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<p>1 CHAIRMAN:</p> <p>2 Q. I hope we all smiled for the camera, did we?</p> <p>3 So where are we, madam. We are going to get</p> <p>4 to Mr. O'Reilly or Mr. Johnson?</p> <p>5 O'REILLY, Q.C.:</p> <p>6 Q. Mr. Chairman, we have reviewed the transcript.</p> <p>7 There are some issues with respect to the</p> <p>8 accuracy of who is saying what, who is</p> <p>9 responding--</p> <p>10 CHAIRMAN:</p> <p>11 Q. Uh-hm.</p> <p>12 O'REILLY, Q.C.:</p> <p>13 Q. --and I spoke to counsel about that, and I</p> <p>14 think we don't need to take up the</p> <p>15 Commission's time on that. We can correct</p> <p>16 that offline sort of thing.</p> <p>17 CHAIRMAN:</p> <p>18 Q. Sure, yeah.</p> <p>19 O'REILLY, Q.C.:</p> <p>20 Q. It's mainly questions between Mr. Humphries, I</p> <p>21 think, and Mr. Kean. They seem to be a little</p> <p>22 confused, but we can fix that out afterwards,</p> <p>23 so that's it, so -</p> <p>24 CHAIRMAN:</p> <p>25 Q. Editorial accuracy.</p>	<p>1 MR. HUMPHRIES:</p> <p>2 A. Yes, thank you. When we look at these more</p> <p>3 detailed probabilistic reliability studies, we</p> <p>4 start to introduce factors such as the cost,</p> <p>5 societal cost, of the interruptions to</p> <p>6 customers and items like that that we</p> <p>7 traditionally have not included in our cost</p> <p>8 effective analysis and our lease cost</p> <p>9 decision-making to date, and when we--you look</p> <p>10 at the inclusion of these things, while in</p> <p>11 principle, yes, these things do have cost, but</p> <p>12 in relation to what we currently do in our</p> <p>13 isolated scheme as compared to what may be the</p> <p>14 case in an interconnected scheme, when we</p> <p>15 consider a customer outage and the value of a</p> <p>16 customer outage, it causes a little bit of</p> <p>17 concern in how that gets treated, particularly</p> <p>18 in the isolated case as it is today, and will</p> <p>19 probably continue to exist for a long time,</p> <p>20 and the fact that we do incorporate under</p> <p>21 frequency load shedding, and in fact customer</p> <p>22 interruption is a significant contributor to</p> <p>23 the overall reliability of the system, and it</p> <p>24 will continue to be so. That's something</p> <p>25 that's worked for us in Newfoundland over the</p>
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<p>1 O'REILLY, Q.C.:</p> <p>2 Q. That's it, right, and we can fix that, so I</p> <p>3 think it's probably over to Mr. Johnson, yes.</p> <p>4 MR. JOHNSON:</p> <p>5 Q. Okay, good morning, Mr. Chairman,</p> <p>6 commissioners. Good morning, gentlemen. I'd</p> <p>7 just like to circle back a little bit. A few</p> <p>8 issues arising from yesterday's questioning by</p> <p>9 my friend, Ms. Greene, and then there's some</p> <p>10 customer questions that I've been receiving,</p> <p>11 which I'll try to get before you as well for</p> <p>12 your comment this morning. I guess the first</p> <p>13 one I would address to Mr. Humphries. It has</p> <p>14 to do with the probabilistic adequacy studies,</p> <p>15 and I think yesterday you indicated that these</p> <p>16 probabilistic adequacy studies would not be</p> <p>17 addressed to DG3, and you indicated that</p> <p>18 incorporating that level of evaluation in your</p> <p>19 decision-making process could have significant</p> <p>20 implications, and we feel it needs to be</p> <p>21 addressed with stakeholders, the regulator and</p> <p>22 the customers, and I just wanted you to advise</p> <p>23 us in Nalcor's judgment what are the</p> <p>24 significant implications that could arise</p> <p>25 because that wasn't developed on the record.</p>	<p>1 years, and it's not the norm. As I said</p> <p>2 yesterday, it's not the norm, but if we start</p> <p>3 to introduce to put a cost on those</p> <p>4 interruptions, I have the concern that we may</p> <p>5 be unduly disadvantaging, for argument's sake,</p> <p>6 an interconnected alternative because we have</p> <p>7 a solution that works. It probably doesn't</p> <p>8 work anywhere else, but it works here, and is</p> <p>9 that really fundamentally where we want to go,</p> <p>10 and we need to assess that and fully explore</p> <p>11 what the implications of these studies would</p> <p>12 mean on a go-forward basis, and with respect</p> <p>13 to both alternatives, you can look at it from</p> <p>14 the interconnected alternative, and these</p> <p>15 types of outages are not going to be prevalent</p> <p>16 in the interconnected phase. When we</p> <p>17 interrupt the customer it's going to be</p> <p>18 because we have a problem, and it's not--we're</p> <p>19 not interrupting him to--or them to</p> <p>20 necessarily prevent further deterioration of</p> <p>21 the system, but that's the standard in the</p> <p>22 isolated case, and it's going to continue to</p> <p>23 be, so all I'm saying from the perspective--we</p> <p>24 have to think through--and this whole</p> <p>25 philosophy and look at how it applies to the</p>

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<p>1 way we have planned our isolated system, and</p> <p>2 it has been reasonable, and will it continue</p> <p>3 to be reasonable to do that, and if it's not--</p> <p>4 it's a fundamental shift in our thinking, and</p> <p>5 all I'm saying, that we're not at a stage to</p> <p>6 make a determination if we want to move off</p> <p>7 that yet, or even if we should, or it's</p> <p>8 prudent to do it, so that's the basic concern</p> <p>9 we'll have with--and the major issue with</p> <p>10 those types of studies.</p> <p>11 MR. JOHNSON:</p> <p>12 Q. The other point I'd like to ask about is in</p> <p>13 relation to the discussion around 11 gas</p> <p>14 turbines, and it was indicated that if we were</p> <p>15 to advance or put in 11 gas turbines to</p> <p>16 provide the same level of reliability on some</p> <p>17 measurements as the isolated option, that that</p> <p>18 would involve a 350 million dollar effect on</p> <p>19 the CPW to the infeed option, which is not</p> <p>20 currently reflected in the CPW analysis for</p> <p>21 that option, and I'd like some clarity on</p> <p>22 Nalcor's position on this potential</p> <p>23 proposition for rate payers.</p> <p>24 MR. HUMPHRIES:</p> <p>25 A. You mean what the--the impact that that 350</p>	<p>1 connection with Page 219 of the transcript,</p> <p>2 Line 6, and your answer was in connection from</p> <p>3 my learned friend, Ms. Greene, having to do</p> <p>4 with the financial analysis that you did for</p> <p>5 the PPA, and there being--and was there any</p> <p>6 contemplation of changing the price, and Ms.</p> <p>7 Greene asked you--"I was--just all you did was</p> <p>8 escalate it by two percent and you assumed</p> <p>9 there would be no off-ramps. If there was any</p> <p>10 change in market conditions relating to</p> <p>11 pricing that Hydro would be locked into paying</p> <p>12 this as a take or pay," and your answer was,</p> <p>13 "If Hydro required less power than provided</p> <p>14 for in the supply arrangements, then Hydro and</p> <p>15 Nalcor would work to monetize that</p> <p>16 differential and supply requirement in order</p> <p>17 to minimize any rate payer benefits." Were</p> <p>18 you indicating--is that what you were</p> <p>19 intending to -</p> <p>20 MR. GOUDIE:</p> <p>21 A. No, it's not. As I read that today,</p> <p>22 obviously, what I meant to say was to minimize</p> <p>23 any rate payer impacts.</p> <p>24 MR. JOHNSON:</p> <p>25 Q. I thought so, okay.</p>
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<p>1 million dollars would be?</p> <p>2 MR. JOHNSON:</p> <p>3 Q. Well, what's the probability that this needs</p> <p>4 to be incurred from Nalcor's judgment?</p> <p>5 MR. HUMPHRIES:</p> <p>6 A. From a probability perspective as, you know,</p> <p>7 we've indicated in the past, the probability</p> <p>8 of an event, loss of the--failure of the</p> <p>9 Labrador-Island link, it has a design as we</p> <p>10 propose of 1-in-50-year failure but, then</p> <p>11 again, we combine that with the probability of</p> <p>12 that failure resulting at a time when it</p> <p>13 actually has an impact on customers. The</p> <p>14 probabilities get down fairly low, in excess</p> <p>15 of 1-in-50-year event. It's somewhere in the</p> <p>16 range of probably a 1-in-200- to 1-in-300-year</p> <p>17 event that we would have--be actually in a</p> <p>18 situation where we would have the levels of</p> <p>19 unserved energy that we have indicated in our</p> <p>20 deterministic modelling that was there, these</p> <p>21 exposures that we would be trying to cover off</p> <p>22 with the 11 gas turbines, so it's a small</p> <p>23 probability that we would be there.</p> <p>24 MR. JOHNSON:</p> <p>25 Q. The question to Mr. Goudie came on--in</p>	<p>1 MR. GOUDIE:</p> <p>2 A. Thank you.</p> <p>3 MR. JOHNSON:</p> <p>4 Q. Thank you. Further clarification as it</p> <p>5 relates to the AC Integration Study, and I'd</p> <p>6 address this to Mr. Humphries. Mr. Humphries,</p> <p>7 as you're aware, the MHI report said at Page</p> <p>8 53, for the record, that "In the absence of</p> <p>9 integration studies there may be unidentified</p> <p>10 risks in proceeding with the project at this</p> <p>11 time," and they say, "For example, the studies</p> <p>12 could identify the requirement for additional</p> <p>13 back-up generation, new transmission, enhanced</p> <p>14 protection schemes or other systems,</p> <p>15 additions," and I was interested in knowing</p> <p>16 whether you would accept that these are the</p> <p>17 types of recommendations--or the types of</p> <p>18 requirements rather that could be identified</p> <p>19 in an integration study as MHI states.</p> <p>20 MR. HUMPHRIES:</p> <p>21 A. Yes, they are the types of things that would</p> <p>22 normally be identified in those studies. The</p> <p>23 level of back-up generation, I'm not positive</p> <p>24 that that would come out of the integration</p> <p>25 study in itself but, again, it's possible.</p>

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<p>1 MR. JOHNSON:</p> <p>2 Q. Because there was--I guess when I looked at</p> <p>3 the transcript from February 13th, I was--at</p> <p>4 Page 193, and maybe it's worthwhile to bring</p> <p>5 it up. At Line 18 I--we're having a</p> <p>6 discussion about costs that have been</p> <p>7 contemplated, and I said "When you say all</p> <p>8 those items got costed in, would that have</p> <p>9 contemplated costing in any back-up generation</p> <p>10 or beefed-up lines," and your answer was, "No,</p> <p>11 the system integration does not address system</p> <p>12 reliability issues." Can you clarify? Is</p> <p>13 there any conflict between what MHI is saying</p> <p>14 and what you were saying on that point?</p> <p>15 MR. HUMPHRIES:</p> <p>16 A. No, and from the perspective of the back-up</p> <p>17 generation, I guess, if--and the--an</p> <p>18 integration could identify the requirement for</p> <p>19 back-up generation if the configuration--if</p> <p>20 we're not able to perform adequately through a</p> <p>21 given contingency situation, whether that be a</p> <p>22 line out or trip of the pole not, but from the</p> <p>23 preliminary--our--the previous studies that</p> <p>24 we've done in 1998 and the preliminary work we</p> <p>25 did in preparation for DG2 internally, we did</p>	<p>1 Labrador. It's a statement of provincial</p> <p>2 energy policy. The policy commitment is fair.</p> <p>3 MR. JOHNSON:</p> <p>4 Q. The second question is how many homes are</p> <p>5 directly affected by the Holyrood thermal</p> <p>6 plant, and I presume they mean by "omissions."</p> <p>7 I don't know if you have the answer to that.</p> <p>8 MR. BENNETT:</p> <p>9 A. I don't have a specific answer, but it would</p> <p>10 say that the omissions of the Holyrood thermal</p> <p>11 generating facility have been an ongoing</p> <p>12 community concern. Those concerns have been</p> <p>13 expressed on a continuous and regular basis in</p> <p>14 a variety of different situations, and I think</p> <p>15 we'd all recognize that those are a public</p> <p>16 concern.</p> <p>17 MR. JOHNSON:</p> <p>18 Q. The next question was has Nalcor considered a</p> <p>19 relocation plan for residents who want to</p> <p>20 move, and Nalcor could then resell the homes</p> <p>21 to others who may not have a problem living</p> <p>22 near the plant.</p> <p>23 MR. BENNETT:</p> <p>24 A. No, we have not considered the relocation</p> <p>25 plan.</p>
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<p>1 not identify back-up generation as an issue at</p> <p>2 all, just to clarify that, you know, from the</p> <p>3 integration perspective.</p> <p>4 MR. JOHNSON:</p> <p>5 Q. Okay, no, that's good. I guess then what I'd</p> <p>6 like to do is turn to some questions from the</p> <p>7 customers and interested citizens who want me</p> <p>8 to put forward some questions on their behalf</p> <p>9 for the appropriate panel members'</p> <p>10 consideration. The first question has to do</p> <p>11 with the proposed upgrade to the Holyrood</p> <p>12 facility in relation to environmental</p> <p>13 upgrades, and the question states as follows</p> <p>14 that "MHI states that the question as to</p> <p>15 whether this is necessary, as switching to .7</p> <p>16 sulphur fuel has accomplished as much as is</p> <p>17 necessary to meet provincial targets for</p> <p>18 sulphur dioxide," and the first question</p> <p>19 related to this is--Nalcor helped draft the</p> <p>20 2007 Energy Plan--what did Nalcor recommend</p> <p>21 the 600 million scrubber upgrade, which MHI</p> <p>22 states is not needed?</p> <p>23 MR. BENNETT:</p> <p>24 A. I'm the--the 2007 Energy Plan is a document</p> <p>25 issued by the Government of Newfoundland</p>	<p>1 (9:45 a.m.)</p> <p>2 MR. JOHNSON:</p> <p>3 Q. Okay. The next question is if, according to</p> <p>4 the MHR report, presumably at Page 196, which</p> <p>5 is what the questioner suggests, if there was</p> <p>6 no 600 million dollar Newfoundland policy</p> <p>7 upgrade, the CPW preference would 1.8 billion,</p> <p>8 and the questioner says, "This is a bit</p> <p>9 reduction of 400 million dollars in the PCW,"</p> <p>10 and the question is "Please comment."</p> <p>11 MR. BENNETT:</p> <p>12 A. There's still a 1.8 billion dollar preference</p> <p>13 for the interconnected scenario.</p> <p>14 MR. JOHNSON:</p> <p>15 Q. Next question has to do with the--with respect</p> <p>16 to 100 percent equity financing of the</p> <p>17 generation component of Muskrat Falls. "Could</p> <p>18 you please ask the following questions:</p> <p>19 Please provide the likely capital structure</p> <p>20 for Muskrat Falls Generation Project, which</p> <p>21 was used to examine the Bruce power type rate</p> <p>22 profile over time with foregone equity income</p> <p>23 matched with higher future returns in order to</p> <p>24 prevent rate shock and to create lower rates</p> <p>25 than would apply under cost of service?" Do</p>

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<p>1 you follow that?</p> <p>2 MR. BENNETT:</p> <p>3 A. No, I can't say I followed that one.</p> <p>4 MR. JOHNSON:</p> <p>5 Q. Okay.</p> <p>6 CHAIRMAN:</p> <p>7 Q. Thank you very much.</p> <p>8 O'REILLY, Q.C.:</p> <p>9 Q. I was wondering in terms of the reference</p> <p>10 question. I'm just wondering how -</p> <p>11 CHAIRMAN:</p> <p>12 Q. Does anybody understand the question, and I'm</p> <p>13 not trying to facile, but I have no idea</p> <p>14 what's being said but, I mean, you know, I'd</p> <p>15 take your -</p> <p>16 MR. JOHNSON:</p> <p>17 Q. I think what the question may be getting at is</p> <p>18 the--Nalcor has developed a power purchase</p> <p>19 arrangement, and I think the materials suggest</p> <p>20 that it was in some fashion modelled after the</p> <p>21 use of such a mechanism elsewhere, and I don't</p> <p>22 know if rereading would add to it, or perhaps</p> <p>23 I'm best off putting in writing and just</p> <p>24 proposing it in that fashion.</p> <p>25 MR. GOUDIE:</p>	<p>1 don't you?</p> <p>2 O'REILLY, Q.C.:</p> <p>3 Q. Yes, that's fair and it's not the--I mean, the</p> <p>4 question--the nature of the question seem to</p> <p>5 get down into rates. It was difficult to</p> <p>6 follow, and I was just wondering for purposes</p> <p>7 of moving and informing this process, whether</p> <p>8 it was down into--you know, was something that</p> <p>9 we should be considering, but I think Mr.</p> <p>10 Goudie's suggestion probably is the way to</p> <p>11 deal with it if that's reasonable.</p> <p>12 MR. JOHNSON:</p> <p>13 Q. Okay.</p> <p>14 O'REILLY, Q.C.:</p> <p>15 Q. Yeah.</p> <p>16 MR. JOHNSON:</p> <p>17 Q. Okay, I'll do that because some of the other</p> <p>18 questions have to do with the Bruce power</p> <p>19 arrangement as well--</p> <p>20 O'REILLY, Q.C.:</p> <p>21 Q. Yeah.</p> <p>22 MR. JOHNSON:</p> <p>23 Q. --and I think I'll do it in that fashion.</p> <p>24 Here is a question that I've been asked to put</p> <p>25 to you as well. It regards a Nalcor statement</p>
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<p>1 A. If I can make a suggestion, that type of</p> <p>2 question--I mean, it has a certain convoluted</p> <p>3 character to it. If you submitted it as an</p> <p>4 RFI, we could sort of properly think our way</p> <p>5 through it and understand the question and</p> <p>6 answer it.</p> <p>7 MR. JOHNSON:</p> <p>8 Q. Okay, and just for clarity too, Mr. Chairman,</p> <p>9 as regards to--I think as you can probably</p> <p>10 appreciate, I'm getting questions that are not</p> <p>11 necessarily within the reference altogether--</p> <p>12 CHAIRMAN:</p> <p>13 Q. Sure. Oh no, yeah.</p> <p>14 MR. JOHNSON:</p> <p>15 Q. --and I guess I've sort of made a policy</p> <p>16 decision on that where--I pose the question as</p> <p>17 it's asked--</p> <p>18 CHAIRMAN:</p> <p>19 Q. Yes.</p> <p>20 MR. JOHNSON:</p> <p>21 Q. --and then if Nalcor wants to say it's</p> <p>22 outside, I just leave it at that as opposed to</p> <p>23 saying, "I'm going to censor it" -</p> <p>24 CHAIRMAN:</p> <p>25 Q. Yeah. I think that's fair, Mr. O'Reilly,</p>	<p>1 in Exhibit #36, and the statement quoted, and</p> <p>2 I'm not sure whereabouts in the exhibit that</p> <p>3 this statement comes from, but the quote is,</p> <p>4 "This escalating supply price is lower than</p> <p>5 would be indicated initially by the cost of a</p> <p>6 service framework and is applied only to power</p> <p>7 actually used by rate payers early, the</p> <p>8 earlier burden placed on rate payers at that</p> <p>9 time is minimized." Is that in accordance</p> <p>10 with what that exhibit says?</p> <p>11 O'REILLY, Q.C.:</p> <p>12 Q. And just so everybody can follow, that's in</p> <p>13 the latter half of the last paragraph on Page</p> <p>14 1.</p> <p>15 MR. JOHNSON:</p> <p>16 Q. Okay.</p> <p>17 O'REILLY, Q.C.:</p> <p>18 Q. I can give you exactly the right place there.</p> <p>19 MR. JOHNSON:</p> <p>20 Q. Okay, and the question in relation to that,</p> <p>21 Mr. Bennett, would be, "Does this artificially</p> <p>22 lower power rates created for the 2017 rate</p> <p>23 payer require future generations to pay higher</p> <p>24 rates to compensate for the early shortfall?"</p> <p>25 MR. BENNETT:</p>

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1 A. I think at the outset maybe it's important to
2 point out there is no shortfall as such with
3 the return and equities earned over the entire
4 50-year period. Another observation, I think,
5 that might be worth considering would be the
6 cost of the PPA compared to the cost of the
7 isolated alternative, and in all cases Muskrat
8 Falls energy both early in the study period
9 and late in the study period is lower cost
10 than the alternative, and the alternative
11 being increased reliance on thermal generation
12 at Holyrood.

13 MR. JOHNSON:

14 Q. And I think it would be probably appropriate
15 if--because I know--I realize I'm putting
16 these to you and they're complex questions, so
17 that if Nalcor felt that they wanted to add
18 more to the answer in writing, I guess we
19 could do it in that fashion. The second part
20 of the question is again pertaining to Exhibit
21 36--is "If the 2017 rate payer only pays for
22 the power actually used, like 40 percent of
23 Muskrat Falls, who pays for the other 40
24 percent. If there an unpaid deficit that has
25 to be paid future generations." I guess it's

1 Q. Could you just expand on that so that we can--
2 so somebody watching can fully understand what
3 you're -

4 MR. BENNETT:

5 A. Steve, do you want to step into that?

6 MR. GOUDIE:

7 A. Yeah, sure, it's Steve Goudie. I think with
8 respect to the particulars of that third
9 question, the intergenerational equity issue
10 would be that under a conventional cost of
11 service the return on equity for the utility
12 is highest in the early years, and as that
13 asset is depreciated, the return on equity
14 declines, so that the unit cost of production
15 from that facility would be highest in its
16 early years and lowest in its later years, so
17 people 50 years from now will pay very little
18 for the power from a long-term generation
19 asset like a hydro plant, whereas people in
20 the early years would be paying more. Under
21 the PPA approach that we have, the real 2010
22 price for power from that facility is constant
23 across the entire planning period, so the only
24 adjustment to that price is for this two
25 percent general inflation rate.

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1 driving at similar points.

2 MR. BENNETT:

3 A. That's a similar point, and the answer is that
4 all the costs of Muskrat Falls are recovered
5 in the PPA, so there's no outstanding costs to
6 recover.

7 MR. JOHNSON:

8 Q. The third question relates to a further
9 statement in that exhibit, which is quoted as
10 follows: "A supply price for its output set
11 in 2010 constant dollars helped address
12 intergenerational equity issues associated
13 with large, public expenditures," and I'm
14 asked to "Ask Nalcor to comment on the
15 intergenerational equity issues and, in
16 particular, does the 2035 rate payer have to
17 pay more so that the 2017 rate payer can pay
18 less?"

19 MR. BENNETT:

20 A. And I guess the response is in a similar
21 context as I mentioned earlier in comparison
22 to the isolated alternative, even the 2035
23 rate payer is paying less than they would've
24 otherwise in that isolated scenario.

25 MR. JOHNSON:

1 MR. JOHNSON:

2 Q. Okay.

3 MR. BENNETT:

4 A. So people 50 years from now in inflation-
5 adjusted terms will pay exactly the same price
6 per unit of power as we would pay in 2017.

7 MR. JOHNSON:

8 Q. So the current generation is not hosing the
9 future generation, is that the takeaway?

10 MR. BENNETT:

11 A. Well, I wouldn't characterize it like that,
12 but -

13 MR. JOHNSON:

14 Q. I guess the customer wants to know that,
15 right?

16 MR. BENNETT:

17 A. Well, I mean, under existing cost of service,
18 customers 50 years from now get a very good
19 deal. They get a better deal than the people
20 today.

21 MR. JOHNSON:

22 Q. So if you could put it in Bay d'Espoir terms,
23 for instance, I guess that would be an example
24 of how now we enjoy the fact that it's an aged
25 asset and it's been depreciated and -

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<p>1 MR. GOUDIE:</p> <p>2 A. That's correct.</p> <p>3 (10:00 a.m.)</p> <p>4 MR. BENNETT:</p> <p>5 A. And maybe building on that point, the</p> <p>6 customers in 2068, who have an asset that's--</p> <p>7 whose costs are fully recovered will have a</p> <p>8 similar situation as we've seen with Bay</p> <p>9 d'Espoir.</p> <p>10 CHAIRMAN:</p> <p>11 Q. Can't wait. Excuse me.</p> <p>12 MR. JOHNSON:</p> <p>13 Q. Okay. I guess there was a--I guess a related</p> <p>14 question--and, again, there might be a term of</p> <p>15 reference issues with it, but maybe not. It</p> <p>16 pertains to the answer to the consumer</p> <p>17 question that was posed--that I posed on</p> <p>18 behalf of a consumer, being CAKPL-27, which</p> <p>19 was asked--or was answered in a revised format</p> <p>20 yesterday, having to do with the incremental</p> <p>21 stand-alone kilowatt hour cost of Muskrat</p> <p>22 Falls power delivered to Soldier's Pond and,</p> <p>23 essentially, they are wishing me to direct</p> <p>24 your attention to Page 6 of the reply and, in</p> <p>25 particular, Column 5, which has a nominal,</p>	<p>1 of both expansion plans are captured in our</p> <p>2 analysis. The second question then is what we</p> <p>3 use for analysis and what we use for</p> <p>4 comparison rather and providing context around</p> <p>5 those numbers, so if we look at an annual cash</p> <p>6 flow stream that extends over a period of 50</p> <p>7 years, it's sometimes helpful to put that in</p> <p>8 context, so from an economic analysis</p> <p>9 perspective we can use various series of</p> <p>10 metrics in order to put that number into</p> <p>11 context so that we can understand it. So the</p> <p>12 14.3 cents escalating price is equivalent to</p> <p>13 the costs that are contained in Exhibit 99,</p> <p>14 and it provides a useful reference when you're</p> <p>15 comparing, for example, to the escalating</p> <p>16 price of fuel at Holyrood, and the other costs</p> <p>17 that are associated with that. I mean, I</p> <p>18 think when we're talking about this and</p> <p>19 explaining the concept we can look at a cost</p> <p>20 series as an escalating price, as we might say</p> <p>21 in real terms, or we can look at it as a</p> <p>22 levelized unit price or LUEC, and we often use</p> <p>23 that price in the industry as well. Those are</p> <p>24 equivalent costs, and are used to put context</p> <p>25 and explanation around the actual specific</p>
Page 22	Page 24
<p>1 annual cost per megawatt hour of 239 dollars</p> <p>2 of megawatt hour in 2017, and they want me to</p> <p>3 ask Nalcor to compare the Muskrat Falls 2017</p> <p>4 direct costs of 23.9 cents per kilowatt hour</p> <p>5 to the 14.3 cents per kilowatt hour often used</p> <p>6 by government and Nalcor, I guess, in speaking</p> <p>7 rates. I presume that's what the question is</p> <p>8 getting at.</p> <p>9 MR. BENNETT:</p> <p>10 A. And I think that, you know, in order to put</p> <p>11 that in its full context we need to look at</p> <p>12 the entire response to the RFI, so if we look</p> <p>13 at the cost associated with Muskrat Falls with</p> <p>14 the Labrador-Island transmission link with</p> <p>15 Holyrood, its upgrades, the associated thermal</p> <p>16 generating facilities, all of those costs are</p> <p>17 captured in our analysis, and you can see</p> <p>18 those on the record in a couple of different</p> <p>19 places. Some are confidential, but others are</p> <p>20 in the public domain so, for example, Exhibit</p> <p>21 99 has all of the costs of both alternatives.</p> <p>22 There's a common database of all of that</p> <p>23 information, and that's where we derive our</p> <p>24 CPW analysis from, so I think the first and</p> <p>25 most important point is that all of the costs</p>	<p>1 costs, dollar numbers, that are used over the</p> <p>2 course of the 50-year study.</p> <p>3 MR. JOHNSON:</p> <p>4 Q. In terms of--does that conclude your answer to</p> <p>5 this particular question?</p> <p>6 MR. BENNETT:</p> <p>7 A. I think those are the key points, so for</p> <p>8 example on page 4, we have those incremental</p> <p>9 costs for Muskrat Falls and transmission,</p> <p>10 compared to the Isolated-Island thermal costs,</p> <p>11 expressed as LUEC. On the next page -</p> <p>12 MR. JOHNSON:</p> <p>13 Q. Okay, do you want to bring that up and just</p> <p>14 explain as we're going through, Mr. Bennett,</p> <p>15 so that -</p> <p>16 MR. BENNETT:</p> <p>17 A. So the second graph on page 4.</p> <p>18 MR. MCNIVEN:</p> <p>19 Q. Page 4 of 27?</p> <p>20 MR. BENNETT:</p> <p>21 A. Oh I'm sorry, page 4 of 7, maybe I have</p> <p>22 different paging--if we could go a little</p> <p>23 further down, I'm sorry, looks like I have an</p> <p>24 earlier--there we go. There's a levelized</p> <p>25 price. If you compare the Isolated</p>

1 alternative to the Muskrat Falls and Labrador-
 2 Island Transmission Link.
 3 MR. JOHNSON:
 4 Q. Okay, so your red line is your Isolated?
 5 MR. BENNETT:
 6 A. Yeah.
 7 MR. JOHNSON:
 8 Q. And your blue line is the Muskrat Falls and
 9 Labrador-Island Link, so just give us a
 10 narrative now so someone at home can
 11 understand this.
 12 MR. BENNETT:
 13 A. So now we've taken all of the costs over the
 14 50 year study period and we have expressed it
 15 now as a constant amount paid in each year.
 16 So this is equivalent to the actual series of
 17 cashflows and the cash amounts that are
 18 incorporated in our 50 year study period.
 19 MR. JOHNSON:
 20 Q. Okay.
 21 MR. BENNETT:
 22 A. And if we go to the next slide, the next graph
 23 here, now we see the escalating price.
 24 MR. JOHNSON:
 25 Q. So just go back to your first graph for a

1 CPW preference.
 2 CHAIRMAN:
 3 Q. From the--that's a cumulative difference there
 4 that turns out to be, in terms of present
 5 value, the 2 billion dollars or whatever it is
 6 we're talking about.
 7 MR. BENNETT:
 8 A. That's right.
 9 MR. JOHNSON:
 10 Q. And similarly, and I guess Mr. Bennett, I
 11 guess--I'm not being facetious, but I'm asking
 12 you to really explain this and I know you guys
 13 are emersed into it, but you know, because
 14 people want to understand it.
 15 MR. BENNETT:
 16 A. Oh I understand, I understand, these are
 17 complex topics, I understand.
 18 MR. JOHNSON:
 19 Q. So if you go to the next graph -
 20 MR. BENNETT:
 21 A. Now we've expressed it in an escalating term,
 22 so we have an amount now that increases a
 23 percentage year over year, and if we look back
 24 in 2017 at the beginning of the blue curve on
 25 this line, you can see that there's

