



MANITOBA HYDRO'S
NEEDS FOR AND ALTERNATIVES TO (NFAT)
PREFERRED DEVELOPMENT PLAN
Technical Conference

HELD AT:

Manitoba Hydro
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Pages 1 to 260

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1 --- Upon commencing at 9:12 a.m.

2

3 MS. PATTI RAMAGE: Good morning,
4 everybody, and thank you for coming today. We greatly
5 appreciate you coming on a beautiful July day. It was
6 tough, I'm sure, for many to leave their cottages and
7 homes this morning, but we're hoping for a really good
8 couple of days.

9 The purpose of this session, from
10 Manitoba Hydro's perspective, is to educate. It's --
11 there's some self-interest there, because we're hoping
12 that by conducting these sessions, it will reduce the
13 number of IRs.

14 So part of that is in order to achieve
15 that on, one of the things we'd really like to see is
16 that people ask questions. Don't wait until the
17 speakers finish their topic to ask your question,
18 because you might get lost along the way if you don't
19 have that point answered.

20 So, please, if you do have a question,
21 get your hand up so that the people who are joining us
22 remotely hear your question. We will have someone come
23 to you with one (1) of these portable mics so that they
24 will catch it and the court reporter today here catches
25 it.

1 The court reporter will be transcribing
2 today's session. It's not under oath. Nevertheless,
3 we will have that available to you so that you can
4 revisit what we've talked about and -- and if you have
5 any questions. I'm not sure exactly what arrangements
6 have been made getting those transcripts out, but it
7 may be a possibility that we can answer some of those
8 things Wednesday. Hollis, you...

9 MR. HOLLIS SINGH: It will be on the
10 PUB web site.

11 MS. PATTI RAMAGE: It'll be on the
12 PUB's web site. Okay. That's perfect.

13 As I say, the goal is to educate. We're
14 going to have a -- at least one (1), maybe more, people
15 here today speaking who have never testified in a
16 regulatory proceeding, never actually seen a regulatory
17 proceeding. I have given them -- attempted to give
18 them -- them comfort by saying the questions will not
19 be cross-examination.

20 They're -- what we're looking for is
21 questions of clarification on the materials that are
22 here, as opposed to jumping ahead to what is next. So
23 we'd appreciate it if everyone could stick to that and
24 let me keep my word to these people that it'll be on
25 what they know.

1 And I -- I think with that, maybe I'll
2 turn it over to Ed. And he has a few words to say,
3 introductries, comments.

4 MR. ED WOJCZYNSKI: Yeah, thanks,
5 Patti. I'll try and keep my comments very short. It's
6 going to be a long day today, a long day on Wednesday,
7 and the less time you hear from me, the more time
8 you'll have available to hear the stuff you're really
9 here for.

10 Just a quick comment. On behalf of all
11 the Hydro staff who are involved in this, including the
12 -- the ones here, including the people who are not here
13 in this room, we welcome you. And just a comment, that
14 we live and breathe this material. And so each one of
15 us who's going to be presenting will try and avoid
16 getting into the super detailed, technical stuff that
17 we talk to our technical peers about and try and make
18 it at a -- at a level that people who don't have thirty
19 (30) years or ten (10) years of background in the
20 company can understand and be -- and help you
21 understand what it is we're trying to say.

22 So if sometimes we lapse into
23 terminology that doesn't quite work for most people,
24 please stop us and get us to explain it. We'd be very
25 glad to do that. I have the super-interesting job of

1 giving you some of the housekeeping items here.

2 Washrooms are located between the -- the
3 elevators. If you go to either door, exactly on the
4 other side of this wall there's a hallway, and there's
5 women's and men's washrooms right there.

6 The fire exit is on the north stairway,
7 so out that -- north is that way, by the way, for those
8 who don't have compasses on them. And there's a
9 stairwell just down the hall. But if anything happens,
10 of course, which I don't expect will, the Hydro staff
11 will escort you.

12 Breaks are scheduled in the morning and
13 the afternoon. When -- lunch will be provided. We
14 have -- the agenda was sent out by email earlier. But,
15 Dawn, we printed extra copies. Are they here yet?
16 They're coming. We will have some extra copies of the
17 agenda for the two (2) days that we'll hand out in case
18 you don't have yours with you.

19 I think you just heard from Patti about
20 the workshop being recorded and transcribed. If you --
21 if you'd like to ask a question, could you raise your
22 hand? And then we'll -- we'll -- one (1) of the staff
23 -- we have two (2) travelling mics -- will bring the
24 mic to you.

25 And I think, as Patti explained,

1 otherwise, there are least two (2) people right now who
2 are on the external audio connection. And this way,
3 they'll be able to hear your question. And then
4 obviously who gives the answer will also have to have
5 the mic.

6 And the last comment, cell phones, the
7 traditional please put them on mute. So obviously
8 you're going to do what you have to do, but if you
9 could have the -- the ringers off, please.

10 What we thought we would do is go around
11 and have some quick introductions of everybody. It's a
12 small enough crowd we can do that. We thought perhaps
13 we'd start with the commissioners, and then go around
14 the room.

15 MS. MARILYN KAPITANY: I'm Marilyn
16 Kapitany. I'm a Board member at the Public Utilities
17 Board. And I'll be on the NFAT panel.

18 MR. REGIS GOSSELIN: It's Regis
19 Gosselin. I'm also a member of the -- the Board.

20 MR. LARRY SOLDIER: Larry Soldier. I'm
21 also a member of the Board.

22 MR. HOLLIS SINGH: Hollis Singh,
23 executive director and secretary to the Board.

24 MR. BOB PETERS: My name is Bob Peters.
25 I'm legal counsel to the Public Utilities Board.

1 MS. ANITA SOUTHALL: Good morning.

2 Anita Southall. I'm also counsel to the PUB.

3 MR. SVEN HOMBACH: Good morning. Sven

4 Hombach, from Fillmore Riley, also counsel to the PUB.

5 MR. ROGER CATHCART: Roger Cathcart,
6 accounting advisor to the PUB.

7 MS. JOSEE LEMOINE: Good morning.

8 Josee Lemoine. I'm the project manager for the NFAT
9 with the PUB.

10 MR. PATRICK BOWMAN: Good morning. I'm
11 Patrick Bowman, with InterGroup Consultants. And I'm
12 here with the MIPUG group.

13 MS. MELISSA DAVIES: Melissa Davies,
14 from InterGroup Consultants, also here representing
15 MIPUG.

16 MR. BRUCE DUGGAN: Bruce Duggan, from
17 Providence's Buller Centre for Business. Oh, and I'm
18 on 50by30.

19 DR. PETER MILLER: Peter Miller, Green
20 Action Centre.

21 MR. BILL GANGE: Bill Gange, counsel to
22 Green Action Centre.

23 MR. LARRY BUHR: Larry Buhr,
24 Engineering Advisor to the PUB.

25 MR. BYRON WILLIAMS: Byron Williams,

1 Public Interest Law Centre, representing CAC
2 (Manitoba).

3 MS. GLORIA DESORCY: Gloria Desorcy,
4 from the Manitoba Branch of the Consumers' Association
5 of Canada.

6 MS. MEGHAN MENZIES: Meghan Menzies,
7 also with the Public Interest Law Centre, representing
8 CAC.

9 MS. MARCI RIEL: Good morning, I'm
10 Marci Riel. I'm from the Manitoba Metis Federation.

11 MS. ALANA LAJOIE-O'MALLEY: Alana
12 Lajoie-O'Malley, I'm the director of the Campus
13 Sustainability Office at the University of Winnipeg,
14 and I'm with 50by30.

15 MR. BILL HENDERSON: Bill Henderson,
16 Public Affairs, Manitoba Hydro.

17 MR. DAVE BOWEN: Dave Bowen, new gen
18 construction, Manitoba Hydro.

19 MR. RALPH WITTEBOLLE: Ralph
20 Wittebolle, division manager of new generation
21 construction, Manitoba Hydro.

22 MR. TERRY MILES: I'm Terry Miles, with
23 power planning in Manitoba Hydro.

24 MR. CHRIS ALLERTON: Chris Allerton,
25 Manitoba Hydro IT services.

1 MS. MARLA BOYD: Good morning. I'm
2 Marla Boyd, with Manitoba Hydro law department.

3 MS. JOANNE FLYNN: Good morning.
4 Joanne Flynn, with power planning at Manitoba Hydro.

5 MR. DAVID CORMIE: And I'm David Cormie
6 at Manitoba Hydro.

7 MS. PATTI RAMAGE: And I'm, again,
8 Patti Ramage, Manitoba Hydro law department and I'll be
9 here Mondays and Wednesdays if you're looking for
10 something to do those days.

11 MR. ED WOSJCZYNSKI: And there are two
12 (2) people right now on the external connection, David
13 Lamont from CAC and Erick Matthiesen from Pattern
14 Energy. Are there any others, Nicole, right now?

15 So before we actually start the
16 presentations, are there any questions or comments at
17 the outset that people would like to ask for -- about
18 the process or anything before we get started?

19

20 (BRIEF PAUSE)

21

22 MR. ED WOJCZYNSKI: Going once...
23 Going twice...

24 MS. PATTI RAMAGE: Does everybody -- we
25 have two (2) dial-ins right now, or access. Does that

1 meet everyone's expectations, in terms of are they
2 thinking their -- their consultants should have
3 contacted us?

4 MR. ED WOJCZYNSKI: Bill Harper you're
5 expecting?

6

7 (BRIEF PAUSE)

8

9 MR. ED WOJCZYNSKI: Yeah. Okay. The
10 question was what -- but what about Bill Harper coming
11 on, and the answer is that he isn't on right now, but
12 we expect him to come on and he has the information.
13 Any -- does that work? Does that work for you? Okay.
14 You're asking about Paul Chernick. He's not on yet
15 either.

16 Okay. Okay. And when you people come
17 on, Nicole will notify us. And as the moderator I will
18 sort of announce that, I guess. We have -- someone
19 else just joined us?

20

21 (BRIEF PAUSE)

22

23 MR. ED WOJCZYNSKI: Antoine, with
24 MIPUG.

25 MR. ANTOINE HACAULT: Sorry. Hello,

1 everybody.

2 MR. ED WOJCZYNSKI: I'm looking at --
3 are you concerned about not having Bill right at the
4 beginning here right now, or -- or the other
5 individual, who I can't remember right now? No? Okay.
6 So I guess we should get going, unless there's anything
7 else. No? No comments from anybody? Okay.

8 So our first presenter is -- the agenda
9 actually says that the first item is going to be
10 presented by Dave Cormie, but it's going to be both
11 Dave Cormie and Joanne Flynn doing the overview of the
12 Manitoba Hydro system. But Dave is the one who is
13 going to kick it off.

14 Okay. You have a lapel, right?

15 MR. DAVID CORMIE: Yes, I think
16 everybody can hear me.

17 MR. ED WOJCZYNSKI: So the travelling
18 mic, we'll leave it with Barb, and she'll bring it to
19 anybody who wants to ask a question or make a comment.
20 So that's why we ask you to raise your hand. Oh, yes,
21 the presentations, we will provide those. They're --
22 they're just finishing be printed and being brought
23 down, so you will have them shortly, hard copies in
24 front of you, very soon.

25

1 PRESENTATION RE: OVERVIEW OF MANITOBA HYDRO'S SYSTEM:

2 MR. DAVID CORMIE: Okay. Normally I'm
3 under oath. I understand from Patti's remarks I can
4 say anything I want now, so...

5 Like Ed said, there's nothing that we
6 can't explain better. If we have -- if -- if our
7 presentations are -- are going off into jargon, stop us
8 and we'll explain. It's -- it's a good time to -- to
9 get the fundamentals understood, and questions are --
10 are completely part of this presentation.

11 Yeah, I'm David Cormie. I'm the
12 division manager of Power Sales and Operations at
13 Manitoba Hydro. My responsibilities include Manitoba
14 Hydro's activities in the export market and power
15 system operations, the management of the energy
16 resources. Joanne and I are going to tag-team this
17 morning. We've got quite a few slides to go through,
18 and we thought it would be good just to -- to trade off
19 every -- every once in a while.

20 So, with that -- oops. Can we go back?
21 There we go. The first presentation this morning will
22 be about the -- the power system, the system of
23 generating stations, transmission lines, reservoirs,
24 and -- and then we're going to talk about the -- the
25 characteristics of a power system. And Joanne will --

1 will speak to that, including our planning objectives
2 and our criteria. And there has been some -- some
3 questions about the impacts of the preferred
4 development plan on Lake Winnipeg. And so we're going
5 to -- to talk a little bit about -- about that -- that
6 subject.

7 Firstly, we need to make sure that we're
8 all talking in the same -- in jargon. If you're in the
9 gas, you have to know about joules. If you're in
10 electricity, you need to know about megawatts and
11 megawatt hours. As a homeowner, you may read your bill
12 from Manitoba Hydro, and your bill is issued to you in
13 kilowatt hours. If you -- and you pay about six (6) or
14 seven (7) cents a kilowatt hour for your electricity.

15 But at the -- at the power system level,
16 we don't talk in kilowatt hours. They're too small.
17 But if you have a half a million customers and each
18 customer is using 10,000 kilowatt hours a year, you
19 have five hundred thousand (500,000) times ten thousand
20 (10,000), pretty soon you're starting to talk about
21 trillions of watt hours, or billions of kilowatt hours,
22 and it's just too complicated to -- to talk about the
23 units of measurement in -- in those terms.

24 So at the power system level, the units
25 that we use are megawatts and megawatt hours. And so I

1 want to talk firstly about what a megawatt is. A
2 megawatt is a million watts. Imagine one hundred
3 thousand (100,000) 1,000 watt light bulbs. That's a
4 meg -- a megawatt. And in terms of what it is, it's
5 the maximum rate of power output, just in the same way
6 that what's the capacity of the engine in your car?
7 It's measured in horsepower.

8 If you asked about your car, they'd say,
9 Oh, it has a 200 horsepower engine. It can put out 200
10 horsepower if you put the pedal to the -- gas pedal to
11 the floor. That's the maximum amount of power that
12 that car engine can produce.

13 Well, in the same way, in the -- in the
14 power system, if all the generators were running at
15 full output, that would be -- that would be the
16 capacity of the Manitoba Hydro system, and we would
17 measure that in megawatts. And that number is around
18 6,300 megawatts. So 6,300 million watts, that's the
19 capacity. That doesn't talk about energy; that's just
20 the capability. It's the capability of the engine to
21 produce -- produce power.

22 As I came up in the elevator this
23 morning, the sign on the wall in the elevator said,
24 "Capacity of the elevator: twenty-two (22)." You can
25 get twenty-two (22) people in that elevator. That's

1 the capacity of the elevator. Do you ever have twenty-
2 two (22) people in an elevator? No. You can't squeeze
3 them in there. But theoretically, if you put twenty-
4 two (22) people in that elevator, it could carry
5 twenty-two (22) people. That would be the capacity of
6 the elevator.

7 So the other -- the other unit that we
8 talk about it is -- is the energy. And energy is
9 measured in -- it's the capacity times time. So if you
10 had a hundred watt light bulb and you ran it for ten
11 (10) hours, you would produce a hundred times ten (10),
12 that would be a kilowatt hour, or a thousand watt
13 hours. And again, if you take everybody's electric
14 bill and you multiplied it by the number of customers,
15 we would be talking about billions of kilowatt hours
16 consumed in electricity.

17 At the wholesale level, at the planning
18 level, we don't talk in terms of kilowatt hours, but
19 that's how you get billed. We talk about it in terms
20 of -- of gigawatt hours or megawatt hours. If you hade
21 a hundred-megawatt unit running for twenty-four (24)
22 hours, it would produce 2,400 megawatt hours of
23 production in a day.

24 The -- the analogy in a car is how many
25 litres of gas does your car use a year? Well, it's the

1 -- it's the gas that you use to drive the engine.

2 Well, in my family we probably use about 2,500 litres

3 of gas a year. And that's different than the capacity

4 of the engine. The capacity of the engine is 200

5 horsepower. But when I run it for all the times that I

6 need over the year, I'll use 2,500 litres of gas.

7 So the energy produced is the amount of

8 energy that's generated by the -- by the power system

9 in a year. And for Manitoba Hydro's system, when we

10 have average water flows, it's around 32,000 gigawatt

11 hours, or 32 million megawatt hours, or 32 billion

12 kilowatt hours, or 32 trillion watt hours.

13 This -- and we don't want to talk in

14 those terms, so we have these abbreviations. And --

15 and the units of measurement are when you're talking

16 about an -- an hourly scale or megawatt hours. But

17 when you start aggregate -- aggregating them over the

18 month -- when you start aggregating over the month, you

19 start talking in gigawatt hours.

20 So the power system might produce 2,000

21 or 3,000 gigawatt hours a month. Over the year it'll

22 produce around 32,000 gigawatt hours over the whole

23 year. And even this number is getting big. So

24 there'll be a few slides where we actually show it as

25 32 terawatt hours.

1 So we're going to kind of -- you know,
2 when you have a graph and you're trying to put those
3 big numbers on the side of the graph, there's not
4 enough room so, you like to just put the important
5 numbers. And -- and when we talk in terms of -- of
6 gigawatt hours, it's just simpler to talk in terms of
7 terawatt hours.

8 So the -- the power system generates
9 around 32,000 gigawatt hours or 32 terawatt hours.
10 Manitoba consumers in a -- in -- last year will consume
11 around 25,000 gigawatt hours, 25 billion kilowatt
12 hours. And so you can see there's a difference of
13 around 6,000, 7,000 gigawatt hours. That's the surplus
14 energy in the system, and that's the energy that goes
15 to the market.

16 In an average year, Manitoba Hydro can
17 sell between 10,000 gigawatt hours, and in a high-water
18 year it can be as high as 14,000 gigawatt hours. But
19 those are the kind of -- those are the units that we're
20 generally going to talk about. All -- Joanne's
21 planning is all done in -- in gigawatt hours for the
22 energy and megawatts for the capacity. And so when you
23 look through the supply and demand tables, those are
24 the units that -- that we're going to be -- that we're
25 going to talk about.

1 A couple of other things. You'll notice
2 at times we'll be talking in term -- in metric terms
3 when it comes to the facilities. Some dams have been
4 designed in terms of metres, and -- and cubic metres
5 per second. The legacy system of Manitoba Hydro is
6 still imperial units. So when we talk about Lake
7 Winnipeg, we're talking in term of elevation in feet
8 above sea level. But when you talk about elevation at
9 the Keeyask Generating Station, you might see metres.

10 So there's still this mixture of units
11 that -- and it's just what the licences are written in.
12 And if the licence is written in metric, we still
13 regulate the reservoir in metric, the power system. So
14 you'll -- you might notice that as we go through the
15 presentation as well.

16 Is there -- is there something I need to
17 do to keep this thing from falling asleep?

18

19 (BRIEF PAUSE)

20

21 MR. DAVID CORMIE: So what is Manitoba
22 Hydro? In the context of North America, we're a
23 medium-size utility. What's unique about us is we're
24 predominantly hydroelectric. There are very few
25 utilities like Manitoba Hydro in North America: BC

1 Hydro, Quebec-Hydro, Manitoba Hydro. A high proportion
2 -- a very high proportion of -- of electricity produced
3 from -- from water.

4 Because we're a hydro utility on the
5 prairies, we have huge volatility in the water supply.
6 That means we go from extreme drought to extreme flood,
7 and you've seen that this year. Big rainstorm in
8 Alberta; all of a sudden the Saskatchewan River goes
9 from being a trickle to being in a massive flood. And
10 that -- and -- and so the variable is -- is huge. And
11 for a utility in North America, we have the greatest
12 variability in water supply.

13

14 (MOVED TO SLIDE 5)

15

16 MR. DAVID CORMIE: Now, if you're
17 fortunate, you have a bunch of reservoirs that catch
18 that water. And -- and it really doesn't matter how it
19 arrives, as long as it's rising. And if your
20 reservoir's big enough, you can hold that water and
21 then meter it out over time in order to shape the
22 supply water in to match the demand of electricity.

23 We're not that fortunate because the
24 amount of storage we have relative to the volatility is
25 -- is pretty -- pretty small. If -- if you gave me my

1 druthers, I'd -- I'd have another -- twice as much
2 storage in the system. And then we would be able to
3 manage the flows properly. But we don't. Quebec-Hydro
4 has much more storage relative to its water supply vol-
5 -- variability than we do.

6 So the -- the large volatility in -- in
7 water supply means that our hydro generation varies.
8 It can be as low as -- okay, I'm going to use the word
9 'gigawatt hour' -- 1,500 gigawatt hours in a low year
10 of how much hydro we could have. But in a really high
11 year it can be as high as 37, 38,000 gigawatt hours, so
12 more than double the minimum, so lots of volatility.
13 And -- and that -- that's a unique characteristic.

14 We're physically remote in the -- in --
15 in the electric system. North America is divided by a
16 line, and there's the Western Interconnection and the
17 Eastern Interconnection. And that dividing line is the
18 border between Alberta and Saskatchewan. And if you
19 were to draw that line due south all the way to Texas,
20 everything west of that is the Western Interconnection
21 and everything east is the inner -- Eastern
22 Interconnection. And this chart shows that -- that
23 dividing line. It's right here.

24 So you can see Manitoba Hydro is sitting
25 up here in the northwest corner of the Eastern

1 Interconnection. I mean, not a lot of people up here.
2 We're -- we're sparsely populated. Most of the load is
3 in -- in north -- in the Eastern Interconnection is
4 down here south of Chicago, south of the Great Lakes.
5 And so relative to where all the generation is and
6 where all the electric demand is, Manitoba Hydro is
7 isolated up in the north -- northeast corner.

8 The connections across the -- oops. The
9 connections across the east -- the -- the
10 interconnection between the Western Interconnection and
11 Eastern Interconnection are shown on this chart.
12 There's these little arrows that you can see. But
13 there's a couple of hundred thousand megawatts of
14 generation on -- on the Western Interconnection and --
15 and more than that on the Eastern Interconnection.

16 But the megawatts of transfer capability
17 across the regions is small, measured in a few thousand
18 megawatts. So you've got these two (2) huge electric
19 grids that are very lightly connected. The connection
20 between Alberta and Saskatchewan is 150 megawatts.
21 Alberta load is 10,000 megawatts, Saskatchewan and
22 Manitoba are another six (6). So there's not a lot of
23 room for trade to go across that border. So we're --
24 as I say, we're remote when it comes to the -- to the
25 Eastern Interconnection.

1 We are surrounded by predominantly
2 summer-peaking thermal utilities. To the west,
3 Saskatchewan, most of their energy comes from burning
4 coal and natural gas. To the south, over most of the
5 electricity in -- in Minnesota is produced with coal
6 and natural gas. Northwest Ontario, lots of hydro in
7 Northwest Ontario; but as you go farther south into --
8 into Southern Ontario, more hydro, more nuclear, and
9 they were just in the process of shutting down the last
10 of their -- their coal utilities.

11 Summer peaking, most of our neighbours,
12 including Saskatchewan, Saskatchewan's peak demand is
13 almost the same as their winter peak demand, but most
14 of our neighbours have a -- their maximum demand for
15 electricity in the summertime as a result of air-
16 conditioning load.

17 Manitoba Hydro has its maximum demand in
18 the wintertime because of heating load. We have about
19 a thousand megawatts of electrically heated homes. And
20 -- and that's -- you know, that's -- that's pretty --
21 like I think Quebec-Hydro has a winter peak as well,
22 with lots of electric heating. So that makes us --
23 that makes us a little bit unique in North America.

24 And we're -- we're -- we describe
25 ourselves as transmission constrained. If you look at

1 that map, you can see all these big red lines. These
2 are the major high voltage lines across North America.
3 And you can see that Manitoba has only one (1) major
4 high voltage line connecting us to Central Minnesota.
5 And -- and there's not enough transfer capability there
6 to meet all of Manitoba Hydro's need to connect into
7 the market. So we describe ourselves as transmission
8 constrained.

9 If you compare that to utilities down
10 south of the Great Lakes, lots of transmission lines.
11 They don't have issues of transmission instabilities.
12 They don't -- they're -- most of their transmission
13 limits are because the -- the lines are thermally
14 limited. That means if -- they get to the point where
15 they start to melt, and they'll sag into the trees.

16 And so -- yes, Byron...?

17 MR. BYRON WILLIAMS: Dave, it's Byron
18 Williams, just in -- in terms of the transmission
19 constraints within MISO, we've heard that one of the --
20 the challenges is the rich wind-producing plains of
21 North Dakota, etcetera, there's not a lot of ability to
22 move that power into the more lucrative Eastern
23 marketplace, so it has a dampening influence on -- on
24 prices within -- within MISO.

25 And I just wonder, I guess two (2)

1 questions. One is if you could comment on that. And,
2 secondly, at some point in time will -- will Hydro be
3 providing information relative to any transmission
4 constraints within MISO as compared to between Manitoba
5 and MISO?

6 MR. DAVID CORMIE: We are -- we are
7 going to speak about congestion later on, Byron. But I
8 can -- I can speak to the fact that -- that,
9 historically, transmission was -- was -- is -- was --
10 was well developed within the region.

11 So on this -- on this map, you can see
12 there's areas of different colour. Those would be the
13 transmission regions, and within those regions there's
14 probably about seven (7) or eight (8) NERC regions.
15 Within those regions electricity flow was -- was really
16 well -- well managed and there was lots of capability.

17 But between regions -- so if -- if
18 Manitoba wanted to move its power out of the old map
19 region into Wisconsin or in -- into Illinois, you would
20 be moving out of the -- the upper Midwest region into
21 other regions, and it's those seams issues. There's
22 not enough -- not enough transmission.

23 Cause the regions were designed to be
24 standalone regions of -- of power supply and demand,
25 and not a lot of effort was put into connecting the

1 regions. So when you start talking about moving wind
2 from, you know, the plains of North Dakota through
3 Minnesota, into Wisconsin, down into Illinois, the
4 transmission grid was never designed for that purpose.
5 Inter-region transfers were -- who's -- you know, who's
6 going to pay for that? And it was never -- it was
7 never an issue. S

8 o now that is becoming an issue because
9 to develop the renewables, there's millions of
10 megawatts of wind generation potential in Minnesota and
11 North Dakota and South Dakota. There's millions of --
12 or hundreds of thousand megawatts of load in the -- in
13 the Northeast United States. How do you get that
14 across the regions?

