



“When You Talk - We Listen!”



MANITOBA PUBLIC UTILITIES BOARD

Re:

MANITOBA HYDRO
NEEDS FOR AND ALTERNATIVES TO
REVIEW OF MANITOBA HYDRO'S
PREFERRED DEVELOPMENT PLAN

Regis Gosselin	- Chairperson
Marilyn Kapitany	- Board Member
Larry Soldier	- Board Member
Richard Bel	- Board Member
Hugh Grant	- Board Member

HELD AT:

Public Utilities Board
400, 330 Portage Avenue
Winnipeg, Manitoba
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Pages 8454 to 8723

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1	LIST OF UNDERTAKINGS	
2	NO.	PAGE NO.
3	124	Dr. Simpson will update the slide
4		14 of his PowerPoint report on risk
5		analysis to reflect the information
6		underlying Mr. Harper's analysis at
7		slide 47 of his PowerPoint
8		presentation from today.
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1 --- Upon commencing at 10:03 a.m.

2

3 THE CHAIRPERSON: Good morning. Every
4 -- I believe that everybody's in position and suitably
5 dressed. So back to you, Mr. Williams.

6

7 CAC LOAD FORECAST, EXPERT REVENUES, AND ECONOMICS/RISK
8 PANEL, RESUMED:

9

10 WILLIAM HARPER, Previously Sworn (Qual.)

11 DOUGLAS GOTHAM, Previously Affirmed (Qual.)

12 WAYNE SIMPSON, Previously Sworn (Qual.)

13

14 CONTINUED EXAMINATION-IN-CHIEF BY MR. BYRON WILLIAMS:

15 MR. BYRON WILLIAMS: I'm not sure if
16 I'm -- if it's -- if I'm allowed to make an objection
17 to Mr. Hacaault's attire or not, Mr. Chair. But given
18 his general outstanding standard and my typical less-
19 than-outstanding standard, I -- I believe I'll make an
20 exception on -- on this one (1) occasion.

21 MR. ANTOINE HACAULT: I'll let Mr.
22 Williams know that I anticipated his objection, and I
23 have in the bag behind me a full suit and tie.

24 MR. BOB PETERS: It's casual Saturday.

25 MR. BYRON WILLIAMS: Mr. Chairman, if -

1 - if Mr. Wojczynski's going to be taking shots at Board
2 counsel, I believe that should be on the record and on
3 the -- I -- I guess we should get some work done
4 though, so I'm going to invite Mr. Harper to proceed
5 with CAC Exhibit 68, and remind him that, if he can
6 refer to the page number for the slide, that would be
7 helpful.

8 MR. WILLIAM HARPER: Good morning,
9 panel. Knowing the slide numbers, but my mic too
10 helps, so I'm reminded about it. Thank you.

11 Well, starting on slide 2, the -- the
12 PUB's Needs For and Alternatives review of Manitoba
13 Hydro's Proposed Development Plan is meant to inform
14 the provincial government regarding a series of
15 approvals that the Company is seeking.

16 In the short term, these approvals
17 reflect commitments Manitoba Hydro seeks to make to
18 start construction of the Keeyask generating station
19 with a view of having it in service by 2019, to proceed
20 with a new 750-megawatt interconnection into the US,
21 and formalize export contracts that are signed with
22 Minnesota Power for 250 megawatts and Wisconsin Power
23 for both 100 megawatts and a more recent 300 megawatt
24 contract.

25 Beyond these short-term commitments,

1 Manitoba Hydro is seeking approval to proceed down a
2 path as set out in its Preferred Development Plan.

3 At the same time, Manitoba Hydro has
4 acknowledged that circumstances may change, but they
5 are seeking to at this point maintain spending on
6 Conawapa so as to protect an in-service date about the
7 mid-2020s.

8 Finally, the last bullet in this slide
9 makes reference to the long-term role for the larger
10 Minnesota Power contract. And I flagged this because,
11 as I understand it, the agreement is worded such that
12 Manitoba Hydro or WPS can opt out of the contract under
13 certain conditions if -- if Conawapa isn't committed to
14 by certain dates.

15 This certainly creates flexibility for
16 Manitoba Hydro going forward in its planning, but as
17 well it creates some uncertainty as well in terms of
18 decisions that WPS may make in the future. And it's
19 something that needs to be factored into the evaluation
20 of plans, particularly those plans that don't involve
21 Conawapa.

22 And moving now to slide 3 --

23 MR. BYRON WILLIAMS: Mr. Harper, stay
24 on slide 3, but just in finishing the -- the last point
25 on slide 2, you reference WPS, but you also use the

1 words 'Minnesota Power'.

2 I take it that you -- you, when you're
3 referring to WPS you're referring to Wisco -- Wisconsin
4 Public Service?

5 MR. WILLIAM HARPER: Yes, I -- I
6 apologize. These acronyms -- even after all this time,
7 I get confused sometimes amongst them. Thank you very
8 much, Mr. Williams.

9 On slide 3, the ECS evidence that was
10 prepared by myself addresses Manitoba Hydro's economic
11 evaluation of the plan and its alternatives. The focus
12 of the evidence is on the approach taken by Manitoba
13 Hydro in the interpretation of the results. And as a
14 result, there are a -- in -- in context of this, there
15 are a couple of caveats I should like to note before
16 going forward.

17 The first is that for purposes of the
18 evidence, it was assumed that the underlying planning
19 assumptions as set out by Manitoba Hydro were
20 appropriate. This assumption was really made for two
21 (2) -- two (2) reasons. The first was somewhat of a
22 pragmatic one in terms of it limited the scope of the
23 task to something that was manageable within the time
24 and the -- and the budget allotted.

25 And secondly, I was aware that there

1 were various independent experts that have been hired
2 by -- by the PUB to look specifically at areas such as
3 capital costs and export prices, who had specific
4 expertise in these areas, but more importantly had
5 access to the commercially sensitive information that
6 would be critical to undertaking such -- such an
7 assessment.

8 The second caveat, and probably more
9 important one to add, is that the ECS evidence focuses
10 on the economic evaluation of the Preferred Plan and
11 its alternatives and that the conclusions with respect
12 to the relative economics of the Preferred Plan or not
13 is only one input into the PUB's broader decision that
14 it's going to have to make, where it need -- needs to
15 balance other considerations, such as financial
16 implications, macroeconomic environmental issues, and
17 socioeconomic issues. And again, there -- there are
18 various experts, including ones that -- that have been
19 retained by CAC to comment on some of these issues.

20 Moving on to slide 4, this just sort of
21 sets out the organization of the presentation. And it
22 will generally follow the same outline as the ECS
23 evidence that we filed in February. However, in terms
24 of the numbers and results, I will not be focussing as
25 much on the analysis that was presented in the report

1 that's trying to indicate what has changed and what is
2 -- what -- what are the difference in the conclusions
3 that one should draw based on the new information that
4 has come to light, particularly during the oral part of
5 the proceeding regarding such things as changes in
6 capital costs and anticipated levels of DSM.

7 My focus will be in -- in the three (3)
8 areas of the application where economic evaluations
9 were employed and -- and the underlying principles of
10 net present value analysis. And these were namely the
11 economic evaluations of the reference plans, the
12 economic uncertainty analysis that was taken for a
13 subset of those plans, and finally the use of net --
14 net present value analysis in the mul -- multiple
15 account analysis that -- that was undertaken to --
16 towards the end of the application. I will then finish
17 off with some observations or conclusions as to what
18 this all means in terms -- terms of the specific
19 approvals that Manitoba Hydro is seeking.

20 Move on to slide 5, When considering a
21 Needs For and Alternatives application, the role or
22 mandate of the proponent is a good starting point to
23 set the context for any initiative that's being
24 proposed. In Manitoba Hydro's context as a Crown
25 corporation, its purpose is set out in the Manitoba

1 Hydro Act, the most applicable section of which I've
2 set -- set on this slide here and which states that:

3 "The -- the purpose of Manitoba Hydro
4 is to provide for the continuance of
5 a supply of power adequate for the
6 needs of the province and to engage
7 in and to promote economy and
8 efficiency in the development,
9 generation, transmission,
10 distribution, supply, and end use of
11 power."

12 I've also set out here the terms of
13 reference for the Manitoba Hydro board of directors
14 which generally says the same thing, but probably in a
15 little bit more plain Eng -- English for those of us,
16 like the lawyers in the room, aren't used to reading
17 statutory acts. And it basically says:

18 "The Corporation is charged with --
19 with responsibilities which include
20 to ensure a safe, reliable,
21 economical, environmentally
22 responsible supply of energy for
23 Manitoba and to earn revenues to keep
24 rates low for Manitobans through the
25 export of power."

1 And it goes on to say also through the
2 provision of -- of energy-related services. I think
3 the terms of reference are particularly useful in the
4 context of this proceeding, since it specifically
5 references the role that exports should be playing and
6 how it should be looked at when you're considering
7 exports in the context of the Needs For and
8 Alternatives to application.

9 We'll move on to slide 6. The Canadian
10 Environmental Assessment Agency defines 'need for' as:

11 "The problem or the opportunity the
12 project is intended to solve or
13 satisfy."

14 If we line this definition up with
15 Manitoba Hydro's purpose and objectives, it can be seen
16 that the current application is addressing both the
17 problem and an opportunity. The problem is being one
18 of reliability, in that based on Manitoba Hydro's
19 outlook at the time it was preparing the application,
20 there was going to be a shortfall in resources to meet
21 future requirements sometime in the early 2020s. And
22 therefore the problem was maintaining reliability on
23 the system.

24 At the same time, there was an -- an
25 opportunity appeared to exist for increasing exports if

1 an in-service date for new generation to US markets
2 could be advanced and new interconnections built so --
3 so as to allow for increased exports into the US. This
4 can only be viewed as an opportunity, in terms of
5 reducing rates, but also in terms of improving the --
6 the reli -- the reliability of the overall system
7 through accessed increased imports.

8 Given Manitoba Hydro's mandate, it -- it
9 seems to me that both -- both the problem and the
10 opportunity fit -- fit clearly within the context of
11 Manitoba Hydro's objectives and their legitimate needs.

12 I'll move on to slide 7. Having
13 identified the need, the next step in any evaluation of
14 a problem or opportunity is to look at what -- what
15 alternatives are available. In Manitoba Hydro's case,
16 this involves screening a range of potential resource
17 options and developing a short list of candidates for -
18 - for further consideration.

19 The candidates selected by Manitoba
20 Hydro include additional DSM; hydro, specifically
21 Keeyask or Conawapa; wind; natural gas fired
22 generation, both in the form of single and combined
23 cycle turbines; and imports. And it was on the basis
24 of these that Manitoba Hydro then proceeded to develop
25 a number of altern -- alternative development plans.

1 MR. BYRON WILLIAMS: Mr. Harper, before
2 you leave this slide, slide 7, without asking you to
3 comment on the merits of Hydro's decision, would it be
4 fair to say that it is your understanding that solar
5 was screened out of the shortlist?

6 MR. WILLIAM HARPER: I -- I think you
7 have to define solar in two (2) -- two (2) contexts.
8 There is large-scale solar, which you might think is
9 more sort of at a -- sort of a large generating utility
10 or a large-scale utility might think, in terms of
11 large-scale solar. My understanding, that was included
12 in -- in the options that were assessed and was
13 screened out.

14 The other aspect you could say is very
15 small, local solar that might be -- very small scaled
16 solar that would be installed on individual homes and
17 sort of individual commercial properties. It was --
18 it's my understanding that that was not included in --
19 in the options for -- for consideration.

20 MR. BYRON WILLIAMS: Thank you.

21 MR. WILLIAM HARPER: Okay. We move on
22 to slide 8. I think that's where I am. Yeah. Okay.
23 Okay, if we look first at the issue of how to address
24 the domestic reliability problem, in this context,
25 seven (7) alternative plans were created that focussed

1 on domestic reliability.

2 And this -- this -- and this is critical
3 because, in my mind, it's important to first establish
4 what's -- what's the appropriate plan for -- for
5 meeting the problem part of the need, which is address
6 reliability, and then use that as a basis to jump off
7 of, in terms of having identified what's the most
8 optimal plan to meet the current need.

9 Can I improve on that by looking at some
10 alternate plan in which would include exports that
11 would -- that would be -- put me in a better economic
12 position than it was to start off with?

13 So I think the first step is to identify
14 what's the best plan just to solve the problem. And
15 the you can jump from that, in terms of, can I do
16 better than in terms of other opportunities.

17 These plans included a combination of
18 wind, gas, and -- and hydro. In this context, the key
19 shortcomings flagged in the ECS evidence were the fact
20 that it included -- it neither included increased
21 levels of DSM nor increased exports, both of which have
22 been short-listed in -- in the previous chapter of the
23 NFAT. Of these two (2), the failure to include
24 additional DSM in the additional plans is -- was the
25 more mater -- was the more -- more material omission of

1 the two (2).

2 While there was no clear explanation
3 provided in the initial application as to why increased
4 exports were not considered, subsequent information
5 provided by Manitoba Hydro has indicated that it is
6 unlikely it would be able to construct a new intertie
7 solely for import without a counterparty, in terms of
8 an export contract customer in the US to champion the
9 construction on the other side of the border. Imports.

10 MR. BYRON WILLIAMS: I'll ask it. Mr.
11 Harper, in -- in talking about the shortcomings, you
12 flagged the DSM not being treated as a competing option
13 as a major shortcoming.

14 Is that fair?

15 MR. WILLIAM HARPER: Yes.

16 MR. BYRON WILLIAMS: And it may be that
17 you misspoke, sir, because the other shortcoming you
18 identified was an increased roles for -- for exports.

19 And I presume you meant increased role
20 for imports?

21 MR. WILLIAM HARPER: Yes, I apologize.
22 Thank you very much. In contrast, increased levels of
23 DSM beyond the base levels reflected in the initial
24 application are a real possibility. Furthermore, not
25 only could increased levels of DSM postpone the need

1 date for new generation resources, they can also create
2 an opportunity for other options or -- or plans to be
3 brought into consideration.

4 One of the examples cited in the
5 original ECS evidence was the fact that Conawapa was
6 not considered as a first resource to meet the need,
7 simply because it could not be brought -- brought in --
8 in service in -- in time. It just phys -- physically
9 couldn't be done.

10 If there had been a later need date,
11 that would have been one of the plans or options that
12 they could have considered. That's not to say it would
13 have come out as the optimal plan, but it would have
14 been one -- one of the considerations that -- that they
15 could have given.

16 The second and more controversial
17 suggestion in -- in the evidence was that it would
18 allow for new options to -- to come into play and to be
19 considered. As noted in my Interrogatory Response to
20 Manitoba Hydro -- and that's number 8C, if anyone's
21 interested in looking at -- the proposal was not -- the
22 proposal was not to decide now to implement a plan that
23 would include specifically wind or -- or solar at a
24 certain time, but -- but rather that by increased
25 levels of DSM and delaying the need date, it would

1 increase Manitoba Hydro's flexibility to consider such
2 alternatives in the future, whereas early construction
3 of large-scale resources could well crowd out con --
4 consideration of such options as we move into the
5 future.

6 We move on to slide 9. Leaving the --
7 leaving the reliability and domestic problem, various
8 alternative plans were also created that focussed on
9 not only the reliability, but the export opportunity.
10 And these essentially fell into three (3) categories.

11 First, there were three (3) plans with a
12 small 250 megawatt intertie in Keeyask advanced to
13 2019, designed specifically to meet the Minnesota Power
14 contract.

15 Then there were three (3) plans with a
16 larger 750 megawatt tie, again, envisioned with -- with
17 the advancement of Keeyask and to meet the Minnesota
18 Power contract.

19 And finally, there were two (2) plans
20 that also included a 750 megawatt intertie, but also
21 included the -- the larger 300 megawatt contract with
22 WPS, which would necessitate not only the advancement
23 of Keeyask, but the advancement of resources after that
24 as well in order to meet the timing of the -- of the
25 WPS contract.

1 The development of these plans,
2 basically, in our view, obviously included the same
3 shor -- shortcoming as noted earlier. And that was
4 there was no consideration to increase levels of DSM in
5 -- in them either.

6 Mov -- moving on to slide 10. To focus
7 the assessment of these plans, it is useful to go back
8 and remind ourselves what exactly are the -- are the
9 key issues that are being addressed. The immediate --
10 immediate issues relate to the approvals that Manitoba
11 Hydro is seeking and are: Should the in-service date
12 of Keeyask be advanced to 2019 and a new intertie
13 constructed to support the -- the Minnesota Power
14 contract? And second, should this intertie be as large
15 as 750 megawatts, as opposed to -- as opposed to a 250
16 megawatt intertie?

17 Issues for the longer term, again,
18 include: Should spending on Conawapa continue with the
19 view to supporting an in-service date as early as the
20 mid-2020s? How does the larger WPS contract fit in,
21 and how does the larger WPS contract fit into Manitoba
22 Hydro's longer-term plans?

23 Okay. So with -- with that context and
24 the -- these alternatives, we then turn to the -- to
25 the -- basically, to the topic of economic evaluations.

1 And really, the purpose of economic evaluations, or
2 sometimes referred to as cost-benefit analysis, is to
3 compare the costs and benefits of two (2) or more
4 alternatives in order to decide which alternative
5 yields the greatest economic benefit.

6 Since the focus is on comparing
7 alternatives, it looks at differences in costs and
8 benefits as between the alternatives. And the -- the
9 corollary of that being it -- it excludes costs that
10 are common to all alternatives. It is this exclusion
11 of common costs that leads to the exclusion of -- of
12 some costs, because -- because they have already been
13 spent. And regardless of which alternative you -- you
14 pick going forward, those are costs that -- that are
15 going to have to -- to be paid.

16 It needs to be addressed that economic
17 evaluations are carried out from a specific
18 perspective. And this perspective is critical for two
19 (2) purposes: 1) it's the perspective it's being
20 carried out from that defines the costs and the
21 benefits that are going to be included in -- in the
22 evaluation. It's the cost and the benefits from --
23 from that perspective that -- that are important.

24 Also, since these costs and benefits
25 accrue at different points in time, a discount rate is

1 used in order to standardize the cost and benefits to a
2 common point in time for -- for comparison. And again,
3 the perspective is important, as it's the discount rate
4 from the perspective of the party whose costs and
5 benefits you're looking at that's going to define the
6 basis for -- for the discount rate. And if you have a
7 different perspective, you may well have a different
8 discount rate.

9 There are shortcomings in economic
10 evaluations. And the first one relates back directly
11 to this issue I was talking about, per -- perspective.
12 Since it is taken from a particular perspective, it
13 does not account for -- for distributional issues that
14 -- that may arise.

15 For example, if the perspective
16 represents a collective of a number of different --
17 different stakeholders, it just looks at the total cost
18 and benefit overall. It isn't concerned about how that
19 cost -- costs and benefits may accrue amongst the
20 individual stakeholders within that collec --
21 collective.

22 A good example is the one we're dealing
23 with here which -- which is an electric utility where
24 you could say the collective perspective is that -- is
25 -- is that -- that of all ratepayers. But the question

1 is: At the end of the day, will the best plan chosen
2 be the best one from the perspective of a particular
3 group of ratepayers?

4 It may not, but it may be the best
5 perspec -- best from the perspective of the overall
6 collective of -- of all the ratepayers. I think that's
7 some -- that's sort of a shortcoming.

8 The other shortcoming is obviously, if
9 there are other stakeholders whose perspective isn't
10 even included in that, then they would -- might have a
11 different view. And if the cost allo -- cost -- excuse
12 me, the cost-benefit analysis was carried out from
13 their perspective, you could well come up with
14 different results because you would be including
15 different costs and different benefits, and perhaps
16 even using a different discount rate.

17 Another of the shortcomings is that they
18 are typically done over the lifetime of the project,
19 and therefore there are no temporal cons -- typically
20 no temporal considerations included.

21 You just look at what's the overall cost
22 discounted back, what's the overall benefit, and you
23 don't look at it in terms of temporal issues, which
24 becomes important if -- if you're looking at longer-
25 term projects such we have -- such -- excuse me -- such

1 as we are here.

2 Let me pause and have a drink for a
3 minute.

4 THE COURT REPORTER: It's okay if you
5 talk a little slower.

6 MR. WILLIAM HARPER: Thank -- thank you
7 for reminding me. I'm -- I think you've done this
8 before in the past for me, so thank you.

9 The next slide just reminds me that
10 we're moving on to reference case economics. So I'd
11 like to move on to slide 13, if we could, please.

12 MR. BYRON WILLIAMS: Mr. Harper, just
13 when you use the word 'reference case economics', what
14 -- what does that mean?

15 MR. WILLIAM HARPER: That's what I'm
16 going to get into.

17 MR. BYRON WILLIAMS: Okay.

18 MR. WILLIAM HARPER: In -- in the -- in
19 the Needs For and Alternatives application, Manitoba
20 Hydro has essentially set out a reference case for each
21 -- each of the alternative plans. And this reference
22 case is based on what it considers to be the most
23 likely costs and ben -- benefits for -- for each plan.

24 And so the chapter of the application
25 that look -- that looks at the reference case and

1 economics of that is using the -- what they view as the
2 most likely outlook for the costs and benefits for each
3 -- each of those plans and evaluate on that basis.

4 It has -- the -- the economics has
5 adopted a seventy-eight (78) year study period to
6 reflect both the long -- the long life of some of the
7 assets that are being included in the analysis plus the
8 fact that, as we move forward in time, some of the
9 assets actually aren't being added until many, many
10 years in -- into the future.

11 And the costs and the benefits
12 themselves are really only detailed, in my
13 understanding, for about the first forty-seven (47)
14 years of the analysis. And then after that, they're
15 more extrapolated based on the most recent years on
16 sort of the later years in the plan and extrapolated
17 after that.

18 So the details that we have in the
19 evaluation are, you could say, much better for the for
20 -- first forty-seven (47) year -- years of the study
21 period than they are for the years after that.

22 Again, in each case, the evaluation is
23 done from Manitoba Hydro's perspective, that is, the
24 costs and the benefits that Manitoba Hydro will
25 experience if that particular plan was implemented.

1 Given this Manitoba Hydro perspective,
2 the costs and benefits were discounted using Manitoba
3 Hydro's weighted average cost of capital which in the
4 original application was 5.05 percent real, in real
5 terms, and in the 2013 update included in the
6 application was 5.4 percent.

7 This weighted average cost of capital
8 reflects Manitoba Hydro's target capital structure of
9 75 percent debt to 25 percent equity -- its forecast
10 cost of debt and the premium over the cost of debt to
11 establish the cost of equity for the equity component
12 of the overall average.

13 If we can move on slide 14 now, this
14 slide effectively summarizes the results of Manitoba
15 Hydro's economic evaluation of the reference cases as
16 it presented in -- in its orig -- in its original
17 application based on the 2012 planning assumptions.

18 In my view, there are probably several
19 notable results to -- to take out of all this. First
20 was that Plan 2, which was Keeyask in 2022 followed by
21 gas generation, was the most economic plan just to meet
22 domestic need going forward.

23 However, the economics of advan -- Plan
24 4, which involved advancing Keeyask and a smaller
25 intertie to meet the Minne -- Minnesota Power contract,

1 were superior to that of Plan 2.

2 Plans that involve a larger intertie and
3 Conawapa after Keeyask were -- also exhibited superior
4 economics to Plan 4 again. So again, there -- there
5 was an improvement there. In contrast, plans with the
6 larger intertie but gas generation after Keeyask were
7 not superior to -- to the smaller inter -- intertie
8 plan.

9 Out of all the plans with the larger 750
10 intertie -- all the plans with the larger 750 intertie
11 are superior to the -- the original just build for
12 domestic need, or Plan -- Plan 2 option. And finally,
13 overall, Plan 14, which was the Preferred Plan, had the
14 most superior economics of -- of all.

15 We'll move on to slide 15. As part of
16 the Needs For and Alternatives To application, Manitoba
17 Hydro updated its evaluation of a subset of the fifteen
18 (15) plans using more recent 2013 planning assumptions.
19 While the differences in the net present values of the
20 various plans were reduced with this update, their same
21 relative rankings remain the -- remained the same, and
22 unchanged actually, since the -- the Preferred Plan,
23 Plan 14, would still continue to demonstrate superior
24 economics.

25 We move on to slide 16. What -- what I

1 note here is some of the issues that ECS raised with
2 the approach Manitoba Hydro undertook in undertaking
3 its -- its economic evaluation of the reference cases.
4 And the -- the -- and the first issue was the fact that
5 the evaluation was not truly done from a Manitoba Hydro
6 perspective, as it included costs that would be paid by
7 and benefits that would accrue to KCN, the partner in
8 the Keeyask generating station.

9 However, since the investment by KCN was
10 only forecast to be some roughly 25 million out of a
11 project that was over \$6 billion in costs, and the bene
12 -- benefits commensurate with that cost, this is
13 unlikely to -- if you're correct for this, it's very
14 unlikely it would have any impact on -- on -- material
15 impact on the relative economics that were coming out
16 of the evaluation.

17 The second issue was that after
18 undertaking the evaluation from a Manitoba Hydro
19 perspective, in Section 9.3.3 of the application,
20 Manitoba Hydro then compared the various plans, after
21 combining for each plan the net present values as
22 calculated from Manitoba Hydro's perspective; the net
23 present value of the cash transfers to the province,
24 that is water rentals; debt guarantee fees; and capital
25 taxes using Manitoba Hydro's -- also using Manitoba

1 Hydro's discount rate.

2 The concern here rests with the fact
3 that the result you have is no longer a Manitoba Hydro
4 perspective, but at the same time it's no longer a
5 broader societal perspective. First, the provincial
6 transfers were discounted at Manitoba Hydro's discount
7 rate, not at a discount rate -- one where I think would
8 be applicable from a provincial perspective. And the
9 second thing was the -- the analysis didn't include any
10 potential costs that might accrue to the province
11 because of looking at different alternative plans.

12 Now, in Chapter 13, which is the
13 multiple accounts analysis, Manitoba Hydro has -- has
14 addressed a lot of these concerns. But -- but our
15 concern was in that -- in that particular section we
16 seemed to be mixing apples and oranges when we were
17 actually undertaking the evaluation.

18 The third issue noted was the treatment
19 Wisconsin Power (sic) Ser -- Service contract and
20 investment. In our re-reading of the NFAT (sic)
21 application -- excuse me -- NFAT application, it -- it
22 treated the -- the -- both the contract and the
23 investment as alternatives that Manitoba Hydro had,
24 where -- whereas, really at that point in time the
25 contract will still under negotiation. It could still

1 or could -- could not be successful; and also the
2 investment itself in the line, as we subsequently
3 learned, which Wisconsin Power Service decided not to
4 make the investment. And so, therefore, that was not -
5 - not an option.

6 Now, in the subsequent sort of process
7 we've gone through here in the proceeding, Manitoba
8 Hydro has filed -- filed updated information which
9 excludes the investments they've -- the contract has
10 been signed, so these problems are no -- are no longer
11 the issue they were when -- when we wrote -- when we
12 wrote the analysis.

13 The next issue here is simply noting
14 that this is a long study period which covers multiple
15 generations. And it is important to understand how the
16 costs and the benefits accrue over time and whether,
17 from this perspective, there are material differences
18 between -- between the plans. In the evidence, we
19 didn't go into this any further because we were aware
20 that other parties, such as La Capra, were spending a
21 fair -- fair bit of time looking at this ,and we want -
22 - didn't want to duplicate their particular efforts.

23 My next point here is to emphasize the
24 fact that looking at costs and benefits from a Manitoba
25 Hydro perspective is not the same as looking at them

1 from a ratepayer perspective. While Manitoba Hydro is
2 regulated on a cost-of-service basis, accounting
3 policies give -- give rise to the difference as to when
4 costs and benefits accrue to Manitoba Hydro and when
5 they will accrue to rate -- ratepayers.

6 Also, financial policies of the
7 Corporation give rise to different retained earnings
8 requirements as between the different plans.

9 And finally, customers' views as to what
10 might be the appropriate discount rate in discounting
11 their costs and benefits, i.e., their bills, may vary
12 from what Manitoba Hydro's discount rates are. And
13 we'll talk about this more when we get the multiple
14 account analysis.

15 MR. BYRON WILLIAMS: Mr. Harper, just
16 before we leave this page. Just the first bullet you
17 talk about, the perspective not being truly a Manitoba
18 Hydro perspective because it includes costs and
19 benefits accruing to the KCN.

20 Is that right?

21 MR. WILLIAM HARPER: That -- that's
22 correct.

23 MR. BYRON WILLIAMS: That you noted
24 that, based upon the assumptions in the file, those
25 were -- were relatively small, and I think you cited 25

1 million?

2 MR. WILLIAM HARPER: Yes. That's my
3 understanding, is the -- is the filing is based on the
4 presumption that there'll be a 25 million preferred
5 inves -- investment by -- by KCN.

6 MR. BYRON WILLIAMS: Just you're aware,
7 sir, that the KCN have an option of a smaller preferred
8 option or the common unit option which can go up to 25
9 percent of -- of equity.

10 Is that right?

11 MR. WILLIAM HARPER: Yes. I -- I think
12 -- I think that's a decision that the -- I understand
13 that the KCN partners have the option to make that
14 decision. And they don't actually have to make that
15 decision for -- for quite a while, I understand, until
16 -- until the station is actually either in -- in
17 service or the last unit has been constructed,
18 somewhere around that time is my understanding.

19 MR. BYRON WILLIAMS: And whether or not
20 I have the common unit magnitude correct, sir, does
21 that raise any implications for your analysis?

22 MR. WILLIAM HARPER: Well, I guess one
23 could have -- and -- and to be -- be quite honest with
24 you, whether it was the wording of the -- of the
25 partnership agreement or whatever, I myself personally

1 was unable to clearly disentangle exactly what all the
2 puts and takes were. But I guess one could construct a
3 scenario in -- in which there was a larger, more equity
4 style investment by -- by the KCN Partners and try --
5 and then see what would be the cost that they would be
6 contributing, what would be -- be the benefits they
7 were contributing, and try and anticipate whether there
8 would be a more terial -- there would be a material
9 impact.

10 But to be quite honest with you, I --
11 I'm not in the position right now to indicate whether
12 there would or there wouldn't.

13 MR. BYRON WILLIAMS: Thank you.

14

15 (BRIEF PAUSE)

16

17 MR. WILLIAM HARPER: I think the last
18 point I noted on slide 16 was -- was an issue over the
19 basis for the Manitoba Hydro discount rate that -- that
20 was used, and that was the final issue that we had in
21 our ECS evidence.

22 And I'd like to move on now to slide 17
23 and -- and talk about that more specifically. As noted
24 earlier, Manitoba Hydro's discount rate reflects its
25 target debt-equity ratio of 75:25 and calculates a cost

1 of capital by using its cost of new borrowing plus the
2 debt guarantee fee as the cost of debt and adds a
3 premium of 3 percent to that to set the return on
4 equity component of the overall average.

5 In my mind, there's really two (2)
6 issues that -- that arise with it. The first issue is
7 really -- really more of a calculation issue. And that
8 is, while -- while the equity rate purportedly reflects
9 the return on equity allowed by regulated utilities,
10 recent experience would suggest that that portion or
11 that particular rate should be higher.

12 And the second issue is a little bit
13 more of a principled one. That says -- and that -- and
14 that, in my mind, asks whether using a weighted average
15 cost of capital approach is appropriate for Manitoba
16 Hydro, given that it isn't regulated on a rate-of-
17 return basis. And so these -- and I'd like to look at
18 the first of those two (2) questions in -- in --
19 starting at slide 18 here.

20 For utilities that are regulated on a
21 rate-of-return basis, regulators frequently undertake
22 formal assessments of what's the appropriate rate of
23 return on -- on equity that should be applied to those
24 utilities? And in doing so, they use a number of
25 different methods to determine what -- what should be a

1 fair and reasonable rate of return to the investors.

2 One of the common standards used in this
3 process is -- is with -- is setting the ROE with
4 reference to what's the long-term Canada bond rate,
5 typically thirty (30) years, as this considered to be a
6 benchmark for risk-free debt. Looking at the
7 calculation of Manitoba Hydro's 5.05 percent real
8 weighted average cost of capital, the nominal ROE used
9 in that calculation is 9.3 percent, which represents a
10 4.65 percent premium over the underlying forecast
11 they're using for yields on Canada bonds.

12 In contrast, if we look at recent formal
13 assessments by Canadian regulators and what premiums
14 are -- are in the determinations that -- that they --
15 they've made. The results range from 4.68 percent up
16 to 5.5 percent.

17 Now, you note on the slide here I -- I
18 have an asterisk beside -- beside the Alberta decision.
19 And that's basically just to flag the fact that in my
20 original evid -- evidence the -- the reference I had
21 was to a 2011 decision. And actually, in going back
22 and checking my notes, the numbers actually referred to
23 a 2000 -- were actually based on a 2009 decision by the
24 Alb -- by the Alberta Commission.

25 And before any -- anybody asks,

1 actually, if you had actually use -- of the 2011
2 decision, the ROE had been set at 8.75 percent, and
3 that was base -- based -- with reference to a view that
4 the Canada long-term bond rate would probably be
5 somewhere in the order of 3.4 to 3.8 percent.

6 So even if we were to use the upper end
7 of that range and say 3.8 and compare that with the
8 8.75, you would get a premium of 4.95 percent, which is
9 -- which is somewhat a little bit higher, actually,
10 than the number I -- I have used in -- in the evidence
11 here.

12 But -- but for purposes of going
13 forward, I -- I think it's reasonable to -- to continue
14 to think of -- think of it just in the context of the
15 evidence as it originally presented. And basically, in
16 terms of thinking then what should be a -- what would
17 be a reasonable premium to use in trying to determine
18 the return on equity for Manitoba Hydro's purposes,
19 basically I just took the average of these three (3) --
20 of -- of these three (3) values and -- and adjusted
21 that for the fact that Mani -- Manitoba Hydro, in
22 using a benchmark for Canadian bonds, uses an average
23 of ten (10) -- ten (10) and thirty (30) year bonds.
24 Regulators typically use a -- just -- just a thirty
25 (30) year bond rate, which -- which would give you an

1 adjustment of about twenty-five (25) bas -- basis
2 points. And that basis overall leads -- leads to a
3 premium over the long-term bond rate of 5.25 percent.

4 And this -- and this is what we -- we
5 used in -- in our subsequent analysis. And that 5.25
6 percent premium, when you work it through the weighted
7 average cost of capital calculation, it gives you a
8 result of about 5.2 percent as opposed to the 5.05 that
9 was used by Manitoba Hydro.

10 Now, we move on to chapter 9 -- excuse
11 me, not chapter, slide 19. In -- in its rebuttal
12 evidence Manitoba Hydro referred to a recent report by
13 Concentric Advisors (phonetic) setting out 2013
14 authorized return on equity values for Canadian gas and
15 electric distribution utilities, as well as gas
16 distributors, as support for its return on equity
17 premium.

18 However, if you look at the following
19 table here, which basically sets out the -- the return
20 on equity values that -- that were provided by that
21 report, plus the report also provided 2013 returns for
22 long-term government bonds, both in Canada and in the
23 US. If you look at the resulting premiums, which is
24 the last -- last row on the slide, you can see that the
25 premiums in 2013 are all higher than the -- actually,

1 higher than the Manitoba Hydro premium and they're
2 actually all higher than the premium that we -- we --
3 ECS recommended in -- in its evidence as well.

4 So in my view, the -- the report
5 referenced to in the rebuttal evidence really -- really
6 doesn't, unlike Manitoba Hydro suggested, support its
7 particular approach. Indeed, if anything, it -- it
8 supports the numbers should be moved up -- upwards
9 higher, something more, if not above, what ECS had
10 proposed.