1 second and I'll ask you a question now a
 2 customer would want to know. How come I
 3 should be happy about that?
 4 MR. BENNETT:
 5 A. Well the reason we should be happy about that
 6 is because the cost of the Muskrat Falls and
 7 Labrador-Island Link is substantially lower
 8 than the costs associated with the Isolated
 9 Link.
 10 MR. JOHNSON:
 11 Q. And put that in terms now with what you're
 12 seeing on the graph?
 13 MR. BENNETT:
 14 A. Well we see the LUEC for Muskrat Falls and
 15 LIL, the blue line, being a much lower annual
 16 amount than the red line, which is the
 17 equivalent expression of the cost associated
 18 with Holyrood, to use a fuel with pollution
 19 upgrades and a thermal generation associated
 20 with the Isolated plan.
 21 CHAIRMAN:
 22 Q. So that equals the two--in the cumulative
 23 sense, the two billion -
 24 MR. BENNETT:
 25 A. You could get back to the 2.2 billion dollar

1 approximately--it's sort of hard to read on
 2 this scale, but this is where the 143 dollars
 3 comes from. And now the 143 dollars escalates
 4 over time, and that's useful in comparison to
 5 our Isolated case, which has a substantial
 6 amount of fuel in it, so the bill for Holyrood
 7 will continue to escalate over time in the
 8 same manner.
 9 MR. JOHNSON:
 10 Q. Okay, and so again then, what makes us happy
 11 if someone is sitting at home about that
 12 graph?
 13 MR. BENNETT:
 14 A. The same point here, the gap between the blue
 15 line which is the Interconnected scenario and
 16 the red line, which is the Isolated scenario.
 17 And in both cases, just as in the same manner
 18 as the previous graph, the blue line is lower
 19 than the red line. So there's been lots of
 20 discussion about rates, there's been lots of
 21 discussion about the cost of energy, but at
 22 the end of the day, it is the actual cost flow
 23 to cost stream that's included in Exhibit 99
 24 and the other related documents that we used
 25 to derive those long-term projections. And

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<p>1 when, outside of this form when we hear people</p> <p>2 talking about the impact on consumer rates,</p> <p>3 wholesale rates, Newfoundland Power's rates,</p> <p>4 projected Domestic rates, all of that analysis</p> <p>5 comes from the database and is not derived</p> <p>6 directly from these analytical expressions.</p> <p>7 So these are really helpful to us in the</p> <p>8 industry, but from the consumer perspective,</p> <p>9 you have to look at the long-term rate</p> <p>10 projections that are used and are derived from</p> <p>11 the original cost numbers that are contained</p> <p>12 in our database.</p> <p>13 MR. JOHNSON:</p> <p>14 Q. So in terms of your red number being your</p> <p>15 Isolated escalating, the number in your lower</p> <p>16 graph, why--what's the narrative, why is that</p> <p>17 line going up in a fashion higher than the</p> <p>18 blue line?</p> <p>19 MR. BENNETT:</p> <p>20 A. Most fundamentally it's because the costs</p> <p>21 associated with that alternative are higher.</p> <p>22 MR. JOHNSON:</p> <p>23 Q. In plain English.</p> <p>24 MR. BENNETT:</p> <p>25 A. Well, we spend more on the Isolated</p>	<p>1 power from Labrador. It starts at 238 in</p> <p>2 2017, it declines, then stabilizes and then</p> <p>3 turns up a little bit late in the period. So</p> <p>4 that's the incremental nominal unit costs that</p> <p>5 ultimately enters into our total revenue</p> <p>6 requirement, but this is not a rate that a</p> <p>7 consumer pays. This is our incremental cost</p> <p>8 of production, if we can sort of characterize</p> <p>9 it that way. What matters is what these costs</p> <p>10 are doing over time. On a weighted basis,</p> <p>11 when that moves into our total revenue</p> <p>12 requirement, this would only account for maybe</p> <p>13 25 percent of our output, so these costs go</p> <p>14 into our total revenue requirement and get</p> <p>15 blended through to come up with the total</p> <p>16 revenue requirement on which rates are based.</p> <p>17 MR. JOHNSON:</p> <p>18 Q. So what other costs are they getting blended</p> <p>19 with then?</p> <p>20 MR. GOUDIE:</p> <p>21 A. They're getting blended with the existing</p> <p>22 system costs.</p> <p>23 MR. JOHNSON:</p> <p>24 Q. Okay, and tell the person at home what the</p> <p>25 existing system is.</p>
Page 30	Page 32
<p>1 alternative for fuel, for pollution controls,</p> <p>2 for replacement of Holyrood for the ongoing</p> <p>3 maintenance for the new thermal generating</p> <p>4 facilities than we do in the Interconnected</p> <p>5 scenario. This is another way of getting back</p> <p>6 to the 2.2 billion dollar CPW preference.</p> <p>7 MR. JOHNSON:</p> <p>8 Q. Okay, so we want to make sure we've answered</p> <p>9 this question, just to recap it then, ask</p> <p>10 Nalcor to compare the Muskrat Falls 2017</p> <p>11 direct costs of 23.9 cents per kilowatt hour</p> <p>12 to the 14.3 cents per kilowatt hour often used</p> <p>13 by government and Nalcor. So answer that in a</p> <p>14 nice bow for this customer.</p> <p>15 MR. GOUDIE:</p> <p>16 A. Steve Goudie. Maybe I can try to help out</p> <p>17 here. If we move back to the first graph, if</p> <p>18 we could? No, that's the second graph, okay,</p> <p>19 this graph. So what this chart represents is</p> <p>20 the incremental costs of Muskrat Falls, plus</p> <p>21 Soldier's Pond delivered or--I'm sorry,</p> <p>22 Muskrat Falls plus transmission delivered as</p> <p>23 Soldier's Pond, that is the blue line. So</p> <p>24 these are the annual nominal costs of an</p> <p>25 incremental basis associated with bringing</p>	<p>1 MR. GOUDIE:</p> <p>2 A. The existing system would be our hydro</p> <p>3 electric base of Bay D'Espoir, Upper Salmon,</p> <p>4 Hynes Lake, et cetera. So we have two kind of</p> <p>5 cost buckets, we have our incremental cost</p> <p>6 bucket which is what this analysis represents;</p> <p>7 and then we have our existing cost bucket and</p> <p>8 that existing cost bucket accounts for maybe</p> <p>9 75 percent of our output in the early years,</p> <p>10 but it's very low cost. So the higher</p> <p>11 incremental cost comes in and gets blended</p> <p>12 with the lower existing cost and that turns</p> <p>13 into our overall revenue requirement. Now the</p> <p>14 red line here represents the, comparatively,</p> <p>15 the annual thermal incremental costs</p> <p>16 associated with the Isolated-Island Option, so</p> <p>17 it's all the incremental, OMN, fuel and</p> <p>18 capital related to both Holyrood and our base</p> <p>19 load thermal plant going forward and we have</p> <p>20 to do that to make sure that we're comparing</p> <p>21 apples to apples because what matters to the</p> <p>22 customer is not the rate in 2017, what matters</p> <p>23 is how that rate changes over time, and that's</p> <p>24 the analysis we are obviously undertaking here</p> <p>25 in our CPW analysis. So this chart is</p>

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1 actually very important because it conveys
 2 sort of the economic prize that we all receive
 3 once we get to where we're trying to get to,
 4 and that is that our incremental cost
 5 structure has now changed from an uncertain
 6 and increasing cost to a very stable and known
 7 cost. And this kind of cost structure will
 8 deliver declining real electricity prices to
 9 consumers over time. So once we move from
 10 this first chart, we want to say--well, we
 11 want to reflect on the fact that these nominal
 12 costs are changing each and every year, so how
 13 can we translate that into an economic message
 14 that we can sort of encapsulate what the
 15 message is into a single number, and that's
 16 why we calculate LUEC and that's why we
 17 calculate escalating supply crisis because
 18 we're trying to take the same information
 19 that's in this chart, which is changing each
 20 and every year, and we're trying to translate
 21 that back into a single number that we can
 22 kind of get our head around and make a fair
 23 comparison. So that's what we do when we move
 24 to chart No. 2, we take each of those two
 25 nominal costs over time and we translate them

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1 into single relevant economic numbers that
 2 open up what the message is. So the
 3 incremental costs associated with Muskrat
 4 Falls plus LIL delivered at Soldier's Pond
 5 across the planning period, would be in the
 6 order of 200 dollars per megawatt hours,
 7 levelized; whereas our incremental thermal
 8 would be in the order of 350, 360 dollars
 9 levelized. It is that differential that
 10 ultimately makes a huge contribution to the
 11 Interconnected Island preference of 2.2
 12 billion. And then when we move to the next
 13 chart, we're just going to take the LUEC and
 14 we're going to restate that into an equivalent
 15 escalating price for a comparison against
 16 something like a Holyrood cost, which tends to
 17 escalate over time because of fuel. So all
 18 we're doing is that we're restating the same
 19 numbers in a different algebraic manner for
 20 different purposes, but they all have the same
 21 present value and they all mean the same at
 22 the end of the day in economic terms.

23 MR. JOHNSON:

24 Q. Okay.

25 CHAIRMAN:

1 Q. So you sum it up and divide it by the number
 2 of years to get that straight line.

3 MR. GOUDIE:

4 A. The straight line is the present value of all
 5 the costs over the 50 year period, divided
 6 through by the present value of all the
 7 output. It's a division of those two present
 8 values, and that's just the way the algebra
 9 works, but they are identical. In present
 10 value these three different series for the two
 11 alternatives are identical.

12 MR. JOHNSON:

13 Q. So just come--if I could ask then regarding
 14 page 6 of 7, if we could look at column 5,
 15 this is the numerical representation of the
 16 nominal annual cost per megawatt hour and so
 17 I'm just going to start at the top of the line
 18 there, \$239.00 in 2017, and then I'm going to
 19 pick, let's say 2037 and I think if I come
 20 across, that's \$192.00 and that's the figure
 21 in 2010 dollars, I take it, is it?

22 MR. GOUDIE:

23 A. No, that is the nominal dollars of the day, so
 24 it's actually declining in nominal terms, in
 25 real terms it's declining at even a steeper

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1 rate. And that's the cost stability on our
 2 incremental costs that we're talking about.
 3 It's a change in the cost structure, a
 4 positive change in the cost structure.

5 MR. JOHNSON:

6 Q. Thank you. Some of these are very long
 7 commentaries and I have to tease a question
 8 out, so I have to put that in writing.
 9 There's a further question actually on CA-27,
 10 our revision one. I'm asked to direct you to
 11 page 6, column 2 for Muskrat Falls purchases
 12 and they're directing our attention to 2017
 13 which is \$166,054,000 for Muskrat Falls
 14 purchases and the question is, is this on a
 15 PPA basis?

16 MR. GOUDIE:

17 A. This is Steve Goudie. The purchase amount of
 18 166 million in 2017 would be the nominal
 19 annual cost in that year.

20 MR. JOHNSON:

21 Q. And is that on a PPA basis?

22 MR. GOUDIE:

23 A. At that point it's not, but it ultimately
 24 feeds--all the nominal costs feed into a total
 25 and it's the total cost that would be present

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1 valued or put into CPW terms, but you have to
 2 build up your costs first in nominal dollars,
 3 which is what this is doing here.
 4 MR. JOHNSON:
 5 Q. Okay.
 6 (10:15 a.m.)
 7 MR. BENNETT:
 8 A. If I could have a second?
 9 MR. GOUDIE:
 10 A. Perhaps I misunderstood your question. Do you
 11 want to try that again?
 12 MR. JOHNSON:
 13 Q. Yes, no problem. The question is in relation
 14 to that 166 million dollars that we see in
 15 column No. 2 for Muskrat Falls purchases, is
 16 this on a PPA basis; and then the follow-up
 17 question is if so, costs would be higher on a
 18 cost of service basis? And ask Nalcor to
 19 comment.
 20 MR. GOUDIE:
 21 A. The 166 million is derived from the PPA, it's
 22 basically the PPA price in that year, in
 23 nominal dollars, divided by the take for
 24 Newfoundland and Labrador Hydro. As I said
 25 before, it will build up into the total

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1 incremental costs and it will be present
 2 valued, so if that was a--the PPA again is
 3 focused on the rate of return on equity, it's
 4 not focused on net book value. So if we were
 5 moving to a cost of service framework, where
 6 we're going to revert back to net book value
 7 as to what really drives the rate, that 166
 8 million would be at least doubled what it
 9 otherwise would be under PPA.
 10 MR. JOHNSON:
 11 Q. Okay. Well I guess just to follow up, why not
 12 just go cost of service? You have double,
 13 what's the--I guess, you know, I'd just like
 14 to flesh that out.
 15 MR. BENNETT:
 16 A. I think, you know, our rationale for using a
 17 PPA approach was laid out in Exhibit 36 and we
 18 think there are some good reasons for having
 19 that PPA approach, I mean, first of all you
 20 avoid that rate hit. The return for the
 21 investment is still recovered over the study
 22 period and the price schedule that shows up
 23 here in column 2 in general terms follows the
 24 same format and the same shape generally, but
 25 lower than the Isolated-Island scenario. So

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1 we think there are some very good reasons for
 2 using the PPA approach.
 3 MR. JOHNSON:
 4 Q. The next question has to do with interest
 5 during construction in relation to the Muskrat
 6 Falls generating facility. I think the
 7 background on that is initially that question
 8 was asked in CA-25, it was a customer
 9 question, an inquiry, and the question was is
 10 any interest during construction cost provided
 11 for in the cost projections for the Muskrat
 12 project and the answer said that "applicable
 13 interest during construction, IDC, is included
 14 in all in-service capital costs associated
 15 with both the Isolated-Island and
 16 Interconnected-Island alternatives. For all
 17 regulated assets, including the Labrador-
 18 Island Transmission Link, there is an
 19 allowance for funds used during construction,
 20 AFUDC, which includes costs for both the debt
 21 and equity used during the construction period
 22 based on the weighted cost of capital. The
 23 weighted cost of capital or WACC is determined
 24 by the capital structure assumed, i.e. 75 to
 25 25 debt equity and the cost of debt and

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1 equity, i.e. 7.4 percent and 10 percent
 2 respectively." Then the answer continues,
 3 "The analysis for the Muskrat Falls generating
 4 facility is based on 100 percent equity with
 5 no debt. Since IDC only accrues against debt,
 6 no IDC is applicable." And I guess the
 7 question was if one--I guess what's behind the
 8 question is it doesn't appear likely that
 9 Muskrat Falls generating facility is going to
 10 be financed 100 percent with equity and what--
 11 it will take another capital structure to
 12 finance the project and I guess how would the
 13 "water on the beans" change in terms of CPW
 14 analysis if you were to assume a more likely
 15 financing scenario for the generating
 16 facility. I think that's the thrust of the
 17 question.
 18 MR. GOUDIE:
 19 A. Steve Goudie. We analyzed Muskrat Falls on
 20 100 percent equity basis in DG2 for analytical
 21 purposes, there was really no clarity at the
 22 time on what the final financing arrangements
 23 would be, so we just analyzed it basically on
 24 a project basis, which is really quite common
 25 in many industries before the introduction of

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1 debt leverage. So once we put debt into
 2 Muskrat Falls, it doesn't necessary change the
 3 "water on the beans" at all. In fact, it
 4 could be favourable and likely will be
 5 favourable for consumers because the cost of
 6 debt will be less than the cost of equity. So
 7 as we leverage the project, the PPA price will
 8 reflect that, as long as we're focused on the
 9 return on equity--as long as we're focused on
 10 the return on equity, then the--as our hurdle,
 11 then the fall out will be on the PPA price.

12 MR. JOHNSON:

13 Q. Wouldn't be a bad way to conduct trials, just
 14 to have people give you the questions to ask.
 15 This one would be, "Dear Sir: Has Nalcor
 16 provided the following information"--and
 17 again, there might be issues of Terms of
 18 Reference, but we'll see. "Were there detailed
 19 negotiations with CF(L)Co and or Hydro Quebec
 20 for possible energy supply for the Interlink
 21 to the Island of Newfoundland."

22 MR. BENNETT:

23 A. Detailed negotiations with CF(L)Co. Certainly
 24 as far as CF(L)Co is concerned, you know,
 25 CF(L)Co's energy availability is something

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1 that we understand, it's a recall and it's the
 2 Twingo of the so called Twingo block which is
 3 available for iron ore development or
 4 industrial use in Western Labrador. So
 5 CF(L)Co in of itself has a limited supply of
 6 energy. And as far as Hydro Quebec is
 7 concerned, no, we have not undertaken detailed
 8 negotiations with Hydro Quebec.

9 O'REILLY, Q.C.:

10 Q. I think that's about as far as we can -

11 MR. JOHNSON:

12 Q. As far as you can go.

13 O'REILLY, Q.C.:

14 Q. - run that.

15 GREENE, Q.C.:

16 Q. Is Nalcor making an objection for the record?
 17 I just heard a consultant's question.

18 O'REILLY, Q.C.:

19 Q. Well what I heard the Consumer Advocate say is
 20 that he's getting these things here and we're
 21 trying to be discreet in raising them, I
 22 understand he's under some obligation to ask
 23 questions. I think the question that was put
 24 in general terms was responded to and I think
 25 he'd be pressed to go further than that, you

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1 know, there is some latitude and we're
 2 prepared to acknowledge that, but I think
 3 we're getting into an issue now that we
 4 shouldn't go down and if there's something in
 5 addition to that that the Consumer Advocate
 6 feels that is bearing on this and informs this
 7 process, then he can probably use the same
 8 method he suggested before as to put it in the
 9 form of a RFI and file it.

10 MR. JOHNSON:

11 Q. Well, and in point of fact the follow up was
 12 my follow up, not the customers and if they
 13 wanted to further email me and perhaps we
 14 could put it in the writing, if that be the
 15 case.

16 GREENE, Q.C.:

17 Q. No, I just wanted to make the process clear if
 18 there is a question asked by the Consumer
 19 Advocate it's for Nalcor to take an exception
 20 as to whether it is within or without the
 21 Terms of Reference, as opposed to counsel
 22 having a little discussion, it should be made
 23 for the record.

24 O'REILLY, Q.C.:

25 Q. Well I guess we will raise the objection to

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1 it.

2 MR. JOHNSON:

3 Q. Okay.

4 O'REILLY, Q.C.:

5 Q. I'm trying to be nice about this and not too
 6 stickily, you know, it is a review process,
 7 it's not a judicial process per se and so, you
 8 know, ordinarily if you were in probably a
 9 more defined setting, you'd be popping up and
 10 down and saying "objection" and so on. It is
 11 a review process; it's a little different.
 12 And Nalcor wants to be forthcoming in its
 13 answers, but at the same time it wants to stay
 14 focused on what the reference questions are.

15 GREENE, Q.C.:

16 Q. And there's no problem, that -

17 O'REILLY, Q.C.:

18 Q. Okay, well let's -

19 GREENE, Q.C.:

20 Q. The only thing was, there was a discussion
 21 between counsel which wasn't recorded for the
 22 record and if there was a decision made, it
 23 should be really on the record, that's my only
 24 point.

25 MR. JOHNSON:

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<p>1 Q. Were diversion of exported recall energy to 2 the Interlink considered?</p> <p>3 MR. BENNETT:</p> <p>4 A. So the currently exported energy from 5 Churchill Falls is insufficient to meet our 6 needs and there's a limited supply in the 7 winter when we actually need the -- need firm 8 capacity on the Island. The available recall 9 capacity in the winter is about 80 megawatts.</p> <p>10 MR. JOHNSON:</p> <p>11 Q. The next--this is part C, were "SWAP" 12 arrangements with Hydro Quebec re: Menihek 13 output considered?</p> <p>14 MR. BENNETT:</p> <p>15 A. No, Menihek is an isolated generating facility 16 next to Schefferville that has no transmission 17 interconnection to the North American grid.</p> <p>18 MR. JOHNSON:</p> <p>19 Q. I think the next, Part D, is what will be the 20 status of the Twin Falls Plant and 21 transmission lines after reversion to CF(L)Co 22 in 2014, and cannot moves be made to utilize 23 them for input to the Interlink with regain of 24 water supply as needed.</p> <p>25 MR. BENNETT:</p>	<p>1 CHAIRMAN:</p> <p>2 Q. I am sure, I know.</p> <p>3 GREENE, Q.C.:</p> <p>4 Q. This is definitely not argument, Mr. Chair. 5 (10:30 a.m.)</p> <p>6 MR. JOHNSON:</p> <p>7 Q. The last part (e) is how much spillage occurs 8 at Upper Churchill at the present time and 9 usually annually?</p> <p>10 MR. BENNETT:</p> <p>11 A. I don't have that number. Paul, do you -</p> <p>12 MR. HUMPHRIES:</p> <p>13 A. No, I don't have -</p> <p>14 O'REILLY, Q.C.:</p> <p>15 Q. It's the same issue and I raise an objection 16 if I have to put it on the record.</p> <p>17 GREENE, Q.C.:</p> <p>18 Q. And the Consumer Advocate's position on this 19 objection is, is it within or outside the 20 Terms of Reference in your view?</p> <p>21 MR. JOHNSON:</p> <p>22 Q. It would appear to be outside, I have to 23 concur, but again I wanted to put it there.</p> <p>24 CHAIRMAN:</p> <p>25 Q. But I think it's fair to Consumer Advocate, I</p>
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<p>1 A. I don't have specifics on Twin Falls, so I 2 can't answer that question.</p> <p>3 O'REILLY, Q.C.:</p> <p>4 Q. I think that's outside the Terms of Reference, 5 that's, you know--I raise an objection to 6 that, if I can.</p> <p>7 GREENE, Q.C.:</p> <p>8 Q. And then, Mr. Johnson, your position on the 9 objection?</p> <p>10 MR. JOHNSON:</p> <p>11 Q. I think it is probably outside.</p> <p>12 GREENE, Q.C.:</p> <p>13 Q. So there's no need for the panel to make a 14 decision, I'm just--this is the type of 15 process -</p> <p>16 MR. JOHNSON:</p> <p>17 Q. Yes, yes.</p> <p>18 CHAIRMAN:</p> <p>19 Q. I love it when lawyers argue.</p> <p>20 GREENE, Q.C.:</p> <p>21 Q. We're not arguing, we're just ensuring that 22 the process is clear for all of the parties 23 and for the process.</p> <p>24 O'REILLY, Q.C.:</p> <p>25 Q. Not always as pleasant.</p>	<p>1 mean, for the question was asked by a 2 concerned citizen.</p> <p>3 MR. JOHNSON:</p> <p>4 Q. Yes, yeah.</p> <p>5 CHAIRMAN:</p> <p>6 Q. And it seems to me that it should be read into 7 the public record so that at least you would 8 have done your job and acknowledged the fact 9 that this is a question that you asked.</p> <p>10 O'REILLY, Q.C.:</p> <p>11 Q. That's right.</p> <p>12 CHAIRMAN:</p> <p>13 Q. And if there's an objection, of course, 14 that's--you know, and it is deemed to be 15 outside the Terms of Reference, well duty has 16 been done, I guess.</p> <p>17 GREENE, Q.C.:</p> <p>18 Q. And in a situation where there may be 19 disagreement as to whether it is within or 20 without the Terms of Reference, that is when 21 there will be the opportunity for argument 22 with Nalcor, the Consumer Advocate and Board 23 Counsel expressing a view on that issue.</p> <p>24 MR. JOHNSON:</p> <p>25 Q. A question concerning--this is the question:</p>

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<p>1 "There is public concern that the 824 megawatt 2 Muskrat Falls capacity may have reduced 3 capacity of only 575 megawatts for the winter 4 peak from January to March on the Island 5 (cause 500 megawatts will be needed for 6 Holyrood, 165 megawatts for Nova Scotia), 7 leaving an estimated 150 megawatts for new 8 demand. Ask Nalcor for public comment." 9 MR. BENNETT: 10 A. Well as far as production in Muskrat Falls 11 goes, certainly Muskrat and Churchill Falls 12 operate under the terms of--or will operate 13 rather under the terms of a water management 14 agreement that has been established by the 15 Board, so when we look at the production 16 between Muskrat and Churchill Falls, there 17 will be available capacity on peak through the 18 operation of that water management agreement. 19 MR. JOHNSON: 20 Q. The second question is: does Nalcor have any 21 recent updated hydrology studies to confirm 22 that Muskrat Falls can produce at 824 23 megawatts for the winter peak? 24 MR. BENNETT: 25 A. We have a long history of hydrology studies on</p>	<p>1 That does not inform this process and I'd 2 raise an objection to that. 3 MR. JOHNSON: 4 Q. Well, I certainly can't take the position that 5 we are here in this reference assuming that 6 the link is part of the reference, but you 7 know, there was some discussion about it and I 8 guess from a technical aspect, I may be wrong, 9 but someone may have tuned in yesterday and 10 said "well, you know, there was a bit of 11 discussion about it yesterday." So, pretty 12 much all I can say about the point. 13 O'REILLY, Q.C.: 14 Q. I mean, you know, I guess what you're prodding 15 into here is a subject that is the subject of 16 ongoing negotiations between parties that are 17 not part of this reference question and I 18 can't see how this could be -- really, I can't 19 see how this could be informative of this 20 process. 21 GREENE, Q.C.: 22 Q. One of the challenges with this particular 23 question is trying -- is the proper 24 interpretation of the terms of reference that 25 were given to the Board by the government.</p>
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<p>1 Muskrat Falls. Records go back over 50 years. 2 So, we're comfortable with the energy 3 production at Muskrat. 4 MR. JOHNSON: 5 Q. The next question is: for the winter peak of 6 2018, how much Muskrat Falls 824 megawatt 7 capacity will be available? 8 MR. BENNETT: 9 A. We expect to have the capacity necessary for 10 Muskrat Falls to meet the winter peak in 2018. 11 MR. JOHNSON: 12 Q. The next question is: if there are power 13 outages, how will these be apportioned between 14 Newfoundland and Nova Scotia? Again, that's a 15 -- we're assuming for the purposes of this 16 reference that there is no link. But there 17 was some discussion of it yesterday. 18 GREENE, Q.C.: 19 Q. Does Nalcor take objection to the question? 20 O'REILLY, Q.C.: 21 Q. I think that that's outside -- it's outside 22 the terms. It's not -- it doesn't inform -- 23 again, it doesn't inform this process, you 24 know, how the distribution of power, who's 25 going to get the recall, primary call on that.</p>	<p>1 The Terms of Reference exclude consideration 2 of the monetization of any excess power. As 3 mentioned in the Terms of Reference, certain 4 issues were excluded from consideration by the 5 Board. One of those issues was the Maritime 6 link and the arrangements with Emera. While 7 there was discussion yesterday, it was brought 8 forward by Nalcor as to whether that is within 9 or without the Terms of Reference and it was 10 the reference to the Maritime link with 11 respect to reliability. However, Nalcor's 12 position is that the Maritime link is not 13 required to adequately address reliability, so 14 while they did refer to it, it is not 15 necessary for the Board's consideration and in 16 fact would be outside the Terms of Reference. 17 So with respect to this particular question, 18 my opinion would be that it would be outside 19 the Terms of Reference as well. 20 I don't know if the Panel needs to take 21 any additional time to consider before making 22 their decisions or their view. 23 CHAIRMAN: 24 Q. No, I don't think so. We can carry on and we 25 might discuss it, but we're satisfied with it,</p>

1 you know.
 2 O'REILLY, Q.C.:
 3 Q. Well, I guess the question will be deferred
 4 until there's a ruling.
 5 GREENE, Q.C.:
 6 Q. Yes.
 7 MR. JOHNSON:
 8 Q. Another question: Nalcor advised today, that
 9 being yesterday, that IOC expansion may
 10 require 500 megawatts of power. Muskrat Falls
 11 has 824 megawatts of capacity, 165 megawatts
 12 for Nova Scotia, being 159 megawatts left for
 13 the island of Newfoundland over the in-feed.
 14 That would amount to transmission line in-
 15 service cost of 2.5 billion for 159 megawatts,
 16 question mark. Ask Nalcor to comment on that
 17 scenario.
 18 MR. BENNETT:
 19 A. I don't see that as a viable scenario. First
 20 of all, we don't have a firm request from IOC
 21 and I think it's fair to say that if customers
 22 on the island part of the system are paying
 23 the cost associated with Muskrat Falls and the
 24 Labrador-Island transmission link, then
 25 they're absolutely entitled to receive the

1 energy that's associated with the assets
 2 they're paying for.
 3 MR. JOHNSON:
 4 Q. I think you answered the second question
 5 already. When does IOC need the 500 megawatts
 6 for expansion?
 7 MR. BENNETT:
 8 A. Yeah, in general terms, they're following a
 9 Decision Gate process the same way that we do
 10 and they have not put forward a firm request
 11 for energy.
 12 MR. JOHNSON:
 13 Q. Third question: Why not dedicate Muskrat Falls
 14 solely to Labrador power requirements if IOC
 15 needs 500 megawatts? It's answered in the
 16 previous question.
 17 Nalcor advised that the transmission line
 18 losses would be the maximum peak of ten
 19 percent when Muskrat Falls is operated at peak
 20 capacity. This will impact the ability of
 21 Muskrat Falls to meet the island winter peak
 22 power demands. Can Nalcor comment?
 23 MR. BENNETT:
 24 A. I'm not sure how it affects it. So, can you
 25 just restate that question, please?

1 MR. JOHNSON:
 2 Q. Nalcor advised that the transmission losses
 3 would be at the maximum peak of ten percent
 4 when Muskrat Falls is operated at peak
 5 capacity. This will impact the ability of
 6 Muskrat Falls to meet the island winter peak
 7 power demands. Can Nalcor comment on that?
 8 MR. HUMPHRIES:
 9 A. The existing analysis up to DG2 assumes that
 10 the peak losses could be at the nine or ten
 11 percent range, so the expansion plan already
 12 compensates for that ability to supply the
 13 load. It's just not Muskrat Falls. It's the
 14 total resource in Labrador and on the island.
 15 MR. JOHNSON:
 16 Q. That does that. There might be some in there
 17 that are embedded that I'll put in writing.
 18 They look like they're a bit more involved
 19 than what can be handled like that. So those
 20 are my questions of the Panel. Thank you very
 21 much.
 22 CHAIRMAN:
 23 Q. So I guess we'll take a break now. No?
 24 O'REILLY, Q.C.:
 25 Q. I don't know. Does the Panel have questions?