15 And -- and this transmission grid that
16 we have was never designed for the bulk transfer of --
17 of power. So what the US wants to do is develop this -
18 - like an interstate highway for electricity, to
19 develop the infrastructure on electricity like the gas
20 system is.

21 And you notice that because -- in the
22 gas system that there's very diff -- little difference
23 in price in natural gas across the United States. It
24 might be a -- a dollar or -- or, you know, a few cents
25 per gigajoule basis spread between the pricing points

1 in the United States.

2 That's because the transmission system
3 has been built for continental transfers of natural
4 gas. It hasn't been that way for electricity. In 1998
5 we had power prices of three thousand dollars (\$3,000)
6 in -- in California, and we're sitting here in MAPP,
7 and I'm trying to sell it for a hundred dollars, right.
8 Why can't I get three thousand (3,000)? Well, there's
9 no transmission.

10 So the transmission system was never
11 developed for Manitoba Hydro to sell power into
12 California. And that's the -- that's now the
13 objective, is to develop that transmission grid to
14 allow these interregional transfers.

15 And that will be -- that's the way that
16 renewables will be -- will be brought on line, because
17 like hydro, renewables need to be developed where they
18 are. You can't -- you can't decide where you want your
19 hydro plant to be. It has to be at the place where the
20 water falls, and the same with wind. Wind is in North
21 Dakota. The load is in New York. How do you get it
22 there?

23 MR. BYRON WILLIAMS: Thank you.

24 MS. MARILYN KAPITANY: Dave...?

25 MR. DAVID CORMIE: Yes...? Yes...?

1 MS. MARILYN KAPITANY: Could you just
2 confirm: Did you say that there are a thousand
3 megawatts of electrically heated homes in Manitoba?

4 MR. DAVID CORMIE: About that, yes.
5 There's -- so -- so every degree that the -- that --
6 that it gets colder, we have about twenty-five (25)
7 more megawatts of electric demand. So imagine -- and
8 the -- and the heating kicks in at about, I don't know,
9 let's say 15 degrees Celsius.

10 When it's fifteen (15) outside, you'll
11 probably -- your heat will start to come on. So
12 imagine -- imagine going from 15 degrees Celsius to
13 minus thirty (30); that's 45 degrees. Forty-five (45)
14 times twenty-five (25), is like a thousand -- a
15 thousand megawatts. So you -- there's about a thousand
16 megawatts of load. And that's mainly because rural
17 houses don't have access to natural gas. Farm -- farm
18 homes.

19

20 (MOVED TO SLIDE 6)

21

22 MR. DAVID CORMIE: So the power system
23 that Manitoba Hydro has is made up of a -- a set of
24 generating stations and transmission systems that --
25 that connect the generating stations to the load. We

1 have about 500 megawatts of -- of hydro generation just
2 east of the city on the Winnipeg River, but the -- but
3 the vast majority of -- of Manitoba Hydro's generating
4 assets are in the North, and -- and -- and the -- and
5 the bulk of those are on the Nelson River near Kettle,
6 Long Spruce, and Limestone.

7 In total we have about 6,200 megawatts
8 of -- of capacity, about 5,200 megawatts of -- of
9 hydro, about 3,700 megawatts of that generation at the
10 Lower Nelson, about -- over -- over 70 percent at -- at
11 -- as the Nelson River drains into the sea on the Lower
12 Nelson. We also have about 5 -- 500 megawatts of
13 thermal generating stations at Brandon and Selkirk. We
14 have some combustion turbines at Brandon.

15 We have a hundred-megawatt unit at
16 Brandon that can -- that burns coals. And we have a
17 hundred megawatt, or 130 megawatt unit at Selkirk that
18 burns natural gas. But -- but the -- the coal and the
19 -- or the -- the natural gas units in Manitoba Hydro
20 are very expensive to operate relative to the cost of
21 purchasing power. So they -- they run very
22 infrequently for economic reasons. They mostly run for
23 training, proficiency runs, and -- and are there for
24 emergencies.

25 We also have power purchase arrangements

1 with neighbouring utilities, where we have the right to
2 buy 500 and -- 500 megawatts of capacity, and we -- we
3 include that in -- in our -- our supply.

4 The -- the transmission system is there
5 to bring the electricity from the generating stations
6 to the load. Most of the load in Manitoba, probably 80
7 percent of the load, is within 50 meg -- 50 miles of
8 the US border.

9 And so the transmission system is made
10 up of -- of two (2) major systems. One (1) is the HVDC
11 system, and that's -- that's the Bipole 1 and Bipole 2.
12 And that's shown on this chart as this line here. And
13 then there's an AC system. And the AC system also
14 connects Northern Manitoba to Southern Manitoba, and
15 power can be brought south on that as well.

16 We have under contract two (2) wind
17 farms: one (1) at St. Joseph, Manitoba, and one (1) at
18 St. Leon, Manitoba. And Manitoba Hydro entered into
19 power purchase arrangements with these companies, and -
20 - and they -- they've installed 250 megawatts of wind
21 turbines. But from a -- go ahead. Question?

22 MS. MARILYN KAPITANY: So 250
23 megawatts, but then it says zero, in terms of the
24 supply that's --

25 MR. DAVID CORMIE: Yes.

1 MS. MARILYN KAPITANY: -- part of our
2 6,265 megawatts?

3 MR. DAVID CORMIE: Right. So the
4 question is: So why do we show on the table here a
5 zero as the supply? Well, the capacity of the turbine
6 is two hundred and fifty (250). So when the -- when
7 the wind is blowing the hardest, and all the units are
8 running, the station will put 250 megawatts out. But
9 Manitoba Hydro only counts capacity that's available at
10 the time of the system peak, on a guaranteed basis.

11 When is the system peak? Well, it's in
12 January; it's minus twenty-five (25), minus thirty (30)
13 out. When it's minus twenty-five (25) and minus thirty
14 (30), the wind rarely bl -- doesn't brow -- blow for
15 certain. There's -- our experience is it's only
16 blowing about half the time, so we can't count on that
17 capacity to serve the load. So we -- from a capacity
18 perspective, although there's 250 megawatts installed,
19 it's not something that you can depend on.

20 And the other complicating factor is
21 that all these turbines shut down when it gets to be 30
22 degrees. They -- they are not able to run when it's
23 colder than that. So if -- if the peak temp -- if the
24 peak demand occurs when it's minus thirty-five (35),
25 and it's -- and the -- and the turbines shut down when

1 it's -- when it's thirty (30), they're not available to
2 run, even if it was windy. So there's a low -- there's
3 a -- there's a low correlation between power output at
4 the time of the system peak from -- from a wind farm.
5 So from a planning perspective, we do not count the --
6 the capacity.

7 Fortunately, Manitoba Hydro is -- not
8 fortunately, but the -- the characteristic of our
9 system is that we're building for energy, not for
10 capacity, so this is not really an issue for us that --
11 if we had an extra 250 megawatts of capacity, would it
12 do anything to our plans? Probably not.

13 MR. ED WOJCZYNSKI: Dave...?

14 MR. DAVID CORMIE: Yes, Ed.

15 MR. ED WOJCZYNSKI: Maybe a
16 clarification on what Dave said. I think, Dave, you're
17 referring to the front end, but later on in our
18 sequence, when we become capacity short, then that does
19 become an issue, the issue of capacity and energy.

20 MR. DAVID CORMIE: Okay. I'm -- I
21 haven't looked at the latest --

22 MR. ED WOJCZYNSKI: Yeah. Yeah. I
23 mean, you're dealing with the front end of the
24 sequence, the operating, we're talking --

25 MR. DAVID CORMIE: Yeah. Okay.

1 MR. ED WOJCZYNSKI: -- about the
2 thirty-five (35) year sequence. We eventually become
3 capacity short, so --

4 MR. DAVID CORMIE: Okay.

5 MR. ED WOJCZYNSKI: -- then that does
6 become an issue.

7 MR. DAVID CORMIE: Sure.

8

9 (MOVED TO SLIDE 7)

10

11 MR. DAVID CORMIE: The -- the Manitoba
12 Hydro system is hydraulic. I'm sorry, question?

13

14 (BRIEF PAUSE)

15

16 MR. BRUCE DUGGAN: So I take your point
17 with only two (2) wind farms. That's kind of a minor
18 capacity. But if you had twenty (20) wind farms, would
19 you still say that you had zero capacity from wind?

20 MR. DAVID CORMIE: You know, if all the
21 wind farms were in the same location --

22 MR. BRUCE DUGGAN: Well --

23 MR. DAVID CORMIE: -- and it's -- it's
24 not windy in the same location, you would have no capac
25 -- but if you had a diversified -- if you had a

1 diversified wind portfolio with the -- with -- with the
2 wind turbines spread across a wide region so that when
3 -- you know, when it -- when it wasn't windy in one (1)
4 area -- so from the MISO footprint, in -- in the MISO
5 world, they only accredit 10 percent of the capacity,
6 even though the MISO wind is spread all over a -- a
7 large region.

8 But for a -- for a local area like Mani
9 -- Southern Manitoba, where our wind is concentrated, I
10 -- I don't think there's enous -- enough diversity
11 there that -- when it's thirty (30) below in Winnipeg,
12 it's thirty (30) below in Altona and thirty (30) below
13 in Winkler and thirty (30) below in -- in St. Leon.

14 So the weather -- weather is
15 continental. And --

16 MR. BRUCE DUGGAN: Yeah, I -- I get
17 that.

18 MR. DAVID CORMIE: -- you really have
19 to go to a broad -- go to a broad footprint before you
20 get the diversity associated with winds.

21 MR. BRUCE DUGGAN: So you're saying
22 that this is a standard practice for -- for how wind is
23 treated by all utilities?

24 MR. DAVID CORMIE: Pretty well. But
25 there is -- there is credit given to the wind capacity

1 in the MISO market. At Manitoba Hydro, we can't count
2 it for our capacity needs, but it -- it is, you know,
3 we can -- we can accredit 10 percent of that -- that
4 capacity and sell that, because now we're selling to a
5 summer capacity market. And generally it's windy in
6 the summer. There's no temperature limits associated
7 with cold -- cold wat -- cold weather.

8 The -- the purpose of this chart is to
9 show the extent of Manitoba Hydro's watersheds. The
10 water rises out west in -- in the Rocky Mountains and
11 it flows east towards Lake Winnipeg. Lake Winnipeg is
12 the low point in the watershed, so water from Northwest
13 Ontario, from the northern -- northeast corner of South
14 Dakota, flows north up the Red River to Lake Winnipeg.
15 Lake Winnipeg catches the runoff from -- from this --
16 this vast drainage basin.

17 It -- it goes into Lake Winnipeg and
18 then Lake Winnipeg is the regulating reservoir. Yes?

19 MS. NICOLE FITKOWSKI: I have a
20 question from an external guest, Erick Matthiesen. He
21 says:

22 MR. DAVID LAMONT (VIA CHAT): For the
23 past two (2) winters the St. Joseph wind farms has
24 never been taken offline for solely temperature-related
25 reasons, as indicated by the presenter.

1 MR. DAVID CORMIE: That may be true,
2 but the question is whether we can count on them being
3 online at the time of peak and that's the criteria.

4 So this -- this chart shows the -- the
5 watersheds. The -- the percentages is -- is -- are --
6 are designed to show the percent of hydraulic energy
7 that comes from that watershed. So you'll see a 20
8 percent in the centre of the Saskatchewan River
9 Watershed.

10 So 20 percent of Manitoba hydraulic
11 energy, that wat -- that energy rises on the
12 Saskatchewan River. The Winnipeg River is 39 percent.
13 So although the Winnipeg River footprint is relatively
14 small, most of the lar -- it has -- it carries the
15 largest burden with recov -- when -- when it comes to
16 supplying electricity, because the water in the
17 Winnipeg River flows through all the generating
18 stations on the Winnipeg River, then it goes into Lake
19 Winnipeg, and then it flows through all the generating
20 stations downstream. So there's more head developed
21 for -- for Winnipeg River water.

22 The watershed is brou -- is very -- is
23 very expansive. That means that there's diversity in
24 water supply. So if it's -- if it's dry in one (1)
25 region, it's likely that it's going to be raining in

1 another, and they -- it tends to be offsetting. And --
2 and -- but there -- there are times when we have
3 drought everywhere.

4

5 (MOVED TO SLIDE 8)

6

7 MR. DAVID CORMIE: This chart shows the
8 history of the water supply going back to 1912.
9 Manitoba Hydro is very fortunate that we have a
10 hundred-year record. What we're showing here is the
11 variability from year to year expressed as a percent of
12 average. The -- the average line is shown at a hundred
13 percent.

14 And so you can see that there are years
15 of low flow and there are -- there are years of high
16 flow. And -- and, fortunately, we've been in -- in the
17 last ten (10) years we've had average or better than
18 average river flows, and so we have ups and downs.

19 What's important from a power system
20 perspective in designing the future, as well, we have
21 to be able to supply electricity even in the lowest
22 water year. So we look at the historic record and we
23 find the year in which the water flows are low. And if
24 you -- you can see that this period here, after the
25 1930s, ending in 1939/1940, is the lowest flow on

1 record.

2 We call that the dependable flow.
3 That's the flow that you can depend upon. You can
4 depend on that flow being exceeded all the time. So
5 from a planning perspective, that's a very im --
6 important period.

7 We had a drought in 2003. We didn't
8 come as low as the -- as the dependable flow figure,
9 but I think we came within about 3 percent of -- of the
10 -- of the number. So it was very close.

11 Now, there have been -- there have been
12 changes to the watershed over time. And from Manitoba
13 Hydro's planning perspective, we have -- we've adjusted
14 back in time so that the flow record that we use
15 reflects the current use conditions.

16 So people in -- in Alberta and
17 Saskatchewan are now irrigating. So we assume that
18 that irrigation is -- was -- had -- we go back and
19 adjust the record as if that irrigation had taken place
20 all the way back to 1912. And that -- that's the flow
21 record that we use for planning and operating the power
22 system.

23 Oh, I need to go back.

24

25 (MOVED TO SLIDE 9, THEN WENT BACK TO 8)

1 MR. DAVID CORMIE: I want to go back
2 because this dependable flow issue is -- is really
3 important. Dependable flow is the flow that we use and
4 assume that will produce the hydro power for our firm
5 customers. I don't want to be able to say to you, You
6 know what, we're relying on -- on non-dependable flows
7 to supply your electricity, and, you know what, we're
8 not having a good water year, so we're going to have to
9 stop providing you with electricity.

10 So our firm customers, whether in
11 Manitoba Hydro, our domestic customers, or our export
12 customers, are all served out of dependable flows, out
13 of -- out of dependable energy, energy that will be
14 there all the time.

15 The corollary of that though is that
16 whenever you have more than dependable flows, you're
17 going to have surplus energy. And --

18 MR. ED WOJCZYNSKI: Dave, hang on.
19 Someone wants to ask a question.

20 MS. ALANA LAJOIE-O'MALLEY: Just
21 regarding water supply, are -- are you guys looking at
22 all at any impacts -- future impacts from climate
23 change in water supply? Oh, sorry, Alana Lajoie-
24 O'Malley, 50by30, of Winnipeg.

25 MR. DAVID CORMIE: The question was

1 about climate change. Yes, we have a very extensive
2 program in climate change and we -- we've got a lot of
3 material to show on that. I don't know if it's part of
4 this workshop, but we'd be glad to -- to show you our -
5 - our activities in that area. But we are -- we are
6 studying climate change and involved -- and -- and
7 looking at the impacts on the water supply in the
8 future.

9 So we have --

10 MR. ED WOJCZYNSKI: Hang on a second.
11 Maybe just to help answer that, in the submission there
12 will be a reporting on our climate change program, the
13 research that's been done and the implications.

14

15 (MOVED TO SLIDE 9)

16

17 MR. DAVID CORMIE: So if you -- if you
18 were to look at that flow record in ninety-four (94) of
19 the ninety (90) -- ninety-four (94) out of the ninety-
20 seven (97) or ninety-four (94) out of a hundred, there
21 is surplus energy available. And what -- the question
22 is: What do you do with that -- with that surplus
23 electricity?

24 Well, this is where interconnections
25 come in. It's one (1) of the uses of the

1 interconnection. You can now generate that extra hydro
2 energy and you can -- and you can sell it into the
3 external markets.

4 This chart shows the interconnected
5 capacities. There are two (2) sets of numbers here.
6 The numbers on the -- on the chart, those are the --
7 those are the -- the maximum flows that that -- those
8 transmission lines can carry. So the 2,175 megawatts,
9 that's how much power that -- that transmission system
10 can -- can export to the United States. But not all
11 2,175 megawatts can be used for commercial purposes.
12 We have to back off from that to -- to create some
13 trans -- transmission space so that Manitoba Hydro can
14 deliver its reserve obligations, and -- and also to
15 accommodate unscheduled power flows that would occur on
16 the transmission line.

17 So let's say that there was a -- a
18 generator suddenly went off a line in Manitoba, so
19 there's a lack of power. Where does the electricity
20 come? It surges up from the United States. And so the
21 power system operators have to maintain some
22 transmission capacity in reserve for these unscheduled
23 flows.

24 So you can see on the chart it says,
25 "1,950 megawatts." That's the number of megawatts that

1 can be scheduled on. The difference between nineteen
2 fifty (1,950) and twenty-one seventy-five (2,175),
3 these are for these unscheduled flows, including
4 Manitoba -- the ability of Manitoba Hydro to make
5 delivery of -- of electricity.

6 So there's -- so that -- that's --
7 there's always this confusion over, Well, what number
8 do we use? Well, use the -- from the -- from the
9 scheduling perspective, what -- what is used in moving
10 electricity to market are the -- are the numbers shown
11 with scheduling limits.

12 Then there are times when transmission
13 lines are taken out of service for maintenance, so the
14 scheduling limit goes down. And if the -- if a storm
15 were to damage the line, we -- we would be without that
16 transfer capacity for a while.

17 So the -- the interconnections were
18 built in order to maximize the value of the surplus and
19 energy and capacity. And so every -- almost -- with
20 every large plant that we build, when we built Kettle,
21 when we built Long Spruce, when we built Limestone,
22 incremental transmission capacity was added because the
23 power system was now capable of generating more surplus
24 electricity because of the -- of -- as you add a hydro
25 unit, you -- you add firm power and you also add

1 surplus power. And the surplus needs to go to market.

2 Yes, Peter...?

3 DR. PETER MILLER: Why the large
4 discrepancy between the import and export capacity to
5 the US? And is there any fix, in terms of reliability,
6 you know, for -- for Manitoba's system that could
7 increase the import capacity?

8 MR. DAVID CORMIE: Well, as -- as I
9 said, we are on the periphery of the North American
10 electric grid. And if we were in the heart of the
11 Midwest of the US, where all those big red lines were
12 shown, those numbers would be essentially the same.
13 But because we're stability limited, that's the --
14 that's the capability of the power system to -- to
15 import more.

16 Our proposed new 500 kV line will have
17 exactly the same import -- additional import capability
18 as the export capability. The both increase by 750
19 megawatts. But the existing system can't support more
20 than 700 megawatts of imports. And it -- it's just
21 that -- that -- the characteristics.

22 So there would have to be some
23 significant investment in transmission facilities to --
24 to move that number from 700 megawatts up. It's --
25 it's not a limitation in Manitoba. It's a limitation

1 in -- I -- I believe it's in North Dakota and
2 Minnesota.

3

4 (MOVED TO SLIDE 10)

5

6 MR. DAVID CORMIE: The other asset that
7 we have that we use to operate the power system is
8 reservoir storage. So the -- the water supply mainly
9 comes in -- in the spring and the early summer, like
10 we're -- in the period we're at right now. And that
11 doesn't match the demand for electricity. The
12 transmission connections to the United States aren't
13 big enough to move all that surplus power to market.
14 So at times there is surplus water that needs to be
15 stored in the reservoir for -- for future generation.

16 Move to a time of greater value or
17 greater need, and if -- if we -- if there's room in the
18 reservoir and the water is being spilled at the
19 generating stations, is it possible to back off the
20 reservoir release and hold some of that water and not
21 spill it but to -- to sell it later in the fall, when -
22 - when water flows are lower or demand for electricity
23 is higher? That's the purpose of the reservoir.

24 The reservoirs that are -- that are
25 under Manitoba Hydro control are shown in this chart,

1 and it -- this shows a history of storages activity
2 since 1977. The -- the pink or the -- the beige area
3 shows the range of storage activities.

4 The black line indicates the average.
5 And so you can see -- shift -- the black line -- you
6 can see on the black line it starts out in spring at
7 around -- on average about 5 terawatt hours, or 5,000
8 gigawatt hours, in storage. And on average it rises to
9 about 11 and 11 1/2 terawatt hours by this time of
10 year, in the middle of July.

11 So about 5,000 gigawatt hours goes into
12 storage on average in Manitoba reservoirs, bec --
13 because there's more water supply than there is demand
14 for electricity, so that extra water goes into the
15 reservoir.

16 And then that 5,000 gigawatt hours is
17 drawn out of those reservoirs, over the -- over the --
18 the remaining months of the -- of the year so that the
19 reservoirs, on average, are drawn down over the
20 wintertime. And -- and by the end of March, they're --
21 on average, it's back down to -- to five (5). So the
22 five (5) was put in, in the spring, and it's slowly
23 drawn out over time, when the water supply is less than
24 the demand, and there's a -- there's a need for that
25 electricity.

1 You can -- yes, Byron?

2 MR. BYRON WILLIAMS: Excuse me. Byron
3 Williams. Just wondering how vulnerable Hydro is to
4 changes in the regulatory approach to storage on Lake
5 Winnipeg? For example, there is a CEC proceeding
6 coming up relating to the regulation on Lake Winnipeg.

7 And -- and just curious how, if at all,
8 that might affect Hydro?

9 MR. DAVID CORMIE: Lake Winnipeg is a -
10 - a critical asset. Over half the live storage in
11 Western Canada is in Lake Winnipeg. And so the -- the
12 8 terawatt hours of storage there is -- is extremely
13 important. And I -- I've got some slides later, Byron,
14 to talk about Lake Winnipeg. Yeah. Yeah.

15 So the key reservoirs in -- that
16 Manitoba Hydro operates in Manitoba are Lake Winnipeg,
17 Cedar Lake, and Southern Indian Lake. There are other
18 reservoirs in -- in Western Canada, but these are
19 controlled by other agencies. So on the Winnipeg
20 River, there's Lake of the Woods and Lac Seul. Those
21 are controlled by the Lake of the Woods Control Board.

22 But that storage is effective for our
23 use, because the -- the way they manage that water
24 affects the flows on the Winnipeg River. And in
25 Saskatchewan there's Lake Diefenbaker, and there's the

1 reservoirs in the Rocky Mountains. And on the
2 Churchill River there's the -- the -- Reindeer Lake.
3 So this chart just refers to the -- to the reservoirs
4 that -- that Manitoba Hydro controls.

5 These re -- reservoir operations are
6 subject to limits. And so we have Water Power Act
7 licences for these reservoirs, and they tell us how low
8 the reservoir can be drawn and how high it can -- it
9 can be filled.

10 In the case of Lake Winnipeg, Lake
11 Winnipeg is also regulated for flood control. And
12 you'll see on this chart, a -- a zone called 'flood
13 zone'. That's when Lake Winnipeg goes above the
14 elevation seven hundred and fifteen (715), when the
15 reservoir is now being used to -- to manage the flood
16 on Lake Winnipeg.

17 That water is not available for hydro
18 generation. And you can see we can put in -- about
19 6,000 gigawatt hours will go into storage, but the
20 licence requires us to spill that water away. We can't
21 -- we can't operate that part of the -- of the
22 reservoir for -- for hydro power. And we'll -- I'll
23 talk about that in a little while.

24 Is this were Joanne steps up? No. No.
25 Okay.

1 (MOVED TO SLIDE 12)

2

3 MR. DAVID CORMIE: The characteristics
4 of a hydro system. So we talked about the large water
5 variability. We're energy constrained because of the
6 size of our interconnections; we can't call on that
7 huge capability of the generating systems south of us
8 to -- for energy, because of our transmission system.
9 It is quite limited. We can only import 700 megawatts.
10 We like to import much more than that.

11 We have resource diversity, so we have
12 lots of different generating supplies: we've got wind,
13 we've got hydro, we've got coal, we've got natural gas.
14 And there are transmission limitations, and those have
15 to do with the import and export capability.

16 The other characteristic is long lead
17 times. It takes a long time to build a hydro plant,
18 and these involve significant investments.

19 Energy-constrained system, our power
20 system is designed to meet the -- the power demand in
21 the lowest low period. And that's what this -- the --
22 this critical flow period. What is the dependable
23 flow?

24

25 (MOVED TO SLIDE 13)

1 MR. DAVID CORMIE: It's also designed
2 to meet the peak load. So if, for some reason, we had
3 to put twenty-two (22) people in that elevator, we
4 could get them in there. But in the case of megawatts,
5 our peak demand is in the wintertime, and so we have to
6 have enough capacity so that when the winter peak hits,
7 when it's minus forty (40) out and everybody's calling
8 for heat in their homes, there's enough capacity in the
9 system, or purchased capacity, that that power demand
10 can be met.

11 The -- another characteristic of our
12 system is that there's surplus energy available in
13 almost all the flow conditions.

14

15 (MOVED TO SLIDE 14)

16

17 MR. DAVID CORMIE: Resource diversity.
18 We've got a -- a mix of generation types in times of
19 drought and high fuel prices. So although in a normal
20 year we don't have most of our energies produced from
21 hydro, in the critical year, over 20 percent of our
22 energy supply will come from non-hydro. It'll -- and I
23 think in the drought of 2003 we were -- probably over
24 30 percent of our supply was coming from -- from non-
25 hydro.

1 As I said, we have a mix of resources.
2 And -- and the important thing is that some of those
3 resources can be brought to Manitoba over the
4 interconnections.

5

6 (MOVED TO SLIDE 15)

7

8 MR. DAVID CORMIE: Hydro generation is
9 remote. Like all renewables, the resource is where it
10 is, and you need transmission lines to bring power from
11 the generator to the load. Lack of transmission means
12 congestion. So if you have a generator and you don't
13 have a matching capability on transmission, then you
14 have congestion.

15 So if Bipole 1 and Bipole 2 goes down,
16 sure, we have 3,600 megawatts of generators in Northern
17 Manitoba, but how do you get the -- how do you get the
18 power to Southern Manitoba? The -- the DC system is
19 down. So that's the reason we're building Bipole 3, so
20 we have an alternate path.