11 MR. BYRON WILLIAMS: And just for the
12 record, Mr. Harper, when you use 'ECS', that's the firm
13 in which you're an associate?

14 MR. WILLIAM HARPER: That's right. I'm
15 sorry. I'm referring to Econalysis Consulting
16 Services. I get tired of saying, "I," so much of the
17 time. I think it's a -- a little bit presumptive
18 sometimes, so I -- I use that instead.

19 Move -- moving on to slide 20, the --
20 the bigger issue is why, since Manitoba Hydro is not
21 regulated on a rate-of-return basis, should a return-
22 on-equity style approach be used in determining its
23 weighted cost of capital? And I think -- I -- I
24 thought this through and this really represents my
25 thinking and my logic as to why it seems to be a

1 reasonable proxy.

2 First, Manitoba Hydro's ability to
3 borrow at favourable rates reflects the fact that its
4 debt guar -- its debt is guaranteed by the province.
5 Now, in turn for that, the province expects Manitoba
6 Hydro to be financially self-supporting.

7 One of the key metrics in assessing
8 whether a company is financially self-supporting is its
9 debt-equity ratio, which indeed gives rise as to why
10 Manitoba Hydro has a target debt-equ -- debt-equity
11 ratio as -- as one of its financial pol -- policies in
12 which it strives to maintain over the longer term.

13 However, the equity for the Company
14 doesn't come from shareholders; rather it comes from
15 net income. And while export revenues may contribute
16 to the net income, more so in good years than in bad
17 years, at the end of the day it's the customers that --
18 that are responsible when all is said and done as
19 ensuring that -- that there's an appropriate level of
20 retained earnings for the Corporation and that the
21 Manitoba Hydro's financial integrity is maintained.

22 So the question that arises as to what
23 do customers require in terms of return or to be
24 neutral in terms of the timing of their contributions
25 to -- to these retained earnings. And it seemed to me

1 the one proxy of what they might be reasonable to
2 expect is what would proxy -- what -- what's the return
3 that investors would get for investing in similar -- in
4 similar -- making similar investments in -- in similar
5 types of companies, which is really what the allowed
6 return on equity that regulators give regulated
7 utilities.

8 And so on that basis, it seemed to me
9 that the approach Manitoba Hydro was taking was a
10 reasonable one in order to try -- try and establish a
11 discount for -- for purposes of their financial
12 evaluation.

13 The -- the next slide compares the
14 reference case economics net present values as
15 calculated by Manitoba Hydro at 5.05 percent with the
16 results you would get if you did the calculation at --
17 at the 5.25 percent -- excuse me, 5.2 percent weighted
18 cost of capital that we came up with in our
19 calculations.

20 Furthermore, the table was prepared with
21 variations on Plan 5 and 14 that has excluded the
22 investment that originally was thought would be made by
23 Wisconsin Power Service but we now know will -- will
24 not be made. And those are characterized here as Plans
25 5A and Plans 14A.

1 First, it's worth noting that at
2 Manitoba Hydro's 5.05 percent discount rate, even with
3 no investment by Wisconsin Public Service, Plan 14 is -
4 - is still the superior alternative overall. However,
5 with the increase in discount rate, some things -- some
6 things change and some things don't.

7 The conclusion that Plan 2 yields the
8 highest economic benefit out of all the no intertie
9 options plans doesn't change. The conclusion that Plan
10 4 with a small intertie is superior to all of the no
11 intertie plans, that doesn't change. All the plans
12 with a larger intertie are still superior to the no
13 intertie option, although the results are virtually
14 equivalent for Plan 5 when there's no Wisconsin Public
15 Service investment.

16 However, relative to Plan 4 -- however,
17 relative to Plan 4, it is no longer economic to advance
18 Conawapa without the Wisconsin Power Service contract
19 and that without the public -- Wisconsin Public Service
20 investment, Plan 4 and Plan 14 are virtually
21 equivalent, from an economic perspective.

22 Finally, it's interesting to note that
23 Plan 4 continues to be superior to all the large
24 intertie plans for gas as well as Keeyask.

25 MR. BYRON WILLIAMS: And just before

1 you leave that slide, Mr. Harper, and recognizing this
2 is based on reference cases, but using your weighted
3 average cost of capital analysis as opposed to Hydro's
4 at 5.2 percent, when you say that Plan 4 is roughly the
5 equivalent of Plan 14A, you're referring to the NPV of
6 roughly 1.2 billion for both of them?

7 MR. WILLIAM HARPER: Yes. I think the
8 difference is between 1.21 billion and 1.235 billion.
9 And I think the observation's been made that things
10 have to be -- be bigger than a hundred before they're
11 very material. And on that basis, I view that anything
12 different than fifty (50) is really virtually the same.
13 If the difference is less than fifty (50), it's
14 virtually the same sort of thing.

15 THE CHAIRPERSON: Mr. Harper, in this
16 case, you use five point two-zero (5.20)?

17 MR. WILLIAM HARPER: Yes.

18 THE CHAIRPERSON: Why?

19 MR. WILLIAM HARPER: Well, like I said,
20 that was -- if we go through and we say that we believe
21 the premium that -- the equity premium that Manitoba
22 Hydro used in determining its weighted average cost of
23 capital was too low, because if you look at what --
24 what regulators have granted utilities recently for
25 allowed return on equity, it -- it gives a result that

1 -- that would be higher. And on that basis, looking at
2 those recent decisions by -- by regulators and taking
3 the average of those and using that value in -- in the
4 calculation, we came up with 5.2 percent as opposed to
5 5.05 percent.

6 THE CHAIRPERSON: The reason I'm asking
7 because the earlier slide suggested five point two-five
8 (5.25). Did I -- did I...?

9 MR. WILLIAM HARPER: No, five point
10 two-zero (5.20). And I'm sorry if I misspoke myself.
11 The -- it's -- five point two-zero (5.20) was the
12 number that we used.

13 THE CHAIRPERSON: Oh, I see. Okay.

14 MR. WILLIAM HARPER: No. Okay, there -
15 - there's a difference there. The -- and maybe this is
16 a -- the -- the numbers are so close, they get
17 confused. If we go back -- and I think what you were
18 looking at back on slide 18, if I'm not mistaken -- the
19 5.25 percent there is referred to. That's the premium
20 that we get over the long-term bond rate in order to
21 determine the return-on-equity component.

22 THE CHAIRPERSON: Okay.

23 MR. WILLIAM HARPER: Then, once you've
24 got the return-on-equity component, you work that into
25 the overall weigh -- weighted average. And when you

1 work it into the overall weighted average, the weighted
2 average changes from 5.05 to the 5.22 percent. I can
3 understand, the numbers are so close, it gets confusing
4 as to which number is used in which context.

5 On slide 22 here, what -- what we've
6 tried to capture here is the fact that, during the
7 course of the -- this -- this proceeding, Manitoba
8 Hydro provided an update to the -- to the -- to their -
9 - to their valuing of the plans using the 2012 planning
10 assumptions for the new capital costs for Keeyask and
11 Conawapa.

12 And so what -- what we've done, if you
13 look at the far left-hand side, the column there
14 reflects the net present value for each plan as filed
15 in the original Application. And you can see that by
16 the sixteen ninety-six (1696) for Plan 14, which I'm
17 sure we're all familiar with, come -- coming out of the
18 application.

19 When you maintain the same -- Manitoba
20 Hydro's discount rate but you update the cap -- update
21 for the new capital costs that are now -- that we now
22 know for Keeyask and Conawapa, you get the middle
23 column here, which is -- which I've referred to as the
24 2012 NFAT new -- new capital at 5.05 percent.

25 And then the third column here is really

1 just taking that middle column, and instead of using
2 the five point o-five (5.05), I've used the higher 5.25
3 percent that we're suggesting should be used for
4 purposes of evaluation.

5

6 CONTINUED BY MR. BYRON WILLIAMS:

7 MR. BYRON WILLIAMS: You said five
8 point two-five (5.25). Did you mean five point two
9 (5.2), sir?

10 MR. WILLIAM HARPER: Yes. I'm making
11 the same -- same mistake you are, Mr. Gosselin. I'm
12 sorry.

13 MR. BYRON WILLIAMS: Are we going to
14 blame the Chairperson for --

15 MR. WILLIAM HARPER: No, no. We're --
16 we're going to blame me for the very start and for his
17 error as well.

18 MR. BYRON WILLIAMS: Mr. Harper, before
19 you -- or you're staying on the slide? Okay. Good.

20 MR. WILLIAM HARPER: Well, what -- what
21 I've done on the next slide is try and -- and it's a
22 little bit awkward. And actually, what I would like to
23 suggest you do is, what I've done on the next slide and
24 which you can maybe use as reference or you can read
25 through, is try and summarize what I view as some of

1 the main takeaways to take from -- from this slide.

2 And it's kind of awkward because we
3 can't have two (2) slides open at the same time. And I
4 leave it to any -- anyone's choice as to whether they
5 want to turn to slide 23 and look at the points I'm
6 going to say, or keep on slide 22 and look at the
7 numbers as I walk through the points. And so it's
8 probably easier to look -- to look at the numbers.

9 First, in terms of meeting domestic
10 need, Plan 2, that's Keeyask in the early 2020s
11 followed by gas, is -- is still the superior option
12 from an economic perspective. Plan -- however, Plan 4
13 is now superior to all the no intertie options and to
14 all plans with the 750-megawatt intertie. With no WPS
15 contract in the larger intertie, Plan 6 -- that's gas
16 after Keeyask -- is economic relative to the no
17 intertie options.

18 However, for Plan 12 -- that's Conawapa
19 after Keeyask -- economics changes at the higher
20 discount rate such that it's no -- such that Plan 12 is
21 no longer superior to the no in -- intertie option. And
22 Plan 6 -- that's with gas -- is superior to Plan 12
23 with -- with Conawapa, which is a change from what
24 we've seen before.

25 With the Wisconsin Power Service

1 contract and the larger intertie but no in -- no
2 investment, the economics of Plan 5 -- that's gas after
3 Keeyask -- is marginally less than the no intertie at
4 both rates. However, the economics of Plan 14 changes
5 such that at the higher discount rate, it is no longer
6 economic or relative to the no-intertie option.

7 And those points of reference -- like I
8 said, for those points of reference, I summarized on
9 the next slide just so they were read -- readily
10 available.

11 MR. BYRON WILLIAMS: Mr. Harper, I
12 apologize for interrupting --

13 MR. WILLIAM HARPER: Ah, technology at
14 its best.

15 MR. BYRON WILLIAMS: Diana's brilliant.
16 Just if I were to go to the right-hand column on slide
17 22 just for a moment and -- am I right that the ranking
18 in terms of -- under that column, the -- in terms of
19 NPV, the most economic plan would be number 4, Plan 4,
20 at seven eighty-five (785)?

21 MR. WILLIAM HARPER: That -- that's
22 correct.

23 MR. BYRON WILLIAMS: And then the
24 second highest --

25 MR. WILLIAM HARPER: And actually, to

1 pause, that -- that ranking is similar in the middle
2 column using Manitoba Hydro's discount rate as well.

3 MR. BYRON WILLIAMS: Fair enough. And
4 secondly the second ranked would be Plan 6, and that
5 would be both at Manitoba Hydro's discount rate and at
6 your discount rate?

7 MR. WILLIAM HARPER: Well, not -- not
8 quite at Manitoba Hydro's discount rate, even though
9 the difference between six sixty-seven (667) and six
10 sixty-two (662) is probably worth arg -- arguing about
11 between us at this point.

12 MR. BYRON WILLIAMS: Is -- and I
13 apologize for that, is -- is Plan 5 and Plan 14, as
14 opposed to the 'A's, given that they include the
15 investments, are they -- are they still the -- the
16 game, Mr. Harper?

17 MR. WILLIAM HARPER: Well, I -- I guess
18 I'm struggling because you mean by 'still in the game'
19 -- at -- at some future point in time circumstances
20 might arise, and I guess Manitoba Hydro is looking for
21 these opportunities where they can find anoth - another
22 in -- investor.

23 But if we're looking at what we know
24 right now, that's not the circumstance we know. And
25 therefore, I -- I think -- I think their plans that --

1 I dare to use the word 'hypothetical' because it's been
2 used in other contexts around here, but they -- they
3 maybe are somewhat more hyp -- hypothetical at this
4 point in time.

5 MR. BYRON WILLIAMS: And just before we
6 leave it -- and I take your point about Plan 6.

7 But it -- are the relative results for
8 Plan 6 under both the Hydro discount rate and the --
9 your discount rate indicative of why you've -- you've
10 been wanting to keep an eye on this plan on a going-
11 forward basis, sir?

12 MR. WILLIAM HARPER: I think that's --
13 yes. And that's something I -- I've been having
14 discussions with my counsel throughout the process as
15 to what we should be looking at and not looking at. I
16 think he's referring to those on a going-forward basis,
17 so, yes. If we want coll -- collapse ourselves down
18 again that would be great, thank you.

19 If we move on to slide 24, Manitoba
20 Hydro has also revised its 2013 reference case -- cases
21 to reflect the new capital costs for Conawapa and for
22 Keeyask, but only for a selected number of plans. And
23 what I've set out on -- on this slide here is sort of
24 try -- trying to summarize the -- the results for --
25 for some of the key plans using the initial 2013

1 planning assumptions, both at five (5) point -- and re
2 -- recall we moved the 2013 planning assumptions. The
3 discount rate -- Manitoba Hydro's discount rate changed
4 from 5.05 percent to 5.4 percent. And that's -- that's
5 the reference here.

6 And if you use the sort of same
7 differential, that would mean under the approach that I
8 proposed you'd be using a discount rate of 5.5 percent.
9 So what we have here is the planning assumption -- the
10 results using the 2013 planning assumptions, the far
11 left column being Manitoba Hydro's numbers. And I've
12 included the reference at the bottom of the slide, and
13 the revised numbers using the higher 5.5 percent
14 discount rate; and the reference for that is shown at
15 the bottom of the slide again.

16 And again then, like I said, Manitoba
17 Hydro has provided some updates on how -- how these
18 numbers would change with the new capital cost, but
19 they've only done that -- those for Plan 2 and Plan 14.
20 That's shown in the second to the right column. And
21 then again what I've done here is I've just
22 recalculated those numbers using 5.5 percent instead of
23 the five (5) point -- excuse me -- 5.5 percent -- 5
24 percent. Let me start again; 5.55 percent instead of
25 the 5.4 percent.

1 Probably the most interesting result is
2 that the economics of both Plan 2 and Plan 14 have
3 declined significantly relative to the All Gas case.
4 And the difference between the two (2) plans now, Plan
5 2 and Plan 14, is less than a hundred million dollars
6 which, as we had this conversation a little bit
7 earlier, was almost the material -- materiality
8 threshold within the context of looking at differences
9 between the values of the different plans.

10 Recently, Manitoba Hydro has also
11 provided information as to what would be the impact of
12 different levels of DSM on the net present values of
13 various plans. And I've set up this -- out in -- in
14 the next slide here, along with the reference, which is
15 -- was Exhibit Manitoba Hydro 104-4. And I'm on slide
16 25 at this point in time.

17 And there are two (2) interesting things
18 in my view to take from this slide. The first is that
19 for all three (3) plans, economics improve until --
20 economics improve until one moves from DSM Level 2 to
21 DSM Level 3.

22 The second point is that the improvement
23 in the economics of the plans is far greater for the
24 All Gas Plan and Plan 5 -- that is, where gas follows
25 Keeyask -- than for Plan 14, when Conawapa follows

1 Keeyask. So it seems that the plans with more gas in
2 them seem -- seem to benefit more from increased levels
3 of DSM than -- than do plans such as Plan 14, that has
4 Conawapa foll -- following Keeyask.

5 Before leaving this slide, I want to
6 note, in case somebody sort of checks and wonders why
7 the numbers are different. These values are based on a
8 Manitoba Hydro view. And if you recall, if you look at
9 Exhibit 104-4, it presented results for both the TRC,
10 or the total resource cost, view and the Manitoba Hydro
11 view.

12 And -- and in Exhibit 95 at slide 129,
13 Manitoba Hydro presented the TRC results, which were
14 what you would see based on the total resource cost
15 point of view. So they will be different than -- than
16 what -- than what are here. Both sets of numbers come
17 from the same -- from the same exhibit, except this
18 just takes the Manitoba Hydro perspective, consistent
19 with the view that we were doing these economic
20 evaluations from a Manitoba Hydro perspective.

21 But what's also interesting to note is
22 that the implications of DSM are the same in both cases
23 because, if you recalled Exhibit 95, again there --
24 there were benefits from increased levels of DSM until
25 you started to move from the DSM 2 level to -- to the

1 DSM 3 level. So while the numbers are different, the
2 message that you get and the -- and the general
3 takeaways you should get are -- are exactly the same in
4 both cases.

5 And again, the points that I've just
6 made in talking to that slide are exactly the same
7 points as I raised noted on the -- the same slide here,
8 which is slide 27. Oh, sorry, did I? Oh, I'm sorry,
9 I'm getting ahead of myself here.

10 Again, what -- what I've done here is
11 again tried to in one (1) place summarize the various
12 numbers that we know so we -- so we can compare them.
13 And again, this tries to look at the 2013 update moving
14 through not only the new capital costs, but what
15 happens when you add in increased levels of DSM.

16 And if we could maybe split the slide
17 again, that -- that would be great, and I can talk to
18 both at the same point in time, because it's 26, and on
19 27 I make some -- I make some specific takeaway
20 comments. And those are really that increased levels
21 of DSM appear to be economic regardless of which plan
22 you are looking at.

23 With increased levels of DSM, the All
24 Gas Plan now starts to look superior to -- to Plan 2,
25 which was the preferred no intertie option up until

1 this point in time. With increased DSM, advancing
2 Keeyask with a 750 intertie is superior to the no
3 intertie when followed by gas. And gas is more
4 economic than Conawapa as a post-Keeyask resource.

5 MR. BYRON WILLIAMS: If you can stay
6 here for one (1) last second. Mr. Harper, just going
7 back to -- we can keep the split screen, but slide 26,
8 and focussing your attention on the second-last column.
9 First of all, it -- that takes into account DSM 2 new
10 capital and is represented at Hydro's discount rate?

11 MR. WILLIAM HARPER: That's correct.

12 MR. BYRON WILLIAMS: And if we look at
13 that specific column, sir, would it be fair to say that
14 the -- the two (2) strongest plans represented in this
15 column are 6 and 5?

16 MR. WILLIAM HARPER: Yes. And both of
17 those plans are plans that involve advancing Keeyask
18 but then building gas as your subsequent generation
19 resource after that. The difference between the two
20 (2) is whether you add the contract or not.

21 MR. BYRON WILLIAMS: And we see the
22 Preferred Plan in the second-last column falling back?

23 MR. WILLIAM HARPER: Yes, that --
24 that's correct.

25 MR. BYRON WILLIAMS: Now, let's just

1 move it over to your -- the final column. Again, it's
2 DSM 2 new capital, but this time using your preferred
3 discount rate, sir?

4 MR. WILLIAM HARPER: That's correct.

5 MR. BYRON WILLIAMS: And again, we see
6 the -- a relatively -- what we see, first of all, that
7 6 and 5 again are the -- the strongest plans in -- in
8 this particular presentation?

9 MR. WILLIAM HARPER: That's correct.

10 MR. BYRON WILLIAMS: And again with a
11 relatively tight gap?

12 MR. WILLIAM HARPER: Yes.

13 MR. BYRON WILLIAMS: Thank you.

14 MR. WILLIAM HARPER: If we move on to
15 slide 28.

16 THE CHAIRPERSON: Mr. Harper, the --
17 the last reference on that slide was the caveat. And --

18 MR. WILLIAM HARPER: Right. And that
19 sort of is -- is the segue into the next part of the
20 presentation which is really -- we recall that what
21 we've been dealing with so far is just looking at the
22 reference values for each -- each of the cases, which
23 is really what's the most likely -- what do we view as
24 to be the most likely cost and let's do the evaluation
25 on that perspective without taking into account any

1 issues around what's the uncertainty around what --
2 what those ref -- reference values are.

3 And so that was just to remind me that
4 sort of the next part of the presentation is segueing
5 into Manitoba Hydro's unc -- uncertainty analysis where
6 it develops scenarios and attaches prob --
7 probabilities to -- to them, which -- which probably is
8 sort of more -- more useful in understanding the
9 overall implications of the plan than just looking at
10 the reference value.

11 Again -- which is sli -- slide 28 is
12 just sort of to make -- to make the break -- to make
13 the break point as we move into slide 29 which talks
14 about the -- Manitoba Hydro's uncertainty analysis.
15 Again, I think Manitoba Hydro's pointed in its
16 application that the uncertainty analysis it performed
17 was really, in -- in lieu of using a risk adjusted
18 hurdle rate as was done in the Wuskwatim Need For and
19 Alternatives To submission.

20 Its uncertainty analysis involved
21 generating twenty-seven (27) scenarios based on high,
22 reference, and low outcomes for three (3) key factors
23 where probabilities were assigned to each of the
24 outcomes for each of these factors. The key factors
25 assessed were economics, that is inflation, interest

1 rates, and discount rates; energy prices, both natural
2 gas and electricity exports; and capital costs.

3 I think, the final note which was the
4 comment I just made earlier that the useful thing about
5 economic uncertainty analysis, it -- it's not only --
6 it's -- it also gives you -- you can -- you calculate
7 an -- an expected value. And that's probably much more
8 informative than the reference value because the
9 expected value gives -- gives you some sense of -- it
10 takes into account the -- the various uncertainties and
11 the various probabilities associated with them. And I
12 think that other parties as well have also indicated
13 that it's probably a better point of reference if
14 you're trying to compare plans than by looking at the
15 reference value.

16 In sort of looking at Manitoba Hydro's
17 uncertainty analysis -- and on slide 30 now -- the
18 following general issues were -- were noted. And
19 I guess first from our -- from our perspective the
20 issue of uncertainty analysis is -- is -- can be seen
21 as an improvement over the previous use of -- of the
22 hurdle rate as we saw done in the Wuskwatim
23 application. The -- the second observation was that
24 more factors and more outcomes would lead to more
25 robust results and allow us a better

1 understanding of -- of the risks. And fi -- finally,
2 we had a concern about in -- including the discount
3 rates as -- explicitly including discount rates as one
4 (1) of the three (3) factors in -- in going through the
5 scenarios and -- and the prob -- probability analysis.

6 Sli -- slide -- in its rebuttal
7 evidence, Manitoba Hydro addressed each of these points
8 and I'd like to comment on them at this point in time.
9 With respect to our observation about only using three
10 (3) factors, Manitoba Hydro's response was that -- they
11 consider the major factors. And on -- and on this
12 point we -- we agree. They -- they seemed to have use
13 one (1) of the major factors.

14 But what our concern was that in many
15 cases the comparative results are fairly close to each
16 -- each other and the inclusion of more factors might -
17 - might have allowed us to be able to differentiate the
18 results be -- between -- between the plans more so.

19 With respect to the probability
20 distributions based on high, reference, and low,
21 Manitoba Hydro's rebuttal stated that a three (3) point
22 probability distribution was reasonable. Again our
23 point and concern here was again given how clo -- close
24 the results were, perhaps a -- a more sophisticated
25 approach with either more scenarios or -- or more

1 probabilities would have given you more robust results
2 and be able to differentiate between the plans better.

3 As we've seen some of the reference
4 values are pre -- pretty close together as we'll see
5 going forward. Some of the curves, those S-curves
6 we're familiar with, are pretty close together, and
7 sort of with more factors and more probabilities you
8 might have been able to differentiate between them a
9 little bit better.

10 And finally, with respect to the
11 inclusion of discount rates as one (1) of the
12 uncertainty factors, Manitoba Hydro inserted and
13 actually had experts appear to confirm that this was
14 accepted practice.

15 On the other hand, Manitoba Hydro seems
16 to have at least acknowledged in some sense our -- our
17 concern about the inclusion of common costs as being a
18 factor that -- that seemed -- that seemed to occur in
19 the original analysis and sort of be -- be problematic
20 if you were varying discount rates and made an effort
21 to exclude the -- exclude common costs from -- from the
22 subsequent values and analysis that -- that they
23 provided in -- in the proceeding here.

24 However, it's not fair that all common -
25 - in my view, it's not fair that all common costs have

1 been, or actually can be effectively removed. What
2 Manitoba Hydro did was to find common costs as the net
3 revenues under the All Gas Plan on the basis that the -
4 - the values for every other plan for these net
5 revenues were -- were higher. And, therefore, if it
6 was the lowest value we'd remove that as common costs.

7 Now, this is a fairly simply approach
8 and ignores the fact that some of the components of
9 that All Gas net -- net revenue calculation, for
10 example, thermal costs, are likely to be higher under
11 the All Gas Plan than some of the other plans.
12 However, at the same time, to be quite honest, in my
13 view, it's probably impossible to try and tease common
14 costs out -- that is the costs that are unchanged, out
15 -- out of the analysis, and this is because Manitoba
16 Hydro operates its system on an integrated bas --
17 basis. And actually, individual stations -- even
18 existing individual stations, how they operate in the
19 future will change depending upon what types of new
20 resources you add to -- to the system.

21 And so -- so therefore, I'm not too sure
22 if -- if asking them to go back and try and do a better
23 job would get you any better results at the end of the
24 day. It's an integrated system. At the end of the day
25 they try and work the whole system, even existing

1 stations, so as to get the best -- the best result.
2 And how they work an existing station is going to
3 change depending upon whether they gas in -- in the
4 future or -- or add hyd -- hydro in -- in the future.
5 So we're left with the issue of are there -- are there
6 common costs in there? I think there probably still
7 are. Can we do more about it? I don't think we can.

8 Now, I'd like to walk through Manitoba
9 Hydro's uncertainty analys -- though going through the
10 same sort of thinking process that we talked about -- I
11 talked about at the very beginning and, therefore, the
12 starting point would be let's look at what -- what the
13 results are for those options that involve no intertie.
14 More or less, what -- what are the options that have
15 been looked at in order to just meet domestic need, and
16 let's look at what -- what the results of the
17 uncertainty analysis are for -- for those.

18 And without -- I haven't gone back to
19 the very beginning, but if -- but if we look at
20 Manitoba Hydro's -- the results of -- if we update the
21 capital costs that were used in the original 2012 NFAT
22 for the new capital cost values and you used Manitoba
23 Hydro's approach to uncertainty analysis, these --
24 these are effectively the S-curves that you would get
25 for the plans that -- that they updated with -- without

1 no intertie. That's Plan 1, the All Gas Plan. Plan 2,
2 which is Keeyask followed by Gas. And Plan 8, which is
3 Gas followed by -- by Conawapa. And out of the three
4 (3) I've put Plan 2 in -- in red. It -- and out of the
5 three (3) it -- it appears to be, and is -- and is the
6 more superior plan, in term -- in terms of -- of
7 expected value.

8

9 (BRIEF PAUSE)

10

11 MR. WILLIAM HARPER: But what I've done
12 here is done -- done is I step back and said, If we
13 looked at the original NFAT evidence as filed by
14 Manitoba Hydro and used the 5.2 percent discount rate
15 that ECS has pro -- proposed -- and I'm on slide 34 now
16 -- and done the analysis for the S-curves for the no
17 intertie options, for which information was available
18 at that point in time, in which there were four (4) --
19 four (4) of them, here's the resulting -- here's the
20 results that you get.

21 And as you can see, the red line, which
22 is Plan 2, is effectively, virtually to the right of
23 all the other plans for virtually all the -- all the
24 time, suggesting that from both -- from both a risk and
25 an expected value point of view, it -- it's the

1 superior plan if you want to look at what are the plans
2 that we should -- what -- what is the plan we should
3 consider as being the most optimal plan from a no
4 intertie perspective.

5 I've basically then taken the updated
6 capital costs that -- results that Manitoba Hydro
7 provided for the -- for the 2012 planning assumptions
8 and applied the ECS discount rate to them, which is the
9 5.2 percent. And -- and again, unfortunately at this
10 point in time what we have are three (3) plans to
11 compare, which is Plan 1, Plan 2, and Plan 8. And the
12 results of the analysis are set out here on slide 35.

13 And you can see -- and I -- I've put the
14 numerical values in the corner -- corner of the slide
15 for reference, because this -- this is really new
16 information that -- that's been provided now and -- and
17 you won't find in the ECS evidence. But you notice
18 here that the expected value for Plan 2 is still higher
19 than any of the other plans. And if you look at the
20 curves, Plan 2 tends to be to the right of the other
21 plans for the majority of the time.

22 So based on all these curves and graphs,
23 sort of what -- what sort of conclusions you can reach
24 about -- from that as to what -- what's the preferred
25 domestic plan? I think it's fair to say that both

1 Manitoba Hydro's and our -- our analysis supported the
2 view that the Plan 2 was the preferred economic plan
3 out of those assessed.

4 However, when we looked at the
5 information that you have within 2012 and the updated
6 capital costs, the -- these were all based on base-case
7 DSM. And we've seen that with higher lev -- levels of
8 -- that higher levels of DSM are -- are economic, and
9 that -- therefore they -- they will impact the -- the
10 results that we've seen here. And -- and that we also
11 have new planning assumptions now for 2013, and that
12 with these new pla -- planning assumptions, Plan 1,
13 which was the All Gas Plan, now appears to be more
14 economic than -- than Plan 2.

15 MR. BYRON WILLIAMS: And just that
16 point, sir, just so -- to make sure I understand it.
17 On the slide previous, slide 35, taking into account
18 the updated capital costs and your preferred discount
19 rate and using what we had, which was the 2012
20 reference case, out of that we've got Plan 2 as the
21 preferred plan purely for the -- meeting domestic need.

22 MR. WILLIAM HARPER: Right.

23 MR. BYRON WILLIAMS: And as we flip to
24 page 36, the question you're asking here is -- or --
25 what are the implications of inserting higher DSM, and

1 also putting into place the 2013 planning assumptions?

2 MR. WILLIAM HARPER: That's correct.

3 And if you go back to slide 35, you'll see here that
4 the reference value for Plan 2 is -- is higher than
5 Plan 1. However, we know that when we implement higher
6 levels of D -- DSM, this actually -- this actually --
7 if we remember from the previous slide, when you
8 implement higher levels of DSM with the 2013 planning
9 assumptions, Plan 1 now looks preferable to -- to Plan
10 2. So there -- and unfortunately, we haven't -- we
11 don't have this analysis with higher levels of DSM.

12 I just wanted to add that caveat,
13 though, that while you take this as being Plan 2 looks
14 preferable, on uncertainty analysis, when we -- when we
15 look at the results for -- for the reference cases and
16 we go to higher levels of DSM, we find that Plan 1 now
17 looks more economic, at least at a reference case
18 perspective. And so that whether -- whether these --
19 whether these same results in terms of the preference
20 for Plan 2 under an uncertainty analysis would -- would
21 continue if we were able to redo it again with higher
22 levels of DSM and the 2013 planning assumptions is
23 really questionable.

24 And -- and so I -- I wanted to not only
25 present the results, but present some caveats around

1 sort of the caution one should use in looking at them.

2 MR. BYRON WILLIAMS: So why can't you
3 do it with higher levels of D -- DSM and the -- the
4 2013 planning assumptions, sir?

5 MR. WILLIAM HARPER: Well, I -- I guess
6 I can't 'cause I don't have the information. Manitoba
7 Hydro could. It probably would take -- take them some
8 time to do so.

9 And I know there's been debates amongst
10 parties in the room here as to what updates should be
11 done and should not be done, and that's -- within the
12 fixed amount of time, there -- there are resources.
13 People have to make priority decisions in terms of what
14 information they want to get and don't want to get.

15 MR. BYRON WILLIAMS: Thank you.

16 MR. WILLIAM HARPER: I'd like to now
17 move on to -- to the next issue, which was advancing
18 Keeyask with a smaller intertie. And if we look at
19 page -- excuse me, slide 38, and again, this is the
20 2012 costs updated for the capital costs using ECS's
21 5.2 -- 2 percent weighted average cost of capital.

22 And out -- and so -- but -- and if you
23 compare the four (4) plans -- the four (4) plans that -
24 - that are set out here, which is really Plan 4 which
25 has the advancement of Keeyask and the 250 kV intertie

1 -- excuse me, 230 kV intertie, 250 megawatt intertie,
2 excuse me, against the three (3) no intertie plans, it
3 -- it's -- we're on slide 8 -- it's fairly clear to see
4 that Plan 4 dominates those -- those other three (3)
5 plans.

6 And then when we look down at -- at the
7 numerical results, the expected value is considerably
8 higher than that for any of the other three (3) -- any
9 of the other three (3) plans. And so the results here
10 are really consistent with what we were seeing just out
11 -- out of the reference case -- case analyses.

12 And slide 39, that's essentially what I
13 am summarizing here in -- in slide -- slide 39. Again,
14 the caveats being that there's been no update for the
15 2013 planning assumptions or for the increased levels
16 of DSM.

17 Now that we're talking about uncertainty
18 analysis, I guess there's been -- there's been no
19 updates and people have different views as to what the
20 range or the probabilities are for -- particularly for
21 export prices as a result of the independent experts
22 having reviewed the export price forecast. But I think
23 it's fair to say, if you look back at the previous
24 slide, the differences in expected value were fairly
25 considerable as -- as between Plan 4, and even -- and

1 even Plan 2, with a difference of almost \$400 million.

2 We'd like to now turn to the question of
3 -- of the larger -- of advancing Keeyask with -- with a
4 larger intertie. And again, both -- both Manitoba
5 Hydro's and ECS evidence and analysis based on the
6 original 2012 NFAT planning assumptions is presented in
7 our ECS report.

8 And in Manitoba Hydro's case, the
9 findings were that only the expected value for Plan 14,
10 which included the WPS investment, was greater than
11 that for Plan 4, and then by roughly some \$114 million.
12 Offsetting this was a wider range of potential outcomes
13 associated with Plan 14 versus Plan 4, which, hence,
14 lead -- lead them to the conclusion that there was a
15 risk reward tradeoff here.

16 However, in the ECS evidence using the
17 higher discount rate we presented that both the plans
18 now had virtually the same expected value, while Plan
19 14 obviously had greater risk. And so, therefore,
20 probably if you were risk adverse, Plan 4 would be more
21 preferential than Plan 14.

22 So that was the context which we knew at
23 the start of the -- at the start of the oral
24 proceeding.

25 The -- the slide here on slide 41

1 basically shows the uncertainty analysis based on --
2 based on the updated capital costs that we now have,
3 using Manitoba Hydro's 5.05 percent discount rate.
4 What we're effectively prepare -- comparing here is the
5 uncertainty curve for Plan 4, which is shown in red,
6 against the uncertainty curve for the various plans
7 that involve a 750 megawatt intertie, and there's
8 effectively four (4) -- four (4) of them.

9 And as we can see, the plans that
10 involve All -- All Gas, the curves are fair -- tracked
11 fairly closely to that of Plan 4, even though they're a
12 little bit to the left and not quite as -- as quite as
13 preferred. But the plans that involve Conawapa show a
14 considerably diff -- different -- excuse me, risk curve
15 and, in the end, have a considerably lower expected
16 value than that for Plan 4.

17 MR. BYRON WILLIAMS: Just in terms of
18 expected value, out of this analysis we have Plan 4
19 leading, and with Plan 6 second, and then Plan 5 be
20 third. Is that what -- what this suggests, sir?

21 MR. WILLIAM HARPER: Yes, that is what
22 I'm suggesting. That as a -- 'cause like I said, the -
23 - the plans with the 750 intertie and Gas after Keeyask
24 tracked fairly closely the same shape of uncertainty
25 curve as Plan 4, but are a little -- are a little bit

1 more to the left, which -- which suggests they aren't
2 quite -- quite as preferred as Plan 4 in terms of the
3 overall outcome.