1 I'm just wondering if we can finish with the
 2 Panel because -- I don't know. If you wish to
 3 take a break, that's fine with us, but if
 4 there's -
 5 CHAIRMAN:
 6 Q. I can keep going all day, but I mean, I got
 7 chastised the day before yesterday.
 8 O'REILLY, Q.C.:
 9 Q. Okay. Well, alright, we'll take a break.
 10 GREENE, Q.C.:
 11 Q. What Mr. O'Reilly is wondering is how long the
 12 Commissioners might be with the Panel, whether
 13 the Panel could be finished before the coffee
 14 break. It would assist in them moving forward
 15 to the next panel.
 16 CHAIRMAN:
 17 Q. Well, I got a few questions. I won't be very
 18 long.
 19 GREENE, Q.C.:
 20 Q. So that's -- the idea would be -
 21 O'REILLY, Q.C.:
 22 Q. There's two things. There's the Board's, the
 23 Commission's questions and also there's a few
 24 undertakings that we can deal with while the
 25 panel is here. So I thought if we could get

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1 that part and if you're not going to be long -
 2 CHAIRMAN:
 3 Q. No, no.
 4 O'REILLY, Q.C.:
 5 Q. - we can deal with that and then we can
 6 dismiss the panel, if that's satisfactory.
 7 CHAIRMAN:
 8 Q. Okay. Is that acceptable to all parties?
 9 GREENE, Q.C.:
 10 Q. Yes. Yes, Mr. Chair.
 11 CHAIRMAN:
 12 Q. So it's up to us now. So, Commissioner
 13 Newman, have you got any questions?
 14 COMMISSIONER NEWMAN:
 15 Q. No questions, thank you.
 16 COMMISSIONER OXFORD:
 17 Q. No, sir, no questions.
 18 CHAIRMAN:
 19 Q. Madame?
 20 VICE-CHAIR WHALEN:
 21 Q. I just have a -- I had lots of questions. I
 22 think most of them have been covered. I have
 23 one question from something you, Mr. Bennett,
 24 just said about in reference to a -- in your
 25 response to a question from Mr. Johnson with

1 because of the environmental assessment
 2 process. Ultimately, we may have to find we
 3 have to go to the market in order to meet a
 4 short term need or use a thermal alternative.
 5 Those are the general suite of alternatives.
 6 Mr. Humphries, I don't know if you -
 7 MR. HUMPHRIES:
 8 A. No, that would be -- and again, the important
 9 factor is the size and the time. That would,
 10 you know, whether it's 100 megawatts or 500
 11 megawatts makes a difference, and the timing,
 12 and to date, we do not have a firm request or
 13 even a firm idea of where this may settle out
 14 and once we get that, then we will start
 15 through a process to address how we would meet
 16 that request.
 17 VICE-CHAIR WHALEN:
 18 Q. I had another question and it relates to the
 19 probabilistic assessment, reliability
 20 assessment discussion you were having with Mr.
 21 Johnson yesterday and Ms. Greene and Mr.
 22 Johnson this morning and you were talking -- I
 23 wrote down your comment. I can't find the
 24 transcript reference. That the results of
 25 such an assessment could have significant --

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1 reference to IOC and you don't have a firm
 2 power commitment or request from IOC of 500
 3 megawatts, I think was the number. What does
 4 Nalcor or Hydro do when you get that request?
 5 MR. BENNETT:
 6 A. So once we see that request, then we'll have
 7 to look at timing. We'll have to compare the
 8 size of that request compared to our various
 9 resources. If we look at Muskrat Falls in the
 10 short term, it has supply. I guess in very
 11 general terms, that would go into a generation
 12 expansion plan and we'll have to come up with
 13 a solution to meet that requirement.
 14 VICE-CHAIR WHALEN:
 15 Q. So what other -- are there any other options
 16 or alternatives in Labrador for to meet that
 17 significant load?
 18 MR. BENNETT:
 19 A. There are other potential developments in
 20 Labrador.
 21 VICE-CHAIR WHALEN:
 22 Q. Gull Island for example.
 23 MR. BENNETT:
 24 A. Gull Island being one. The others would be
 25 further down the line in terms of timing

1 and I think your word was significant
 2 implications for ratepayers.
 3 MR. HUMPHRIES:
 4 A. They would have significant impact on the way
 5 we currently -- our current practices, which
 6 ultimately could have an impact on ratepayers,
 7 yes.
 8 (10:45 a.m.)
 9 VICE-CHAIR WHALEN:
 10 Q. Could you expand on what the impacts
 11 specifically might be?
 12 MR. HUMPHRIES:
 13 A. Well, like in the -- when we start to
 14 introduce these new, I would call new factors
 15 into the overall reliability assessment, like
 16 the cost, the societal cost of outages,
 17 customer outages and those types of things,
 18 and that if our standard increases to a level
 19 that we have to incorporate them, we could end
 20 up having to add additional capacity,
 21 generating capacity, transmission capacity to
 22 live within these new constraints and that
 23 could introduce significant costs given the
 24 fact that we are a small rate base and, you
 25 know, the ability to pay and the desire to pay

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<p>1 is not -- it has a larger impact than it would</p> <p>2 in a larger jurisdiction where there's a</p> <p>3 bigger rate base to spread these costs over.</p> <p>4 VICE-CHAIR WHALEN:</p> <p>5 Q. Okay. That's fine. I think that's all.</p> <p>6 Thank you very much, Panel. It's helpful.</p> <p>7 CHAIRMAN:</p> <p>8 Q. I had a couple of questions. I would have put</p> <p>9 them to Mr. Martin if he was here, but I</p> <p>10 think, Mr. Bennett, you can fill the breach</p> <p>11 admirably.</p> <p>12 MR. BENNETT:</p> <p>13 A. I'll try.</p> <p>14 CHAIRMAN:</p> <p>15 Q. On the issue of economic benefit, Mr. Martin I</p> <p>16 think said that because with respect to</p> <p>17 Muskrat Falls that we would be spending this</p> <p>18 money immediately in the community that there</p> <p>19 was a greater economic benefit as opposed to</p> <p>20 doing an Isolated island scenario, and I mean,</p> <p>21 really we will not know whether or not this</p> <p>22 project or the Isolated island is a good</p> <p>23 project except over an extended period of</p> <p>24 time, wouldn't you agree?</p> <p>25 MR. BENNETT:</p>	<p>1 CHAIRMAN:</p> <p>2 Q. Yeah, but the assumption there is always that</p> <p>3 there's other alternatives you can spend that</p> <p>4 money on that may produce some value.</p> <p>5 MR. BENNETT:</p> <p>6 A. And you're right, but in this case, most of</p> <p>7 the value in the Isolated case is gone to</p> <p>8 imported oil where we don't see that benefit</p> <p>9 in our economy.</p> <p>10 CHAIRMAN:</p> <p>11 Q. And I also got a question on this business of</p> <p>12 clean energy and I guess the question is why</p> <p>13 do you say hydro is clean energy? I think you</p> <p>14 said that the avoided CO2 emissions would be</p> <p>15 866 thousand tons. Is that the number that</p> <p>16 you guys used?</p> <p>17 MR. BENNETT:</p> <p>18 A. There is some large numbers.</p> <p>19 CHAIRMAN:</p> <p>20 Q. Yeah.</p> <p>21 MR. BENNETT:</p> <p>22 A. Yes. I think for Holyrood the number is in</p> <p>23 that -</p> <p>24 CHAIRMAN:</p> <p>25 Q. The not burning a fossil fuel generates carbon</p>
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<p>1 A. Yes, I would agree with that. You know, we're</p> <p>2 looking at the beginning of that expansion</p> <p>3 plan and the project as it unfolds.</p> <p>4 CHAIRMAN:</p> <p>5 Q. As long as the chosen alternative remains over</p> <p>6 time the least cost then there is an economic</p> <p>7 benefit?</p> <p>8 MR. BENNETT:</p> <p>9 A. Yes, and I think maybe when Mr. Martin was</p> <p>10 speaking of that, he was looking at the cost</p> <p>11 preference as well as the benefits to the</p> <p>12 economy, just in general, from the large scale</p> <p>13 project that we'd be undertaking.</p> <p>14 CHAIRMAN:</p> <p>15 Q. Well, that's my point. I mean, there's no</p> <p>16 benefit to the economy if you don't produce an</p> <p>17 asset that has economic value over time. We</p> <p>18 can build a tunnel to Bell Island tomorrow and</p> <p>19 it would be great for the work, but it won't</p> <p>20 produce any economic value.</p> <p>21 MR. BENNETT:</p> <p>22 A. Other than the benefit to the economy from the</p> <p>23 construction, labour, the tax income, the</p> <p>24 purchases that are associated with the project</p> <p>25 itself.</p>	<p>1 savings of 866 thousand tons of CO2?</p> <p>2 MR. BENNETT:</p> <p>3 A. Right, and on a larger scale basis, if we were</p> <p>4 talking about the export energy and the</p> <p>5 displacement of thermal generation in other</p> <p>6 markets, the numbers would be much bigger than</p> <p>7 that.</p> <p>8 CHAIRMAN:</p> <p>9 Q. But it's at 866 thousand tons, and I mean, I</p> <p>10 don't have no -- I have no idea what a ton of</p> <p>11 carbon looks like. Do you? I mean, it's just</p> <p>12 so abstract to me, it just -- I mean, anyway.</p> <p>13 MR. BENNETT:</p> <p>14 A. Just maybe to put it in perspective, a typical</p> <p>15 vehicle on the road is about five tons per</p> <p>16 year. So that's sort of some insight into the</p> <p>17 magnitude.</p> <p>18 CHAIRMAN:</p> <p>19 Q. But is that a net figure?</p> <p>20 MR. BENNETT:</p> <p>21 A. Oh yes, that's a net number.</p> <p>22 CHAIRMAN:</p> <p>23 Q. So you've calculated in your -- coming up with</p> <p>24 your 866 thousand tons, you've calculated the</p> <p>25 carbon content, the fossil fuel content in the</p>

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1 construction of the project?
 2 MR. BENNETT:
 3 A. Oh yes.
 4 CHAIRMAN:
 5 Q. All the materials that are bought?
 6 MR. BENNETT:
 7 A. Yes, we have. So there's a process for doing
 8 that. The Intergovernmental Panel on Climate
 9 Change has identified a methodology for doing
 10 that and we look at both the emissions during
 11 construction, as well as the greenhouse gas
 12 emissions from the reservoir itself over time.
 13 CHAIRMAN:
 14 Q. And the net is 866?
 15 MR. BENNETT:
 16 A. That's right, and that's just for
 17 Newfoundland, for the Newfoundland system. In
 18 Nova Scotia, there would be about another one
 19 million tons from their displacement.
 20 CHAIRMAN:
 21 Q. And why is that significant? I mean, 866
 22 thousand is a big number, but is it really
 23 big?
 24 MR. BENNETT:
 25 A. Well, Canada's greenhouse gas emissions in

1 Q. And what's the percentage of the Canadian
 2 emissions as the percentage of world
 3 emissions?
 4 MR. BENNETT:
 5 A. That number I don't have. On a per capita
 6 basis, we're among the highest per capita
 7 greenhouse gas emitters in the world.
 8 CHAIRMAN:
 9 Q. Yes, but we're not a big population.
 10 MR. BENNETT:
 11 A. We're not a big population, you're right.
 12 CHAIRMAN:
 13 Q. I have read that Canada's CO2 emissions are
 14 two percent of the world total.
 15 MR. BENNETT:
 16 A. That wouldn't surprise me. I would tend to
 17 agree with that number.
 18 CHAIRMAN:
 19 Q. Are you aware that, for instance, that the
 20 brick countries -- you know what I'm talking
 21 about, Brazil?
 22 MR. BENNETT:
 23 A. Yes, I do.
 24 CHAIRMAN:
 25 Q. They refuse to have any -- contemplate any

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1 approximate numbers are in the order of 700
 2 million tons. So, I think, from -- you know,
 3 from all of our perspectives, there's a
 4 collective desire to reduce our carbon
 5 footprint, as a society, to reduce our
 6 greenhouse gas emissions. So, I think over -
 7 CHAIRMAN:
 8 Q. Well, that's -- there's arguments about that.
 9 MR. BENNETT:
 10 A. There's a lot that we all have to do.
 11 CHAIRMAN:
 12 Q. But what percentage does -- what percentage
 13 are Newfoundland's emissions as a percentage
 14 of Canadian emissions?
 15 MR. BENNETT:
 16 A. They're slightly less than two percent. I'll
 17 confirm these numbers for you.
 18 CHAIRMAN:
 19 Q. No, that's the number I got, so we agree on
 20 that.
 21 MR. BENNETT:
 22 A. Okay. Yeah, my recollection is that we emit,
 23 in Newfoundland and Labrador, about ten
 24 megatons per year.
 25 CHAIRMAN:

1 reduction in the use of fossil fuels in their
 2 economic development.
 3 MR. BENNETT:
 4 A. I think that's a concern. They're a big block
 5 of population.
 6 CHAIRMAN:
 7 Q. They said no.
 8 MR. BENNETT:
 9 A. And so far they've said no.
 10 CHAIRMAN:
 11 Q. And are you aware that since 1998, I think I
 12 read that CO2 emissions have risen by, I think
 13 the number is some 28 percent. Have you come
 14 across that number?
 15 MR. BENNETT:
 16 A. That rings a bell, and certainly the questions
 17 that we all have to -- you know, as part of
 18 our global society, we're going to have to
 19 consider the consequences. I think in looking
 20 the other way, the Intergovernmental Panel on
 21 Climate Change from the UN have said that we
 22 collectively have to find a way by 2050 to
 23 reduce our greenhouse gas emission
 24 substantially and that's a big challenge and I
 25 would agree that everybody on the planet can

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<p>1 look at this and say "well, I'm only a small 2 piece" and you know, this is a -- you know, 3 from a global perspective, I'd agree this is a 4 very complicated topic. 5 CHAIRMAN: 6 Q. And you don't think whatever Canada does or 7 Newfoundland does is irrelevant in that 8 process? 9 MR. BENNETT: 10 A. Well, I think it's helpful in two senses. I 11 think we can say, first of all, that we're 12 doing our share. And secondly, we're setting 13 a good example for the rest of the world. So, 14 I would look at it that way and say I think 15 everybody - 16 CHAIRMAN: 17 Q. And you actually believe the rest of the world 18 will care? 19 MR. BENNETT: 20 A. Well, that's -- I don't know if I can answer 21 that one. It's a concern. There's no 22 question. 23 CHAIRMAN: 24 Q. You think the Chinese would be concerned, "oh, 25 gee, Canada is stepping up to the plate. We</p>	<p>1 now, while you're - 2 CHAIRMAN: 3 Q. Sure. I'd be interested. 4 O'REILLY, Q.C.: 5 Q. - while you're in mid - 6 CHAIRMAN: 7 Q. In mid flight or mid fancy. 8 O'REILLY, Q.C.: 9 Q. - mid flight there, and I can produce that and 10 actually, Steve, you need to speak to it. You 11 can speak to it. 12 MR. GOUDIE: 13 A. If we have to, yeah, sure. 14 O'REILLY, Q.C.: 15 Q. So I can make those available here. So I hope 16 we can now check off one of the undertakings. 17 And Mr. Goudie can speak to that, if - 18 CHAIRMAN: 19 Q. I'm sorry? 20 O'REILLY, Q.C.: 21 Q. Mr. Goudie can speak to that if you want to. 22 CHAIRMAN: 23 Q. Commissioner Oxford said six bucks a month. 24 Where am I looking for that? 25 MR. GOUDIE:</p>
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<p>1 got to follow"? 2 MR. BENNETT: 3 A. Well, I hear you. 4 CHAIRMAN: 5 Q. And I asked the -- you're going to get the 6 number on the CO2, you know, the cost of CO2 7 per -- and you think Newfoundlanders would be 8 willing to pay carbon tax in their electricity 9 rates because they want to be good world 10 citizens? You think that's a viable political 11 alternative? 12 MR. BENNETT: 13 A. Well, I think in the scenario that we're 14 moving forward with, we're proposing to move 15 forward with, that being the Interconnected 16 scenario, we avoid that debate. 17 CHAIRMAN: 18 Q. Yeah, yeah, that's true. 19 O'REILLY, Q.C.: 20 Q. Mr. Chairman, I have those -- I have that 21 number. I think you asked for that yesterday. 22 CHAIRMAN: 23 Q. Yeah. 24 O'REILLY, Q.C.: 25 Q. And we have the cost and I can give it to you</p>	<p>1 A. Yes, Mr. Chairman, if you look to line 17. 2 CHAIRMAN: 3 Q. It was too big. I was looking at the small 4 print. 5 MR. GOUDIE: 6 A. Yeah. Well, at line one, you'll see that the 7 input there is 24 dollars a ton. So, we took 8 that and increased Hydro's revenue requirement 9 and then followed through the calculations as 10 in PUB-5, which take revenue requirement 11 through to wholesale and retail rates and that 12 would be our preliminary estimate. Given 24 13 dollars a ton for CO2, it would be 14 approximately six dollars per month per 15 residential customer. 16 CHAIRMAN: 17 Q. So if we had a carbon tax in Newfoundland with 18 the Isolated island, it would cost consumers 19 about 70 bucks a year, assuming the tax was a 20 reality? 21 MR. GOUDIE: 22 A. 24, yes, that's correct. 23 CHAIRMAN: 24 Q. And Mr. Bennett, you're aware that Canada has 25 withdrawn from Kyoto?</p>

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<p>1 MR. BENNETT:</p> <p>2 A. Yes, they have. You're right.</p> <p>3 CHAIRMAN:</p> <p>4 Q. And you're aware that there's no possibility,</p> <p>5 there's no -- it doesn't look likely that</p> <p>6 there's going to be any international</p> <p>7 agreement on carbon taxation?</p> <p>8 MR. BENNETT:</p> <p>9 A. You're right, it's a global challenge.</p> <p>10 CHAIRMAN:</p> <p>11 Q. And that Mr. Harper has said that they will</p> <p>12 follow the -- Canada will follow the US</p> <p>13 example?</p> <p>14 MR. BENNETT:</p> <p>15 A. That's right.</p> <p>16 CHAIRMAN:</p> <p>17 Q. And you're aware that the House of</p> <p>18 Representatives for sure, certainly have</p> <p>19 turned thumbs down on the Waxman -- is it</p> <p>20 Waxman goes first, Waxman Markey Act?</p> <p>21 MR. BENNETT:</p> <p>22 A. Waxman Markey, that's right.</p> <p>23 CHAIRMAN:</p> <p>24 Q. So that's dead on arrival in the House of</p> <p>25 Representatives.</p>	<p>1 the question, the science behind greenhouse</p> <p>2 gas, the connection between emissions and</p> <p>3 global warming I think is a long term</p> <p>4 challenge that we're going to have to come to</p> <p>5 grips with, but that's a whole -- that's a</p> <p>6 whole different topic, you know, for a</p> <p>7 different venue, I think, unless you'd like to</p> <p>8 go there.</p> <p>9 CHAIRMAN:</p> <p>10 Q. No, I don't want to take up -- I'd sure like</p> <p>11 to argue with you about it, but I'm not going</p> <p>12 to do it here. But, I mean, I just read the</p> <p>13 other day, China has got plans now for 100</p> <p>14 coal-fired plants.</p> <p>15 MR. BENNETT:</p> <p>16 A. Right, they build coal plants like, you know,</p> <p>17 like a lot of utilities install distribution</p> <p>18 systems.</p> <p>19 CHAIRMAN:</p> <p>20 Q. Coal is not going away anytime soon. I think</p> <p>21 the EIA said coal use is probably going to</p> <p>22 rise.</p> <p>23 MR. BENNETT:</p> <p>24 A. It's a challenge.</p> <p>25 CHAIRMAN:</p>
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<p>1 MR. BENNETT:</p> <p>2 A. Yes, I -</p> <p>3 CHAIRMAN:</p> <p>4 Q. And you still believe that carbon taxation is</p> <p>5 a possibility?</p> <p>6 MR. BENNETT:</p> <p>7 A. No, what I said was that the Federal</p> <p>8 government has taken steps on coal-fired</p> <p>9 generating facilities. So they have moved</p> <p>10 forward with legislation. Now, and I agree</p> <p>11 with everything you've said, those are all</p> <p>12 absolutely correct. I'm also concerned with</p> <p>13 the science and I'm also concerned with the</p> <p>14 long term implications. So, I just -- we</p> <p>15 recognize there's a challenge. We didn't</p> <p>16 include it in our economics, but I think both</p> <p>17 Navigant and MHI identified this as a</p> <p>18 potential risk to the Isolated scenario. I</p> <p>19 agree with you that this is complex question</p> <p>20 and there -</p> <p>21 CHAIRMAN:</p> <p>22 Q. When you say concerned with the science, what</p> <p>23 do you mean?</p> <p>24 MR. BENNETT:</p> <p>25 A. Well, I think that in the long term, you know,</p>	<p>1 Q. Are you aware that, like for instance, I have</p> <p>2 also read you can't make steel without using</p> <p>3 coal. So no matter what you do with CO2,</p> <p>4 you're still going to have some. You got to</p> <p>5 make coal to make steel.</p> <p>6 MR. BENNETT:</p> <p>7 A. Coal, cement, aluminum are all big industrial</p> <p>8 challenges.</p> <p>9 (11:00 a.m.)</p> <p>10 CHAIRMAN:</p> <p>11 Q. And big components in dams. Now, let's --</p> <p>12 just a couple of questions on CO2, which is a</p> <p>13 real puzzle for me. I mean, you and most</p> <p>14 people link together CO2 -- you link SO2, NO 2</p> <p>15 and CO and soot all together. Now I agree</p> <p>16 that -- I mean, there's no doubt in this room</p> <p>17 or anywhere, if you know anything about it,</p> <p>18 that SO2, NO2 and CO, even though there's only</p> <p>19 one little difference between CO2 and CO, CO</p> <p>20 and soot are bad. They're not nice. They</p> <p>21 make people sick. Are you aware of people</p> <p>22 showing up at the Health Science with CO 2</p> <p>23 problems?</p> <p>24 MR. BENNETT:</p> <p>25 A. No, I'm not.</p>

1 CHAIRMAN:
 2 Q. Do you know anywhere in the world where people
 3 have gotten sick from CO2?
 4 MR. BENNETT:
 5 A. Not from atmospheric CO2, no, I would agree
 6 with you there. I'm not aware of any
 7 situation.
 8 CHAIRMAN:
 9 Q. Do you know what -- I mean, toxicologists say
 10 that it's not the substance, it's the dose
 11 that matters. Do you have any idea what the -
 12 - I don't, but do you have any idea what a
 13 toxic dose of CO2 would be?
 14 MR. BENNETT:
 15 A. No, I don't.
 16 CHAIRMAN:
 17 Q. Do you know what PPN we are at now with
 18 respect to CO2 in the atmosphere? What number
 19 do you use?
 20 MR. BENNETT:
 21 A. My recollection is that number is just north
 22 or just approximately 200 parts per million.
 23 CHAIRMAN:
 24 Q. I think it -- I thought it was closer to 400.
 25 MR. BENNETT:

1 A. I think that's where we're projected to be
 2 going.
 3 CHAIRMAN:
 4 Q. Oh, that's where we're projected to be going?
 5 MR. BENNETT:
 6 A. I think so. I can validate that. That's an
 7 easy one to look up to confirm for you.
 8 CHAIRMAN:
 9 Q. Have you ever looked at climate history? Have
 10 you ever looked at what some of these
 11 paleoclimatologists say about the CO2 levels?
 12 MR. BENNETT:
 13 A. Certainly in previous points in our history, I
 14 would agree that CO2 levels have been much
 15 higher than they are today.
 16 CHAIRMAN:
 17 Q. I read one article where it said that CO₂
 18 levels during mankind's time on earth were 50
 19 times higher than they are now with no threat
 20 to life.
 21 MR. BENNETT:
 22 A. I haven't seen that number.
 23 CHAIRMAN:
 24 Q. So we don't -- you can't really say that CO₂
 25 is a pollutant because we got no evidence.

1 MR. BENNETT:
 2 A. And at this point, we've never put forward CO2
 3 as that issue, and as I said, we haven't
 4 included it in our economic analysis.
 5 CHAIRMAN:
 6 Q. I'm just saying if there's no evidence of it
 7 being a problem, why is it necessary to tax it
 8 or control it? I mean, I don't want to -- you
 9 know, am I getting -
 10 O'REILLY, Q.C.:
 11 Q. I guess that's -
 12 CHAIRMAN:
 13 Q. - am I running afoul of you, Mr. O'Reilly? Do
 14 you want to do that, you know?
 15 O'REILLY, Q.C.:
 16 Q. Well, this is very -- you know, very
 17 interesting. I guess, I -
 18 CHAIRMAN:
 19 Q. Anyway, alright.
 20 O'REILLY, Q.C.:
 21 Q. - I just think that we might be -- I mean, the
 22 -- if there are going to be policy
 23 considerations for regulating carbon
 24 emissions, I think it's a little bit beyond
 25 this Panel to argue with them.

1 CHAIRMAN:
 2 Q. Okay.
 3 O'REILLY, Q.C.:
 4 Q. But I'm very cognizant of the fact that when I
 5 take an objection, I'm taking the objection to
 6 the person who's making a ruling on it, so I
 7 got to take -- the chances of raising a
 8 successful objection in this context is very,
 9 very low. It's probably plus 50, minus 30 and
 10 probably getting broader.
 11 CHAIRMAN:
 12 Q. Let me assure you, I wouldn't under estimate
 13 you. Anyway, I just -- I'm just -- all I can
 14 say is I just find the whole thing -- I'm
 15 bemused or I'm perplexed. I don't understand
 16 what is going on and I mean, we're in somewhat
 17 of a judicial setting. I just refer to the
 18 Supreme Court of the United States and the
 19 unanimous decision which said that this whole
 20 issue should be subject to an awful lot more
 21 debate before any major policy decisions are
 22 made that have cost implications for society.
 23 I read 272 billion dollars been wasted so far
 24 in Europe. Anyway, I'll stand chastised by
 25 Mr. O'Reilly, so I'll carry on.

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<p>1 The rank of wind in the Isolated island,</p> <p>2 would you -- if I could ask you, is it</p> <p>3 important, somewhat or not very important?</p> <p>4 MR. HUMPHRIES:</p> <p>5 A. In the Isolated island?</p> <p>6 CHAIRMAN:</p> <p>7 Q. Yes.</p> <p>8 MR. HUMPHRIES:</p> <p>9 A. We feel wind is important as a resource. It</p> <p>10 is limited in the -- going to be limited in</p> <p>11 the Isolated island case and we will continue,</p> <p>12 I guess, if we stay Isolated, to look at</p> <p>13 opportunities to integrate as much wind as we</p> <p>14 can, when we can, into that system and again,</p> <p>15 in the Interconnected case, there are huge</p> <p>16 opportunities for wind because of the fact</p> <p>17 that we have those connections. There are the</p> <p>18 potential to integrate hundreds of megawatts</p> <p>19 of wind.</p> <p>20 CHAIRMAN:</p> <p>21 Q. Wow. I mean, have you looked at wind in other</p> <p>22 jurisdictions?</p> <p>23 MR. HUMPHRIES:</p> <p>24 A. We've looked at it in other jurisdictions and</p> <p>25 we have a limited amount in our current</p>	<p>1 MR. HUMPHRIES:</p> <p>2 A. Close to it.</p> <p>3 CHAIRMAN:</p> <p>4 Q. Well, there's no -- I haven't come across a</p> <p>5 capacity factor higher than 30 percent.</p> <p>6 MR. HUMPHRIES:</p> <p>7 A. That's more the norm, but there are numerous</p> <p>8 sites in Newfoundland and Labrador.</p> <p>9 CHAIRMAN:</p> <p>10 Q. In Texas, which got 3400 wind farms, ERCOT</p> <p>11 rates Texas reliability at less than ten</p> <p>12 percent. In Germany, it's the same. In</p> <p>13 France or in England, it's the same. Anyway,</p> <p>14 I'm having some problems with -- anyway. Are</p> <p>15 you aware of -- like I saw a British study of</p> <p>16 the British grid with respect to wind</p> <p>17 integration and the title of the -- I got the</p> <p>18 title of the book in my office. Anyway, this</p> <p>19 guy is a grid engineer. That would be -- the</p> <p>20 closest would be you?</p> <p>21 MR. HUMPHRIES:</p> <p>22 A. That's correct, yes.</p> <p>23 CHAIRMAN:</p> <p>24 Q. And his study showed that once you get beyond</p> <p>25 -- I think he used a figure of seven to eight</p>
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<p>1 jurisdiction.</p> <p>2 CHAIRMAN:</p> <p>3 Q. Pardon?</p> <p>4 MR. HUMPHRIES:</p> <p>5 A. We have wind in our current jurisdiction.</p> <p>6 CHAIRMAN:</p> <p>7 Q. No, but I mean, have you looked at wind --</p> <p>8 like I looked at wind in Germany, in Denmark,</p> <p>9 in Spain, in Texas, in Ontario, and again, I</p> <p>10 remain perplexed why people consider it first</p> <p>11 of all as a source of power because it's not</p> <p>12 really power. It's energy, but it's not</p> <p>13 power.</p> <p>14 MR. HUMPHRIES:</p> <p>15 A. I agree and that is one of the concerns</p> <p>16 particularly in our Isolated situation. It is</p> <p>17 not capacity, but it is energy and we do have</p> <p>18 an abundance of it and the capacity factors of</p> <p>19 the developments we do have in Newfoundland</p> <p>20 are attractive. They are in excess of 40</p> <p>21 percent. The two facilities that we have</p> <p>22 right now, the small ones, they work quite</p> <p>23 well.</p> <p>24 CHAIRMAN:</p> <p>25 Q. They're the highest in the world.</p>	<p>1 percent of wind integration into your grid,</p> <p>2 certainly no higher than ten percent, it</p> <p>3 introduces tremendous supply instabilities and</p> <p>4 can cause blackouts.</p> <p>5 MR. HUMPHRIES:</p> <p>6 A. That's correct.</p> <p>7 CHAIRMAN:</p> <p>8 Q. And he expects anytime now the British grid to</p> <p>9 crash because of the -- they got close to</p> <p>10 4,000 turbines operating now too.</p> <p>11 MR. HUMPHRIES:</p> <p>12 A. It's very much a function of the size of the</p> <p>13 grid and in our Isolated road, we are a very</p> <p>14 small grid and that is a concern.</p> <p>15 CHAIRMAN:</p> <p>16 Q. But why do you think if you went with Muskrat</p> <p>17 Falls you could introduce large amounts of</p> <p>18 wind then if you got this ten percent problem?</p> <p>19 MR. HUMPHRIES:</p> <p>20 A. Well, we're part of a bigger grid now. We're</p> <p>21 part of the North American grid. So it is an</p> <p>22 attractive North American solution because of</p> <p>23 our high capacity factors. Wind in</p> <p>24 Newfoundland will be more attractive than wind</p> <p>25 in the other jurisdictions.</p>

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1 CHAIRMAN:
2 Q. Anyway, I don't want to -- I mean, I'd like to
3 -- again, I could argue the point, but we'll -
4 - I guess that's -- just check my notes now to
5 see. At Holyrood, with respect to the good
6 problem and the other stuff, how many events
7 have you had in the past five years? Anybody
8 know?
9 MR. HUMPHRIES:
10 A. I don't have that number right now, but
11 there's been a marked reduction in the number
12 of complaints from the public.
13 CHAIRMAN:
14 Q. Because Holyrood really runs during the winter
15 months, doesn't it?
16 MR. HUMPHRIES:
17 A. Predominantly, yes.
18 CHAIRMAN:
19 Q. Winter peak.
20 MR. HUMPHRIES:
21 A. Yes.
22 CHAIRMAN:
23 Q. I guess that comes back to the wind thing. I
24 mean, what's the good of wind in the summer,
25 if you're not using Holyrood?