21 So you have congestion unless new
22 transmission is built to handle, in the case of surplus
23 power, to the -- to the export market. And congestion
24 exists today in our exports to Ontario. Congestion
25 occurs when all the wind turbines in North Dakota are

1 operating at full load and we're trying to export
2 maximum power in the United States. There's not enough
3 transmission capacity into Minneapolis for both of us
4 to sell, so prices go down. Prices can go negative.
5 The other day, it was minus three thousand dollars
6 (\$3,000) a megawatt hour. That -- just telling
7 everybody there's too much power, stop generating.

8 There's very limited ability to move
9 power across Canada and the United States. And we
10 talked about that earlier on, about the -- the region
11 was -- the regional transmission is -- is robust.
12 Interregional transmission is very weak. And -- and
13 the best demonstration of that is we can hardly export
14 anything east into Ontario or west into Saskatchewan
15 compared to what we can do going south.

16

17 (MOVED TO SLIDE 16)

18

19 MR. DAVID CORMIE: I don't know if I
20 really need to explain more than this except that
21 you'll notice that those other Canadian utilities, like
22 BC Hydro and Quebec-Hydro, that have large surpluses,
23 have done what Manitoba has done. They're strongly
24 interconnected north/south. They're not interconnected
25 east/west. And the reason that they're not

1 interconnected east/west is because there's more value
2 in connecting to the south. There's a bigger power
3 demand there, a greater ability to absorb the surplus
4 that is available.

5 It's very difficult for -- for
6 Saskatchewan to back all their generators down and
7 absorb anything but a small portion of the surplus that
8 Manitoba Hydro may have. So if we're going to invest
9 in transmission, we want to build south to where
10 there's a big enough market to absorb the surpluses.

11

12 (MOVE TO SLIDE 17)

13

14 MR. DAVID CORMIE: Here we go. Did I -
15 - I probably used up half your time.

16 MR. REGIS GOSSELIN: David, there's a
17 couple -- a couple questions, please. I just wanted to
18 -- you mentioned that there was congestion to Ontario.
19 Did you mean that there was -- that line is limited to
20 Ontario?

21 You could sell more power if that line
22 was -- had more capacity? Is that --

23 MR. DAVID CORMIE: Right. The way the
24 market works in Ontario is that Manitoba Hydro is able
25 to participate in the market, to offer their energy in,

1 but they'll -- they constrain Manitoba generation off
2 if there's oversupply.

3 Normally what they would do is they
4 would say, Well, who's -- you know, we would be -- we
5 would be on an equal footing with Ontario generation in
6 Northwest Ontario. They don't do that. They say,
7 Manitoba, you keep your power and we'll -- we'll let
8 Ontario generators go first.

9 So there's not enough transmission
10 capacity connecting Northwest Ontario to Southern
11 Ontario so that all the power that's available for
12 Manitoba could reach -- ultimately reach the market.
13 So there's congestion.

14 Hydro One is building a new line from
15 Sudbury across northern Lake Superior to Thunder Bay,
16 and -- and that congestion should go away in about 2018
17 so that Manitoba Hydro should be able to inject and
18 physically deliver power because if there's surplus in
19 Northwest Ontario, it will be -- it will be able to
20 reach Southern Ontario.

21 MR. REGIS GOSSELIN: Now, the line that
22 goes from Manitoba to Saskatchewan is located where?

23 MR. DAVID CORMIE: Well, there's
24 actually five (5) lines. Yeah, there's two (2) at Flin
25 Flon and three (3) south of that. But -- but most of

1 the transfer capability between Manitoba and
2 Saskatchewan is tied up with returning Island Falls
3 power. So Saskatchewan Power has a generating station
4 in Northern Saskatchewan. They wheel their power
5 through Manitoba and they eject it back into Southern
6 Saskatchewan, in Southern Manitoba, so...

7 And then the rest of it is essentially
8 reserved in case a large generating unit in
9 Saskatchewan trips, and they -- they need to be able to
10 have transmission to -- to accommodate the surge of
11 power that would come in from Manitoba. So there's
12 very little capacity on those lines that's available
13 for commercial transactions, so...

14 MR. REGIS GOSSELIN: There was an
15 announcement a few weeks ago by Premier Wall and
16 Premier Selinger about --

17 MR. DAVID CORMIE: Yes.

18 MR. REGIS GOSSELIN: -- a new
19 agreement. Could you -- could you explain that one to
20 us?

21 MR. DAVID CORMIE: Saskatchewan has
22 some mining load in Northern Saskatchewan, and they
23 would like to serve that with a purchase from Manitoba
24 Hydro. And so we're working on -- on a transaction
25 with them to do that.

1 MR. REGIS GOSSELIN: And the Ontario
2 line runs from where to where? Like the one going from
3 Manitoba to Ontario, where does it run?

4 MR. DAVID CORMIE: There's two (2) 230
5 kV lines, and if you're -- if you're in the Whiteshell
6 you'll -- and you go to Seven Sisters, there's the
7 Whiteshell terminal station, those two (2) lines go
8 east from -- from Seven Sisters and they go -- they go
9 to Canora.

10 MR. REGIS GOSSELIN: And the AC/DC line
11 that you referred to with respect to transmission that
12 goes from north to south, it's running along to the
13 Bipole? Is that --

14 MR. DAVID CORMIE: No, no. It -- I --
15 I -- that -- that was just a simplified schematic.
16 There's a whole network that goes from -- from Thompson
17 down the west side of the province through Neepaw --
18 Neepaw, Brandon. There's an integrated electric
19 network that -- the -- I think the best thing is to
20 look probably in the back page of the annual report.
21 There's quite a detailed schematic showing the major
22 high voltage lines.

23 I asked that question, Why are you
24 showing just one (1) line on the chart? Oh, we wanted
25 to represent the AC network. But there is -- there is

1 an ability to -- to move Northern power into Southern
2 Manitoba by switching Kelsey units onto the AC system,
3 or to -- or moving power through Western Manitoba.

4 MR. REGIS GOSSELIN: Now, you made a
5 reference to critical flow period. And could you
6 explain that, please?

7 MR. DAVID CORMIE: The critical flow
8 period is the -- is the period when river flows are --
9 historically have been the lowest. So I think -- I
10 think the critical flow period for Manitoba Hydro is
11 probably about eighteen (18) months long.

12 It starts, I think, in the spring of
13 1939, and it goes all the way '39 and all the way
14 through 19 -- 1940. So it's -- it's longer than a one
15 (1) year period. And that's the flow period that --
16 that is used to determine the dependable hydro energy.

17 MR. REGIS GOSSELIN: Now, looking at
18 the -- at this chart that reflected the -- the various
19 water supplies available, I think it's slide 10, it's
20 showing a white line at the bottom, where it -- I guess
21 it represents the -- the minimum that was available at
22 -- at certain years.

23 MR. DAVID CORMIE: Yeah, that -- that's
24 dead -- dead storage. It's -- it's not -- it's -- it's
25 not used. It's not available. It -- it's kind of

1 saying, Where do we start measuring from?

2

3 Well, we can measure from sea level.

4 Those are just the nominal minimums. In 2003 we -- we
5 had Lake Winnipeg at seven eleven point two-five
6 (711.25) so it was essentially bumping along the
7 bottom. Even though, you there's water from seven
8 eleven (711) down to seven-o-nine (709) it's just not -
9 - not available for use, either for licence or you
10 can't get the water out of storage.

11 So I think our historical records and
12 scientific -- shows what's usable, and I think that
13 chart is a good demonstration of what's available in
14 the low-flow year, and what's -- or what's -- what can
15 be used in a high-flow year.

16 MS. NICOLE FITKOWSKI: Erick Matthiesen
17 has a question. It says:

18 MR. DAVID LAMONT (VIA CHAT): Can you
19 provide any more details on the geographic distribution
20 of demand, i.e., Greater Winnipeg area, Southern
21 Manitoba, Northern Manitoba?

22 And then he says:

23 "Same question for generation north
24 versus south."

25 MR. DAVID CORMIE: I believe there's a

1 presentation this afternoon on load, and maybe Lois can
2 best speak to that at her presentation, if that's all
3 right?

4 MS. JOANNE FLYNN: Okay. I'm Joanne
5 Flynn, and I'm the division manager of power planning
6 for Manitoba Hydro, and I will carry on with the
7 section here on planning objectives and criteria.
8 Maybe. Okay, here we go.

9

10 (MOVED TO SLIDE 18)

11

12 MS. JOANNE FLYNN: Okay. So the main
13 objective in -- in planning is to secure resources for
14 the future needs for Manitoba and, as required under
15 the -- the Manitoba Hydro Act, as well as to meet the
16 firm committed sales that we have in existence at the
17 time we're doing our planning.

18 And this is to do so at the least net
19 cost to Manitoba customers. And so what that means is,
20 we don't only take into consideration the cost, but
21 also the benefits of the various development plans.
22 Now -- and -- and also consideration for environmental
23 and social impacts.

24 Now, because the load growth is
25 forecasted to continue, adding generation is not a

1 discretionary investment for Manitoba Hydro. But --
2 and that is because doing nothing is not an option. We
3 are obligated to meet the load.

4

5 (MOVED TO SLIDE 19)

6

7 MS. JOANNE FLYNN: Okay. So the
8 generation planning criteria is what -- what we must
9 comply with when we do our planning. And having
10 planning criteria is consistent across the electrical
11 utility industry. And it's consistent also with NERC
12 requirements. NERC being the North American Electric
13 Reliability Corporation.

14 And NERC requires utilities to carry
15 capacity reserves. And the capacity reserve carried by
16 Manitoba Hydro is 12 percent of forecast firm peak
17 load. And what this does is, it recognizes that there
18 is uncertainty in both load growth and equipment ava --
19 availability, and so allows for high loads and for
20 equipment breakdown.

21 Now, Manitoba Hydro, as a predominantly
22 energy -- or, sorry -- predominantly hydro system, also
23 has an energy resource planning criterion. And this is
24 what -- what we've been talking about -- what Dave
25 Cormie has been talking about when we've talked about

1 that critical period. So there must be sufficient
2 energy supply available to meet firm energy demand in
3 the event of a repeat of the lowest water conditions on
4 record. And the sources of dependable energy that we
5 do count on are sourced from hydro, thermal, wind
6 purchases, and imports.

7

8 (MOVED TO SLIDE 20)

9

10 MS. JOANNE FLYNN: So in terms of --
11 I'm going to talk about the hydro first of all, but --
12 and there is -- there is three (3) classifications that
13 we talk about: dependable energy, which is energy
14 produced by the system under the lowest flow conditions
15 on record, so this is drought conditions; average
16 energy, which is the average of energy produced from
17 all historic flow conditions, so -- so this is truly an
18 average across each one (1) of the flow conditions; and
19 maximum energy, which is energy produced as a result of
20 the most favourable flow conditions on record, which
21 basically means we're in flood-like conditions.

22

23 (MOVED TO SLIDE 21)

24

25 MS. JOANNE FLYNN: So here again we've

1 got, this time, identified the critical flow period.
2 And I think we've heard -- we've heard about this from
3 Dave. So what we're doing is, we're designing for the
4 critical period for energy from hydro resources. And
5 as was mentioned earlier, a surplus would occur, except
6 when the flows are at or near these critical systems.
7 So, basically, ninety-seven (97) out of a hundred
8 years, we'd have some form of fur -- of surplus.

9 And then when we do our planning, any
10 forecast deficiency of dependable supply over demand
11 signals a need for new resources. And this again is,
12 we are planning to serve Manitoba load and any firm
13 load commitments only from those dependable resources.
14 So the difference between that line at the -- sort of
15 just above the 40 -- 40 percent level, and above all of
16 that would be surplus energy.

17

18 (MOVED TO SLIDE 22)

19

20 MS. JOANNE FLYNN: Okay. So the -- the
21 energy sources, we just talked about hydro. And so
22 when we look at it from a planning perspective, we
23 include the dependable inflows, which is sort of the --
24 the chart that you've been seeing as a representation
25 of inflows, plus the use of -- plus the use of

1 reservoir storage.

2 From the thermal perspective, so for the
3 coal and natural gas, it is the station output as if
4 it's operated continuously, but then derated for
5 outages and maintenance.

6 In terms of wind energy, wind energy is
7 -- is calculated at 85 percent of the average annual
8 wind generation in terms of what we are counting on as
9 dependable energy. And this is to put it on sort of
10 that same level playing field as the hydro is. We look
11 at hydro from the critical period perspective and we
12 look wind. It's -- it's difficult to predict exactly
13 how much wind you're going to get out of the system.
14 And this 85 percent of average annual wind generation
15 is a representation of a 95 percent level of confidence
16 in -- in the amount of wind that will be generated over
17 the long-term, because these are all over a thirty-five
18 (35) year period.

19 And then purchased energy, which is
20 according to the generation planning criteria,
21 something that we can rely on to a degree, must be on
22 firm transmission, available on -- under contract. And
23 there are -- there's some that we can also count on
24 from organized power markets.

25

1 (MOVED TO SLIDE 23)

2

3 MS. JOANNE FLYNN: So surplus energy by
4 design is a graphic representation of the effect of --
5 of adding generation. So the number of years in
6 gigawatt hours are the scale. You see the firm load
7 represented. And then if we add an increment of new
8 generation, what you see is surplus energy in -- in the
9 blue there that is labelled as "minimum" and
10 "predictable." This is the dependable energy. This is
11 below that critical flow period line on -- on the
12 chart. And it's added just in time to meet firm load.
13 And it shows a couple of increments coming in.

14 What we also get when we add that
15 increment is we get an amount of surplus energy which
16 is unpredictable. From year to year, we don't know how
17 much of it will be there. And as -- as we add more the
18 increment gets -- the increment of surplus energy gets
19 bigger.

20 So that is why we say we have surplus
21 energy by design. It's actually driven largely by the
22 water variability.

23

24 (MOVED TO SLIDE 24)

25

1 MS. JOANNE FLYNN: Okay. So this chart
2 is showing us if we continue to -- to build hydro
3 resources out in time, and this shows us going from
4 basically 1970 to 2090, and this isn't saying that
5 there's any commitment to do this kind of thing, but
6 this is showing if we ran all of the hydro potential
7 out in time and built it all, this is the effect it
8 would have in terms of surplus energy and dependable
9 energy.

10 So you can see historically Kettle, Long
11 Spruce, Jenpeg, Limestone being added, and the surplus
12 energy being 8 terawatt hours to the median level and
13 an additional 6 terawatt hours above that. As we put
14 in Wuskwatim, Keeyask, and Conawapa, you see that
15 surplus energy growing from 6 -- from 8 terawatt hours
16 to 12 and 6 terawatt hours to 10. And then if we
17 continued to develop hydro over time, it would grow to
18 15 terawatt hours and 14 terawatt hours so that it --
19 there's almost as much dependable energy -- surplus
20 energy as there is dependable energy. And the value we
21 get out of building the hydro plants is also to be able
22 to take that surplus energy to market.

23

24 (MOVED TO SLIDE 25)

25

1 MS. JOANNE FLYNN: So then this is
2 where the interconnections become valuable if you're
3 going to build the hydro. What did -- what did the
4 interconnections then give us?

5 Firstly, it provides market access both
6 for the export of surplus power and the import of a
7 diversified (sic) source of power. As Dave mentioned, the
8 -- the interconnections to the markets we're connected
9 to have different basis of resources, predominantly
10 thermal at this time.

11 They also allow us to do capacity
12 sharing due to load diversity. We talk about the south
13 being a summer peaking load and Manitoba being a winter
14 peaking load, and therefore, we can share some
15 resources in order to be more cost effective. But we
16 can't do that without a transmission line, without
17 interconnections.

18 As well, risk mitigation, in terms of
19 load forecast. There's uncertainty in the -- the
20 forecast for load. And having a transmission line
21 allows you to have -- to manage that uncertainty,
22 whether it's too high or too low, more surplus to sell
23 or a source for import.

24 The same is true for the climate change.
25 Where there's uncertainty in the future as to whether

1 there'll be more water or less water, or an increased
2 variability in the -- in the events that may occur in
3 terms of drought and flood, an interconnection allows
4 you manage those, as well.

5 In the short term, it allows us to deal
6 with emergencies and enhances grid reliability. So it
7 allows -- and Dave talked about the transmission and
8 the capacity of the transmission and having room on it
9 to -- to hold an amount in reserve to deal with things
10 like emergencies.

11 And the last point on this is that
12 because we are moving predominantly hydraulic energy
13 into the market, there's -- would be a decrease in
14 overall regional greenhouse gases. They would need to
15 -- they would need to run their thermal generators
16 less.

17

18 (MOVED TO SLIDE 26)

19

20 MS. JOANNE FLYNN: So in terms of
21 market access, then we just take a quick look at price.
22 And so a typical summer day and a typical winter day is
23 depicted here, and you see there's a shape to the day
24 in both seasons. So the spot market price is highly
25 variable and dependent on quite a number of factors, so

1 the range in price can go from minus two thousand
2 (2,000) to plus two thousand dollars (\$2,000) a
3 megawatt hour.

4 So it is -- it is difficult to just pick
5 a typical price. It's always changing. There's pri --
6 different prices in the on-peak versus the off-peak,
7 and what we end up typically depicting are just
8 averages which don't really represent the variability
9 that you see in the -- in the market price.

10 Meanwhile, the marginal cost of
11 hydraulic energy is in that five dollar (\$5) range
12 because it is invest -- the -- the large spend for it
13 is up front, and the operating costs basically consist
14 of -- of water rentals. Hydro is a flexible resource
15 and -- and can be backed off and ramped up as required.

16

17

18 (MOVED TO SLIDE 27)

19

20 MS. JOANNE FLYNN: So this picture is a
21 picture of the spot price in the MISO market at a
22 particular five (5) minute point in time. There's
23 tremendous variability across the region, and the price
24 for Manitoba energy is at the border.

25 In this particular shot, the price is at

1 minus two thousand two hundred and forty-six dollars
2 and forty cents (\$2,246.40); not the best time to be
3 selling. But the price is location and time dependent,
4 so you also see the price at the Minnesota hub is at
5 seventy-three dollars and seven cents (\$73.07). So
6 with firm transmission we can move the delivery point
7 and get the price at a different node. So the value of
8 us having transmission positions in the MISO market
9 also gives us a greater opportunity to take advantage
10 of different prices in the market.

11

12 (MOVED TO SLIDE 28)

13

14 MS. JOANNE FLYNN: Okay. So investing
15 in hydro, they are large -- large upfront investments
16 with the majority of the cost in civil structures
17 providing a fixed cost, once constructed, and low
18 stable operating cost that provide a basis for stable
19 rate increases. In addition, large plants can satisfy
20 many years of Manitoba load growth.

21

22 (MOVED TO SLIDE 29)

23

24 MS. JOANNE FLYNN: As well, hydro
25 plants take an extremely long time to get into place.

1 So exploration work can occur decades before a plant is
2 -- is built, as can varying degrees of engineering work
3 and environmental work along the way. And then going
4 through negotiations, approvals, licensing, before we
5 get to the construction period, which are also lengthy,
6 it's not unusual to see twenty (20) years before a
7 large hydro plant would be in place. So half a career
8 for people or more. And what we are looking at are in-
9 service dates of Keeyask at 2019 and Conawapa at 2026.

10

11 (MOVED TO SLIDE 30)

12

13 MS. JOANNE FLYNN: So the preferred
14 development plan that we're talking about is this one
15 with Keeyask in 2019/'20, Conawapa in '26/'27, a new
16 500 kV US interconnection in 2020, and a number of sale
17 agreements.

18

19 (MOVED TO SLIDE 31)

20

21 MS. JOANNE FLYNN: Now, as we go
22 through our resource sequence comparisons, we use a
23 consistent methodology to evaluate any new addition
24 that we look at. So it -- it doesn't matter whether
25 it's hydro, thermal, wind, or purchases, the same

1 methodology and the same models are used to evaluate
2 the resource additions.

3 So this is standard practice across the
4 industry, and it's been used over time by Manitoba
5 Hydro at -- I think -- I'll call it as long ago as the
6 1990 PUB capital plans hearings and through to 2003
7 Wuskwatim ones, as well

8 So with that, I will turn it back to --
9 to Dave.

10

11 (MOVED TO SLIDE 32)

12

13 MR. DAVID CORMIE: Yeah. So there's
14 this -- this issue of -- of impacts. If you change
15 something, you add a new generating station, you add a
16 new transmission line, you change the size of the
17 Manitoba load, a power system changes. There's what we
18 call 'system impacts'. The whole power system is
19 operated as a -- as a unit, and -- and the various
20 pieces will react depending on -- on what -- what
21 changes you occur.

22 So when we add a generating station like
23 Conawapa, there will be -- there will be a change to
24 the power system, because you have the -- you may have
25 the same water supply, you may have the same load but

1 now you may dispatch the -- the generating system in a
2 -- in a different manner.

3 And system impact could be -- it could
4 affect the water levels on Grand Rapids. It could
5 affect the water levels on Lake Winnipeg. It could
6 affect the amount of energy that you're purchasing,
7 because you're added now a low-cost resource, and why
8 would you need to go to market. You may -- so the --
9 the -- from -- we -- we need to look at the impacts on
10 the entire system from adding -- adding new -- new
11 generation.

12 Now, when you add new generation in
13 combination with the new interconnection and new export
14 and import contracts, it becomes even more complicated.
15 And so we have computer models that look at the
16 interaction and dispatch the resources based on -- on
17 the new resources being there, the new load
18 requirements being there. And we can measure the --
19 the differences in -- in water levels in -- in how much
20 energy that you purchase, how much -- how often the gas
21 turbines run now.

22 And, so those are the things that --
23 that -- where the power system is affected by adding
24 one (1) resource, it'll affect the way the other
25 resources are -- are used.

1 Now, those impacts can be physical --
2 oh, the water level is a little bit different than I
3 remember it being. The financial impacts can be huge.
4 Manitoba Hydro has now borrowed -- I don't know what
5 it's going to be, \$18 billion. There's going to be an
6 impact from that on the -- on the finances of Manitoba
7 Hydro.

8 There is going to be environmental
9 changes: less greenhouse gas emissions. We're going to
10 -- if we change the -- the water regime maybe there's
11 an environmental impact. And there's going to be a
12 rate impact, so you go through the financial process,
13 you go through the regulatory process, and -- and you
14 know that if -- with different scenarios you have
15 different -- different rate scenarios.

16 But remember, we are doing this in a
17 dynamic world. And so the impacts of -- of adding the
18 new generation are -- are only one (1) of the many
19 variables that are occurring. And -- and what -- in
20 our modelling we can -- we can fix a lot of the
21 variables and say, Well, let's just change the -- the
22 hydro system and see what -- the impacts on those.
23 And, so we can go through various scenario analysis to
24 -- to show what the impacts are on the power system but
25 it's a -- it's complicated. It takes a long time to

1 run the hydraulic models and then go through the -- the
2 finical process.

3 And these -- these are not really
4 trivial calculations that you can do overnight. They -
5 - they take a long time to -- if that's the new
6 sequence, the new scenario, what -- what does it
7 involve, and what are the impacts in all of these four
8 (4) areas?

9

10 (MOVED TO SLIDE 33)

11

12 MR. DAVID CORMIE: The -- the question
13 that we were asked is: What's the effect of the new
14 generation on Lake Winnipeg? Firstly, Lake Winnipeg is
15 a -- a huge lake; it's the twelfth-largest lake in the
16 world. And -- and it's not only impressive that way,
17 but it's also impressive in that it's half the live
18 storage in the Nelson-Churchill watershed. There's
19 about eighteen (18) ma -- major reservoirs. Seventeen
20 (17) of them comprise 50 percent of the storage. Lake
21 Winnipeg is the other 50 percent, and that's just
22 because of its -- its huge extent.

23 We have a licence to regulate Lake
24 Winnipeg from the province. And there's a -- a --
25 historically, there was a water level range from as low

1 as 709 feet, up to 718, so there was a 9 foot range.
2 Now that range has been reduced to 4 feet for the
3 purposes of power, between elevation seven-eleven (711)
4 and seven-fifteen (715). So as long as the water
5 level's be -- in that 4 foot range, Manitoba Hydro can
6 regulate the outflows for power purposes.

7 When the level goes above seven-fifteen
8 (715), the licence tells us now the dam at Jenpeg has
9 to be opened wide, and you have to let as much water as
10 physically possible down the river. And -- and that's
11 when the -- the flood management rules in the licence
12 kick in.

13 So right now, we know with the flood
14 that's coming from Alberta, Lake Winnipeg's at seven-
15 fifteen (715); we're at maximum discharge. And
16 regardless of the benefits or disbenefits to power,
17 that water has to be moved down the river. And -- and
18 there's a lot of water being spilled in the power
19 system. But that's to provide flood relief on -- to
20 the -- the people around Lake Winnipeg. And those
21 rules are all set out in our Water Power Act licence.

22 Now, we don't actually regulate the
23 water level on Lake Winnipeg, so the water level at
24 every point in the lake is whatever the wind is doing
25 at that moment. What we regulate is the outflow, so we

1 control how much water leaves the lake. And if more
2 water is leaving the lake than is flowing in the lake -
3 - the -- the lake, the level of the lake will drop
4 because you're taking extra water out of storage.

5 If the -- if the opposite is true,
6 like's happening now, more water is flowing into the
7 lake than even can be passed at maximum discharge, the
8 level of the lake will rise. So over the next few
9 weeks Lake Winnipeg might get up to seven fifteen point
10 two (715.2), or point three (.3). As that flood wave
11 from Alberta is coming in, we're absorbing it, and then
12 passing it downstream.

13 But the Lake Winnipeg regulation project
14 is successful in managing the floods because we built
15 channels at the north end of Lake Winnipeg, shown in
16 that -- in that red box, so that we can get 50 percent
17 more water out of the lake now than was possible in a
18 natural condition. And so that 50 percent more water
19 provides the flood benefits to Lake Winnipeg.

20 In the wintertime, that 50 percent
21 outflow capability is beneficial to Manitoba Hydro.
22 Because, in the winter, when our power demand is high,
23 when all those a thousand megawatts of electric heating
24 load are high, we can get more water out in the winter.
25 So the -- the outflow capacity in the winter gives us

1 the be -- Hydro the benefit. The outflow capacity in
2 the summer provides the flood control benefit on Lake -
3 - to Lake Winnipeg shoreline owners.