4 DR. HUGH GRANT: Can I interrupt with
5 just one (1) thing.

6 MR. WILLIAM HARPER: Sure.

7 DR. HUGH GRANT: This is all relative
8 to reference --

9 MR. WILLIAM HARPER: All Gas.

10 DR. HUGH GRANT: -- All Gas reference?

11 MR. WILLIAM HARPER: Right. Well, this
12 is relative to All Gas under the same assumptions. So
13 this would be -- in this case we're using the 2012
14 planning assumptions updated for -- for capital costs.
15 Now, obviously updated for capital costs with the All
16 Gas doesn't make any change in the -- in -- in the
17 reference point. But -- but it's based on All Gas
18 under the 2012 planning assumptions and the 5.05
19 percent discount rate, yes.

20 DR. HUGH GRANT: And just one (1) other
21 thing, before you invite me to compare how closely
22 bunched they are compared to -- the scale is changing
23 pretty dramatically from previous slides now, right --

24 MR. WILLIAM HARPER: Yes, and -- yes,
25 you know, and -- and that's -- that's probably a good -

1 - a good point to note in that I -- I did that because
2 if I used the same sli -- if I used the same scale some
3 of the slides -- some of the -- some of the curves, you
4 wouldn't be able to see the differences between them.

5 And I thought it was important to try
6 and appreciate what were the differences between the
7 slides. Also a change in the scale allowed me to sneak
8 my numbers into the corner of -- in -- into the corner
9 of the slide without obfuscating some of the curves
10 themselves.

11 DR. HUGH GRANT: We've been invited to
12 think of rounding to the nearest half billion, so...

13 MR. WILLIAM HARPER: I won't say what's
14 a half billion.

15 All -- all I've done on slide 42 here is
16 repeat the same analysis, but using the higher discount
17 rate of 5.2 percent. And you get roughly similar
18 results in terms of the plans, that's Plan 6 or Plan 5,
19 where gas follows Keeyask. The curves follow the same
20 shape as that of Plan 4, but they're to the left, which
21 suggests they're not quite as preferred.

22 The plans involving Conawapa after
23 Keeyask show a considerably different shape with
24 considerably -- considerable down-side risk and a
25 little bit more upside benefit. But that translates

1 overall if you look at the results into -- into
2 expected values that are considerably lower for Plans
3 14 -- I characterized them as 14B and 5B in order to
4 differentiate them from your original Plans 14 and 5 --
5 translate into expected values that -- that are
6 considerably less.

7

8 (BRIEF PAUSE)

9

10 MR. WILLIAM HARPER: And so look --
11 looking at all the issues today, should Keeyask be
12 advanced with a 750 as opposed to a 250 intertie? And
13 I guess if you reflect back on where we saw the red --
14 the red line versus the other curves, it seems that the
15 economics of a 250 intertie are superior to a 750
16 intertie, both in terms of expected value and risk
17 profile.

18 And these findings are consistent using
19 the 2012 planning assumptions, even those with the
20 updated capital costs. They are consistent with or
21 without the WPS contract. And while I haven't shown
22 the numbers here, they're also consistent even if you
23 were to also find an outside investor to -- to take up
24 the investment in -- in that transmission line. The --
25 the -- that -- that sort of -- that saving isn't

1 sufficient to -- to swing Plan 14 or Plan 5 to -- to be
2 more favourable from -- from an expected value
3 perspective than Plan 4.

4 However, given -- I've been talking so
5 far about the 250 line and two-fifty (250) versus
6 seven-fifty (750). But I guess given more recent
7 developments, the comments by Man -- Manitoba Hydro
8 about the viability of a 250 option, it's probably also
9 particularly useful at this point in time to look at
10 how does -- how does the 750 intertie stack up against
11 building no -- no intertie.

12 If you truly believe the 250 intertie is
13 off the table, then really the question is do we go
14 with the no intertie option, or do we go with the 750
15 intertie option? And that's -- that's what this
16 particular next section of the pre -- presentation is
17 going to look at.

18 And so if we're on slide 45 now, and
19 this sets out the S-curve based on the orig -- based on
20 -- based on the original NFAT 2012 planning assumptions
21 using the 5.2 percent discount rate that was
22 recommended in -- the ECS evidence. And what you have
23 here is the S-curve for Plan 2, which is the red curve,
24 versus the S-curves for the various plans that involve
25 a 750 megawatt intertie. And there is four (4) -- four

1 (4) of them set -- set out here.

2 And the reason I used Pla -- Plan -- the
3 reason we used Plan 2 was it was, as -- as we've seen
4 from the analysis we did have, was it was -- it was the
5 most Ec. -- it -- it seemed to be the most economic of
6 the no-intertie options going -- going forward.

7 And again, as we can see, the -- the
8 plans with the 750 intertie that involved gas after
9 Keeyask again tra -- seem to track generally the same
10 shape as -- as the Plan 2 or the red curve, whereas in
11 contrast again, the plans with Conawapa following
12 Keeyask have a considerably dif -- different risk --
13 risk curve, which involves moth -- both considerable
14 more downside risk, plus it looks like an opportunity
15 for more -- more benefit on -- on the high side.

16 I just want my reading glasses. I just
17 -- yeah.

18 However, if we look at -- if -- if we
19 look at the expected values un -- under these plans, we
20 can see that the expected value effect -- the expected
21 value for all the -- at this level of analysis, based
22 on these assumptions, the expected value for all the
23 750 megawatt intertie plans is higher than that for the
24 Plan 2.

25 So -- so that if you were thinking of

1 plans that involve Keeyask followed by gas, they --
2 they have a higher expected value with roughly the same
3 risk -- risk profile, which would suggest to you they
4 are more preferable.

5 The plans involving Conawapa after
6 Keeyask have a higher expected value. They also have a
7 much different risk profile, and so again, you -- you
8 have there a tradeoff you have to make between what's -
9 - what's the risk associated with the plan, ver --
10 versus what's the expected value of the plan.

11 If we move then to sort of doing the
12 same analysis but with the updated capital costs, and
13 I've pre -- I've presented here first the analysis
14 based on Manitoba Hydro's discount rate of 5.05
15 percent, and thi -- this is slide 46 for -- for
16 reference pur -- purposes -- with the higher capital
17 costs, the 750 plans with Conawapa now have a lower
18 expected value than the no-intertie plan and a greater
19 risk profile.

20 So this would suggest to you that,
21 relative to Plan 2, those plans involving Con --
22 Conawapa are not -- not preferable from either expected
23 value or a risk profile perspective.

24 In contrast, the 750 plans with gas have
25 expected plans that are roughly equal to or greater

1 than Plan 2, and exhibit a similar risk profile so --
2 so that there seems to be a suggestion here that, you
3 know, if there was gas followed by Keeyask, that --
4 that there would -- that there would be an economic
5 benefit in -- in moving ahead with the 750 megawatt
6 intertie as opposed to having no intertie, and that
7 that benefit from an expected value wouldn't be --
8 wouldn't be compromised that much by the risk profile
9 of the 750 megawatt plans.

10 And finally, if -- if we take the
11 updated capital costs and we apply the 5.2 percent
12 common discount rate to it, the -- the results are set
13 out here on slide 47, and they're fairly similar to
14 what -- to what I've just said in that the expected
15 values for those plans involving Con -- Conawapa is
16 less -- less than that for Plan 2.

17 And -- and the risk profile is -- I'll
18 use -- I'll use the adjective 'greater' in the sense
19 that it's wi -- wider spread, whereas the expected
20 values for the gas plans are just a little bit above.
21 They're virtually the same or somewhat -- either I'm
22 not mo -- moving enough, or -- I'm -- I'm sorry.
23 Something...

24

25

(BRIEF PAUSE)

1 MR. WILLIAM HARPER: Technology and me.

2 Where -- whereas the -- the expected
3 values for the plans with gas follows Keeyask are, I'd
4 say, vir -- virtually the same or a little bit -- or
5 above that -- that of the -- that of Plan 2, and have
6 virtually a similar risk -- risk profile, and that --
7 while -- while -- as again, it tends -- as well, the
8 reference was made to sort of size the numbers. While
9 numerically the num -- numbers are larger, it's -- it's
10 only in Plan 6 that -- that the difference is greater
11 than \$100 million.

12 Overall, then, if we consider all those
13 graphs and all those numbers and try and separate the
14 data and come -- come out at the end with, What should
15 we conclude about that from all this? And that is that
16 if we look at the 2012 planning assumptions and the
17 updated capital costs, the economics of a no-intertie
18 plan are superior to 750 intertie plans with Conawapa
19 in that they have a higher expected values and a lower
20 risk.

21 Economic of 750 plans with Gas are
22 equal, or nominally superior to the no intertie plan
23 with a similar risk profile. And that, obviously, if
24 you put those two (2) together the economics of -- a
25 750 intertie Gas Plan is superior to that of a 750 mega

1 -- megawatt Con -- Conawapa-based plan, which -- which
2 is a fundamental shift from -- from what we saw at --
3 at the start of the proceeding and in -- and based on
4 the initial assumptions that -- that we had at that
5 point in time.

6 And I guess what you can say is, having
7 seen that is this almost begs the question of: Do we
8 protect the Conawapa in-service date? That sort of
9 leads -- leads us to the last question here. And what
10 -- what I've tried to do here is indicate the various
11 750 intertie plans as envisioned in the original NFAT
12 application, and which ones could or would not
13 continue, depending upon whether spending was -- was
14 deferred or not.

15 And the notation I have here associated
16 with Plan 5 reflects my understanding of the
17 optionality in the current WPS contract, whereby if
18 Conawapa is not pursued either party can choose to
19 terminate the contract. And so it -- it's a lit --
20 it's a -- and -- and really -- but -- but this really -
21 - that -- that doesn't have a lot of bearing in terms
22 of whether or not you continue to protect Conawapa,
23 because it's a gas-based plan.

24 Clearly Plan 6 continues to be available
25 as well, because it -- it's an All Gas Plan that --

1 that doesn't involve Conawapa. But for the last three
2 (3) plans we have, 12, 14, and 15, the specific in-
3 service dates that have been anticipated in the
4 original NFAT application would -- would be effected,
5 depending upon what level -- what level of -- of
6 spending you make and what -- what date you want to
7 protect in ter -- terms of an in service -- a potential
8 in service date for -- for Conawapa going forward.

9 And -- and clearly, if you don't -- if
10 you defer spending entirely then even -- then even and
11 in-service date as late -- my understanding is that if
12 you defer it now and don't spend anything, then even
13 you're sort of at the point where even an in-service
14 date around 2030 wouldn't -- wouldn't be available.

15

16 (BRIEF PAUSE)

17

18 MR. WILLIAM HARPER: Now, bas -- based
19 on the original NFAT application and the information
20 that had been applied there, ECS evidence concluded
21 that it would be prudent to protect a mid-'20s and an
22 early '20/'30s in-service date for Conawapa. Based on
23 the recent updates in capital costs and the
24 implications of higher levels of DSM spending and the
25 2013 planning assumptions, the 2012 uncertainty

1 analysis now suggests that gas is preferable to
2 Conawapa as the next -- next option after Keeyask with
3 the 750 megawatt intertie.

4 The -- the 2013 reference case results
5 with higher DSM increased the spreading costs between
6 the plans for gas and those -- those with Conawapa. So
7 they basically -- if you think about -- sort of
8 aggravate the results we saw from the 2012 uncertainty
9 analysis, and would sort of make the -- and make the
10 economics of Conawapa look even less -- less
11 advantageous. However, at the same time, with the
12 higher levels of DSM, than with Keeyask in 2019 in the
13 WPS contract, it looks like the next -- the need date
14 for the next resource actually isn't until about 2030.

15 And sort of my observations out of that
16 is that there does not appear to be a need -- a need
17 anymore for an early in-service date for Conawapa in --
18 in the mid -- in the mid-2020s. And, therefore, there
19 isn't any need to con -- consider an aggressive
20 spending type plan that -- that would have to be
21 implemented in order to -- to accompany such an in-
22 service date.

23 With respect to the 2030 in-service
24 date, while it doesn't look economic at this point in
25 time, there likely are some futures that could favour

1 Conawapa. And I guess the -- the real question comes
2 down to one needs a careful assessment of how much
3 money do we actually have to spend to keep that
4 Conawapa option open and look at what are the key --
5 the key decision points in the future that would seek -
6 - that would generate us having to spend significant
7 amounts of -- of money -- money in order to do so.

8 So I -- I think -- I wouldn't be at the
9 point of ans -- of answering the question right now and
10 saying, No, I -- I think we should stop Conaw --
11 Conawapa -- spending on Conawapa now, but I think it
12 takes a serious -- serious reconsideration of exactly
13 how much mon -- mon -- like what's -- maybe the -- is -
14 - what's the minimal amount of money we can spend to
15 keep that option open? How much is that? And at what
16 point in time in the future do we get to a point where
17 we're going to really have commit ourselves to it? And
18 how much more would that -- spend? And what do we
19 think we -- we will know at that point in time?

20

21 (BRIEF PAUSE)

22

23 MR. WILLIAM HARPER: I'd like to turn
24 now to Manitoba Hydro's multiple account analysis as
25 set out in Chapter 13 of its NFAT application. In it's

1 multiple account analysis, Manitoba Hydro examines the
2 consequences of various alternative plans from a number
3 of broader perspectives and creates what it calls
4 accounts in order to track the findings from each of
5 these perspectives. The first of these accounts is
6 what it calls the market value -- valuation account.

7 Thank you. The market valuation account
8 is meant to look at the -- excuse me, the cost and
9 benefits of a project from -- from a societal
10 perspective. In the original NFAT, the market
11 valuation account used -- used the 2012 reference
12 values for each plan. However, early in the
13 proceeding, these values were updated to reflect higher
14 capital costs associated with Keeyask and Cona --
15 Conawapa.

16 It employs a 6 percent discount rate,
17 which is meant to reflect the social opportunity cost
18 of capital. That's -- that's society's perspective as
19 to what the discount rate should be, as opposed to Mani
20 -- Manitoba Hydro's perspective.

21 And finally, also the same 6 percent
22 value was to value -- or was used, as is appropriate,
23 to value the other accounts that -- that were
24 monetized; i.e., the government account and the
25 environmental accounts.

1 However, what struck us in going through
2 the application was that for the market valuation
3 account and for the cost and benefits, it was only --
4 it was only for the period 2012 to 2047 that they were
5 actually discounted at the 6.66 percent -- excuse me,
6 6.0 percent, and that after 2047, a 5.05 percent
7 discount rate was -- was used to bring the values back
8 to 2047, at which point in time, a 6 percent value was
9 used from there to bring them back to 2014.

10 Right. Slide 54 just notes some of the
11 issues from our perspective, and looking at the way the
12 approach was -- was -- what the approach used for the
13 market eval -- valuation account, and one was, and I --
14 you know, and this is not a fundamental -- it's just a
15 common in terms of when you're looking at the results,
16 as their -- the results as they were presented really
17 haven't been adjusted for higher levels of DSM or for
18 the 2012 planning assumptions.

19 And then to recall back to what we've
20 seen before, higher of levels of DSM appear to provide
21 greater benefit to the Keeyask/Gas Plans as opposed to
22 the Keeyask/Cona -- Conawapa Plans. So I think that
23 has to be borne in mind if -- if you're looking at the
24 results of the market valuation account.

25 The second thing is there's -- there was

1 no rationale provided in the NFAT as to why they were
2 using 5.05 percent as the discount rate after 2047, and
3 that doing so increases the relative value of the
4 Preferred Plan.

5 Now, in interrogatories to ECS, the --
6 the suggestion appeared to be that the -- that a lower
7 discount rate in later years was appropriate for
8 intergenerational projects. We'll get to that in -- in
9 the next slide.

10 And -- and then, subsequently, in the
11 most recent days of the -- of the proceeding here, we -
12 - we've seen Manitoba Hydro raise the suggestion that
13 there are also embedded equity benefits associated with
14 the Preferred Plan that have to be added in to the
15 overall evaluation that weren't added in the original
16 mark -- market valuation.

17 If we turn to the question of lower
18 discount rates for intergenerational projects, I'll --
19 I'll be quite honest with you. It's not -- it's not
20 something I have experience with. However, I did do my
21 homework reading that was assigned at the start of the
22 process here, and I did supplement it with some further
23 additional read -- reading of my own over and above
24 that, and there's just a few observations I'd like to
25 make and share with you.

1 And then there's that first -- there
2 seems to be a wide variation in practice as to what's
3 done out there. And probably -- what was probably more
4 telling than anything else to me is the EPA, which is a
5 branch of the US government, uses a time declining rate
6 based on savings. That's -- that's their approach for
7 discount rates.

8 In contrast, the US White House Office
9 of Management and Budget, in providing their directives
10 as to what should be used for discount rates in
11 assessing projects, uses a 7 percent discount rate
12 based on private investments. So not only do you have
13 differences between parties out there, you have
14 differences between different branches of governments,
15 which leads me to believe there is a -- obviously a
16 practical differences out there in people's views as to
17 what should be done.

18 In reading my homework, I noted there
19 were a lot of -- a lot of continuing theoretical debate
20 going on out there, so in practice and in theory,
21 there's a lot of difference. And actually, probably
22 the most useful piece of reading I found in Manitoba
23 Hydro was the reading from a doc -- Dr. Shaffer's book,
24 and he -- if you recall, he was the witness that
25 appeared here on behalf of Manitoba Hydro talking about

1 multiple account.

2 And I put the quote in here, which
3 basically says:

4 "Most issues of long-term
5 sustainability or quality of life are
6 not discounting issues at all. It is
7 not the future values discounted to
8 the present that need to be
9 addressed, but rather, the values
10 that people hold today in respect to
11 possible long-term outcomes."

12 Which I sort of synopsized as saying, We
13 need to separate issues relating to valuing the future
14 outcome versus issues relating to how we discount the
15 value of the future outcome. And I think people, in
16 proposing different discount rates, try to solve one
17 (1) problem by using discount -- by using the valuing
18 problem by picking a -- the discount rate probably in
19 part because they don't know how to address the value
20 problem itself.

21

22 (BRIEF PAUSE)

23

24 MR. WILLIAM HARPER: The -- the second
25 issue that was -- that -- that was raised was this

1 notion of embedded equity, and the concept was first
2 presented in Manitoba Hydro Exhibit 129-7, where some
3 \$1.3 billion in embedded equity benefits was attributed
4 to the Preferred Development Plan.

5 The calculation of the \$1.3 billion is
6 set out on this slide here, and as we can see, the
7 calculation looks at the change in the difference
8 between the value of the Preferred Plan and the All Gas
9 Plan using 4.65 percent as opposed to a 5.4 percent
10 discount rate, and when you sum the -- when you look at
11 the difference between 45 mill -- 45 million and a
12 hundred -- \$1.364 billion, you get the \$1.319 billion
13 that was referenced by Manitoba Hydro.

14 Now, breaking down -- if you look at the
15 breakdown of the calculation a little bit further, what
16 you can see is that in terms of the preferred plan, in
17 moving from a 5.4 percent discount rate to a 4.65
18 percent discount rate, you really only improve the --
19 the benefit -- the -- the value of the plan by some --
20 close to -- a little -- little bit less than \$400
21 million, and in my mind, if you want to talk about this
22 in the context of, What's the embedded equity, that's
23 the best way and the way you should probably be looking
24 at -- at this.

25 The major contribution comes from the

1 fact that when we use the 4.65 percent discount rate on
2 the All Gas Plan, the net present value actually
3 decreases by over \$900 million. However, if I take
4 that same logic in thinking that this would suggest
5 that there's close to a billion dollars in negative
6 equity associated with the net -- with the -- with the
7 sort of evaluations that -- that they've done using the
8 higher ROE, which, frankly, to me, doesn't make any
9 sense to be -- be quite honest with you.

10 Step -- stepping back, the difference in
11 embedded equity, each -- each plan, in my view, can't
12 be calculated using different -- different discount
13 rates. And really, the \$1.3 billion has nothing to do
14 with embedded equity. Rather, if you want to look at
15 embedded equity associated with each plan, you really
16 have to go to Manitoba Hydro's financial analysis and
17 the -- and -- and the financial results that they've --
18 that they've given you and look at what's the
19 difference in retained earnings for -- for the
20 different plans.

21 And clearly, the plans involving more
22 capital such as Plan 14 will have higher levels --
23 levels of embedded equity, but this is really a direct
24 result of the plans needing additional equity in order
25 to maintain the 45:25 target -- target debt-equity

1 ratio that Manitoba Hydro has established in order to
2 maintain its financial integrity.

3 And in this context, that additional
4 equity, I'm not too sure if I'd view it as a benefit or
5 more it's a cost, because it's a cost that comes with
6 maintaining your financial integrity given that you've
7 got a larger capital structure and more capital on --
8 on the books.

9 So again, I'm not too sure if there's
10 more embedded equity there. I question whether or not
11 you can actually characterize it as a benefit. It's --
12 it's needed in order to main the self-sustat --
13 sustaining status of Manitoba Hydro.

14 MR. BYRON WILLIAMS: Just a small
15 point. When you refer to the debt-equity target, you -
16 - you said 45:25.

17 Did you mean to say 75:25?

18 MR. WILLIAM HARPER: Yes, I -- I
19 apologize, 75:25, yes. I'd like to turn now to the
20 cust -- cust -- to the customer account, which is meant
21 to include both rate impacts and the reliability
22 impacts of the various plans on customers. Rate
23 impacts are expressed in terms of cumulative rate
24 increases after twenty (20) years and after fifty (50)
25 years, that -- that is, at 2031/'32, and again at

1 2061/2062.

2 In the ECS evidence, a question was
3 raised as to why customer bill and rate im -- impacts
4 were not expressed in net present value terms as they
5 were in the NFAT that was filed for -- for Wuskwatim, I
6 guess, roughly ten (10) years ago now, actually.

7 Subsequently, in -- in responses -- in -
8 - in responses, I -- I expressed -- to interrogatories,
9 I expressed the view that perhaps comparing net present
10 values over time was a better metric for gauging
11 customer bill impacts and cumulative bill increases,
12 the reason being that the cumulative bill increase
13 metric only -- only reflects the bill at a specific
14 point in time, and does not capture any differences
15 between the plans in terms of the trajectory as to how
16 the bill actually got to that level at that point in
17 time, and those differences in trajectory would be
18 captured if you did a net -- net present value
19 analysis.

20 And also, in response -- but on the
21 other side, in response to interrogatories, Manitoba
22 Hydro has provided net present values for various --
23 the customer revenues under the various plans using a
24 1.86 percent real discount rate.

25 Let me see. Con -- concerns about the

1 one point eight (1.8) -- point -- one point eight (1.8)
2 -- 1.86 percent discount rate were, I guess, expressed
3 by a number of parties in their evidence and in -- and
4 in subsequent interrogatories. And in its rebuttal
5 evidence, Manitoba Hydro addressed this, and I'd like
6 to make some comments on the various points that
7 Manitoba Hydro has raised in its rebuttal evidence.

8 The first point Manitoba Hydro raised
9 was that lit -- literature and practice supports the
10 use of lower intergenerational discount rates.

11 However, I -- I think it should -- I think we've talked
12 a little about -- bit about intergenerational discount
13 rates already and the -- the practice for using them.

14 I think it's also important to note that
15 the practice in this area typically focusses on
16 discounting from a societal per -- perspective. And
17 what we're talking about here is a customer perspective
18 whi -- which is different. We're talking about what --
19 what's -- what's the customer view from discounting as
20 opposed to fro -- from a societal view?

21 The second rationale was that the
22 revenue requirement already includes the cost of debt
23 and equity. However, in my view, this factor isn't
24 rele -- relevant from a customer perspective.

25 To the extent plans generate different

1 bills for customers, what is relevant is the time
2 preference of money that Manitoba Hydro's domestic
3 customers will attribute to the potential difference in
4 streams of the bills that they see, not what types of
5 costs go in -- into determining those -- those bills.

6 At the end of the day, when I get a bill
7 for four hundred dollars (\$400), it's somewhat
8 immaterial to me whether two hundred (200) of that was
9 the cost of debt or two hundred and ten dollars (\$210)
10 was the cost of debt. I have to pay four hundred
11 dollars (\$400) in any event, regardless of what the
12 makeup of the bill is.

13 The next point made by Manitoba is that
14 uncertainty was addressed in the uncertainty analysis
15 and doesn't have to be included again. And while I'd
16 say, yes, the uncertainty analysis gives us a better
17 understanding of risk, I don't think, by any means, it
18 has eliminated the risk, and we still face significant
19 risks going forward.

20 Maybe we have a better understanding of
21 what those risks are and what the potain -- potential
22 ranges are, but we no -- but we by no means have
23 managed to sort of have alternatives now before us that
24 have no risk associated with them.

25 In contrast, the 1.86 percent discount

1 rate reflects a real return on treasury bills, and
2 therefore is only appropriate when you have no -- when
3 -- when you have no -- no risk.

4 Finally, the use of rates associated
5 with treasury bills assumes customers are generally net
6 savers, and therefore receiving or not receiving funds
7 sooner or later will -- will impact on their savings.

8 However, in many cases, this may not be
9 the case. Examples would include indebted households
10 where it's debt levels that could be affected, and also
11 bus -- business customers, where higher bills may delay
12 investment opportunities that -- that they are looking
13 at, because they have to use the money to pay their
14 electric bills as opposed to -- as opposed to pursue
15 other investment opportunities.

16 Overall, different customers will have
17 different discount rates. However, in my view, a rate
18 based on treasury bills likely represents the low end
19 of what's a reasonable range that -- that should --
20 that should be used.

21 This next slide really just repeats
22 Manitoba Hydro Exhibit 166, which summarizes the
23 results of their multiple account analysis, where the
24 market valuation has been updated for the new capital
25 costs of Keeyask and Conawapa.

1 MR. BYRON WILLIAMS: Can I stop you
2 here --

3 MR. WILLIAM HARPER: Yeah.

4 MR. BYRON WILLIAMS: -- just for a
5 moment, Mr. Harper? Just when we look at this page,
6 and you -- you've said it on an earlier slide, but
7 you'll agree it doesn't represent updated DSM
8 scenarios?

9 MR. WILLIAM HARPER: Right. My -- my
10 understanding there is -- and I think I've made this
11 comment before, there's two (2) issues: 1) it doesn't
12 reflect any updates for -- for DSM, and it doesn't
13 reflect any updates for the 2013 plan -- planning
14 assumptions.

15 MR. BYRON WILLIAMS: And -- and would
16 it -- as you've expressed previously, it's your opinion
17 that including the updated DSM would tend to benefit
18 the plans which have gas as the second generational
19 option?

20 MR. WILLIAM HARPER: Yes, they would,
21 benefit relative to the -- relative to those plans that
22 have Conawapa as the second generation option.

23 MR. BYRON WILLIAMS: So when we look at
24 this table, if we look at the results for, say, Plan 6,
25 if -- it would be your expectation that if we were then

1 accounting for DSM Scenario 2, for example, its
2 relative position would -- would strengthen compared to
3 the Conawapa second -- second resource plans?

4 MR. WILLIAM HARPER: Yes. Actually --
5 that's actually a separate point from what I was going
6 to actually ask you to draw out of these, because in my
7 view, what's noticeable from -- from this slide, and
8 these points are made on -- on the next slide, that's
9 slide 60, there's a significant dist -- distributional
10 issue in that the plans yielding the greatest
11 environmental and provincial benefits are also the
12 plans that impose the most -- greatest costs from a
13 market -- market valuation perspective on Manitoba
14 Hydro, and to the extent there's any correlation, also
15 on -- on its customers.

16 THE CHAIRPERSON: Would you mind
17 repeating that statement again, please?

18 MR. WILLIAM HARPER: Yes. I -- I guess
19 what -- what I'm saying is that the -- those plans that
20 have the greatest benefit, and you can read those in
21 terms of the lines relating to the government and the -
22 - the government and the environment.

23 Like -- like, I think, for example, Plan
24 -- Plan 6 has a -- Plan 6 shows, as Mr. Byron -- as Mr.
25 Williams was raising with me, shows -- over Plan 14

1 shows a significant benefit on the market val --
2 valuation account, but it shows significant lower
3 values on the government and environmental account.

4 And so I -- I view this as a
5 distributional issue. At the end of the day what --
6 what the economist does is sums all -- all the accounts
7 up and says at the end of the day, What's the total --
8 what's the total value? They look at the total line at
9 the bottom and they say, Which -- which number is
10 bigger, which number is smaller when I take all of
11 these issues into consideration?

12 What I was trying to flag is the fact
13 that, you know, between Plan -- let's say between Plan
14 14 and Plan 6, there's only twenty-seven -- \$27 million
15 in difference. Which you might say, That's not a lot
16 of difference in the scheme of what we're talking about
17 here, but there is a lot of difference in
18 distributional impacts be -- between the two (2).

19 Plan -- Plan -- in -- in terms of the --
20 Plan 6 has much greater sort of, you could say costs or
21 disbenefits on the government and environment side
22 relative to Plan 14, but shows much more positive
23 benefits on the market val -- valuation side than Plan
24 14, which is my comment that there is sort of
25 distributional issues go -- going on -- going on here.

1 I mean, if the numbers were in the same
2 order of magnitude, and relatively going up and down
3 across all the rows, you wouldn't have those
4 distributional issues, and you could fairly look at
5 just the bottom line, but I think the fact there are
6 those distributional -- distributional issues is
7 something you have -- have to be aware of when -- when
8 you're looking at the -- when you're looking at the
9 results of a mult -- multiple account analysis.

10 And I guess this gets to the -- this
11 gets directly to the last bullet I have on slide 60,
12 which is economists, when -- when they look at this,
13 say, We can look at the overall result. And in
14 economic theory, if there are winners and losers, the
15 winners should be able to take part of their winnings
16 and compensate the losers and everybody should be
17 better off at the end of the day.

18 That sounds great in theory. The
19 question is, Does -- does that happen in reality? And
20 if it doesn't happen in reality, then -- then there's a
21 probl -- then there's a problem, or at least we should
22 try to the extent we can, perhaps try and see if there
23 are ways we can ensure that there is sort of a
24 proportional redistribution between the winners and the
25 losers, so that if at least the losers aren't losing by

1 as much, but the winners are still ahead -- ahead of
2 the game at -- at the end of the day.

3 And I guess I also wanted to flag the
4 fact that isn't evident from these -- from -- from the
5 last slide or from any analysis I did, but is evident
6 from the analysis that was done by La Capra and other
7 people is that there are intergen -- there are
8 intergenerational issues associated with the -- with
9 the economics of -- of the various plans, and in -- in
10 some plans, there is greater cost relative benefits
11 imposed in earlier generations than there are in other
12 plans. And that's also a -- a relevant consideration
13 that should be taken into account as well when you're
14 just looking at -- at the results of this analysis.

15 The last two (2) slides here, you'll be
16 sort of probably thankful we're at the end of this, is
17 in my concluding two (2) slides, I'd like to return to
18 the main two (2) questions at hand.

19 The first was, Should Keeyask and an
20 intertie be constructed to satisfy the Minnesota Power
21 con -- contract?

22 And based on the analysis presented to
23 date, and this is based on the numbers that we have to
24 date and -- as provided by Manitoba Hydro, it would
25 appear that advancing Keeyask with a 750 intertie is

1 economic as compared to plans with no -- with no
2 intertie. This conclusion is based on what you would
3 take away from the results of the updated 2012
4 uncertainty analysis and what implications you might
5 then try -- inferences you might try and draw from the
6 2013 reference case results after they've been adjusted
7 for higher levels of DSM.

8 However, sort of drawing those
9 conclusions from the information we have, I think
10 there's -- there's a few significant information gaps
11 or questions we still have to ask our self, and the
12 first one is:

13 Is the 250 megawatt intertie alternative
14 truly not -- not viable? Because you only get to the
15 this point if you can satisfy yourself that the 250
16 megawatt intertie is -- isn't viable.

17 The -- the second critical information
18 gap in -- in my mind is: What are the implications of
19 future carbon pricing assumptions embedded in the
20 analysis -- we have these probability analysis which
21 underlying the export prices have assumptions about
22 carbon pricing. Which, to be quite honest with you,
23 you know on your side of the table, I don't know on my
24 side of the table, what -- what those assumptions are.

25 But those assumptions, to my mind, seem

1 to be critical. They seem to be something that aren't
2 based on -- you know, you -- you -- and I don't know
3 how best to characterize this because it -- because, to
4 some extent, either they're there or they're not there.

5 Whether they're going to be there or not
6 there, this isn't simply a matter of economics in terms
7 of, you know, new -- what's the cost of new entry into
8 the market when you're trying to assess sort of cos --
9 the cost of electricity. It's sort of -- it -- it's a
10 political issue. It's a social issue. And so,
11 therefore, it's all -- it's -- either it's there or
12 it's a not-issue.

13 And I think it's important to understand
14 what are the implications if it is there or it isn't
15 there. And that's something I would ask -- I would ask
16 people who have the information to sort of, as they're
17 going forward, make sure they -- make sure they
18 understand.

19 And the third thing is -- is that we --
20 we recently heard evidence that there may be
21 significantly more DSM that's economically available.
22 And I stress that word, 'economically available'. And
23 it's -- it's unclear to me at this point in time what -
24 - what impact, if any, that -- that would have on -- on
25 the relative economics, but that's something that's

1 maybe still a little bit uncertain and needs to be
2 considered.

3 When it comes to Conawapa, sort of, as -
4 - as we've seen earlier, the -- the results would --
5 would suggest that it's currently not -- not the
6 preferred option from -- from an economic perspective.
7 It's supported both by the updated 2012 uncertainty
8 analysis and the reference cases results we've seen
9 when -- when the -- when higher levels of DSM are
10 incorporated since the economics deteriorates even
11 further as compared to Keeyask followed by gas plans.

12 I guess, at -- at this point in time, my
13 observation is it may be, and I stress the 'may', be
14 beneficial to protect a later in-service date, but it
15 involves careful consider -- it involves very careful
16 consideration.

17 I guess the final point is, the other
18 thing we've seen, is that the -- these decisions and
19 the types of issues that are coming out are not
20 strictly system planning issues. And as a result, at
21 the end of the day, when we come forward again to
22 decide what we want to do with Conawapa on a long-term
23 basis, I -- I think it again will require a full -- a
24 full public debate and full -- full public
25 consideration of things that go beyond the economics of

1 the plan in order to make a proper decision.

2 And that's the end of my presentation
3 part, and myself and my colleagues are available for
4 questions.

5 MR. BYRON WILLIAMS: I -- I believe we
6 have a very brief presentation from Mr. Simpson on
7 risk. We're certainly at the Board's discretion. It
8 would -- Mr. Simpson is a better estimator of time than
9 either Mr. Harper or myself. Dr. Simpson. I -- I
10 think about fifteen (15) to twenty (20) minutes.

11

12 (BRIEF PAUSE)

13

14 THE CHAIRPERSON: Okay, that's been
15 resolved, that issue now. Let's break for lunch. And
16 then we'll resume after lunch with questions and the
17 presentation, of course.

18 MR. BYRON WILLIAMS: And, Mr. Chair, I
19 -- I've canvassed -- I think Mr. Peters will share with
20 me some time estimates for cross. And as I said, we'll
21 be very short afterwards. The one (1) issue we -- we
22 have is Dr. Gotham has a flight later this afternoon.
23 I think we'll be okay, but -- and again, I hate to do
24 this, but I would suggest, subject to your discretion,
25 that we only take a half an hour for lunch, if that's

1 okay with the panel.

2 THE CHAIRPERSON: No, that's exactly
3 what I had in mind from the assumption that, you know,
4 we want to leave here earlier rather than later. So
5 let's -- half hour. Thank you.

6

7 --- Upon recessing at 12:02 p.m.

8 --- Upon resuming at 12:35 p.m.