1 MR. HUMPHRIES:
2 A. It's not cheap, but it's -
3 CHAIRMAN:
4 Q. So what's the good of it?
5 MR. HUMPHRIES:
6 A. In the -
7 CHAIRMAN:
8 Q. I mean, I got an open mind. I mean, I have no
9 preconceived notions, but I just ask myself
10 questions and I don't get a chance often to
11 talk to experts.
12 MR. HUMPHRIES:
13 A. From an energy perspective, from the global
14 sense and the North American sense, it still
15 fits in a range that is an acceptable option.
16 There are issues with capacity and all those
17 factors, but there's still a place for wind in
18 an overall balanced portfolio of resource.
19 CHAIRMAN:
20 Q. Well, in terms of the concept that I like to
21 think about, power density, I mean, wind is
22 not even power, but that's another -- do you
23 agree with me on that? Mr. Bennett is shaking
24 his head and saying yes.
25 MR. HUMPHRIES:

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1 MR. HUMPHRIES:
2 A. Yes, that is another fact and when you have
3 Hydro resources, you have to balance the wind
4 with the Hydro and obviously if you spill
5 water to generate this wind, that's not good
6 either.
7 CHAIRMAN:
8 Q. No. Are you aware of the Energy Information
9 Agency's -- they did a calculation on what it
10 costs to generate a megawatt of wind in the
11 United States. Their figure was 119 dollars.
12 Do you have any numbers on to create a
13 megawatt of wind? What are you guys using?
14 MR. HUMPHRIES:
15 A. It's in that range, yes.
16 CHAIRMAN:
17 Q. Versus say what's a megawatt of Muskrat going
18 to cost?
19 MR. GOUDIE:
20 A. 76 dollars.
21 MR. HUMPHRIES:
22 A. 76 dollars.
23 CHAIRMAN:
24 Q. So we got a 45 dollar difference. So wind is
25 pretty expensive, isn't it?

1 A. From the overall -
2 CHAIRMAN:
3 Q. Well, wind is not power. I mean, when we
4 think of power, we turn the switch on, the
5 energy is there.
6 MR. HUMPHRIES:
7 A. That's right.
8 CHAIRMAN:
9 Q. When you start your car, I mean, you only use
10 your car an hour a day, but boy, that engine
11 got a reliability of what, 100 percent? How
12 often does your car breakdown? Wind, you
13 don't know whether wind is going to be there.
14 It could be there and it could not be. It
15 could go up. It could go down.
16 MR. HUMPHRIES:
17 A. That's right.
18 CHAIRMAN:
19 Q. You got problems. You got parameters on
20 operating. I mean, you need ranges between
21 six miles per hour and 40, I think. Once you
22 get beyond 40 you got to shut her down because
23 they're liable to go off their -- well, they
24 crash and they break.
25 MR. HUMPHRIES:

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1 A. That's right. Wind, as a technology stand
2 alone, is not a reliable power source.

3 CHAIRMAN:

4 Q. And you're going to put windmills in Labrador
5 in that climate? Wow. Anyway, I guess I've
6 digressed or wasted enough of your time.
7 Weighted average cost of capital, that's one
8 of the things interests me. 75/25 you're
9 saying for -- wouldn't you -- if you had a
10 higher debt ratio and a lower equity ratio,
11 wouldn't that make your rates cheaper? I
12 mean, can't you guys finance this at a higher
13 -- aside from -- I guess you got a government
14 order to have an equity base of 25, have you?

15 MR. GOUDIE:

16 A. It's Steve Goudie. I think the government
17 policy directive has to do with the return on
18 equity that we're entitled to earn and that
19 would be in the order of what Newfoundland
20 Power receives, if not equal to it. On
21 capital structure, to the extent that debt is
22 cheaper than equity, that's the whole point of
23 leverage, you will minimize your -- you'll
24 minimize your selling price. But we have a --
25 you know, you got to take into account the

1 has to go to the marketplace and the financial
2 strength for Muskrat Falls has to be there.
3 Otherwise, people will not be interested in
4 buying -- in financing it.

5 CHAIRMAN:

6 Q. Yes, but it's backed by the -- I mean, it's
7 backed by the Province though, isn't it? It's
8 not like Fortis. I mean, Fortis is a stand
9 alone company. It has no guarantees beyond
10 the equity base and its fiscal integrity. I
11 mean, Nalcor is more like -- you know, it's
12 more like a -- I shouldn't say a bank, that's
13 unfair to Nalcor, but I mean, you know, Nalcor
14 can get bailed out if he runs into problems
15 because it's a government entity.

16 MR. GOUDIE:

17 A. The debt guarantee fee applies to Newfoundland
18 and Labrador Hydro capital.

19 CHAIRMAN:

20 Q. Yeah, but does it -- it doesn't matter then
21 you're saying, Mr. Goudie, that it's owned by
22 the government, guaranteed by them? Does it
23 make any difference in terms of a potential
24 investment?

25 MR. GOUDIE:

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1 sort of financial strength of the company too.
2 So I think our debt equity target right now, I
3 think our actual target for Hydro is around
4 75/25 as we speak.

5 CHAIRMAN:

6 Q. But I mean, you -- Nalcor/Hydro has a
7 government guarantee, so you guys can't go
8 bust unless the government goes bust, and I
9 guess my point is if you decided to increase
10 your debt ratio say to 95 percent and you only
11 had five percent equity, I mean, that wouldn't
12 make the company any riskier in the markets
13 because of the government guarantee. Would
14 that lower rates to consumers? Because that's
15 the only thing that concerns me in this whole
16 exercise. I mean, all of us, what's the best
17 deal for the ratepayers of Newfoundland over
18 the period that we're talking? How do we get
19 the best deal for the people? That's the only
20 thing I'm interested in. Would it -- as one
21 of the factors, wouldn't it be a 95/5 versus
22 75/25?

23 MR. GOUDIE:

24 A. Well, Nalcor will be financing Muskrat Falls,
25 not Newfoundland and Labrador Hydro, so Nalcor

1 Q. Well, I'm sure it does make a difference, but
2 at the same time, if you're trying to interest
3 people in the capital markets in your project,
4 which we will be, in terms of Muskrat Falls
5 investment itself, the capital structure of
6 that company has to be solid and it can't be
7 over leveraged.

8 CHAIRMAN:

9 Q. So you don't think we could finance at 95/5
10 for instance? You don't think anybody -- a
11 bond holder would find 95 percent attractive?

12 MR. GOUDIE:

13 A. I don't think we could, no.

14 CHAIRMAN:

15 Q. Okay. Just one last quick question on gas
16 turbines. What kind of gas are you -- how does
17 that work?

18 MR. HUMPHRIES:

19 A. The units we have now, they burn number two,
20 which is basically diesel fuel.

21 CHAIRMAN:

22 Q. Oh, okay, alright. Well, that ends that line
23 of questioning. Is there anything else before
24 we break?

25 GREENE, Q.C.:

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1 Q. I believe Mr. O'Reilly would like to respond
2 to some undertakings.
3 O'REILLY, Q.C.:
4 Q. Yeah. There were five undertakings, I think,
5 correct?
6 GREENE, Q.C.:
7 Q. And for the record, we will mark these
8 undertakings we haven't to date. The one you
9 just filed on the carbon tax will be
10 Undertaking No. 2, in case you wish to refer
11 to it in your submissions.
12 O'REILLY, Q.C.:
13 Q. Okay. I'm just going to go through the ones -
14 - the time period deficits to bridge the loss
15 of 880 gigawatts from the system now, that's
16 being worked on and we'll deal with that
17 later.
18 GREENE, Q.C.:
19 Q. If that is the case, I would reserve the
20 right, based on the information filed, to
21 either have -- well, further RFIs obviously or
22 possibly have a witness come back from Nalcor.
23 O'REILLY, Q.C.:
24 Q. Understand. Understand that, okay. The
25 other, the second one that I have noted here

1 (11:15 a.m.)
2 MR. KEAN:
3 A. Yes, Jason Kean. The total value is
4 approximately 4.5 million.
5 O'REILLY, Q.C.:
6 Q. And the carbon charge on the domestic rate
7 payers, we've dealt with that. And the last
8 item, last undertaking was to provide the
9 costing of adding additional reliability in
10 Alpine regions of the transmission system.
11 And Mr. Bennett, probably you could speak to
12 that.
13 MR. BENNETT:
14 A. Thank you. So, we went back and looked at the
15 Long Range Mountain crossing and I think we
16 will want to file an update to Exhibit 97
17 because we do have the meteorological loadings
18 for the Alpine areas. So, we're happy to put
19 that on the record. But the loadings in those
20 areas are much higher than elsewhere on the
21 line. And the cost per kilometre in those
22 Alpine areas reflects those increased
23 loadings. So, in the Long Range Mountains,
24 for example, the cost per kilometre is
25 approximately--more than double what we're

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1 is the requested confirmation of the change in
2 the Vale numbers between DG2 and the current
3 understanding, there was a question asked on
4 that. And Mr. Stratton can speak to that,
5 probably he can go over that. I think he's
6 worked that number.
7 MR. STRATTON:
8 A. Paul Stratton. Vale, as of our DG2 analysis,
9 indicated that the requirements were for 80
10 megawatts firm power and with an annual energy
11 requirement of 640 gigawatt hours. As per our
12 latest operating load forecast numbers that
13 were just recently indicated to us from Vale,
14 their requirement are now 84 megawatts of firm
15 power with annual energy requirements of 670
16 gigawatt hours. So, just marginally higher
17 with incremental firm power requirement of 4
18 megawatts.
19 O'REILLY, Q.C.:
20 Q. Okay, thank you. The next undertaking was a
21 request to provide a total value of the
22 tenders already awarded and ready to be
23 awarded cumulatively, not by bidder, but
24 cumulatively. And I think Jason you can speak
25 to that. Mr. Kean will speak to that.

1 spending per kilometre in the normal loading
2 areas. So, that would put the cost per
3 kilometre in the range of say eight hundred
4 thousand dollars to one million dollars per
5 kilometre. Those costs are reflected in a
6 much more robust structural design in those
7 areas, as well as the addition of additional
8 anti-cascade structure to minimize the impact
9 of a failure, should it happen.
10 So, if we were to look at, for example,
11 upgrading the structural integrity in those
12 areas, let's say 25 percent, the cost impact
13 in those Alpine areas would be in the order of
14 20 to 25 million dollars. And maybe as a,
15 just as an operational note on that, certainly
16 our operational planning going forward will
17 see, you know, additional repair structures
18 for this new type of line on the system and
19 certainly our emergency restoration plan would
20 be focused on the Long Range Mountain areas.
21 GREENE, Q.C.:
22 Q. As a follow up question, the cost that you
23 just gave us at that point, those are
24 additional costs not included in the capital
25 cost estimate of the transmission line

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<p>1 included in the CPW analysis for DG2, is that</p> <p>2 -</p> <p>3 MR. BENNETT:</p> <p>4 A. That's right. Our DG2 estimate would--had an</p> <p>5 allocation in the cost per kilometre range</p> <p>6 that I identified. And to increase the</p> <p>7 structural capacity in those areas, the cost</p> <p>8 would be an additional 20 to 25 million</p> <p>9 dollars.</p> <p>10 GREENE, Q.C.:</p> <p>11 Q. Thank you.</p> <p>12 O'REILLY, Q.C.:</p> <p>13 Q. So, the only outstanding, we only have one</p> <p>14 outstanding undertaking and subject to that,</p> <p>15 unless there is some question arising out of</p> <p>16 those responses, I would ask that the Panel be</p> <p>17 dismissed.</p> <p>18 MR. JOHNSON:</p> <p>19 Q. After one of Commissioner Whalen's questions,</p> <p>20 I was asked to ask--and this is in connection</p> <p>21 with the question regarding any IOC requests</p> <p>22 for load, whether Nalcor has received any</p> <p>23 applications for power and energy from any</p> <p>24 other company or entity in Labrador.</p> <p>25 MR. BENNETT:</p>	<p>1 deferring is going -</p> <p>2 GREENE, Q.C.:</p> <p>3 Q. Okay, you are -</p> <p>4 MR. HUMPHRIES:</p> <p>5 A. Yes, we do have those numbers.</p> <p>6 GREENE, Q.C.:</p> <p>7 Q. Alright.</p> <p>8 O'REILLY, Q.C.:</p> <p>9 Q. We're in a position to respond to that now.</p> <p>10 So, Mr. Humphries will with that.</p> <p>11 MR. HUMPHRIES:</p> <p>12 A. They are consistent with what we--counsel</p> <p>13 anticipated yesterday for the loss of an 880</p> <p>14 gigawatt hour load in 2013. And we'd assume</p> <p>15 that we'd have a capacity of 125 megawatts.</p> <p>16 The capacity deficit would occur in 2023 and</p> <p>17 the energy deficit would now be in 2030.</p> <p>18 GREENE, Q.C.:</p> <p>19 Q. Sorry, I didn't hear your -</p> <p>20 MR. HUMPHRIES:</p> <p>21 A. 2030 for the energy, 2023 for capacity.</p> <p>22 GREENE, Q.C.:</p> <p>23 Q. Thank you. My team did do the calculations</p> <p>24 correctly then.</p> <p>25 MR. HUMPHRIES:</p>
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<p>1 A. An application? If you can help me understand</p> <p>2 what you mean by that?</p> <p>3 MR. JOHNSON:</p> <p>4 Q. That's how it was put to me. I guess a</p> <p>5 request for power.</p> <p>6 MR. BENNETT:</p> <p>7 A. There's no firm request for power, no.</p> <p>8 MR. JOHNSON:</p> <p>9 Q. Thank you.</p> <p>10 MR. BENNETT:</p> <p>11 A. This might be unusual, Mr. O'Reilly, I think</p> <p>12 we have the answer for the 880 gigawatt hour.</p> <p>13 So, if it's convenient to the Chair, maybe we</p> <p>14 can address that before we -</p> <p>15 O'REILLY, Q.C.:</p> <p>16 Q. Okay, fine. That'll be--okay.</p> <p>17 MR. HUMPHRIES:</p> <p>18 A. Okay. Based on that, the actually deficit</p> <p>19 dates are similar to the assumptions that</p> <p>20 counsel made yesterday.</p> <p>21 GREENE, Q.C.:</p> <p>22 Q. I'm sorry, I was distracted with the</p> <p>23 undertaking numbers. Are we -</p> <p>24 O'REILLY, Q.C.:</p> <p>25 Q. This is the first one, the one that we were</p>	<p>1 Q. Yes.</p> <p>2 GREENE, Q.C.:</p> <p>3 Q. They'll be kept on.</p> <p>4 CHAIRMAN:</p> <p>5 Q. So, that's it now, Mr. O'Reilly.</p> <p>6 O'REILLY, Q.C.:</p> <p>7 Q. That's it for the Panel.</p> <p>8 CHAIRMAN:</p> <p>9 Q. So, Mr. Bennett and your colleagues, thank you</p> <p>10 very much. If I may use a terrible energy</p> <p>11 pun, there was more light shed than heat, so</p> <p>12 thank you.</p> <p>13 O'REILLY, Q.C.:</p> <p>14 Q. That's good; that's the idea, thank you.</p> <p>15 GREENE, Q.C.:</p> <p>16 Q. During the -</p> <p>17 CHAIRMAN:</p> <p>18 Q. Yes, 15 minutes.</p> <p>19 GREENE, Q.C.:</p> <p>20 Q. We might need a slightly longer, we're going</p> <p>21 to change over the panel and MHI will start</p> <p>22 the presentation. Fifteen, twenty minutes</p> <p>23 possibly.</p> <p>24 CHAIRMAN:</p> <p>25 Q. We're in your hands.</p>

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<p>1 O'REILLY, Q.C.:</p> <p>2 Q. So, another five on top of the fifteen, the</p> <p>3 usual. Okay.</p> <p>4 (11:23 a.m.) (BREAK)</p> <p>5 (12:06 p.m.)</p> <p>6 CHAIRMAN:</p> <p>7 Q. Now, Madame, you're on and I assume we'll go</p> <p>8 to around 1:00. Is that what -- or I'll wait</p> <p>9 for a certain look from a certain solicitor?</p> <p>10 Is that what I'm supposed to do?</p> <p>11 GREENE, Q.C.:</p> <p>12 Q. Thank you, Mr. Chair. That would be</p> <p>13 acceptable. I don't think the presentation</p> <p>14 will be finished at that time, so depending on</p> <p>15 the flow of the presentation, whether it's</p> <p>16 five to one or ten to one or five after one,</p> <p>17 but generally 1:00 will be acceptable.</p> <p>18 CHAIRMAN:</p> <p>19 Q. Okay.</p> <p>20 GREENE, Q.C.:</p> <p>21 Q. Mr. Chair, Manitoba Hydro International are</p> <p>22 here this morning and ready to present the</p> <p>23 report for the Commissioners and for the</p> <p>24 review process. I would like to introduce</p> <p>25 first the members of the panel who are seated</p>	<p>1 presentation. I've been told to -- I guess I</p> <p>2 have a trait like many Newfoundlanders of</p> <p>3 speaking too fast and I've been told to slow</p> <p>4 down and I shall try to endeavour to do that.</p> <p>5 O'REILLY, Q.C.:</p> <p>6 Q. We listen fast.</p> <p>7 MR. WILSON:</p> <p>8 A. I have spent a fair bit of time here in</p> <p>9 Newfoundland in the last six months and it's</p> <p>10 been very interesting. A number of slides</p> <p>11 here today are included in material that's</p> <p>12 already been discussed.</p> <p>13 GREENE, Q.C.:</p> <p>14 Q. Excuse me, Mr. Wilson. I'm getting a sign</p> <p>15 from the back of the room that it may be</p> <p>16 difficult to hear you, so if you could speak</p> <p>17 up, please.</p> <p>18 MR. WILSON:</p> <p>19 A. How's that? Okay?</p> <p>20 O'REILLY, Q.C.:</p> <p>21 Q. Speed and a low voice is lethal.</p> <p>22 MR. WILSON:</p> <p>23 A. Yes. Thank you. A number of slides in this</p> <p>24 presentation we've seen already in the report</p> <p>25 through the cross-examinations and</p>
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<p>1 over at the table. In the middle, we have</p> <p>2 Paul Wilson, who is the managing director of</p> <p>3 Manitoba Hydro International, and for this</p> <p>4 particular project, for this review, he was</p> <p>5 the project director. Seated immediately to</p> <p>6 Paul's right, we have Mack Kast, who for this</p> <p>7 review is the financial project manager. And</p> <p>8 on the other side of the table, we have Mr.</p> <p>9 Allan Synder, who is the project manager team</p> <p>10 lead and the biographies for each of the panel</p> <p>11 members, there is a short biography included</p> <p>12 with the Manitoba Hydro report in Volume 2.</p> <p>13 So with that introduction, I turn it over to</p> <p>14 Mr. Wilson who I believe will start the</p> <p>15 presentation.</p> <p>16 MR. WILSON:</p> <p>17 A. Thank you. Mr. Chairman, Commissioners of the</p> <p>18 Board, respective counsels and ladies and</p> <p>19 gentlemen, it's a pleasure to be here today to</p> <p>20 present Manitoba Hydro International's report.</p> <p>21 Assisting me today I have Al Snyder on my left</p> <p>22 and Mr. Mack Kast on my right and we will be</p> <p>23 splitting this presentation into the three</p> <p>24 parts and you have the pleasure of my voice</p> <p>25 for at least the first part of this</p>	<p>1 presentations and they're in here for</p> <p>2 completeness, but I may be glossing over,</p> <p>3 reading through them fairly quickly.</p> <p>4 The outline of today's presentation,</p> <p>5 there's an introduction of the project and</p> <p>6 what we did and who MHI is, the options that</p> <p>7 were reviewed and our review methodology.</p> <p>8 What MHI did in this review has been</p> <p>9 documented. We talk the details of what</p> <p>10 Nalcor has done in terms of project screening</p> <p>11 and project estimating, which has a big impact</p> <p>12 on how the CPW analysis is constructed and</p> <p>13 presented. MHI was part of -- undertook a</p> <p>14 technical review of the materials provided by</p> <p>15 Nalcor and their various consultants,</p> <p>16 particularly in the areas of load forecasting,</p> <p>17 hydrology, reliability studies, the AC</p> <p>18 integration was reviewed, those studies, and</p> <p>19 there's some documents on NERC standards we</p> <p>20 reviewed. The infeed option and the Isolated</p> <p>21 island options were reviewed in detail and</p> <p>22 then we concluded with the CPW analysis and</p> <p>23 the results thereof and we'll have some</p> <p>24 concluding comments at the end of the</p> <p>25 presentation.</p>

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<p>1 It was a challenge to reduce all of this 2 comprehensive material in the review into this 3 presentation and for the most part, all the 4 important points have been retained in here 5 and some of the areas, I've de-emphasized 6 since we've covered those extensively already 7 in this hearing.</p> <p>8 Central to MHI's review was the reference 9 question. It was front and central and it 10 defined what was to be done and how we 11 undertook this undertaking. It was the 12 foundation. It outlined what the options were 13 and what we could not do.</p> <p>14 MHI filed its report in January, which 15 was made public January 31st, the report 16 entitled "Two Generation Expansion 17 Alternatives for the Island Interconnected 18 Electrical System" and the two expansion 19 alternatives were identified in the terms of 20 reference and are as follows: the infeed 21 option, which is the Muskrat Falls generating 22 station and Labrador-Island link HVdc system, 23 and the Isolated Island option which was 24 largely a thermal generation expansion plan. 25 It's important to note what areas were</p>	<p>1 countries, Mozambique, Liberia, East Timor and 2 then we move on to some other nice locations 3 in Kenya, Saudi Arabia. We've been working in 4 the United States, Canada and many other 5 countries around the world. We provide 6 consulting services and management services 7 worldwide to these clients, including 8 engineering.</p> <p>9 Our engagement in this project was 10 undertaken through a request for proposal. 11 MHI was invited and awarded this contract 12 through a competitive RFP process. This RFP 13 is a public document and on the PUB Board 14 website, along with our proposal. That 15 contract was awarded on July 4th of 2011.</p> <p>16 To undertake this work, MHI assembled a 17 team of specialists, many of them in-house and 18 from our parent company and from other 19 contacts and contractors that we use in our 20 projects around the world. We assembled this 21 team to look at load forecasting, project 22 management and they're experienced in utility 23 resource planning, hydroelectric generation, 24 engineering, operations and maintenance, 25 thermal generation, HVdc engineering,</p>
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<p>1 not covered in MHI's review. The terms of 2 reference did not include consideration of the 3 following: alternative fuel types, for 4 example, natural gas, coal or liquified 5 natural gas. We did not consider other island 6 supply options which were not part of the 7 options presented to us, for example, biomass 8 or tidal power, solar. Consideration of the 9 export market via the Maritime link and the 10 monetization thereof was not included in our 11 review by terms of reference. Technical 12 feasibility of the Maritime link was not 13 reviewed nor were the electricity requirements 14 in Labrador or the potential impact of the 15 island rates for the ratepayers.</p> <p>16 Now, MHI's engagement in this, Manitoba 17 Hydro International, is a wholly owned 18 subsidiary of Manitoba Hydro and Manitoba 19 Hydro is a provincial Crown corporation 20 charged with serving generation, transmission, 21 distribution to the people of the Province of 22 Manitoba, much like Nalcor is here in 23 Newfoundland. MHI has provided consulting 24 services in over 70 countries worldwide. The 25 countries include a lot of post-conflict</p>	<p>1 operations and maintenance, hydrology, 2 reliability, AC integration and planning 3 studies, submarine cables and marine 4 crossings, wind power and financial analysis 5 and when needed, I would invite other subject 6 matter experts from the parent company, when 7 need arose.</p> <p>8 Now I want to briefly cover the options 9 reviewed. The first option was the infeed 10 option, which is the Interconnected option 11 with Labrador. We have a nice little diagram 12 here, shows the route of the interconnection 13 link, which the locations are approximate. 14 The facilities are noted. The details of the 15 infeed option are fairly well known. You 16 know, there's a Muskrat Falls generating 17 station, 824 megawatts with an average energy 18 of 4.9 terawatt hours per year. The Labrador- 19 Island HVdc transmission link or LIL is part 20 of that. There's HVdc converter stations. 21 There's the marine crossing at the Strait of 22 Belle Isle and the addition of thermal energy 23 plants and other energy sources to assist with 24 capacity and demand. 25 The time line of these additional</p>

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<p>1 resources to the island power system has been 2 outlined in many exhibits. In this one, we've 3 drawn and extended out for the full study 4 period, but the details, you know, are that 5 there's the large investment in 2017 with 6 Muskrat Falls and the LIL and then the next 7 source isn't until 2036 with additional 8 sources then scattered throughout the rest of 9 the study period to 2067.</p> <p>10 (12:15 p.m.)</p> <p>11 With the Isolated island option, there is 12 not interconnection to the mainland. As 13 mentioned, it's largely a thermal plan 14 focusing on the Holyrood thermal generating 15 station with installation of pollution control 16 equipment. It provides for life extension for 17 the generation to 2033 and 2036. The plant is 18 replaced ultimately with three 170 megawatt 19 CCCTs. There's three hydroelectric generating 20 stations in that plan with additions of CCCTs 21 and CTs to fill out the energy requirements. 22 Also, there's one new wind farm. Time line 23 for this plan, you know, it's less capital 24 intensive, but investments are scattered 25 throughout the time horizon of the study.</p>	<p>1 estimating methodologies and then the risk 2 analysis associated with each of those 3 projects.</p> <p>4 For the financial perspective, financial 5 review, we reviewed Nalcor's CPW methodology 6 which has a number of elements in it, 7 including capital and operating expenses. We 8 reviewed the fuel price forecasts. MHI did an 9 assessment on the allowance for funds used 10 during construction as part of those 11 estimates. We looked at the escalation rates, 12 discount rates and the debt to equity 13 component of those projects. We examined the 14 power purchase agreements and we looked at the 15 power purchase agreement, PPA, versus the cost 16 of service methodology approach and their 17 treatment for Muskrat Falls. In order to test 18 the merits of the CPW results, we used a 19 sensitivity analysis to determine what were 20 the critical elements and the sensitivities to 21 the CPW.</p> <p>22 Now there's been a lot of material 23 provided and talked about the project 24 estimating and the Decision Gate process and 25 how that works, so I won't go into a lot of</p>
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<p>1 Now I'd like to describe our review 2 methodology for how we undertook this work. 3 This diagram is in our report. I guess what's 4 important about it is that it somewhat mimics 5 a generation resource planning process. 6 There's a load forecast that's identified, 7 that's fed in to the generation resource plan. 8 It develops the alternatives. In our case, 9 there was two alternatives to review. There's 10 a large number of feasibility studies that 11 were available or not available for both 12 options and we had a number of volumes 13 (phonetic) that were common to both options. 14 Reliability analysis would be undertaken for 15 both options and the CPW analysis or the 16 financial business case for those options 17 would be reviewed and then for our report, we 18 developed our key findings from all of this 19 material.</p> <p>20 From the technical perspective, for the 21 technical review, we looked at the generation 22 resource plan, load forecast, hydrology, 23 reliability, the feasibility studies for the 24 various project components, AC system 25 integration studies, the cost estimates and</p>	<p>1 details here. DG2 was the important milestone 2 and all the study reviews that MHI undertook 3 were at the DG2 level and we've also stated 4 that not all the information was available for 5 Nalcor to pass DG2, such as the AC integration 6 studies in our key findings.</p> <p>7 The DG3, which is project sanction, which 8 Nalcor is endeavouring to move to now, is 9 really the final check and confirmation of 10 that investment or that decision is well 11 founded to pass through that decision gate.</p> <p>12 Now this is the last time you'll 13 hopefully see AACE on any slide. It's very 14 difficult. From now on, we'll call it just 15 class four and class three, but we did follow 16 the cost estimating methodology under this 17 standard, which Nalcor has adopted for their 18 project estimating. The important part here 19 is the class four and class three estimates 20 where class four is the study or feasibility 21 level at plus 50, minus 30, and for class 22 three was the plus 30, minus 20 or budget 23 authorization, project sanction in Nalcor's 24 case. It's a metric for our assessments when 25 we're undertaking to review those cost</p>

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<p>1 estimates. If they fit within those ranges, 2 then we would find that the work was 3 reasonable. So we've seen that chart already, 4 so I'll just go on. We're good.</p> <p>5 Again, I'll just gloss over some of this, 6 but the important part on this slide, other 7 than the ranges and that, is the capital cost 8 that we've seen in this hearing has a role in 9 how the CPW analysis rolls out. So, you know, 10 the refinements of these estimates are 11 critical to that outcome of the CPW analysis. 12 What ranges of accuracy are used have an 13 impact on that CPW result.</p> <p>14 Now, for risk review, Nalcor has 15 documented in their documents and their 16 consultants, they categorized risk under two 17 headings, tactical risk and strategic risks 18 and tactical risks, you know, is the 19 evaluation of the design and planning aspects, 20 for example, foundation risks of the Muskrat 21 Falls dam, performance risks associated with 22 contractors, weather or pricing, and then in 23 terms of strategic risks, you know, there's 24 changes in scope, market conditions and local 25 factors that have an influence on how costs</p>	<p>1 be lumpy and what I mean by lumpy is they're 2 rather large. In terms of Muskrat Falls, it's 3 a large plant with the LIL at 900 megawatts 4 and loads can be similar with, you know, I 5 heard a potential 500 megawatt requirement in 6 Labrador, Western Labrador, which may or may 7 not come. Now, supply price may impact the 8 load curve, thus the analysis is typically 9 iterative. And we did not show any iterations 10 on our--in our review since we're doing a 11 straight-line review, but when you perform a 12 CPW analysis, price has an impact on how much 13 energy is consumed and that has an impact on, 14 ultimately, the CPW. Depending upon the 15 location, supply choices involve various 16 preferred sources, so if you have indigenous 17 sources on the island, that may be your 18 preferred choice. The objective of generation 19 which is declining is that--to determine the 20 most economic mix to reliably satisfy the 21 demand. And the supply equation must also 22 consider security and reliability, 23 environmental, social issues, transmission 24 capabilities, et cetera. Also as part of the 25 generation resource plan, reserve requirements</p>
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<p>1 are estimated, and organizational risks, size 2 and complexity of the project. So this was 3 the platform for Nalcor's risk assessment.</p> <p>4 In our review, we noted that as part of 5 the technical review that risks were generally 6 related into three areas: determination of 7 costs, the timing of the projects and the 8 ongoing technical and operational risk issues. 9 Prior to DG3, Nalcor had done a fair bit of 10 risk analysis work and factored it at a higher 11 level in those reviews. MHI has documented 12 these risks in our report where appropriate.</p> <p>13 Now for generation resource planning, the 14 time horizon is typically 20 years or more. 15 You need to take the long view when you 16 develop these very large projects. Generation 17 planning is a function of the load forecast, 18 generation retirements and government policy. 19 The timing and the sizing of future generation 20 is driven by the annual energy needs and peak 21 demand requirements. Ideally you want to keep 22 a reasonably tight relationship between supply 23 and demand in order to maintain reliability 24 and the economics of delivering power. 25 Increments on both the demand and supply can</p>	<p>1 must be factored in. There's been a lot of 2 talk in this hearing and material presented 3 about the loss of load hours. The amount 4 that's established is based on reliability and 5 economic factors. Interconnections generally 6 reduce, reserve requirements while improving 7 reliability. A sophisticated modelling 8 program was used to optimize these preferred 9 choices and in Nalcor's case, they used 10 strategists, in Manitoba Hydro we use our own 11 in-house tools, but the principles are the 12 same. Newfoundland found that Nalcor's 13 generation resource planning process is 14 consistent with leading North American 15 utilities, such as Xcel Energy, Minnesota 16 Power, Ontario Power Generation, Trans Alta or 17 ATCO--and I'll include Manitoba Hydro with 18 that.</p> <p>19 Now, I'd like to talk about Nalcor's load 20 forecast. We're starting to get to the 21 technical material and some of these concepts 22 --we'll move on. The load forecast is key 23 input into the generation expansion plan where 24 the generation plan is structured to match 25 load growth increments in both capacity and</p>