4 So Lake Winnipeg is a hugely important
5 asset for Manitoba Hydro. It's -- 70 percent of our
6 hydro generation is downstream. And when Lake Winnipeg
7 is in that hydro range, we can adjust the flows to meet
8 the -- the power demand pretty precisely. Once we
9 build Keeyask and Conawapa, it's importance becomes
10 even greater. It now represents -- regulates the flow
11 to almost 80 percent of the -- of the hydro capacity in
12 the system.

13

14 (MOVED TO SLIDE 34)

15

16 MR. DAVID CORMIE: So a little bit of
17 background on Lake Winnipeg. What won't change with
18 Keeyask and Conawapa, the licence isn't going to
19 change. We're operating under an interim licence. The
20 Clean Environment Commission has been asked to hold
21 public hearings into Manitoba Hydro's request to
22 finalize that licence.

23 We've been operating the lake under
24 standard terms and conditions since 1976. Those
25 conditions haven't changed. We're not proposing to

1 change those conditions when we apply for a final
2 licence. All we're doing is taking it, changing the
3 name of the licence from "interim" to "final". The
4 province has asked the Clean Environment Commission to
5 go out and hold public hearings, get public feedback on
6 Lake Winnipeg regulation, because it is a very
7 controversial subject.

8 So the -- but we don't expect the terms
9 of the Water Power Act licence to change. It'll --
10 it'll convert from a -- an interim to a final licence,
11 but it'll do it under -- under exactly the same terms
12 and conditions that we have now.

13 What also won't -- won't change with
14 Keeyask and Conawapa is our -- our approach to
15 regulation. As we see floods coming, we don't wait for
16 the water level to get to seven-fifteen (715) before we
17 go to maximum discharge. It rained massive amounts in
18 Alberta; almost instantly we started increasing the
19 outflows from Lake Winnipeg so that we can provide the
20 maximum amount of flood protection to the people on
21 Lake Winnipeg. So our approach is to continue to
22 anticipate our -- and -- and meet our flood management
23 obligations.

24 And we have obligations to all the
25 stakeholders around Lake Winnipeg. And our approach is

1 to enter into dialogue, explain to them what -- what
2 Manitoba Hydro is doing with regard to regulation, what
3 things that we control and what things are -- are
4 natural. For example, with the issue of erosion around
5 Lake Winnipeg. That's not something that Manitoba
6 Hydro's in -- is responsible for, but there's a
7 perception that erosion is -- is affected by Lake
8 Winnipeg regulation. And -- and so we go out there in
9 a -- with a very comprehensive outreach program,
10 meeting with the -- with the communities to explain.
11 And we're going to continue to do that in perpetuity,
12 because we have the responsibility.

13 What will change is the outflows and
14 levels. But the main driver in outflows and levels is
15 the water supply. Why are we at maximum discharge out
16 of Lake Winnipeg now? Because there's a big flood
17 coming, not because Manitoba Hydro chose to do that.

18 So the hydrology will drive what the
19 outflows and -- and levels are to the most regard. If
20 the -- if in -- inflows to the lake are high the lake
21 will fill up because there'll be surplus. If outflows
22 are -- inflows are low, we'll be -- we'll be cutting
23 back flows.

24 Now, to the extent that we have some
25 flexibility within that range of seven eleven (711) to

1 seven fifteen (715), there will be slight variations in
2 -- in those. But those changes in water flows will be
3 minor as long as Manitoba Hydro builds an
4 interconnection, so that the surplus energy can go to
5 market rather than go into storage.

6 So imagine building a generation station
7 like Conawapa, all of the sudden, having 40 percent
8 more surplus from Conawapa but having no place to sell
9 it to. Well, then what would you do? You would -- you
10 would put it in reservoir storage and the lake would
11 fill up. But -- so you -- if you had a sequence when
12 you built a big power plant that doesn't -- and you
13 haven't addressed the issue of what are you going to do
14 with the surplus, there will be large changes in -- in
15 -- could be large changes in the water regime.

16 So it's important, from a water regime
17 perspective, and especially for Lake Winnipeg, to have
18 -- to bring not only the generating station to the
19 table, but the -- but the ability to manage the
20 surplus.

21

22 (MOVED TO SLIDE 35)

23

24 The -- the history of the water levels
25 is shown on this chart. We call this a -- the tunnel

1 chart. And what this does is it shows for the --
2 starting about 1977 to date, the green area indicates
3 the range of water levels that have been experienced
4 with regulation. The red line in the middle is the
5 average water level.

6 And you can see that the range is
7 between seven seventeen (717) and about seven eleven
8 (711) and seven eleven point four (711.4), seven eleven
9 point three (711.3). So the range is, you know, about
10 5 -- 5, 6 feet.

11 The grey area shows the range had there
12 not been regulation. The water levels would have been
13 as high as seven nineteen (719), and the low levels
14 would have been in -- in -- would have been lower. So
15 what regulation has done is kept the water levels in a
16 -- in a tighter band.

17 And you can see that without regulation
18 the average water level, shown by the blue line, would
19 be significantly higher than the level that actually
20 was recorded by about a foot. So Lake Winnipeg
21 regulation has lowered the average level.

22 And if you look at the history of water
23 levels from '77 to date and you compare those to the
24 history of water levels from 1912 to 1977, the average
25 that has -- has -- that we've recorded and the average

1 that was recorded prior to the project are almost the
2 same. That red -- that red line is not significantly
3 different. So the reason that there hasn't been a
4 significant change in the average water level in Lake
5 Winnipeg is because every time we built a large hydro
6 plant we built interconnected, and there was no need to
7 use more storage than was naturally being used in a
8 state of nature.

9 And so on a daily basis, there may be
10 slight changes in outflows, but we don't expect there
11 will be a big impact on Lake Winnipeg as a result of
12 building new downstream generation stations, as long as
13 we have the transmission capability to manage the
14 surplus.

15

16 (BRIEF PAUSE)

17

18 MR. DAVID CORMIE: I think we used up a
19 coffee break.

20 MR. ED WOJCZYNSKI: So as Dave and
21 Joanne have used up the coffee, and I think we're going
22 to go overtime and there's no sleep for anybody
23 tonight.

24 Seriously, for any last questions on
25 these two (2) presentations before we take a break?

1 Maybe a quick question for you. We are running late.
2 Maybe some feedback. Is there any commentary whether
3 this is the right level of detail, too much detail?
4 We've still got most of two (2) days to go, so we can
5 tailor our approach to this based on any feedback. Or
6 should we more or less keep on going like we are, maybe
7 shorten the lunch break a bit, something like that?
8 Any -- any comments from anybody?

9 Okay. So I'm not hearing any
10 objections. I'm hearing that the level of detail is
11 about right, and -- but we may -- we're going to have
12 to shorten lunch, probably. So we'll plan on
13 shortening lunch. And why don't we take a ten (10)
14 minute break right now and come back at 11:00.

15 MR. DAVID CORMIE: Hey, Ed, we started
16 fifteen (15) minutes --

17 MR. ED WOJCZYNSKI: Yes?

18 MR. DAVID CORMIE: -- late, so we're
19 right on time.

20 MR. ED WOJCZYNSKI: Okay. Ah, that's
21 good. Okay.

22 MR. DAVID CORMIE: It's not the
23 presenters.

24 MR. ED WOJCZYNSKI: Okay. That's good
25 to know. Thanks for that one (1), Dave.

1 Okay. Nonetheless, we're still going to
2 have to take ten (10) minutes for -- for the coffee.
3 and we'll see how we are at lunch time; maybe we can
4 have forty-five (45) minutes.

5

6 --- Upon recessing at 10:50 a.m.

7 --- Upon resuming at 11:00 a.m.

8

9 MR. ED WOJCZYNSKI: Before the break I
10 had indicated that perhaps we should perhaps cut back
11 on our lunch. But upon further reflection and hearing
12 that some of the attendees here are going -- are having
13 some meetings at lunchtime, what I'm going to propose
14 to you is instead of cutting back on the lunch break,
15 that we stick to an hour. And if we need extra time we
16 go a little bit later than four o'clock. An advantage
17 of that, it occurs to me, is that this is fairly dense
18 material. It's getting piled on you overhead after
19 overhead, and having a bit of a break over a long -- a
20 full break over lunch might be better so that you can
21 actually understand what -- and have a brain left for
22 this afternoon.

23 So -- so why don't you think about that
24 and we'll -- we'll see where we are at the end of the
25 morning and revisit that. And maybe you just give that

1 a little bit of thought, what your preference is, and
2 I'll probably propose that at the end. And as we go
3 on, it's back to the Joanne and Dave show. And
4 Joanne...?

5

6 PRESENTATION OVERVIEW OF MISO MARKET:

7 MS. JOANNE FLYNN: All right. Do we
8 have a presentation?

9

10 (BRIEF PAUSE)

11

12 MS. JOANNE FLYNN: So what I can start
13 with is -- because this -- this presentation is -- is
14 the overview of the MISO market. That -- MISO is the
15 Midwest Independent Transmission System Operator, who's
16 going through a name change at this time and has
17 renamed themselves to be the Midcontinent Independent
18 System Operator as of June of 2013, but they are the
19 same organization.

20

21 (MOVED TO SLIDE 2)

22

23 MS. JOANNE FLYNN: And what they are as
24 a transmission system operator is, firstly, a regional
25 transmission operator, which is an -- an entity that

1 has responsibility for grid operations, short-term
2 reliability, and transmission service; in this case for
3 the midwest market, or what they're calling the
4 midcontinent now.

5 And in addition to that they act as a
6 market operator for wholesale -- for wholesale power.
7 So they have two (2) responsibilities, one (1) for
8 reliability and one (1) as a market operator.

9

10 (MOVED TO SLIDE 3)

11

12 MS. JOANNE FLYNN: So the scope of
13 operations is -- is shown in slide 3. So -- and these
14 are the -- the two (2) separate perspectives. The
15 membership in MISO looks different from a market
16 perspective than it does from a reliability
17 coordination perspective. And Manitoba has a
18 reliability coordination agreement with MISO and is
19 shown as a member on the bottom map.

20 So you see -- see Manitoba shown on that
21 map. Whereas, for -- from the market perspective,
22 Manitoba's an external market participant and not
23 considered to be within the footprint of MISO.

24 So the generation capacity therefore has
25 two (2) different numbers. One (1) for the market

1 operation separate from the reliability coordination
2 one. So a hundred and thirty-one thousand five eighty-
3 one (131,581) for the market, a hundred and forty-three
4 seven sixty-five (143,765) for reliability.

5 As well, historic peak loads market just
6 under a hundred thousand, reliability just over a
7 hundred thousand. And so that includes eleven (11)
8 states and -- and Manitoba. And the region serves 39
9 million people.

10

11 (MOVED TO SLIDE 4)

12

13 Okay. So just another note on the -- I
14 guess the -- the size of MISO is that there's work in
15 progress that will add another fifteen thousand five
16 hundred (15,500) miles of transmission and 30,000
17 megawatts of generation to MISO called -- the MISO
18 South Integration, which you can see on the -- on the
19 slide.

20 But it's not expected to have a huge
21 impact on what -- what's now sort of the northern main
22 part of MISO, because the connection between the
23 historical size of MISO and the MISO south region is
24 only a thousand megawatts. But that is -- they expect
25 to have that integrated into their footprint by

1 December of this year.

2

3 (MOVED TO SLIDE 5)

4

5 MS. JOANNE FLYNN: Okay. So the
6 installed generation cap -- capacity in MISO. So now
7 this is from the market perspective. And what you see
8 is that in the MISO footprint coal is about 48 percent
9 of the capacity; natural gas and oil, 32 percent;
10 nuclear, six (6); renewables, consisting of wind,
11 hydro, and 2 percent of other, making up the rest of
12 it. And the capacity in megawatts in the little table
13 there beside it.

14 And I'll go through a couple of these to
15 show kind of the makeup and how -- what -- what the
16 source of energy is within the MISO market.

17

18 (MOVED TO SLIDE 6)

19

20 MS. JOANNE FLYNN: So this chart does
21 have some -- this table does have -- have some cryptic
22 names on it so I'll just take a moment to explain that.

23 So there's three (3) markets from the
24 eastern part of the US on here: the Northeast, which is
25 the first column, PJM, which is

1 Pennsylvania/Maryland/New Jersey and New York, there's
2 also Ontario: the California/ISO, that's the CAISO; and
3 MISO.

4 So when you look across the US, you see
5 that 42 percent -- now we're talking energy, not
6 capacity -- 42 percent of the energy supplied across
7 the US is from coal -- this is 2011 information based
8 on the actual energy generated, not installed capacity
9 -- 26 percent is natural gas and oil; hydro, 8 percent;
10 nuclear, 9 percent.

11 When you contrast that to MISO, MISO is
12 a high coal-reliant region. So 75 percent of the
13 energy in 2011 was from coal, 5 percent from natural
14 gas and oil, 1 percent from hydro, 13 percent from
15 nuclear, 5 percent from wind. And those -- those
16 percentages change by year, by month, as the generation
17 mix changes and depending on the requirements for a
18 particular year, and certainly a particular month.

19

20 (MOVED TO SLIDE 7)

21

22 MS. JOANNE FLYNN: So we look at
23 January of 2013 to bring some more current information
24 into it. And you see the MISO energy supplied by fuel
25 type in January of 2013, 71.2 percent for -- for coal;

1 gas at just under five (5); wind at almost ten (10);
2 nuclear, thirteen point six (13.6). Those -- those are
3 the big ones.

4 If we look at April, you see the coal
5 percentage has dropped from seventy-one (71) to sixty-
6 eight (68), and the nuclear one has dropped a bit, as
7 well. Gas is up a little bit.

8

9 (MOVED TO SLIDE 8)

10

11 MS. JOANNE FLYNN: Now, the springtime
12 is usually a time of year where there is outages taken
13 by the thermal plants for maintenance because loads are
14 lower. So there's -- it does have an effect on the --
15 on the supply provided. So every month will have a
16 different mix of resources that gets used, but pretty
17 constantly across MISO will be a predominance of -- of
18 coal.

19

20 (MOVED TO SLIDE 9)

21

22 MS. JOANNE FLYNN: Now, in terms of the
23 MISO -- yes, a question.

24 MR. BILL GANGE: Is the 1 percent of
25 MISO that's hydro, is that -- is that entirely from

1 Manitoba?

2 MS. JOANNE FLYNN: No, this, I believe,
3 is the resources within -- within the MISO footprint
4 itself. They do have a little bit of -- of hydro in
5 there.

6 MR. DAVID CORMIE: Manitoba -- Manitoba
7 Hydro generation and load is not in the market, right.
8 Remember? So -- so from a reliability coordinating
9 perspective, we are, but -- but Manitoba Hydro does its
10 own dispatch of its own generation and it meets its own
11 load. We don't rely on MISO to do that.

12 So these MISO statistics are about the -
13 - all the generation and load in the -- in the US in
14 the MISO footprint.

15 MS. JOANNE FLYNN: Okay. So when
16 looking at things from the market perspective, first of
17 all, we need to be aware that there's a high
18 percentage, approximately 95 percent of the generation
19 in MISO, owned and operated by vertically integrated
20 utilities. And it is the utility that has the
21 obligation to serve load, not the market.

22 So when there is a need for new
23 resources, the utility looks at when they're required
24 and how to get them, either through construction or
25 through bilateral agreements with other utilities.

1 So in the end, from a market
2 perspective, there isn't a large reliance on the market
3 to provide -- to meet the load. That is still the
4 responsibility of the utility. But MISO does have the
5 responsibility for dispatching all of the resources.
6 So all of the resources and the load are recognized in
7 the market, but the -- the requirements are already
8 met. It's like the -- the generators and loads are
9 entered into the market, but really a utility is
10 serving its own load.

11 So that means that the market is
12 effectively a balancing market. There will be some
13 shortfalls, some minor reliance on the market to supply
14 for periods of time, but not for the majority of the
15 energy and -- and capacity that is required to serve
16 load.

17

18 (MOVED TO SLIDE 10)

19

20 MS. JOANNE FLYNN: So then how is the -
21 - how is the mar -- how is the energy or electricity
22 priced in the market? And there's two (2) main
23 components for the electricity price: the variable
24 production cost and the capacity charge.

25 So the variable production cost is the

1 cost of producing the energy. And in a thermal system,
2 this is largely fuel, natural gas costs or coal costs,
3 and in the future would be expected to include the cost
4 of carbon credits.

5 The cost of energy is captured in the
6 day ahead of real price real-time markets so that we
7 would expect that to be reflective of variable
8 production costs. And the US also has -- in -- in
9 their system the costs flow through to the customers
10 through fuel cost rate adjustments. So they're -- so
11 they are allowed to recover those costs from -- from
12 the ratepayer.

13 From a capacity perspective, which is
14 the fixed costs or capital costs, this represents the
15 cost of having a plant available for generation just
16 sitting there, ready to go.

17 So the cost of -- of capacity then is
18 not captured through the energy price but through
19 either bilateral sale arrangements or the planning
20 reserve auction revenues that actually are quite new to
21 the MISO market. So the cost of capacity is not
22 incorporated in that day-ahead and real-time price that
23 you see from the market.

24 And the -- the production -- the
25 variable production cost is what a generator would be

1 expected to offer their generation into the MISO day-
2 ahead market at.

3

4 (MOVED TO SLIDE 11)

5

6 MS. JOANNE FLYNN: So how do they
7 arrive at the price? So generators offer their output
8 of their units into the market based on this variable
9 cost of production, fuel cost, variable O&M, and
10 emissions permits, if -- if that's part of their
11 profile.

12 The market operator uses security-
13 constrained economic dispatch to stack the orders from
14 lowest to highest in cost. And -- but the security-
15 constrained part of that brings in their reliability
16 responsibilities. They're not going to select
17 generators that are on the other side of a transmission
18 constraint.

19 So if there are limitations on line
20 capacities, they have to take into consideration the
21 physical limitations of the system. And this is where
22 congestion comes from. So you may have a lower-cost
23 generator on the other side of the transmission
24 constraint, but you're going to have to dispatch a
25 higher-cost generator, because you can't get that

1 energy to the -- to the load.

2 So after doing this, security-
3 constrained economic dispatch, so once they've taken
4 into consideration the constraints of the system, they
5 will stack the offers from lowest to highest. And each
6 generator who runs gets paid the market clearing price
7 for that hour. And that is representative of the
8 variable or marginal cost of the most expensive
9 generating unit that is needed to meet the load
10 requirements in that hour.

11

12 (MOVED TO SLIDE 12)

13

14 MS. JOANNE FLYNN: Okay. So the next
15 slide is a -- a schematic of an illustrative supply
16 curve. And we've got two (2) examples on here, so it
17 really would be easier to see the screen on this one,
18 but...

19

20 (BRIEF PAUSE)

21

22 MS. JOANNE FLYNN: Well, I guess just
23 to start with, you can see the different offers. This
24 -- this example has a number of offers stacked from
25 lowest to highest.

1 And basically, the first example is for
2 700 megawatts of load. And you see the -- the load
3 line in the dashed black line, the one that's at the
4 lower price there. And what that means is the clearing
5 price, to meet that load, would take you to that
6 generator and it would be in that -- you've got dollars
7 per megawatt hours there on the Y-axis, so in that
8 range of fifty dollars (\$50) a megawatt hour.

9 A higher load -- if the same -- if the
10 generators offered in at the same costs, a higher load
11 would require us to go up the -- the offer stack one
12 (1) more generator. And then the market clearing price
13 for a 900 megawatt load would be at seventy dollars
14 (\$70). So all the generators that bid in and were
15 cleared to run -- so that's everybody lower in the
16 stack -- is expected to run now, they will get paid the
17 market clearing price of seventy dollars (\$70).

18 And that's the energy component in the
19 price. And as Dave mentioned earlier, there would be
20 congestion costs on top of that, as well as losses. So
21 the -- the prices actually consist of three (3)
22 components, the energy, congestion, and losses. And
23 that's what creates the difference across the footprint
24 in the pricing.

25

1 (MOVED TO SLIDE 13)

2

3 MS. JOANNE FLYNN: So the next slide is
4 one that I showed you not that long ago. And again,
5 just a reminder, summer -- a summer day versus a winter
6 day. There's going to be all this variability in the -
7 - in the price, even across the day from -- from going
8 from the off-peak hours through to the on peak and --
9 and as you go from zero to twenty-four (24) hours, back
10 down into -- into the off peak.

11 So this does is it creates those points
12 in time where Manitoba Hydro could purchase in the
13 lower-cost hours and sell in the higher-cost dol --
14 hours. And it also shows you that there isn't what we
15 -- what we refer to as an on-peak/off-peak
16 differential. So the differential between the pricing
17 in the on peak and the pricing in the off peak.

18

19 (MOVED TO SLIDE 14)

20

21 MS. JOANNE FLYNN: So the next slide on
22 monthly variability, I -- I had actually wanted to try
23 and show the variability across all eight thousand
24 seven hundred and sixty (8,760) hours in a year, but it
25 just looks like one (1) big, blue blob when you try and

1 do that.

2 So -- so the monthly information gives
3 you the same sense that every hour is marked on there.
4 This is the month of July 2012. So this is in
5 chronological order. So you can see how the price is
6 changing constantly, depending on the demands on the
7 system and the load that requires -- that -- that needs
8 to be served.

9 So we'll talk about the price in July
10 being twenty-nine dollars and twenty-seven cents
11 (\$29.27), which is an average across all seven hundred
12 and thirty (730) hours for the month. But what really
13 is the price? At any given point in time it can be
14 very different, and the price ranged in that month from
15 seven dollars (\$7) a megawatt hour to a hundred and
16 sixty-eight dollars (\$168) a megawatt hour, which is a
17 huge variation in price.

18 MR. DAVID CORMIE: Now, I think the --
19 the important thing is -- to note is that -- that all
20 load isn't served at that price. That's just the last
21 -- the last little bit of load that's served at that
22 price. Most utilities, like Northern States Power in
23 Minnesota, have long-term fixed price contracts in
24 place. So 95 percent of the -- 95 percent of the
25 energy that is going to load is -- has been fixed.

1 This is just what the last megawatt -- the last -- the
2 last 5 percent of load is being served.

3 So we -- that -- it's -- can you imagine
4 if you were a utility and all your -- all your load was
5 being served by this volatile price, well, how do you
6 manage that risk? What happens if it stays up at two
7 thousand dollars (\$2,000) for a month? Like you can't
8 do that. So they enter into a long-term fixed-price
9 contracts either with -- you know, for their fuel or for
10 a purchase agreement with Manitoba Hydro so they can --
11 they can minimize their exposure to this risk.

12 So less than 5 percent of the energy
13 that goes to serve load is charged to the utilities at
14 that market price. It's -- it's a -- it's a small --
15 it's a small percent. But that's the price signal that
16 -- that MISO needs for economic dispatch so that the --
17 the -- so that there's a balance maintained between
18 supply and demand in a -- in the -- in the five (5)
19 minute market.

20 MR. BYRON WILLIAMS: It's Byron. It's
21 really a follow-up to Dave's question, but I'm sure you
22 can answer it more competently than -- than he can.
23 Just -- just teasing.

24 When you -- when we use the term 'long-
25 term contract', what are -- what are we talking now?

1 How long do long-term contracts -- would we expect the
2 -- kind of the longest limit of those to run now, ten
3 (10), fifteen (15) years? What...

4 MS. JOANNE FLYNN: Yeah, I mean, we --
5 we did have some in the portfolio that were thirty (30)
6 years long. But basically -- Dave should answer this
7 but base -- but I'll do it anyway.

8 Basically the -- the contacts are sort
9 of in that ten (10) year range. But depending -- it
10 could be ten (10) to twenty (20) years, depending on
11 what type of product and -- and what -- what the
12 customer is looking for, as well. So they are long
13 term. When we talk long term, we really do mean long
14 term.

15

16 (MOVED TO SLIDE 15)

17

18 MS. JOANNE FLYNN: Okay. So the next
19 slide takes us into looking at costs by decision
20 horizon. So this is from the utility point of view,
21 somebody who has the obligation to serve.

22 And we've talked about the operating
23 horizon. So it's very short term. So the decisions
24 that are made in the operating hori -- horizon are ones
25 where you're not making resource decisions. Your

1 resources are set. Now you're going to operate with
2 what you got as best you can.

3 So capacity costs are considered sunk.
4 So whatever resources you've got, you use. Embedded
5 capital costs are not in the energy price to reco --
6 they're rec -- recovered by other means than this MISO
7 market price. That's what Dave was just talking about,
8 that most of the utilities will have long-term
9 arrangements in place, either for their own generation
10 or for power purchase agreements with -- with other
11 utilities that have surplus, like us.

12 So thermal generators will offer into
13 the market a variable cost of production, and that
14 variable cost of production would normally set the
15 floor on the market price. So it shouldn't be going
16 any lower than their variable cost of production.

17 When you look at the long-term planning
18 horizon, now this is a point where the utilities have
19 looked at it and they're going, Okay, load is still
20 growing; we have -- or we have aging infrastructure,
21 whatever their reasons are, they need to make some sort
22 of investment in new generation.

23 So the capacity costs haven't been
24 incurred yet. So now they're relevant to what we're
25 looking at. The capacity costs aren't incurred, so

1 they'll be considered along with how much it will -- it
2 is expected to -- to cost a generator to operate.

3 The other thing they're going to
4 consider is, what is the plant going to be used for?
5 Are they looking for a resource that's going to run
6 pretty much continuously, so a base load type of -- of
7 plant? Or are they looking at something that's just
8 going to fill in those peak hours that you saw on the
9 price graph for a day?

10 Is -- are they looking for more of a
11 peaking type of resource? So one (1) would be more --
12 more equivalent to using a -- a peaking type of -- of
13 generation type, versus -- or a generator type, versus
14 one (1) that is traditionally a base load generator
15 type.

16 The other things they need to consider
17 is the cost of transmission. We've been talking about,
18 either you can have your resources close to the load,
19 as long as you can get your fuel supply there, or you
20 have to have your generators where the resource is,
21 like wind; you have to put the wind where the wind is,
22 and transmit the generation -- or, the generation, the
23 energy to -- to the load.

24 And it's important to get the cost of
25 the firm fuel supply in place as well. Natural gas is

1 an example. You want to be sure that you -- you have
2 access to the natural gas, and there's a cost
3 associated with that.