9

10 THE CHAIRPERSON: I believe that
11 everybody is in position, so we'll resume the
12 proceedings. I understand Dr. Gotham has a plane to
13 catch this afternoon, and so that we're time bound by -
14 - what's the time frame, Mr. Williams?

15 MR. BYRON WILLIAMS: His flight is at
16 4:30. I believe with the cooperation of My Learned
17 Friend, Ms. Ramage, and Mr. -- My Learned Friend, Mr.
18 Peters -- I haven't talked with Mr. Hacault, but I
19 don't think he has that many questions for Dr. Gotham.

20 I think the plan, as I understand it,
21 and I -- I appreciate everyone's accommodation, is Mr.
22 Hacault would do his entire cross. I don't think Mr.
23 Gange has any questions, or at least that's what I
24 heard; just a tiny bit. And then I believe Ms. Ramage
25 will ask some questions of Dr. Simpson and Dr. Gotham.

1 And then we'll turn it over to Mr. Peters to ask some
2 questions of Dr. Gotham and then ask that he be
3 excused, if that's possible.

4 THE CHAIRPERSON: Thank you very much.

5

6 (BRIEF PAUSE)

7

8 MR. RICHARD BEL: Dr. Harper --

9 MR. WILLIAM HARPER: Mr. Harper.

10 MR. RICHARD BEL: Mr. Harper, sorry,
11 could I ask -- I -- from your analysis, it's clear that
12 you're a very careful man. But could I ask you to
13 speculate? Because we've -- we've had some testimony
14 that -- some compelling testimony on DSM. And one of
15 the most interesting arguments that occurred just
16 recently was that, in fact, it is possible -- it seems
17 to be possible that, in fact, with a sustained DSM
18 effort, domestic load could flatten.

19 So that leads you inevitably down a path
20 to say there's two (2) possibilities then. Possibility
21 1 is we don't need Keeyask at all, so it's a No
22 Generation Plan. But the second possibility then is if
23 we -- if we're doing Keeyask, then my question -- or
24 question to you is: What happens to the risk analysis
25 if that plan is a purely merchant plan, if in fact you

1 can flatten domestic load in the appropriate time frame
2 and, in fact, Keeyask is built solely for export?

3 Do you have any ideas on what would
4 happen to those curves? That's the -- you -- you
5 actually speculated on that when --

6 MR. WILLIAM HARPER: Yeah.

7 MR. RICHARD BEL: -- in your second-
8 last slide.

9 MR. BYRON WILLIAMS: Do you want to
10 thank him for that question, Mr. --

11 MR. WILLIAM HARPER: I'm not sure if I
12 want to thank him or...

13 I think that question probably ties
14 directly into the comment I made about the uncertainty
15 about the carbon pricing, because I think if you --
16 because it's relating to the fact that, just as you
17 acknowledged, if you move into a plan that's strictly
18 based on -- no, the term used is 'merchant plant', then
19 it hinges entirely on the price that you're going to
20 get for -- for that -- for that generation.

21 And -- you know, and the -- the low of
22 the lows, I'm not party to all of the information, but
23 my understanding of the low of the lows in the export
24 range is probably something that's go up at -- at
25 inflation or maybe close to that, which is probably --

1 probably reasonable to accept as a -- as minimum value,
2 you know.

3 But the probabilities of each of those
4 three (3) cases and the -- you know, have a certain
5 amount of assumptions about when or if carbon pricing
6 will -- will occur, which become, in my mind, the
7 critical point to -- to understand if you're going to
8 look -- look at it in that perspective.

9 And I think that -- that's what you'd
10 want to go back to, is maybe try and decompose those
11 probabilities and understand more precisely exactly
12 what's the carbon pricing implicit in -- or implicit in
13 each of those probabilities and, therefore, how much am
14 I relying on carbon pricing in the future if -- if I go
15 for a merchant plant and do I feel comfortable with
16 that level of risk.

17 And I'm not too sure, in that context,
18 you can plot it in the context of a curve, to be quite
19 honest with you, because I'm not too sure if assigning
20 prob -- probabilities at that point in time. I -- I
21 think you just have to under -- it becomes more
22 difficult, and you just have to under what are the
23 likely outcomes, what's the difference?

24 You know, if -- if it's a matter of
25 somebody somewhere else makes a decision, and if they

1 go my way, I can make \$300 million, but if they go my
2 way (sic) I could lose a billion, and I'm leaving it up
3 to them to make the decision, and I don't know what the
4 probability is, personally, I know which way I'd go.

5 If it's the other way around, if I could
6 lose -- if I could lose a bit but maybe win a lot, then
7 I might go another way. I think it's a matter of just
8 understanding the risk -- the risk range that's
9 involved in -- in those specific decisions.

10 MR. RICHARD BEL: Does the risk range
11 increase or not?

12 MR. WILLIAM HARPER: Well, I -- I think
13 -- again, I think it -- and I have a problem because we
14 -- we've got a risk range of three (3) -- three (3)
15 numbers: medium, high, and low. And I don't know how
16 much carbon pricing is built in -- in -- into those
17 particular numbers.

18 If the low -- if the low includes no
19 carbon pricing and the high includes very high -- high
20 carbon pricing, then it's probably exactly the same.
21 If the low implicitly includes some carbon pricing,
22 then I think the risk pro -- probably in -- increases.

23 MR. RICHARD BEL: Okay. Thank you.

24

25 CONTINUED BY MR. BYRON WILLIAMS:

1 MR. BYRON WILLIAMS: Just on that
2 question, Dr. Gotham, do you have anything you want to
3 add on -- on carbon pricing?

4 DR. DOUGLAS GOTHAM: Well, I would -- I
5 guess I would say, from my perspective, the carbon
6 pricing issue is -- is kind of a -- a 'yes' or 'no'
7 question. And so there's almost a step there that you
8 take. It's on or off. It will happen or it doesn't
9 happen.

10 And so there's that to be considered,
11 that it's -- I'm showing my engineering background, but
12 a binary decision: It's either on or it's off. And
13 that -- there's the -- you know, a significant amount
14 of difference between one (1) state and the other.

15 MR. RICHARD BEL: Can I jump in with
16 you, Dr. Gotham? The -- the interesting part of your
17 presentation yesterday for me was the congestion
18 argument with the Minnesota Hub.

19 DR. DOUGLAS GOTHAM: Yeah.

20 MR. RICHARD BEL: And what immediately
21 -- actually, I was going to try and interrupt you. Why
22 has not -- not the MISO relieved that congestion by
23 building more shared-cost transmission lines and -- so
24 what explains that -- that congestion?

25 And looking forward, is -- do you

1 believe that congestion's going to always be in place?

2 DR. DOUGLAS GOTHAM: The -- the -- to
3 the second question, I don't know in terms of whether
4 or not that congestion's always going to be in place.

5 The -- the question about why it hasn't
6 been addressed is -- is complicated. There are -- in
7 any situation like that, there are people that would be
8 better off if the congestion were to go away.

9 For instance, if I were trying to sell
10 into the congested region, I would like it to go away
11 because that would bring up the price that I'm getting
12 when I sell in. But if I'm a customer, if I'm a -- a
13 purchaser in that congested region, I want the
14 congestion to stay because I'm buying at a lower price.

15 Similarly, if you look at the other side
16 of the congestion downstream, then if I'm a -- if I'm a
17 purchaser there, I want the congestion to be relieved
18 because that'll get some low-cost power, extra low cost
19 power coming in and it'll bring down the price in my
20 region. And the -- and the -- the suppliers in that
21 region are -- would not want the congestion relieved.

22 So there are people on both sides that
23 both win and -- there are winners and losers on both
24 sides. And -- and historically, the -- you know, the -
25 - the decision of whether to build a transmission line,

1 it may be that a -- a -- somebody who's better off
2 because of the congestion would be the one who's best
3 suited to build that transmission line and has no real
4 incentive to do it.

5 Now, in terms of what's going on with
6 MISO, they do have what they call their multiple value
7 projects, or MVP projects, and there are some in that
8 region that are -- have been proposed. The most recent
9 information I have is they have a -- a project in-
10 service date toward the end of the decade, 2018 time
11 frame, something like that, but that they're also tied
12 to increasing wind generation and trying to get wind
13 from that region out into the rest of MISO.

14 And so the question then becomes: Yes,
15 we -- we may have increased the amount that can be
16 transferred across that congested bor -- border, so to
17 speak, but have we also increased at the same the
18 amount that's trying to -- to get through and will we
19 still have congestion? I don't know.

20 MR. RICHARD BEL: Okay.

21 THE CHAIRPERSON: To some extent, this
22 new intertie, if it's built, will relieve some of that
23 congestion, wouldn't it?

24 DR. DOUGLAS GOTHAM: Actually, I don't
25 think so, because what you're doing there is you're

1 getting power into the Minnesota Hub region. And the
2 congestion is getting out the other side. So the --
3 the new intertie -- and I'm not -- and -- and it may be
4 depend on what the -- the final path that's taken and
5 where it actually ends up may change that if the -- the
6 intertie were to go into Wisconsin instead of
7 Minnesota. Then you may get a different answer. I
8 don't know.

9 But the -- the big issue for me is not
10 the congestion between Manitoba and Minnesota; it's the
11 congestion between Minnesota and Iowa and Wisconsin and
12 Illinois and -- and port -- and points beyond. And so
13 this intertie would allow you to get power into
14 Minnesota, but it wouldn't necessarily allow you to get
15 power out. So you'd be just bringing more power into
16 that congested and price-depressed region.

17 THE CHAIRPERSON: You -- you also know
18 that some of those contracts involve a exchange of
19 power during a -- you know, a time frame. In other
20 words, get power in from the US and ship out power from
21 Manitoba. So it really is using the Manitoba system as
22 a storage system for US power.

23 DR. DOUGLAS GOTHAM: Yes.

24 THE CHAIRPERSON: Does that change your
25 perspective at all?

1 DR. DOUGLAS GOTHAM: It -- it doesn't
2 change my perspective so much on the -- the issue of
3 whether the congestion's there and it may depress
4 prices. But it is entirely possible in that type of
5 circumstance, where Manitoba Hydro is alternatively
6 essentially a buyer in that market and at other times a
7 seller, if they can buy at lower prices because of the
8 congestion and depressed price, that's not a bad thing
9 for Manitoba Hydro.

10 On the other hand, then when they go to
11 turn and -- turn around and sell it, both those prices
12 may be lower. So they may be buying at a low price,
13 but also selling at a low price. So that would offset
14 some of the -- potentially offset some of the issues
15 with any lost revenue in that you could -- those --
16 those diversity contracts may -- may wash out, so to
17 speak.

18 DR. HUGH GRANT: Can I just follow up
19 on this? There were two (2) other ways, I think, we
20 were suggesting we think about the intertie. And one
21 was just the reliability issue which I assume isn't --
22 no one's attempted to quantify the value of that in any
23 of the analysis.

24 And the second one was someone just
25 suggesting that we should think of the intertie more as

1 an import vehicle and that that would allow Manitoba
2 Hydro to relax their planning target of 10 percent
3 imports. One question I had -- but I'd like to hear
4 you comments on the reliability issue.

5 But -- but also when I was scanning
6 through the EIA data, you -- you don't see any states
7 importing more than 5 or 10 percent of their
8 electricity needs. It seems -- it seems that most
9 states in general produce at least 90 percent or more
10 of their power needs.

11 Is there some institutional reason why
12 that happens, or is it in the nature of these regulated
13 utilities? Or -- or maybe I'm wrong. Are there states
14 that import large volumes of electricity?

15 DR. DOUGLAS GOTHAM: In -- one of the
16 cautions that I have with looking at EIA's generation
17 data versus their consumption data is that they're not
18 directly comparable. And -- and what I mean by that is
19 that generation also includes -- and it -- their --
20 EIA's generation numbers include self-generation. So
21 if I'm a customer and I generate my own power, it shows
22 up as generation, but not as a sale -- the sales
23 numbers.

24 The other thing is that there are losses
25 associated with transmission and distribution that will

1 show up in the generation numbers, but not in the sales
2 numbers. And I -- I -- one of the things I've noticed
3 that if you look at just those generation and sales
4 numbers and try to make that determination, it looks
5 like Hawaii is an exporter of power, which is obviously
6 not the case.

7 So those numbers tend to be skewed
8 toward the -- the generation side more so than the
9 sales side. I do think that most states tend to be
10 mostly self-reliant. The states that are traditionally
11 regulated, like my home state of Indiana, generally
12 tend to be more so self-reliant just because they have
13 a regulatory commission that seriously frowns on
14 negative reserve margins and things like that.

15 And -- and they've also got a -- an ad -
16 - something of an advantage when it comes to the risk
17 premium of building new capacity and that they -- they
18 can acquire capital at a -- at a lower rate because of
19 the fact that they've got this -- this return on
20 investment that's built into the -- the regulatory
21 process.

22 So they -- it -- and even the states
23 that are deregulated, most of those haven't -- haven't
24 been deregulated more than, say, at this point, fifteen
25 (15) years or so. And so they -- until -- before they

1 deregulated they were largely self-sufficient up until
2 then. And there hasn't been enough change, in terms of
3 the load versus the generation in the state, to make a
4 significant difference in that, although you -- that
5 may exacerbate over time.

6 I -- it -- the -- you did ask a question
7 about the -- the reliability benefits. And I don't
8 know enough to really be able to say what specifically
9 here. Those things tend to be, so specific to the --
10 the transmission system that they're being added to, a
11 specific line, and then I -- and I don't know the --
12 enough to say.

13 MR. RICHARD BEL: One (1) last
14 question. Do I take it from your presentation -- or
15 can I assume that in the MISO region as a whole, are we
16 seeing a decrease in the rate that load is increasing?

17 DR. DOUGLAS GOTHAM: Yes, that -- that
18 is true. That's happening all across the country,
19 that we're -- we're seeing the rate of -- of load
20 growth going forward dropping over time.

21 MR. RICHARD BEL: Thank you.

22

23 CONTINUED BY MR. BYRON WILLIAMS:

24 MR. BYRON WILLIAMS: Dr. Simpson, over
25 to you and CAC Exhibit 69.

1 DR. WAYNE SIMPSON: Okay. Thank you
2 again. So this -- I was asked to look at the risk
3 analysis in the -- in the NFAT. And certainly, risk
4 analysis is important to the question and -- and modern
5 risk analysis concepts are important to understanding
6 the impact of risk on the investments of this -- of
7 this nature; in other words, assessing the development
8 plans in the NFAT.

9 Another point that I will make that is
10 quite obvious is that the numbers are fluid. And while
11 I'll give some assessment to their impact on risk and
12 the rule in assessing the development plans, I'll also
13 focus on the general economic concepts and how well
14 they're applied in the NFAT report. And in some
15 places, I'll certainly be repeating things that Mr.
16 Harper said, but I won't -- I -- I'll try not to
17 overlap too much.

18 So we'll start with the idea of risk or
19 risk factors. I think there's -- sorry, slide 2.
20 There's four (4) important points here. One (1) is
21 that risk is associated with uncertainty and a range of
22 possible outcomes, some of which are good and some of
23 which are bad.

24 Now, in the NFAT report, the -- the good
25 is the upside opportunities and the bad is the downside

1 risk. But one thing I want to emphasize is that in
2 terms of standard analysis of risk and the response of
3 consumers and producers to -- to risk, we don't
4 differentiate between those two (2), because the
5 question is really about the total risk and the
6 volatility of outcomes that is the -- the nature of the
7 -- of the risk.

8 Secondly, modern risk analysis
9 characterizes risk or uncertainty in terms of a
10 probability distribution that attaches probability to
11 each possible outcome. And I'll take a little bit more
12 about that in the next slide.

13 Thirdly, that the probability
14 distribution can, at least in principle, be quantified
15 or estimated. We have evidence on a lot of the things,
16 and certainly the NFAT has brought to bear some
17 evidence on trying to get at the -- the distribution of
18 possible outcomes. And with that said, probably a lot
19 more can be done.

20 And then fourthly, that replication
21 methods like Monte Carlo can be used to determine the
22 range of outcomes from multiple risk factors
23 interacting in complex ways as advocated by Drs.
24 Kubursi and Magee in 2010 in their independent and, I
25 would add, largely inf -- uninfluential review for the

1 PUB of Hydro's risk assessment practices.

2 So slide 3 is just a simple diagram of
3 what is referred to in statistics as probability
4 density function. But this captures the ideas around a
5 -- a risk factor or the combination of risk factors
6 would come up as -- as the range of net present values
7 in the evaluations. And I'll get to that in a moment.

8 So first of all, on the horizontal, or
9 X-axis, we have a range of possible outcomes. Now,
10 here, the standard bell curve, we have minus three (3)
11 to plus three (3), but you can think of this as a range
12 of possible outcomes of something, say, like energy
13 prices. They can take on a variety of possible values.
14 Discount rates, a variety of possible values. Capital
15 costs can have a range.

16 On the Y-axis, the vertical axis, what
17 we have is what we call the probabilities. These are
18 the probabilities attached to each of these possible
19 outcomes. So, for example, the highest or most
20 probable outcome is at zero in this, and there's
21 probabilities attached to other outcomes, for example,
22 at minus two (2) or plus two (2), which are
23 considerably smaller.

24 Now, at this point, if we talk about a
25 risk or a risk factor, let's say energy prices, and we

1 have at least notionally a distribution and we actually
2 draw data and construct or estimate what a distribution
3 looks like, then we can make draws from that
4 distribution, much like the -- if you're a sports fan,
5 the -- the lotteries in sports.

6 You know, there's a -- an inverse order
7 of finish. You get the probabilities of -- of
8 selection. Well, here, the thing that's most likely to
9 be selected is zero, but there's possibilities for
10 minus one (1), minus two (2), minus three (3), and they
11 just get smaller. The probabilities are smaller and
12 smaller, just like the player -- teams that finished
13 higher in the standings.

14 And so, making those draws, an
15 individual draw like that, we can combine that with the
16 draws on other risk factors. So I can make a draw on
17 energy prices, I can make a draw on capital costs, I
18 can make a draw on the discount rate to take the three
19 (3) risk factors we'll talk about -- or talked about in
20 the NFAT. I can make a draw on load, I can make a draw
21 on all sorts of other things, provided that there's
22 variability and that I can characterize it.

23 And I can produce, as Hydro has produced
24 -- I can produce from those draws and other
25 information, I can produce a -- a net present value

1 going forward of outcomes for a particular development
2 plan, or I can do it for all fourteen (14) plans, I
3 guess would be a better way to think of it.

4 So the second way to think of this dis -
5 - density function is to think of it as the outcome of
6 that process for one (1) draw, and you would have a
7 particular value, again, on the horizontal or X-axis,
8 which we chari -- say was the net present value for a
9 particular plan, say.

10 Replication is to repeat that over and
11 over and over. Typically, you know, a typical
12 replication can be ten thousand (10,000) times, but
13 computers are fast, and they -- they can be made to do
14 these things extremely quickly, so that we build up a -
15 - the relative frequencies of outcomes of different net
16 present values for different draws from these risk
17 distributions.

18 And what that would build up, along with
19 the net present values, again, on the horizontal or X-
20 axis, is a probability distribution of this type for
21 the net present values for, say, a particular plan.
22 And we could do it for each of the plans. This is just
23 one (1) of the plans.

24 Now, once we did that, I should relate
25 this to the S-curves, because this is the S-curve. The

1 S-curve is then what we'd call the cumulative
2 distribution function of -- of this -- of this curve.

3 And the way to think of that is to think
4 of it at -- that at each point, if this curve in front
5 of you now represents the net present value as the
6 probabilities of different values, as I've suggested,
7 at any point, let's say at minus one (1), we can take
8 the slope of the curve -- or, I'm sorry, we can take
9 that value, that probability, and that gives us the
10 slope of the S-curve at that point.

11 So where's the highest or steepest point
12 of the S-curve? Steepest point of the S-curve is at
13 the highest point, highest probability, which is at
14 zero. What are the low points of the S-curve? They
15 are at minus two (2) to minus three (3), and plus two
16 (2) to plus three (3), all right?

17 So what you get is low -- the low
18 values, you get a slow increase, then you get a sharp
19 increase, and then you get the tapering off. This --
20 this is the S-curve, in other words, just de --
21 developed in a slightly different way. That's the
22 cumulative distribution function, this is the marginal
23 or probability density function.

24 So another point I want to make out
25 about this that comes into play is symmetry. This

1 distribution is symmetric. The probability -- normal
2 probability distribution or bell curve is used widely
3 because it has a lot of desirable properties as a
4 likely outcome of a variety of -- of things.

5 But the main point here is that if the
6 distribution is symmetric, what you observe on the
7 left-hand side below zero, and what you observe on the
8 right-hand side are the same thing. They look the
9 same, and what that really means is that what is
10 characterized as downside risk from zero to minus three
11 (3), and what is characterized as upside opportunity
12 from zero to plus three (3) in this context are
13 equivalent. They're completely correlated.

14 And what that also means is that the
15 downside risk and the total risk are completely
16 correlated. They'll move in the -- exactly the same
17 direction, and that's practically important, because I
18 think this distinction between looking at downside risk
19 and -- and total risk is -- is, in practical terms, not
20 -- not relevant, and I'll show a -- a diagram to
21 illustrate that.

22 And the other point I want to make, and
23 in -- before I leave this diagram is that the -- the
24 key point here is that what the consumer is concerned
25 about, in this case, the ratepayer -- the Hydro

1 ratepayer, if -- if they're the ones that eventually
2 absorb this risk, is the volatility, both good and bad.
3 That is to say, if you give someone a choice, typically
4 between a certain investment, in this case, zero, at
5 the mean, which is zero, or an uncertain investment,
6 which involves this range of outcomes that we've shown
7 here, they'll choose a certain investment.

8 In other words, we observe that people
9 require what we'd call a risk premium to accept
10 volatility, and what that really means is that con --
11 consumers and typically most others are risk averse,
12 and most of the evidence suggests that collectively, we
13 are -- are risk averse, and we require risk premiums in
14 order to accept volatility, and that's total
15 volatility, before the fact we don't know if it's going
16 to be good or bad. We don't like to take that chance.

17 Okay. The next slide is the -- just a
18 quote from the NFAT:

19 "It is important to recognize
20 uncertainty and identify the way
21 forward that has the best chance of
22 value and risk given that
23 uncertainty."

24 So two (2) questions from this. One (1)
25 is What is the methodology used to analyze risk in the

1 NFAT? And secondly, how has the risk analysis been
2 used to assess outcomes for alternative development
3 plans? And those are the two (2) points of my
4 presentation.

5 Next slide, this -- the -- the select --
6 regarding the selection of the risk factors, and Mr.
7 Harper has already talked a little bit about this. I
8 won't go on and on. But first of all, it's limited to
9 only what we call the three (3) most important risk
10 factors. This is a arbitrary choice, and I don't know
11 how much it matters. Those turn out to be energy
12 prices, discount rate, and capital costs.

13 The selection of the factors is based on
14 the calculated difference in net present value for each
15 risk factor between a plausible high value and a
16 plausible low value for only the two (2) development
17 plans with the most significant difference in
18 characteristics, the All Gas Plan 1 in Pathway 1, and
19 the Preferred Development Plan 14 in Pathway 5.

20 A concern I would have is that this
21 ignores other pathways and other plans that do come
22 into play, as I'll show. In particular, Plan 2 in
23 Pathway 2, Plan 4 in Pa -- Pathway 3, Plan 6 in Pathway
24 4, and Plan 5, which is also in Pathway 5, but isn't
25 part of the selection process for the risk factors. In

1 other words, the question that might be in the back of
2 other peoples' minds, but certainly was in mine when I
3 read this -- and I don't have an answer, because I -- I
4 don't have the data to -- to re-analyze this in a
5 different way.

6 But would the answers on terms of the
7 three (3) risk factors chosen be the same if other
8 plans were used to identify them? My answer is, I
9 don't know, but I -- I would be interested in that que
10 -- in the answers to that question.

11 Then secondly, in terms of these
12 probability distributions, the probability
13 distributions and distributions, I guess, in quotes,
14 are really just three (3) points. There's a -- an
15 expected reference scenar -- val -- scenario, a low
16 scenario, and a high -- high-outcome scenario for each
17 one (1).

18 MR. BYRON WILLIAMS: Are we turning to
19 slide 6, Dr. Simpson?

20 DR. WAYNE SIMPSON: I'm sorry, the next
21 slide. Yeah, I'm not getting numbers on the -- is this
22 slide 6? I'm sorry. Thank you. Slide 6.

23 So remember now that these three (3)
24 points need to represent the actual range of outcomes
25 for things like energy prices, discount rate, and

1 capital costs, and it's somewhat difficult to see how
2 this can actually be done. I mean, if you're into any
3 sort of an empirical curve fitting exercise, you'd
4 certainly want to represent it by more than -- than
5 three (3) points.

6 I'm sorry, I didn't change the slide,
7 I... Sorry, I got wound up in my own discussion, I
8 guess.

9 Okay, so the ques -- one question, then,
10 is how these scenarios are chosen. The energy prices,
11 for example, are chosen on the basis of consultant
12 price forecasts where they're asked to produce the best
13 estimate, and then lower and upper estimates for
14 prolonged pricing.

15 I don't have a sense from the discussion
16 in the NFAT how the consultants would have interpreted
17 prolonged pricing, how that would relate to the
18 determination of P10 and P90 points for the low and
19 high outcome scenarios, and indeed, how you would
20 attach probabilities. There's some sense that the
21 forecasts are combined, that some may have been
22 dropped. All this leaves me uneasy in a way that I
23 can't -- I can't, again, quantify.

24 And so the question is how can these
25 points effectively represent a range of outcomes of the

1 underlying probability distribution, which is what we
2 want to capture if, in fact, we want to try to draw
3 from these points or what equivalently has been done
4 here, construct S-curves in -- in some other way. A
5 Monte Carlo analysis would produce a lot more points in
6 the distribution.

7 Okay, the next slide, which I'll
8 actually go to this time. This is slide 7. So the
9 third point is the question of the S-curve methodology,
10 and this is a minor point if you've got more points,
11 but you don't have very many points, and I wondered how
12 these twenty-seven (27) points, which is the three (3)
13 factors times three (3) outcomes, can actually
14 represent the cumulative probability distributions of
15 the outcomes.

16 We've seen from -- from Bill Harper's
17 presentation that a lot of areas -- there's -- you
18 know, the -- the curves are pretty close together, and
19 it's -- it's almost hard to differentiate amongst them.
20 So the curve-fitting exercise, the S-curve, is not
21 immaterial to consideration of the -- of -- of how many
22 points and how they're actually describe that S-curve,
23 and then, secondly, how they're actually connected.

24 I -- if I had twenty-seven (27) points
25 and I -- I do the distribution, approximated an S-

1 curve, just as the probability density function
2 approximated a bell curve, say, then I would -- I would
3 want to think about some sort of connection of the
4 points other than a linear one. But again, this goes
5 away in -- if you add more points to the -- to the
6 exercise.

7 Now that said, we need to look at what
8 evidence there is on risk and returns, and what the
9 NFAT report and subsequent IRs have produced, because
10 this is what we have, and so what I want to do now is
11 turn to the whole question of the comparison of plans
12 and -- and use the actual data that is in the NFAT and
13 the subsequent IRs.

14 So this is slide 8. To quickly read
15 what Chapter 13 says, and I agree with:

16 "There's uncertainty in the reference
17 scenario assumptions, and therefore,
18 in the consequences for the different
19 plans for Hydro revenues and
20 expenditures and customer rates. The
21 question, thus, arises, Does the
22 uncertainty favour some plans over
23 others? Is there a risk tradeoff
24 ['balance' was the term used before]
25 that could change the relative

1 advantage of the different plans
2 based on the reference scenario
3 analysis, which recognizes the
4 tradeoff of return or expected value
5 and risk that is at the heart of what
6 we would call modern portfolio
7 analysis?"

8 So I turn, then, in slide 9 to a -- a
9 simple schematic notion of -- of investment analysis
10 involving a risk-return tradeoff akin to the decision
11 on investments. You know, you -- the most basic level,
12 people go to a financial advisor, and they're asked --
13 one of the first meaningful questions they're asked is:
14 Well, do you want to be risky or conservative?

15 And that is at the heart of this
16 portfolio theory, but it implies all the way up to the
17 kinds of investment decisions that are being conducted
18 here and the kinds of risks that the consumers, that is
19 to say, ratepayers, are being asked to accept.

20 So point A on this diagram -- I should
21 say, first of all, the -- the horizontal axis is our
22 expected return. This is the mean of the -- of the
23 distribution. In a symmetric distribution, this is
24 P50, and then there's risk or variance which is
25 captured by the spread, and usually, we capture that

1 with something like the variance. The numbers we have
2 in the NFAT are really what we would call interdecile
3 ranges, so they're differences between the P90 point
4 and the P10 point are the ones that I've -- I've
5 largely used.

6 And then we can plot on there -- and
7 I've just -- this is -- there's no numbers here yet,
8 this is just schematically -- points A and 'B'. Point
9 A we could think of, say, as the more risky investment,
10 because we can see that it's above 'B', so on the risk
11 scale, it's higher.

12 And it also has a higher expected value
13 or return, because I'm going to attach a risk premium
14 to -- to this and say that in order for stocks to be
15 sold, if this -- if this riskier investment, say, is
16 stocks, then they have to command a premium in terms of
17 their expected value return over bonds if bonds are a
18 more sure thing. That is to say, they have a lower --
19 they're less risky or they have a lower spread.

20 Now, the -- I've -- there's some dotted
21 lines there, and the dotted lines, say, emanating from
22 'A' simply cut off the things that are clearly inferior
23 to 'A'. Take point C. 'C' is inferior to 'A' because
24 it has the same risk. It's just as high, but it has
25 less expected value.

1 Similarly, 'D' -- a point like 'D' going
2 in the dotted lines going out from point B, or roughly
3 going out from point B -- my graph shifted slightly --
4 point D, again, is inferior to 'B' because it has less
5 return for, in fact, slightly more risk.

6 And any of the points in those quarter -
7 - those quarter areas are going to be inferior to
8 points A and 'B' as they're marked out.

9 Now, there is an area between 'A' and
10 'B' under those dotted lines, to the right of the one
11 dotted line and other the other one when you've only
12 got two (2) points, where you can't really say, but in
13 fact, that the -- you'll see from the diagrams I show
14 that that isn't germane to the comparisons being made
15 in the -- with the NFAT numbers.

16 So now we're moving to slide 10, and
17 slide 10 takes the numbers from the NFAT report, the
18 conclusion -- concluding numbers on net present values
19 and their range, takes the expected value and the full
20 interdecile range, the P90 minus P10 numbers.

21 And so along the horizontal axis, we
22 have the expected value. Along the vertical axis, we
23 have the risk measured as this P10 -- P90 minus P10
24 interdecile range.

25 And I did this originally because when

1 I looked at the numbers in the original NFAT, I said,
2 Well, fourteen (14) has the highest return, but it also
3 has quite a bit of risk associated with it.

4 And if there are other plans that have
5 less return, but in turn, also have a lot less risk,
6 then it's not entirely clear that an investor would
7 choose Plan 14 over the other plans. We can't choose
8 just on the expected return, if, in fact, the risk
9 profiles of the returns differ substantially. That's
10 standard best analysis. That's -- that's mean-variance
11 portfolio theory.

12 So in that context, you can see that the
13 consideration would be Plan 4 with the 250 intertie
14 that's been discussed extensively by Bill. The --
15 there, Plan 4 has a lower return -- it's to the left of
16 fourteen (14) -- but it also has a lot less risk.

17 So the risk premium, if you will, that's
18 required, that's implied here is a little bit more
19 return, but the assumption of a great deal more risk,
20 and I thought that should be pointed out based on what
21 was in the NFAT. Of course, as I said, the numbers are
22 fluid.

23 The other issue that came up in the --
24 in the NFAT and in the interrogatories that followed
25 was the question of downside risk, and so the next

1 graph I'm going to show just looks at the downside
2 risk, in other words, the values below the -- below
3 P50.

4 But before I do that, remember I said
5 that if the distributions are more or less symmetric,
6 then the total risk and the downside risk are going to
7 be highly correlated, so you're not likely -- so my
8 assumption was I wouldn't see anything very different.

9 And if I go to slide -- well, I'm -- let
10 me -- let me go to slide 11 first. Another backdrop to
11 this about downside risk, to give it a point, is that
12 there's a lot of work in modern -- what is sometimes
13 referred to as behavioural economics, but it's -- it's
14 really a branch of microeconomics that says that
15 downside risk might matter because people are loss
16 averse.

17 That is to say, people really don't like
18 volatility, which is the standard notion of risk, but
19 in recent years, and a couple of psychologists won a
20 Nobel Prize for essentially porting this -- pointing
21 this out, is that in experimental evidence and so on,
22 people are -- are also loss averse, so that gives more
23 weight to downside risk. Now it wouldn't give weight
24 only to downside risk, and again, if -- if downside
25 risk is correlated with total risk, in practical terms,

1 it doesn't matter, but it suggested that we should give
2 this its -- its due. So --

3 THE CHAIRPERSON: Dr. Simpson, the
4 values that you used for -- for establishing risk,
5 where did you get those values? You know, the -- the
6 values --

7 DR. WAYNE SIMPSON: The -- the
8 interdecile range?

9 THE CHAIRPERSON: Yeah. So -- so
10 that's the...

11 DR. WAYNE SIMPSON: These are the P90
12 minus P10 numbers from NFAT Report Table 14.2.

13 THE CHAIRPERSON: I see. Okay.

14 DR. WAYNE SIMPSON: As -- as is the
15 expected value referenced to gas.

16 So this is the -- the -- it -- using
17 downside risk. Now, the scale is slightly different,
18 but -- because I didn't block out the -- the empty
19 space at the bottom, but the results are exactly the
20 same. If you compare this table to slide 10 -- slide
21 10, you'll see that, again, if we go back to slide 10
22 for a moment, four (4) and fourteen (14) are the main
23 competitors. Five (5), six (6), and twelve (12) lie
24 inside them, and not much has really changed when we
25 look at downside risk.

1 So this is a -- my way of saying that
2 you could actually look at the correlations between
3 downside risk and total risk, but I -- I suspect
4 they're extremely high, because I expect that where you
5 see downside risk, you see upside opportunity.

6 So I'm going to look at total risk for
7 the remainder, because that's more consistent with the
8 way we understand risk analysis in terms of portfolio
9 theory, and again, there's this trade-off between Plan
10 4 and 14 that was in the -- the NFAT in Table 14.2.

11 So now moving to slide thir -- 13.
12 Thank you. There were some updates, and in particular,
13 what I've done is taken Hydro update 104-8, Undertaking
14 number 27, which updated the capital costs for Keeyask
15 and Conawapa, updated the probability weightings for
16 capital cost factor, updated the treatment of common
17 factors. We've heard some -- some things about that
18 this morning, or this afternoon. And where Plans 5 and
19 14 are calculated with the -- the WPS sale, but no WPS
20 investment consistent with existing events and with
21 base DSM.

22

23 CONTINUED BY MR. BYRON WILLIAMS:

24 MR. BYRON WILLIAMS: And, Dr. Simpson,
25 just before you leave this slide, why wouldn't you do

1 an update taking into account Scenario 2 DSM, for
2 example?

3 DR. WAYNE SIMPSON: I don't have that
4 information. That information isn't -- hasn't been
5 presented to me, but I could easily do that if it were.
6 Yeah, these -- this isn't very -- this isn't rocket
7 science, to use the colloquial term.

8 Then slide 14, then, is -- the source --
9 well, I don't have the source here. I had the source.
10 The source is the undertaking, I'm sorry, 104-8 and the
11 data therein, which is a counterpart of Table 14.2 in
12 the NFAT with the -- with the new calculations.