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<p>1 energy. As part of MHI's review, we completed 2 a comprehensive review of Nalcor's load 3 forecast methods, data sources, analysis 4 techniques, using the Island of Newfoundland's 5 historical load data and key inputs provided 6 by Nalcor. MHI reviewed the rationale behind 7 the historical load growth factors and we 8 tested these factors and assumptions for 9 future load growth. For example, the 10 penetration of electric heat in the Domestic 11 sector or the number of housing starts, these 12 are inputs into the load forecast.</p> <p>13 Past performance was measured by 14 examining the accuracy of the last ten 15 forecasts. In the econometric model, it's 16 based on historical past performance to 17 project forward. The load forecast is based 18 on the summation of different sectors, you 19 know, in Domestic, which is largely 20 residential or is residential, general service 21 sector, the industry or the Industrial sector 22 and other, which is technically transmission 23 lines.</p> <p>24 So for the Domestic sector what did we 25 find? Well it's based entirely on econometric</p>	<p>1 In the general service sector the 2 methodology has produced excellent results, 3 I'm using regression modelling and linear 4 extrapolation techniques. The forecast was 5 only one to two percent out as far as eight to 6 nine years into the future. At this time 7 implementation of end-use modelling techniques 8 is not required. In the Industrial sector 9 forecast accuracy has been adversely impacted 10 by unforeseen plant closures in recent years. 11 The load forecast for this sector has 12 consistently over predicted load growth due to 13 unanticipated mill closures. The future 14 status of the existing pulp and paper mill is 15 a critical component of the Industrial load 16 forecast.</p> <p>17 Industrial load, the total Island- 18 Industrial load in the 2010 forecast was 1258 19 gigawatt hours and this represents 20 approximately 17 percent of the total island 21 load. The existing pulp and paper mill 22 consumption in 2010 was 981 gigawatt hours, 23 also representing about 13 percent of the 24 island load, and now there's a new industrial, 25 oncoming, I understand with Vale, which has a</p>
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<p>1 modelling techniques and the results 2 consistently under predicted future energy 3 needs by a rate of one percent per year. The 4 forecast error is nationally mitigated with 5 the annual production of an updated load 6 forecast and generation expansion plan which 7 naturally biases it to correct for that. Now 8 the most recent load forecast was done in 9 2010, and this is the load forecast we 10 assessed. What we found for the Domestic 11 sector was that the methodology was 12 acceptable, but does not fully meet utility 13 best practices for this sector and MHI 14 recommends the incorporation of end use 15 modelling techniques. End use modelling 16 techniques will improve the capability to 17 quantify load growth by end use, incorporate 18 new energy uses into the model, quantify 19 energy efficiency by end use or improve the 20 design of conservation and demand management 21 programs. It is important to note that, you 22 know, even with the adoption of end-use 23 modelling, the accuracy of the forecast may 24 not improve, but the quality of the derived 25 knowledge would.</p>	<p>1 demand of 80 megawatts and 600 gigawatt hours 2 in 2015 and I understand that there's 3 additional--that has been revised recently and 4 was discussed this morning.</p> <p>5 Now this is the total Island energy 6 demand over the study period, don't want to 7 get into too many of the details, but after 8 the 2029 period, since the load forecast is 9 only done for a twenty year period, the load 10 is extrapolated based on the average of the 11 last five years to the end of the study 12 period. So at the end you have a total load 13 of 12 terawatt hours.</p> <p>14 This next slides shows system peak 15 demand, in terms of capacity and today you 16 have about 1,600 megawatts of demand, capacity 17 demand peak, and it goes to about 2,400 18 megawatts by the end of the study period in-- 19 is it 2069? 2067, which is roughly about the 20 same amount, the differential amount is about 21 Muskrat Falls, about 800 megawatts. So our 22 key findings in this area in load forecast, 23 the load forecasting process was conducted 24 with due diligence, skill and care and meets 25 acceptable utility practices with the</p>

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<p>1 exception that end-use modelling techniques 2 for domestic loads are not currently employed. 3 The load forecasting process has produced 4 reasonable results for the domestic and line 5 loss sectors, excellent results for the 6 general service sector, and very poor results 7 for the industrial sector. The industrial 8 sector has adversely affected the overall 9 energy and peak forecast results and in 10 hindsight MHI finds that if the pulp and paper 11 mill closures were accurately forecasted, the 12 energy and peak forecast would have been 13 excellent. 14 The domestic sector consistently under 15 predicts future energy at a rate of one 16 percent per future year. And as indicated, 17 although the magnitude of the forecast error 18 is acceptable, the frequency of the under 19 prediction of the energy consumption should be 20 addressed. And to solve this problem, I 21 gather the model needs to be recalibrated in 22 some fashion. 23 In the next ten years, the load forecast 24 performance should produce good results, if 25 the remaining pulp and paper mill remains</p>	<p>1 requirements at all times, taking into account 2 scheduled and reasonably expected, unscheduled 3 outages or system components. Operating 4 reliability or security is the ability of the 5 electric system to withstand sudden 6 disturbances such as electric short circuits 7 or unanticipated loss of system components; 8 for example, of the loss of HVdc transmission 9 line. Now adequacy is the type of reliability 10 analysis done in strategists for generation 11 resource planning. Security is--can be 12 assessed by deterministic means or by 13 reliability probabilistic assessment methods 14 as recommended in our key findings. Now 15 there's generally two categories of power 16 system reliability studies. One is a 17 deterministic mode, which is subjective and 18 based on engineering judgment, and then 19 there's a probabilistic method, which is more 20 accurate for reliability assessment. It takes 21 into account the nature of the risks 22 associated with the power system, and how we 23 operate power systems. If events are random 24 that occur, probabilistic assessment takes 25 into account these random events. Also, these</p>
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<p>1 operational. Conversely, the load forecast 2 will significantly over predict electricity 3 requirements, if the remaining pulp and paper 4 mill closes. 5 In the long term, if the remaining pulp 6 and paper mill stays operational, the load 7 forecast is likely to under predict future 8 requirements because the industrial forecast 9 does not include any new loads for the study 10 period. Another way to say that is it may be 11 unrealistic to expect that there would be no 12 new industrial load over a period of 50 years. 13 And that is enough on load forecast. 14 The next area of topic I would to cover 15 is reliability, and reliability, power system 16 reliability has been discussed quite 17 significantly in this hearing and MHI's report 18 on this area. We've got the definition of 19 reliability by NERC on the screen, which 20 consist of two fundamental concept, which 21 consists of two fundamental concepts: 22 adequacy, all right, and what we call 23 operating reliability, which is also termed 24 security. Adequacy is the ability of the 25 electric system to supply power and energy</p>	<p>1 probabilistic methods are being recommended by 2 industry-wide standards and by working groups. 3 We have the MISO reliability working group 4 there, but probably a better example would be 5 the NERC generation and transmission 6 reliability model task force, which fed the 7 recommendations into the NERC resource issue 8 subcommittee, which was approved, and which 9 approved those recommendations for adoption by 10 NERC. The deterministic methods noted above 11 were the methods that were used in Nalcor's 12 Exhibit 106 on reliability risk assessment as 13 stated in the hearing by Nalcor. The 14 probabilistic methods are applied system-wide 15 and consistent risk factors for the component 16 parts. Now the following are some examples 17 where industry performs probabilistic 18 reliability studies. The Northeast Power 19 Coordinating Council, or MPCC, performs annual 20 loss of load expectations studies for the 21 region considering transmission restrictions, 22 so they factor in the transmission system into 23 their reliability assessments. Members of the 24 Midwest independence transmission system 25 operator utilities are a part of the Midwest</p>

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<p>1 Reliability Organization, or Reliability First 2 Corporation, and they undertake these types of 3 studies, and individual utilities also take 4 these studies: BC Hydro, Idaho Power, the 5 California ISO or--undertake these studies as 6 part of the Western Electricity Coordinating 7 Council. When we talk about reliability 8 assessments for specific projects or mega 9 projects such as Muskrat Falls and the 10 Labrador-Island link, there's example of 11 utilities that undertake these themselves. BC 12 Hydro undertook one for the Vancouver Island 13 Transmission Reinforcement Project, and 14 Manitoba Hydro did these probabilistic 15 reliability assessments for the HVdc Bipole 16 III alternatives, and Hydro One does these 17 studies as part of their transmission planning 18 and asset management in Ontario. Now for a 19 review of the probability system reliability-- 20 or power system reliability, excuse me--MHI 21 reviewed the related information provided by 22 Nalcor, so we looked at the generation 23 expansion plan documents filed in their 24 exhibits. We examined Nalcor's Exhibit 106, 25 Labrador-Island HVdc link and Island</p>	<p>1 replaced by a more advanced and comprehensive 2 reliability model incorporating all components 3 of the Labrador-Island linkage HVdc system, 4 and Nalcor has stated that they are 5 undertaking this work, which I applaud. 6 (12:45 p.m.) 7 When we talk about the normally accepted 8 range of Forced Outage Rate, it's typically 9 one percent, and then HVdc specifications, 10 they typically have targets of about one 11 percent for forced energy and availability, 12 which equates to about a one percent Forced 13 Outage Rate, and then two percent typically 14 with penalty thresholds, so there's a 15 contractual obligation on the manufacturers to 16 provide a system that will perform reliably. 17 This is from our experience. For your 18 information, Mr. Chair, we don't know if those 19 numbers are in the specifications since we 20 have not examined those power system 21 reliability findings. Deterministic 22 assessments such as those performed by Nalcor 23 cannot quantify the true risks associated with 24 a power system, and are unable to provide some 25 of the important inputs for making sound</p>
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<p>1 Interconnected Reliability study. We looked 2 at CIGRE HVdc reliability surveys which 3 collect member information on the performance 4 of HVdc systems, and we also looked at the 5 early Gull Island HVdc reliability analysis 6 studies that were done in the 80's, and this 7 was the information that was made available to 8 MHI. Nalcor has established generation 9 planning criteria related to the reliability 10 of the island interconnected system and timing 11 of generation additions, and this is a central 12 driver in the strategist generation plan. 13 Nalcor's capacity criteria of adequacy is a 14 loss of load hours with a target of 2.8 hours 15 per year, and I guess in layman's terms that 16 means there's insufficient generation for two- 17 point hours per year to service the needs of 18 the customers, and MHI considers this criteria 19 reasonable. Probabilistic reliability models 20 performed in the 80's for the HVdc system have 21 not been updated by Nalcor. MHI finds that 22 Nalcor is Forced Outage Rate, or FOR, of .89 23 percent per pole for the Labrador-Island link 24 is within the normal accepted range. The 25 Labrador-Island link, FOR, however, should be</p>	<p>1 engineering and business decisions. 2 Probabilistic reliability studies, including 3 transmission considerations, have not been 4 performed for the comparison of the 5 reliability for the two options. MHI has 6 determined that choosing between the two 7 options under review without such an 8 assessment is a gap in Nalcor's work to date. 9 Typically these studies are completed as part 10 of the DG2--Decision Gate process. Several 11 Canadian utilities, NERC regions and members 12 have adopted these probabilistic methods 13 reliability studies, particularly for major 14 projects. Risk factors are factors such as 15 risk and associated cost, including potential 16 larger societal cause related outages are not 17 evaluated. Probabilistic assessment is an 18 invaluable means to assess system risk, 19 reliability and associated cost of benefits 20 for various system improvement options, 21 particularly for major projects proposed by 22 Nalcor, and this is my last slide. MHI 23 recommends that these probabilistic 24 reliability assessment studies be completed as 25 soon as possible for both options under</p>

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<p>1 review. Such studies should become part of</p> <p>2 Nalcor's planning processes that would allow</p> <p>3 them to do a comparison of the relative</p> <p>4 reliability for significant future facilities.</p> <p>5 GREENE, Q.C.</p> <p>6 Q. Thank you, Mr. Wilson. At this time, Mr.</p> <p>7 Snyder would start the presentation, so I</p> <p>8 don't know if this is a convenient time for</p> <p>9 you to break for lunch, Mr. Chair, or if you</p> <p>10 would like to carry on for a few moments. We</p> <p>11 would be switching panel members at this</p> <p>12 point.</p> <p>13 CHAIRMAN:</p> <p>14 Q. I don't care. What do people want to do? Do</p> <p>15 you want to keep going for awhile?</p> <p>16 GREENE, Q.C.</p> <p>17 Q. I'd suggest that we break at this point then</p> <p>18 if -</p> <p>19 CHAIRMAN:</p> <p>20 Q. All right, we'll break.</p> <p>21 GREENE, Q.C.</p> <p>22 Q. Yeah.</p> <p>23 (12:47 p.m.) (BREAK FOR LUNCH)</p> <p>24 (2:10 p.m.) (RESUME)</p> <p>25 CHAIRMAN:</p>	<p>1 for a 1600 megawatt, 3- terminal HVdc link</p> <p>2 between Labrador, Newfoundland and New</p> <p>3 Brunswick. They also provides us with a 1998</p> <p>4 study of the Gull Island, the Soldier's Pond</p> <p>5 interconnection. However, the project</p> <p>6 definition has changed that DG2 with the</p> <p>7 Muskrat Falls development. Nalcor initially</p> <p>8 indicated that studies for the new project</p> <p>9 configuration would be available in November</p> <p>10 of 2011, and this was revised to March 2012,</p> <p>11 so we've really not had the opportunity to</p> <p>12 review the results of this study. Not having</p> <p>13 these studies completed has introduced an</p> <p>14 additional design and operational risk or</p> <p>15 potential unknown capital costs in the</p> <p>16 generation expansion plan. For example, there</p> <p>17 may be a need for additional transmission</p> <p>18 lines, additional AC equipment needed to</p> <p>19 regulate frequency or voltage or back-up</p> <p>20 generation to cover operational limitations of</p> <p>21 the Labrador-Island link. The detailed AC</p> <p>22 integration study is required prior to DG3 to</p> <p>23 fully conform--or to confirm the system</p> <p>24 requirements, operating parameters and risks</p> <p>25 associated with this elected option. The</p>
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<p>1 Q. All right, madam, you can continue with your -</p> <p>2 GREENE, Q.C.</p> <p>3 Q. Thank you, Mr. Chair. Mr. Snyder will now</p> <p>4 start his part of the presentation with AC</p> <p>5 integration studies. Mr. Snyder?</p> <p>6 MR. SNYDER:</p> <p>7 Q. Thank you very much.</p> <p>8 MR. SNYDER:</p> <p>9 A. Thank you very much. Good afternoon, Mr.</p> <p>10 Chairman, members of the Board, members</p> <p>11 representing the legal facilities in</p> <p>12 Newfoundland, and women and gentlemen--</p> <p>13 gentlemen and ladies. I don't see--oh yeah,</p> <p>14 there's one lady in the corner.</p> <p>15 CHAIRMAN:</p> <p>16 Q. There's two.</p> <p>17 MR. SNYDER:</p> <p>18 A. Two, sorry.</p> <p>19 CHAIRMAN:</p> <p>20 Q. And she's upset too you missed her.</p> <p>21 MR. SNYDER:</p> <p>22 A. Why integration studies. Integration studies</p> <p>23 are necessary to assess the impact of new</p> <p>24 facilities on existing electrical power</p> <p>25 systems. Nalcor did provide us with studies</p>	<p>1 planning criteria is a document that clearly</p> <p>2 identifies the parameters that would trigger</p> <p>3 system additions to meet operational criteria</p> <p>4 as a result of demand. Nalcor's planning</p> <p>5 criteria was provided for MHI's review along</p> <p>6 with a self-assessment of their compliance to</p> <p>7 that criteria. In general, the transmission</p> <p>8 planning criteria in use at Nalcor follows</p> <p>9 best utility practices. It could be improved,</p> <p>10 however, by referencing external standards</p> <p>11 such as the transmission rating calculations.</p> <p>12 With respect to NERC standards, some of the</p> <p>13 key of NERC standards include reliability,</p> <p>14 communication, critical infrastructure</p> <p>15 protection, transmission operations,</p> <p>16 transmission planning, personnel performance,</p> <p>17 training and qualifications. While Nalcor has</p> <p>18 stated that they don't currently comply to</p> <p>19 NERC's standards, they have stated that they</p> <p>20 were launching a study compliance team, and</p> <p>21 that was good news to us, as a review team.</p> <p>22 NERC's standards are in place in eight of the</p> <p>23 10 places in Canada, and the adoption of the</p> <p>24 NERC's standards is becoming synonymous with</p> <p>25 what's known as good utility practice.</p>

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<p>1 (2:15)</p> <p>2 MR. SNYDER:</p> <p>3 A. Application of NERC's standards is important.</p> <p>4 When the island interconnects to a</p> <p>5 neighbouring utility, and assurances of</p> <p>6 operational norms are part of the</p> <p>7 interconnection agreements. NERC's standards</p> <p>8 help to define these norms. The key findings</p> <p>9 that we found is that--from a transmission</p> <p>10 planning criteria, Nalcor generally follows</p> <p>11 utility best practices. With respect to the</p> <p>12 AC Integrational Studies, they should be</p> <p>13 completed prior to DG2 to adequately describe</p> <p>14 the facilities to operate the system under new</p> <p>15 configuration. However, they weren't done at</p> <p>16 this particular stage, and it's what we feel</p> <p>17 is a major gap in Nalcor's work to date.</p> <p>18 While Nalcor doesn't comply with NERC's</p> <p>19 standards, we do recommend the decision that</p> <p>20 they've taken to undertake a self-assessment</p> <p>21 and prepare for compliance to the NERC</p> <p>22 standards with or without the Maritime link.</p> <p>23 I'd now like to review the hydrology studies</p> <p>24 that we went through that were made available</p> <p>25 to us by Nalcor. We reviewed the engineering</p>	<p>1 accordance with utility best practices. The</p> <p>2 energy and capacity experts for Muskrat Falls</p> <p>3 were reviewed by MHI and confirmed to be</p> <p>4 reasonable for DG2. We looked, as I said, at</p> <p>5 the three small hydroelectric plants on the</p> <p>6 island, and found that Island Pond had an</p> <p>7 energy estimate of 186 gigawatt hours per year</p> <p>8 with a nominal capacity of 36 megawatts.</p> <p>9 Round Pond had an energy capacity--or an</p> <p>10 energy estimate at 139 gigawatt hours per year</p> <p>11 with a nominal capacity of 18 megawatts, and</p> <p>12 Portland Creek, the energy is estimated at 142</p> <p>13 gigawatt hours per year with a nominal</p> <p>14 capacity of 23 megawatts. These have all been</p> <p>15 established by qualified consultants using</p> <p>16 similar techniques to Muskrat Falls using the</p> <p>17 head and average time series river flows. The</p> <p>18 key finding from the hydrology studies were</p> <p>19 that Muskrat Falls studies were conducted in</p> <p>20 accordance with utility best practices</p> <p>21 comprehensively and with no apparent</p> <p>22 demonstrated weaknesses. Also the energy an</p> <p>23 capacity estimates for Muskrat Falls and the</p> <p>24 three small hydroelectric facilities on the</p> <p>25 island, which were prepared by a variety of</p>
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<p>1 documents provided by both Nalcor and their</p> <p>2 consultants as they related to the hydrology</p> <p>3 for Muskrat Falls and the three small</p> <p>4 hydroelectric plants on the island. MHI</p> <p>5 reviewed the time series river flows, the</p> <p>6 various heads associated with those river</p> <p>7 flows, and the results of the models provided.</p> <p>8 The software tools employed by Nalcor's</p> <p>9 consultants have been used on numerous</p> <p>10 hydroelectric projects on a global basis. We</p> <p>11 reviewed the project layout for Muskrat Falls</p> <p>12 and the characteristics including construction</p> <p>13 design flood estimates, the probably maximum</p> <p>14 flow and maximum floods, a spillway design,</p> <p>15 the numerical modelling of structures, the dam</p> <p>16 break analysis, ice studies, and the energy</p> <p>17 estimates. There were a large of reports, but</p> <p>18 these reports were structured with--a lot of</p> <p>19 them were structured with Gull Island built</p> <p>20 first. We reviewed the engineering analysis</p> <p>21 provided by Nalcor and its consultants and</p> <p>22 determined that it was appropriately done. In</p> <p>23 terms of the key findings, the Muskrat Falls</p> <p>24 studies provided by Nalcor were conducted and</p> <p>25 prepared by qualified consultants in</p>	<p>1 consultants using industry accepted practised</p> <p>2 were reviewed and confirmed to be reasonable</p> <p>3 for DG2, and now I would like to look at the</p> <p>4 infeed option, which includes Muskrat Falls,</p> <p>5 the HVdc converter stations, the HVdc</p> <p>6 transmission lines, and the Strait of Belle</p> <p>7 Isle crossing. Here's an overview from a mock</p> <p>8 sketch of Muskrat Falls and what it'll look</p> <p>9 like with the power house on the left and the</p> <p>10 spillway and the concrete dams on either side.</p> <p>11 Our technical review of Muskrat Falls included</p> <p>12 reviewing the proposed project layout and</p> <p>13 characteristics to identify any factors that</p> <p>14 might preclude successful development of this</p> <p>15 site. Confirmation that the scope of work of-</p> <p>16 for the project is both comprehensive and as</p> <p>17 a basis for planning. We assessed the methods</p> <p>18 used for preparation of the project cost</p> <p>19 estimate and evaluated the construction</p> <p>20 schedule. MHI also assessed the method used</p> <p>21 to prepare the cost estimates, and we'll get</p> <p>22 involved in that later with the CPW</p> <p>23 discussion. Nalcor used the work breakdown</p> <p>24 structure approach, or bottom-up estimate as</p> <p>25 we heard from them a couple of days ago. They</p>

provided extensive focus on construction and labour rates, construction materials, construction equipment, project management and engineering and they made provision for contingencies and cost escalations throughout the duration of the project. We did find that the capital cost of the project had increased by 104 percent between 1998 and 2010, but this can be largely explained by changes in scope of the project, inflation and an increase in the EPCM estimate, construction management estimate.

Key findings for Muskrat Falls were that the proposed layout and design of the generating station appears to be well defined and consistent with good utility practices. The general arrangement of the permanent works is a reasonable proposal for the optimum development in terms of both cost and construction duration and for those of you that are interested, the construction duration is estimated to be 62 months.

Another key finding is that based on the information provided, the proposed design and construction schedule is consistent with good

engineering and construction practices and should not pose any unusual risk for construction or operation of the facilities. The available studies have identified technical risks and appropriate risk management strategies, and despite the increase in costs, MHI considers the cost estimate at DG2 to be within the accuracy range of a class four estimate, that is the plus 50 or minus 30, which is representative of a feasibility study.

In terms of the HVdc transmission link, the converter stations themselves, one at Muskrat Falls, a second at Soldier's Pond, as far as the Muskrat Falls station is concerned, each pole operates at a nominal rating of 450 megawatts, thus the transfer capability of 900. Each pole has an overload capacity of 150 percent or 675 megawatts on a continuous rating and an overload pole capacity of 200 percent or 900 megawatts for ten minutes. Without the overload capability, the loss of a 450 megawatt pole due to an outage, the load could not be supplied without backup and could lead to load shedding or possible blackout.

The intended project is to transmit the 900 megawatts of power over 1100 kilometres of transmission line and inject this power into the island's electrical system at Soldier's Pond with an appropriate voltage and frequency control.

Here's a typical example of a footprint of a converter station. This happens to be the Henday converter station in the Province of Manitoba in the Manitoba Hydro system and you can see in the foreground consists of a dc switchyard, a converter building and in the background, a 230 kV switchyard. So you can see the footprint is not all that large, despite the fact that it's going to be the most significant station, I would guess, these two stations in the province.

Soldier's Pond converter station has a design similar to Muskrat Falls. It has three MVAR synchronous condensers to support DC conversion and stabilize AC performance. There's AC system upgrades required. For example, Holyrood units one and two will be converted to synchronous condenser units. Unit three has already been converted. A

number of HV high voltage breakers will need to be upgraded as a result of the higher fault currents. Also associated with the HV converter stations is an electrode used for grounding and there's a distribution type line will be used to reach the electrode at each site location, one at the Strait of Belle Isle and one at Dowden's Point.

What we found is that most of the HVdc system documentation was not available, such as the converter station single line diagrams or the concept transition document, since the project definition was changed at DG2, and this really hampered MHI's review to form an opinion on the anticipated performance of the converter stations. MHI found that the HVdc converter station system design parameters that were available for review were reasonable for the intended application.

One of the key findings was the Labrador-Island design link was specified using line commutated converters for the HVdc technology and this technology is mature and robust for the application and I think that Nalcor spelled that out earlier this week. The

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<p>1 estimated cost for the HVdc converter stations 2 and electrodes that were reviewed by MHI were 3 found to be within the range of a class four 4 estimate. Cost estimates for the synchronous 5 condensers, while low, are still within the 6 range of a class four estimate.</p> <p>7 We also found that there was no 8 comprehensive HVdc system risk analysis of 9 operation and maintenance done for the HVdc 10 converter stations or the operational aspects 11 of the Labrador-Island HVdc transmission line 12 and outages could be lengthy and repairs 13 expensive. For example, a converter station 14 may take only -- may take a week if a spare 15 isn't -- to repair if a spare isn't in the 16 area; may take two and a half years if there 17 is no spare. Risk analysis should be 18 completed prior to completion of finalization 19 of specifications of the HVdc converter 20 stations post DG2. Functional specifications 21 are being prepared by the EPCM contractor to 22 be issued to HVdc suppliers as part of the 23 detailed design.</p> <p>24 Here's a picture of an HVdc transmission 25 line and as you can see, the footprint is not</p>	<p>1 a 1 in 150 year return period and in Alberta, 2 AltaLink is designing to a 1 in 100 year 3 return period with a 100 percent safety 4 factor.</p> <p>5 As this HVdc transmission line is a major 6 component of the Island electrical system and 7 given that the line has a singular failure 8 mode, standards dictate a high reliability 9 level. In terms of the HVdc transmission line 10 outages themselves could also be lengthy and 11 given that the HVdc line is the primary source 12 of power in the Province, then rotating 13 outages to interconnected customers could be a 14 reality if the worst case scenario occurs. 15 The length of the outage can be mitigated with 16 a well prepared response plan. As an example, 17 best utility response plans could include: an 18 inventory of spare towers, conductors and 19 insulators; trained operators and construction 20 forces; mobilization and logistical plans; 21 equipment on site; and supply agreements with 22 neighbouring utilities, consultants, 23 contractors and manufacturers.</p> <p>24 The two-week repair period stated by 25 Nalcor in their Exhibit 106 may not be</p>
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<p>1 significantly large and they're guyed towers 2 and it's very similar to what would be built 3 here in Newfoundland.</p> <p>4 In terms of the HVdc transmission line 5 itself, you can see some of the exhibits that 6 we -- I'm not going to read through the 7 exhibits that we went through, but there was a 8 lot of available metrological data as input 9 into the reliability base design.</p> <p>10 The Nalcor decision to adopt the IEC 11 standard and CSA code for design and 12 reliability is appropriate. However, Nalcor 13 does deviated from the code in our 14 interpretation of it. Nalcor has used a 1 in 15 50 year return period and Nalcor also stated 16 that the HVdc line need not be designed at a 17 level greater than that of the existing 230 kV 18 AC system. A significant icing event could 19 occur however in an area remote from the 230 20 kV system which could down the HVdc line while 21 all the 230 kV lines remain intact.</p> <p>22 I've provided some examples of what other 23 utilities are doing for critical lines that 24 have an alternate supply. For example, the 25 Manitoba Hydro Bipole III is being designed to</p>	<p>1 realistic and is not an industry adopted 2 metric. Remote regions in Newfoundland and 3 Labrador may require additional infrastructure 4 during periods when access is restricted. For 5 example, in Manitoba, in order to achieve a 6 system wide two-week repair period, additional 7 berms, roads, and/or equipment located on site 8 are required at many remote locations.</p> <p>9 An option to meet load requirements could 10 also be alternate supplies, and again, we 11 heard from Nalcor on that matter. Connection 12 to the mainland via Maritime link may be a 13 viable alternate supply, provided this 14 interconnection agreement allows for this and 15 market conditions allow access to that power, 16 also, standby thermal sources, CTs or CCTTs, 17 and of course, retention of the Holyrood 18 thermal station or curtailable load.</p> <p>19 MHI recommends that a minimum of a 1 in 20 150 year return period should be used for the 21 design of the transmission -- of the Labrador- 22 Island link HVdc transmission line. The 23 design choice selected by Nalcor is contrary 24 to best utility practices and the IEC Industry 25 Standard recommends 1 in -- suggests, I'm</p>