4 DR. PETER MILLER: Peter Miller. What
5 about throwing another turbine into a dam as an
6 addition to capacity?

7 MS. JOANNE FLYNN: Well, when -- when
8 the generating stations are designed, they're des --
9 designed to the optimal -- to the optimal size, based
10 on the water regime that is there. So if you can put
11 another unit on -- but it's a question of whether
12 there's a cost effectiveness associated with putting
13 that extra unit on. Because that's what a lot of time
14 is spent doing in the engineering side of things, is
15 figuring out what is the -- what is the right size of
16 the generating station for the -- for the flow of the
17 river that's -- that it's being built on.

18 MS. NICOLE FITKOWSKI: Erick Matthiesen
19 has a question.

20 MR. DAVID LAMONT (VIA CHAT): I noticed
21 MISO in January and April had approximately 10 percent
22 energy from wind. How does MISO plan for wind?

23 MS. JOANNE FLYNN: Okay. Wind can --
24 in the last couple of years, the -- the rules in MISO
25 have changed so that wind can be offered into the

1 system as a resource. So on a -- on a day ahead basis,
2 they're expected to offer their generators in just like
3 any other generator does. But, as Dave spoke about
4 earlier, when it comes to relying on wind from a
5 capacity perspective, then that is considered
6 separately from a reliability perspective. And that
7 calculation, again, is done, I believe, by the
8 generator submitting information to MISO, and it's
9 calculated based on the peak hours of the day. And I
10 believe it's -- it's somewhere in the neighbourhood of
11 10 to 13 percent that's being relied on from a capacity
12 perspective.

13

14 (MOVED TO SLIDE 16)

15

16 MS. JOANNE FLYNN: All right. Moving
17 on to slide -- the one (1), "Illustrative Variable
18 Productions Costs from Existing Generation."

19 So what this does is, it shows you what
20 the plant characteristics are. Firstly...

21

22 (BRIEF PAUSE)

23

24 MS. JOANNE FLYNN: Okay. So the
25 typical heat rate across a coal plant -- and -- and I'm

1 going to go through a couple of examples now of coal
2 plants, combined cycles and simple cycles being
3 contrasted by characteristics and costs.

4 So the typical heat rate in BTUs per
5 kilowatt hour is ten (10) to the twelve thousand
6 (12,000) for a coal plant, seventy-five hundred (7,500)
7 to ten thousand (10,000) for combined cycle, and nine
8 thousand (9,000) to thirteen-five (13.5) for a simple
9 cycle gas turbine.

10 And, basically, this data is pretty
11 representative of MISO. Over 80 percent of the coal
12 generation comes from plants within that range. Over
13 80 percent of the combined cycles, as well as simple
14 cycles, come from basically those ranges. So those are
15 representative ranges of what we see in the market.

16 The non-fuel operating and maintenance
17 cost in terms of dollars per megawatt hour, so keeping
18 the plants running, four dollars (\$4) a megawatt hour
19 for coal, seven (7) and ten (10) for the combined and
20 simple cycle. And then the emissions rates are -- are
21 given here in CO -- tonnes of CO2 per megawatt hour.
22 You'll see the coal plant is greater than a one (1) to
23 one (1) ratio, whereas a combined cycle is in that
24 point four three (.43) to point five nine (.59) range
25 with the simple cycle having a higher range than that.

1

2

(MOVED TO SLIDE 17)

3

4

MS. JOANNE FLYNN: Okay. And now just to -- to show you the impact of -- on costs, on -- on market prices for these three (3) types of -- of generation in a lower sort of midrange and higher cost of fuel. So we are only talking about variable production costs here. We're not talking about a total cost for the generator including capacity; just the variable operating costs.

12

So the first chart shows you three (3) groupings, no carbon, with fifteen dollars (\$15) of carbon, and then thirty dollars (\$30) of carbon, and the dollars per megawatt hour on the Y-axis. And so these groupings are kind of stacked in the first no-carbon instance from the coal plants at lower and higher efficiency followed by the combined cycles at lower and higher efficiency, then followed by the combustion turbines, the simple cycles at lower and higher efficiency.

22

So without carbon, coal is a low-cost generator. These lower fuel graphs are at a natural gas price of three dollars (\$3) per MMBtu and at a dollar sixty (\$1.60) per MMBtu for coal. So that's

1 considered a lower price for both of those fuels.

2 You can see as you add carbon, that of
3 these thermal resources, the combined cycle, you see
4 that emissions rate starting to have an effect and --
5 and giving you the -- the lowest of the prices for the
6 thermal resources if carbon is applied at those levels.

7

8 (MOVED TO SLIDE 18)

9

10 MS. JOANNE FLYNN: If we go to the next
11 slide, we move up to the midrange fuel price scenario,
12 now we've got a natural gas at five dollars (\$5) per
13 MMBtu and coal at a dollar ninety (\$1.90) per MMBtu.
14 Again, with no carbon, all that's going to happen is
15 the natural gas price goes up. The coal price does not
16 go up in the same sort of proportion as the natural gas
17 price goes up, and so the coal really looks like a low
18 cost producer.

19 As you apply the carbon to it at fifteen
20 (15) and thirty dollars (\$30) per tonne, you see the
21 prices rise, so that if you were to look at the
22 combined cycle, you would see them in that order of
23 forty (40) to sixty dollars (\$60). And when you get to
24 thirty dollars (\$30) a tonne for the carbon, then
25 you're getting to -- close to that sixty dollars (\$60)

1 a megawatt hour range for -- for the price.

2

3 (MOVED TO SLIDE 19)

4

5 MS. JOANNE FLYNN: So not surprisingly,
6 when you go to the high fuel pri -- price example, it's
7 just going to look that much more costly. So if there
8 is a concern about carbon in the future, this is sort
9 of what the outcome of that concern would be versus a
10 no-carbon view of the future. So this is at a high --
11 higher fuel price at eight dollars (\$8) per MMBtu.

12

13 (MOVED TO SLIDE 20)

14

15 MS. JOANNE FLYNN: Okay. This one --
16 this is an old slide. It's from 2007 information. But
17 I want to use it because it was produced by MISO, and
18 MISO hasn't produced another one since then.

19 So what this chart is showing is that
20 what the cost of a generator is, is very much tied to
21 how much you expect it to run. So the -- the curves
22 that you're seeing on the slide are representative of
23 the percentage of time the unit will run. And so it
24 goes from -- from zero to 100 percent. And, basically,
25 the higher the percentage of time a generator runs the

1 lower cost per unit you will have.

2 Now, I will note that -- that on this
3 chart it was recognized that the nuclear capital costs
4 were significantly understated. But this isn't to be
5 looked at in terms of -- of that exactness of
6 representation, but more the shape of the curve.

7 We would expect a nuclear unit -- and
8 it's there in red -- to -- to be a very high capacity
9 factor plant, so it would run 90 percent of the time or
10 more. So when you look at this chart you would go up
11 from the 90 percent and say, Oh, okay, that's the price
12 per megawatt hour that's most relevant for that kind of
13 plant.

14 You'll notice wind is on there in green
15 and it sort of stops. It stops around the 35 to 40
16 percent range and that's because there isn't any wind
17 in MISO that can produce more than 40 percent capacity
18 factor. So the best you can get for a price out of the
19 wind is going to be at that 40 percent capacity factor
20 level.

21 The other lines on here -- and I would
22 draw your attention to the solid, I think they're blue
23 and black lines, as opposed to the dashed ones, and
24 those are -- those are natural gas generation. And
25 they're for a simple cycle turbine. You don't really

1 expect it to run more than about 25ish percent of the
2 time. If you're going to run it consistently more than
3 that, it would be more cost effective to put in a
4 combined cycle.

5 So, again, at around that 20, 30, 40
6 percent range is the best dollars per megawatt hour
7 you're going to get out of a simple cycle unit.

8 The combined cycle has more flexibility
9 than that. They're often considered also a -- to -- to
10 run in the on-peak hours. So that would be, you know,
11 close to 50 percent of the time, but they can be loaded
12 up to run up to 80 percent of the time. So they have a
13 little more flexibility on that.

14 So what this chart is trying to show you
15 is that it's -- it's really hard to say what the cost
16 per megawatt hour of -- of a unit is, because it really
17 depends on how you're going unit -- use it. But when
18 we're asked that we usually give sort of those general
19 types of -- of responses. But it's depe -- very much
20 dependent on the capacity factor, how much it's going
21 to run, and also on the -- the capital cost, and the
22 associated discounting mechanism that you use for that.

23

24 (MOVED TO SLIDE 21)

25

1 MS. JOANNE FLYNN: So one (1) last
2 slide for me and I'll turn it over to -- to Dave.

3 Other considerations that the US
4 utilities have when they're considering new generation
5 for the future, the -- the EPA regulations -- so this
6 is the Environmental Protection Agency in the US, were
7 quite actively bringing out restrictions on coal
8 generations and new source performance standards, so
9 what -- so providing some -- some very stringent
10 direction on what's happening with -- with coal in the
11 future.

12 Also, a utility owner has to be -- the
13 owners have to be concerned about the age of their
14 generation fleet, because almost half of the capacity
15 is approaching forty (40) years of age. Forty (40)
16 years is about the life -- considered to be the life of
17 a thermal generating unit.

18 They're also concerned about
19 diversification, because that protects them against the
20 risks of things like climate change, legislation, these
21 EPA regulations. So they're looking for that kind of
22 diversity.

23 And an investor-owned utility is also
24 seeking some form of investment opportunities. And in
25 the US their -- their structure is such that

1 constructing new transmission is something that can
2 give them a rate of return.

3 Okay. I think I'm done and Dave is up.
4 Are there any other questions?

5 MR. DAVID CORMIE: I guess, Joanne,
6 that last chart of those curved lines, that was the
7 all-in cost, right?

8 MS. JOANNE FLYNN: Yes.

9 MR. DAVID CORMIE: Yeah.

10

11 (MOVED TO SLIDE 23)

12

13 MR. DAVID CORMIE: So we wanted to talk
14 a little bit about the MISO tariff. And our -- and the
15 reason that's important is because when Manitoba Hydro
16 exports title to the electricity transfers at the
17 border to someone else, but there is no load at the
18 border; you have to have transmission lines that
19 connect the border to Minneapolis or the border to
20 Duluth.

21 And the way that that electricity flows
22 is over transmission lines owned by investor-owned
23 utilities in the United States, but the rates for
24 service for using those lines is covered by the MISO
25 tariff. So those transmission owners, Northern States

1 Power, Minnesota Power, Great River Energy, they take
2 all their transmission assets, their transmission
3 lines, they give them to MISO and say: MISO, here's
4 our transmission assets. You operate them. We need to
5 cover our costs for running those transmission lines
6 and -- but you can use them to serve load. And -- and
7 if somebody like Manitoba Hydro wants to use them, you
8 have to charge them something so that -- that -- you
9 know, that we -- that we get -- that we get paid,
10 'cause their -- the cost of their transmission system
11 has to be paid.

12 So the MISO tariff lays out the rules
13 under which the transmission grid -- the MISO
14 transmission grid is operated.

15

16 (MOVED TO SLIDE 24)

17

18 MR. DAVID CORMIE: Because MISO is a
19 regional transmission organization. They're an RTO,
20 and -- and that's one of their responsibilities.
21 Transmission owners don't operate them. They own them.
22 They maintain them. MISO collects the revenues and --
23 and dispatches the electricity over those lines.

24 So they operate the electric grid.
25 Another thing that they do is -- is like Joanne said,

1 you know, if we -- if we run the generator too much
2 that transmission line will get overloaded. So when
3 that -- when the loads on that transmission line, in
4 real time, get to the point where the line is starting
5 to be in danger, instead of keep adding load to the gen
6 -- to the transmission, they'll start another generator
7 that's closer even though it's more expensive. So
8 they're responsibility is to operate the electric grid.

9 And -- and then they also have the
10 responsibility under the tariff to provide transmission
11 access. So when Manitoba Hydro says: You know, we got
12 lots of water today. We'd like to get that electricity
13 and sell it into -- into Minneapolis. Can we buy
14 transmission service?

15 And MISO will say: Well, no, it's full
16 today. There's nothing left; or, Yeah, there's some --
17 there's some -- some space on the transmission line.
18 Manitoba Hydro, you can buy it.

19 And so they administer the access to the
20 transmission line.

21 Reliability coordination is something
22 MISO does. And that's saying that, You know what, that
23 transmission line starts at Dorsey and it goes all the
24 way to Minneapolis, and if you take your end of the
25 line out of service to do maintenance, well, we ought

1 to know about it because that line is going to affect
2 the reliability of our transmission system in -- in the
3 United States. So we've got to be coordinated. So you
4 have a coordination agreement. Let's not take any
5 units out of service that we don't know about, and
6 let's study all these situations.

7 And so MISO acts as the reliability
8 coordinator to transmission organizations like Manitoba
9 Hydro who are outside the MISO footprint.

10 And they do efficient market operations.
11 You know, my power traders can only phone so many
12 people to make a transaction. In -- maybe in an hour
13 you can talk to six (6) people. Well, that doesn't
14 work very well. It's not -- not as efficient as if
15 MISO was doing all the dispatch.

16 So MISO is -- is figuring out what's the
17 most efficient way to operate the generators. So they
18 -- they run the market rather than having what was --
19 used to be in the old days, a bilateral market. You
20 did it on the phone. You phoned a few people. You
21 found out what's the -- you know, what -- what do you
22 want to charge me for my power? And -- and, you know,
23 that -- that's the way it used to be done.

24 But now it's much more efficient than
25 that. MISO can dispatch all the generators in the --

1 in the region and -- and lower the cost of electricity
2 to everybody through efficient market operations.

3 And they coordinate regional planning.

4 So they make sure that -- that transmission plans that
5 are put in are the right plans, and not something
6 that's just in the interest of a single utility.

7

8 (MOVED TO SLIDE 25)

9

10 MR. DAVID CORMIE: So the -- all those
11 rules about those -- those six (6) items that I talked
12 about, are -- those rules are laid out in the MISO
13 tariff. It's a document, and it tells everybody how
14 the -- the MISO system will be run.

15 As part of the tariff, they also
16 calculate how much spare transmission, or unused
17 transmission capability, is on the system. And they do
18 that under an open access transmission tariff.

19 Open access being everybody can take
20 service. It's non-discriminatory. It used to be
21 Manitoba Hydro could say, We're going to hold that
22 transmission for our own use; you can't use it. So we
23 would be discriminating against somebody like
24 Saskatchewan from using our transmission. You know,
25 just -- just hoard it. Don't let anybody have market

1 access.

2 Under an open access transmission
3 tariff, it has to be non-discriminatory. Manitoba
4 Hydro has to offer service to everybody on the same,
5 equal terms and conditions. And it doesn't matter
6 whether it's SaskPower, or Manitoba Hydro's merchants,
7 or Northern States Power, everybody has access under an
8 open access transmission tariff.

9 And we will calculate the available
10 transfer capability on a non-discriminatory basis. If
11 there's a hundred megawatts available, first come,
12 first serve. You just have to pay for it according to
13 the rates that are set out in the -- in the tariff.

14 And so they -- they evaluate and approve
15 all requests for service. And those requests can be
16 for hourly -- I want transmission service for -- for
17 the next hour, or it could be for tomorrow, or it could
18 be next week, next month, or -- or for a year. There's
19 lots of different time-frames in which you can ask for
20 transmission service.

21 So if we're in a period of high water,
22 and Manitoba Hydro needs transmission service for six
23 (6) months, we'll go and ask MISO for firm transmission
24 service for six (6) months. They'll run through their
25 computer models and say: You know, there's only 15

1 megawatts of firm transmission service available. Oh,
2 okay, well, we'll buy that.

3 And -- or they may say: No, it's all --
4 it's all been allocated. There's no firm transmission
5 service. Okay. Then we have to take non-firm service.

6 So they perform transmission impact
7 studies. And in the case of Manitoba Hydro wanting to
8 sell to Minnesota Power 250 megawatts, MISO says: You
9 know what, there's no spare long-term transmission
10 available. If you are going to consider a power sale
11 from Manitoba to Minnesota Power, you'll have to build
12 new transmission. And this is the impact of you trying
13 to sell that power.

14 And they'll tell you what those -- that
15 transformer is too small, that breaker is too small,
16 you need to have these facilities. And they'll tell
17 you what those costs are going to be to -- on the
18 system, to getting it up to the standard necessary so
19 that an additional 250 megawatts can go to the United
20 States.

21 And they communicate with all
22 transmission customers on the Internet, in an open
23 fashion. It's -- it's completely transparent. Nobody
24 has access to information in -- in confidence. All of
25 the information that they make available, the

1 transmission, is made available to anybody at the same
2 time, on an -- on the -- on -- it's called 'the oasis'.

3 So they administer the open access
4 transmission tariff, and -- what's the next thing here
5 -- and they coordinate the use of -- of the
6 transmission system among other regions. So MISO has a
7 footprint, but MISO is connected to PJM. Well, there's
8 flows of electricity between those two (2) regions. So
9 MISO ensures that flows -- or the -- the activities on
10 the -- between regions are coordinated.

11 And then they operate the energy and
12 operating reserve market. And Joanne went through
13 that. You make your offers on a day-ahead basis. MISO
14 evaluates that. It sets in plan -- it sets in place a
15 plan for how the load is going to be met tomorrow.
16 Everybody gets paid based on that plan. And then they
17 turn it over to the real-time operators, and -- and, if
18 everything goes according to plan, people operate their
19 generators according to that plan.

20 But if things are different because the
21 load is higher than it's forecast, or generators aren't
22 available to work, there's a real-time market to -- to
23 balance the available supply and demand. And you see
24 prices that we saw in the pricing map as a result of
25 those kind of real-time ev -- events.

1 And they're the balancing authority for
2 all the load in the MISO footprint. They balance the -
3 - the operation of the generators with the -- the
4 amount of load that there is. And they try and keep
5 that balance within every five (5) minutes. They've
6 got to make sure that every five (5) minutes there's
7 enough generators generating to meet the load.

8 So when you turn off your switch, your -
9 - in your house, and you stop using electricity,
10 somebody has to actually turn a generator down. They
11 have to -- they have to balance the load, because you
12 stopped using electricity. Well, who's -- who's in
13 charge of making sure that the generator is shut down?
14 That's what a balancing authority does. They stop
15 generating when the load goes down. And when the load
16 spikes they're responsible for bringing the -- the
17 generator online.

18 Manitoba Hydro is a balancing authority.
19 We balance supply and demand in Manitoba. MISO does it
20 for the MISO footprint. Saskatchewan does it -- is a
21 balancing authority. They balance the supply and
22 demand moment by moment of load and generation in
23 Saskatchewan.

24 And we talked about the day-ahead and
25 real-time operating reserve market.

1

2

(MOVED TO SLIDE 26)

3

4

MR. DAVID CORMIE: So what is

5

transmission service? It's the right to use the

6

transmission grid to ship electricity. And there are

7

different types of transmission service available.

8

You, as electric customers, are taking transmission

9

service, but it's -- but you don't have to do anything.

10

Manitoba Hydro provides that service for you. It's

11

called network service and it's built into your rate.

12

A general service large customer in

13

Manitoba Hydro's footprint pays about 15 percent of its

14

bill to Manitoba Hydro to operate the transmission

15

service so that they get their electricity, and that's

16

called 'network service'.

17

And you don't actually identify what

18

specific facilities are... So network service is --

19

it's like a -- it's based on cost-of-service. So if

20

you understand cost-of-service principles where the

21

cost of -- of putting the transmission facilities in

22

place for your network load, it's done on a pro rata

23

cost sharing basis. It's very similar to the

24

principles that we use in rate making in Manitoba.

25

That's how network service is.

1 And -- and utilities don't have to
2 actually arrange for that. MISO just provides that as
3 a matter of course. And it's used to serve network
4 load, large industrial customers, retail customers.
5 And that's -- and -- and you can -- you can mak -- you
6 can buy that from MISO if your load was in -- in the
7 MISO footprint.

8 The other type of transmission service
9 that's more relevant to Manitoba Hydro is called firm
10 point-to-point service. I want to ship my power from
11 the border to Minneapolis. One (1) point is the
12 border, one (1) point is Minneapolis, so it's called
13 point-to-point. It's like when you fly on a -- on an
14 airline. You take point-to-point service. You go from
15 London to -- to Toronto, point-to-point service. The
16 same principle applies in electricity and it's used for
17 wholesale power transactions.

18 So when Manitoba Hydro sells 500
19 megawatts to Northern States Power we sell it from
20 Dorsey to the border. We take point-to-point service
21 under the Manitoba Hydro tariff for 500 megawatts, and
22 then Northern States Power will take point-to-point
23 service from the border to Minneapolis under the MISO
24 tariff, 500 megawatts of transmission service.

25 And -- and that's how bulk transmission

1 -- bulk -- bulk electricity is shipped across the grid,
2 using point-to-point service. There are seven (7)
3 priorities of transmission service. Network service is
4 the highest. So everybody's obligation is -- firstly
5 is to serve their load. So network service is priority
6 7.

7 If you're using point-to-point -- point-
8 to-point service is of the same quality. It's used to
9 serve a firm load. And so when we talked about having
10 an import contract, if the import contract is on firm
11 transmission, MISO will use that transmission to serve
12 Manitoba's firm load, giving it the same priority as
13 they use -- as they serve their own network load. So
14 that's why we can call that -- those imports on firm
15 transmission a dependable supply, because it's -- it's
16 -- it has the highest priority of transmission service.

17 If you can't get a -- if -- if point-to-
18 point transmission service isn't available then you
19 have to go to the -- to the non-firm point-to-point.
20 And there are five (5) different types of priority 1 to
21 priority 5, and that depends on whether you're buying
22 it by the hour, by the day, by the week, by the month,
23 or by the year. The longer the term transaction the
24 higher priority it is.

25 But what non -- non-firm point-to-point

1 service, it's like getting an airline ticket with Air
2 Canada and you go there and you say, you know, I want
3 my seat and they, Well, we oversold. You get bumped.
4 So even though -- but Air Canada charges a full price,
5 here you get it at a discount at least.

6 So the -- the price that you pay is
7 depending on the priority and the next slide actually
8 talks about what those prices are.

9

10 (MOVED TO SLIDE 27)

11

12 MR. DAVID CORMIE: Who sells it?
13 Anybody who operates -- is a transmission -- has a
14 transmission tariff, like Manitoba Hydro, SaskPower,
15 MISO, or other transmission owners are -- offer
16 transmission service. How much does it cost? We've
17 talked about that. It's built into network services
18 built into your bill point-to-point. It depends on
19 where -- where you're going from and where you're going
20 to. It's like an airline ticket.

21 It costs fifty-seven thousand dollars
22 (\$57,000) a megawatt year to buy point-to-point service
23 from the border to Minneapolis under the -- under the
24 northern -- to -- to deliver it to Northern States
25 Power. So if you were buying point-to-point service

1 for 500 megawatts, you take five hundred (500) times
2 seven hundred (700), five -- fifty-seven thousand
3 (57,000), and that's the cost of providing that firm
4 transmission service.

5 If you were -- if you were to ship it
6 from the border to Minnesota, they have a different
7 price. It's more -- more like thirty thousand dollars
8 (\$30,000) a megawatt year.

9 So you look up under the tariff. You
10 find the points that you want to go. It's like an
11 airline ticket, and you just -- you can figure out what
12 the rate is. Non-firm, the -- it depends on -- the
13 units are different. Hourly transmission is by the
14 megawatt hour. Monthly is by the month, you know,
15 thirty-four hundred dollars (\$3,400) a megawatt month.
16 But again, this is a very low quality service. And you
17 may pay for it but you may never get to use it because
18 you were interrupted.

19 Can others use your transmission
20 service? So if Manitoba Hydro goes and owns point-to-
21 point, can we do anything with it if we don't need it?
22 Then we can sell it. If somebody else -- we -- and it
23 can be sold in the after-market, or it can be assigned.

24 So let's say that we bought transmission
25 service because we thought we were going to have a high

1 water year, we don't need the transmission service and
2 we're importing instead of exporting. No, we have a --
3 we can go to the market and -- and sell our point-to-
4 point service to somebody else and they can use it.

5 MR. BYRON WILLIAMS: I --

6 MR. DAVID CORMIE: Yes, Byron?

7 MR. BYRON WILLIAMS: Thanks, Dave. I
8 just missed the distinction between network and firm
9 point-to-point in terms of priority, so I'm sorry to
10 ask you to repeat, but I -- I didn't quite understand
11 it.

12 MR. DAVID CORMIE: Network has the same
13 priority as firm -- as firm point-to-point.

14

15 (MOVED TO SLIDE 28)

16

17 MR. DAVID CORMIE: So what happens at
18 the border? In jargon, we call the border seams.
19 Seams are where one (1) regional transmission
20 organization butts up against another. So this is
21 where Manitoba Hydro's transmission network stops and
22 the MISO starts, or where the Saskatchewan -- you know,
23 the Saskatchewan and Manitoba border.

24 In Canada, those are at the geographic
25 boundaries. In the United States, it's not. They

1 don't follow geographic boundaries. They -- it's just
2 -- it's depending on where the service territory would
3 be.

4 So you -- you've seen that map of the
5 MISO footprint. It's -- it doesn't really match any
6 geographic -- sometimes it does -- boundaries but not
7 necessarily. It generally is where -- whether the
8 service territory of that utility goes to the next
9 utility service territory.

10 So we've got the Manitoba-Saskatchewan
11 seam. We've got the Manitoba-MISO seam. We've got the
12 Manitoba-Ontario seam. There's the seam between MISO
13 and PJM. There's the seam between PJM and New York.
14 So you can move power -- we can move power from
15 Manitoba across into Ontario, across into New York,
16 into PJM. You can follow all those seams. But the
17 question is: Can you afford to buy the transmission
18 service all the way across?

19 Transmission service is required on both
20 sides of the border because there is no load at the
21 border. We can deliver our -- we can deliver our power
22 to the border, transfer -- title transfer at the
23 border, but the utility who's buying it needs to then
24 move it from the border to their load.

25 Right now, Manitoba Hydro owns twenty

1 (20) long-term transmission service reservations under
2 the Manitoba Hydro tariff. So all of the firm
3 transmission capability between Manitoba and MISO is
4 held by Manitoba Hydro, is owned by Manitoba Hydro in
5 Manitoba, so. And we do that under twenty (20)
6 different transmission service reservations. And those
7 are held under the transmission tariff. We pay for
8 them but Manitoba Hydro's transmission company gets the
9 revenue.