13 And here, the reason that -- my original
14 reason for looking at the risk return trade-off with
15 Plan 14 is not so important is simply because Plan 14
16 has disappeared into the hinterland. It's way off the
17 chart. It has a -- a relatively low return, but it
18 also has a relatively high risk, so it is arguably the
19 worst plan here, in fact.

20 Plan 4 is the clear winner, unless you
21 think that for the little bit of reduction in risk that
22 Plans 5 and 2 would give you, you would be willing to
23 accept a much lower expected value or return, and I
24 suspect most people wouldn't take that -- wouldn't take
25 that trade-off. Given that trade-off they would

1 probably say, Well, there's not much more risk in four
2 (4), so I'd take four (4).

3 The reason why I have a second dotted
4 line this time indicating the -- the trade-offs is
5 because the intertie, the 250 intertie associated with
6 Plan 4 has been either taken off the table or not,
7 depending, I guess, on your perspective, but I thought
8 it was relevant to look at situations where we don't
9 have the 250 intertie.

10 And that brings into play Plans 6, 5,
11 and 2. And in that again, Plan 6 appears to be the
12 strongest, but there is some tradeoff in the sense that
13 Plans 5 and 2 do have a lower risk associated with
14 them. And I guess from there I'll go to my
15 conclusions. I won't say any more about that. I can
16 come back to that if people have questions.

17 So my conclusions are that the NFAT risk
18 analysis has several limitations -- limitations on the
19 selection of risk factors, the choice of only three (3)
20 risk factors, the three (3) point probability
21 distributions, and the associated problems in computing
22 the -- or estimating the S-curves, and falls well short
23 of analyzing all relevant risk factors with defined
24 empirical probability distribution of the sort be
25 recommended by, say, the Kubursi/Magee report, or by

1 other -- judging by some of the testimony on April the
2 17th by the Morrison Park people, in terms of what they
3 might have recommended would be an appropriate -- I
4 think the term they use is 'appropriate methodology'.

5 A plan evaluation requires assessment of
6 the expected returns risk tradeoff. That's a standard
7 modern portfolio theory. And that the NFAT plan
8 evaluation is not robust to changing cost conditions
9 and other updates, especially, but not only preferred -
10 - referring to Plan 14, the Preferred Development Plan.

11 Thank you.

12 MR. BYRON WILLIAMS: Dr. Simpson, just
13 before we turn it over to cross-examination, and I ask
14 this question -- it's not related to the risk analysis,
15 so I -- I ask this question with some trepidation, but
16 my client will kill me if I don't. The -- you've
17 recalled over the last few days there's been discussion
18 of income elasticity and price elasticity of demand.

19 Do you recall some of that conversation,
20 sir?

21 DR. WAYNE SIMPSON: Yes. Yes, I do,
22 because you asked me to prepare something.

23 MR. BYRON WILLIAMS: And I -- I wonder
24 if you could try and clear it up for both your ever-so-
25 humble lawyer and his client?

1 (BRIEF PAUSE)

2

3 DR. WAYNE SIMPSON: Here's what I've
4 prepared, which I will read into the record, I guess.

5 Income elasticity is a percentage change
6 in electricity consumption for a 1 percent increase in
7 household income across households at a particular
8 point in time, such as in the survey of household
9 spending for one particular survey between 2000 and
10 2009, is probably the best example.

11 This would measure how electricity
12 consumption patterns change as household income grows;
13 i.e., an income elasticity of point six (6) as measured
14 in Stevens and Simpson means that as household income
15 increases by 10 percent, electricity consumption in
16 quantity units increases by only 6 percent, such that
17 electricity share of all household income falls.

18 Economists say electricity is incoming
19 elastic, less than one (1) in value, or a necessity.
20 This is a term used to contrast with -- with things
21 that become more prominent in higher income households
22 that are luxuries. I think someone said Rolex watches
23 was an example. More important as a share -- in other
24 words, more important as a share of income to lower
25 income than higher income households.

1 We expect that income elasticity will
2 always be positive for goods and services, sometimes
3 less than one (1), such as electricity, and sometimes
4 greater than one (1). Where there's fierce competition
5 for brands, for example, you expect very high
6 elasticities. This is about the consumption patterns
7 across households of different incomes at one (1) point
8 in time.

9 Price elasticity, or own price
10 elasticity, is the percent -- that should be percent,
11 not dollar -- percent change in electricity consumption
12 for a 1 percent increase in the real price of
13 electricity. As the price of electricity increases
14 over time relative to all other prices and incomes,
15 this would measure how the average consumption of
16 electricity in households changes; i.e., a price
17 elasticity of zero point five (0.5), which is the one I
18 took in my load calculation, means that as the
19 electricity price increases by 2 percent, 4 percent
20 nominal less 2 percent inflation of prices and incomes,
21 average household electricity consumption falls by 1
22 percent: point five (.5) times two (2).

23 Economists say electricity is price
24 inelastic if the elasticity is less than one (1). We
25 expect that the price elasticity, or owned price

1 elasticity, to always be negative for goods and
2 services -- demand curves sloped downwards -- sometimes
3 less than one (1), such as electricity, and sometimes
4 greater than one (1).

5 This is the consumption of electricity
6 by the average household or households collectively --
7 in other words, the load -- as electricity prices
8 change over time.

9 MR. BYRON WILLIAMS: Thank you for
10 that. And our -- our witnesses are available for
11 cross-examination. I just note, and, Ms. Ramage, I --
12 I flag this for your attention, Dr. Gotham, his
13 flight's supposed to leave at 4:30, so we were -- we --
14 we probably need to get him out of here by around 2:30
15 to get through customs, unless I need to start making
16 alternative plans to change his flight. So -- so
17 you'll advise...

18 If you're worried about the time, I -- I
19 think we -- you -- if you could let us know, that would
20 be appreciated.

21

22 (BRIEF PAUSE)

23

24 DR. HUGH GRANT: Wayne -- oh, sorry.
25 Dr. Simpson and I will do some -- go out and do some

1 surgery later today, but -- Professor Simpson. I'm not
2 going to belabour the price elasticity. I'm going to
3 invite you to the university. We'll have a seminar. I
4 -- I'm still convinced Stevens and Simpson have an
5 upward slope in demand curve, but...

6 I wanted to ask you about the risk
7 analysis. And there are two (2) things. The one, on
8 the graphs you present, I wanted to use the term 'scale
9 independent', but it's not quite correct. This would
10 be -- on the one axis, it'd be risk relative to the All
11 Gas Plan. So it -- it is sensitive on the base case
12 you select? Okay. As would the expected value, I
13 suppose.

14 What I was hoping -- if I could
15 understand this properly. Suppose you were -- the most
16 vexing thing I found is trying to understand why
17 capital costs seem to be constantly going up in these
18 projects, and particularly with large construction
19 projects.

20 If you were going out to construct a
21 risk analysis of that, would you -- so let's say you
22 went out and you first got an estimate today of what it
23 would cost to build the plant. Would it then be a
24 question -- using past experience, seeing as that there
25 seems to be this great escalation in costs, would it

1 just be the case you wouldn't have that normally
2 distributed risk factor?

3 In other words, it would be skewed more
4 to the fact you would expect the probability that costs
5 would rise over time?

6 DR. WAYNE SIMPSON: Well, I would think
7 that what would happen is that if you -- you ask
8 someone for cost estimates, they would give -- if they
9 gave you their best estimate, and we've heard a lot of,
10 you know, the notion of the -- the best -- the
11 reference, it would sort of be symmetric around it.
12 That is to say they might do better, they might do
13 worse. Now, I'm not sure how the construction industry
14 operates in that fashion.

15 But the other side of that is that you
16 can draw on the information from previous dam
17 construction, both in Manitoba and elsewhere. And
18 depending on the propriety of the information, you can
19 gather information on construction costs. And you can
20 construct -- in addition to what you've been told, you
21 can construct distributions, right? This is -- this
22 appealing to the empirical evidence. If you're
23 inviting bids, you'll get a variety of evidence. And -
24 - and that will also give you some idea of the
25 variability, because what you're trying to capture with

1 the risk factors is this prospective variability.

2 Whether it would be symmetric or not,
3 it's hard to say. It's hard to say for me. It's hard
4 to say for me.

5 MR. WILLIAM HARPER: Could I perhaps
6 make -- make an observation? With -- with a client I
7 work with in British Columbia, there basically Fortis
8 BC and BC Hydro have to come forward seeking capital
9 approvals for -- for most of the large capital projects
10 that they do. And through different points in time and
11 project evolution they make estimates of -- of the
12 capital cost of the project, you know.

13 And -- you know, and I think we've seen
14 through time, sit in a hearing and ask, Well, how has
15 this changed over time, typically, the estimates are --
16 typically, the estimates go up more than they -- they
17 go down as time progresses.

18 And -- and I -- and I think the reason
19 for that often is -- is as utilities do more
20 investigation into the -- into the particular
21 situation, the odds are more often they find out that
22 something is going to take more cost to remedy than --
23 than the circumstances are better than they are.

24 A simple example, one of the recent ones
25 that they were looking at, it was just a simple

1 transformation station. And they found they have to
2 spend a lot more problem -- time -- costs when they
3 really looked at it to fix the drainage problems than
4 they had originally anticipated.

5 So I think it's -- it's evolution. I
6 think just a matter of course, and maybe -- and
7 probability analysis might address it, that typically,
8 when you get more information, unfortunately, it tends
9 to be bad information as to good information; bad in
10 terms of the implications for the -- for the capital
11 costs.

12 DR. HUGH GRANT: Can I put this -- pose
13 it this way? Suppose I knew with a hundred percent
14 certainty that the -- the cost of building Keeyask
15 tomorrow was 6.5 billion. Then I -- then if I asked
16 you, What's the probability -- what's the expected
17 value of building Keeyask five (5) years from now,
18 would you say 6.5 billion in -- you know, adjusting for
19 inflation?

20 Or, you know, given this -- it's not
21 just as a project approaches that costs seem to go
22 higher. When you look back over large construction
23 projects in the past, or even hydro dams in Manitoba,
24 these projects have just increase -- increasing. It
25 could be we're just in a strange construction cycle,

1 but I'm just...

2 DR. WAYNE SIMPSON: They're never
3 lower. They're always higher is what you're -- it's
4 cost overruns. There's never cost underruns.

5 DR. HUGH GRANT: But there -- there
6 seems to be just this upward path in large construction
7 projects.

8 DR. WAYNE SIMPSON: The other thing in
9 this, I could be wrong, but there are some
10 contingencies built into -- contingency funds built
11 into it to essentially anticipate overruns. So, you
12 know, that would have to be factored into the
13 determination of where you -- where you think your --
14 your best price is. I mean, those contingency funds
15 are there because they -- they don't think they're rock
16 bottom prices. In fact, they're more or less likely to
17 -- to be realized, I suspect.

18

19 (BRIEF PAUSE)

20

21 THE CHAIRPERSON: That's all the
22 questions the panel has for the -- for the time being.
23 So I'll turn the microphone over to you, Mr. Gange,
24 please.

25 MR. WILLIAM GANGE: Mr. Chair, my

1 preference would be to stand down. I -- I don't have
2 many questions and I may not have any by the time that
3 other questioning has taken place. And if Mr. -- Dr.
4 Gotham has to leave, I'd rather get to the meat of the
5 issue rather than me as the fluff. Thanks.

6 THE CHAIRPERSON: Thanks, Mr. Gange.

7 MR. WILLIAM GANGE: Only on this issue.
8 Thanks, Mr. Wojczynski.

9 THE CHAIRPERSON: Me. Hacaault, s'il
10 vous plait.

11

12 CROSS-EXAMINATION BY MR. ANTOINE HACAULT:

13 MR. ANTOINE HACAULT: I don't expect
14 I'll be too long; hopefully ten (10) to fifteen (15)
15 minutes. The -- the one (1) thing that hasn't been
16 discussed much by this panel -- and I don't know if it
17 has any comments; I'll touch on various aspects -- the
18 plausible high and the plausible low, firstly, with
19 respect to load forecasting.

20 The panel group has talked about the
21 impact of the 80 percent increase in real prices and
22 its possible effect on load. And it's aware of the
23 evidence of Dunskey on DSM and its possible effect on
24 load.

25 Does the panel, or members of it, have

1 any views as to whether or not if we've taken a flat
2 load growth, have we properly taken into account the
3 plausible low input for the load forecast?

4 Or should it even be lower than that,
5 given the two (2) separate views that DSM may lead you
6 to a flat load and the price increase may also have
7 that same effect?

8 DR. WAYNE SIMPSON: I think when we
9 talk about the -- the biases in the forecast in the
10 terms of the price -- and that's the one where we do
11 think there is a bias because the direction of the
12 effect is -- is predicted to be down. The forecast --
13 the load will turn out to be lower than predicted if
14 you lower prices. Then I -- I don't think that moves
15 the ref closer to the previous low, but then you
16 probably should revise what the high and low are around
17 that ref.

18 DR. DOUGLAS GOTHAM: I guess I would
19 also like to add that I don't really -- I couldn't
20 really tell you I have a -- a -- honestly tell you have
21 a feel for what the plausible high and plausible low
22 would be. I'm skeptical of a negative load growth.

23 And the reason for that is that I think
24 that if the other factors are keeping load growth very
25 low, I -- I think the incentives change for DSM when

1 you're not -- when -- when you -- when you start
2 looking at actually shrinking load. Because there's
3 really no avoided cost of new generation inc --
4 incurred with that analysis.

5 So it may be that DSM that makes sense
6 under increasing load, or -- or maintaining a flat load
7 growth doesn't necessarily make sense if it's actually
8 shrinking load.

9 MR. ANTOINE HACAULT: Thank you. Now,
10 with respect to load, how do we deal with possible
11 major additions? For example, this utility, for
12 planning purposes, has to deal with possible additions
13 of major load for pipeline.

14 How do we deal with that in the context
15 of a Needs For and Alternatives To exercise?

16 DR. DOUGLAS GOTHAM: Well, if there --
17 if there's some level of certainty that these loads are
18 coming on, you certainly want to make sure that they're
19 included in your forecast.

20 The problem with adjusting your forecast
21 for specific loads is there's tremendous opportunity
22 for double counting. For instance, in Hydro's top --
23 top consumer forecast, they -- they use -- after the
24 first initial period, they use a trend analysis which
25 is based on what has happened in the past in terms of

1 growth for those top consumers.

2 Well, that growth in the past basically
3 consists of increases in those top consumers. And so
4 to a certain degree, some of that -- that new load is
5 included in that trend analysis. How much of that load
6 is included in the trend analysis, I don't know. And I
7 don't think, from a trend analysis, you can actually
8 even answer that question.

9 MR. WILLIAM HARPER: Can I perhaps
10 offer an alternative way one -- one could consider
11 that? That is, you know, you could view the -- the
12 pipeline as a risk and think in the context -- in that
13 context, What would be my risk mitigation strategy that
14 -- that I might have -- that I might have to implement
15 if that pipeline did -- didn't materialize?

16 And that really depends on: What does
17 it do to my need date? And off the top of my head --
18 and, Manitoba Hydro, please correct me if I'm wrong --
19 but I seem to recall with the last DSM 2 the with and
20 without the pipeline load, the difference in need date
21 was one (1) year to two (2) years.

22 It wasn't like -- no? Okay. I
23 apologize. Then I'm obviously looking at the wrong
24 thing.

25 So it seems to me what you want to do is

1 think about a risk -- specifically maybe a risk
2 mitigation strategy for that particular event and think
3 about, If I had a strategy, what -- what could it be,
4 and could I put it in place in a reasonable time in
5 order to -- to address that situation?

6 And if it was as simple as having had to
7 install a single gas turbine in the -- in the rare
8 event that that did occur, how long would it take me to
9 do that versus how much advance notice am I going to
10 get? Because pipelines don't materialize the next day,
11 as we've seen for regulatory hearings and others that
12 have to happen sort of thing, you know. How long would
13 it take? And that may be another way, as opposed to
14 trying to adjust the load forecast, think of that
15 particular event and -- and develop -- try and develop
16 a risk miti -- mitigation strategy specifically around
17 it.

18 MR. ANTOINE HACAULT: So am I correct
19 in -- looking at this from a second perspective, as I
20 understand you're saying, it can be dealt with as a
21 risk, but also it would be important to see whether a
22 particular path that Hydro is following allows for the
23 optionality to deal with that extra load?

24 MR. WILLIAM HARPER: Yes. I -- I think
25 in -- that -- that -- you've probably put it in better

1 words than I have, yes.

2 MR. ANTOINE HACAULT: The next -- oh,
3 I'm feeding back here. The next area, again with the
4 plausible highs and plausible lows, at page 9 of the
5 report on export pricing, you make some comments with
6 respect to the reasonableness of the Brattle pricing,
7 Dr. Gotham.

8 And I'd like to focus my question,
9 however, on the plausible low. We've heard you say, as
10 I understood your testimony today, that the CO2 pricing
11 is kind of an off-and-on switch, and it might -- I'm
12 trying to understand that in the context of should we
13 use that off-and-on switch with CO2 pricing out and
14 Brattle Group forecasting as being the plausible low?

15 And a low situation, we aren't privy to
16 that in CSI, but I'd like your comments generally from
17 -- if we're going to test the robustness of how plans
18 fare in different scenarios, especially if it's going
19 to be a merchant plant, how do we approach the
20 plausible low?

21 DR. DOUGLAS GOTHAM: I -- I think the -
22 - the Brattle Group, what they call the low carbon
23 scenario, which is the one without a carbon price in
24 it, is -- would put you in the ballpark of -- of the
25 low -- the plausible low.

1 And I think there's another data point
2 to consider there, and that is Potomac's no carbon
3 reference case, which is actually slightly lower. I --
4 I think both of those forecasts are in the -- in the
5 reasonable range if carbon doesn't happen.

6 So I guess I would also say that the --
7 the Potomac forecast in that situation is -- is
8 plausible, and since it's lower, that might be your
9 plausible low.

10 MR. BYRON WILLIAMS: Mr. Hacaault, just
11 -- just for the purposes of that question, I just want
12 to make sure that you're using 'plausible' in the same
13 way that Dr. Gotham is, and so if you could just make
14 sure that you are?

15

16 CONTINUED BY MR. ANTOINE HACAULT:

17 MR. ANTOINE HACAULT: Okay. Could you
18 perhaps define that? I -- I used it because it was
19 found in some of your material. Does it equate to the
20 P90 and P10s that were put in the Manitoba Hydro
21 high/low probabilities?

22 DR. DOUGLAS GOTHAM: I don't recall
23 where I would have used specifically the word
24 'plausible', but if you say that it's in there, I --
25 I'll take you at your word. In my -- and the answer to

1 your question is, no, it's not specifically related to
2 the -- the P10s and P90s.

3 My -- my way of looking at this was
4 whether or not the -- the analysis that went into it
5 was reasonable, and whether or not the -- the numbers
6 coming out made sense in -- in terms of something that
7 -- that I felt could happen in -- in those
8 circumstances. So there's not any -- I would not put a
9 -- a probability on that personally.

10 MR. ANTOINE HACAULT: Okay, let me try
11 and understand that question. You would not put a
12 probability, but is it a scenario that's, I'm going to
13 say, reasonable enough to include as a test parameter
14 for a low testing point to see how a plan fares with a
15 no CO2 scenario? Is it --

16 DR. DOUGLAS GOTHAM: Yes, I -- I would
17 say so.

18 MR. ANTOINE HACAULT: It's -- it's
19 something you believe would be useful to test in
20 arriving at the possible risk and downside or upside of
21 a particular plan and how it fares?

22 DR. DOUGLAS GOTHAM: Yes.

23 MR. ANTOINE HACAULT: Okay. The --
24 thank you. The next question I have is, understanding,
25 from this panel's perspective, Hydro has used two (2)

1 types of numbers, a ref/ref/ref number and an expected
2 value, and what's the significance of those two (2)
3 numbers, and does one send us a different message than
4 the other one? Should we put more reliance on one
5 versus the other?

6 I don't know who can answer that, but
7 I'd like some insight from this panel on that
8 particular issue.

9 MR. WILLIAM HARPER: Well, I -- I think
10 I specifically addressed that question in -- in my
11 presentation, actually, in a sense that, if you don't
12 have a normal probabil -- if you have a normal
13 probability distribution, theoretically, as -- as Dr.
14 Simpson said, the P50 is equal to the expected value.

15 If you don't, then they aren't, and you
16 -- and if you look at the materials pre -- presented by
17 Manitoba Hydro, or even in the analysis done with the
18 discount rates that I did in my evidence, the two (2)
19 values are -- are different, they are not the same,
20 which suggests that there is a difference there.

21 And in -- in my -- in my view, if you're
22 sort of looking at the two (2), the -- the view who I
23 already expressed is that I think the -- if you're --
24 if you're going to rely on one (1) number out of the
25 two (2), and that's all you're going to look at,

1 probably the expected value at least gives you some
2 context of what's the risk involved, because it's
3 basically taking into account the various probabilities
4 and sort of combining those into one (1) number as
5 opposed to the reference value.

6 So that -- that would be my opinion if I
7 had -- if someone said, You got to make a decision just
8 on this one (1) number, or just on that number, I'd
9 pick the expected value number.

10 MR. ANTOINE HACAULT: Thank you. Now,
11 the last subject area that I want to deal with is how
12 these, I'm going to say, quilts and probabilities are
13 useful and perhaps some of the weak points, and let me
14 try and put that into context.

15 If we go down a quilt and we go to high
16 capital costs, and there's a certain probability
17 assigned to that that's changed, and the updates, I
18 think it gets to some of the evidence that we've
19 chosen, one (1) plan to kind of use those probability
20 points.

21 Am I right in understanding that if, as
22 follows, for example, if Hydro has chosen a certain
23 percentage probability that it might be high and a
24 certain proba -- percentage probability that it might
25 be low for capital costs, as relates to the generating

1 stations and -- and -- but if it -- does that skew the
2 All Gas or Gas turbines to the same percentages?

3 While that might not necessarily be so,
4 we've heard some evidence that gas turbines aren't
5 necessarily always over budget and always increasing in
6 costs, so if we assign the same kind of percentage of
7 high risk that the Gas turbine will be a high price
8 when that occurs for the generating stations, how does
9 that affect how we look at the results?

10 MR. WILLIAM HARPER: I -- I think -- I
11 -- I think the issue is going to be specifically rela -
12 - related to when someone defines I got a high capital
13 cost for -- for stations, what is the reason for that
14 high capital cost? If -- if the reason is, is that
15 generally I view that turbines are going to cos -- you
16 know, turbines are going to cost more, transformers are
17 going to cost more, copper has more -- has -- going up
18 at a higher cost than -- than typi -- typically
19 inflation, those might be factors that -- or generating
20 use, that affect all type -- types of generation.

21 And so therefore, when -- when you were
22 constructing that scenario, you would basically
23 probably see hyd -- hydraulic stations going up at a
24 high -- higher than inflation, based on their
25 components of those particular types of materials, and

1 you'd do something the same -- same for Keeyask.

2 If -- if the reasons for high capital
3 construction costs were -- your view of that was
4 related strictly to the fact that I'm building in
5 northern Manitoba and they are circumstances related
6 specifically to that, then -- then clearly, that high
7 capital cost scenario -- you know, higher capital costs
8 for maybe Keeyask and Conawapa, but it would not be
9 affe -- it would not be affecting the All Gas.

10 So I -- I think it depends when you're
11 saying high capital, what's the -- what's the source of
12 the high capital, making sure you understand that, and
13 making sure it's been properly reflected in the costs
14 for each of the alternatives that you're considering.

15 MR. ANTOINE HACAULT: I think you're
16 getting to what I'm trying to determine. For example,
17 at a generating station, you might have different cost
18 pressures than you would in putting a gas turbine used
19 for the city to supply the city and deal with demand
20 and energy.

21 Is it fair, in the analysis when we do a
22 high capital costs, to assume that the gas turbines
23 will increase as much and have the same level of risk
24 of having a high capital cost as the generating
25 stations and incidental transmission, et cetera.

1 MR. WILLIAM HARPER: Two (2) comments:
2 It may not be fair, and 2) I'm not too sure if that's
3 what Manitoba Hyd -- Hydro did. I -- I'm trying to
4 recall, but I thought there were perhaps two (2)
5 different escalation rates. They -- they were higher
6 than normal, but there were different escalation rates
7 attributed to one (1) type of gen -- generation, then
8 another, as opposed to saying, It's going to be 3
9 percent higher than inflation for both types.

10 MR. ANTOINE HACAULT: But the one thing
11 it doesn't allow us to judge is if some people are
12 right that there was a tendency for gas turbine options
13 to be at a lower value, to judge how the plans will
14 fair if we assume a low capital cost for gas generation
15 and a high capital cost, or a reference cost for
16 generating stations, the quilts and the analysis do not
17 allow us to see what happens under those scenarios,
18 correct?

19 MR. WILLIAM HARPER: Right. I guess --
20 maybe this goes back to Dr. Simpson's point about that
21 would be another scenario. We've -- we've got high,
22 low, reference scenarios for -- for capital costs.
23 That would be another scenario again, that, you know,
24 you would say, What's the likelihood of that, and is
25 that plausible? And if it is, let's -- let's put --

1 put it in the analysis as another scenario and attach a
2 -- a probability to it, so that -- that goes down to
3 the point of how many -- how many points do -- do you
4 pick in doing your probability curves?

5 MR. ANTOINE HACAULT: Thank you very
6 much, members of the panel. That's -- those are all my
7 questions.

8 THE CHAIRPERSON: Merci, Me. Hacault.
9 Me. Monnin, s'il vous plait.

10 MR. CHRISTIAN MONNIN: Merci, M.
11 President, we have no questions.

12 THE CHAIRPERSON: Merci. Ms. Ramage,
13 please.

14

15 (BRIEF PAUSE)

16

17 MS. PATTI RAMAGE: Ms. Boyd is passing
18 out a book of documents. I believe, for the record, it
19 will be Manitoba Hydro Exhibit 182.

20 MR. KURT SIMONSEN: That's correct.

21

22 --- EXHIBIT NO. MH-182: Book of documents

23

24 MS. PATTI RAMAGE: And I have attempted
25 to renumber or re-file my pages to address Dr. Gotham

1 first, so we're going to be flipping all over this book
2 of documents, so.

3

4 (BRIEF PAUSE)

5

6 MS. PATTI RAMAGE: Are we ready?

7 MR. BYRON WILLIAMS: And -- and, Ms.

8 Ramage, you'll avi -- advise us if there's anything
9 that's not on the record?

10 MS. PATTI RAMAGE: Yes, I will. I had
11 to think if there is. I don't believe there is
12 anything that's not already on the record, but I will
13 count on my comrades here to tap me on the shoulder if
14 we get to something.

15 THE CHAIRPERSON: Mr. Williams, Dr.
16 Gotham has to leave when?

17 MR. BYRON WILLIAMS: Roughly about
18 2:30. Now --

19 THE CHAIRPERSON: Okay, we're --

20 MR. BYRON WILLIAMS: -- so I think
21 we're -- I think she's leading -- Ms. -- Ms. Ramage is
22 -- is prepared to lead with Dr. Gotham.

23 THE CHAIRPERSON: I was more concerned
24 about that we've been sitting for close to an hour and
25 a half now. I was just wondering if --

1 MR. BYRON WILLIAMS: Oh.

2 THE CHAIRPERSON: -- if -- as long as
3 people are prepared to go two (2) hours.

4 MR. BYRON WILLIAMS: Oh, you'd like a
5 brief -- and obviously, we're at your discretion.

6 THE CHAIRPERSON: Well, I think -- I
7 think in the interests of -- of trying to use Dr.
8 Gotham's time, I'm prepared to -- to sit quietly here
9 for another...

10 MR. BYRON WILLIAMS: Mr. Chair, I guess
11 the question is whether it's quietly or uncomfortably.

12

13 CROSS-EXAMINATION BY MS. PATTI RAMAGE:

14 MS. PATTI RAMAGE: I have to say I
15 don't like the mics on this side. You can't see the
16 light at all, but, Dr. Gotham, beginning with the load
17 forecast report, which is CAC Exhibit 65, you were the
18 primary author for part 1 of that report.

19 Is that correct?

20 DR. DOUGLAS GOTHAM: Yes.

21 MS. PATTI RAMAGE: And that part of the
22 report concentrated on standard approaches to load
23 forecasting, correct?

24 DR. DOUGLAS GOTHAM: Yes.

25 MS. PATTI RAMAGE: And part 1 of the

1 report attaches labels of 'acceptable' or
2 'unacceptable' to those approaches reviewed based on
3 statements made in a report titled "Peak Forecasting
4 Methodology Review," which was published by MISO in
5 2013.

6 Is that correct?

7 DR. DOUGLAS GOTHAM: That is correct.

8 MS. PATTI RAMAGE: And did you have any
9 part in the preparation of the MISO report?

10 DR. DOUGLAS GOTHAM: No, I did not.

11 MS. PATTI RAMAGE: Manitoba Hydro has
12 included the MISO report in the book of documents.
13 It's at Tab 7, page 42, and if we could turn to that?

14 Would you agree the MISO report is
15 intended to assist those developing annual forecasts of
16 peak demand of a load-serving entity coincident for
17 MISO summer annual peak demand?

18 DR. DOUGLAS GOTHAM: Yes.

19 MS. PATTI RAMAGE: And there I'm
20 referring to the first paragraph of -- the first
21 sentence in the first paragraph of the report.

22 And if we look down to the second
23 paragraph, you would agree that the meaning of
24 coincident peak demand in the context of this report is
25 the peak demand of a load-serving entity at the time of

1 MISO's summer annual peak, that is, MISO's largest peak
2 when viewed as a single entity?

3 DR. DOUGLAS GOTHAM: Yes.

4 MS. PATTI RAMAGE: You see that in the
5 second paragraph? Now if I could draw your attention
6 to the last sentence of the first paragraph in the MISO
7 report, and it says:

8 "At the outset, we wish to make clear
9 that this document is intended
10 primarily to assist, not prescribe,
11 while at the same time delineating
12 certain courses that are preferable,
13 and those that are acceptable for the
14 task at hand."

15 Did I read that correctly?

16 DR. DOUGLAS GOTHAM: I'm not sure where
17 the -- where you were reading from. I'm sorry.

18 MS. PATTI RAMAGE: And I'm sorry, I
19 didn't read it correctly. So let's do it again. My
20 record is broken. I didn't type it correctly is the
21 problem. I'm going to read it from the report. It is
22 in the -- if we look at the first paragraph, the last
23 sentence.

24 DR. DOUGLAS GOTHAM: Certainly.

25 MS. PATTI RAMAGE:

1 "At the outset, we wish to make clear
2 that this document is intended
3 primarily to assist, not prescribe,
4 while at the same time delineating
5 certain courses that are preferable,
6 and those that are unacceptable for
7 the task at hand."

8 Did I read it correctly this time?

9 DR. DOUGLAS GOTHAM: Yes.

10 MS. PATTI RAMAGE: So you would agree
11 that the task at hand is forecasting the peak demand of
12 a load-serving entity at the time of MISO's summer
13 annual peak?

14 DR. DOUGLAS GOTHAM: Yes.

15 MS. PATTI RAMAGE: And you'd also agree
16 that the purpose -- the purpose or primary function of
17 Manitoba Hydro's load forecast is not to forecast peak
18 demand at the time of MISO's summer annual peak demand.

19 Is that correct?

20 DR. DOUGLAS GOTHAM: Yes.

21 MS. PATTI RAMAGE: Now, if I could draw
22 your attention to footnote number 2, which is at page 6
23 of the report? That's page 47 of the book of
24 documents.

25 And footnote number 2 has been included

1 by MISO in the section that -- it's a footnote to the
2 section that introduces its list of unacceptable
3 forecasting methods for forecasting the peak demand of
4 a load-serving entity at the time of MISO's summer
5 annual peak.

6 It says, and I quote:

7 "These fore -- forecasting methods,
8 however, maybe valid under other
9 circumstances. Over longer horizons,
10 causal explanation of the forecast
11 becomes more critical."

12 Now, did I read that one correctly?

13 DR. DOUGLAS GOTHAM: You did read that
14 correct, yes.

15 MS. PATTI RAMAGE: So would you agree
16 that this footnote makes clear that the list of
17 unacceptable forecasting methods for MISO's peak
18 forecasting methodology review is not intended to apply
19 to all circumstances?

20 DR. DOUGLAS GOTHAM: It is not intended
21 to apply to all circumstances, but I would note that
22 you did read the last sentence of that, which indicates
23 that over longer horizons, causal explanation of the
24 forecast becomes more critical, and that includes the -
25 - the time trend which is used under the longer-term

1 forecast.

2 MS. PATTI RAMAGE: But the MISO report
3 doesn't comment on what methods of forecasting are
4 acceptable for other aspects of load forecasting such
5 as energy modelling or detailed sector breakdowns,
6 correct?

7 DR. DOUGLAS GOTHAM: It does not -- it
8 -- it's -- I don't know if I would agree with that
9 premise. I think the forecasting document is intended
10 for the use of MISO market participants and their load-
11 ser -- serving entities for their -- their -- for their
12 use in -- in the MISO process of -- of pro -- producing
13 a -- a peak demand at -- at time of MISO's -- MISO's
14 coincident peak, but it relies on, What is a -- a --
15 what are -- what are reasonable long-term methods for
16 forecasting to make that determination?

17 MS. PATTI RAMAGE: But when it says,
18 "the forecasting methods may be valid under other
19 circumstances," it doesn't purport to comment on those
20 other circumstances, correct?

21 DR. DOUGLAS GOTHAM: Other than saying
22 that over longer horizons, causal explanations of
23 forecast becomes more critical, yes.

24 MS. PATTI RAMAGE: Fair enough, and I
25 don't think it's necessary to turn to it, I really

1 don't, but on page 2 of your report, you say:

2 "Load forecasts based on regression
3 models have been largely
4 discredited."

5 And I'm wondering if you meant trend
6 analysis as opposed to regression models.

7 DR. DOUGLAS GOTHAM: I -- I -- yes. I
8 would -- I would say so. I have a tendency to --
9 they're -- both econometric and trend analysis rely on
10 a form of regression, and I've used what I would refer
11 to as a simple regression or a linear trend is what I
12 was referring to here, yes.

13 MS. PATTI RAMAGE: Okay. Good. I just
14 wanted to sort of --

15 DR. DOUGLAS GOTHAM: Yes.

16 MS. PATTI RAMAGE: -- narrow the -- the
17 discussion regarding trend analysis, which is where I'm
18 going now.

19 You would acknowledge that Manitoba
20 Hydro's use of trend analysis is -- trend analysis is
21 used only for the purpose of forecasting the load of
22 top consumers?

23 DR. DOUGLAS GOTHAM: When -- if you
24 talk in -- talking in terms of direct use in terms of
25 producing a forecast, yes, but there are other

1 components that I would classify as that within the
2 modelling framework.

3 For instance, the use of -- of moving
4 averages for the breakdown of electric versus non-
5 electric space heating and the assumption that the
6 number of people per household won't change is
7 essentially the -- the simplest form of -- of a linear
8 trend, and that's just assuming it's a straight, flat
9 line.

10 But in terms of -- of actual produce --
11 the -- the final -- the final output, which is the --
12 the forecast itself, or the com -- that component of
13 forecast itself, I would agree, yes.

14 MS. PATTI RAMAGE: Okay. And when
15 we're dealing with the top consumers, you'd agree that
16 that -- that that analysis begins at year 4 of the
17 forecast and -- and then continues through the end of
18 the forecast?