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<p>1 sorry, 1 in 500 year return period for a</p> <p>2 critical single sourced power supply. Nalcor</p> <p>3 should also consider enhanced reliability in</p> <p>4 the remote Alpine regions, considering the</p> <p>5 potential access problems, and again, we heard</p> <p>6 from this morning that they were intending to</p> <p>7 do that. But as a minimum, a 1 in 150 year</p> <p>8 return period should be employed where no</p> <p>9 alternate supply is available.</p> <p>10 The capital cost for the HVdc</p> <p>11 transmission line fall within the range of a</p> <p>12 class four estimate, but appear to be at the</p> <p>13 low end of the range.</p> <p>14 GREENE, Q.C.:</p> <p>15 Q. Mr. Synder, perhaps if you could go back to</p> <p>16 slide 90? Your last bullet, you said</p> <p>17 something differently than what's shown on the</p> <p>18 slide there.</p> <p>19 MR. SYNDER:</p> <p>20 A. I'm sorry. As a minimum, 1 in 150 year return</p> <p>21 period is acceptable where an alternate supply</p> <p>22 is available.</p> <p>23 GREENE, Q.C.:</p> <p>24 Q. Okay.</p> <p>25 MR. SYNDER:</p>	<p>1 period is approximately 150 million dollars,</p> <p>2 again which we've heard earlier, and within a</p> <p>3 class four estimate.</p> <p>4 The Strait of Belle Isle crossing</p> <p>5 presents some specific challenges to this</p> <p>6 particular project and again, we had reviewed</p> <p>7 documentation from Nalcor. We evaluated</p> <p>8 things like the rock berms, the onshore</p> <p>9 trenching, cabling equipment and placement.</p> <p>10 Strait of Belle Isle crossing consists of</p> <p>11 three cables, 36 kilometres in length, two</p> <p>12 load carrying and one spare. The width of the</p> <p>13 Strait is only 18 kilometres, but cables will</p> <p>14 follow a circuitous route as a result of</p> <p>15 maximizing the depth of the cables. The</p> <p>16 intent is to keep the cables between 80 and</p> <p>17 100 metres beneath the surface of the water.</p> <p>18 Cables will enter the Strait using</p> <p>19 horizontal directional drilling techniques to</p> <p>20 a water depth of 80 metres and rock berms will</p> <p>21 be placed over the cables for protection</p> <p>22 against damage from anchors and fishing gear.</p> <p>23 The Strait of Belle Isle crossing is a</p> <p>24 critical component of the infeed option and</p> <p>25 construction of this particular component is a</p>
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<p>1 A. Sorry.</p> <p>2 O'REILLY, Q.C.:</p> <p>3 Q. And also, just make a correction that on the</p> <p>4 second bullet, instead of recommend, you used</p> <p>5 the word "suggested" in your oral</p> <p>6 presentation. Is that correct?</p> <p>7 MR. SYNDER:</p> <p>8 A. That is correct because we read the -</p> <p>9 O'REILLY, Q.C.:</p> <p>10 Q. You read the standard?</p> <p>11 MR. SYNDER:</p> <p>12 A. - read the standard.</p> <p>13 O'REILLY, Q.C.:</p> <p>14 Q. Okay.</p> <p>15 MR. SYNDER:</p> <p>16 A. It's still our recommendation.</p> <p>17 O'REILLY, Q.C.:</p> <p>18 Q. Yeah.</p> <p>19 MR. SYNDER:</p> <p>20 A. But it does say suggested in the standard.</p> <p>21 Capital cost for the HVdc overland</p> <p>22 transmission line fall within the range of a</p> <p>23 class four estimate, but appear to be at the</p> <p>24 low end of the range and the incremental cost</p> <p>25 to extent from 1 in 50 to 1 in 150 year return</p>	<p>1 complex undertaking. Cable laying and</p> <p>2 protection could take up to two years to</p> <p>3 complete, two seasons.</p> <p>4 Iceberg risk assessment. Local</p> <p>5 consulting firm C-CORE developed a model to</p> <p>6 assess the probability of cable contact by</p> <p>7 icebergs. Data indicated that iceberg scours</p> <p>8 were mostly present in deep water and C-CORE</p> <p>9 postulated that these iceberg scours had taken</p> <p>10 place in previous glacial periods. However,</p> <p>11 this could not be positively confirmed at this</p> <p>12 stage. Model studies found that the</p> <p>13 probability of iceberg contact with a</p> <p>14 submarine cable was one in 1,000 years at the</p> <p>15 depths planned for the marine crossing. The</p> <p>16 probability of contacting multiple cables was</p> <p>17 reduced with increased cable separation. And</p> <p>18 further investigation of iceberg scours and</p> <p>19 iceberg roll rates was recommended by C-CORE.</p> <p>20 One of our key findings was that the</p> <p>21 selection of the plus or minus 350 kV mass</p> <p>22 impregnated cable is an appropriate technology</p> <p>23 selection for the application of an HVdc</p> <p>24 marine crossing operating at plus or minus 320</p> <p>25 kV. Nalcor's base cost estimate for the</p>

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<p>1 marine crossing at DG2 was reviewed and found</p> <p>2 to be within the range of a class four cost</p> <p>3 estimate.</p> <p>4 The iceberg risks, as perceived to be</p> <p>5 significant by C-CORE, has quantified the risk</p> <p>6 to be less than one iceberg strike in 1,000</p> <p>7 years and this risk is further mitigated with</p> <p>8 rock berms and with increased cable</p> <p>9 separation. Additional research, monitoring</p> <p>10 of iceberg roll rates and bathymetric surveys</p> <p>11 of earlier iceberg scours should be done to</p> <p>12 provide a level of validation to further tune</p> <p>13 the iceberg strike model.</p> <p>14 Application of a spare cable with as much</p> <p>15 separation as practical is a prudent design</p> <p>16 feature of the Strait of Belle Isle marine</p> <p>17 crossing considering the potential</p> <p>18 difficulties of bringing in repair equipment</p> <p>19 at certain times of the year.</p> <p>20 Lastly, we reviewed the information made</p> <p>21 available for the Isolated Island option. The</p> <p>22 Holyrood thermal generating station consists</p> <p>23 of three heavy fuel oil boilers for a combined</p> <p>24 net generating capacity of 466 megawatts. The</p> <p>25 Holyrood station currently supplies</p>	<p>1 greenhouse gas emissions which could be</p> <p>2 problematic if emission standards change. The</p> <p>3 pollution control equipment additions that</p> <p>4 were discussed earlier are not required to</p> <p>5 satisfy the current limit of 25,000 tons of</p> <p>6 SOx emissions even at full load. Continued</p> <p>7 use of the 0.7 percent sulphur fuel satisfies</p> <p>8 the current certificate of approval and the</p> <p>9 pollution control equipment additions are not</p> <p>10 required by current Federal regulations, but</p> <p>11 are based upon the government direction</p> <p>12 related to the Provincial Energy Plan.</p> <p>13 The Holyrood replacement is anticipated</p> <p>14 to consist of three 170 megawatt number two</p> <p>15 oil-fired combined cycle combustion turbines</p> <p>16 installed in 2033 for units one and two and</p> <p>17 2036 for unit three. The technology and costs</p> <p>18 for the replacement plant appear to be</p> <p>19 reasonable.</p> <p>20 In terms of CTs and CCCTs, the Isolated</p> <p>21 Island option includes seven CCCTs and nine</p> <p>22 CTs and the methodology and base cost assumed</p> <p>23 for both the 50 megawatt CT and the 170</p> <p>24 megawatt CCCT installations are reasonable.</p> <p>25 In terms of the small hydro plants, as</p>
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<p>1 approximately one-third, up to 2.99 -- up to</p> <p>2 2,996 gigawatt hours annually, of the island's</p> <p>3 existing firm energy. The plant normally</p> <p>4 operates all three units during the highest</p> <p>5 customer demand periods of December through</p> <p>6 March.</p> <p>7 Also noted for Holyrood was the fact that</p> <p>8 as of 2011, the units are 41, 40 and 31 years</p> <p>9 of age and operation beyond 50 years may not</p> <p>10 be viable. The plant may become unsafe and</p> <p>11 unreliable to operate before the 2033- 36</p> <p>12 planned replacement period. With respect to</p> <p>13 Holyrood life extension, Nalcor has included</p> <p>14 230 million dollars in the Isolated Island</p> <p>15 option to extend the life of the plant. The</p> <p>16 estimates don't appear to have been based on</p> <p>17 detailed engineering, but are considered</p> <p>18 reasonable for sustaining capital for the</p> <p>19 plant for DG2 purposes.</p> <p>20 The Holyrood pollution control equipment</p> <p>21 additions with a projected cost of 603 million</p> <p>22 dollars with an in service date of 2015</p> <p>23 includes electrostatic precipitators,</p> <p>24 scrubbers, low NOx burners, but as suggested</p> <p>25 earlier, the upgrade will not reduce</p>	<p>1 discussed earlier, the in-service dates:</p> <p>2 Island Pond would be 2015; Round Pond 2020;</p> <p>3 and Portland Creek, 2036. The project cost</p> <p>4 estimates and schedule are optimistic in light</p> <p>5 of more recent stringent environmental</p> <p>6 requirements these plants might have to</p> <p>7 undergo.</p> <p>8 In terms of wind farms, there is only one</p> <p>9 new 25 megawatt wind farm proposed and that's</p> <p>10 for in-service in 2014. The two existing wind</p> <p>11 farms will be replaced after 20 years of</p> <p>12 service in 2028 and 2048. The capacity factor</p> <p>13 of 40 percent for these two plants is</p> <p>14 reasonable for a planning study and the</p> <p>15 estimated capital cost and operating expenses</p> <p>16 used in the CPW analysis are appropriate.</p> <p>17 Nalcor's 2004 study which specified an</p> <p>18 upper limit of 80 megawatts for non-</p> <p>19 dispatchable capacity is considered reasonable</p> <p>20 as well. Additional wind beyond the 80</p> <p>21 megawatts could result in potential spilling</p> <p>22 of water due to the limited hydraulic storage</p> <p>23 on the island.</p> <p>24 Thanks very much for your attention. I</p> <p>25 would now like to turn the podium over to Mack</p>

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1 Kast, our financial project leader.
 2 MR. KAST:
 3 A. Chair, members of the Board, counsel and
 4 parties present, I will address the matter of
 5 the cumulative present worth, otherwise known
 6 as the CPW analysis. To begin, we need to
 7 appreciate that when the government set out
 8 its mandate to the Board, it did not define
 9 the metric for making a determination of least
 10 cost. Rather, the CPW metric was defined by
 11 Nalcor in its July 6th, 2011 letter to the
 12 Board. The CPW focuses on costs only, those
 13 being capital expenditures, fuel costs, power
 14 purchases and operating expenses. The CPW
 15 approach excludes costs that are common to
 16 both options and the CPW does not take cash
 17 inflows into account. If it did, we would
 18 likely be looking at doing an NPV analysis or
 19 an internal rate of return analysis.
 20 That said, MHI found the CPW approach to
 21 be reasonable for the purposes intended, that
 22 is to make a determination of the least cost
 23 between the two options. The CPW results, as
 24 per Nalcor's final submission, are set out in
 25 the table. We have heard numerous references

1 sold. In the analysis, an 11 percent internal
 2 rate of return was targeted based on the
 3 project cash flows. The result was \$75.82 per
 4 megawatt hour expressed in 2010 hours,
 5 estimated at 2 percent per year, first applied
 6 with a 2017 in-service date for Muskrat Falls.
 7 (2:45 p.m.)

8 Now more specifically dealing with the
 9 PPA rate it relates to Muskrat Falls, using a
 10 \$75.82 per megawatt hour rate, multiplied
 11 against the projected Newfoundland Hydro
 12 volumes, results in an internal rate of return
 13 of 8.4 percent. The internal rate of return
 14 of 8.4 percent is considered reasonable and
 15 positive relative to the 8 percent weighted
 16 average cost of capital approved by the Board
 17 in its recent rate decisions. Further, Nalcor
 18 was comfortable with the 8.4 percent internal
 19 rate of return since the derivation of the
 20 \$75.82 per megawatt hour assumed 100 percent
 21 equity financing. To the extent that Nalcor
 22 can bring in debt financing to replace a
 23 portion of the equity financing, it will be
 24 able to lever up the 8.4 percent internal rate
 25 of return. Further, to the extent that the

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1 to the base differential and it is a 2. 2
 2 billion in favour of the infeed option.
 3 MHI has identified a number of matters
 4 which I would like to highlight in my
 5 presentation, the first being the PPA approach
 6 versus a cost of service approach. This
 7 matter pertains only to the Muskrat Falls
 8 generating station. The PPA approach avoids
 9 the impact of rate shock following the
 10 implementation of the project for Muskrat
 11 Falls, in as much as the PPA rates are uniform
 12 over the period under review. In contract
 13 following a cost of service approach, the
 14 rates would be impacted by carrying charges on
 15 the undepreciated plant in the early years
 16 resulting in the highest rate impact in the
 17 early years following implementation of
 18 Muskrat Falls. However, quite apart from the
 19 rate impact, the choice of the approach has
 20 minimal impact on the CPW result. Dealing
 21 further with the derivation of the PPA rate
 22 for Muskrat Falls, the plant cost input for
 23 Muskrat Falls was based in 2010 dollars and it
 24 is assumed that 100 percent, that is 100
 25 percent of the output from the plant would be

1 volumes in excess of Newfoundland Hydro's
 2 needs can be sold, such revenues will enhance
 3 the 8.4 percent return.

4 My final comment in this area relates to
 5 the take or pay aspect of the PPA rate. The
 6 PPA rate is proposed to be fixed at the time
 7 of the signing of the PPA contract between
 8 Nalcor and Newfoundland Hydro based on, as I
 9 understand it, the then-current Newfoundland
 10 Hydro planning load forecast. The PPA
 11 contract will be a take or pay contract for a
 12 50-year term. The minimum revenues from
 13 Newfoundland Hydro to Nalcor for any given
 14 year, as I understand, will be fixed by
 15 contract at that time of signing. On the
 16 other hand, if the volumes exceed those in the
 17 contract, the unit rate will be, for example,
 18 the \$75.82 per megawatt hour, of course,
 19 escalated.

20 My next area of comment relates to the
 21 discount rate sensitivity. Nalcor used a
 22 discount rate based on the weighted average
 23 cost of capital, that is the WACC. And the
 24 WACC was calculated being the composite of
 25 percent debt at 7.35 percent cost and 25

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<p>1 percent equity at 10 percent cost, resulting</p> <p>2 in a weighted average cost of capital of 8</p> <p>3 percent. Co-incidentally, a WACC rate of 8</p> <p>4 percent is in line with those rates approved</p> <p>5 by the Board in prior rate applications and</p> <p>6 MHI considers that the 8 percent WACC used in</p> <p>7 this instance is reasonable.</p> <p>8 In terms of discount sensitivity, the</p> <p>9 discount rate would have to increase to 17</p> <p>10 percent to result in a zero differential</p> <p>11 between the two options.</p> <p>12 Looking next to the capital cost</p> <p>13 sensitivity, the Nalcor study is based on DG 2</p> <p>14 estimating accuracy. If both Muskrat Falls</p> <p>15 and LIL capital costs are increased by 25</p> <p>16 percent, the CPW differential in favour of the</p> <p>17 Infeed Option would be reduced from 2. 2</p> <p>18 billion to 1.2 billion and that's with a 25</p> <p>19 percent increase. However, as we understand</p> <p>20 DG2 level estimates for class 4 that would be</p> <p>21 cost estimates have the potential to increase</p> <p>22 by as much as 50 percent. An increase of 50</p> <p>23 percent could cause the CPW differential</p> <p>24 between the two options to essentially become</p> <p>25 equivalent. And I say "essentially" because</p>	<p>1 differential between the two options was</p> <p>2 already 2.2 billion in favour of the Infeed</p> <p>3 option and presenting a high forecast would</p> <p>4 only illustrate that the differential would be</p> <p>5 increased.</p> <p>6 In short, fuel pricing forecasting will</p> <p>7 remain a challenge over the duration of the</p> <p>8 period under review. And this is evidenced</p> <p>9 partly by the fact, first of all, that one</p> <p>10 cannot buy derivative contracts probably for</p> <p>11 more than a year or two forward; secondly,</p> <p>12 PIRA itself only forecasts forward for 15</p> <p>13 years and I consider that a pretty short</p> <p>14 window relative to the 50 year horizon that</p> <p>15 we're looking at in this review. And, of</p> <p>16 course the fuel price forecasting is a concern</p> <p>17 because as we've heard as much as 70 percent</p> <p>18 of the CPW value for the Isolated-Island</p> <p>19 Option is related to fuel pricing.</p> <p>20 So up to this point I've only talked</p> <p>21 about sensitivity impacts from a single</p> <p>22 focused perspective. We can all appreciate</p> <p>23 that changing only one variable by holding all</p> <p>24 others constant is probably not that</p> <p>25 realistic, so let's take a look at the impact</p>
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<p>1 the net differential is reduced to 200 million</p> <p>2 from 2.2 billion. The capital costs</p> <p>3 sensitivity results for 25 percent and 50</p> <p>4 percent increases to Muskrat Falls and LIL are</p> <p>5 summarized in the table as shown.</p> <p>6 Moving on to load forecast sensitivity,</p> <p>7 Nalcor assumed a continuation of the operation</p> <p>8 of pulp and paper mill. Such a plant closure,</p> <p>9 however, would result in increased generation</p> <p>10 capacity of approximately 880 gigawatt hours</p> <p>11 per year, and if that were to be the case, the</p> <p>12 CPW differential would be reduced from 2. 2</p> <p>13 billion to approximately 400 million, as shown</p> <p>14 in the table below. MHI also looked at</p> <p>15 sensitivity associated with fuel pricing for</p> <p>16 thermal plants. The fuel price forecast used</p> <p>17 by Nalcor were provided by the PIRA Energy</p> <p>18 Group. The PIRA forecast provides:</p> <p>19 reference, low, high and expected price</p> <p>20 forecasts. Using the March 2010 PIRA low</p> <p>21 forecast, the CPW differential in favour of</p> <p>22 the Infeed is essentially eliminated, and that</p> <p>23 is illustrated in a table below. In terms of</p> <p>24 this presentation, the PIRA high forecast was</p> <p>25 not illustrated, in as much as the CPW</p>	<p>1 of a couple of examples related to combined</p> <p>2 sensitivities. The changes to the risk areas</p> <p>3 acting in unison could have a major impact on</p> <p>4 shifting the CPW differential. The first</p> <p>5 example: Assume the fuel cost decreased by 20</p> <p>6 percent, the load growth decreases by 20</p> <p>7 percent and capital costs for Muskrat Falls</p> <p>8 and LIL increase by 20 percent, in which case</p> <p>9 the CPW is essentially reduced to a minimal</p> <p>10 differential. Well, 100 million differential,</p> <p>11 but still in favour of the Infeed option.</p> <p>12 In Example two, if we have a pulp and</p> <p>13 paper mill closure and capital costs of</p> <p>14 Muskrat Falls and LIL increase by 10 percent,</p> <p>15 the CPW is essentially reduced again to a</p> <p>16 minimal differential. This table provides a</p> <p>17 summary of the various sensitivity reviews.</p> <p>18 The scenarios are illustrated in order of</p> <p>19 diminishing differential. I spoke to the</p> <p>20 first nine items, I believe, up to this point</p> <p>21 and the tenth item that's in this table</p> <p>22 relates to how much would fuel prices have to</p> <p>23 decrease for the differential to be zero and</p> <p>24 the answer is 44 percent in this case.</p> <p>25 So in summary, MHI has several key</p>

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<p>1 findings which I would like to highlight.</p> <p>2 First MHI endorses the CPW differential--I'm</p> <p>3 sorry, the CPW method as a valid approach for</p> <p>4 comparing the least cost of the two</p> <p>5 alternatives. In that regard, Nalcor has</p> <p>6 determined that the CPW differential is</p> <p>7 favourable to the Infeed Option by 2.2 billion</p> <p>8 dollars relative to the Isolated-Island</p> <p>9 Option. And the CPW results for each option</p> <p>10 have been validated by MHI based on the inputs</p> <p>11 used by Nalcor at DG2. That said, however,</p> <p>12 the CPW results may vary significantly if</p> <p>13 impacted by variations from the base case used</p> <p>14 by Nalcor for changes to, first of all,</p> <p>15 significant additions or deletions of load,</p> <p>16 for example the continued operation of the</p> <p>17 existing pulp and paper mill. Second, capital</p> <p>18 costs which at this point are based on DG2</p> <p>19 level of review; and third, fuel prices which</p> <p>20 are difficult to forecast over the long term.</p> <p>21 Suffice it to say particularly as it related</p> <p>22 to forecasting for fuel prices, the risks</p> <p>23 associated with these inputs are further</p> <p>24 magnified given the length of the period under</p> <p>25 review, that is from the year 2010 to 2067, 57</p>	<p>1 scours--iceberg scours, pardon me, whether</p> <p>2 they're glacial or not, C-CORE has recommended</p> <p>3 further work to identify that and further turn</p> <p>4 their ice risk model. And the uncertainty</p> <p>5 associated with the continued operation of</p> <p>6 large industrial load on the Island.</p> <p>7 Also noted in the hearing here and</p> <p>8 through our study, there may be a firm</p> <p>9 commitment for large industrial load in the</p> <p>10 future in Western Labrador that could change</p> <p>11 the generation resource expansion plan, and</p> <p>12 this would have impacts on how generation</p> <p>13 would be rolled out on the Island here. Fuel</p> <p>14 price forecasting will remain a challenge over</p> <p>15 the period under the review. Those risks, or</p> <p>16 the fuel price risks are not risks readily</p> <p>17 within our control. In conclusion, overall</p> <p>18 Nalcor's inputs, for example the capital cost</p> <p>19 estimates, fuel price forecasts and load</p> <p>20 forecasts into the CPW were developed in</p> <p>21 accordance with the utility best practices.</p> <p>22 And that the Infeed Option was found to be the</p> <p>23 least cost option of the two options reviewed,</p> <p>24 based on Nalcor's assumptions and the level of</p> <p>25 available information provided by Nalcor for</p>
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<p>1 years used in the preparation of the CPW</p> <p>2 analysis.</p> <p>3 MR. WILSON:</p> <p>4 A. Thank you Mac. I would just like to make a</p> <p>5 couple of concluding statements as we wrap up</p> <p>6 our presentation, through MHI's work on this</p> <p>7 review, we've identified a number of areas of</p> <p>8 concern in our report which have been</p> <p>9 highlighted in the key findings.</p> <p>10 GREENE, Q.C.:</p> <p>11 Q. We need slide 133, Mr. McNiven.</p> <p>12 MR. WILSON:</p> <p>13 A. We have identified a number of areas of</p> <p>14 concern and we talked about a number of them</p> <p>15 already in our presentation, the areas in</p> <p>16 reliability assessment, which we found there's</p> <p>17 a gap in Nalcor's work; AC integration studies</p> <p>18 is another concern of ours as a gap; NERC</p> <p>19 Standards which Nalcor has decided and to</p> <p>20 prepare an assessment team to look at those</p> <p>21 issues; the transmission line design criteria</p> <p>22 was another critical issue highlighted in our</p> <p>23 review, and we noted that there are risks with</p> <p>24 the marine crossing at the Strait of Belle</p> <p>25 Isle, mostly with the concern of the relic ice</p>	<p>1 DG2. And I would like to thank the Board and</p> <p>2 people here for your attention and this was a</p> <p>3 pleasure doing this presentation. Thank you.</p> <p>4 GREENE, Q.C.:</p> <p>5 Q. Thank you, Mr. Wilson, Mr. Kast and Mr.</p> <p>6 Snyder, that concludes, of course, MHI's</p> <p>7 presentation. It may be a suitable time to</p> <p>8 break to give the parties if they needed any</p> <p>9 time or--and then to reconvene after the break</p> <p>10 for questioning by, as I understand it, it is</p> <p>11 the Consumer Advocate who is going first.</p> <p>12 CHAIRMAN:</p> <p>13 Q. Okay, we shall break. Ten minutes, is that</p> <p>14 what we -</p> <p>15 GREENE, Q.C.:</p> <p>16 Q. Ten to fifteen minutes, sure, yes.</p> <p>17 (3:00 p.m.)</p> <p>18 (BREAK)</p> <p>19 (3:26 p.m.) (RESUMED)</p> <p>20 CHAIRMAN:</p> <p>21 Q. I used to move faster. Now, where are we,</p> <p>22 Madam? We're with Mr. Johnson, are we?</p> <p>23 GREENE, Q.C.:</p> <p>24 Q. Mr. Johnson is going to be -</p> <p>25 CHAIRMAN:</p>

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1 Q. Oh, okay, sorry.
 2 MR. JOHNSON:
 3 Q. Thank you, Mr. Chairman. Good afternoon
 4 gentlemen. I am representing the consumers of
 5 the Province, as you know, in this proceeding
 6 and I guess before I start, I would like to
 7 just observe that I appreciated the clear
 8 language and the candour that you used in your
 9 report by times to describe things as you saw
 10 them and we'll visit some of that this
 11 afternoon so that I can get a better
 12 understanding of where you are, where Hydro is
 13 and see if I can wrap my mind around it. I
 14 have a question at the start on the point
 15 which, as you recall from my questioning of
 16 Nalcor, I spent some time talking about the
 17 classes of their estimates, and one particular
 18 passage that I pointed out to them in my
 19 questioning occurred at page 35 of your
 20 report, at volume one, where you referred to
 21 seeing a mix of class estimates. And the
 22 quote was that typically in the early stages
 23 of a project's development, a mix of cost
 24 estimate classes would be used as evidenced by
 25 what MHI has seen in the case of Muskrat Falls

1 range than the plus fifty, minus thirty. I
 2 would agree with some of their estimates
 3 probably are and some of the old estimates
 4 that were done, particularly as they related
 5 to the Isolated-Island Option, I would think
 6 would be at the upper range.
 7 MR. JOHNSON:
 8 Q. Which ones would be more at the upper range
 9 when we're thinking about the components of
 10 the projects in the Infeed Option?
 11 MR. SNYDER:
 12 A. The two hydro stations that were looked at as-
 13 - the two small hydro stations that were
 14 looked at.
 15 MR. JOHNSON:
 16 Q. Okay, and that's in the Isolated scenario you
 17 mean?
 18 MR. SNYDER:
 19 A. In the Isolated scenario that were not part of
 20 the overall integrated solution.
 21 (3:30 p.m.)
 22 MR. JOHNSON:
 23 Q. And at the reference at page 35, makes a
 24 discussion of "as evidenced by what MHI has
 25 seen in the case of Muskrat Falls Generating

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1 Generation Station or the Strait of Belle
 2 Island Marine Crossing, which were studied
 3 more extensively than other components. And
 4 I'm just interested in knowing what it is that
 5 you meant by that.
 6 MR. SNYDER:
 7 A. Basically some of the estimates that were done
 8 were 1988 and have been updated only with the
 9 price of inflation and some of the estimates
 10 have been done in 2010, so there was a range
 11 that had been conducted, and as a result, I
 12 would say that there was a range of class of
 13 estimates, some of them would be more
 14 accurate, those done in 2010 would probably be
 15 more accurate than those done in 1988 and
 16 escalated to today's dollars.
 17 MR. JOHNSON:
 18 Q. Okay, and when you say "more accurate" would
 19 you mean to suggest that they would fall in a
 20 different class under the AACE estimation
 21 methodology or what else would you mean?
 22 MR. SNYDER:
 23 A. Just degree of accuracy and so some of them
 24 suggested by Nalcor that they were talking
 25 about, they felt their estimate was a narrower

1 Station or the Strait of Belle Isle Marine
 2 Crossing which were studied more extensively
 3 than other components" do I take that to mean
 4 that you felt that they were a bit more
 5 accurate than other components of the Muskrat
 6 Falls LIL?
 7 MR. SNYDER:
 8 A. Yes, there is no question that they have done
 9 some, you know, a lot of homework on the
 10 Strait of Belle Isle and we had an independent
 11 consultant do an evaluation of that estimate
 12 and while they're both, you know, not--I can't
 13 describe the numbers because they're--can't be
 14 produced on the record, but in fact I would
 15 say that both of those estimates have been
 16 done accurately and within a range of a class
 17 4 estimate.
 18 MR. JOHNSON:
 19 Q. Okay, so they're still a class 4, but you
 20 would feel them as being in a tighter range?
 21 MR. SNYDER:
 22 A. Yes.
 23 MR. JOHNSON:
 24 Q. And where would be the tighter range within
 25 that overall classification, in your view in

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1 respect of the generation station SOBI.
 2 MR. SNYDER:
 3 A. Yeah, they done a lot more engineering on both
 4 of those projects, so the range would probably
 5 be at the lower end in line with what Nalcor
 6 had suggested.
 7 MR. JOHNSON:
 8 Q. So the--you're referring I think in the
 9 evidence given by Mr. Harrington?
 10 MR. SNYDER:
 11 A. Right.
 12 MR. JOHNSON:
 13 Q. And that would be applicable to what
 14 components, the generating station and the
 15 SOBI, anything else?
 16 MR. SNYDER:
 17 A. No, I would say that we don't have sufficient
 18 information to make that judgment on the
 19 convertor station or the transmission line.
 20 MR. JOHNSON:
 21 Q. Okay. In relation to the transmission line,
 22 just to back up for a second, on an overall
 23 basis do you have--are you prepared to give us
 24 some guidance as to where you think the range
 25 is for the overall on the Infeed Option?

1 added to the estimate for the Long Range
 2 Mountain Crossing, that would still be within
 3 the range of a class 4 estimate.
 4 MR. JOHNSON:
 5 Q. And I think your report indicates that you had
 6 some regard to benchmarking as a cost
 7 comparison to the number that Nalcor had
 8 provided with respect to the over land
 9 transmission line.
 10 MR. SNYDER:
 11 A. Yes.
 12 MR. JOHNSON:
 13 Q. And what was the range of that benchmark that
 14 you were using as a comparison?
 15 MR. SNYDER:
 16 A. It would be in dollars per kilometer.
 17 MR. JOHNSON:
 18 Q. Okay, and what would the dollar per kilometer
 19 be in the range that you were referring to for
 20 the benchmark?
 21 MR. SNYDER:
 22 A. Well, you know, the 400 million dollars was
 23 the 1,100 kilometer transmission line and
 24 that's basically in the range of some of the
 25 other options that we looked at.

