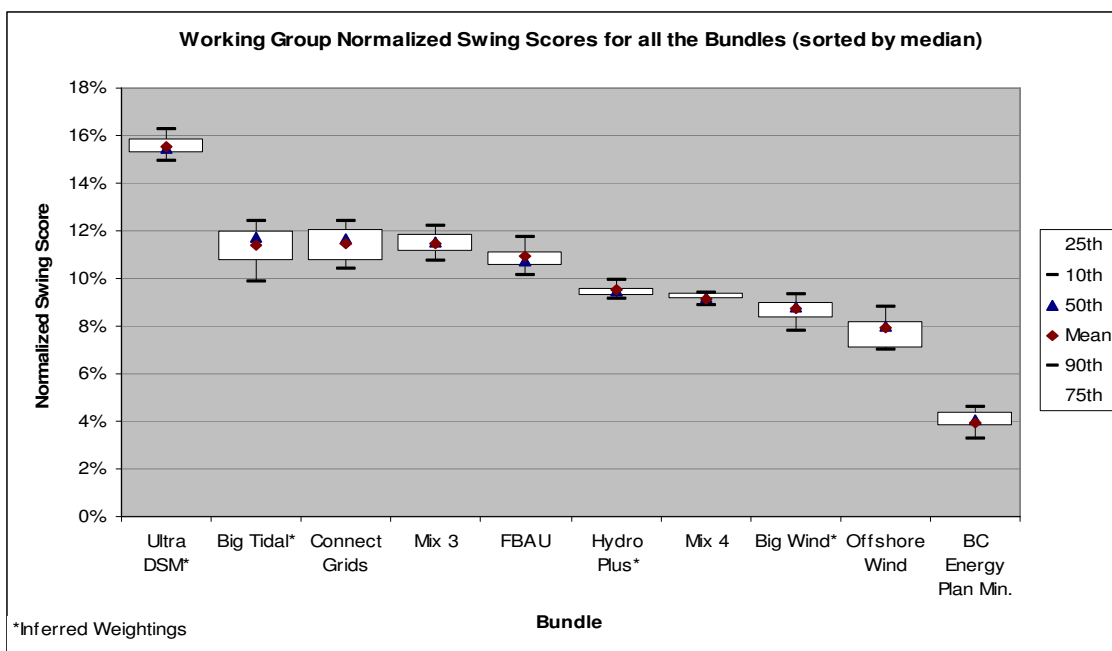
The Working Group also reviewed their inferred rankings of the bundles according to their swing weighting scores (Table 9 below). This emphasized how well the **Ultra DSM Bundle** was outperforming the other bundles and also highlighted that the other new bundles were not performing as well as the preliminary bundles **FBAU**, **Mix 3** and **Connect Grids** (by the swing weighting results).

**Table 9. Inferred Working Group Rankings using the Swing Weighting Results**

SWING WEIGHTING	Member #	Connect						
		FBAU	Mix 3	Grids	Big Wind	Big Tidal	Hydro Plus	Ultra DSM
	Member #1	0.14	0.17	0.16	0.11	0.11	0.09	0.22
	Member #2	0.19	0.18	0.19	0.03	0.10	0.06	0.26
	Member #3	0.14	0.15	0.16	0.07	0.12	0.07	0.28
	Member #4	0.16	0.18	0.18	0.07	0.08	0.08	0.24
	Member #5	0.14	0.15	0.15	0.08	0.15	0.09	0.24
	Member #6	0.15	0.17	0.17	0.07	0.11	0.08	0.25
	Member #7	0.13	0.15	0.15	0.08	0.13	0.10	0.26
	Member #8	0.13	0.16	0.17	0.07	0.14	0.09	0.24

Chart 5 prioritizes the bundles according to the inferred preferences of the Working Group using the median values of their swing weighting rankings.

**Chart 5. Prioritized WG Bundle Rankings using the Swing Weighting Results**



## Next Steps

Working Group members briefly discussed the next steps in the process related to the upcoming community meetings and how the results from this meeting could be used to help elicit community feedback. In general, there was support for selecting a small and representative set of bundles and characterizing their impacts according to a smaller set of evaluation criteria. The Working Group reviewed their top six evaluation criterion (identified during the swing weighting exercise) and felt that this was a reasonable list to solicit public input on the performance of various bundles. The Working Group's top six criteria were (in order of cumulative swing weighting scores):

1. Green House Gas Emissions
2. Food Harvesting Impacts
3. Unit Energy Cost
4. Aquatic Area Impact
5. % Dependable Peak by Renewables
6. Local Air Emissions

*Note that:*

- (a) highlighting the top six is somewhat arbitrary,*
- (b) that if there had only been one criterion for jobs, it would have likely ranked in the top six, and*
- (c) service quality is obviously an important criterion to people and would have likely been in the top 5, if there had been any difference across the bundles.*

### **An Idea Forward**

An idea that was discussed by the consulting team after the meeting to both actively engage participants at the upcoming community meetings and provide useful feedback to inform the Working Group's deliberations towards recommending their preferred characteristics for a bundle, is discussed below. This reflected the time and resource constraints associated with the community meetings.

- A few bundles could be developed to highlight some of the key desired features and/or outstanding questions that need answering by the Working Group in the CEP.
- A shortlist of evaluation criteria (*as already identified*) could be used to characterize the performance of the bundles – *without identifying what specific resource types make up the bundles*.
- Participants to the community meetings could be asked to express their support for the bundles based purely on the evaluation criteria provided.
- Afterwards, the resource types that are associated with each bundle could be revealed to see how people's preferences might change or not.