19 DR. DOUGLAS GOTHAM: Yes, I would
20 agree.

21 MS. PATTI RAMAGE: Okay. Now, if you
22 could turn to Tab 8, which is page 56 of the book of
23 documents. And, Mr. Williams, I'm going to -- I
24 don't think this has been previously introduced. We'll
25 -- we'll put this to the witness. It's a -- it's a

1 Manitoba Hydro document, for the record.

2 MR. BYRON WILLIAMS: And -- and if
3 you're just -- the witness may choose to accept it
4 subject to check, if he --

5 MS. PATTI RAMAGE: That's absolutely --

6 MR. BYRON WILLIAMS: -- if he wishes,
7 or he may choose not to, but I'll -- I'll leave that up
8 to -- to him.

9

10 CONTINUED BY MS. PATTI RAMAGE:

11 MS. PATTI RAMAGE: What here we have,
12 Dr. Gotham, is I asked our staff to draw me a picture,
13 because the lawyers have trouble with the numbers. We
14 just -- we work better in pictures. So I asked them
15 what exactly -- what portion of our load forecast does
16 this trend analysis impact -- or the -- the top
17 consumers.

18 And they have graphically depicted it
19 here, along with providing the -- the numbers for --
20 for those that work better in numbers. And -- and in
21 this, the trend analysis is depicted in blue and the
22 remainder in -- in rust, I would call that colour.

23 Would you accept that the -- the blue
24 line ranges from zero percent in year 1, it's -- then
25 it starts and it appears as .38 percent in 2016/'17, to

1 a high of 5 percent in 2032/'33?

2 DR. DOUGLAS GOTHAM: Subject to check,
3 yes.

4 MS. PATTI RAMAGE: And before I leave
5 the topic of trend analysis, could we turn to slide 30
6 of your presentation, which is not in the book of
7 documents. Yes. And here I wanted to draw attention
8 to the -- the bottom -- the statement on the bottom of
9 the slide, where it says the fact that closure of one
10 (1) top consumer was unexpected goes to a major flaw in
11 informed opinion forecasting. Now, I'm -- I'm moving
12 trend analysis and -- and informed opinion.

13 But anyways, your criticism here is tied
14 to the failure to predict the -- what is -- amounts to
15 the economic downturn of a top consumer in Manitoba
16 Hydro's load forecast.

17 Is that correct?

18 DR. DOUGLAS GOTHAM: Yes.

19 MS. PATTI RAMAGE: If I could have you
20 turn to Tab 9, or page 58, of the book of documents.
21 This is -- this is the Indiana 2013 industrial load
22 forecast.

23 You participated in the preparation of
24 this load forecast?

25 DR. DOUGLAS GOTHAM: Yes, I did.

1 MS. PATTI RAMAGE: And the graph on
2 this page, this is the -- the Indiana industrial
3 electricity sales average, a graph of sales average
4 compound growth rates. And if we look on -- on this
5 graph, on the left-hand side of the line, where the
6 history of industrial sales is depicted, is it say --
7 safe to say that the line that says, "2013 forecast,"
8 and if we move to the left, that would represent
9 actuals prior to that line, the horizontal -- or I mean
10 vertical line?

11 DR. DOUGLAS GOTHAM: The -- the right
12 of the vertical line for the 2013 forecast is actual.
13 The left for the 2013 forecast line is history. The
14 history period actually is different for the 2009 and
15 2011 forecasts.

16 MS. PATTI RAMAGE: Would the -- if --
17 if we look to the 2007 or so mark, and you see the --

18 DR. DOUGLAS GOTHAM: M-hm.

19 MS. PATTI RAMAGE: -- the drop in the
20 line --

21 DR. DOUGLAS GOTHAM: Right.

22 MS. PATTI RAMAGE: -- would that
23 represent the economic downturn -- the global economic
24 downturn?

25 DR. DOUGLAS GOTHAM: That is part of

1 the global -- yeah, the global economic downturn
2 essentially happened midway through 2008. And so
3 that's one (1) of the factors that affects the
4 forecast.

5 MS. PATTI RAMAGE: And that was a
6 decrease of consumption of roughly 6,000 gigawatt
7 hours?

8 DR. DOUGLAS GOTHAM: But not strictly
9 due to the global economic downturn. That was part of
10 the factors affecting it. There was also other factors
11 that are different between the forecasts, including the
12 amount of demand-side management that's included in the
13 -- and self-generation that's included in the forecast.
14 Those -- those numbers also change.

15 MS. PATTI RAMAGE: Okay. If I could
16 have you then turn to page 67 of the book of documents.
17 Here we've provided the Indiana -- Indiana's 2007
18 industrial load forecast.

19 And, Dr. Gotham, you were also involved
20 in the preparation of this load forecast?

21 DR. DOUGLAS GOTHAM: Yes, I was.

22 MS. PATTI RAMAGE: You would agree that
23 if we look at the forecast of load in Indiana made back
24 in 2007, and that would be the top line of the graph,
25 and we've -- and following that line beginning in or

1 around load year 2006, there's no forecast decline in
2 consumption?

3 In fact the trend is increasing
4 consumption?

5 DR. DOUGLAS GOTHAM: Yes, that's true.

6 MS. PATTI RAMAGE: And that 2007
7 forecast of increasing consumption was, I would suggest
8 -- well, it was higher than the increasing consumption
9 trend forecast in 2005 and 2003 before that.

10 Is that correct?

11 DR. DOUGLAS GOTHAM: Yes, that is
12 correct.

13 MS. PATTI RAMAGE: So the 2007 Indiana
14 econometric formulated forecast did not predict the
15 economic downturn?

16 DR. DOUGLAS GOTHAM: That is correct.

17 MS. PATTI RAMAGE: Does that suggest it
18 has a major flaw or that it -- or would you agree that
19 some unexpected events simply can't be predicted by any
20 methodology?

21 DR. DOUGLAS GOTHAM: I would agree with
22 the statement that some events can't be predicted with
23 any methodology. That is correct.

24 MS. PATTI RAMAGE: And finally, before
25 I leave this area, we talked about a 6,000 gigawatt

1 drop. And you said part of it was DSM. But the
2 overall load in -- industrial load is roughly 40,000
3 gigawatt hours in Indiana.

4 Is that correct?

5 DR. DOUGLAS GOTHAM: Yes, that is
6 correct.

7 MS. PATTI RAMAGE: And that -- that
8 drop in 2000 and -- I think you said eight (8), of
9 6,000 gigawatt hours, that would compare to total
10 industrial load in Manitoba of 6,000 gigawatt hours?

11 DR. DOUGLAS GOTHAM: I'll -- I'll take
12 your word for that. I don't know the -- the number
13 on...

14 MS. PATTI RAMAGE: You'd agree there's
15 substantially more industrial customers in Indiana --

16 DR. DOUGLAS GOTHAM: Oh, yes, yes.

17 MS. PATTI RAMAGE: -- than in Manitoba?
18 Yeah. You lost, over that time period, what we have to
19 begin with.

20 Would that be correct?

21 DR. DOUGLAS GOTHAM: We -- we lost over
22 the short period. Most of that recovered.

23 MS. PATTI RAMAGE: Thank you.

24

25

1 (BRIEF PAUSE)

2

3 MS. PATTI RAMAGE: It's good when I'm
4 crossing things off. We'll move much faster.

5 DR. DOUGLAS GOTHAM: If I just answer -
6 - if I say 'yes' to everything, do I get to make the
7 flight?

8 MS. PATTI RAMAGE: It's very tempting,
9 but I do like Mr. Williams. I try to get along with
10 him. Next I wanted to talk about your evidence
11 regarding transmission congestion and losses.

12 You highlighted pricing differentials
13 between the MISO regions in an attempt to show how
14 congestion and losses affect regional prices, correct?

15 DR. DOUGLAS GOTHAM: Yes.

16 MS. PATTI RAMAGE: And if I follow your
17 logic correctly, if Manitoba Hydro doesn't acknowledge
18 the impact of congestion appropriately in its planning,
19 it will overestimate the prices that it can obtain in
20 the export market.

21 DR. DOUGLAS GOTHAM: I think that's
22 likely, yes.

23 MS. PATTI RAMAGE: Okay. And you're
24 aware that Manitoba Hydro relies on six (6) different
25 export price forecasts to create the Manitoba Hydro

1 consensus price forecast?

2 DR. DOUGLAS GOTHAM: Yes.

3 MS. PATTI RAMAGE: And you had an
4 opportunity to review Manitoba Hydro's rebuttal
5 evidence on this point?

6 DR. DOUGLAS GOTHAM: Yes.

7 MS. PATTI RAMAGE: Okay. If I could
8 have you turn to page 1 of the book of documents. Do
9 you see where it says, beginning at line 3:

10 "The external price forecast provided
11 to Manitoba Hydro by the price
12 forecast consultants are locational
13 forecasts for the Minnesota Hub.
14 Therefore, no further adjustments
15 need to be made for any congestion
16 and losses between the Minnesota Hub
17 and locations further east in the
18 MISO market, such as Indiana or the
19 Michigan Hub -- Hubs."

20 Did I read that correctly?

21 DR. DOUGLAS GOTHAM: Yes.

22 MS. PATTI RAMAGE: Now, I'm not asking
23 you to confirm the contents of the -- of proprietary
24 reports that you haven't seen, but do you accept that
25 if the export price forecast used by Manitoba Hydro are

1 locational forecasts for the Minnesota Hub, would you
2 agree that Manitoba Hydro would only need to apply a
3 basis differential to account for congestion, losses
4 between the Minnesota Hub, and the MHEB pricing note?

5 DR. DOUGLAS GOTHAM: That would ass --
6 that would require me to assume that the -- the other
7 five (5) consultants other than Brattle had actually
8 done so correctly, which I have no way of knowing
9 whether --

10 MS. PATTI RAMAGE: But that would be my
11 -- that's the assumption I'm asking, that if they have
12 used the Minnesota Hub and they have -- they have done
13 that correctly and -- and --

14 DR. DOUGLAS GOTHAM: If they've -- yes
15 --

16 MS. PATTI RAMAGE: -- an independent
17 consultant such as Potomac has confirmed that, if that
18 was -- if that's confirmed --

19 DR. DOUGLAS GOTHAM: If -- if they'd
20 done that correctly, then, yes, I would agree.

21 MS. PATTI RAMAGE: Okay. And based on
22 -- oh, sorry. I'm trying to move things along. Maybe
23 a little too fast.

24 And based on discussions this afternoon,
25 I heard you agree with the testimony -- or at least I

1 think I heard you agree with the testimony of our Dr.
2 Jacobson regarding the potential benefits of multi-
3 value projects for Manitoba Hydro, that we are on one
4 side of the congestion. And if those MVPs are -- are
5 put in place that would allow us to get to the other
6 side of the congestion where, as I understand it, the -
7 - there are higher prices to be gained?

8 DR. DOUGLAS GOTHAM: The addition of
9 the MVPs will -- absent any other changes, will relieve
10 congestion. However, those MVPs are, for the most
11 part, particularly tied to specific wind developments.
12 And so if they're exporting wind along those lines,
13 it's like adding another -- another line to the -- to
14 the expr -- another lane to the expressway, but adding
15 an equivalent and number of cars as well. You're still
16 having traffic jam issues.

17 And now you may have situations where
18 the wind's not blowing, where -- and you -- and tho --
19 those lines become available. And -- and so there may
20 be times during the -- the day or the year where those
21 things would -- would help in general alleviate
22 congestion.

23 But in reality you don't build a -- a
24 transmission line on a 1 megawatt to 1 megawatt basis
25 for wind. You want -- if you had 1,000 megawatts of

1 wind, you wouldn't build a 1,000 megawatt transmission
2 line. You'd build something smaller. So there may be
3 times when it actually also -- if the wind is really
4 blowing strong, it would actually exacerbate that.

5 The -- the real question from -- in my
6 mind is whether or not there will be additional
7 transmission built to alleviate that congestion beyond
8 what's being built for the addition of wind. And I
9 don't have an answer for that.

10 THE CHAIRPERSON: Can I ask you, Dr.
11 Gotham, to -- to define a multi-value project for the
12 benefit of the panel members who may not be familiar
13 with the term?

14 DR. DOUGLAS GOTHAM: I won't have the -
15 - the official MISO definition, but it is essentially a
16 transmission project that isn't -- it -- it doesn't
17 make sense if you're only looking at a specific
18 purpose, whether that's the -- the economic evaluation,
19 the alleviation of congestion, and so forth.

20 But if you look at multiple purposes for
21 the line, for instance, policy decisions like renewable
22 portfolio standards and meeting those things, if you
23 look at -- at all of the different values for the line,
24 then the line becomes economic.

25 And the MISO process identifies multiple

1 -- the MVP process is the multiple value projects that
2 it -- it ceases being economic if you consider all of
3 the various factors.

4

5 CONTINUED BY MS. PATTI RAMAGE:

6 MS. PATTI RAMAGE: Dr. Gotham, just to
7 sort of finish up on this. If Manitoba Hydro is
8 relying on price forecasts at the Minnesota Hub and
9 those Minne -- and those price forecasts -- multi-value
10 products are simply not part of those price forecasts,
11 you would agree then they're two (2) separate issues
12 and that if some day in the future that project comes
13 along and if that provides benefits, those benefits
14 would be pure -- that's bonus. That's not -- would you
15 agree with that?

16 That's -- if you're -- if you're -- the
17 export price forecast you're relying on are Minnesota
18 Hub on this side of the congestion?

19 DR. DOUGLAS GOTHAM: I guess I would --
20 I would agree that anything that alleviates congest --
21 the congestion issue would benefit the -- would --
22 would benefit Manitoba Hydro in terms of their export
23 price that they would receive. And I -- I don't know
24 that the -- the MVP projects would -- I would -- I
25 don't know that I could say that the MVP projects will

1 or won't do that. I -- I have a -- because of the
2 increased wind, I'm -- I'm somewhat skeptical that
3 they'll do much to -- to alleviate the overall
4 situation.

5 MS. PATTI RAMAGE: I think that's fair.
6 I -- I think my point was it's not part of our case.
7 It would -- so therefore, I think we're -- we're
8 agreeing on that point.

9 DR. DOUGLAS GOTHAM: Yeah, that's nice.

10

11 (BRIEF PAUSE)

12

13 MS. PATTI RAMAGE: Next then I'll turn
14 to the discussion you had regarding MISO's 2014/'15
15 planning resource option results that you presented in
16 your direct evidence.

17 How long has the MISO planning reserve
18 option been active?

19 DR. DOUGLAS GOTHAM: I don't know
20 exactly. This is at least the second, maybe the third
21 one they've had.

22 MS. PATTI RAMAGE: So that would be
23 2013 or so they --

24 DR. DOUGLAS GOTHAM: They -- they --
25 this -- this was for the -- what they referred to as

1 the 2014/2015 year, which covers, essentially, this
2 summer through next spring. And there was one in 2013
3 that covered 2013 and 2014. I don't know if there was
4 one from 2012 to 2013.

5 I haven't -- until now, I haven't really
6 followed it very closely because the -- the excess
7 capacity in MISO has meant that the option has
8 basically come back with a price of zero up until now,
9 so it hasn't been of much interest.

10 MS. PATTI RAMAGE: Fair to say it's in
11 its infancy?

12 DR. DOUGLAS GOTHAM: At least a toddler
13 maybe. I'll give you that much.

14 MS. PATTI RAMAGE: Okay. Good. Are
15 you aware of Potomac's concerns with MISO's capacity
16 market design?

17 DR. DOUGLAS GOTHAM: Yes, I am.

18 MS. PATTI RAMAGE: And would you agree
19 that utilities in northwest MISO primarily rely on
20 self-supply or bilateral contracts much more so than
21 the planning resource option?

22 DR. DOUGLAS GOTHAM: Yes, I would

23 MS. PATTI RAMAGE: Would you agree then
24 that that means, without significant changes, the
25 option base market won't produce the prices, for

1 example, in the Potomac forecast or that they forecast
2 instead those -- those type of prices are reflected of
3 bilateral capacity contracts?

4 DR. DOUGLAS GOTHAM: I think that
5 you'll see most of -- I think without changes to the --
6 the MISO capacity market construct, you'll see --
7 you'll contin -- continue to see most of the -- the
8 transactions occurring on the -- the bilateral market.
9 If that's what you're asking, I would agree.

10 MS. PATTI RAMAGE: Okay. Next we'll
11 deal with carbon prices. Mr. Williams has a big smile
12 on his face. He can see how I'm moving along.

13 Would you agree you didn't have the
14 opportunity to see Manitoba Hydro's actual carbon price
15 forecast; rather you were only able to base your
16 preliminary conclusions on Brattle's carbon price?

17 DR. DOUGLAS GOTHAM: That is correct.

18 MS. PATTI RAMAGE: And you have not
19 seen the prices Manitoba Hydro has negotiated for its
20 long-term export sales, correct?

21 DR. DOUGLAS GOTHAM: That is correct.

22 MS. PATTI RAMAGE: But could we agree
23 that counterparties to those sales do not have any more
24 certainty than Manitoba Hydro does as to whether and to
25 what degree carbon will influence future prices for

1 electricity?

2 DR. DOUGLAS GOTHAM: I would agree with
3 that.

4

5 (BRIEF PAUSE)

6

7 MS. PATTI RAMAGE: Thank you, Dr.
8 Gotham. We managed to get through all of those
9 questions. And I think we'll get you to the airport on
10 time.

11 DR. DOUGLAS GOTHAM: I appreciate the
12 help.

13 MR. BYRON WILLIAMS: Just for the
14 record, I want to indicate that I like Ms. -- Ms.
15 Ramage, as well.

16 THE CHAIRPERSON: Mr. Peters, do you
17 have questions for Dr. Gotham?

18

19 CROSS-EXAMINATION BY MR. BOB PETERS:

20 MR. BOB PETERS: I have a few. And I
21 don't expect to delay him either, so if I might. And -
22 - and I'll ask them, Dr. Gotham and Dr. Simpson, in
23 looking at the Manitoba Hydro forecast, did you spend
24 time evaluating the period between 2034 and 2049?

25 Did you go out past the twenty (20)

1 years?

2 DR. DOUGLAS GOTHAM: I did not.

3 DR. WAYNE SIMPSON: In the -- in the
4 illustrative example I gave, I went out thirty (30)
5 years. But I -- I would point out that if you go out a
6 different number of years, you'll get the same -- get
7 the same results. I mean, the proportionalities work
8 right all the way through. It doesn't matter whether
9 you choose fifteen (15), seventeen (17), thirty (30),
10 or fifty (50) years.

11 MR. BOB PETERS: I want to turn to the
12 forecast specifically with the top customers. And I --
13 I also want to understand the discussion you had with
14 Ms. Ramage, and perhaps we could put up Ms. Ramage's
15 book of documents, Manitoba Hydro 182, page 56. That
16 was the chart with the rust on it.

17 Did I understand correctly, Dr. Gotham,
18 that the sliver in blue or lavender was related to the
19 potential large industrial load, which was the trend
20 analysis portion of the top customers?

21 DR. DOUGLAS GOTHAM: That is my
22 understanding from what Ms. Ramage described.

23 MR. BOB PETERS: And what I didn't
24 understand was, I think you had answered to one (1) of
25 her questions that you used trend analysis -- I'm

1 sorry, that you detected Manitoba Hydro used trend
2 analysis in other aspects of its -- of its load
3 forecast.

4 DR. DOUGLAS GOTHAM: That is correct.

5 MR. BOB PETERS: So some portion of the
6 rust would also involve trend analysis, what the panel
7 should understand?

8 DR. DOUGLAS GOTHAM: Yes. There are --
9 there are components within the forecasting modelling
10 system that the -- the forecasting models they've used,
11 that have trend analysis built into them. For
12 instance, the residential customers is -- is a forecast
13 from going from a population projection to a number of
14 dwellings, and the number -- and -- and that conversion
15 is essentially a very simplified version of a trend
16 analysis in that it's just held constant.

17 And then also, the -- the next step on
18 that is -- is the number of electric space heating
19 customers versus the non-electric space heating
20 customers, which is done using a five (5) year moving
21 average, which is a more sophisticated but yet still a
22 trend analysis in that there are no causal -- causal
23 factors included.

24 MR. BOB PETERS: Did Manitoba Hydro use
25 trend analysis to calculate the general service mass

1 market average use?

2 DR. DOUGLAS GOTHAM: Their -- the one
3 (1) component of -- of that that includes the trend
4 analysis is that the -- the number of -- of households
5 or dwellings is part of the inputs to that forecast.

6 MR. BOB PETERS: And in terms of the
7 top customers' forecasts, what would be a better
8 methodology? And I want to make sure the Board has
9 your -- your views on that.

10 DR. DOUGLAS GOTHAM: In my opinion, the
11 -- especially when it comes to the large -- the -- the
12 industrial sector, as these customers are most likely a
13 part of, it's difficult to do anything with a -- a --
14 an end-use model. There's too many individual
15 processes that we -- the -- the utility or -- or any
16 other forecaster's not going to know the specifics of.
17 It's difficult to get data on that level.

18 So the -- the -- the best option is an
19 econometric forecast, and as -- as you've seen, that
20 doesn't necessarily capture the -- the vagaries of the
21 economy, but it does give you some explanation of
22 what's going on.

23 And also, if you do have a -- a specific
24 load like you do with -- like -- like Hydro may have
25 with the upcoming pipeline load, you can see what's

1 built into the forecast already in terms of that and
2 make the proper adjustments so that you're not
3 undercounting or overcounting.

4 MR. BOB PETERS: Dr. Gotham, did you
5 and/or Dr. Simpson look at historical price elasticity
6 in Manitoba?

7 DR. DOUGLAS GOTHAM: I saw indications
8 from Hydro that they had looked at it in the past. One
9 of the issues that -- that the Hydro forecasters would
10 have, and I sympathize with them on this, is that if
11 you haven't had price variation in your history, you
12 can't tease out a price elasticity from the data.

13 And so having a -- a history of low,
14 stable electricity prices makes determining a -- from a
15 mathematical standpoint, determining a price elasticity
16 from the historical data difficult, if not impossible.

17 MR. BOB PETERS: If we could, Diana,
18 turn to CAC Exhibit 65 and slide 20, please? This is a
19 presentation that, Dr. Gotham, you made with Dr.
20 Simpson yesterday, and I want to make sure the panel
21 understands the conclusion that was reached relative to
22 your -- your discussion.

23 Would the -- would it be correct to
24 understand that, based on the price elasticity that
25 could be attributed to residential customers, you would

1 calculate that there could be a deferral of resources
2 needed to serve Manitobans by one (1) extra year?

3 DR. WAYNE SIMPSON: Yes --

4 MR. BOB PETERS: Is that --

5 DR. WAYNE SIMPSON: -- for residential
6 alone.

7 MR. BOB PETERS: That was my qualifi --
8 it was just a residential, et cetera --

9 DR. WAYNE SIMPSON: That's -- yeah. And
10 I note that that's one-third (1/3) of the load,
11 according to Hydro figures.

12 MR. BOB PETERS: All right. And then
13 in terms of general service mass market, if you applied
14 the same reasoning, you're suggesting that that portion
15 of the load could be deferred an extra three (3) to
16 four (4) years?

17 DR. WAYNE SIMPSON: No, it would be the
18 twice the residential, which would be two (2) plus
19 years, and I've said the sum of the two (2), the
20 residential and the -- and the other two (2) groups,
21 which are two-thirds (2/3s) of the load, would be three
22 (3) plus years, and I characterized it as -- as three
23 (3) to four (4) years.

24 MR. BOB PETERS: Except in terms of the
25 overall load of Manitoba Hydro, it's not deferring the

1 entire load for another three (3) plus years. Have I -
2 - have I misunderstood what your -- what your
3 conclusion was?

4 DR. WAYNE SIMPSON: I'm carrying
5 forward the -- the effect of the residential -- on the
6 residential load, the one (1) plus years, which is a
7 third (1/3) of the total load. I'm just multiplying
8 that by three (3).

9 MR. BOB PETERS: All right. Then I
10 have your point.

11 DR. WAYNE SIMPSON: That's a relatively
12 unsophisticated forecast, but the best that I can do
13 with the information that I have.

14 MR. BOB PETERS: Resulting in a three
15 (3) to four (4) year, perhaps, exaggeration of the year
16 of need?

17 DR. WAYNE SIMPSON: That's correct.

18 MR. BOB PETERS: In terms of the price
19 forecast, Dr. Gotham, I think these points were
20 covered, well, except did you have an opportunity to
21 review Brattle's capacity price forecast?

22 DR. DOUGLAS GOTHAM: There was some
23 information in there, I think. There wasn't
24 information behind where they got the price forecast,
25 but the -- the capacity price numbers themselves were

1 there.

2 MR. BOB PETERS: So you're not able to
3 provide a view as to the reasonableness of -- of their
4 capacity price forecast?

5 DR. DOUGLAS GOTHAM: Their capacity --
6 yeah, I thought -- their capacity price forecast, I
7 think, is within the realm of the uncertainty regarding
8 future cost of new entry. So I -- I would find -- I
9 guess I would classify it as reasonable.

10 MR. BOB PETERS: And that layered on
11 top of a -- a comment you made, I think, to Ms. Ramage,
12 that the -- the capacity market in MISO, while not in
13 its infancy, but a toddler, it's still -- still close
14 to zero?

15 DR. DOUGLAS GOTHAM: It's close to
16 zero. This is the first auction that they've had that
17 indicated a -- a -- essentially a -- a real -- a -- a
18 reasonable, positive price for -- for capacity, and --
19 and it's the -- the issue there isn't necessarily, in
20 my mind, the -- the maturity of the market as it is the
21 -- the situation in terms of existing capacity surplus
22 within MISO.

23 If there's a surplus in cap -- of
24 capacity, there's no value in -- in the -- essentially,
25 in the market for capa -- for that excess capacity, the

1 price ends up being zero. But now that we're starting
2 to -- to see a -- a situation where we don't have that
3 significant surplus going forward, we're starting to
4 see positive prices.

5 MR. BOB PETERS: Do the multi-value
6 transmission projects impact on the capacity prices?

7 DR. DOUGLAS GOTHAM: They would have
8 some impact, yes.

9 MR. BOB PETERS: Mr. Chairman, I'd like
10 to thank Dr. Gotham for his attention and answers to my
11 questions. I have no further questions for him.

12 THE CHAIRPERSON: Thank you, Mr.
13 Peters. I think that concludes the -- the evidence
14 that we expected to get from --

15 DR. DOUGLAS GOTHAM: Thank you, Mr.
16 Chairman.

17 THE CHAIRPERSON: -- Dr. Gotham. So I
18 want to wish you a safe trip back, and thank you for
19 the work you've done and your contributions to these
20 proceedings. Thank you.

21 DR. DOUGLAS GOTHAM: Thank you.

22 MR. BYRON WILLIAMS: Mr. Chair, if I
23 just -- I -- I don't think we have any redirect, but if
24 I just might caucus with Dr. Gotham for a second?

25

1 (BRIEF PAUSE)

2

3 MR. BYRON WILLIAMS: We have no
4 redirect. Just CAC (Manitoba) really would like to
5 thank Dr. Gotham for -- for coming. I -- I don't get
6 to take him out for a -- a drink afterwards, so -- but
7 next time I'm in West -- West Lafayette, I'll make sure
8 I do.

9 THE CHAIRPERSON: Okay. With that,
10 let's take ten (10) minutes.

11

12 (DOUGLAS GOTHAM STANDS DOWN)

13

14 --- Upon recessing at 2:29 p.m.

15 --- Upon resuming at 2:46 p.m.

16

17 THE CHAIRPERSON: I believe that we can
18 resume the proceedings. So I will ask -- maybe, no,
19 we'll stand down for a second.

20

21 (BRIEF PAUSE)

22

23 THE CHAIRPERSON: I think that we
24 should resume the proceedings. So, with that, I'll ask
25 Mr. Gange, please, do you have questions of Dr. Simpson

1 and Mr. Harper?

2 MR. WILLIAM GANGE: Thank you, Mr.

3 Chair.

4

5 CROSS-EXAMINATION BY MR. WILLIAM GANGE:

6 MR. WILLIAM GANGE: Mr. Harper, a
7 couple of questions. And -- and these may be very
8 trite and obvious, but from -- I need to put them on
9 the record.

10 At page 60 of -- of your slide
11 presentation, you indicate -- and -- and thank you,
12 Diana, that's very kind of you to get that up already -
13 - the plans yielding the greatest environmental and
14 provincial benefits impose the greatest costs on
15 Manitoba Hydro or ratepayers.

16 Could you explain what you meant by
17 that, sir?

18 MR. WILLIAM HARPER: I -- I think, if
19 you want to go back to the previous slide, right, I --
20 I think in -- I think -- I think -- I apologize, I
21 can't remember which -- which panel member I had this
22 conversation with, but I -- I think I went through this
23 with one of the panel members in showing the -- the
24 plans that tended to have the -- the largest negative
25 numbers, which you would -- for government and

1 environment, which you could say are disband benefits.
2 Like Plan 6 had the highest positive values for market
3 val -- for market valuation, which is really to a large
4 extent the Manitoba Hydro perspective, except using a
5 dis -- different discount rate.

6 And so it was the fact that, whereas on
7 the far left-hand side you see zeroes all the way down,
8 some of those columns there have big pluses and big --
9 big minuses, which means there's -- there's winners --
10 you know, tho -- tho -- those accounts are really to
11 the good or to the bad by significant amounts. That
12 was the point I was trying to make.

13 MR. WILLIAM GANGE: And -- and when you
14 were making that point, you're -- I -- I take it, sir,
15 that what you're saying is that, at some point, the
16 people making decisions with respect to these issues
17 have to look to -- to balance off those -- those
18 competing interests.

19 MR. WILLIAM HARPER: Right. The only -
20 - only point I was making, you can't simply look at the
21 bottom row.

22 MR. WILLIAM GANGE: Right. So that,
23 for instance, the -- at -- at page 61, you -- you made
24 the point that advancing Keeyask/750/Gas appears
25 economic, but -- and -- and then this is the point

1 where I -- I guess it's very -- the obvious comment is
2 that although it appears economic, that would have a
3 greater impact -- a negative impact environmentally
4 than some of the other plans, correct, sir?

5 MR. WILLIAM HARPER: Right. And that -
6 - if you recall back right to the beginning of my
7 presentation, I was saying what I was dealing with was
8 the economic evaluation and clearly issues like the
9 macroeconomic or the macro -- macrosocioeconomic or the
10 macro-environmental.

11 Those are other things that had to be
12 taken into consideration. And the way they're
13 reflected is in these multiple accounts that -- that
14 were represented on -- on that slide. It would be nice
15 if we had one (1) preferred plan that was best coming
16 out on all those accounts, but that's never reality, is
17 it?

18 MR. WILLIAM GANGE: Yes, right. So
19 that the greenhouse gas effects of -- of having a gas
20 plant is one of those things where the decision makers
21 are going to have to make hard decisions --

22 MR. WILLIAM HARPER: Yes.

23 MR. WILLIAM GANGE: -- in terms of what
24 the greenhouse gas effect is as compared to the
25 economic bottom line.

1 MR. WILLIAM HARPER: Yes.

2 MR. WILLIAM GANGE: Okay. Those are my
3 questions. Thank you, sir. Appreciate that.

4 THE CHAIRPERSON: Thank you, Mr. Gange.
5 Me. Monnin, any questions for this
6 panel?

7 MR. CHRISTIAN MONNIN: Merci, M.
8 President. No, we have no questions.

9 THE CHAIRPERSON: Ms. Ramage, please.
10

11 CONTINUED CROSS-EXAMINATION BY MS. PATTI RAMAGE:

12 MS. PATTI RAMAGE: Okay. Thank you.
13 And I'm going to move on to the topic of elasticity
14 now, with you, Dr. Simpson. I'm funny. I don't know
15 why.

16 MR. WILLIAM HARPER: You were looking
17 at me when you said that.

18 MS. PATTI RAMAGE: Oh, did I?

19 DR. WAYNE SIMPSON: That's why we
20 laughed.

21 MS. PATTI RAMAGE: Oh, okay. I know
22 the difference. Yes, I know.

23 If I could get you to turn to Tab 6,
24 which is page 60 in the book of documents. And here,
25 this is where you provided some illustrative, back of

1 the envelope calculations. And you -- you indicate
2 that -- you said:

3 "Take the US estimates that a 10
4 percent increase in the price of
5 electricity can be expected to reduce
6 household load by around 5 percent in
7 the long run."

8 If I understood your evidence earlier,
9 this would be equivalent to a negative point five-zero
10 (.50) price elasticity.

11 Is that correct?

12 DR. WAYNE SIMPSON: That's correct.

13 MS. PATTI RAMAGE: Okay. And in
14 Manitoba Hydro/CAC Simpson and Gotham 38, Manitoba
15 Hydro asked you to file a copy of the US estimate
16 referred to at page 9 of your report. And in response
17 you filed a document titled, "A Review of the
18 Literature on the Price Elasticity of Demand for
19 Electricity." And we've provided that at page 61 of
20 the book of documents.

21 Do you recall your response?

22 DR. WAYNE SIMPSON: That I filed --
23 that I supplied this, which was filed, yes.

24 MS. PATTI RAMAGE: Yes. Now, looking
25 at that review, I don't see any indication of the

1 author of the report on the document filed.

2 Can you advise who the author is?

3 DR. WAYNE SIMPSON: No, this -- this is
4 from E3 -- what are their names... E3 Network. So the
5 -- the author is -- is not supplied.

6 MS. PATTI RAMAGE: Sir, when I look on
7 the E3 Network website, I can say that the -- the best
8 I could find out, they had a student named Matt
9 (phonetic).

10 Does that sound familiar, or did you
11 look on the website to see who the author was?

12 DR. WAYNE SIMPSON: I did. And I
13 contacted E3 Network, but didn't receive any reply on
14 specifics of the preparation of the report that I could
15 answer to.

16 MS. PATTI RAMAGE: Okay. The first
17 sentence of the review indicates that:

18 "The results of this review are shown
19 on three (3) tables."

20 But I don't see any tables included in
21 the materials filed. And so I take it this isn't the
22 full report.

23 Do you have the full report?

24 DR. WAYNE SIMPSON: I do not.

25 MS. PATTI RAMAGE: The bibliography

1 references twenty-three (23) academic articles and
2 studies. Would you agree that six (6) of those
3 articles relate to studies done on price elasticity in
4 countries outside of North America, specifically
5 Demark? There's two (2) for Spain, Belgium, Norway,
6 and India.

7 Does that sound correct?

8 DR. WAYNE SIMPSON: Yes.

9 MS. PATTI RAMAGE: And at least seven
10 (7) of the remaining articles are fifteen (15) or more
11 years older; three (3) I noted from the 1970s.

12 DR. WAYNE SIMPSON: I'll -- I'll take
13 that number subject to verification.

14 MS. PATTI RAMAGE: Okay. And the most
15 recent of the articles was written in 2006?

16 DR. WAYNE SIMPSON: Yes.

17 MS. PATTI RAMAGE: And I -- when I say,
18 "articles," I -- I'm using this -- 'article' and
19 'study' as the same term. And, for example, the 2006
20 article I'm referring to, or study, is "EIA 2006
21 Assumptions to the Energy Outlook 2006."

22 Do you see that one? It the -- it's on
23 page 62.

24 DR. WAYNE SIMPSON: Which would -- I
25 take your point, would not be a -- a refereed, pure

1 reviewed article in the sense -- in an academic sense.

2 MS. PATTI RAMAGE: I'm not even making
3 that point. My point would be, have you looked at that
4 article?

5 DR. WAYNE SIMPSON: No.

6 MS. PATTI RAMAGE: Would you accept
7 then, subject to check, that -- or that study doesn't
8 refer to price elasticity? If you...

9 DR. WAYNE SIMPSON: It says,
10 "assumptions." I'd -- I'd have to actually look at
11 that article. I did not go through the list -- the
12 articles referred to in the meta-analysis, no.