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1 MR. SNYDER:
 2 A. I think it's fair to say that it's a class 4
 3 estimate, that's what we looked at.
 4 MR. JOHNSON:
 5 Q. So you don't wish to make a comment as to
 6 where it would be within that estimate on an
 7 overall basis?
 8 MR. SNYDER:
 9 A. No, we were looking at the difference between
 10 the two options.
 11 MR. JOHNSON:
 12 Q. In relation to the cost of the transmission
 13 line, I understand it was priced at 400
 14 million dollars, that component, but I
 15 understand there was a slight up date of that
 16 today on account of some of the more alpine
 17 regions and that one struck me because you did
 18 indicate that it was consistent with a DG 2
 19 estimate but the low end of a range and I'd
 20 like, if you could just explore that a little
 21 bit with you in terms of what you meant by
 22 that.
 23 MR. SNYDER:
 24 A. Well even with the update that was given today
 25 for the potential for 20 million dollars to be

1 MR. JOHNSON:
 2 Q. And I take it--am I to understand you're aware
 3 of benchmarks out there in terms of a certain
 4 cost per kilometer of this type of line?
 5 MR. SNYDER:
 6 A. Yes.
 7 MR. JOHNSON:
 8 Q. Okay, and what--who publishes these or which
 9 ones were you relying on?
 10 MR. SNYDER:
 11 A. There is internal confidential information
 12 that we have had access to, as to comparisons.
 13 Also, you know, you have to consider the
 14 terrain that you're going through and the
 15 types of crossings. This particular line, the
 16 LIL line is not, you know, not exactly the
 17 same as what somebody else would have built
 18 elsewhere.
 19 MR. JOHNSON:
 20 Q. With respect to--Mr. Kean I think described it
 21 as, you know, they took sort of a bottom-up
 22 approach and would they have described for you
 23 the bottom-up approach they took to that over
 24 land transmission line?
 25 MR. SNYDER:

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1 A. In terms of the number of towers and things?
 2 No, they did not describe that to us.
 3 MR. JOHNSON:
 4 Q. Okay. So your comparison was more along the
 5 lines of taking their number and then
 6 comparing it to an external comparator being a
 7 benchmark.
 8 MR. SNYDER:
 9 A. Yes.
 10 MR. JOHNSON:
 11 Q. And you indicate as well about the incremental
 12 cost and I think Nalcor provided the
 13 incremental cost to get up to the 150 year
 14 return period standard, being another 150
 15 million, and in your report it would indicate
 16 that you can add that to the 400 million and
 17 still stay within the range, we're
 18 understanding each other so far?
 19 MR. SNYDER:
 20 A. That's correct.
 21 MR. JOHNSON:
 22 Q. Okay, and my question would be if you were
 23 told that there was an incremental cost of 150
 24 million to get to that higher standard, do you
 25 then treat that incremental cost estimate

1 Q. On the whole -
 2 MR. SNYDER:
 3 A. Yes, on the whole thing.
 4 MR. JOHNSON:
 5 Q. Okay. I guess as I said at the outset, the
 6 comments, you know, the very direct and candid
 7 comments on some of the issues is applicable
 8 now because I'm going to talk to you about the
 9 transmission line design. And, you know, your
 10 report has termed that a major issue, you've
 11 indicated fairly clearly in the report that
 12 you believe it to be contrary to best
 13 practices to pursue a one to fifty year return
 14 over the length of that 1,100 kilometer
 15 transmission line.
 16 MR. SNYDER:
 17 A. That's correct.
 18 MR. JOHNSON:
 19 Q. And I guess my purpose is not to challenge
 20 your view in that in any respect, my purpose
 21 is to ask you more about it and to get a sense
 22 of what you have to say about the Hydro
 23 position and see if I can get it straight in
 24 my mind.
 25 MR. SNYDER:

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1 itself as a class 4 estimate and then have to
 2 say, well, you know, that could be minus 30 to
 3 plus 50 itself, or do you just take the 150
 4 and say that's a solid enough number and just
 5 add it to your, the 400 million. How does
 6 that work?
 7 MR. SNYDER:
 8 A. It does go within the range of a class 4
 9 estimate with a 150 million dollars, it's, you
 10 know, we feel it's still applicable.
 11 MR. JOHNSON:
 12 Q. So you accept the 150 as a good tight estimate
 13 and that's how you do it, you don't -
 14 MR. SNYDER:
 15 A. It's reasonable.
 16 MR. JOHNSON:
 17 Q. Okay, all right, so the 150 itself is not
 18 subject to a possibility of being 50 percent
 19 higher, is it, the incremental cost of getting
 20 to the 150 line?
 21 MR. SNYDER:
 22 A. It was deemed to be reasonable, you know, and
 23 it was within the range of, again, of plus 50
 24 or minus 30 on that.
 25 MR. JOHNSON:

1 A. Okay.
 2 MR. JOHNSON:
 3 Q. And the discussion yesterday having to do with
 4 the Standard which is set out at page 62 of
 5 volume one, and this I would take it is a
 6 commonly referred to standard in the business?
 7 MR. SNYDER:
 8 A. Yes, it is.
 9 MR. JOHNSON:
 10 Q. And it's an international standard?
 11 MR. SNYDER:
 12 A. Yes, it is, adopted for Canada.
 13 MR. JOHNSON:
 14 Q. Adopted for Canada and I was interested about
 15 the bit of to'ing and fro'ing as to the
 16 interpretation of this standard. And Mr.
 17 Bennett, yesterday, pointed out a wording in
 18 the standard where he said, you know, it is
 19 suggested to use a reliability level
 20 characterized by return periods of 150 years
 21 for lines above 230 kV. And the same is
 22 suggested for lines below 230 kV which
 23 constitute the principal or perhaps the only
 24 source of supply, and then the standard goes
 25 on finally it is suggested to use a

1 reliability level characterized by return
2 period of 500 years for lines, and he said
3 well, because it was suggested it's not
4 mandatory and does anything turn on that in
5 your view of the standard? Is that a point of
6 significance?

7 MR. SNYDER:

8 A. I think it's a point of significance in the
9 fact that the IEC standard suggests lines in
10 excess of 230 kV should consider the use of 1
11 in 150 year return. It's the principal source
12 of supply. It's routed through a mountainous
13 area that has no transmission lines in it and
14 very little history in the area. Could be
15 integrated into a system, be it the Maritime
16 link or elsewhere, and with all of those
17 things considered, I would say that it's our
18 recommendation that it stay at a 1 in 150 year
19 return period.

20 MR. JOHNSON:

21 Q. And I accept that you are making that
22 recommendation. If you go up to the top of
23 the paragraph, it talks about in all cases
24 lines should at least meet the requirements of
25 a reliability level which would seem to be

1 establishing national and regional standards
2 or specifications, decisions on the
3 reliability level should be made taking into
4 consideration also the experience with
5 existing lines" and what is your understanding
6 of what that means?

7 MR. SNYDER:

8 A. My understanding is that, you know, you should
9 look at your past records in a specific area
10 and given the fact that there is no record in
11 parts of Labrador and the Long Range
12 Mountains, I would suggest that I would take
13 the conservative approach and be assured that
14 I was building to the best standards that I
15 thought was customer friendly, if you will.

16 MR. JOHNSON:

17 Q. And just to get your understanding of that,
18 would data from other areas on the Island of
19 Newfoundland, whether it be ice loading,
20 meteorological, would that, in your judgment,
21 have any bearing or is that something that
22 would be applicable to be taken into
23 consideration under that aspect of the
24 standard?

25 MR. SNYDER:

1 indicative of the 50 years as being a minimum
2 in certain circumstances.

3 MR. SNYDER:

4 A. Yes, that would be our consideration, as a
5 minimum.

6 MR. JOHNSON:

7 Q. And do you know or have any knowledge as to
8 why it would be set out as a minimum for at
9 least meeting the requirements of a return
10 period of 50 years, but in the bottom two
11 paragraphs be only a suggestion? Do you know
12 any of the background on that?

13 MR. SNYDER:

14 A. I don't know the history of how this came
15 about other than the fact that, you know,
16 there are certain segments in the world that
17 could not afford probably a 1 in 150, but in
18 most of the areas in North America, I happen
19 to be working in Alberta and in Manitoba where
20 they've accepted a higher degree, a 1 in 150
21 or at least a 1 in 100 in Alberta.

22 MR. JOHNSON:

23 Q. And I'll want to address those with you as
24 well. I wonder if you could look at the last
25 paragraph of that standard which says "when

1 A. Well, all of the information that you have for
2 the route of the 1100 kilometres should be
3 taken into consideration.

4 MR. JOHNSON:

5 Q. And I want to go to the examples of in
6 Manitoba and Alberta in a minute, but I want
7 to find out what you mean at the bottom of
8 page 62 of the report where it says "no design
9 optimization plan has been provided for the
10 review or justification of the reduced
11 transmission line reliability." And could you
12 indicate what you mean by that sentence?

13 MR. SNYDER:

14 A. Well, I think some of that was due in the
15 discussions this mornings when there was
16 discussion of the fact that the original 3-
17 terminal 1600 megawatt line specified was 1 in
18 150, and that some time in the past year or so
19 that was reduced to one in 50 because of a
20 different format, basically the Muskrat Falls
21 line, and we were not privy to any of that
22 information.

23 MR. JOHNSON:

24 Q. In terms of the best practices carried out by
25 utilities in Canada and your report saying the

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1 design for less than 1 in 150 year return
 2 period is contrary to best practices carried
 3 out by utilities in Canada. Just elaborate on
 4 these best practices and how they arise.
 5 MR. SNYDER:
 6 A. When you have a line, as I suggested earlier,
 7 that's the principal source of supply, you
 8 know, to an isolated location like the island,
 9 it would be good, for safety and reliability
 10 standards, to use a 1 in 150 years return
 11 period.
 12 MR. JOHNSON:
 13 Q. And these best practices, to your knowledge,
 14 they would be applicable across the country
 15 except here--or not--
 16 MR. SNYDER:
 17 A. And they would be--they should be applicable
 18 anywhere.
 19 MR. JOHNSON:
 20 Q. --applicable everywhere--
 21 MR. SNYDER:
 22 A. Yeah.
 23 MR. JOHNSON:
 24 Q. --but they're not adhered to here, but they
 25 would be adhered to everywhere else.

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1 MR. SNYDER:
 2 A. I'm not saying they're adhered to everywhere
 3 else, but I do know where they haven't been
 4 adhered to, and they're things that--the
 5 transmission lines in those particular
 6 instances are not the principal source of
 7 supply as they are here.
 8 MR. JOHNSON:
 9 Q. Okay, and I'm not taking issue with what
 10 you're saying. I am truly not. I'm
 11 interested in the debate on the topic.
 12 MR. SNYDER:
 13 A. Right.
 14 MR. JOHNSON:
 15 Q. The experience in Manitoba, just could you
 16 elaborate for us what that experience is in
 17 relation to that 150 year standard?
 18 MR. SNYDER:
 19 A. There is a new 1300 kilometre, 450 kV line
 20 being built from Northern Manitoba to
 21 Winnipeg, and it's being built to a 1 in 150-
 22 year return period, and that line is not
 23 single source because there's already two
 24 lines that are in that providing service from
 25 that same area.

1 MR. JOHNSON:
 2 Q. How long--that's a Line that's under
 3 construction?
 4 MR. SNYDER:
 5 A. It's not under construction at the moment, but
 6 it's under design phase.
 7 MR. JOHNSON:
 8 Q. Under design phase, and in terms of other--are
 9 there other similar lines that you can speak
 10 to in the province of Manitoba, for instance,
 11 that were also designed to that stage, or -
 12 MR. SNYDER:
 13 A. There's been nothing built in the province of
 14 Manitoba for the last 30 years other than that
 15 major one.
 16 MR. JOHNSON:
 17 Q. Okay. What would the existing transmission
 18 lines be? Would they be built to the 150
 19 years?
 20 MR. SNYDER:
 21 A. I'd have to take that under advisement. I'm
 22 not sure what they were built too. They were
 23 built in 1971.
 24 MR. JOHNSON:
 25 Q. Okay, and you mentioned as well--in your

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1 presentation mentioned Alberta, and that's a
 2 slightly different standard, one in 100?
 3 MR. SNYDER:
 4 A. It's one in 100.
 5 MR. JOHNSON:
 6 Q. And just tell the board about that particular
 7 transmission line, the age of it and what it
 8 serves.
 9 MR. SNYDER:
 10 A. There are several transmission lines. Well,
 11 there's 14 billion dollars worth of
 12 transmission lines being built in Alberta over
 13 the next five years, including two
 14 transmission lines from the Edmonton area to
 15 the Calgary area, so balancing load DC lines.
 16 They're held at the present point in time. As
 17 a matter of fact, the Government of Alberta is
 18 to release a report on them within the next
 19 day or so as to whether or not they'll release
 20 them back into construction because they were
 21 started under construction, and the consumer's
 22 advocate them on hold until they can see
 23 whether or not they were used and needed to be
 24 used.
 25 MR. JOHNSON:

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<p>1 Q. In terms of the 1 in 500 year that we've heard</p> <p>2 some citizens and customers interested in</p> <p>3 discussing the fallout in the province of</p> <p>4 Quebec in 1998--</p> <p>5 MR. SNYDER:</p> <p>6 A. Right.</p> <p>7 MR. JOHNSON:</p> <p>8 Q. --and do you have any knowledge of what</p> <p>9 decisions were made there after that ice</p> <p>10 storm?</p> <p>11 MR. SNYDER:</p> <p>12 A. Yes, there was a 735 ring around the city of</p> <p>13 Montreal, and most of that ring collapsed, and</p> <p>14 so they rebuilt that--those transmission</p> <p>15 towers to a 1 in 700 and--1 in 500 year</p> <p>16 standard, I'm sorry.</p> <p>17 MR. JOHNSON:</p> <p>18 Q. What had they been designed to?</p> <p>19 MR. SNYDER:</p> <p>20 A. I really don't know that.</p> <p>21 MR. JOHNSON:</p> <p>22 Q. Thank you. You've dealt in your report with</p> <p>23 the counter argument, if you will, or the</p> <p>24 justification in terms of--well, if we--we</p> <p>25 could build the HVdc line to that more robust</p>	<p>1 our view, but then if it was all built to a 1</p> <p>2 in 150 year standard, that may not be</p> <p>3 necessary. It may be necessary to put in</p> <p>4 dead-end towers as well as a 1 in 150 year</p> <p>5 standard in some areas.</p> <p>6 MR. JOHNSON:</p> <p>7 Q. No doubt, people in the province, sir, would</p> <p>8 be interested in your views as to reasonable</p> <p>9 or realistic response times to get a line back</p> <p>10 up and running in the case of a failure, and</p> <p>11 could you share with us your insights and</p> <p>12 experiences on that point?</p> <p>13 MR. SNYDER:</p> <p>14 A. You know, it's important that, obviously, you</p> <p>15 get the line up as quickly as possible. You</p> <p>16 know, it's cited that two weeks was a</p> <p>17 reasonable period of time, and I believe two</p> <p>18 weeks is a reasonable period of time if you've</p> <p>19 got a plan in place, a plan in place which has</p> <p>20 spare towers, which may have spare converter</p> <p>21 transformers, and some of those towers--and a</p> <p>22 plan that actually dictates where crews go,</p> <p>23 how they work. On personal experience, we</p> <p>24 lost a 2300 megawatt line in the province of</p> <p>25 Manitoba on September 5th, 1996, and that line</p>
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<p>1 standard, but chances are, given our</p> <p>2 configuration here--or that's that argument--</p> <p>3 which are designed to a much lesser return</p> <p>4 periods, we could have a situation where the</p> <p>5 DC line stands and the rest of it is all down</p> <p>6 around our ears, and I'd like you to comment</p> <p>7 on that argument.</p> <p>8 MR. SNYDER:</p> <p>9 A. Well, nobody would wish that the transmission</p> <p>10 line come down at anytime, but if it does, you</p> <p>11 know, and then having not built it to the</p> <p>12 safety standard that we believe is necessary,</p> <p>13 would be unfortunate.</p> <p>14 MR. JOHNSON:</p> <p>15 Q. Do you have any opinion on the notion of--</p> <p>16 along certain elements of the line beefing it</p> <p>17 up more than other areas; for instance, in the</p> <p>18 Long Range Mountains and the Alpine--you know,</p> <p>19 what's your advice to us on that?</p> <p>20 MR. SNYDER:</p> <p>21 A. The advice was that, obviously, you know, as</p> <p>22 Mr. Bennett pointed out this morning. They've</p> <p>23 looked at the Long Range Mountains, things</p> <p>24 that they need to beef up and put in some</p> <p>25 dead-end towers. That's a good decision in</p>	<p>1 was up within three and half days. However,</p> <p>2 it was also in an area that was easy to</p> <p>3 access, and equipment was available.</p> <p>4 MR. JOHNSON:</p> <p>5 Q. At what stage in the process of design and,</p> <p>6 you know, decision gates, etc., would it be</p> <p>7 reasonable for these types of plans to be</p> <p>8 formulated in terms of, "Look, this is the</p> <p>9 spare inventory that we're going to have here.</p> <p>10 This is the access points." Whereabouts in</p> <p>11 the process does that fit?</p> <p>12 MR. SNYDER:</p> <p>13 A. You should have it place before the line is</p> <p>14 commissioned, so do you need to have it right</p> <p>15 now, no, but you need to have it in place in</p> <p>16 terms of what you're ordering so that when the</p> <p>17 line is commissioned you have a plan in place</p> <p>18 to be able to restore that line because</p> <p>19 whether it's 1 in 50 or whether it's 1 in 150,</p> <p>20 that one period could happen the day after the</p> <p>21 line is commissioned.</p> <p>22 MR. JOHNSON:</p> <p>23 Q. That's right. I want to get your comment on</p> <p>24 the system reliability studies, and</p> <p>25 particularly interested to start off with the</p>

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<p>1 probabilistic approach and the probabilistic</p> <p>2 adequacy studies and, I guess, just to--can</p> <p>3 you try to explain to a customer what it is</p> <p>4 you're talking about?</p> <p>5 MR. WILSON:</p> <p>6 A. Probabilistic adequacy studies as Nalcor uses</p> <p>7 them in their strategist program as for</p> <p>8 generation resource adequacy planning?</p> <p>9 MR. JOHNSON:</p> <p>10 Q. I'm sorry, I can't hear you very well.</p> <p>11 MR. WILSON:</p> <p>12 A. Can you hear me now?</p> <p>13 MR. JOHNSON:</p> <p>14 Q. Yes.</p> <p>15 MR. WILSON:</p> <p>16 A. Okay. Can you repeat the question, please?</p> <p>17 MR. JOHNSON:</p> <p>18 Q. Yes, can you explain to the customer who's</p> <p>19 maybe tuning in what these probabilistic</p> <p>20 adequacy studies are that you're referring to</p> <p>21 in your major finding, #6, and loop the gap</p> <p>22 that you found in Nalcor's case. Make them</p> <p>23 understand that.</p> <p>24 MR. WILSON:</p> <p>25 A. That is a challenge.</p>	<p>1 and you get, you know, an average reliability</p> <p>2 figure out of that. Now what does that mean</p> <p>3 to the customer as a number? Very little,</p> <p>4 right, but it is a tool that allows Nalcor to</p> <p>5 judge the relative marriage between one option</p> <p>6 or the other, so what is the reliability</p> <p>7 figure for the isolated island option versus</p> <p>8 the reliability for the infeed option, so you</p> <p>9 can see if reliability actually degrades with</p> <p>10 one option or the other, or improves</p> <p>11 conversely. Those are the types of studies</p> <p>12 that we've recommended in this key finding.</p> <p>13 MR. JOHNSON:</p> <p>14 Q. And where are--I take it, then that we are, in</p> <p>15 your opinion, lacking insight as to the</p> <p>16 ability to compare the two at the present</p> <p>17 time, is that the -</p> <p>18 MR. WILSON:</p> <p>19 A. Only in that these studies have not been done-</p> <p>20 -</p> <p>21 MR. JOHNSON:</p> <p>22 Q. Yes.</p> <p>23 MR. WILSON:</p> <p>24 A. --by Nalcor or any consultant for the island</p> <p>25 power system, so there was nothing to examine</p>
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<p>1 MR. JOHNSON:</p> <p>2 Q. That is a challenge, yeah.</p> <p>3 MR. WILSON:</p> <p>4 A. Okay, maybe we can put the key finding, #6,</p> <p>5 up?</p> <p>6 GREENE, Q.C.:</p> <p>7 Q. It's Page 9.</p> <p>8 MR. JOHNSON:</p> <p>9 Q. It's at Page 9.</p> <p>10 MR. WILSON:</p> <p>11 A. Okay. Now the probabilistic adequacy studies</p> <p>12 that are being referred to in this key finding</p> <p>13 look at the entire Newfoundland Power system</p> <p>14 in its totality--well, including Labrador,</p> <p>15 right, with Muskrat Falls and those</p> <p>16 connections. Probabilistic studies, you know,</p> <p>17 take then into account the random nature of</p> <p>18 failures that would occur on a power system</p> <p>19 so, you know, if the line--a line goes out or</p> <p>20 a generator would trip off, or a combination</p> <p>21 of certain events, what is the impact on the</p> <p>22 power system for that event, but these studies</p> <p>23 take into account when you run them many,</p> <p>24 many, many thousands of different types of</p> <p>25 events that could occur on the power system,</p>	<p>1 or review.</p> <p>2 MR. JOHNSON:</p> <p>3 Q. Except the deterministic studies, I think.</p> <p>4 MR. WILSON:</p> <p>5 A. Of course, yes.</p> <p>6 MR. JOHNSON:</p> <p>7 Q. And in terms of the use of these deterministic</p> <p>8 studies, what is the problem with using those</p> <p>9 or relying on those and not having also the</p> <p>10 probabilistic approach applied?</p> <p>11 (4:00 p.m.)</p> <p>12 MR. WILSON:</p> <p>13 A. Well, as we stated in our presentation, these</p> <p>14 deterministic evaluation methods are</p> <p>15 subjective, based on engineering judgment,</p> <p>16 which is good. Well, it could be good because</p> <p>17 it takes knowledge of the system into account,</p> <p>18 but in our view it does not identify, you</p> <p>19 know, the true level of risks between the two</p> <p>20 alternatives. It is--yeah, you've picked</p> <p>21 certain contingencies, representative</p> <p>22 contingencies to calculate what the impact on</p> <p>23 clients is, which may not be the highest risk</p> <p>24 factor, or I may be overstating a case</p> <p>25 particularly.</p>

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<p>1 MR. JOHNSON:</p> <p>2 Q. Okay, the--I guess Mr. Humphries' of Nalcor</p> <p>3 indicated that--I'm sort of paraphrasing--it</p> <p>4 wasn't as simple as Nalcor making a decision</p> <p>5 to incorporate this level of probabilistic</p> <p>6 evaluation in our decision-making process</p> <p>7 because it could have significant</p> <p>8 implications, and we feel it needs to be</p> <p>9 addressed with the stakeholders, the regulator</p> <p>10 and customers, and I'm just wondering if that</p> <p>11 was a point that you had discussed with</p> <p>12 Nalcor, you know, prior to the hearing or--</p> <p>13 what's your reaction to that?</p> <p>14 MR. WILSON:</p> <p>15 A. I did not discuss that with Nalcor prior to</p> <p>16 the hearing or in this--in my meetings. The</p> <p>17 reliability expert that underdid the review</p> <p>18 may have discussed these concepts with Nalcor</p> <p>19 during his interviews and meetings with them,</p> <p>20 but I don't know, really, all the context of</p> <p>21 what was discussed and -</p> <p>22 MR. JOHNSON:</p> <p>23 Q. Do you have an observation about Mr. Humphries'</p> <p>24 observation, what he had to say about that</p> <p>25 issue? What do you make of that?</p>	<p>1 and the report says this information for a</p> <p>2 large hydroelectric project would normally be</p> <p>3 available prior to DG2, and these AC</p> <p>4 Integration Studies must be completed prior to</p> <p>5 DG3, and yesterday in essence, I think, Nalcor</p> <p>6 agreed--and I guess we could take up--put up</p> <p>7 the transcript from yesterday, Page 200, and</p> <p>8 in particular Line 8 where my learned friend,</p> <p>9 Ms. Greene, said--you indicated yesterday as</p> <p>10 well that you had done previous studies on</p> <p>11 system integration. Some were done in 1998</p> <p>12 when we had the proposed Gull Island</p> <p>13 development and Sales West, and in 2008 when</p> <p>14 you were looking at the 1600 megawatt, multi-</p> <p>15 terminal line with one terminal in New</p> <p>16 Brunswick, and that had provided you a level</p> <p>17 of comfort that you had sufficient for DG 2</p> <p>18 purposes. Is that a correct paraphrasing of</p> <p>19 what you said, and Mr. Humphries said, yes,</p> <p>20 that was correct, and they also mentioned that</p> <p>21 they had personnel going back to 1998 involved</p> <p>22 with Teshmont and they still had two of those</p> <p>23 engineers, as I understood it, in shop and</p> <p>24 then Mr. Humphries said "now it was by no</p> <p>25 means a complete integration study, but it</p>
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<p>1 MR. WILSON:</p> <p>2 A. I believe the studies should be done as we</p> <p>3 recommended, yeah, because it provides</p> <p>4 information that is lacking in the decision-</p> <p>5 making process now. Now the decisions at the</p> <p>6 end of the day may be the same, right, but now</p> <p>7 you have that information on what is the cost</p> <p>8 and the relative merits of the risks between</p> <p>9 the two options, or any other development that</p> <p>10 may occur.</p> <p>11 MR. JOHNSON:</p> <p>12 Q. So Mr. Humphries' observation doesn't change</p> <p>13 your -</p> <p>14 MR. WILSON:</p> <p>15 A. No, it does not.</p> <p>16 MR. JOHNSON:</p> <p>17 Q. Okay, and I'm not inviting to change it. I'm</p> <p>18 just wanting to put it to you to see what you</p> <p>19 had to say about it. In terms of the AC</p> <p>20 Integration Studies, turn to Page 52 of Volume</p> <p>21 1, and this would state at Paragraph 3.4.2</p> <p>22 that the lack of an AC Integration Study</p> <p>23 looking at the new configuration of Muskrat</p> <p>24 Falls was identified or considered by MHI to</p> <p>25 be a significant gap in Nalcor's work to date,</p>	<p>1 gave us that level of comfort to know that</p> <p>2 this looks very similar" and when I read that</p> <p>3 similarly, as I have done, I guess with this</p> <p>4 explanation, does MHI still consider the lack</p> <p>5 of a completed integration study a significant</p> <p>6 gap in the work to date or does that in some</p> <p>7 way go to the benefit of Nalcor?</p> <p>8 MR. SNYDER:</p> <p>9 A. We still consider it a significant gap. They</p> <p>10 have suggested they were doing it. Those two</p> <p>11 previous studies were looking at different</p> <p>12 size generation, different transmission sizes,</p> <p>13 different relocations. So, saying that</p> <p>14 they're similar is a bit of a stretch to me.</p> <p>15 Some of the same characteristics, yes.</p> <p>16 MR. JOHNSON:</p> <p>17 Q. Yeah, okay. The MHI report at page 53 says,</p> <p>18 toward the first full paragraph on the top of</p> <p>19 page 53 says "with the redefined project</p> <p>20 definition, these studies do not adequately</p> <p>21 describe the facilities required to</p> <p>22 successfully operate the transmission system</p> <p>23 under the new configuration. As such, there</p> <p>24 may be unidentified risks in proceeding with</p> <p>25 the project at this time. For example,</p>

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1 studies could identify the requirement for
2 additional backup generation, new
3 transmission, enhanced protection schemes or
4 other system additions." Now as I understand
5 it, Mr. Humphries indicated in his comments to
6 the Board that what they considered at DG2 as
7 a result of the analysis they did was -- that
8 was needed based upon their view of the
9 integration needs was three additional
10 synchronous condensers at Soldier's Pond -- at
11 the Soldier's Pond converter station and a
12 number of circuit breakers that were
13 identified. Is that your understanding?

14 MR. SNYDER:

15 A. That's one of the things that they've done,
16 yes.

17 MR. JOHNSON:

18 Q. Okay. And in terms of these unidentified
19 risks, I guess consumers tend not to like
20 risks and then they tend really not to like
21 unidentified risks and I guess I'd like to
22 have, you know, some measure of the risk that
23 may be there in the absence of these
24 integration studies, albeit they're being done
25 for DG3 as we know.

1 you to give us an indication of how low?

2 MR. SNYDER:

3 A. Well, within the class four range.

4 MR. JOHNSON:

5 Q. Okay. So that means the -

6 MR. SNYDER:

7 A. It's confidential information that I don't
8 think Nalcor wants us to use.

9 MR. JOHNSON:

10 Q. Okay. But it would still fit within the
11 range, but you felt it was low?

12 MR. SNYDER:

13 A. Yes.

14 MR. JOHNSON:

15 Q. Based on similar prior projects?

16 MR. SNYDER:

17 A. Yes.

18 MR. JOHNSON:

19 Q. And recent similar prior projects?

20 MR. SNYDER:

21 A. Yes.

22 MR. JOHNSON:

23 Q. In your province or -

24 MR. SNYDER:

25 A. In Alberta.

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1 MR. SNYDER:

2 A. You know, I can't give you a definitive number
3 in terms of value of what those may be, but
4 there's certainly things that they may have to
5 -- you know, when you model the system, that
6 they may choose to incorporate because it
7 makes better practice, better operation of the
8 system. It makes the system more reliable and
9 as a result, that might change the number of
10 dollars that are required.

11 MR. JOHNSON:

12 Q. Could it -- and I guess is it also possible
13 that what they've already incorporated is
14 sufficient as well. I guess that remains a
15 possibility.

16 MR. SNYDER:

17 A. Yeah, that remains a possibility.

18 MR. JOHNSON:

19 Q. In relation to then the costs for the three
20 synchronous condensers and the several high
21 voltage breakers, I understand that MHI
22 considered the cost estimates on these to be
23 on the low side and using data from similar
24 prior projects and I think they came in in the
25 DG2 estimate at 198 million, and I'd just like

1 MR. JOHNSON:

2 Q. In Alberta, okay, and this is the cost of the
3 hardware?

4 MR. SNYDER:

5 A. Yes.

6 MR. JOHNSON:

7 Q. I'm probably going to revisit some of the
8 areas of NERC but probably won't be doing it
9 this afternoon, but I do want to switch gears
10 a little bit and talk about the thermal
11 generation and particularly Holyrood. The
12 first point I want to bring up with you is the
13 pollution control equipment that you say "with
14 pollution control equipment installed at
15 Holyrood, greenhouse gases will continue to
16 present a challenge to its long term operation
17 should emission standards change" and you talk
18 about a risk that a facility such as Holyrood
19 may not be able to operate long term.