10 So, in effect, Manitoba Hydro merchants
11 are paying Manitoba Hydro transmission. So no cash
12 actually transfers but we buy the transmission service
13 as if we were any third party.

14 We also own ten (10) long-term
15 transmission service reservations under the MISO
16 tariff. So you can see on this chart there's a blue
17 arrow pointing north in Minnesota, the orange arrow
18 pointing south. The orange arrow pointing south would
19 be a transmission position held by a US entity. But
20 the blue arrow pointing north says Manitoba Hydro owns
21 the transmission reservation for -- in MISO to bring
22 the power from Minneapolis to the border.

23 So we own it from Minneapolis to the
24 border, and then we own it in Manitoba. So the -- the
25 one (1) -- there are -- there are ten (10) transmission

1 reservations in the US that Manitoba Hydro owns.

2 We don't own the transmission line. We
3 have the right to use the line. And we have the right
4 to use it on a priority 7 basis because it's -- it's
5 firm transmission. So we can then rely on that
6 transmission in MISO to serve our load in the same way
7 we can rely on our own transmission to serve our load.

8 All we need then to complete that
9 transaction is to have a generator in MISO. So we need
10 to have a contract with a US generator to commit that
11 power, and then we'll put it on our firm transmission
12 and we'll bring it to Manitoba, and then we'll use it
13 on Manitoba's transmission to bring it into our load.

14 So you can see that you have to have the
15 package of generation and transmission in order to have
16 firm transmission, and -- and we own transmission
17 service in the United States to do that.

18 As well, we own transmission service in
19 the United States for exports. So we own about 60
20 percent, almost -- I think 700 megawatts of the 1,900
21 megawatts of export capability -- it's in Manitoba
22 Hydro's name. And we control the use of that
23 transmission.

24 And then on a daily basis there are many
25 short-term transmission reservations. So high water

1 you might want to have more transmission so the power
2 traders will go buy a -- buy transmission service,
3 whatever is available, in order to make sure that our
4 electricity doesn't get curtailed.

5 Manitoba has a coordination agreement
6 with MISO. So not only do we coordinate the operation
7 and the -- from the relia -- the transmission system
8 reliability but we also coordinate the tariff, the
9 rates, so you don't pay for transmission service twice.

10 So the tariff of the load applies under
11 our agreement. So let's say that we're importing. Who
12 is our load? Our load is our Manitoba customers. So
13 MISO says, We won't charge you, Manitoba Hydro, for
14 using the MISO transmission system to bring power to
15 the border because your customers are paying for the
16 transmission service already in Manitoba. You only
17 have to pay for transmission service once.

18 So MISO waives their transmission
19 charges under the coordination agreement. Likewise,
20 when we're serving MISO load the MISO customer is
21 paying for transmission service under their tariff so
22 Manitoba Hydro waives our transmission service so that
23 there's no pancaking of -- of tariffs. And that's very
24 beneficial for -- for Manitoba Hydro to do that because
25 we're exporting way more than we import.

1 So the -- the value to us of -- of
2 having the tariff in the United States -- or we're
3 exporting way more so the -- the benefit to us is much
4 greater than -- than the -- than the cost of lost
5 transmission service in the -- in the opposite
6 direction.

7 Okay. I probably confused you a lot
8 about that. If there are any questions after lunch I
9 can tell you about that, unless there is questions now?

10

11 (BRIEF PAUSE)

12

13 MR. ED WOJCZYNSKI: No questions? No
14 comments on anything that was talked about this
15 morning? Yes, Regis.

16 MR. REGIS GOSSELIN: David, the -- the
17 -- Manitoba Hydro is an associate member of MISO, and
18 could you explain to me why that is as opposed to say,
19 for example PUB is a member of OMS and -- and you're an
20 associate member. Now -- now, is there some historical
21 basis for that decision?

22 MR. DAVID CORMIE: We're a coordinating
23 member and we are a market participant. So in -- in a
24 coordinate -- in a coordinating member we coordinate
25 our operation of our transmission system in Manitoba

1 with the operation of the transmission facilities in
2 the United States.

3 But -- but we haven't turned the actual
4 con -- the facilities over to MISO to operate. We've
5 just agreed to coordinate our activities. And the
6 reason is is because we're in a different country than
7 -- than MISO. MISO is in the United States. So for
8 sovereignty reasons, under the Manitoba Hydro Act, we
9 have to maintain control of the operation of all of the
10 facilities in Man -- yeah, in Manitoba.

11 So we're -- there's probably not a lot
12 of aff -- effect of that except legally we're -- we're
13 complying with -- with the laws of Canada. But, you
14 know, that's -- we -- we have to maintain control of
15 our -- of -- of our facilities. We can't turn that
16 control over to another jurisdiction.

17 As far as a market participant is
18 concerned, we behave exactly as any market participant
19 in MISO. So we can -- we -- there are no restrictions
20 on what Manitoba Hydro can do in the marketplace. We
21 offer our surplus in, we can buy out of the market,
22 just as any -- anybody. So we're a full market
23 participant. We use all the financial instruments that
24 the market makes available. Billing and all that is --
25 it -- it -- you couldn't tell that Manitoba Hydro

1 wasn't in the market.

2 The other major difference is our load
3 is served from Manitoba generating stations and we
4 determine how much surplus we actually take to market.
5 Wherein, if -- if it was under MISO's control, MISO
6 would decide where our -- where our load was being
7 served from, what generators would be operated.
8 Manitoba Hydro does that independent of MISO.

9 And that -- although the -- the power
10 traders do the planning for the day -- for -- on the
11 day ahead, the real-time operation and the dispatch is
12 done by the control centre with the sole purpose of
13 serving Manitoba load first, and then whatever is left
14 over the surplus actually goes to market.

15 MR. BRUCE DUGGAN: Bruce Duggan from
16 Providence. Can you -- I hope this isn't too big a
17 question. Can you talk about how our relationship with
18 MISO compares to say, Hydro-Quebec's relationship with
19 their American counterparts, or BC? Is it typical? Is
20 it unusual? I'm sorry if this is too broad a question.

21 MR. DAVID CORMIE: Both Hydro-Quebec
22 and BC Hydro have US subsidiaries, or they have
23 subsidiaries that -- that participate in -- in the
24 market. Manitoba Hydro does not have a US subsidiary.
25 We transact at the border, so that's -- that's a -- a

1 difference.

2 BC Hydro, under their -- in their --
3 with their PowerX subsidiary, is actually a -- a
4 participant -- is actually -- trades electricity in the
5 United States for non-utility reasons. And so they --
6 they manage the BC Hydro surpluses, like we do. But
7 then they also manage British Columbia's assets that
8 they own under the Columbia River Treaty in Washington
9 because they -- you know, they are entitled to a
10 certain amount of generation. And so they have to --
11 they have to be in that market because they own
12 electricity in that market.

13 And then, thirdly, they -- they enter
14 into -- they're a trading organization. They buy and
15 sell in the market. So Manitoba Hydro doesn't have any
16 generation assets in the United States, so that's what
17 separates us -- differentiates us from PowerX.

18 Quebec-Hydro is very much like Manitoba
19 Hydro, except that they have a US subsidiary that buys
20 the electricity from the utility and markets it in the
21 United States as an indepen -- as a -- as an
22 independent organization. And they -- they may own
23 transmission assets in order to do that.

24 Manitoba Hydro stops at the border. And
25 although we -- we may have transmission service

1 reservations in our name -- it's like when you go and
2 rent a car in the United States at the Minneapolis
3 airport, it doesn't mean you own the car. It's -- and
4 -- and you have a rental agreement. That's the same
5 relationship Manitoba Hydro has when we rent the use of
6 the transmission lines. We go and we -- we have these
7 rental agreements. But it doesn't create a permanent
8 establishment for Manitoba Hydro in the US, where
9 PowerX and -- and Quebec-Hydro do.

10 Both those organizations are -- are
11 probably subject to US regulatory oversight, and US tax
12 laws. Man -- because Manitoba Hydro trades at the
13 border, we're -- our -- we're not subject to -- to
14 regulatory or tax issues in the United States. And
15 that's the reason why we -- we -- we've kept it at the
16 border. We -- we don't want to be FERC jurisdictional,
17 and we don't want to incur any -- any US state or
18 federal taxes.

19 MR. ED WOJCZYNSKI: Any other
20 questions? We still have six (6) minutes. Our --
21 congratulations to our two (2) presenters to being so
22 efficient. But, seriously, any more questions?

23 DR. PETER MILLER: This goes back to
24 Joanne's presentation on slide 20 -- 21. Other
25 considerations for US utilities, under diversification

1 it says:

2 "Coordination challenges utilizing
3 more gas generation due to coal
4 retirements."

5 What does that mean?

6 MS. JOANNE FLYNN: So what that is
7 referring to is that same slide talks about EPA
8 regulations at the top of the slide. Where -- where
9 should I be standing? I don't know. Okay. And what
10 that -- what effect that's having on the MISO
11 jurisdiction is that there -- there's anticipated
12 retirements of coal units in the order of 6 to 12
13 gigawatts across the region, so 6,000 to 12,000
14 megawatts of coal over time.

15 And so what that means is there's an
16 expectation that that will be replaced with -- with
17 natural gas generation so that there'll be more natural
18 gas generation running than -- than we are seeing
19 today. And so the -- in the future, that's -- that's
20 what they're looking at. Where's that slide again?

21 So the coordination challenge is -- is
22 to -- to ensure that they have the gas supply to do
23 that, as well, so -- so it will require some.

24

25 (BRIEF PAUSE)

1 MR. PETER MILLER: What's being
2 coordinated then is gas supply to -- for generation?

3 MS. JOANNE FLYNN: That -- that's part
4 of it. But it -- it's also just the whole change in
5 their -- their generation mix.

6 MR. PETER MILLER: Is hydro plus wind a
7 competitor for that scenario?

8 MS. JOANNE FLYNN: Well, not to the
9 tune of 6 to 12 gigawatts. But they -- they are
10 looking at -- like when they talk about -- when we talk
11 about diversity for the -- for the US -- for the US
12 utilities, they're looking at whatever -- whatever
13 range of -- of resources are available to them. And in
14 some of the states the wind regime is just not that
15 good.

16 But that is part of the benefit of -- of
17 trying to get a major new interconnection into place,
18 is to allow -- to allow for more of the hydro energy to
19 -- to go into that region.

20 MR. PETER MILLER: And going into the -
21 - the larger question, can we go more into the capacity
22 business to firm wind?

23 MS. JOANNE FLYNN: Are you talking
24 about in Manitoba or are you talking about --

25 MR. PETER MILLER: Yeah. I mean, with

1 --

2 MS. JOANNE FLYNN: Oh.

3 MR. PETER MILLER: Instead of selling
4 base load, how about firming wind as -- as a strategy?
5 Yeah. And this may go beyond your presentation,
6 obviously.

7 MS. JOANNE FLYNN: Well, we've looked
8 at a wide range of resources. And having -- having
9 wind backed by capacity is -- is one (1) of the -- one
10 (1) of the plans that we have looked at. What -- what
11 we see is that it'll probably take a few more years
12 before it's really cost competitive. So, yes, it is
13 possible to look at -- at using capacity to back wind
14 sometime in the future.

15 MR. PETER MILLER: On either side of
16 the border?

17 MS. JOANNE FLYNN: Yeah. Well,
18 basically, it's -- it's -- yes, on either side of the
19 border, I suppose. But basically, in the US, they have
20 a lot of -- of their own wind, and so they're --
21 they're going to develop the wind there. It's -- it's
22 also combined with it being an economic -- a driver for
23 their own regions. So then the capacity issue becomes
24 a little more complex but can be somewhat dealt with
25 depending on what sort of market arrangements are in

1 place for capacity.

2 MR. DAVID CORMIE: Peter, the -- the
3 extension to the 500 megawatt sale to Xcel in 2015 was
4 justified as a resource by Northern States Power as
5 exactly what you said. It's a hydro-wind combination,
6 and wind providing half the energy and -- and the
7 purchaser, Manitoba, providing the other half of the
8 energy and the capacity. The mandate in -- in
9 Minnesota is that Xcel needs 30 percent of their retail
10 load served by renewable resources in Minnes -- that --
11 that are available in Minnesota by 2025, so they're
12 forced to build wind.

13 And then they said: Okay. And what
14 we'll do is we'll evaluate the wind-hydro combination
15 as a base load resource, and that's -- that's -- that -
16 - that was exactly what -- what you said they were
17 doing.

18 But they're forced to put in -- put in -
19 - in wind. So having got the wind, recognizing that it
20 has limited capacity value, they have to put a capacity
21 resource. The alternative to that was to put wind with
22 the combined cycle combustion turbine. And compared to
23 the product that Manitoba Hydro offered them, there
24 were significant value to go with the hydro-wind rather
25 than the hydro-gas at the time.

1 And as far as in Manitoba, when we do
2 the evaluation of wind, we give the full benefit of the
3 -- of the hydro resource to any Manitoba -- any
4 Manitoba wind development. So we're not -- we haven't
5 carved off or sold that -- that capacity to somebody
6 else. We don't sell the physical storage services to
7 out -- outside of Manitoba for firming. It's -- it's
8 just -- it's not done. We reserve it all for the
9 benefit of Manitoba wind, and that's been policy for --
10 for, I don't know, ten (10) years now.

11 MR. ED WOJCZYNSKI: Nicole...?

12 MS. NICOLE FITKOWSKI: Dave Lamont has
13 a question.

14 MR. DAVID LAMONT (VIA CHAT): I have
15 one (1) question in the previous set of slides. It was
16 said that Manitoba Hydro plans on the basis of the
17 lowest water flow recorded ever on its system. Is that
18 a standard operating procedure for all the utilities?
19 Is it a choice of Manitoba Hydro? Is it a regulation?
20 What is the basis of that position?

21 MS. JOANNE FLYNN: The -- I'll go back
22 to the -- the NERC requirement for reliability. And in
23 it they recognize that an energy constrained system may
24 wish to have some form of criteria in place that reco -
25 - recognizes the -- the energy constraint of the

1 resource.

2 And hydro is one (1) of those types of
3 resources. So what is expected is that something like
4 the lowest flow on record as a limit for relying on
5 dependable energy would be used, and there are some
6 similar examples in -- across the hydro utilities. But
7 hydro systems tend to be somewhat unique, but there is
8 a similar type of constraint that would be in place on
9 utilities that are predominantly hydro.

10 MR. DAVID CORMIE: We're fortunate that
11 we have a long-term -- a record of long enough duration
12 to describe the risk of drought. If you were -- if you
13 were a utility like Quebec Hydro, their water flows
14 starts somewhere in the 1940s, and so, you know, when I
15 started with Hydro they had a very short record, and --
16 and they had to go into some synthetic -- you know,
17 some probabilist ways of managing the energy risk. But
18 Manitoba Hydro is very similar to other companies who
19 have the long-term records available. That's the basis
20 of their design. It's pretty standard industry
21 practice.

22 MR. ED WOJCZYNSKI: Got a question
23 here.

24 MR. BRUCE DUGGAN: Hi, Joanne. You
25 made a comment right at the beginning of your

1 presentation, I -- I think, that -- something like
2 because there's going to be more demand we have to
3 produce more capacity. And --

4 MS. JOANNE FLYNN: What -- what I --
5 yes? Is that your question?

6 MR. BRUCE DUGGAN: No, no. My -- am I
7 remembering it accurately?

8 MS. JOANNE FLYNN: Not -- not quite,
9 but it's pretty close though. What I -- what I said is
10 because load is continuing to grow, there need to be
11 resources to serve it. So utilities will be looking at
12 generation sources to serve that load.

13 MR. BRUCE DUGGAN: Okay. Am I right in
14 assuming that we're going to get the rationale this
15 afternoon for why that belief -- I mean, that
16 undergirds the whole process, right?

17 MS. JOANNE FLYNN: Yes.

18 MR. BRUCE DUGGAN: That belief
19 undergirds --

20 MS. JOANNE FLYNN: Yeah.

21 MR. BRUCE DUGGAN: -- the entire
22 process?

23 MS. JOANNE FLYNN: It -- so there will
24 -- yes, there will be a presentation on load this
25 afternoon.

1 MR. BRUCE DUGGAN: Okay.

2 MS. JOANNE FLYNN: Yes.

3 MR. ED WOJCZYNSKI: We have hit that
4 time-line, so I suggest unless there's any burning
5 questions now that we take a break for lunch. And
6 given that we actually are on time, I -- I would
7 suggest we stick to the one (1) hour, and -- we'll
8 let's say fifty-five (55) minutes -- and come back at
9 1:15.

10 Is that -- is any -- everybody -- does
11 anybody have a problem with that, or other way?

12 Okay. Lunch. There is lunch available
13 next door, just outside the door on this side where I
14 am. And you can -- actually have two (2) choices. One
15 (1) is just bring it back in here. The other is if you
16 carry down the hallway there's some doors to the
17 outside and there's a patio on the roof there, next to
18 our green roof, by the way. Although, it could do with
19 a bit of water, I think. And so you have a choice of
20 just coming back in here, or going out on the patio.

21 So I suggest we take our break now. And
22 for those who are on the external, we will come back at
23 1:15. Thank you.

24

25 --- Upon recessing at 12:20 p.m.

1 --- Upon resuming at 1:21 p.m.

2

3 MR. ED WOJCZYNSKI: Hello. If we could
4 get started again. Before Dave -- we're going to start
5 off this afternoon with Dave on the export contract
6 fundamentals. But before we do that, maybe, Nicole,
7 could you just mention who is on the externals just for
8 everybody else to know?

9 MS. NICOLE FITKOWSKI: So currently we
10 have Bill Harper who is still logged in, Dave Lamont,
11 Erick Matthiesen, Paul Chernick, and that's it.

12 MR. ED WOJCZYNSKI: Okay. Thanks. I
13 guess we just get going. It's all yours, Dave.

14

15 PRESENTATION RE: EXPORT CONTRACTS FUNDAMENTAL TO
16 PREFERRED PLAN:

17 MR. DAVID CORMIE: Okay, is my slide
18 presentation available? There we go.

19

20 (BRIEF PAUSE)

21

22 MR. DAVID CORMIE: Okay.

23

24 (MOVED TO SLIDE 2)

25

1 MR. DAVID CORMIE: I wanted to spend a
2 little time this afternoon talking about export
3 contracts in a generic ter -- in a generic sense. And
4 then I'm going to end my presentation talking about the
5 Minnesota Power 250 megawatt sale agreement in a bit
6 more detail.

7 Whether we talk about the Minnesota
8 Power product, the NSP product, the WPS sale,
9 essentially they're all the same system participation
10 of power. And -- and rather than go into them all in -
11 - in gruesome detail, we'll just deal with the MP
12 contract.

13 And our -- our customers buy long-term
14 firm power to displace the construction of their own
15 generating facilities. And as Joanne mentioned this
16 morning, when they're making that decision they're
17 considering the capital investment that they may have
18 to make, what it would cost to operate that facility.

19 And so, you know, Manitoba Hydro just
20 can't dream up a price when we go to market and say,
21 This is the price. It has to be competitive to those
22 alternatives because those utilities are either issuing
23 an RFP, they've got a whole bunch of quotes, and
24 Manitoba Hydro has to be competitive. And -- and if
25 it's not done through an RFP process, it's done -- it's

1 negotiated.

2 And then the customer will take that
3 product to the market and ask its other suppliers
4 whether they can beat Manitoba Hydro's product and
5 service offering. And to the extent that was done with
6 the NSP sale, nobody could com -- nobody can compete
7 because they don't have the hydro alternative as an
8 option.

9 And so I just want to start with this
10 chart. This chart shows Manitoba and export demand. I
11 think this was a -- this is a week in June showing
12 hourly loads, starting at midnight on Monday morning,
13 going to midnight on Sunday evening.

14 And these are all the loads that we were
15 serving. The -- the lower chart illustrates the
16 Manitoba load demand. And you can see Monday through
17 Friday. This dark blue area at the bottom is -- you
18 know, every day of the week, it's pretty well the same
19 in -- in the summer. And then Saturday it drops off a
20 little bit. And then Sunday, less load, as there's
21 less industrial and commercial activity.

22 And on top of that we've stacked the
23 export sales, and they're generally the three (3)
24 types. These long-term forward contract sales, a
25 customer buys 500 megawatts starting at seven o'clock

1 in the morning, 500 megawatts. That 500 megawatts is
2 constant for sixteen (16) hours a day, and at eleven
3 o'clock at night, it goes to zero. It's a block of
4 power. And -- and those are -- those are the ones that
5 are shown as the forward sales. They're the long-term
6 forward sales.

7 And then above that I'm showing two (2)
8 types of MISO spot market transactions: the day ahead,
9 so the ones that we commit on a day-ahead basis; and
10 then there's some real time. And you can see the real
11 time is just, you know, little scraps, The little --
12 the -- the little bits of power that we have left in
13 real time that our system control centre may have said
14 to us, You know what, we can't give you everything on a
15 day-ahead basis, because we need to hold a bit of that
16 in reserve. But once you get into real time, the
17 control centre says, You know what, we're okay; You can
18 have the last scraps of surplus. And -- so the day
19 ahead is -- is really it's just a -- a salvaging of the
20 -- of the load forecast on a certain day. And so you
21 end up with this -- this profile.

22 In this case, the -- there's a mix of
23 long-term forward contracts. The Monday-to-Friday
24 sales are -- are pretty well constant. And then some
25 of the contracts, we're not required to deliver on the

1 weekend, so you can see that they peel back for
2 Saturday and Sunday.

3 But in a -- what -- what we're -- what
4 we're going to talk about this afternoon are those
5 forward contracts. And you can see that they make up a
6 considerable portion of the summer, or summer load
7 obligation. So imagine in the wintertime, instead of
8 having 2,500 megawatts of Manitoba load, you've got now
9 a thousand megawatts more of heating load, and it's
10 darker. So that -- that dark blue area would -- could
11 be up around 3,600 megawatts, because there's more
12 winter demand.

13 And so we won't have as much -- many
14 sales in long-term forward sales in the wintertime,
15 because in the summertime, we're delivering our long-
16 term firm power, plus our seasonal diversity
17 obligation. In the winter we don't have the seasonal
18 diversity obligation. So we -- we, in effect, fill in
19 the load profile in the summertime, and -- and back it
20 down a little bit in the wintertime.

21 But you can see that the -- the other
22 interesting thing is there's -- there's very little
23 long-term firm sales at night. Customers don't need
24 power. If they need power, they could just go to the
25 market. And so our load profile is mainly driven by

1 this five (5) by sixteen (16) -- five (5) days a week,
2 sixteen (16) hours a day, this big block of -- of power
3 that's -- that's sold.

4

5 (MOVED TO SLIDE 3)

6

7 MR. DAVID CORMIE: So the -- the recent
8 major long-term contracts that are in the preferred
9 development plan are with three (3) companies: Northern
10 States Power, Minnesota Power, and Wisconsin Public
11 Service. The -- the first sale goes from -- is an
12 extension of the existing sale that expires in 2015:
13 325 megawatts in the wintertime, 370 meg -- 5 megawatts
14 in the summertime.

15 In the summertime we deliver the energy
16 sixteen (16) hours a day, Monday to Friday. In the
17 wintertime, it's twelve (12) hours a day, at a rate of
18 325 megawatts. So it's, again, it's just a block -- a
19 block of -- of energy delivered at the border and in --
20 in those hours.

21 And then on top of that, Manitoba Hydro
22 has the option, starting in 2020, to sell Northern
23 States Power 125 megawatts of additional power,
24 bringing the total quantity up to 450 megawatts in the
25 winter and 500 megawatts in the summer. And it is

1 Manitoba Hydro's option, if Manitoba Hydro deems that
2 it has the surplus available, we -- NSP is required to
3 -- to buy that 125 megawatts for those four (4) years.

4 And I think we have to -- and it's
5 conditional on -- there's condition precedents saying
6 that it's subject to Manitoba Hydro building new --
7 committing to new generation. So if we are to commit
8 to Keeyask, or it may be a condition precedent that we
9 can waive if -- if we still have that surplus without
10 Keeyask, that we can enter into that 125 megawatt sale.

11 And those sales go to -- to 2025. Our -
12 - our relationship with Northern States Power began
13 back in 1976, with large blocks of power sales. Right
14 now we're selling about 900 megawatts in the summer and
15 five hundred (500) in the winter. And we expect in
16 2025 that, for the fourth or the fifth time, we will
17 roll those transactions over and continue to serve them
18 as long as we have surplus capacity available.

19 What's interesting about the NSP sale
20 agreements is that they're -- they don't consume any
21 dependable energy resources in Manitoba. The -- in
22 addition to the sale agreement, we've signed the
23 seasonal diversity agreement which extends the seasonal
24 diversity arrangement starting in 2015, going to 2025,
25 for 350 megawatts in the -- we'll see them 350

1 megawatts in the summer and we get 350 megawatts back
2 in the winter.

3 And the -- and the -- there's clauses in
4 the agreement that say, Under adverse water conditions,
5 Manitoba Hydro can purchase all the energy it needs to
6 serve the sale obligation from Xcel -- or from NSP. So
7 it doesn't consume any -- any Manitoba energy resources
8 to serve the sale. We have the option of buying the
9 energy that we need to fulfill our obligations to NSP
10 from NSP. So in effect, they're self-sup -- they're
11 backstopping the sale under drought conditions.

12 And -- which is -- which is a great
13 option for Manitoba Hydro, because as our load forecast
14 comes and goes -- some years it's higher, some years
15 it's lower -- we don't run out of energy resources to
16 serve that -- to -- to serve the NSP sale. NSP says,
17 We're so low on energy in the wintertime, we can send
18 you the energy you need to -- to meet your energy
19 obligation back to us.

20 And so it's -- it's a very good product
21 for Manitoba Hydro. In effect, they've taken on the --
22 the drought risk associated with energy supply.

23 The second agreement is a 250 megawatt
24 transaction starting in June of 2020, going to 2035,
25 with Minnesota Power. Joanne spoke this morning about

1 Minnesota Power -- or about Minnesota utilities and the
2 utilities in MISO.

3 Minnesota Power is a -- is a great
4 example of a utility that's over 85 percent coal based
5 right now. And their strategy is to transform
6 themselves by 2025 into being 50 percent. So they're
7 going from being essentially 100 percent coal and
8 natural gas to being 50 percent renewable and 50
9 percent carbon based.