13 MR. BYRON WILLIAMS: Ms. Ramage, though
14 we'd certainly be prepared to undertake to verify that
15 assumption if you would like.

16

17 CONTINUED BY MS. PATTI RAMAGE:

18 MS. PATTI RAMAGE: Have -- have you
19 read -- I take it you haven't read all of the twenty-
20 three (23) studies.

21 Did you review any of the twenty-three
22 (23) studies that are referred to in the bibliography?

23 DR. WAYNE SIMPSON: Not for the
24 purposes of this exercise, no.

25 MS. PATTI RAMAGE: Then if I go back to

1 the front page on page 61 of -- of this, you used the -
2 - the price elasticity of negative 0.50 percent. I
3 don't see anywhere on this page that uses that number.

4 Is that correct?

5 DR. WAYNE SIMPSON: Actually, zero
6 point four-seven (0.47) rounded off would be zero point
7 five (0.5), but I think your point is a different one.
8 And I -- I would take that what I did was -- what I
9 actually referenced was based on a review of these
10 surveys. The numbers that come up most often are zero
11 point two (0.2) for the short run and zero point seven
12 (0.7) for the long run.

13 And I thought that I would take a more
14 conservative estimate of the long-run elasticity of
15 zero point five (0.5), taking into account some other
16 information, including the information for Indiana,
17 which suggested that it was close to that figure than
18 to say zero point seven (0.7).

19 MS. PATTI RAMAGE: Well, when they say
20 that, for example, it says:

21 "These come up several times.
22 They're in the same range as other
23 potential estimates, such as the
24 Espey 2004 report."

25 Would you accept that the Espey report

1 was data from 1947 to 1997?

2 DR. WAYNE SIMPSON: Yes.

3 MS. PATTI RAMAGE: And it was various
4 countries. It was not North American data exclusively.

5 Do you accept that?

6 DR. WAYNE SIMPSON: Not exclusively,
7 no.

8 MS. PATTI RAMAGE: Do you know if the
9 data in the -- the studies relied up, if we were
10 dealing with inclining rate structures in -- in those
11 studies?

12 DR. WAYNE SIMPSON: I know that there
13 has been some work on that, but I -- I -- these are --
14 these are both studies of studies and actual studies.
15 And I -- I wouldn't characterize them as, you know -- I
16 haven't characterized them in that way, no.

17 MS. PATTI RAMAGE: But you'd agree that
18 it's important if -- to be a reliable study, you would
19 need to know whether it's -- what type of rate
20 structure is being -- is in place to understand the
21 elasticity associated?

22 DR. WAYNE SIMPSON: It would be a
23 factor, yes.

24 MS. PATTI RAMAGE: As would whether
25 time-of-use rates were in place. That wouldn't be

1 another factor?

2 DR. WAYNE SIMPSON: It -- it could
3 matter, yes.

4 MS. PATTI RAMAGE: And it will also be
5 important to know whether DSM was accounted for in
6 these studies?

7 DR. WAYNE SIMPSON: Sure.

8 MS. PATTI RAMAGE: And if I could bring
9 your attention to the third paragraph here, Matt seems
10 to say that:

11 "There doesn't seem to be a
12 consistent pattern as to which
13 sectors show higher elasticities."

14 So there -- there wasn't a pattern in
15 the author's -- he couldn't detect a pattern?

16 DR. WAYNE SIMPSON: Right. And that,
17 in fact, would be why, when I reach my conclusions on
18 the residential load, I said that the response in the
19 other two-thirds (2/3s) would -- I took it to be
20 comparable because I didn't have any evidence. And he
21 seems to agree with that, that in the commercial
22 industrial sectors it would be different from the
23 residential sector. So I aggregated up on that basis.

24 MS. PATTI RAMAGE: You aggregated up.
25 But your -- your co-author from Indiana had referenced

1 -- or you referenced Indiana's elasticities of point
2 four-zero (.40) for residential, point two six (.26)
3 for commercial -- and these are all negatives, I'm
4 sorry -- negative point four-zero (.40) for
5 residential, negative point two-six (.26) for
6 commercial, and negative point four-eight (.48) for
7 industrial.

8 Do you recall those numbers?

9 DR. WAYNE SIMPSON: Yes.

10 MS. PATTI RAMAGE: And those would
11 average to a negative point three-eight (.38). Would
12 you accept that subject to check?

13 DR. WAYNE SIMPSON: Point four (.4),
14 yeah. And that was one of the -- that was not the only
15 reason, but that was one of the reasons why I chose
16 point five (.5) instead of, say, point seven (.7).

17 MS. PATTI RAMAGE: And on page 7 of the
18 report, it's indicated that Indiana experienced a
19 period of declining rates from 1985 to 2005 and
20 increasing rates from there on. And it goes on to
21 state that, with the start of rate increases, you see a
22 decline in energy intensity.

23 Do you recall that in the report?

24 DR. WAYNE SIMPSON: Yes.

25 MS. PATTI RAMAGE: Okay. And you'd

1 agree that the economic recession began in about 2007?

2 DR. WAYNE SIMPSON: Yes, and hit
3 Indiana harder than Manitoba, for example.

4 MS. PATTI RAMAGE: So is it not
5 possible, in fact probable, that some of the decline in
6 energy intensity in Indianada -- Indiana was due to the
7 global economic downturn rather than to rate increases?

8 DR. WAYNE SIMPSON: Any respectable
9 study of the sort that would be, for example, listed
10 here in the journals would take account of both what
11 we'd refer to as income or output effects and price
12 effects, yes.

13 MS. PATTI RAMAGE: And did you look at
14 any Canadian jurisdictions in your analysis?

15 DR. WAYNE SIMPSON: I looked for
16 Canadian evidence, and frankly, didn't find -- didn't
17 find much that I thought would be useful.

18 MS. PATTI RAMAGE: Well, if we could
19 turn to page 64, which is Manitoba Hydro's rebuttal
20 evidence, you'll see at line 11 that BC Hydro in 2008
21 adopted a price elasticity of negative zero point zero-
22 five (0.05) in their load forecast.

23 Were you aware of BC Hydro's price
24 elasticity figures?

25 DR. WAYNE SIMPSON: Yes. I've -- I've

1 been made aware of it, and I would note 'adopted'
2 doesn't -- I would want to know what 'adopted' mean,
3 and adopted on what basis.

4 MS. PATTI RAMAGE: So you're prepared
5 to reject BC Hydro's, yet you're prepared to accept
6 numbers in a -- in a study that we don't know the
7 author, and we haven't read the backup material, and
8 the numbers have not been verified, and we haven't seen
9 the tables?

10 DR. WAYNE SIMPSON: All I'm saying in -
11 - with the context of the BC Hydro number is that it
12 says it was adopted, and I don't know the basis for
13 that adoption. I've got a pretty good idea of the
14 basis for the adoption of the figures in the -- in the
15 meta-analysis based on the journals, most of which I'm
16 familiar with.

17 MS. PATTI RAMAGE: Which journals are
18 you familiar with, I'm sorry?

19 DR. WAYNE SIMPSON: Journals like the
20 Review of Economics and Statistics.

21 MS. PATTI RAMAGE: But that's not what
22 you repli -- relied on to come up with that negative
23 point five-zero (.50) number. You relied on -- on the
24 study at --

25 DR. WAYNE SIMPSON: These are the kinds

1 of journals that I reviewed.

2 MS. PATTI RAMAGE: If those were the --
3 the journals that you relied on for that, why were they
4 not provided in response to the Information Request?

5 DR. WAYNE SIMPSON: The Information
6 Request I think was referring to the -- the meta-
7 analysis, and -- and that's what I therefore supplied.
8 I --

9 MS. PATTI RAMAGE: That was the number
10 you relied on in your report, correct? That's -- we --
11 we requested the -- the -- you indicated, Take the US
12 estimates, and we asked for the reli -- because you
13 relied on that number, correct?

14 DR. WAYNE SIMPSON: Yes. I -- I relied
15 on a number that I thought was reasonable in light of
16 the -- the articles that had been reviewed in that --
17 in that website, that's correct, and listed on that
18 website.

19 MS. PATTI RAMAGE: Okay. And those
20 articles, all dating back pre-2006, do you have any
21 more recent information?

22 DR. WAYNE SIMPSON: Not -- not at hand,
23 no.

24

25 (BRIEF PAUSE)

1 DR. WAYNE SIMPSON: I -- I would say
2 that, if there was in -- other material at hand that
3 you would like to provide for me to look at, I'd be
4 happy to do that.

5 MS. PATTI RAMAGE: Why don't we move on
6 to economic uncertainty? And Dr. Simpson, would you be
7 prepared to acknowledge there are fundamentally two (2)
8 widely used approaches to uncertainty analysis:
9 Discreet approximations as captured in a probability or
10 decision tree, and Monte Carlo simulations?

11 Would that be right?

12 DR. WAYNE SIMPSON: I'm not what --
13 sure what you're -- what you've -- intending there by a
14 -- a discreet approximation to a distribution which is
15 not discreet, which would, I guess, capture the Monte
16 Carlo? So one would be a -- an approximation to the
17 other?

18 MS. PATTI RAMAGE: Well, would you
19 agree that it's common and well-accepted to use
20 decision and probability tree approaches in evaluating
21 major long-term capital investments in the energy
22 industry?

23 DR. WAYNE SIMPSON: Sure, as a discreet
24 approximation.

25 MS. PATTI RAMAGE: Are you able to

1 provide examples of the use of Monte Carlo simulation
2 in the development or evaluation of a long-term
3 resource plan akin to the plans being reviewed here?

4 DR. WAYNE SIMPSON: No.

5 MS. PATTI RAMAGE: And are you aware of
6 any Integrated Resource Plan where alternatives were
7 evaluated using Monte Carlo simulation?

8 DR. WAYNE SIMPSON: No.

9 MS. PATTI RAMAGE: You --

10 DR. WAYNE SIMPSON: The -- the -- this
11 probably would have been a question better put to the
12 Morrison Park advisors who actually referred to the
13 Monte Carlo analysis as acceptable or appropriate, and
14 they may well have better information on that than --
15 than I would.

16 MS. PATTI RAMAGE: Okay. You made
17 reference to mean-variance portfolio theory as a
18 justification for the use of variance of interdi --
19 decile ranges as a measure of risk.

20 DR. WAYNE SIMPSON: It's an
21 approximation that I had available, yes.

22 MS. PATTI RAMAGE: Okay. Wasn't
23 portfolio theory developed for a particular purpose,
24 and by that, I mean financial portfolios?

25 DR. WAYNE SIMPSON: Yes.

1 MS. PATTI RAMAGE: And would you agree
2 that there are a variety of important assumptions
3 behind the theory, notably that risks are -- are
4 normally distributed?

5 DR. WAYNE SIMPSON: Yes. Those are
6 simplifications used to derive the theorems underlying
7 the mean-variance portfolio analysis. The theory, yes.

8 MS. PATTI RAMAGE: Okay. And is there
9 a reason to believe that these assumptions are relevant
10 to NF -- NFAT resource planning in the same way as they
11 would be to a financial portfolio evaluation?

12 DR. WAYNE SIMPSON: I think there's
13 reasons to believe they're relevant, yes.

14

15 (BRIEF PAUSE)

16

17 MS. PATTI RAMAGE: What would those
18 reasons be?

19 DR. WAYNE SIMPSON: Well, at a high
20 level, the -- the use of the normal distribution is
21 predicated on a whole set of what are referred to as
22 central limit theorems and statistics, which show that
23 when you have a variety of outcome -- of inputs to a
24 process which are not themselves normally distributed,
25 but there are lots of them, that the tendency is for

1 the accumulation of those inputs to produce something
2 which is normally distributed, and I think that is the
3 basis for the wide use of the normal distribution in
4 the statistical literature in the absence of evidence
5 to the contrary.

6

7 (BRIEF PAUSE)

8

9 MS. PATTI RAMAGE: You'd agree or you'd
10 be aware that some of the main factors in Hydro's
11 analysis, like capital costs and energy prices are
12 asymmetral -- asymmetrical -- asymmetrical?

13 MR. ED WOJCZYNSKI: And that's not
14 normally distributed.

15 MS. PATTI RAMAGE: Or -- or not
16 normally distributed? Let's use words I can use.

17 DR. WAYNE SIMPSON: That any normal
18 person not statistically, in the normal sense, would --
19 would use, yeah.

20 If Hydro were to produce evidence on a
21 probability distribution empirically estimated that
22 showed that it was log-normally distributed or in some
23 other fashion skewed, I'd certainly be willing to
24 accept that. In fact, I -- I would welcome it. I'm an
25 evidence guy. I like -- believe in evidence based

1 policy.

2 MS. PATTI RAMAGE: Now, Mr. Harper --

3 DR. WAYNE SIMPSON: Could I just say
4 that I'm flattered by the fact that I was listed first
5 amongst these esteemed authors? It was Simpson,
6 Gotham, and Harper, so I very much respect the -- the
7 knowledge that the other two (2) have brought to these
8 proceedings.

9 MS. PATTI RAMAGE: I'm sort of more
10 fond of people in Manitoba. I always like to give our
11 Manitobans first billing. How's that? I shouldn't say
12 'more fond', Mr. Harper. You -- I'm a -- I'm a homer --

13 MR. WILLIAM HARPER: Toronto's nice.

14 MS. PATTI RAMAGE: Yeah. It's all in
15 Toronto. It's not -- it's not the whole province.

16 Here, I'm looking at page 18 of your
17 presentation, or slide 18, I should say, and there you
18 stated that regulators generally set a return on equity
19 with reference to the thirty (30) year bank rate.

20 Do you recall that?

21 MR. WILLIAM HARPER: Yes, and that was
22 within the context of when they do a formal assessment.

23 MS. PATTI RAMAGE: Do these regulators
24 typically use a one (1) for one (1) relationship
25 between the Bank of Canada rate and the allowed return

1 on equity?

2 MR. WILLIAM HARPER: When they are
3 doing their formal assessment -- and as I said before,
4 there's a number of methods that are used, but when
5 they're doing their formal assessment, they're --
6 they're typically looking at, What's the long-term bond
7 rate for Canada at that point in time, which they take
8 as the risk-free cost of debt?

9 And then, What do we view as being the
10 appropriate risk premium to attach to that for a
11 regulated utility, which probably typically has a
12 little bit less risk than other -- than the other
13 typical industries out there in the market.

14 So they'll look at the overall risk --
15 the overall returns that are granted to companies in
16 the market, and they'll typically apply a discount
17 factor, or adjust -- or apply a beta factor to -- to
18 that in order to say, Well, regulated utilities don't
19 exactly have the same amount of risk, so we'll reduce
20 that, come up with a lower risk premium, and then add
21 that to the long-term Canada bond -- bond rate.

22 MS. PATTI RAMAGE: Now, you cited some
23 return on equity approvals in your presentation,
24 including the BCUC 8.75 percent return on equity versus
25 the 3.8 percent Bank of Canada rate, which, in your

1 view, indicates a spread of 4.95 percent.

2 Is that correct?

3 MR. WILLIAM HARPER: I hope I did my
4 math right, yes.

5 MS. PATTI RAMAGE: It won't be me to
6 find it out. Are you aware the BCUC had an automatic
7 adjustment mechanism that it abandoned in 2009 because
8 it became clear that return on equity was not a fixed
9 interval above the thirty (30) year Bank of Canada
10 rate?

11 MR. WILLIAM HARPER: As I said, that's
12 the -- that's the reason why they do formal
13 assessments, and in a perfect world, you'd say, as
14 circumstances change, I would do a formal assessment
15 every year.

16 These formal assessments, they aren't as
17 long as NFAT hearings, but they do take a fair bit of
18 time, and utilities and -- and regulators and utilities
19 generally came to the conclusion that rather than doing
20 one of these formal assessments every year, we do -- we
21 do one and then we try to put in a -- some sort of
22 formulaic adjustment that hopefully would be -- give us
23 a reasonable number, but we -- we won't let that
24 formulaic adjustment run for too long, because we're
25 concerned it -- it would get out of whack for excuse of

1 a less sophisticated word.

2 And so they periodically do formal
3 assessments in order to sort of reset the -- the
4 benchmark and reset the formula going forward, and one
5 of the major issues in the last BCUC hearing was,
6 Should we have a formal mechanism at all? Should we
7 have an automatic mechanism at all, because some people
8 view even that as being pro -- problematic?

9 But I -- I'm fully aware that there were
10 adjustment mechanisms, and it's really a matter, in my
11 mind, of -- of regulatory efficiency.

12 MS. PATTI RAMAGE: But in 2009, they --
13 they abandoned that, and you're familiar, then, with
14 the current -- the recently instituted BCUC automated
15 adjustment mechanism?

16 MR. WILLIAM HARPER: Well, I -- I know
17 there -- there's a formula, and the formula involves
18 both long-term Canada bond rates, and I believe it also
19 involves utility-grade bond rates as well, and has a --
20 that balance -- that balance between the two (2).

21 MS. PATTI RAMAGE: Okay. Well, let's
22 go to page 69, and we'll just confirm that.

23 MR. WILLIAM HARPER: Okay. And if I'm
24 wrong --

25 MS. PATTI RAMAGE: At page 69 of the

1 book of documents, we've provided excerpts from the May
2 2013 generic cost of capital decision of the BCUC.

3 MR. WILLIAM HARPER: Okay. Ah, yes.

4 MS. PATTI RAMAGE: And you'd agree that
5 the automatic adjustment mechanism is 50 percent of the
6 change in Bank of Canada rate and 50 percent of the
7 change in utility bond index only if the Bank of Canada
8 thirty (30) year rate is above 3.8 percent?

9 It -- I think that's pretty close to
10 what you said earlier.

11 MR. WILLIAM HARPER: Okay. Thank you,
12 and that -- that ties right back into -- it was -- it
13 was the 3.8 percent rate that was used to set it, and
14 there -- there's ongoing concerns about the financial
15 market and -- and returns.

16 And so the view was -- the view was --
17 was, We'll set this mechanism, but to provide some
18 confidence, if the long-term Canada Bank rate goes
19 below three point eight (3.8), we aren't going to let
20 the ROE fall. We're just going to hold it at the -- at
21 -- at the approved -- at the approved level, and it's
22 only when it starts to go up above three point eight
23 (3.8) that the mechanism will then kick -- kick in,
24 yes.

25 MS. PATTI RAMAGE: And the Bank of

1 Canada rate we're referring to, that's the thirty (30)
2 year rate. And it's the rate of the day, not a
3 forecast rate several years out, correct?

4 MR. WILLIAM HARPER: Well, I can't say
5 it's the rate of the day. It's -- it's typically a
6 consensus forecast for the next year. So it isn't like
7 someone looks up on the Bank of Canada website and
8 says, What's the rate for exactly today?

9 What they do is, they'll take the most
10 recent forecast of what's the rate for -- for the
11 coming year or the year in which they're trying to set
12 -- typically, they're looking on a forward-year basis -
13 - what -- what's the most recent consensus forecast for
14 what's the long-term Canada bond rate for the year in
15 which we're trying -- trying to set this? So you could
16 say of year in terms of it's not a rate looking fifteen
17 (15) years forward. It's a rate looking for the year
18 in which you're trying to benchmark.

19 MS. PATTI RAMAGE: Okay. If we could
20 just look at page 70 of the book of documents?

21 MR. WILLIAM HARPER: Yes.

22 MS. PATTI RAMAGE: And if we -- if we
23 look at the -- it's the first full sentence on the
24 page, second line. It says:

25 "Implementation of the AAM will be

1 subject to an actual Canada bond
2 yield of 3.8 percent being met or
3 exceeded."

4 So the -- the term 'actual', to me,
5 meant --

6 MR. WILLIAM HARPER: Well, I -- I
7 could have, you know, I could have -- I could have
8 misspoken. That was -- that -- that was my
9 understanding, but, you know, if -- if -- that's just
10 what it says that -- that could be what it -- I -- I
11 was referring more in terms of how they set the rates
12 when they're actually making the decision itself in
13 terms of, they look at the act -- they look at the
14 forecast for the year, but in terms of applying the
15 actual mechanism, they're -- they're looking at the act
16 -- in terms of looking at the actual mechanism, they're
17 looking at the actual rate. I --

18 MS. PATTI RAMAGE: Okay.

19 MR. WILLIAM HARPER: -- I stand
20 corrected, and I'm willing to accept that.

21 MS. PATTI RAMAGE: And the key is it's
22 not a fixed. It's -- it's not a fixed spread. It's --
23 it's -- there's a mechanism, and it -- it will change.

24 MR. WILLIAM HARPER: It -- yeah. There
25 is a mechanism for changing it. I think the more

1 important thing is there's a mechanism, and there's
2 also regular formal reassessments that -- and certain
3 jurisdictions will use formulaic mechanisms, other ones
4 won't. They'll say, We'll just fix it and we'll leave
5 it there until we come back and re -- revisit it again.
6 I think Alberta is probably an example of that.

7 MS. PATTI RAMAGE: I -- I -- according
8 to my notes, and I'm looking for where it is here, is
9 the -- were you aware that the automatic adjustment
10 mechanism expires in December of 2015 for BC?

11 MR. WILLIAM HARPER: Like I said, that
12 -- that's why periodically they come back and do -- do
13 a reassessment. That's to reassure everybody that,
14 yes, we're going to come back and revisit this and
15 we're going to let -- not let this mechanism run for
16 the next ten (10) years.

17 MS. PATTI RAMAGE: And it would all --
18 it would all suggest that the return on equity does not
19 move in lockstep with the Bank of Canada thirty (30)
20 year rate, correct?

21 MR. WILLIAM HARPER: During the
22 mechanism period, that is correct.

23 MS. PATTI RAMAGE: And for the AUC
24 decision, which you just referred to, and I think you
25 referred to this earlier in your presentation this

1 afternoon, but it's been superceded by a 2013 decision?

2 The 2009 in your --

3 MR. WILLIAM HARPER: Well -- well, I
4 think for 2013 -- well, it's better, because there --
5 there's a proceeding going on in Alberta right now,
6 actually, and the decision will probably come out late
7 -- later this year resetting the whole ROE in terms of
8 what -- what's the appropriate return on the equity for
9 -- for those utilities?

10 And really, what they've done is they've
11 said, We're not going to change anything pending this
12 decision come -- coming out. So it isn't like they've
13 frozen it for a long period of time. There -- there's
14 a process in place to -- to reset it, and I think -- I
15 believe the last thing I heard there was a decision
16 expected before the end of this year.

17 MS. PATTI RAMAGE: Well, if we go to
18 page 72, it -- it indicates that --

19 MR. WILLIAM HARPER: Oh -- oh, sorry.
20 Okay. Here.

21 MS. PATTI RAMAGE: -- there was a
22 December 2013 decision of the 'A' -- of the AUC, and
23 that decision set the ROE at 8.75 percent, with no
24 mechanism to reflect any changes in the Bank of Canada
25 thirty (30) year rate.

1 MR. WILLIAM HARPER: Right. And --

2 MS. PATTI RAMAGE: Do you see that in
3 number 7?

4 MR. WILLIAM HARPER: Right. And I
5 think if you read number 8, which is the order itself,
6 that eight (8) point -- you know, that's set on a
7 interim basis for 2014, and as I said, that's -- there
8 word 'interim' there is because they're currently going
9 through a proceeding right now to -- to come to a
10 decision on this.

11 MS. PATTI RAMAGE: But again, there's
12 no fixed spread in relation to the Bank of Canada
13 thirty (30) year rate then?

14 MR. WILLIAM HARPER: No, the -- the
15 fixed spread was used -- the spread was used in
16 establishing the original eight point seven-five (8.75)
17 to begin with, back in the original decision.

18 MS. PATTI RAMAGE: And if we could go
19 to page 74 of the book of documents, that is the 2009
20 OEB report? And --

21 MR. WILLIAM HARPER: Yes, I've got that
22 here.

23 MS. PATTI RAMAGE: Okay. That decision
24 set the -- set the 5.50 percent Bank of Canada thirty
25 (30) year spread. It -- or it set that 5.5 percent

1 Bank of Canada thirty (30) year spread. It also
2 established an automatic adjustment mechanism, and that
3 mechanism reflects 50 percent of the changes in the
4 Bank of Canada thirty (30) year rate, and 50 percent of
5 the Canadian utility bond index.

6 Is that correct?

7 MR. WILLIAM HARPER: Yes, it's
8 something similar to the -- to the formula we -- we
9 talked about earlier.

10 MS. PATTI RAMAGE: So again it's not a
11 fixed spread with respect to the Bank of Canada thirty
12 (30) year rate?

13 MR. WILLIAM HARPER: During the
14 automatic adjustment mechanism period, no, but that
15 doesn't necessarily mean the spread -- I think if you -
16 - I think if you look at it, the spread now is probably
17 higher than -- higher than what it was -- higher --
18 higher than the five hundred and fifty (550) basis
19 points, because of the way the formula has been
20 working.

21 MS. PATTI RAMAGE: Well, if we go to
22 page 77, we'll be able to see if that's right, because
23 that formula gives a rate for 2014 of 9.36 percent.

24 Do you see that at -- at the bottom of
25 the page?

1 MR. WILLIAM HARPER: Right. This was -
2 - this was referring to the communication that was
3 issued by the Ontario Energy Board on November 25th,
4 2013?

5 MS. PATTI RAMAGE: That's right.

6 MR. WILLIAM HARPER: Yes. There's a
7 nine points three -- three-six (9.36) there, yes? I --
8 I think what's kind of interesting is, you -- you
9 admitted to it in include the attachment to this, and
10 the attachment to this, if you look at it, shows that
11 the spread is higher than the 5.5 percent that we --
12 that was used in the original setting out the return on
13 -- on equity.

14 So, yeah, again, the application of the
15 form in this case has led to a point where I believe
16 the spread's probably now closer to the order of 6 -- 6
17 percent.

18

19 (BRIEF PAUSE)

20

21 MS. PATTI RAMAGE: Mr. Harper, you look
22 at page 77, under "ROE," it says "deemed LT" -- long-
23 term, I believe -- "debt rate, 4.88 percent."

24 Do you know if that's the Bank of Canada
25 rate, or is it something else?

1 MR. WILLIAM HARPER: That would be the
2 deemed long-term debt rate that they're deeming for a -
3 - an electric utility. Not all electric utilities have
4 borrowings from third parties who they are not
5 affiliated with.

6 And for third parties who you're
7 affiliated with, there is a concern of whether or not
8 that debt is really a -- an appropriate debt rate, or
9 there's been some -- some deal between you and your
10 affiliate in terms of what the money's going to be
11 loaned to you at.

12 And so for borrowing -- borrowing
13 arrangements where there is an affiliate -- affiliate
14 involved, instead -- if the affiliate rate is viewed
15 being too high -- higher, they will use this as -- as
16 the ceiling that they will allow to be put in for the
17 cost of debt. So it's a utility-based cost of debt.

18 It's -- would be equivalent to what we -
19 - the view of Manitoba Hydro's view as to what its
20 costs of borrowing would -- would be, as opposed to the
21 -- and, you know -- and you can think about what --
22 what the spreads are between your cost of borrowing and
23 the long-term Canada cost of borrowing. There's
24 obviously a spread there.

25 MR. BYRON WILLIAMS: Ms. -- Ms. Ramage,

1 if it would assist the discussion, in Manitoba Hydro
2 Exhibit 179, you actually did apr -- apply -- provide
3 the attachment to assist Morrison Park, and that's when
4 Morrison Park shared the 6 percent spread.

5 So if that would assist, that
6 calculation's in there.

7 MS. PATTI RAMAGE: No, but maybe,
8 Diana, if I could have you go to page 19 of Mr.
9 Harper's presentation?

10

11 (BRIEF PAUSE)

12

13 MR. WILLIAM HARPER: Yes. It's the one
14 with the Concentric Advisors.

15 MS. PATTI RAMAGE: That's right. Can
16 you confirm that the 4.65 percent under -- in the
17 column under "Manitoba Hydro," that is not the current
18 Bank of Canada rate, correct?

19 MR. WILLIAM HARPER: No. The --
20 Manitoba Hydro was setting its ROE based on its
21 forecast 4.65 percent of what long-term Canada bond
22 rate is, and I was doing exactly the same thing.

23 I was trying to mirror the Manitoba
24 Hydro calculation, except showing what the premium
25 would be if you used the recommended ROE that we had as

1 opposed to the recommended ROE that Manitoba Hydro had.

2 MS. PATTI RAMAGE: And you'd accept,
3 subject to check, that that's the 2018 forecast for the
4 Bank of Canada rate, or that's Manitoba Hydro's
5 forecast?

6 MR. WILLIAM HARPER: Yes, I -- I
7 believe that was it.

8 MS. PATTI RAMAGE: And then if we look
9 further over down the column -- or down the row, now,
10 next to the four point six-five (4.65), the 2.70 and
11 the 3.31 percent government long-term bond rates shown
12 in the remaining columns, they represent the average
13 daily yield for January through September of 2013?

14 MR. WILLIAM HARPER: Well, I took those
15 directly out of the Concentric report as being their
16 reports of what the long-term Canada bond rates were at
17 tho -- at -- for the year 2013, which was t
18 he same year they were reporting the ROEs for.

19 At this point in time, I can't remember
20 exactly what the calculation was, but sub -- subject to
21 check, I'll -- I'll accept your definition of how they
22 calculated it.

23 MS. PATTI RAMAGE: Just so that we're
24 all on the same page, maybe we'll just turn to page 81
25 of the book of documents, and -- and so you don't have

1 to check. If you look at footnote 4 at the very bottom
2 of page 81, and it tells you that the source of the
3 numbers under the -- the data in the middle of the
4 page, economic indicators percent yields, and under the
5 year 2013, the two point seven-zero-three-point-three-
6 one (2.703.31) (phonetic). If you look at those, and
7 then the footnote tells us that that's the average
8 daily yield.

9 MR. WILLIAM HARPER: Okay. Fine. Yes,
10 I -- I --

11 MS. PATTI RAMAGE: 2013 through
12 September.

13 MR. WILLIAM HARPER: I -- I see that,
14 yes.

15 MS. PATTI RAMAGE: I just thought I'd
16 save the trouble of checking.

17 MR. WILLIAM HARPER: I -- I think the -
18 - the point to be made is that the Concentric advisors
19 were comparing 2013 ROEs with the 2013 Canada bond
20 yields and looking at the premium. So it's year --
21 it's the same year comparison. What's -- what's the
22 ROE? What's the bond yield in that year? What's the
23 premium?

24 The first two (2) columns are really,
25 yes, we've got a 2018 forecast yield for Canada bond

1 rates, but also, that's the ROE that you're proposing,
2 I -- I assume, will -- will apply con -- consistent
3 with that year, and I believe the four point six-five
4 (4.65) is pretty well constant after that in Manitoba
5 Hydro's forecast, if I can recall.

6 So -- and so sim -- similarly, it's --
7 it's sort of, Your future long-term Canada bond rate,
8 your future ROE, what's -- what's the difference? Over
9 on the right-hand side, it's current ROEs and current
10 yields. What's -- what's the difference? The first
11 thing I think is an apples-to-apples comparison.

12 MS. PATTI RAMAGE: But if we were
13 apples to apples, should we not be using a number, a
14 2018 number? So, for example, when we get to a
15 premium, if I just go to the next column next to the
16 ECS column, and we have an ROE of 8.38 percent, if we
17 were subtracting a forecast rate, such as a four point
18 six-five (4.65), the premium would appear much loy --
19 lower, would it not?

20 MR. WILLIAM HARPER: But -- but we
21 don't know what, given a 4.65 percent long-term Canada
22 bond yield anticipated, what would a regulator in 2018
23 approve for being the ROE. The odds are, it wouldn't
24 be 8.38 percent, it would be something higher. And all
25 I'm using is: What's the history in terms of what

1 regulators have used as premiums over long-term bonds,
2 and saying, That's probably a reasonable bench --
3 benchmark.

4 MS. PATTI RAMAGE: Diana, if we could
5 go to slide 56 of Mr. Harper's presentation? The last
6 bullet on the right-hand side of this slide --

7 MR. WILLIAM HARPER: Yes.

8 MS. PATTI RAMAGE: -- it -- and this is
9 where I want to focus. It's the:

10 "PDP requires more capital, more
11 equity to maintain self-supporting
12 status."

13 And -- and that's -- that's what I'm
14 focussed on, but if we could now look at page 65 of
15 Manitoba Hydro's book of documents, and I have you
16 flipping around a fair bit here.

17 MR. WILLIAM HARPER: That's okay.

18 MS. PATTI RAMAGE: I apologize.

19 MR. WILLIAM HARPER: It -- it's big
20 print, which is more important to me.

21

22 (BRIEF PAUSE)

23

24 MS. PATTI RAMAGE: And page 65 of the
25 book of documents is slide 131 of Manitoba Hydro's

1 Exhibit 95, and if you note at the bottom of the slide
2 at the first bullet, it says:

3 "Portion of embedded return on equity
4 required to main debt-equity ratio
5 75:25."

6 Do you accept that it's possible -- or,
7 sorry. And would you agree that Manitoba Hydro
8 recognizes that the Preferred Development Plan requires
9 a portion of embedded return to maintain its financial
10 targets based on that bullet?

11 MR. WILLIAM HARPER: Well, actually
12 since this bullet was dealing with net present value
13 calculations as opposed to financial statements, I -- I
14 had a bit of diff -- difficulty in interpreting what it
15 meant, to -- to tell you the honest truth. But if --
16 if your view is that Manitoba Hydro accepts that more
17 capital intensive plans require more retained earnings
18 and more embedded equity, then yes, I accept that.

19 MS. PATTI RAMAGE: And then --

20 MR. WILLIAM HARPER: And exactly,
21 that's exactly the point I was trying to make on the
22 slide here.

23 MS. PATTI RAMAGE: So do you accept
24 that it's possible that only part of the 3 percent
25 equity premium is required to maintain Manitoba Hydro's

1 debt-equity ratio?

2 MR. WILLIAM HARPER: I -- I accept that
3 what's required to maintain Manitoba Hydro's debt-
4 equity ratio could be different. It could be more than
5 3 percent. It could be less than 3 percent. It
6 probably depends a lot on how aggressive Manitoba
7 Hydro's capital program is and, therefore, how much
8 more retained earnings they require in order to
9 maintain the 75:25 debt -- debt-equity ratio.

10 MS. PATTI RAMAGE: So it is possible,
11 then?

12 MR. WILLIAM HARPER: It is possible it
13 could be higher; possible it could be lower.

14 MS. PATTI RAMAGE: So when assuming the
15 -- when assessing the Preferred Development Plan,
16 assuming a portion is not required to maintain Manitoba
17 Hydro's financial targets, would you agree that portion
18 would contribute to Manitoba Hydro's revenue
19 requirement and would result in reducing rate impacts?

20

21 (BRIEF PAUSE)

22

23 MR. WILLIAM HARPER: If eventually it -
24 - it ended up with the explicit decision meaning that
25 we don't have to have rate increases as -- as high as

1 what we would need, yes. But I -- I think we're
2 connecting a lot of dots here and there's a lot of
3 other -- there's a lot of other issues that are going
4 to go into setting the particular rates for a
5 particular year for Manitoba Hydro.

6 MS. PATTI RAMAGE: If we could maybe
7 go to slide 53 now? And --

8 MR. WILLIAM HARPER: Oh, we get into
9 the fun stuff now. Okay.

10 MS. PATTI RAMAGE: I'm looking at the
11 bullet where it says:

12 "For market valuation account costs
13 and benefits are only discounted at 6
14 percent for 2014 through 2047
15 period?"

16 MR. WILLIAM HARPER: Yes, that's my
17 understanding.

18 MS. PATTI RAMAGE: Can you confirm that
19 calculating the present value of post 2047 revenues and
20 expenditures at Manitoba Hydro's discount rate reflects
21 the residual value from a Manitoba Hydro perspective?