20 MR. SNYDER:

21 A. Yes.

22 MR. JOHNSON:

23 Q. And I take it you're speaking there because of
24 environmental considerations and regulations?

25 MR. SNYDER:

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<p>1 A. That's correct.</p> <p>2 MR. JOHNSON:</p> <p>3 Q. And I think your report speaks in terms of it</p> <p>4 being likely that there could be changes which</p> <p>5 could affect Holyrood's future?</p> <p>6 MR. SNYDER:</p> <p>7 A. Yes.</p> <p>8 MR. JOHNSON:</p> <p>9 Q. And likely means probable, 50 plus 1 I</p> <p>10 suppose, but what do you base it on?</p> <p>11 MR. SNYDER:</p> <p>12 A. Based upon what's happening in Ottawa and</p> <p>13 what's happening with respect to the move</p> <p>14 towards the elimination of greenhouse gases in</p> <p>15 Canada.</p> <p>16 MR. JOHNSON:</p> <p>17 Q. Could you elaborate?</p> <p>18 MR. SNYDER:</p> <p>19 A. The one item that they have put in place is</p> <p>20 that all new generation will have to be with</p> <p>21 standards that meet natural gas emission</p> <p>22 standards and all existing plant, when it</p> <p>23 reaches 45 years of age, will have to meet</p> <p>24 greenhouse gas emission standards.</p> <p>25 MR. JOHNSON:</p>	<p>1 intangible?</p> <p>2 (4:15 p.m.)</p> <p>3 MR. SNYDER:</p> <p>4 A. I would say it's intangible.</p> <p>5 MR. JOHNSON:</p> <p>6 Q. Speaking of the pollution control equipment, I</p> <p>7 think your report, you know, raised a question</p> <p>8 about the efficacy of spending a large sum of</p> <p>9 money to install scrubbers and precipitators</p> <p>10 and what's your concern about that?</p> <p>11 MR. SNYDER:</p> <p>12 A. Once you've spent the 603 million dollars, you</p> <p>13 still have greenhouse gases.</p> <p>14 MR. JOHNSON:</p> <p>15 Q. And as you're probably aware, there's an</p> <p>16 energy plan that was delivered in 2007 where</p> <p>17 the Province made a commitment.</p> <p>18 MR. SNYDER:</p> <p>19 A. Yes.</p> <p>20 MR. JOHNSON:</p> <p>21 Q. And I guess, do you have any familiarity or</p> <p>22 experience with such policies of provinces and</p> <p>23 how that gets brought to bear on the point?</p> <p>24 MR. SNYDER:</p> <p>25 A. Essentially, the utility is mandated to follow</p>
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<p>1 Q. And what's your basis -- you're thinking that</p> <p>2 that might be -- have applicability for</p> <p>3 Holyrood obviously?</p> <p>4 MR. SNYDER:</p> <p>5 A. Yes, I do.</p> <p>6 MR. JOHNSON:</p> <p>7 Q. Are there, in other jurisdictions in the</p> <p>8 country, are they taking steps in advance of</p> <p>9 that happening to deal with that possibility</p> <p>10 or likelihood?</p> <p>11 MR. SNYDER:</p> <p>12 A. Yes, in Ontario they have taken steps.</p> <p>13 They're shutting down thermal plants in</p> <p>14 Ontario. Now they're coal thermal plants. In</p> <p>15 Nova Scotia, they've done an evaluation of</p> <p>16 their coal and oil burning plants.</p> <p>17 MR. JOHNSON:</p> <p>18 Q. And what have they determined as a result of</p> <p>19 that?</p> <p>20 MR. SNYDER:</p> <p>21 A. I don't know what their final decision is, but</p> <p>22 they have done an evaluation for sure.</p> <p>23 MR. JOHNSON:</p> <p>24 Q. And is there any way to, you know, quantify</p> <p>25 that type of risk in CPW terms or is it just</p>	<p>1 the plan.</p> <p>2 MR. JOHNSON:</p> <p>3 Q. And I take it you would interpret the 2007</p> <p>4 energy policy as a mandate?</p> <p>5 MR. SNYDER:</p> <p>6 A. Yes.</p> <p>7 MR. JOHNSON:</p> <p>8 Q. The other risk that was raised was with</p> <p>9 respect to the Holyrood service life and</p> <p>10 again, I think this was an area where your</p> <p>11 report was fairly clear and direct in relation</p> <p>12 to some disagreement with AMEC about how long</p> <p>13 its conceivable to operate that facility, even</p> <p>14 putting aside the environmental</p> <p>15 considerations, and you've indicated that it's</p> <p>16 widely accepted in the industry that useable</p> <p>17 plant life is typically a maximum of 60 years</p> <p>18 including life extension work.</p> <p>19 MR. SNYDER:</p> <p>20 A. Yes.</p> <p>21 MR. JOHNSON:</p> <p>22 Q. And in terms of widely accepted in the</p> <p>23 industry, are you speaking in terms of Canada</p> <p>24 or the United States?</p> <p>25 MR. SNYDER:</p>

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1 A. Canada.
 2 MR. JOHNSON:
 3 Q. In Canada?
 4 MR. SNYDER:
 5 A. Yes.
 6 MR. JOHNSON:
 7 Q. And does that mean that you can't operate a
 8 plant beyond that or you shouldn't?
 9 MR. SNYDER:
 10 A. It does not mean you cannot operate it. It
 11 does mean that you should do a thorough
 12 analysis of that plant and ensure that safety
 13 and reliability are there for its operation.
 14 MR. JOHNSON:
 15 Q. You indicate that you -- or the report
 16 indicates that the determination of remaining
 17 life of the equipment appears to be
 18 fundamentally based on operating hours and not
 19 on total life. Just explain to us what the
 20 distinction would be.
 21 MR. SNYDER:
 22 A. Those plants didn't operate or do not operate,
 23 as you're aware, on a full year basis.
 24 Therefore, the assessment that was done by
 25 AMEC was on the number of operating hours, as

1 until such time as the power became available
 2 from Churchill Falls.
 3 MR. JOHNSON:
 4 Q. You're saying forget about it?
 5 MR. SNYDER:
 6 A. I'm saying that, you know, by that particular
 7 stage, you're over 70 years.
 8 MR. JOHNSON:
 9 Q. Okay. So that's not really an option?
 10 MR. SNYDER:
 11 A. You also need the sync condensers, you know,
 12 for reliability.
 13 MR. JOHNSON:
 14 Q. At page 166, and this would be in Volume 2,
 15 you -- and this is under paragraph 10.4.2,
 16 life extension, in the second paragraph of
 17 that section, in meetings with Nalcor, it was
 18 indicated that a cost estimate of 100 million
 19 dollars was identified in the CPW analysis for
 20 the life extension work, 20 million dollars a
 21 year from 2012 to 2016, and was based on
 22 comparisons with similar plants in the region,
 23 example: the Trenton Generating Station, a
 24 Nova Scotia plant, I guess built in 1969; the
 25 Coleson Cove generating station in New

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1 opposed to the total number of hours in a
 2 year.
 3 MR. JOHNSON:
 4 Q. And you believe, it's your opinion or MHI's
 5 opinion that you should look at the total
 6 life?
 7 MR. SNYDER:
 8 A. We believe it should be the total life.
 9 MR. JOHNSON:
 10 Q. Okay. Your report points out that there may -
 11 - this is page 13 of Volume 1. "Even with
 12 life extension under the Isolated Island
 13 option" -- this is paragraph 23. Even with
 14 life extension, "operating Holyrood beyond 50
 15 years to a maximum of 60 years with reduced
 16 reliability may not be practical. There may
 17 come a point well before 2041 when the plant
 18 becomes unreliable to operate and the life
 19 extension plan and requirements under the
 20 infed option are as follows:" and why did you
 21 make a point of pointing out 2041 in that
 22 statement?
 23 MR. SNYDER:
 24 A. The only reason for pointing out 2041 was if
 25 it was ever intended that that plant operate

1 Brunswick, from 1976 vintage, and you indicate
 2 MHI agrees that the 100 million estimate is
 3 conservative and appropriate for DG2 and
 4 what's the basis for saying that you believe
 5 it is conservative, these other life
 6 extensions in the other plants that you
 7 referred to?
 8 MR. SNYDER:
 9 A. Yes, the two other plants that were evaluated
 10 and the fact that this particular plant would
 11 -- under the Isolated Island option, would
 12 keep it in operations, units one and two until
 13 2033 and unit two until 2036.
 14 MR. JOHNSON:
 15 Q. And I guess is there a difference between
 16 conservative and low?
 17 MR. SNYDER:
 18 A. That's your interpretation.
 19 MR. JOHNSON:
 20 Q. I guess what did you mean?
 21 MR. SNYDER:
 22 A. It seems like it's sufficient amount of money
 23 to keep the plant operational until those
 24 dates.
 25 MR. JOHNSON:

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<p>1 Q. Okay. Page 171 of your report refers to, at 2 the top full paragraph, "CO2 emission issues 3 and/or costs have not been addressed in this 4 report. Greenhouse gas emission standards are 5 likely to be set by the Federal government and 6 as such pose a risk to the ongoing operation 7 of Holyrood thermal generating station as a 8 generator" and I note at page 170 is the 9 reference at the bottom of that page to the 10 generation planning issue, July 2010 update, 11 where it references the 866 thousand tons a 12 year of CO2 where it states "the most 13 prominent environmental issue currently under 14 consideration is greenhouse gases and their 15 impact on global warming. Carbon dioxide is 16 the primary greenhouse gas of concern and 17 Hydro's Holyrood plant emits an average of 18 approximately 866 thousand tons per year of 19 CO2 based on the five-year average from '05 to 20 '09" and that's where that figure came from. 21 What should we do -- and we know that 22 these costs are only treated as a sensitivity 23 for the purpose of the CPW analysis and I 24 wonder, do we give it any more weight than 25 that? Do we -- how significant is it in the</p>	<p>1 infeed option. If you're choosing the -- or 2 the Isolated island option, I'm sorry. 3 MR. JOHNSON: 4 Q. Yes. 5 MR. SNYDER: 6 A. If you do the infeed option, it's not a 7 problem. 8 MR. JOHNSON: 9 Q. Your report as well, talking about fuels, we 10 have, as your report notes, a forecast and 11 we've got a long study period and we've got an 12 isolated option that is very oil centred. 13 MR. SNYDER: 14 A. Yeah. 15 MR. JOHNSON: 16 Q. And as we know, the PIRA Energy Group price 17 forecast don't extend -- do not extend beyond 18 2025 at the time of the DG2 analysis and for 19 analysis purposes, Nalcor has projected those 20 prices beyond 2025 by holding PIRA's 2025 21 price levels constant in real terms and would 22 that be considered a reasonable methodology in 23 the circumstances where we can't look out as 24 far as we might want to? 25 MR. SNYDER:</p>
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<p>1 scheme of things? Let's say if the two 2 options ended up where we thought that they 3 were close. What becomes of that 4 consideration? 5 MR. SNYDER: 6 A. I would give more consideration to being able 7 to get an exemption from Ottawa to keep 8 operating the plant. 9 MR. JOHNSON: 10 Q. And so you would expect that there's some sort 11 of exemption being - 12 MR. SNYDER: 13 A. No, I didn't say that. I said I would apply 14 for one. 15 MR. JOHNSON: 16 Q. You'd apply for one, okay, and hope you get 17 one. 18 MR. SNYDER: 19 A. Hope you get one. 20 MR. JOHNSON: 21 Q. So it remains a risk, but what do we do with 22 the risk? We bear it in mind when we're 23 looking at the two options? 24 MR. SNYDER: 25 A. You bear it in mind if you were choosing the</p>	<p>1 A. Yes, I think it is. 2 MR. JOHNSON: 3 Q. And the idea of holding them sort of constant, 4 with the exception of -- or an inflation type 5 of assumption, would that strike you as being 6 conservative or just reasonable? I'm trying 7 to get a sense of - 8 MR. SNYDER: 9 A. I think it would be reasonable. 10 MR. JOHNSON: 11 Q. You make reference as well to the fact that 12 when you have that long time horizon, in terms 13 of the study period, that it magnifies the 14 uncertainty. 15 MR. SNYDER: 16 A. Correct. 17 MR. JOHNSON: 18 Q. And in one part of your report, you make the 19 statement and I think it fairly applies to 20 fuel costs, fuel cost assumptions. What other 21 factor does that magnification factor -- where 22 does it concern us? 23 MR. SNYDER: 24 A. Well, fuel cost is a major for sure because 25 it's 70 percent of the overall cost of the</p>

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<p>1 Isolated Island option. Once you have the</p> <p>2 plant in place, for sake of argument, for the</p> <p>3 infeed option, there isn't a lot of risks</p> <p>4 associated with that because the operating</p> <p>5 costs are low.</p> <p>6 MR. JOHNSON:</p> <p>7 Q. So in terms of this sort of study period, I</p> <p>8 think your report would indicate that -- at</p> <p>9 page 188, I believe -- that the study period</p> <p>10 was considered reasonable, recognizing the</p> <p>11 life of the assets.</p> <p>12 MR. SNYDER:</p> <p>13 A. That's correct.</p> <p>14 MR. JOHNSON:</p> <p>15 Q. And so I guess if you're looking at comparing</p> <p>16 two options with an asset life that goes out</p> <p>17 that far, that's a legitimate exercise. You</p> <p>18 wouldn't say "well, we can't look at that</p> <p>19 because it goes out too far"?</p> <p>20 MR. SNYDER:</p> <p>21 A. No, you would consider that full length.</p> <p>22 MR. JOHNSON:</p> <p>23 Q. The full length?</p> <p>24 MR. SNYDER:</p> <p>25 A. Yes.</p>	<p>1 in, but we did not consider that to be</p> <p>2 material in as much as when you discount those</p> <p>3 values back to the present. It was really -</p> <p>4 MR. JOHNSON:</p> <p>5 Q. So far out.</p> <p>6 MR. KAST:</p> <p>7 A. Became insignificant.</p> <p>8 MR. JOHNSON:</p> <p>9 Q. Okay. As you know, in terms of looking at the</p> <p>10 overall infeed project which, you know, the</p> <p>11 generating station plus the LIL, there's more</p> <p>12 money in the Muskrat Falls generating station</p> <p>13 side of things being spent than there is on</p> <p>14 the LIL and I guess the -- so, in terms of,</p> <p>15 you know, we have, I think, two billion</p> <p>16 dollars approximately being spent in</p> <p>17 connection with the LIL and about 2.9 billion</p> <p>18 in connection with the Muskrat Falls</p> <p>19 generating station, so on a weighted basis, we</p> <p>20 are relatively more sensitive to overruns on</p> <p>21 Muskrat Falls than the Labrador-Island link,</p> <p>22 just as a mathematical point of view, and I</p> <p>23 wonder, do we -- can we get any comfort out of</p> <p>24 the fact that there seems to have been so much</p> <p>25 work done on the generating side of the</p>
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<p>1 MR. JOHNSON:</p> <p>2 Q. Does the length of the study period produce a</p> <p>3 mathematical bias in favour of one option or</p> <p>4 the other at all?</p> <p>5 MR. KAST:</p> <p>6 A. It's Mack Kast here. I don't believe it does.</p> <p>7 In fact, it's very important that the study</p> <p>8 period be extended to the full life of the</p> <p>9 significant assets and those being Muskrat</p> <p>10 Falls and LIL.</p> <p>11 MR. JOHNSON:</p> <p>12 Q. And how about the notion that under the</p> <p>13 Isolated option, you are, you know, adding</p> <p>14 plant and equipment towards the tail end of</p> <p>15 the study period, for instance. I guess</p> <p>16 you're doing the same thing in the Muskrat</p> <p>17 option, but to a lesser extent. But that we</p> <p>18 haven't got to worry about there being a bias</p> <p>19 in that?</p> <p>20 MR. KAST:</p> <p>21 A. No, no, I don't believe there is. We did look</p> <p>22 at that and we did observe that with respect</p> <p>23 to the Isolated island option, that there were</p> <p>24 some undepreciated assets because of the CT</p> <p>25 plants and so on that have not been brought</p>	<p>1 project in terms of the studies and the level</p> <p>2 of effort that went into the generating side</p> <p>3 in terms of giving us some more confidence in</p> <p>4 where they are as at DG2 with the Muskrat</p> <p>5 Falls generating side of things?</p> <p>6 (4:30 p.m.)</p> <p>7 MR. KAST:</p> <p>8 A. I will let my colleagues speak to this as</p> <p>9 well, but I would like to say that with</p> <p>10 respect to that point that you did mention a</p> <p>11 minute ago about the time horizon and really</p> <p>12 with respect to the infeed option that matter</p> <p>13 is reigned in for the most part, in as much as</p> <p>14 the costs for the infeed option will be</p> <p>15 expended by the year 2017. So the time</p> <p>16 horizon first of all is significantly shorter</p> <p>17 and secondly, we're moving from DG2 to DG3, in</p> <p>18 which case the costs are going to be</p> <p>19 determined and cemented in to a large degree</p> <p>20 in contrast to the Isolated Island option</p> <p>21 which now is extending further out and is very</p> <p>22 fuel sensitive and that's where the concern in</p> <p>23 terms of long time horizon comes into play. I</p> <p>24 don't know if there is additional comment.</p> <p>25 MR. JOHNSON:</p>

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1 Q. No, I think what I was -- and I don't know if
2 we've missed each other, I misunderstood you
3 or what, but I guess what I was getting at is
4 that we have -- as I understand it, you know,
5 there was some commentary in the MHI report
6 around the level of detail that existed around
7 the Muskrat Falls generating station side of
8 things and given that there was about three
9 billion dollars being spent on that, whether -
10 - and two billion dollars being spent on the
11 Labrador-Island link, it seemed to me that
12 maybe there was -- we would feel -- we would
13 be a bit more protected on the Muskrat Falls
14 generating side of things, having regard to
15 the amount of project definition they had at
16 DG2.

17 MR. SNYDER:

18 A. I would have more confidence in the Muskrat
19 Falls generating station.

20 MR. JOHNSON:

21 Q. Component.

22 MR. SNYDER:

23 A. Component, at the present point in time
24 because there's not much--we hadn't seen much
25 on the HVdc switchyards, converter

1 the reference, the low and high. And when I
2 read it, I was left with the question, you
3 must be saying this for a reason. And I was
4 thinking, is the point of this exercise is
5 that you're maybe recommending that we should
6 probably incorporate expected as opposed to
7 reference or what was your thinking on that?

8 MR. KAST:

9 A. Mack Kast here. We did hear at the outset
10 from Nalcor that they did speak to the matter
11 of using the expected price and indicated that
12 there's a probabilistic element to that. And
13 it was the right thing to apply if one was
14 trying to get at the matter of the risk in
15 terms of where the prices might be moving to.
16 And so it does have an application in that
17 sense and it is a rate thing. Using the
18 reference price which is what PIRA is saying
19 is a likely outcome, for example, in this case
20 resulted in a 2.2 billion dollar advantage for
21 the infeed option. What we found was if we
22 moved to the expected price and inserted it
23 instead, that the differential indeed
24 increased. So, what it does is it tells us
25 that there's an even higher differential,

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1 switchyards, nor have we seen much on the
2 transmission line, actual design itself,
3 itself which is under way at the present point
4 in time.

5 MR. JOHNSON:

6 Q. Okay. I found your comments in your report on
7 the fuel cost projection, just to circle back
8 to that for a second, to be interesting. And
9 if we could bring up page 204 of your report.
10 And I guess the sentence that I focused on was
11 just under Table 40 and you make the comment,
12 "what is more critical of the accuracy of the
13 base price projections. This raises the issue
14 of how to best incorporate such uncertainty."
15 And then you have a description of PIRA's
16 reference price and low price, high and
17 expected price. And on the next page you talk
18 about the expected price scenario being
19 calculated as the weighted average price
20 forecast of the reference low and high cases.
21 And that the expected price forecast
22 encompasses the uncertainties in the other
23 three scenarios into one. And because you
24 also noted that PIRA also estimates the
25 discrete probability of occurrence for each of

1 first of all, but that the probability of it
2 moving there in terms of using expected
3 prices, a reasonable thing to think about.

4 MR. JOHNSON:

5 Q. Okay. I'd like to talk about the industrial
6 load forecasting, in particular. And I guess
7 as you know, we don't have, in this province,
8 very many, in fact we have very few industrial
9 customers. And you know, I guess the question
10 that I would have is what can Nalcor do, what
11 should they do in terms of trying to forecast
12 that load? Is there a recommendation in that
13 regard? Is there room for improvement on how
14 they go about their industrial forecast?
15 Like, you made suggestions on the domestic
16 side of things, can you indicate what your
17 thoughts are on that?

18 MR. SNYDER:

19 A. Yeah, the principle that we have followed in
20 the past in Manitoba is to do what Nalcor says
21 they're doing. That's interview each of the
22 major customers, once or twice a year and get
23 a value for what they expect in the future.
24 And certainly it's key at Corner Brook because
25 it plays such a large role in your particular

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<p>1 environment. I would also encourage people to</p> <p>2 seek out other industries, whether it be in</p> <p>3 mining or forestry, whether it be in Labrador</p> <p>4 or in Newfoundland, as to, you know, what is</p> <p>5 the potential? Is there any potential for you</p> <p>6 setting up a plant or setting up a</p> <p>7 manufacturing facility that might require a</p> <p>8 certain amount of energy? That's difficult to</p> <p>9 do, I understand that, but I would like to</p> <p>10 have a better handle. I feel that 50 years</p> <p>11 into the future - no more major industrial, I</p> <p>12 can't believe that.</p> <p>13 MR. JOHNSON:</p> <p>14 Q. So, that would be--you didn't use the word</p> <p>15 conservative, you used the word pessimistic in</p> <p>16 the report.</p> <p>17 MR. SNYDER:</p> <p>18 A. What I'm saying is that we should be--you</p> <p>19 should search out what you think is reasonable</p> <p>20 and if there's anything else that you can add</p> <p>21 to it.</p> <p>22 MR. JOHNSON:</p> <p>23 Q. In Manitoba and as you indicated, you follow a</p> <p>24 similar approach in terms of contact.</p> <p>25 MR. SNYDER:</p>	<p>1 into consideration in your load forecast,</p> <p>2 reduce the probability of the mine operating</p> <p>3 past a certain point.</p> <p>4 MR. JOHNSON:</p> <p>5 Q. And that's probably an easier example, you</p> <p>6 know, because every mine has a life, we know,</p> <p>7 right from the start, based upon assumed</p> <p>8 production levels.</p> <p>9 MR. SNYDER:</p> <p>10 A. Yes.</p> <p>11 MR. JOHNSON:</p> <p>12 Q. We can time it to the month that it will end.</p> <p>13 It seems, just inviting your comment, it seems</p> <p>14 to me that it's not as easy in an industry</p> <p>15 that tends to be cyclical.</p> <p>16 MR. SNYDER:</p> <p>17 A. No, that's true and I would hope that the</p> <p>18 people that you were dealing with the pulp</p> <p>19 mill or the pulp and paper mill were</p> <p>20 reasonable and that they were rational in</p> <p>21 their approach as to what their load would be.</p> <p>22 MR. JOHNSON:</p> <p>23 Q. And if you feel you're dealing with a rational</p> <p>24 customer, I guess and they say they're going</p> <p>25 to be around, you assume they're going to be</p>
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<p>1 A. Yes.</p> <p>2 MR. JOHNSON:</p> <p>3 Q. And how many industrial customers would you be</p> <p>4 talking about in Manitoba?</p> <p>5 MR. SNYDER:</p> <p>6 A. It's probably 20 or 25.</p> <p>7 MR. JOHNSON:</p> <p>8 Q. Okay. And if you, you know, make the</p> <p>9 communication and have the contact as has been</p> <p>10 described and they tell you, here's our</p> <p>11 forecast, do you do anything besides say, well</p> <p>12 look, these people are going to--they're</p> <p>13 saying they're going to be in business and</p> <p>14 we've got a load to serve. I'm trying to get</p> <p>15 a sense of do you assume, oh no, they might</p> <p>16 get in trouble and I've heard this or that in</p> <p>17 the papers and--trying to get a handle on</p> <p>18 this.</p> <p>19 MR. SNYDER:</p> <p>20 A. The load forecast people try to take that into</p> <p>21 consideration because they say they're going</p> <p>22 to have a 100 percent load for the foreseeable</p> <p>23 future and it's a gold mine and you've been</p> <p>24 reading that there's a three year supply in</p> <p>25 that gold mine. Then you better take that</p>	<p>1 around?</p> <p>2 MR. SNYDER:</p> <p>3 A. They're going to be around.</p> <p>4 MR. JOHNSON:</p> <p>5 Q. Now, we know that there is risk around that.</p> <p>6 MR. SNYDER:</p> <p>7 A. Yes.</p> <p>8 MR. JOHNSON:</p> <p>9 Q. And for that very reason you brought it</p> <p>10 rightly to the Board's attention and to the</p> <p>11 customer's attention in your report and on</p> <p>12 that--that was sensitivity analyzed. If I</p> <p>13 could ask you to turn up--and I might be</p> <p>14 speaking to your colleague now.</p> <p>15 MR. SNYDER:</p> <p>16 A. Yes.</p> <p>17 MR. JOHNSON:</p> <p>18 Q. Page 87, Table 14.</p> <p>19 MR. MCNIVEN:</p> <p>20 Q. That's Volume 1, is it?</p> <p>21 MR. JOHNSON:</p> <p>22 Q. Yes, sir. This, and I'm referring in</p> <p>23 particular to your sensitivity summary table,</p> <p>24 point number 2, annual load decrease by 880</p> <p>25 gigawatts. Was that your intent at looking at</p>

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<p>1 the Corner Brook situation?</p> <p>2 MR. KAST:</p> <p>3 A. Mack Kast here. I suppose the answer is yes,</p> <p>4 but I don't want it to be absolutely attached</p> <p>5 to the Corner Brook -</p> <p>6 MR. JOHNSON:</p> <p>7 Q. No, okay.</p> <p>8 MR. KAST:</p> <p>9 A. It might be better put that it's reasonably</p> <p>10 representative of Corner Brook.</p> <p>11 MR. JOHNSON:</p> <p>12 Q. That's fine, that's fair.</p> <p>13 MR. KAST:</p> <p>14 A. Okay.</p> <p>15 MR. JOHNSON:</p> <p>16 Q. And then below at .10 you ten combine that</p> <p>17 with a cost over run or capital cost increase</p> <p>18 for both Muskrat Falls and the LIL by ten</p> <p>19 percent which basically brought the isolated</p> <p>20 and infeed option down to sort of a dead heat,</p> <p>21 at that point. And scenario 10, there's a</p> <p>22 footnote under it indicating that was MHI</p> <p>23 derived. So, that was your own calculation, I</p> <p>24 take it. And these sensitivity summaries that</p> <p>25 you've listed in your report at Table 14, were</p>	<p>1 this--you know, bring your own interpretation</p> <p>2 to it in that respect.</p> <p>3 MR. JOHNSON:</p> <p>4 Q. Okay. In terms of what we've heard about made</p> <p>5 it a limited probability of being out there if</p> <p>6 you have a good DG2 estimate.</p> <p>7 MR. SNYDER:</p> <p>8 A. Well, I would expect--what we want to be doing</p> <p>9 is looking at DG3 and where that number</p> <p>10 ultimately ends up.</p> <p>11 MR. JOHNSON:</p> <p>12 Q. Yes, okay. I think, Mr. Chairman, it's sort</p> <p>13 of late in the day and I might profit from</p> <p>14 having a look at my notes and coming back and</p> <p>15 finishing up without too much more time</p> <p>16 tomorrow morning.</p> <p>17 CHAIRMAN:</p> <p>18 Q. Okay.</p> <p>19 GREENE, Q.C.:</p> <p>20 Q. One of the suggestions discussed earlier was</p> <p>21 the possibility of starting tomorrow at 9:00,</p> <p>22 tomorrow is the last day set aside this week</p> <p>23 to conclude these presentations. We're not</p> <p>24 sure, we haven't had the opportunity of a</p> <p>25 counsel meeting to discuss the anticipated</p>
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<p>1 these summaries that you came up with on your</p> <p>2 own to apply? Were these the ones you thought</p> <p>3 were them most pertinent to consider?</p> <p>4 MR. SNYDER:</p> <p>5 A. For the most part, yes, but they were</p> <p>6 discussed over a period of time with different</p> <p>7 people at different times and different</p> <p>8 meetings and so on. And what we were looking</p> <p>9 to do is try and put some reasonable bands</p> <p>10 around the base case differential, if you</p> <p>11 like. And so we see numbers like 25 percent,</p> <p>12 20 percent and 10 percent because that's what</p> <p>13 a reasonable person would likely do and</p> <p>14 understand and appreciate.</p> <p>15 MR. JOHNSON:</p> <p>16 Q. In terms of case number 8 which would imbed an</p> <p>17 assumption that Labrador Island Link and</p> <p>18 Muskrat Falls capital cost increase by 50</p> <p>19 percent is--the 50 percent was chosen because</p> <p>20 it happened to the outer bound of the DG 2</p> <p>21 estimate.</p> <p>22 MR. SNYDER:</p> <p>23 A. That's correct and I appreciate there has been</p> <p>24 discussion on this and it is the outer limit</p> <p>25 and we all know that. And so you can accept</p>	<p>1 schedule tomorrow, but we had previously</p> <p>2 raised the issue of getting a little bit</p> <p>3 earlier start at 9:00 if that would help</p> <p>4 ensure that we concluded by the end of the</p> <p>5 day.</p> <p>6 MR. JOHNSON:</p> <p>7 Q. Well, for my part, I don't anticipate being a</p> <p>8 great deal longer with MHI.</p> <p>9 O'REILLY, Q.C.:</p> <p>10 Q. Mr. Chairman, I don't see--if we start at 9:30</p> <p>11 and based on what I'm hearing from Mr.</p> <p>12 Johnson, I don't anticipate we're going to</p> <p>13 have any difficulty in concluding within the</p> <p>14 ordinary hours of sitting. I don't think</p> <p>15 we're going to have any difficulty in</p> <p>16 finishing that.</p> <p>17 CHAIRMAN:</p> <p>18 Q. We shall adjourn until 9:30 tomorrow morning.</p> <p>19 Thank you.</p> <p>20 O'REILLY, Q.C.:</p> <p>21 Q. Thank you.</p> <p>22 Upon conclusion at 4:51 p.m.</p>

1 CERTIFICATE

2 I, Judy Moss, do hereby certify that the foregoing
3 is a true and correct transcript of a hearing of the
4 Muskrat Falls Review held before the Board of
5 Commissioners of Public Utilities on the 15th day of
6 February, 2012 A.D. in the city of St. John's,
7 Newfoundland and Labrador and was transcribed by me to
8 the best of my ability by means of a sound apparatus.
9 Dated at St. John's, NL this
10 15th day of February, 2012
11 Judy Moss
12 Discoveries Unlimited Inc.

<div>#-</div> <div>#36 [1] 16:1</div> <div>#6 [2] 189:21 190:4</div> <div>-\$-</div> <div>\$166,054,000 [1] 36:13</div> <div>\$192.00 [1] 35:20</div> <div>\$239.00 [1] 35:18</div> <div>\$75.82 [4] 155:3,10,20 156:18</div> <div>-'-</div> <div>'05 [1] 209:19</div> <div>'09 [1] 209:20</div> <div>---</div> <div>-for [1] 136:16</div> <div>-.-</div> <div>.10 [1] 225:16</div> <div>.7 [1] 10:15</div> <div>.89 [1] 126:22</div> <div>-0-</div> <div>0.7 [1] 151:7</div> <div>-1-</div> <div>1 [31] 16:14 142:14 143:1 143:2 144:19,25 145:1,7 145:20 146:25,25 177:10 177:18 178:17,20,21 180:17 181:1,10 182:21 185:1,15,15 187:1,4 188:19,19 194:21 201:9 206:11 224:20</div> <div>1,000 [2] 148:14 149:6</div> <div>1,100 [2] 171:23 175:14</div> <div>1,600 [1] 120:16</div> <div>1-in-200 [1] 6:16</div> <div>1-in-300-year [1] 6:16</div> <div>1-in-50-year [2] 6:10 6:15</div> <div>1.2 [1] 157:18</div> <div>1.8 [2] 12:7,12</div> <div>10 [6] 40:1 132:23 157:1 160:14 225:21 226:12</div> <div>10.4.2 [1] 207:15</div> 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