

SUMMARY Resource Options Update:
 NOTES Wind Engagement

June 3, 2015
 1:00 –2:00
 BC Hydro Dunsmuir

TYPE OF MEETING	Wind Engagement
ATTENDEES	Frankie Nash (CEBC), Colleen Schmidt (Innergex), Ron Zeilstra (FortisBC), Mike Hopkins (FortisBC), Karim Hirji (Columbia Power), Paul Kariya (CEBC), Ian Bailey (CanWEA), Dave Warner (EDF), Ron Percival (Avro Wind), John Partyka (Aeolis Wind), Wagner Kseniuk (Aeolis Wind), David Hermans (Acciona), ; Paul Rapp (Alterra); Paul Wieringa (MEM), Scott Cutler (MEM); Sian Barradough (Capital Power)
BC HYDRO	Anne Wilson, Magdalena Rucker, Kathy Lee, Edlira Gjoshe, Nan Dai
OBJECTIVES	<ol style="list-style-type: none"> 1. Report out on cost assumptions 2. Present preliminary results on wind unit energy costs 3. Seek input on cost assumptions and representation of wind potential in B.C.
MATERIALS	Presentation slides

MEETING SUMMARY
<p>Magdalena welcomed people to the meeting with a roundtable of introductions, described the meeting objectives and then walked through the content of the slides. The following provides a summary of comments/questions and responses by relevant slide.</p> <p>Slide 6</p> <p>A participant asked whether BC Hydro knew the current average capacity factor of the projects in the data base. BC Hydro did not know the average off hand, but spoke to the distribution (based on material presented during the last engagement session): there are no net capacity factors below 25%; the highest net CF is 49%; and approximately 60% of the projects have a capacity factor between 30% and 40%.</p> <p>Another participant mentioned that the capacity factors, as well as capital costs, are project specific and cautioned BC Hydro against painting all projects with high capacity factors as being in complex terrain. BC Hydro agreed with the statement that just because a site has a high capacity factor does not mean that it is automatically assumed to be located in more challenging terrain, and confirmed that this was indeed what was happening in the data base (i.e., there are projects in the database with high wind speeds that were not deemed as more challenging).</p> <p>Slide 7</p> <p>It was clarified that the project sites were identified in the original wind data study that was completed in 2009.</p> <p>It was clarified that in the independent power producer (IPP) survey information, capital costs of IPPs includes transmission line costs to the point of interconnection, but that BC Hydro was told that this was not a significant component of the development/construction cost information provided by the IPPs.</p> <p>It was also assumed that the IPP cost estimates would include the on-site substation costs, but not the upgrades required to the BC Hydro system (it was assumed that the IPPs would not have done the interconnection studies to ascertain those costs).</p> <p>BC Hydro offered the following analogy for deciding which projects were considered challenging (i.e., complex) or not: Imagine the beginning of the movie Sound of Music, where Maria frolics on grassy, broad mountain meadows. This would be considered as non-challenging terrain. Fast forward to the end of the movie where the van Trapp family is climbing up a narrow ridgeline to escape Austria. This would be considered as challenging terrain. It was added that some coastal projects (particularly those with lots of water visible in the satellite images) were also considered as challenging to account for the extra costs to deal with culverts and bridges.</p> <p>Slide 8</p> <p>A participant asked if the projects with the lower unit energy costs (UECs) were larger in size. BC Hydro responded that this generalization does not hold true.</p> <p>It was clarified that the cost curves include the UEC at gate, the wind participation rent, a soft cost of 2.5%, the access</p>

roads (R1) and transmission interconnection costs (T1). Not included in these costs are wind integration costs or additional cost adjusters to deliver firm energy to the load centres.

It was clarified that the lower gray line represented the UECs with no increase applied to any projects. The top gray line represented the UECs with 25% added to the Capex model for all projects. For the coloured curves, the additional 15%, 20% or 25% was added to Capex for only those projects that were identified as being more challenging. BC Hydro was seeking input on which adjustment seemed reasonable.

BC Hydro mentioned there are still a couple of costs that need updating, but are not expected to have a significant impact. These include the updated time series data done by 3Tier (not yet received); and updating R1 and T1 costs from the 2013 numbers. The updated R1/T1 costs will make changes higher up the curve, but not of great consequence.

A participant asked whether BC Hydro followed this kind of process during the last update. BC Hydro did not, and it was noted that this work is trying to improve the reasonableness of the line, and also responds to the consultant's concerns that the costs of more challenging site conditions are not reflected in their analysis.

It was commented that the lines are pretty close, and that going with 15%, 20% or 25% will not make that much difference. And given the planning nature of this work, it may not make sense to go into any further detailed work, but to just choose one. It was mentioned that we would not want to go anywhere past 25%.

It was also clarified that about 46 sites out of 130 were deemed to be more challenging sites (about one third of all the projects). If a project was on a narrow ridge line, then it was deemed challenging. If a project was on a broad ridge, then it was deemed non-complex. As well, coastal sites with boggy terrain and more difficult access due to water crossings were deemed more challenging.

It was commented that it seemed reasonable to consider a third of the projects as more challenging, especially when considering other factors such as access (for example, for coastal sites) and that those projects would be more expensive. Rather than trying to slice this too fine, and looking for just one adder, it was suggested to use a middle value of 20%. A number of participants supported this comment.

There was agreement among the group to go with a 20% increase for the more challenging sites.

The participants were comfortable with the idea of that one third of the sites would be considered as more challenging. It was requested that BC Hydro make the kmz files available to the group for information purposes.

Slide 9

Is it reasonable to assume 100 m hub height for Class 1 sites?

Participants suggested that turbines are being designed to be more robust, and that hub heights will generally keep increasing. There was general agreement that a hub height of 100 m was okay to be used as an assumption.

Wind speeds overly optimistic?

BC Hydro mentioned that about 20% of the sites have wind speeds higher than 9.5 m/s. BC Hydro asked if this is reasonable for B.C.

Participants were not sure – it may be reasonable, but will come down to site specific characteristics.

BC Hydro requested that participants advise Magdalena of any information they may have related to whether or not this is reasonable. It was mentioned that within the planning context, it sounds reasonable.

It was noted that this meeting concludes the wind engagement and participants were thanked for their contributions.

Meeting close.