22 MR. WILLIAM HARPER: Yes, and that's
23 the issue. Because my understanding was in this -- in
24 this particular market valuation account we were
25 supposed to be looking at things from a societal

1 perspective.

2 MS. PATTI RAMAGE: Can you confirm that
3 the MABCA analysis considered the planning period 2014
4 to 2047 for all accounts?

5 MR. WILLIAM HARPER: No, that's
6 something I cannot confirm.

7 MS. PATTI RAMAGE: Are you -- are you
8 aware that no benefits related to government economy
9 and environment -- related to the government account --
10 economy and environment account have been considered
11 for the period after 2047?

12 MR. WILLIAM HARPER: No, not -- no, no
13 I'm not. I'm sorry.

14

15 (BRIEF PAUSE)

16

17 MS. PATTI RAMAGE: At slide 59 of your
18 presentation when discussing the results of the
19 multiple account analysis, you stated that the higher
20 levels of DSM would benefit the gas plans more than the
21 Preferred Development Plan.

22 Do you recall that?

23 MR. WILLIAM HARPER: Yes, I do.

24 MS. PATTI RAMAGE: And when drawing
25 this conclusion had you assessed the impacts on all the

1 different accounts: government, economy, and
2 environment?

3 MR. WILLIAM HARPER: No -- no, I
4 didn't. I -- I was just making that observation
5 specifically with -- with respect to the results we'd -
6 - the directional results we'd seen from applying
7 higher levels of DSM to the reference cases for -- for
8 the various plans from a Manitoba Hydro perspective and
9 assuming that those same directional results would
10 apply with -- within the mult -- within the multiple
11 account -- account analysis.

12 I -- I didn't have that same directional
13 in -- in -- we don't have that same directional
14 information to provide us any guidance in terms of what
15 happens on -- on the other accounts. And so I -- I
16 have not looked at it and I probably don't have the
17 basis on which to do so.

18 MS. PATTI RAMAGE: So your comments
19 were only addressed at the market valuation account.

20 Is that correct?

21 MR. WILLIAM HARPER: That's correct.

22 MS. PATTI RAMAGE: If I could just have
23 a moment.

24

25 (BRIEF PAUSE)

1 MS. PATTI RAMAGE: I think we're good,
2 Mr. Harper. Thank you for coming. And thank you, Dr.
3 Simpson. And we're both out of the playoffs, so I know
4 that...

5 MR. WILLIAM HARPER: Toronto's never in
6 the playoffs.

7 DR. WAYNE SIMPSON: I just -- one (1) -
8 - one (1) further point and I won't mention elasticity
9 again. But in -- in our report we did note, Doug in
10 particular because he was paying attention to the
11 Brattle report -- the Brattle Group report. It says in
12 page 10 of our report:

13 "It should be noted that the Brattle
14 Group uses a price elasticity of
15 minus zero-point-four (0.4) in the
16 export price forecast model that was
17 used as part of an input -- of -- as
18 an input to Manitoba Hydro's export
19 price forecast."

20 Thank you. It's up on your screens.

21 "Furthermore they label that value as
22 conservative and low."

23 This is in the NFAT Appendix 3.1 slide
24 51. The -- the reason I mention this is (1), because
25 it's not far off what I used, which was point-five

1 (.5). It's a lot bigger than point-zero-five (.05).
2 In fact it's increased by a factor of eight (8). But
3 also if someone said, Well, what difference does it
4 make, if you go through my set of calculations they're
5 all proportional.

6 And so I would quickly say, Well, if I
7 said it would delay capacity by three (3) to four (4)
8 years as a illustrative calculation with point-five
9 (.5), then with point-four (.4) 80 percent of that
10 would be, what, two and a half (2 1/2) to three and a
11 third (3 1/3) years.

12 My point in all this was simply to say
13 that if you take what seemed like to me to be
14 reasonable price responses in the literature and -- and
15 what in this case Brattle Group is using, the result is
16 a response on -- on the load forecast which is fairly
17 substantial and in one (1) direction which is that it
18 reduces the load forecast significantly.

19 MS. PATTI RAMAGE: So you recognize
20 that the Brattle report is dealing with wholesale
21 prices?

22 DR. WAYNE SIMPSON: Yes.

23 MS. PATTI RAMAGE: And the prices that
24 your report deals with are retail prices?

25 DR. WAYNE SIMPSON: Yes.

1 MS. PATTI RAMAGE: Thank you.

2 THE CHAIRPERSON: Thank you, Ms.

3 Ramage. Mr. Peters, please.

4

5 CONTINUED CROSS-EXAMINATION BY MR. BOB PETERS:

6 MR. BOB PETERS: Thank you. Gentlemen,

7 I have a few questions and I'd like to start, Mr.

8 Harper, with CAC Exhibit 68 which is the presentation

9 you made this morning, slide 11.

10 MR. WILLIAM HARPER: Yes, it's up on

11 the screen.

12 MR. BOB PETERS: Thank you, sir. When

13 you talked to the panel this morning about economic

14 evaluations you indicated that -- well, before -- there

15 -- there were a number of shortcomings that you had to

16 be aware of, correct?

17 MR. WILLIAM HARPER: Well, I think --

18 yes. The -- those -- those sort of -- they -- those

19 are sort of at least key -- key points of those are

20 summarized at the bottom of the -- of slide 11.

21 MR. BOB PETERS: And you also, I think

22 in answer to Mr. Hacault, gave an answer that when it

23 came time to looking at economic analysis results if

24 your choice is between the ref/ref/ref value or the

25 expected value, you're recommending this panel look at

1 the expected value.

2 MR. WILLIAM HARPER: Yes, I think you
3 want to put far -- far more weight on that than on the
4 ref value, yes.

5 MR. BOB PETERS: Because that's a
6 probability weighted distribution for risk?

7 MR. WILLIAM HARPER: Yes. Yes.

8 MR. BOB PETERS: Now, you also say on
9 slide 11 which is on the screen that be careful to take
10 a single perspective because you don't have the
11 distributional considerations, correct?

12 MR. WILLIAM HARPER: Well, it -- it --
13 not -- not quite that. It was more the fact that the
14 evaluation is done from a single perspective, and that
15 perspective defines what costs and what benefits are
16 going to be put in -- in --into the calculation.

17 And the result is from that particular
18 per -- perspective. And therefore if there are other
19 perspectives, or that perspective is a collection of
20 people -- a collection of peoples, then there may be
21 distributional issues that the evaluation itself is not
22 capturing.

23 MR. BOB PETERS: Well, was your
24 distribution to be broken down by the -- by the rate
25 class that Manitoba Hydro has for its customers?

1 MR. WILLIAM HARPER: No, I wasn't -- I
2 wasn't saying that that was it but I was trying to use
3 that as an example of how -- of how you could have
4 distributional issues arise. You know, a -- an -- an
5 example would -- would be and I guess in -- in this
6 case to some extent since it was done using all -- all
7 costs flowing to both Manitoba Hydro and KCN.

8 You -- you could say, Well, there's
9 really two (2) parties to this. There's going to be
10 Manitoba Hydro and KCN. This evaluation looks at the
11 costs and benefits from the total of the two (2). Each
12 of those individual parties -- you know, the results
13 may be slightly different for each -- each of those two
14 (2) individual parties de -- depending on the plan.
15 And you can't -- you don't understand the distribution
16 between the two (2). What you know is what -- what's
17 the outcome when you look at it from -- from that total
18 perspective of the two (2) combined.

19 MR. BOB PETERS: All right. Other than
20 the example for KCN, is there any other distributional
21 consideration that comes to mind with respect to the
22 NFAT that the panel should be considering?

23 MR. WILLIAM HARPER: I guess not in the
24 context of what's been included in that -- in. I guess
25 what you could say it's what's -- this -- this is a

1 Manitoba Hydro perspective. And I guess just trying to
2 point out that if you were going to take, say later on
3 in the multiple account analysis they -- they take a --
4 you can take a government perspective. If the
5 government was looking at net-present values of costs
6 and benefits to it, you would come up with a totally
7 different set of numbers.

8 The multiple count analysis has tried,
9 tried, tried to capture that, so there are -- are
10 perspectives. I was just trying to add a -- add a pers
11 -- at a principle level say, You just have to ma --
12 make sure that you understand the perspective and make
13 sure the discount rate and the costs and benefits are
14 all aligned with that perspective.

15 MR. BOB PETERS: All right. And one
16 (1) of the other shortcomings that I want you to
17 explain to the panel is the -- the lack of temporal
18 considerations that I interpret you to be saying exist
19 in Manitoba Hydro's materials, correct?

20 MR. WILLIAM HARPER: Well, that was it.
21 I can say it was a matter of saying if you have a
22 project that's of -- of a very long life, then there
23 are not only -- I could say it's another distributional
24 issue if you want to call it that way.

25 But this time it isn't a distribution

1 between stakeholders, it's a different distribution
2 between people at different points in time. And what
3 the evaluation will tell you by calculating a single
4 result is what's -- what's the result if you look at
5 the collective over the total period of time, but it
6 doesn't -- but it -- it doesn't give you any
7 information as to what may happen over particular sub-
8 periods of that time. And if -- and if those vary,
9 that -- that may be of interest to the decision-makers
10 as well.

11 MR. BOB PETERS: So that speaks to
12 perhaps the cumulative present values being -- being
13 summed at various points in time such as twenty (20)
14 years, thirty-five (35) years and/or fifty (50) years.

15 MR. WILLIAM HARPER: Yes. And that was
16 -- when -- when I was making the presentation, I said
17 that was something I acknowledged, but I realized other
18 parties -- other parties, in particular independent
19 experts, were specifically looking at that and
20 providing information to the panel on that.

21 MR. BOB PETERS: All right, thank you.
22 In addition to that -- but those would be another --
23 another way of looking at the net-present value
24 numbers, but at a cumulative basis at a certain point
25 in time.

1 MR. WILLIAM HARPER: Yes, and you know
2 -- yes, and they're -- I think they're another piece of
3 information has to be -- has to be taken into account.

4 MR. BOB PETERS: And you, in your
5 materials, are saying that internal rate of return is
6 another metric but not one on which you should put much
7 weight.

8 Did I state your conclusion correctly?

9 MR. WILLIAM HARPER: I don't think I
10 said anything about internal rate of return in -- in my
11 presentation or in my evidence. If there's a
12 particular reference you'd like to turn me to, that
13 would be fine.

14 MR. BOB PETERS: My scribbled notes I
15 guess don't count as a reference, but let me -- let me
16 rephrase the question then before Mr. Williams jumps
17 up.

18 MR. BYRON WILLIAMS: Hurdle rates might
19 be the reference.

20 MR. BOB PETERS: Well, and -- and Mr.
21 Williams points out that you may have talked about
22 hurdle rates in terms of ways to analyse investments of
23 competing interests.

24 MR. WILLIAM HARPER: Yes. That was in
25 reference to the fact that in the Wuskwatim case,

1 Manitoba Hydro had a hurdle rate policy which
2 established three (3) different hurdle rates and you
3 applied the hurdle rate and depending upon the view of
4 the risk of the project, if it was over that it was a
5 go and if it was below that, it was -- it was a no go.

6 And I guess that type of internal rate
7 of return is probably more useful than looking at one
8 (1) investment and I have a choice; either I do it or I
9 don't, but it doesn't impact other options I have.

10 Here we're trying to assess a -- a
11 number of alternatives, and if we pick one (1)
12 alternative, we -- we can only pick one (1) alternative
13 to a large extent. If we -- we build an intertie or we
14 don't build an intertie, and in those types of
15 comparisons, I think in the net-present value analysis,
16 is more useful than just looking at the internal rate
17 of return.

18 Because the internal rate of return
19 doesn't tell you anything about how much money you
20 actually have to spend.

21 MR. BOB PETERS: As between the
22 internal rate of return and an expected value
23 calculated on an NPV basis, which is the preferred
24 metric?

25 MR. WILLIAM HARPER: Like I said, I

1 think since you're using a net present value -- since I
2 prefer the net present value analysis, it would be the
3 ex -- it would be the expected value on that that would
4 be -- that would be the preferred of the two (2) if
5 you're trying to use a particular -- if you were trying
6 to boil it all down saying I'm going to use one (1)
7 metric for decision making, that would be it.

8 MR. BOB PETERS: Expected value would
9 be the way.

10 MR. WILLIAM HARPER: Yes.

11 MR. BOB PETERS: And what happens if
12 expected value isn't readily available in this -- in
13 this case?

14 MR. WILLIAM HARPER: Well, I -- I
15 guess, you know, you can -- I guess you have to make --
16 you have to make the decision on -- on the information
17 that you've got -- that you have. Excuse me -- excuse
18 my English.

19 And, you know, to some extent, we -- we
20 do have expected values. They aren't up to date, but
21 they can inform our decision in -- in some way, and
22 that was what I was trying to do at the end of my
23 presentation and say we had expected values up to a
24 certain level.

25 We can perhaps try and form that a bit

1 by the information we have on reference values and try
2 and, collectively using all that information, come --
3 come to some judgment in terms of what -- what we
4 should be doing.

5 MR. BOB PETERS: All right. Since you
6 raised that point, moving to your slide 28 -- maybe 29?

7

8 MR. WILLIAM HARPER: Yes, I think it
9 must be something other than twenty-eight (28).

10 MR. BOB PETERS: Your point here is
11 expected value is more informative than the reference
12 value, and I think we -- we've talked about that.

13 Manitoba Hydro has filed Exhibit 104-8,
14 and if we could locate that 104-8, and on page 3 of 7,
15 next page, please, page...

16 Can the Board understand that when you
17 did your S-curves and your calculations, you stated --
18 and if we could go, Diana, to the -- just the table
19 underneath, you started with this table underneath that
20 Manitoba Hydro had calculated?

21 MR. WILLIAM HARPER: Well actually,
22 what I did was start with the base data that Manitoba
23 Hydro had which, if you go up, is the quilt -- you look
24 at the quilt above this, that quilt is basically
25 calculated using cashflows for each of these individual

1 cases discounted back at 5.05 percent.

2 MR. BOB PETERS: And you changed it to
3 your recommended approach of five point two zero
4 (5.20) .

5 MR. WILLIAM HARPER: I changed it to
6 5.2 percent, created a new quilt, and then on the basis
7 of that new quilt, you can create new cumulative
8 probability distributions and on the basis of that, you
9 can recreate the table at the bottom of the page, and
10 that's what I did.

11 MR. BOB PETERS: That's what you did
12 for your S-curves --

13 MR. WILLIAM HARPER: Yes.

14 MR. BOB PETERS: -- that you presented.
15 All right.

16 MR. BOB PETERS: Certainly.

17

18 (BRIEF PAUSE)

19

20 MR. BOB PETERS: On slide 16 of your
21 CAC Exhibit 68, you talked about the perspectives in
22 determining proper discount rates.

23 Do you recall that?

24 MR. WILLIAM HARPER: Yes.

25 MR. BOB PETERS: And there was

1 discussion about what would be an appropriate discount
2 rate when looking at -- at it from the Manitoba
3 ratepayer perspective.

4 Do you recall that?

5 MR. WILLIAM HARPER: I guess -- I -- I
6 recall making the comment that it probably wouldn't be
7 the same as Manitoba Hydro's perspective.

8 MR. BOB PETERS: Well, what should be
9 the discount rate applied to the Province and the
10 Province was to -- if the Province was looking at this
11 separate from Manitoba Hydro, what are you suggesting
12 would be the discount rate that the Province should
13 use?

14 MR. WILLIAM HARPER: Again, within your
15 question, I assume you're taking -- from your question,
16 I would assume you were taking a provincial or a
17 societal perspective.

18 In that context, I really have no
19 problem with -- with the 6 percent value that Manitoba
20 Hy -- Manitoba Hydro used in its market valuation for
21 the multiple count analysis.

22 MR. BOB PETERS: Later on, in looking
23 at the specific rate impacts -- I'll try to remember
24 the page, but it was 1.86 percent was used by Manitoba
25 Hydro.

1 Do you recall that?

2 MR. WILLIAM HARPER: Yes, I do, and...

3 MR. BOB PETERS: I suppose we don't
4 need to locate that, but I took from your testimony
5 this morning that you felt that one point eight six
6 (1.86) - if I have that number correct - was not the
7 appropriate discount rate.

8 MR. WILLIAM HARPER: I -- I indicated I
9 believed it was at -- you know, it was at the low end --
10 it was at the bottom of the range of what -- of what
11 one might consider to be a -- a range of numbers that
12 might -- might be appropriate.

13 Actually -- okay, I'll stop there and
14 wait for your next question.

15

16 (BRIEF PAUSE)

17

18 MR. BOB PETERS: Thank you for finding
19 the slide, Diana, slide 58. And on this particular
20 one, I was wanting you to provide a recommendation to
21 the panel as to what you thought would be the
22 appropriate discount rate on a nominal basis, and you
23 want to give a range, I take it.

24 MR. WILLIAM HARPER: And that's why I
25 said I'd stop and wait for the question, 'cause I was

1 anticipating and wasn't sure whether I should answer or
2 not.

3 If you want to go to the -- the Manitoba
4 Hydro interrogatory to CAC-Harper 23b. It's easier for
5 me to call up the interrogatory because Manitoba Hydro
6 specifically asked me this question.

7 The question was:

8 "What discount rate would Mr. Harper
9 recommend with the present value
10 calculations he suggested should be
11 calculated and why?"

12 And that was referring to present value
13 calculations of customer -- of customer revenues.

14 MR. BOB PETERS: I'll scroll up to get
15 the full response on the screen.

16 MR. WILLIAM HARPER: And I guess the
17 essence of the response is, is that ideally you would
18 be assessing the impacts in terms of what -- what's the
19 time preference of money for customers.

20 To my knowledge there's really been no
21 substantive work or authoritative work done on this.
22 There's been lots of papers published on what's the
23 social discount rate from a society perspective, lots
24 of papers published on what should be the weighted
25 average cost of capital or how you should calculate

1 that from a company perspective.

2 I'm really not aware of a lot of work
3 being done from a customer perspective. But -- and
4 then, having done my reading homework as I was
5 assigned, I sort of tried -- tried to go through those
6 materials and, from my perspective, sort of -- and
7 looking at some references, come up some comments in
8 the very -- and on the very last paragraph, I suggested
9 that an appropriate rate might well be in the range of
10 -- and this is real in contrast to your question which
11 was asking about nominal rates -- in a range of 3 to 8
12 percent.

13 And for want of being an average-type
14 person, I suggested we use the middle of the range
15 which was 5.5 percent. And, sorry, the -- the
16 Interrogatory Response tries to provide some of my
17 thinking as I went through and got to that particular
18 point.

19 MR. BOB PETERS: Your five point five
20 (5.5) midpoint is -- is a real number as opposed to a
21 nominal?

22 MR. WILLIAM HARPER: That's correct.

23 MR. BOB PETERS: So on a nominal basis,
24 it would be closer to 8 percent?

25 MR. WILLIAM HARPER: Seven and a half

1 (7 1/2), yes.

2

3 (BRIEF PAUSE)

4

5 MR. BOB PETERS: I took from your
6 evidence this morning, Mr. Harper, that you recommended
7 that common costs be removed from the uncertainty
8 analysis?

9 MR. WILLIAM HARPER: I think that's --
10 that that's a standard on which economic evaluations
11 are done. The uncertainty analysis was around an
12 economic evaluation, so, yes.

13 MR. BOB PETERS: Did you have a chance
14 to -- to determine whether all of the common costs had
15 been removed?

16 MR. WILLIAM HARPER: As I said in my
17 presentation, I think Manitoba Hydro went through and
18 tried to come up with a definition of what they thought
19 were -- were common costs.

20 I'm not too sure if they captured them
21 all, but probably having said that, I'm not too sure if
22 that's an exercise that's -- that's practically
23 possible when you're looking at a system that's
24 operated on an integrated basis.

25 MR. BOB PETERS: Mr. Harper, for you to

1 be able to update some of your charts, and I just
2 flipped to one on, say, slide 38.

3 You've now told the panel that you
4 recalculated the -- the quilt based on the most current
5 information from -- that you had from 104-8, correct?

6 MR. WILLIAM HARPER: That's what the
7 slide shows.

8 MR. BOB PETERS: And you applied the --
9 the five point two (5.2) discount rate that you felt
10 was more appropriate than the five point zero five
11 (5.05) from Manitoba?

12 MR. WILLIAM HARPER: Yes, and the
13 reason I've used the word "common" in here is because,
14 consistent with my information, I did not vary the
15 discount rate across the three (3) scenarios.

16 I -- I held -- held the disc -- discount
17 rate constant for all -- across all three (3).

18 MR. BOB PETERS: And when Manitoba
19 Hydro updated with their 2013 planning assumptions the
20 discount rate to five point four (5.4), I recall in the
21 slides your comparable -- your suggestion was five
22 point five (5.5)?

23 MR. WILLIAM HARPER: It -- it would
24 have been five point five five (5.55) -- fifteen (15)
25 basis points higher.

1 MR. BOB PETERS: And for all of the
2 same reasons that you gave earlier for changing it?

3 MR. WILLIAM HARPER: Yes.

4 MR. BOB PETERS: Before you are able to
5 update this information on this slide or any of the
6 further slides, you would essentially need a new quilt
7 from Manitoba Hydro with all of their probabilities --

8 MR. WILLIAM HARPER: That -- that is
9 exactly correct. This is -- this is using the updated
10 capital costs, but underlying it is all the 2012 plan -
11 - planning assumptions. And so to -- which I assume
12 includes issues around inflation in -- in the future
13 and all those things, and so, to some extent, to -- to
14 whatever extent those 2013 planning assumptions which
15 are what's consistent with the 5.4 percent discount
16 rate they used.

17 You know, you wouldn't want to just
18 apply the five point four (5.4) without updating for --
19 for the planning assumptions at the same point in time
20 because they're a consistent package.

21

22 (BRIEF PAUSE)

23

24 MR. BOB PETERS: On slide 62 you
25 indicate that in considering the Conawapa Project,

1 careful consideration would be required in the future,
2 correct?

3 MR. WILLIAM HARPER: Yes.

4 MR. BOB PETERS: And what careful
5 consideration are you thinking need go into that? What
6 -- what additional factors do you need to know?

7 MR. WILLIAM HARPER: Well, I -- I think
8 it would be a matter of -- and, like I said, I -- from
9 what I understand, once you put -- if you put Keeyask
10 in place with the 750 intertie, you have a need date
11 somewhere around 2030/2031, depending upon whether or
12 not you have pipe -- pile line load or not.

13 And on that basis, you don't need the
14 type of aggressive spending pattern that they were --
15 that you would require for the 2026.

16 With a -- with a less aggressive
17 spending pattern, I think what you'd want to look at is
18 how -- basically, what's -- what's sort of the minimum
19 I can get -- get away with spending and keeping this
20 option open over the next few -- over the next few
21 years until I hopefully get a better understanding of
22 how the future's going to unfold, one (1) of the key
23 issues around that being carbon pricing.

24 Try to devise some specific decision
25 points in which case you're -- points in time at which

1 you're probably going to have to make a decision; I --
2 if I continue spending now and keep this open, it's
3 going to be a significant increase in spending.

4 Identify those specific points and make
5 note of those at -- if I say "yes" now, we're going to
6 have to come back and revisit this decision again. So
7 it isn't a matter of just a blanket going forward, we
8 want to revisit this decision again, and at some point
9 in time if things aren't evaluating, it may be better
10 to stop.

11 But I think there's a care -- I think
12 it's a careful consideration, and the hope is that that
13 doesn't require a significant amount of spending over
14 the next three (3) or four (4) years to keep this
15 option open.

16 If I could maybe add what -- what sort
17 of leads me to this, is -- and again, I frequently get
18 involved in proceedings in BC on facilities and more
19 frequently than not, sometimes we get to the -- we get
20 to and people say, It totally says, well, we considered
21 all these alternatives and we screened some of them out
22 of the planning process and we've got these three (3)
23 options for you now.

24 And circumstances have actually changed
25 the fact where maybe one (1) of the options they

1 actually kicked out before, based on the numbers they
2 developed today, it starts to look pretty -- would
3 actually look pretty good because the future has gone -
4 - gone a different way.

5 But -- but, unfortunately, you're at a
6 point in time where you really can't -- but you say,
7 Well, let's bring this back and they say, Well, we
8 can't possibly the state it is now. Put -- put that in
9 service for the need date that we've defined for you.
10 We only have these -- these two (2) or three (3)
11 alternatives are the only ones we can actually
12 practically put in place.

13 So I'm a little bit cautious. There's a
14 trade-off between yes, spending too much money on too
15 many options, you know. And basically those are sunk
16 costs 'cause at the end you're only going to pick one
17 (1) option.

18 And, on the other hand, sort of closing
19 yourself off and saying, Yes, and rejecting something
20 too -- too soon when maybe with just a nominal amount
21 of extra spending, hopefully you can sort of see -- see
22 whether circumstances might change and keep it open.

23 But, clearly, you have to make a point
24 in time in which you say, I'm going to have to cut my
25 losses and stop, and I'm not too sure where that

1 stands.

2 But that's really the point I was trying
3 to make here based on some of the experience I -- I've
4 seen in working elsewhere.

5 MR. BOB PETERS: All right. Thank you
6 for that point.

7 Dr. Simpson, just close with you, sir.
8 In your materials, on your risk analysis you -- you,
9 likewise, used the -- the quilt and the -- the table
10 from Exhibit 104-8, correct?

11 DR. WAYNE SIMPSON: I just used the
12 table because I'm looking only at risk versus return.
13 So I'm looking at the expected value and the P90 minus
14 P10 differential leader to a decile range.

15 Mr. Harper, to construct the twenty-
16 seven (27) point S-curve would have had to go back
17 further into the quilt and do a lot more work than I
18 did.

19 MR. BOB PETERS: Did you consider
20 plotting Mr. Harper's new calculations on your -- for
21 example, on slide 14 of your risk presentation?

22

23 (BRIEF PAUSE)

24

25 MR. WILLIAM HARPER: It may well have

1 been my fault. We were pulling these things together
2 pretty quickly at the last minute, and I think it may
3 well have been that by the time I had my quilt done and
4 he was putting his presentation to bed at the same
5 point in time.

6 MR. BOB PETERS: No, I wasn't --

7 MR. WILLIAM HARPER: So, I -- I --

8 MR. BOB PETERS: -- trying to ascribe
9 blame -- Mr. Harper, I wasn't trying to ascribe blame,
10 but nice of you to fall on the sword there, but -- but
11 I'm just wondering, Dr. Simpson, if you were to plot --
12 are you able to tell the panel what the relationship
13 would be if you had to plot your slide 14 using the
14 calculations performed by Mr. Harper?

15 DR. WAYNE SIMPSON: I think I'd have to
16 actually do the plotting exercise and have a careful
17 look at it. I did plot some earlier figures that Mr.
18 Harper produced which had some optionality things and
19 so on.

20 But we thought that it was a little bit
21 misleading to produce those in this context, and so we
22 decided not to present those so. But I -- so I have
23 been sort of updating the plots as -- as things go
24 along, and you can see obviously the -- the sand is
25 shifting pretty -- pretty darn rapidly.

1 But -- which I think is evident just
2 from the numbers, never mind my plot. My plot maybe
3 makes it look more dramatic looking. But I'd -- I
4 could certainly undertake to do other plots if -- if
5 the Board would have thought -- would think it was
6 helpful.

7 MR. BOB PETERS: Mr. Harper, is the
8 only change between your information and that provided
9 in Manitoba Hydro Exhibit 104-8 your use of a discount
10 rate -- a different discount rate?

11 MR. WILLIAM HARPER: Yes, it would --
12 it would be the different discount rate and the -- and
13 the fact that I did not vary the discount rate over the
14 different scenarios.

15 MR. BOB PETERS: I wonder if you could
16 then share your results with Dr. Simpson and then I'll
17 ask Dr. Simpson to update his slide 14 that he has here
18 as well as --

19 MR. WILLIAM HARPER: I think actually
20 that -- we'd probably be using the -- and I can give
21 him the full results, but using the results on slide 47
22 of my presentation.

23

24 (BRIEF PAUSE)

25

1 MR. BYRON WILLIAMS: I believe that
2 we're undertaking that Dr. Simpson will update the
3 slide 14 of his report on risk analysis, his
4 PowerPoint, to reflect the information underlying Mr.
5 Harper's analysis at slide 47 of -- of his PowerPoint
6 presentation from today.

7
8 --- UNDERTAKING NO. 124: Dr. Simpson will update the
9 slide 14 of his PowerPoint
10 report on risk analysis to
11 reflect the information
12 underlying Mr. Harper's
13 analysis at slide 47 of his
14 PowerPoint presentation
15 from today.

16
17 MR. BOB PETERS: Thank you, Mr.
18 Williams, and with that, Mr. Chairman, I'd like to
19 thank Dr. Simpson and Mr. Harper for their answers to
20 my questions. I have no further questions.

21 THE CHAIRPERSON: Thank you, Mr.
22 Peters. Ms. Ramage, please.

23 MS. PATTI RAMAGE: Yes, two (2)
24 administrative matters: One, we have some exhibits to
25 file and Mr. Wojczynski will -- will explain what they

1 are, but for the record, we will be distributing
2 Manitoba Hydro Exhibit 104-4-2 Revised, 104-15 Revised,
3 104-16 Revised and 171 Revised.

4 Those are economic summary tables -- I
5 guess I should have said it as I went -- capital cost
6 cashflow updates and up -- the update to Manitoba Hydro
7 Exhibit 171.

8 And I had one (1) other question, it's
9 for Mr. Harper or Mr. Williams, just to clarify for the
10 record for next week so we're prepared.

11 I note in the schedule that Mr. Harper
12 is scheduled to testify Wednesday, and I'm wondering if
13 there's a report that goes with that? I -- I -- I'm
14 not sure what I'm looking for to get ready for that, so
15 if you could let me -- let us know, Mr. Williams.

16

17 --- EXHIBIT MH-104-4-2 REVISED: Revised exhibit

18

19 --- EXHIBIT MH-104-15 REVISED: Revised exhibit

20

21 --- EXHIBIT MH-104-16 REVISED: Revised exhibit

22

23 --- EXHIBIT MH-171 REVISED: Revised exhibit

24

25 MR. BYRON WILLIAMS: The -- would you

1 like me to let you know on the record or off the
2 record.

3 MR. PATTI RAMAGE: On the record just
4 so we know.

5 MR. BYRON WILLIAMS: Certainly, and the
6 reason that we've asked Mr. Harper to -- to appear with
7 Dr. Higgins is that Mr. Harper will simply be available
8 to assist Dr. Higgins in terms of his recollection of
9 the record.

10 Mr. Harper has been the -- as you can
11 tell, has pretty much memorized the record and, so,
12 there's no report. His -- his advice and -- will
13 always be available, but there's no additional
14 information that we're expecting that he will be
15 providing in terms of pre-filed material.

16 MS. PATTI RAMAGE: Excellent, then no
17 homework. I thought I might have missed one, that's
18 all.

19 MR. BYRON WILLIAMS: Mr. Chair, I -- I
20 did have one (1) question of redirect.

21 THE CHAIRPERSON: Please, before --
22 before we ask Mr. Wojczynski to speak, go ahead. No,
23 go ahead.

24

25 RE-DIRECT EXAMINATION BY MR. BYRON WILLIAMS:

1 MR. BYRON WILLIAMS: And Diana, if you
2 can pull up NFAT Appendix 3.1, slide 51.

3 Dr. -- Dr. Simpson, you recall a
4 discussion in terms of -- with Ms. Ramage in terms of
5 elasticity and -- and you were asked to provide some --
6 some recent support for elasticity estimates?

7 DR. WAYNE SIMPSON: Yes.

8 MR. BYRON WILLIAMS: That's got to go
9 two (2) more pages, please.

10 And you recall that there was a
11 discussion on whether the price elasticity of Brattle
12 were based upon wholesale or retail?

13 Do you recall that discussion?

14 DR. WAYNE SIMPSON: Yes, and I, for
15 want of better information, took the suggestion at face
16 value.

17 MR. BYRON WILLIAMS: And reviewing this
18 slide, sir, you'll agree with me that the elasticity
19 calculated by Brattle was -- was focussed on retail?

20 DR. WAYNE SIMPSON: Yes. In fact it
21 says:

22 "retail prices and how they're
23 driven" [and then it says] "the price
24 elasticity is modelled
25 conservatively, relatively low long-

1 run elasticity of point four (.4)"

2 Which -- I -- is on the low end of the
3 elasticity estimates as I would interpret the studies
4 that I was re -- referring to earlier.

5 MR. BYRON WILLIAMS: Thank you.

6 THE CHAIRPERSON: Thank you, Mr.
7 Williams. Mr. Wojczynski, please.

8 MR. ED WOJCZYNSKI: Yes. There were
9 four (4) exhibits that counsel just put into the record
10 and I'll be just explaining them with reference to
11 Exhibit 15 -- 104-15 revised, page 2.

12 Maybe if -- well, I guess we'll have to
13 go off the hard copy. Oh, maybe not. Now, I want to
14 start off by saying we regret we didn't have this
15 available earlier.

16 We had provided exhibits on Plan 2
17 economics earlier and subsequently, in doing additional
18 checking, we actually found there was an error in the
19 cashflows for the Keeyask capital costs where the costs
20 in the year 2014/'15 -- there was a lar -- the majority
21 of the costs in that year, the \$350 million, should
22 actually have been delayed with the rest of the
23 cashflow when Keeyask was pushed back to a later date.

24 So this error was not made in other
25 calculations, but it was made in this set of the Plan 2

1 for when we did these updates. And once we corrected
2 that, we have the new numbers that are on here.

3 So Plan 2, that's the Keeyask Gas Plan,
4 under the base DSM we formerly said that that was 111
5 million. It turns out that it is actually now, as per
6 down here, 164 million more beneficial compared to All
7 Gas.

8 And if you go to level 2 DSM, there's a
9 more significant change and whereas we'd indicated
10 earlier it was minus 197 million compared to All Gas,
11 it actually is minus 38 million compared to All Gas.

12 The other cash flows were all okay.
13 It's this one that contained the error. So it's
14 unfortunate we didn't catch that one earlier, but
15 fortunately we did catch it and here it is. Thank you.

16 THE CHAIRPERSON: Ms. Ramage, please?

17 MS. PATTI RAMAGE: I was just going to
18 add for the record, Mr. Chairman, Manitoba Hydro is
19 going to clarify with Brattle what was meant by the use
20 of the term "retail."

21 Our understanding is it's "retail
22 suppliers," not "retail prices," but we'll have that
23 clarified for the Board.

24 THE COURT REPORTER: Is that an
25 undertaking?

1 MS. PATTI RAMAGE: I don't think I can
2 give Undertakings. I'm just advising the Board that we
3 want to get that clarified because there was certainly
4 no intention on our part to put something to the
5 witness, subject to check, that we did not believe to
6 be true.

7 And our understanding is, as we said,
8 that that's wholesale and wholesale being retail
9 suppliers, but we will get that confirmed to make sure
10 the record is -- is correct.

11 THE CHAIRPERSON: Thank you for that.
12 I'm looking around to see if there's any other hands
13 up. There being no other hands up, I want to thank Dr.
14 Simpson for your contributions to date and what other
15 work you might -- additional work you might do in the
16 future.

17 And Mr. Harper, thank you for the work
18 so far and we'll see you next week.

19 MR. WILLIAM HARPER: Thank you.

20 THE CHAIRPERSON: Have a good weekend
21 everyone. We'll see you Monday morning, nine o'clock.

22

23 --- Upon adjourning at 4:11 p.m.

24

25

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3 Certified correct,

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8 Cheryl Lavigne, Ms.

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