10 And -- and what -- a major component in
11 their ability to do that is the sale agreement with --
12 with Manitoba. In addition to that, they're investing
13 in wind resources in North Dakota and buying some
14 transmission to bring the wind from North Dakota to
15 Minnesota.

16 But this is a company that's clearly
17 concerned about being able to continue to -- to burn
18 coal, the cost of upgrading their coal plants, and --
19 and has a strategy. And -- and I think we were very
20 successful in getting them to start thinking ten (10),
21 fifteen (15), twenty-five (25) years down the road of
22 having a hydro component in their portfolio.

23 And even if the -- when the contract
24 ends in 2020 -- in 2035, the transmission line that
25 will be built as part of this transaction will still

1 connect them to Manitoba, and they'll still have access
2 to the hydro energy.

3 And so the transaction just allows them
4 to invest in transmission to -- to be able to access
5 that hydro energy that's available ninety-four (94)
6 years out, or ninety-seven (97) years out of a hundred.
7 And then they'll -- they'll deal with the capacity
8 issue if it comes up but they've got a pipeline right
9 into the heart of -- of a very predominant
10 hydroelectric utility and they can always count on
11 hydro energy in perpetuity.

12 So it's critical for them to have this
13 strong connection with Manitoba Hydro, and -- and
14 they've -- they -- they have bought 250 megawatts from
15 us. And this transaction, it's seven (7) days a week,
16 sixteen (16) hours a day, and -- because that's the
17 nature of their base load. They're -- they're large
18 mining loads. The mines work seven (7) days a week.
19 And their capa -- their load factor on their system is
20 very high. It's above 85 percent. So they don't have
21 a big winter peak. They don't have a big summer peak.
22 It's just a cons -- relatively constant load. So they
23 need a resource that's constant over time.

24 Byron...?

25 MR. BYRON WILLIAMS: Yes, Byron

1 Williams. Dave, do you have -- we have moral certitude
2 now about the Canada/US transmission line, like it's --
3 it's a go to Minnesota Power, or what's its status?

4 MR. DAVID CORMIE: The -- the
5 commitment to build a new transmission line from
6 Minnesota Power is part of the contract. The contract
7 is signed. It's been approved by the regulator. There
8 will be a 230 -- at least a 230 kV transmission line.
9 The uncertainty that's associated with the line is
10 whether the line gets sized lar -- to be larger than
11 that.

12 And -- and then as it says here, the
13 contract requires Minnesota Power to build new
14 transmission. And -- and that was an essential part of
15 the transaction, both from Manitoba Hydro's perspective
16 and from their perspective, because they're -- they
17 were looking for an investment opportunity in
18 transmission.

19 So, you know, the -- the challenge that
20 we have is not just to sell power in the export market.
21 The challenge we have with companies like Xcel, and
22 Minnesota Power, and Wisconsin Public Service is for
23 them to start thinking not just five (5) years out and
24 putting in the next combustion turbine, but start
25 thinking out twenty (20) years, thirty (30) years,

1 because that's the kind of time frame that Manitoba
2 Hydro requires, because our build times are -- you
3 know, are so long. So when we say, You know what, we
4 want you to sign today, and it's 2010, or 2011, we're
5 not going to start delivering until 2020, and the power
6 sale will continue to 2035. They're tal -- now we're
7 talking about time horizons that they never -- they
8 were never faced with before. They -- they need a
9 combustion turbine three (3) years from now, they can
10 put it in.

11 So we have to get them to start
12 thinking. If they want to have a diversified portfolio
13 that includes hydro, to start doing coordinated
14 generation planning. And that's what we've been
15 successful with, with Minnesota Power and Wisconsin
16 Public Service. And -- and it's not -- it -- it -- and
17 -- and -- so there's a bunch of constraints they have.
18 We have a bunch of constraints. And it's how the
19 companies can work together to -- to optimize the
20 entire package for both -- both sides.

21 DR. PETER MILLER: Do either of these
22 require Keeyask rather than wind or something?

23 MR. DAVID CORMIE: The -- the sale
24 agreement with Minnesota Power is subject to Manitoba
25 Hydro committing to building a Keeyask, Bipole 3, and a

1 major new transmission. If for any reason we chose not
2 to build Keeyask, we -- we didn't build Bipole 3, or we
3 could build a -- a US interconnection, the transaction
4 falls off the table in 2016.

5 So there -- there -- Manitoba Hydro
6 holds a condition precedent that allows us to walk away
7 from the transaction if for whatever reason we choose
8 not to build either any of those three (3) projects.

9 Now -- and you -- and you can
10 understand, given Minnesota Power's alternatives are
11 short lead-time alternatives, if we went to them in
12 2016 and said, You know, we couldn't get it through the
13 regulatory process; we couldn't get Keeyask built; for
14 some reason the Bipole couldn't be built, or we
15 couldn't get the new inter -- international
16 transmission line built, they would say, Okay, we have
17 another alternative. We can build a -- we can build a
18 -- a combustion turbine, or build wind, or -- or
19 they'll do something different.

20 So the -- the agreements are all
21 structured to give Manitoba Hydro the say on whether
22 the generating station is built. These agreements
23 don't require Manitoba Hydro to build anything. But if
24 we choose to build it, these agreements will -- will
25 proceed.

1 DR. PETER MILLER: And another
2 question: Is the -- are there any provisions for
3 renewing these contracts beyond those time frames?

4 MR. DAVID CORMIE: No. No, those
5 contracts expire on those dates. The other transaction
6 with Wisconsin Public Service...

7 Yes?

8 MS. MARILYN KAPITANY: Sorry, just
9 before you leave that, did you say that the Canada/US
10 transmission line was going to be the responsibility of
11 Minnesota Power, so they would build and pay for that--

12 MR. DAVID CORMIE: They will build --
13 they will build, at a minimum, a line from the border
14 to Duluth.

15 MS. MARILYN KAPITANY: To Duluth, okay.

16 MR. DAVID CORMIE: Right. And Manitoba
17 Hydro will built the transmission line from Winnipeg to
18 the border.

19 MS. MARILYN KAPITANY: Okay.

20 MR. DAVID CORMIE: And we'll pay for
21 that. The -- the -- there is an option that we're all
22 exploring, is to build a bigger line than is necessary
23 for that sale. For -- for a 250 megawatt sale you only
24 have to build a 230,000 volt line. We've identified
25 that building a 500 kV line, twice the voltage, had

1 more time -- four (4) times the energy carrying
2 capacity than a smaller line. And that -- and if
3 you're going to build Conawapa, you need to have a big
4 -- a -- a big transmission line.

5 MS. MARILYN KAPITANY: And so who would
6 pay for that transmission line?

7 MR. DAVID CORMIE: Well, that -- that's
8 --

9 MS. MARILYN KAPITANY: -- from the
10 border to Duluth?

11 MR. DAVID CORMIE: From the border?
12 We're -- we're negotiating that right now. There --
13 it's -- there -- if it were to be built, Manitoba Hydro
14 will have to put up some of the money until the point
15 in time where there are enough sales in the United
16 States to use that extra transmission service.

17 The -- the initial sale with the
18 Wisconsin Public Service is for a hundred megawatts.
19 And it goes -- the -- the agreement goes from 2021 to
20 2029, although energy deliveries under it go from 2021
21 to 2027. So there's -- but the -- but the transaction
22 goes on for an additional two (2) years for
23 transmission reasons.

24 But Manitoba Hydro already -- and -- and
25 Wisconsin Public already own network service from the

1 border to -- to -- and so we're utilizing that existing
2 trans -- transmission service, firm service, to make
3 this transaction. And so we're -- we're still in the
4 process of -- of dis -- of -- of negotiating with
5 Wisconsin Public Service on any additional sales above
6 the hundred megawatts that would come off of Conawapa.
7 And that --

8 MS. MARILYN KAPITANY: Okay.

9 MR. DAVID CORMIE: The -- the critical
10 aspect in -- in those discussions are what is the cost
11 of additional transmission above the cost that
12 Minnesota Power is willing to invest, so taking the
13 line from 250 megawatts to -- to 750 megawatts. And --

14 MS. NICOLE FITKOWSKI: Da -- Dave, I
15 have --

16 MR. DAVID CORMIE: Yes.

17 MS. NICOLE FITKOWSKI: -- Dave Lamont,
18 who has a question for you.

19 MR. DAVID LAMONT (VIA CHAT): Do the
20 price terms of the contract reflect market clearing
21 prices in some manner?

22 MR. DAVID CORMIE: The -- these
23 transactions provide that there will be transmission
24 service provided in the US by these companies and to
25 the extent that that transmission service is not

1 necessary to serve the sale. So you've got a sale that
2 goes for sixteen (16) hours a day. Well, what about at
3 night, the extra -- the next eight (8) hours?

4 These companies are required to make
5 that transmission service available so Manitoba Hydro
6 can sell energy on that transmission and they will buy
7 it. So we have the right to sell energy on that
8 transmission, and they are obligated to buy it. But
9 it's at market price, and it will be sold back into the
10 market.

11 So, in effect, we're getting to use the
12 transmission service that these companies are putting
13 in place to facilitate market transactions when we have
14 surplus energy. So we have the right to use it if we
15 want to. If we don't have -- if -- if we don't need
16 it, we don't have to use -- we don't have to put energy
17 on it. But those -- those surplus -- or those
18 additional energy transactions are an option for us.

19 So there is -- there are times when --
20 when we have the right to take energy to market on firm
21 transmission and get market price for it. Okay, I'm
22 probably running short of time.

23 Why do we have export contracts? Well,
24 we need to define in legal terms the product, the
25 quantity, the price, and the term.

1 (MOVED TO SLIDE 4)

2

3 MR. DAVID CORMIE: What is the power?

4 Well, it's system participation power. And generally,
5 on the quantity, it's so many megawatts for so many
6 years. And it starts at one (1) hour in the mor -- in
7 the day and it ends at another hour in the day. It
8 defines what the price is and what the term is.

9 And these transactions start out
10 generally with an MOU, where you agree to discuss the
11 possibility. And generally, an MOU just puts terms and
12 conditions around issues like confidentiality, We're
13 going to talk about this transaction and -- and we're -
14 - and we're going to respect each other's need for --
15 for confidentiality.

16 And that generally leads to a term sheet
17 where you've agreed to the major terms and conditions,
18 like price, duration, how many megawatts it is. And
19 then finally, we'll then -- after you've signed the
20 term sheet, at some point later, you'll end up at the
21 very formal power purchase agreement that's subject to
22 -- to approval.

23 The -- it sets out all the terms and
24 conditions of the -- the contract sets out all the
25 terms and conditions. And, you know, these things --

1 you know, when I started, you could have a con -- a
2 long-term contract that might only be five (5) pages.
3 These things now go on for hundreds of pages, and they
4 -- they define all the terms and conditions, the
5 transmission arrangements.

6 Remember, we talked about how
7 transmission service -- and what do you do, who's going
8 to provide service, what happens if that service is
9 interrupted, all the scheduling and curtailment rights,
10 when are you going to order your power. You have the
11 right to curtail. Under what cu -- circumstances can
12 you curtail. All the issues about billing and payment
13 and what currency are you going to pay your bill in.
14 And how do you maintain creditworthiness, dispute
15 mechanisms, defaults, issues of bankruptcy, issues of
16 confidentiality, and conditions, precedents, and
17 approvals.

18 And -- and Byron was talking about that
19 su -- subject to Conawapa -- well, or TS. Well, we
20 have conditions precedent in there that says, This
21 transaction's not going to go anywhere if we don't
22 build Keeyask; it'll just stop. So it's a condition
23 precedent.

24 Another condition precedent, or
25 approval, is it's subject to regulatory approval in

1 Canada, both by, you know, the National Energy Board,
2 or -- and in the United States, they -- they have to
3 get regulatory approval in Minnesota. Things like, we
4 need an order in council in Manitoba to get the
5 contract approved.

6 And so all those condition precedents
7 are laid out in the agreement. And then there's just
8 pages and pages of general terms, general commercial
9 terms, associated with a -- a good contract.

10

11 (MOVED TO SLIDE 5)

12

13 MR. DAVID CORMIE: The supply and --
14 and purchase obligations deal with the issue of
15 capacity. How much capacity are you going to supply?
16 And in the case of the Minnesota Power transaction,
17 it's 250 megawatts. But there are no reserves.
18 Generally, that's the difference between a firm power
19 product and a system participation product. Firm means
20 that if something goes wrong, you have some reserves
21 here to help out in that -- in that contingency.

22 And for all of us, as customers in
23 Manitoba, we buy firm power. And so if something goes
24 wrong in the power system, the lights don't go out
25 because Manitoba Hydro has reserved -- has held

1 reserves. In -- in these sale agreements, these are
2 system participation. The buyer is participating in
3 the risks of the power system, so if something goes
4 wrong, the sale gets cut. They're exposed to our --
5 you know, if a -- if lightning strikes something, and -
6 - and blows up, we have the right to curtail.

7 So it -- it defines the -- our capacity
8 obligation, it defines how many megawatt hours we're
9 going to deliver, and it -- and it talks about the
10 quality of supply. And we have to have an independent
11 third-party accreditation process to say that these
12 megawatts really are deliverable. You're not buying a
13 pig in a poke. There's -- there's an accreditation
14 process.

15 And it defines the delivery point.
16 Where is the electricity actually going to get
17 delivered to? And generally that's the point where the
18 transmission line crosses the border.

19 And then it talks about the
20 environmental attributes. And that's really important
21 now, because our customers want the electricity, but
22 they also want to be able to say that it's coming from
23 a non-emitting resource. And so we talk about where's
24 the source of the power? How are we going to track the
25 environmental attributes? And -- and how are we going

1 to transfer those attributes to you?

2 Traditionally, electrons were just
3 electrons, but now they're pai -- they've been painted.
4 Some of them are green, and some of them are blue, and
5 some of them are brown. They want to know, What are we
6 getting? And, in the Minnesota Power case they want
7 hydro. They want large hydro attributes, and -- and we
8 have to be able to provide those. And if you don't
9 have them then what do you do? How can -- do you have
10 the right to substitute? Yes?

11 MR. BRUCE DUGGAN: It sounds like we
12 have some outs. Right now, they're under a mandate, or
13 they have a goal of 50 percent renewables.

14 Do they have outs if a different
15 government comes in and says, You know what, let's not
16 do that; let's just do natural gas?

17 MR. DAVID CORMIE: No. Under none of
18 the contracts do the customers have cancellation
19 rights. They're all -- they're -- from our
20 perspective, they're take or pay.

21

22 (MOVED TO SLIDE 6)

23

24 MR. DAVID CORMIE: The -- the contract
25 has -- talks about pricing, it talks about -- Joanne

1 talked about, this morning, about the difference
2 between the price for energy and capacity, so we sell -
3 - we -- we have a price on the capacity. And that's in
4 terms of dollars per megawatt month.

5 Let's say it's six thousand dollars
6 (\$6,000) a megawatt month. They buy 500 megawatts, so
7 six hundred (600) times five hundred (500). There's
8 three hundred thousand dollars (\$300,000) a month in
9 demand charges. That money comes to Manitoba Hydro
10 every month regardless of whether we make delivery of
11 any energy at all.

12 And then there's the price for the
13 electricity. If they're buying fixed-price energy,
14 they'll -- there's a formula in the -- in the contract
15 that lays out what that price will be. They pay that,
16 and then if there's any additional energy at market
17 price, then they'll pay for that market-priced energy.
18 And so the pricing terms define out -- define how those
19 prices are -- are calculated.

20 The prices are all in -- for the fixed-
21 price energy, the -- they're all escalate, so they --
22 they keep track of in -- they -- they keep up with
23 inflation, and they may be either a fixed escalator.
24 They might be just, you know, 2 percent a year, and it
25 goes 2 percent a year for twenty-five (25) years. Or,

1 it may be tied to an index like the CPI, or the US GDP
2 deflator, something that reflects the increasing value
3 of electricity over time.

4

5 (MOVED TO SLIDE 7)

6

7 MR. DAVID CORMIE: Scheduling and
8 delivery involves the issue of transmission service.
9 And we talked about that this morning. How many
10 megawatts of transmission service are you reserving?

11 They want to be assured that Manitoba
12 Hydro has got the transmission in our -- in our area to
13 make sure that our product can be delivered. We want
14 to be assured that they've got the transmission service
15 in their jurisdiction, and who pays for that
16 transmission service.

17 It talks about changed circumstances
18 and, you know, Joanne talked about the MISO market and
19 how it's become -- you know, how electricity -- but
20 what happens if MISO in five (5) years goes away? We
21 have to have arrangements in the contract that says, If
22 Miso goes away then how are we going to fulfill our
23 obligations to each other under the contract? So, we -
24 - we map out: Oh, well, we're going to sell to you at
25 the boarder. You're going to buy from us. You'll

1 arrange for transmission service.

2 And we pretend that -- that the MISO has
3 disappeared so that the contract can -- can continue,
4 and we've thought through all the issues and the risks
5 of -- of changing circumstances. Because we're talking
6 about contracts now that -- we're going to go to
7 2035/2040. That's a long time to think that the world
8 is going to stay the same. In the time that I've been
9 doing this, we've gone through three (3) market
10 revolutions, and I don't think in five (5) years it's
11 going to be the same. It'll be different. And so when
12 we're negotiating these things we think those things
13 through, about the default provisions.

14 What's really of significance to us is
15 the curtailment rights that we have under the
16 contracts. Manitoba load always has priority, so if we
17 get to the situation where we're selling electricity to
18 our customer and continuing to sell that electricity to
19 -- to the customer puts the Manitoba load at risk
20 because now we have insufficient energy or capacity to
21 serve our loads, Manitoba Hydro has the right to
22 curtail delivery under these contracts. And those can
23 be triggered by either generation or transmission
24 events.

25 So imagine that there's -- we're

1 delivering 500 megawatts to NSP, and we have a fire at
2 one of our generating stations, and now we've lost a
3 thousand megawatt generating station due to a fire.
4 That's a generation curtailment event. And in that
5 circumstance, having lost that thousand megawatt
6 generating station, the question is: Whose load
7 doesn't get served? So the contract allows us to cut
8 the export sale first so that the thousand mega -- the
9 -- anything that's left in the power system is
10 available to serve Manitoba load.

11 So it divines those events. These are
12 the events for which curtailment can occur: fires,
13 explosions, loss of transmission service, tornados,
14 hurricanes, forecasting error, you name it. At any
15 point in time if one of these events occurs, a force
16 majeure, we have the right to curtail.

17 And then the last thing is curtailment
18 priority. Well, then you've got all these contracts.
19 Which one of us who has a contract with Manitoba Hydro
20 gets curtailed first? Where do I land in the pecking
21 order? And so that -- there's a priority criteria.

22 So the -- the contracts talk about tho -
23 - those issues.

24

25 (MOVED TO SLIDE 8)

1 MR. BYRON WILLIAMS: Dave?

2 MR. DAVID CORMIE: Yes, Byron?

3 MR. BYRON WILLIAMS: Byron Williams.

4 Just going back to the pricing slide. You -- you don't
5 have to turn there, but in terms of the escalation and
6 the index, is it -- presumably it's conceivable it
7 could be indexed to the price of natural gas, or some
8 sort of relationship with it?

9 MR. DAVID CORMIE: It could be. And --
10 you know, it's always a challenge to deciding what --
11 what the escalator should be. And we don't necessarily
12 know which escalator in the future will be the best
13 indicator of the real value of power, but -- but -- so
14 we try and have a basket of contracts with a bunch of
15 different escalators so that -- so that we're not going
16 to -- you know, if they're all tied to CPI maybe CPI
17 isn't the right measure in twenty (20) years, or -- but
18 -- so there's a deliberate attempt to diversify the
19 escalator, so that we have a -- that we're -- from a
20 risk management perspective we're not all tied to the
21 same -- to the same escalator. But it could be CPI,
22 the US GDP deflator, it could be gas, or it could be a
23 mixture of all those. There -- it -- it could be a
24 combination.

25 MR. BYRON WILLIAMS: When -- when we're

1 looking at the three (3) forward-looking contracts
2 you've been discussing, is there a gas escalator in --
3 in -- amongst them?

4 MR. DAVID CORMIE: I am not sure I can
5 answer that question, Byron.

6 So the MP sale agreement. We've talked
7 about this. It's 250 megawatts capacity in energy,
8 deliveries seven (7) days a week sixteen (16) hours a
9 day, and it obligates Minnesota Power to build a new
10 transmission line.

11 In addition to that, there's a second
12 agreement; it's an energy exchange agreement. And one
13 (1) of the -- one (1) of the things that Manitoba Hydro
14 wants is the ability to use network service to bring
15 energy north in drought conditions. And so we have the
16 right to purchase up to 250,000 gigawatt hours
17 annually.

18 And -- and what that does is that --
19 that is enough of a commitment from Manitoba Hydro to
20 purchase that we can reserve 250 megawatts of
21 northbound transmission service to serve Manitoba.

22 So the 250,000 megawatt hours a year is
23 -- is small relative to the volumes that we normally
24 purchase. So this is something that easy -- is easily
25 achievable at very little cost. And -- but what it

1 does is it gives us access to that -- to that US
2 transmission, and because we don't pancake the tariff,
3 because it's used to serve Manitoban load, we, in
4 effect, get that service for free. But you have to
5 designate a resource in the US, so that's what this
6 part of the agreement does.

7 The second part of the agreement is --
8 deals with wind storage services. And Manitoba Hydro
9 is committed to purchasing 250,000 gigawatt hours a
10 year from Minnesota Power to help them justify the --
11 their investment in wind in -- in North Dakota.

12 And, again, because Minnesota Power has
13 agreed to make the transmission system bigger, it makes
14 Manitoba a better battery for the -- for the
15 marketplace. We're allowing them to share in the value
16 of -- of the battery that they've contributed through
17 their -- through their investment in transmission
18 through this -- through this arrangement.

19

20 (MOVED TO SLIDE 9)

21

22 MR. DAVID CORMIE: The -- it's a
23 fifteen (15) year term starting in May of 2020, going
24 to '35. Where as a minimum -- so under the lowest flow
25 years we're obligated to send them 14,060 gigawatt

1 hours a year, which is delivery sixteen (16) hours a
2 day, five (5) days a week.

3 But in -- in average years it'll be more
4 than that, because they'll take energy sixteen (16)
5 hours a day, seven (7) days a week. And -- and in a
6 high water year when water supply is so great that we
7 can load up that 250 megawatt transmission reservation
8 twenty-four (24) hours a day for all hours of the year,
9 it'll be 2,100 gigawatt hours that they're obligated to
10 buy from us.

11 So it's about, between 36 and 50 percent
12 of the output of Keeyask. So that's what MP's
13 commitment is from us.

14 Pricing is -- includes both an energy
15 price; it's fixed. And there's a -- and there's also a
16 -- a market price formula, and there's also a capacity
17 price. And there's a provision for escalation and
18 overtime between now and when the contract starts, and
19 then a slightly different provision after that.

20

21 (MOVED TO SLIDE 10)

22

23 MR. DAVID CORMIE: So under normal
24 water conditions those are the -- we talked about those
25 -- overnight deliveries are our option, and there's no

1 transmission use costs to Manitoba Hydro. And adverse
2 water conditions, if we need to, we can call back the
3 weekend energy.

4 And there's this issue of curtailment.
5 In a force majeure, whether it's flood, drought, you
6 name it, we can curtail the sale to zero if necessary.

7 And that includes a drought of worse
8 than record. So Joanne talked about this morning about
9 designing the power system to be able to deliver firm
10 power under that one (1) low flow year in the historic
11 record. So if something worse than that -- so if -- if
12 we had a year that was, you know, 80 percent of the
13 worst on record, this tri -- this -- we -- we have no
14 obligation at all under those circumstances to deliver
15 any energy. We can -- we can -- all the capacity that
16 they've bought out of Keeyask is -- is reserved under
17 those circumstances to serve Manitoba load.

18

19 (MOVED TO SLIDE 11)

20

21 MR. DAVID CORMIE: So they're committed
22 to building, at a minimum, of a 230 kV line, and that
23 line needs to be in service for June of 2020. They
24 have been championing on -- at the request of Manitoba
25 Hydro a larger line. Our studies indicate that having

1 a larger line is an economic alternative for Manitoba
2 Hydro.

3 And so we've been going through the
4 regulatory process in Minnesota with Minnesota Power on
5 the assumption that it will be a five hundred (500)
6 line. And they've gone and -- and undertoo --
7 undertaken public consultations, all their filings with
8 the regulator have been based on a 500 kV of -- but
9 that is not a done deal, and the option there is that
10 it will revert back to a -- to a two-thirty (230) line
11 if -- if we can't make the case for the five hundred
12 (500) line work.

13 We're responsible for all the costs in
14 the -- in Canada for the new transmission line, and
15 they will be responsible for their costs on the US for
16 the two-thirty (230). To the extent that there are
17 additional costs above the two-thirty (230) line
18 associated with the 500 kV, they may or may not be
19 involved in those costs depending on the results of our
20 -- our negotiations that are ongoing.

21

22 (MOVED TO SLIDE 12)

23

24 MR. DAVID CORMIE: There's some
25 conditions and options. There is no requirement to

1 build. This is -- addresses the question that -- our -
2 - our obligation to deliver the power kicks in when
3 Manitoba Hydro places the first rock in the cofferdam
4 in -- at -- at Keeyask. Up to that point the --
5 Manitoba Hydro or the province can decide that Keeyask
6 is not required, is not necessary, it's -- or it -- it
7 can't be done. And -- and if that were the -- that --
8 that were the case, the contract would just terminate.

9 So there's -- there is some optional
10 delays negotiated in there. We -- we're -- we've -- we
11 negotiated such that we have a two (2) year delay
12 option if necessary and -- associated with the start of
13 the Keeyask. So let's say that we do agree that -- and
14 we get regulatory approval to build Keeyask, but it's
15 going to be a year late or two (2) years late. The
16 contract provides for up to a two (2) year delay or a
17 delay in the start of the -- of the transmission
18 facilities.

19 So we need to have Bipole 3 in service
20 in order to make deliveries. So if there was some
21 reason Bipole 3 were delayed, even though the
22 generating station may be on track, we can't get the
23 power out of the North, then that would be a reason to
24 curtail deliveries for two (2) years. And then it says
25 here that the -- the term -- the agreement terminates

1 the penalty if -- if ni -- either condition is not
2 satisfied by June the 1st, 2016.

