

From: Jacobson, David <dajacobson@hydro.mb.ca>
Sent: Tuesday, August 14, 2012 11:01 AM
To: Danny Northcott <dnorthcott@hvdc.ca>; Molinski, Tom <tsmolinski@hydro.mb.ca>
Cc: Paul Wilson <plwilson@mhi.ca>
Subject: RE: Status of Newfoundland Wind Assessment

We met with Nalcor and the Newfoundland government today.

Our customer, Charles Bown, would like our report to make a clear statement on the economic and technical feasibility of a 800 MW wind plant being able to replace Holyrood. This will be tough to do in the time remaining.

Nalcor will be sending us their updated technical analysis this week and their economic analysis next week. They may have looked at up to 500 MW of wind in their reports and determined that 500 MW is not economic but 300 MW is economic. The 300 MW wind plan is the new isolated Island alternative.

At minimum, we could extrapolate the Nalcor analysis of 500 MW to 800 MW and add a shopping list of items that 800 MW might require. Our conclusion would likely be – yes 800 MW can be added but Holyrood would still be required to provide on-peak capacity so there is no cost savings. The plan is uneconomic and has significant technical risks.

Nalcor has a lot of high wind cutouts and no wind on-peak hours to make them nervous about giving the plants any capacity value. They used a best case scenario of 40% CF and it only saved \$80 million in next plant capital cost, which didn't change their economic decision point much.

The government has made a promise to either get rid of Holyrood or add scrubbers to lessan the environmental impact. The addition of wind wouldn't change the decision to add scrubbers.

They can provide access to a hydrology expert if we want to understand their reservoirs a bit more.

The VISTA program had actual wind profiles from the existing plants modeled so the extrapolation to 300+ MW should be reasonable.

David

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From: Jacobson, David
Sent: Monday, August 13, 2012 4:44 PM
To: 'Danny Northcott'; Molinski, Tom
Cc: Wilson, Paul (MHI)
Subject: RE: Status of Newfoundland Wind Assessment

Attached is my assessment report. This is the best I could do given the time constraints. I tried to put in a very high level economic spin to see if the 10% case made sense. It seems marginal to me but I don't really have enough information to say for certain. We would need:

1. Price of Holyrood generation
2. correlation of wind output with Holyrood output
3. probability of spill
4. Likelihood of wind plan being accepted as an alternative GHG reduction plan to Holyrood upgrade
5. Wind equivalent load carrying capability

If there's an opportunity to discuss wind tomorrow with Charles I'll send an e-mail update. The main purpose of the meeting is to finalize the decision gate 3 report – which doesn't have wind development beyond the committed 80 MW in the base case isolated Island option.

Good luck pulling together a final report. You can try sending me e-mail while I'm away but I'm expecting spotty access

in Ireland and Europe so don't count on me.

David

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From: Jacobson, David
Sent: Monday, August 13, 2012 8:45 AM
To: 'Danny Northcott'; Molinski, Tom
Cc: Wilson, Paul (MHI)
Subject: RE: Status of Newfoundland Wind Assessment

Tom, Danny:

I'll send my report to you guys at the end of the day today as I'm off to Europe tomorrow. Sorry I won't be able to contribute much more.

I've attached a 2004 report from Nalcor that helps understand their thinking on the issues. I don't see the new Hatch report as really changing this original position. It really reaffirms 300 MW by 2035 and spreads the development to 50 MW every 5 years rather than 100 MW every 10 years.

This link is to NRCAN's assessment of Churchill Falls. Section 4.3.7 is pertinent.

<http://www.nrcan.gc.ca/media-room/news-release/2012/31c/6138#toc319473580>

This is a good link that talks about Australia and Tasmania as well as reviews some of the issues and other studies:

<http://www.aemo.com.au/~media/Files/Other/planning/0400-0051%20pdf.pdf>

I'm surprised there's no discussion on how the existing projects correlate with load and Holyrood production to help provide credibility to their study results. Fermeuse was installed in May 2009 (9 Vestas 3 MW turbines) and St. Lawrence (9 Vestas 3 MW turbines) was installed in November 2008. They have three complete years of data for both plants.

David

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From: Danny Northcott [mailto:dnorthcott@hvdc.ca]
Sent: Friday, August 10, 2012 6:03 PM
To: Wilson, Paul (MHI)
Cc: Jacobson, David; Molinski, Tom
Subject: Status of Newfoundland Wind Assessment

Hi Paul,

This is kind of an open letter to give a status update and to trying to establish a summary the situation. Where I am misunderstanding I would appreciate and encourage David or Tom to correct me.

Hatch report was received and reviewed

-No economic information was included in the scope of that report (I've sent an email fishing for the NALCOR economic data, but don't expect we will receive it in time if at all)

-Replacement of Holyrood was also not considered

Therefore, barring any additional information, we would be going out on a limb to fulfill our original scope exactly as

stated.

DELIVERABLE #1 – Due Diligence on Hatch Study

-We can certainly do this, there are several good comments we can make, mostly agreeing, sometimes we would reduce the strength of statements given the quality of the underlying data they are drawn from. There are a few errors, but it's questionable if they are important enough on the final conclusion to include in our report (send directly as a separate list of comments/questions?).

-All our comments are technical in nature and some loose statements about economic viability cannot be confirmed or denied unless we get additional NALCOR info or generate our own analysis, which we don't have time for...

-General statements considering economics from other literature might be supportive but won't really make a strong argument in such a small report.

DELIVERABLE #2 – Assessment of wind replacing Holyrood in an isolated island scenario

-Hatch report doesn't consider this, so we would need to find other references if we want to study this

-I think we need a new deliverable #2

Some ideas:

-Expand on other isolated island scenarios (Tasmania, Hawaii)

-Notes about some challenges experienced in Europe due to high penetration, that is left out of the Hatch report

-Narrative on some additional technical background:

-The importance of inertia in high penetration scenarios for voltage/frequency stability

-The opportunities and limitations of using hydro and thermal to balance wind penetration, some recommendations as to where their limitations lie

-Cold weather considerations

-Overproduction, purchase contracts

-Differences of opinion on how wind penetration is expressed (capacity basis, energy basis)

-Recommendations for Newfoundland on how to maximize wind benefit, what effort is required at each penetration level, where they should stop -> Hatch has provided some analysis in a step by step fashion we could interpret and make recommendations

A CHALLENGE:

If our report is going to be brief and stand on its own, we can't pick on every detail line by line. It will be a challenge to write statements which make sense when read independently but also make sense to someone who has the Hatch report in front of them. I'm assuming it should be stand alone, but maybe not. That needs clarification.

David and Tom are writing some commentary this weekend. Tom and I will do some work to organize and flesh out a report outline next week.

As I understand it, David and Tom will have a meeting including Charles Bown this coming Tuesday. Hopefully we can get some direction on which way he wants us to go and what he is looking for in the final product.

Regards,

Danny