3 Peter...?

4 DR. PETER MILLER: Yes, I'm trying to
5 put together a couple of responses. You have these
6 outs if you don't build Keeyask and so on. And in
7 response to Bruce, you said, They don't have any outs.
8 If you wanted to supply them with natural gas, they'd
9 still have to take natural gas.

10 Did I understand that correct?

11 MR. DAVID CORMIE: I didn't say
12 anything about natural gas.

13 DR. PETER MILLER: Okay.

14 MR. DAVID CORMIE: I'm saying they have
15 an alternative of -- of building their own facility
16 rather than buying from Manitoba Hydro. So these
17 condition precedents that protect Manitoba Hydro have
18 been timed so that they still have the alternative
19 option of building a generating station in Minnesota to
20 serve their load.

21 DR. PETER MILLER: Okay. But my
22 question is: If you could find a way to supply them
23 with wind instead of Keeyask, can they say, No, we want
24 Keeyask? Do -- do they have control over you building
25 Keeyask if they are to be a party to the contract?

1 MR. DAVID CORMIE: The simple answer is
2 they're not interested in wind. They have more wind
3 than they know what to do with under their mandate in
4 Minnesota. They don't want more wind because it has no
5 -- it doesn't have the dispatch ability and it doesn't
6 have the capacity.

7 DR. PETER MILLER: Well, the
8 combination. I mean --

9 MR. DAVID CORMIE: Yeah.

10 DR. PETER MILLER: -- suppose you --
11 you backed wind and so on.

12 MR. DAVID CORMIE: So you -- you have
13 to remember what they're doing here, Peter. Like Xcel,
14 they -- they now have a capacity resource, and -- and
15 they can -- they can help use their wind resources to
16 meet -- to meet their load.

17 But -- but really, they're not
18 interested in anything but a hydro product, because
19 Manitoba wind has no advantage to them except -- and --
20 and it has a huge disadvantage because it's not
21 subsidized the way that US wind is. In the United
22 States, they get a production tax credit. You can buy
23 a contract from a wind farm in Minne -- in -- in North
24 Dakota for under thirty dollars (\$30) a megawatt hour
25 because of a subsidy. There's no way that you can buy

1 that in Canada.

2 So we would be investing, you know,
3 twice as much to get the wind resource built to sell to
4 them when they already have an economic alternative
5 that's half the price. So they're -- they're not
6 interested in buying wind.

7 DR. PETER MILLER: DSM --

8 MR. DAVID CORMIE: Well, yeah, okay,
9 but...

10 Okay, so -- so they -- they have
11 alternatives that -- wind alternatives that are way
12 less expensive than -- than Manitoba because they have
13 the ta -- production tax credit available to them.

14 They -- this contract is tied to the
15 construction of new hydro resources in Manitoba because
16 what they want is they want to have a diversified
17 portfolio that includes wind, hydro, some other
18 renewables, gas, and coal. And -- and so hydro is a --
19 is -- you know, is one (1) of the legs of that four (4)
20 legged stool.

21

22 (MOVED TO SLIDE 13)

23

24 MR. DAVID CORMIE: Other provisions;
25 it's served from the Manitoba Hydro generating system,

1 so participation -- they're participating in the entire
2 system. So although we need to -- we would need to
3 build Keeyask, the power is not coming from Keeyask.
4 It's coming from the surplus that's available from all
5 the generating stations in the system.

6 But they are exposed to all our
7 generation and transmission risks. There are
8 participating not only in the energy, but in the risks
9 of -- of delivering that energy. And as I said before,
10 Hydro -- Manitoba's native load has first priority to
11 the energy.

12 And there are no liquidated out -- no
13 liquidated damages in the contract. Liquidated damages
14 would be, Oh, we're -- we can't deliver to you because
15 we've had an outage. Liquidated damages would require
16 us to go to market, buy market price power, and sent it
17 to them. There is nothing in the contract that
18 requires us to -- to pay liquidated damages, although
19 the contract gives us the right to go to the market and
20 buy energy to deliver it if our system is not capable
21 of doing it.

22 Say, for example, that Minnesota Power
23 is buying the energy at eighty dollars (\$80). Market
24 price is at twenty dollars (\$20). We have a
25 curtailment. Why wouldn't we just buy twenty dollar

1 (\$20) power, deliver our -- deliver it to them, and get
2 eighty dollars (\$80) for it?

3 So the contract allows for us to
4 purchase electricity to serve the sale even though we
5 have -- have been subject to a curtailment that gave us
6 the right to curtail.

7

8 (MOVED TO SLIDE 14)

9

10 MR. DAVID CORMIE: And there's --
11 there's a bunch of approvals required. Manitoba Hydro
12 Board approval, that's happened. The -- we've got the
13 order in council from the province. The National
14 Energy Board of Canada, we have yet to get the export
15 permit for -- for that line. Is that correct, Marla,
16 do you know? I can't remember if we -- we got the
17 permit yet for that.

18 And we -- we do not have the
19 international power line export permit yet. That will
20 still come. Minnesota Power needs -- needed their
21 board approval. They've got that. The Minnesota
22 Public Utility Commission has approved the transaction,
23 and the Midwest ISO has approved the capacity as a
24 capacity resource.

25 So I think the only outstanding items

1 left are NEB approval in Canada for the sale and for
2 the construction of the new line.

3 So those fundamentals about that
4 contract apply to -- to the other contracts. They --
5 they may be different pricing amounts. The formulas
6 may be slightly different. But there's nothing sign --
7 not really significant -- there's nothing significantly
8 different between the -- the sale to WPS, MP, and --
9 and to Xcel. Okay.

10 Are there any other questions?

11

12 (BRIEF PAUSE)

13

14 PRESENTATION RE: REVIEW OF MANITOBA HYDRO SUPPLY AND
15 DEMAND TABLES:

16 MS. JOANNE FLYNN: Okay. Good
17 afternoon. I'm going to do the presentation on the
18 review of the supply and demand tables. And what
19 you're having handed out to you, or have available to
20 you, is a set of documents that consists of firstly a -
21 - a Word-type document that has got, "Manitoba Hydro
22 dependable energy supply and demand tables," on the top
23 of it. And that is what I would call a guidance
24 document to explain the setup of the supply/demand
25 tables.

1 And today I'll go over the dependable
2 energy one. So accompanying that guidance document are
3 the actual supply/demand tables, or an illustration of
4 the supply/demand tables, that you will see in the NFAT
5 submission. And there's three (3) separate tables, and
6 they are printed front to back. So you'll see it
7 starts with the year 2012/'13 or the year 2013/'14,
8 depending on which set of tables you're looking at.

9 So what I would call the first set of
10 tables will say, "NFAT 2012 reference, no new
11 resources." The second set will be "May 20" -- sorry,
12 "NFAT 2012 reference preferred development plan," and
13 the third set of tables is the, "NFAT 2013 update
14 preferred development plan."

15 And we'll refer to those as -- as I go
16 through the presentation but I have just a couple of
17 introductory slides before we get into -- into the
18 details.

19

20 (MOVED TO SLIDE 2)

21

22 MS. JOANNE FLYNN: So I went through
23 this morning the generation planning criteria, and I've
24 brought it back up here because it is the generation
25 planning criteria on which our planning is based. So

1 just as a reminder, it's -- it's that 12 percent
2 reserve on the capacity side, and it's planning the
3 system around the lowest coincident water con -- supply
4 conditions being repeated.

5

6 (MOVED TO SLIDE 3)

7

8 So when we look at these supply/demand
9 tables -- oh, sorry. And I was also just going to
10 remind you about the definition of 'capacity' and
11 'energy'. So capacity being that rate of output, and -
12 - and Dave's elevator example of how much you can --
13 how many people you can stuff into an elevator. And
14 then the energy produced, be -- in gigawatt hours is
15 what you're going to see. So if you're looking at the
16 top of these tables, you'll see that it says it's in
17 gigawatt hours. These three (3) tables are in gigawatt
18 hours.

19

20 (MOVED TO SLIDE 4)

21

22 MS. JOANNE FLYNN: Okay. So the
23 supply/demand tables are confirming that we have met
24 the generation planning criteria. So they provide
25 dates for the new resources when we look at no do --

1 the -- the purpose of the no-new-generation table is to
2 show when we become short of resources. And the one
3 (1) you're looking at is the energy, dependable energy
4 table. It also -- it also shows how much exportable
5 surplus we have in the system.

6 And it provides our system modelling
7 with -- with a ma -- very major input for doing -- for
8 doing the modelling and the evaluation work that we do.
9 So the capacity criterion is the application of the 12
10 percent reserve. And for both the capacity and energy,
11 what we're going to do is create development plans that
12 ensure we have no capacity dev -- deficit -- deficits
13 over the thirty-five (35) year planning horizon, nor do
14 we have any dependable energy deficits over that
15 thirty-five (35) year planning horizon.

16

17 (MOVED TO SLIDE 5)

18

19 MS. JOANNE FLYNN: So, once again, I
20 think I've showed you this before. Let me just get it
21 up here. So what you're going to see on the
22 supply/demand tables -- this is the same slide I used
23 earlier -- is you're going to see -- see the quantities
24 associated with the hydro resource, the thermal
25 resources, wind, and the pur -- any purchased energy

1 that we have in the development plans. So firstly we
2 would start out with the system as it exists with no
3 new generation being added to see when those deficits
4 will occur.

5

6 (MOVED TO SLIDE 6)

7

8 MS. JOANNE FLYNN: Okay. So on the --
9 on this next slide, which is labelled as "NFAT 2012
10 Reference" -- and I've just taken selected years out of
11 the table that you have in front of you to -- to show
12 you when we need new resources. Now, you have the
13 dependable energy tables in front of you. I've also
14 put the capacity one up on the -- up on the slide here.

15 But just to keep things sort of
16 manageable, we're only going to go through the
17 dependable energy tables. So you don't have a copy of
18 the capacity tables. But just to show you that it is
19 the dependable energy that is the trigger for new
20 generation, and -- or new resources, because -- now
21 this is according to 2012 planning assumptions. In the
22 year '22/'23 is when you see the red numbers starting
23 to show up. So that's when the deficits start
24 persistently showing up.

25 So what we're doing is we're saying --

1 and I've just taken sort of the su -- the totals for
2 supply and demand to show you this calculation. So
3 total power resources, total energy demand, and you
4 subtract those two (2), and you get your system surplus
5 or deficit. And then there are a couple of conditions
6 that, where we can't export everything that is surplus,
7 you take those off and you get your exportable surplus.
8 But the point of this chart is to show you when we need
9 new resources.

10 If you look at the capacity table, it is
11 structured similarly, so you've got total power
12 resources, total peak demand, subtract those two (2),
13 and you -- you see when the system starts being short
14 of capacity. And based on the 2012 assumptions, it's
15 in '25/'26.

16

17 (MOVED TO SLIDE 7)

18

19 MS. JOANNE FLYNN: I've also done this
20 for the 2013 information, so the -- the planning
21 assumptions around supply and demand for 2013. So the
22 same process of looking at total power resources,
23 looking at the total energy demand, and then
24 subtracting those two (2).

25 And with the change -- slight changes in

1 some of the supply side and a drop in the load forecast
2 for 2013, we see that we need new resources from a
3 dependable energy perspective in the year '23/'24.

4 And from the capacity side, again it's -
5 - it's also shifted a year with the 2013 assumptions so
6 that new capacity resources would be required in
7 '26/'27.

8 MR. BYRON WILLIAMS: Hi, it's Byron.
9 Looking to the NFAT 2013 update and on the energy side
10 for 2025/'26, I guess it's in a surplus because the --
11 you've amended your -- your net load by a fair bit and
12 then a modest change in your total power resources?

13 MS. JOANNE FLYNN: Yes.

14 MR. BYRON WILLIAMS: And does that beg
15 the question of -- of whether we can just bridge out to
16 2025/'26 rather than building for those earlier years?

17 MS. JOANNE FLYNN: It -- it would if it
18 were -- if the deficits were small. But the deficits
19 at 592 gigawatt hours is too substantial to try and
20 bridge through that. So that would result in us
21 building for the '23/'24 year.

22 Barb...?

23 MR. BRUCE DUGGAN: I'm just wondering
24 if -- if you could tell us what the -- the calculation
25 is for the price elas -- or the demand elasticity based

1 on price of the electricity, of domestic demand for
2 electricity? The -- to make a projection that you need
3 more is based on an assumption that demand will be
4 more.

5 MS. JOANNE FLYNN: Correct.

6 MR. BRUCE DUGGAN: But the demand is
7 affected by price. So --

8 MS. JOANNE FLYNN: The --

9 MR. BRUCE DUGGAN: -- I'm wondering if
10 you could tell us what your projections for price are
11 and what -- and, more importantly, what your
12 calculation for the elasticity of demand based on price
13 is.

14 MS. JOANNE FLYNN: So -- so you're
15 asking me load forecasting questions, which is the --
16 the -- which is the presentation after this.

17 MR. BRUCE DUGGAN: Sorry.

18 MR. BYRON WILLIAMS: Sorry, Joanne, and
19 --

20 MS. JOANNE FLYNN: Yeah.

21 MR. BYRON WILLIAMS: -- and then I'll
22 shut up. But the -- what would -- if -- if five
23 hundred (500) is too much, like what's that threshold
24 of being an acceptable or -- in terms of deferring
25 generation?

1 MS. JOANNE FLYNN: Well, if we were to
2 stick exactly to the planning criteria, 1 gigawatt hour
3 would be too much. But there isn't really that level
4 of accuracy in being able to forecast these quantities
5 but it would have to be a smallish amount. And I would
6 -- would say it would need to be less than 100 gigawatt
7 hours.

8

9 (BRIEF PAUSE)

10

11 MR. SVEN HOMBACH: Hi. It's Sven
12 Hombach. Just looking at the NFAT 2012 reference table
13 and then the update, starting in 2025/'26 there's a
14 change in the total net export assumption from about
15 188 gigawatt hours per year to three hundred and fifty
16 (350), and then carrying forward.

17 What's the basis of that change in
18 assumptions?

19 MS. JOANNE FLYNN: Which tables are you
20 looking at?

21 MR. SVEN HOMBACH: Starting at the NFAT
22 2012 reference table.

23 MS. JOANNE FLYNN: Which -- which 2012
24 reference table? On the slide?

25 MR. SVEN HOMBACH: Oh, it's on the

1 slide, yes.

2 MS. JOANNE FLYNN: Okay.

3 MR. SVEN HOMBACH: The -- line 9, the
4 total net exports, 2025/'26 --

5 MS. JOANNE FLYNN: M-hm.

6 MR. SVEN HOMBACH: -- less 188 gigawatt
7 hours, and the 2013 update more or less doubles that to
8 about three hundred and fifty (350). And that seems to
9 be carried forward to the next four (4) years.

10 MS. JOANNE FLYNN: Well, that -- that
11 would be a change -- change in the export sale
12 assumptions between 2012 and 2013.

13 MR. SVEN HOMBACH: And is that just
14 based on market sales, or is that based on contracts?

15 MS. JOANNE FLYNN: Those are long-term
16 sales only, long-term firm sales only. And we will --
17 as we go through the -- the categories of the tables,
18 we'll -- we'll -- you'll see that a little more
19 clearly.

20

21 (MOVED TO SLIDE 8)

22

23 MS. JOANNE FLYNN: Okay. Now -- oh,
24 one (1) more question. Oops.

25 MS. NICOLE FITKOWSKI: Dave Lamont

1 says:

2 MR. DAVID LAMONT (VIA CHAT): Could the
3 deficit be made up with a firm purchase contract?

4 MS. JOANNE FLYNN: Once again, where
5 the -- where the deficits are smaller, we do -- we do
6 assume that we can cover them with -- with purchases.
7 But in this case, two (2) years in a row and the size
8 of the second year would not be something that we would
9 be willing to enter into.

10 Okay, this -- this slide on generation
11 supply sources over a range of water conditions, the --
12 the tables that you're looking at are dependable energy
13 tables. So in every single year of the table, we are
14 in dependable conditions.

15 So what I'm showing you on this chart is
16 the range of water conditions, and they're ranked in
17 historical order from the lowest to the highest. So
18 basically, every year on the chart is representative of
19 the very leftmost position for water conditions, the
20 lowest on record.

21 But in even -- any given year, we can
22 have water conditions that will range -- well, we don't
23 know actually what they're going to be. But from a
24 planning perspective, they can be from the lowest on
25 record to the highest on record.

1 So in any give year, we can supply the
2 load from this mix of resources, which include wind,
3 thermal, and imports along with the hydro. And I've --
4 we've layered in the DSM at the very bottom. It's
5 actually, in terms of this chart, really small on the
6 bottom of the chart.

7 So -- and wind is a fairly constant
8 amount. We're assuming that -- that 85 percent of
9 average annual production is what we can rely on for
10 the wind resource, and it is always there.

11 So the hydro will range, as you see,
12 with -- with the blue -- blue line or the blue part of
13 the -- part of the graph. When we're in that lowest 10
14 percent of water flow conditions, we need to rely on
15 thermal resources to supply Manitoba load. And you see
16 the total commitments above that.

17 When we get to those types of conditions
18 -- we've shown thermal and imports on the graph. And
19 basically, at the time of the -- at which we're
20 operating, so in the operating time horizon the
21 decision will be made as to what is the most cost-
22 effective way of supplying the -- supplying the load,
23 either from our own thermal resources or from imports.

24 As David mentioned earlier, we have some
25 very expensive thermal resources on our system, so very

1 often it will be more economic to serve it through
2 imports. It also shows you that, over time, there is
3 still value in importing from the market even though we
4 have enough hydro to serve our load, and that would be
5 the opportunity to buy in the off peak and resell in
6 the on peak.

7 So this is the depiction of what could
8 happen over the whole range of water conditions. But
9 what the tables are representing is that meeting of our
10 planning criteria if we were in the lowest water
11 conditions on record.

12

13 (MOVED TO SLIDE 9)

14

15 MS. JOANNE FLYNN: Okay. So now, as
16 far as the tables are concerned -- and what I've got up
17 on the slide is -- is basically just the -- the title's
18 on the left-hand side of the dependable energy table.
19 And we prepare a set of supply/demand tables for each
20 development plan. So you actually have an example of
21 no new generation, so the existing system, and one (1)
22 of the development plans, which is the preferred
23 development plan. And then you have that plan
24 represented for the 2012 assumptions and the 2013
25 assumptions.

1 So in terms of what con -- what the
2 power resources consist of, we have it divided between
3 new power resources and base supply power resources.
4 So new power resources will be those that are required
5 as new resources depending on which development plan it
6 is. The base supply of resources are a set of
7 resources that are common to all of the development
8 plans.

9 So you will see that in the no new
10 generation, the base supply of resources is -- is the
11 supply that we're looking at. And if you look at your
12 handout, the table, you will see that for the no new
13 resources supply/demand table, it's blank all the way
14 across for new resources. This is just there so we can
15 identify when we need those resources.

16 So if you were to look instead at the
17 2012 reference for the preferred development plan, what
18 you see is, you see energy values coming in for -- in
19 2019/'20 for the Keeyask generating station. And you
20 see the dependable energy quantity coming in starting
21 in '25/'26 for the Conawapa generating station.

22 And you see that in that first year, not
23 all the units are in service. So there's a lower
24 amount of dependable energy in that first -- first year
25 when the units start coming in, until they're all in

1 place. And they're all in place by the second year --
2 well, the third year for -- for Keeyask, and the second
3 year by Cona -- for Conawapa.

4 Okay. So new -- new resources,
5 depending on the plan, will either be hydro, thermal --
6 and, actually, if you flip your page over to the -- to
7 the back of it, you start seeing in 2041/'42, under the
8 preferred development plan, new simple cycle gas
9 turbines coming in in that year. And that would be to
10 finish off the thirty-five (35) year planning horizon.

11 We look at what the least capital cost
12 resource is to put in place at that time, and put it in
13 there almost effectively as a placeholder because we're
14 not really planning out in detail to -- to that length
15 of time. So that gives you your total new thermal.

16 And then new imports, whether they're
17 contracted or proposed, so there's either a -- a
18 contract in place, or proposals through a term sheet or
19 other means. And those will be added, so you should
20 see with the preferred development plan that you see
21 some proposed and contracted imports coming in at that
22 time. And the imports are not done in isolation,
23 typically. They're going to be associated with an
24 export sale as well.

25 So for the purposes of us identifying

1 our sources of supply, as opposed to the demand placed
2 on our system, it's separated into what we can count on
3 for imports, and what our obligation is to export.

4 Okay. So also on this plan, you won't see new wind
5 coming in. But in the development plan for wind you
6 will see new wind coming in on the line that's in place
7 to -- to show new resources related to wind.

8 The base supply of power resources,
9 first of all, the existing hydro. And you will notice
10 that the existing hydro, if you look out over time,
11 very slowly is declining. And this is a result of what
12 -- what Dave was talking about this morning in terms of
13 the watershed, and what we can count on for new
14 resources, and that there are withdrawals in the system
15 before it gets to Manitoba and there's a recognition
16 that -- or an expectation that, over time, it will
17 slowly decline. So from a -- in terms of what we can
18 rely on to serve Manitoba load, we want to be sure we
19 have accounted for that.

20 The existing thermal plants. Brandon
21 coal unit 5. You'll see that it's there until --
22 should be '19/'20 -- 2019/'20. And after that the --
23 the row is blank. That is when we intend to stop
24 relying on the Brandon coal unit. And that is tied to
25 the federal regulation for coal, in terms of

1 determining probably the -- the most reasonable
2 retirement date for that -- for that unit.

3 And the Selkirk and Brandon gas units
4 will continue through to the end of the planning
5 horizon. There is the expectation -- oh, yeah,
6 question?

7 MS. NICOLE FITKOWSKI: Bill Harper
8 asked:

9 MR. BILL HARPER (VIA CHAT): How does
10 DSM fit in? Is it considered a resource, or factored
11 into the load forecast?

12 MS. JOANNE FLYNN: Okay. It -- it
13 would -- on the supply/demand table it's being shown as
14 a reduction of load. And -- I mean his -- historically
15 if you look back on our plans we have shown it as a
16 resource. In effect when it -- in terms of the
17 supply/demand table it has the same impact of reducing
18 the -- the surplus available.

19 So in the -- in the NFAT submission and
20 in the charts you're seeing today it's being reflected
21 as -- as a reduction to our requirement to meet overall
22 demand, and it'll be shown on that portion of the
23 table. And it will be coming up probably on the next
24 slide when I get into the demand side of things.

25 So in terms of the base supply of power

1 resources, again there is -- there is contracted
2 imports and proposed imports that are common to all the
3 plans and so they are shown here as -- as a base
4 supply. We also have market purchases which is that
5 part of the planning criteria which says that we can
6 purchase from an organized market and rely on those
7 purchases out in the future.

8 The hydro adjustment is also actually
9 rela -- related to a particular type of export sale,
10 and that's the diversity sales. And basically that is
11 because the diversity means that we have an obligation
12 in the summer months to -- Dave talked about NSP and --
13 for example, and they have an obligation to us in the
14 winter months.

15 And allowing us to purchase power in the
16 winter means that we don't have to run our own
17 generators as much, and because of our climate there
18 are icing restrictions in the winter. So it is more
19 efficient for us to use our -- our generators in the
20 summer than in the winter. And that amount can be
21 calculated, that -- that improved efficiency, by having
22 the amount of diversity contracts we do can be
23 calculated and it's represented on -- on the table as a
24 Hydro adjustment.

25 So existing wind. You will see an

1 amount of some 777 gigawatt hours on the table for the
2 existing wind contracts. This is -- this is from an
3 energy perspective. We count on them for dependable
4 energy.

5 And then two (2) other items that are
6 common to all plans. One (1) is -- I will call it a
7 placeholder for the Pointe du Bois rebuild out in
8 2030/'31. That does not mean there's any commitment to
9 do this but it is common to all plans so it does not
10 effect the -- the evaluation of -- of any particular
11 development plan.

12 The Bipole 3 line reduction is --
13 actually it should probably have the word 'loss' in
14 there. And what that is, is by putting in a third
15 Bipole the line losses can be reduced a noticeable
16 amount when the loading is spread across three (3)
17 Bipoles rather than two (2). So from the time it's in
18 service until -- with -- with Conawapa coming on the
19 savings becomes reduced as the line loading increases.

20 But because that isn't -- and there
21 isn't any other northern generation being added besides
22 Keeyask and Conawapa in these plans, you'll see it be
23 reduced with Conawapa coming on and hold at that level
24 for the rest of the planning horizon. And that's -- so
25 that takes us to the total of the power resources.

1 MR. ED WOJCZYNSKI: Just a comment.

2 You -- you mentioned the import, and the -- the energy
3 import. There was that question earlier about counting
4 on energy imports to get through a short-term deficit
5 and you talked about the hundred gigawatt hours.

6 It might be, I think, useful to point
7 out that we're already counting on, in the off peak,
8 fully loading up the off peak with energy imports in
9 that drought year. So in the scenario where we show a
10 deficit we already are very heavily loaded up with
11 dependable energy imports in -- in the off peak, fully
12 loading up the off-peak portion of the tie-line, so up
13 -- up to the 10 percent criteria for -- of our load.
14 So that -- that's -- it's not just that we -- that's
15 part of the -- the background to the judgment call is
16 to -- how much additional can we count on if it's just
17 one (1) or two (2) years of deficit?

18 MS. JOANNE FLYNN: Yeah.

19 MR. REGIS GOSSELIN: You mentioned the
20 -- the reason why we would be importing energy from the
21 US in -- in terms of the saving our generation
22 capability and -- and so on. I'm wondering what's
23 going on with respect to an increase in proposed
24 imports around about '14/'15 under the new -- no new --
25 no new resources, or any of the other scenarios as

1 well.

2 What's -- what's going on there that you
3 would need to be increasing imports?

4 MS. JOANNE FLYNN: The pro -- the
5 proposed imports under the no new resources? Are you
6 talking about under base supply power resources?

7 MR. REGIS GOSSELIN: I'm looking at the
8 proposed imports line for the preferred development
9 plan, but also the...

10 MS. JOANNE FLYNN: The ba -- the base
11 supply line? Yeah. So the base supply line includes
12 contracts that are common to all -- to all development
13 plans. So what is going on there is there is a -- a
14 renewal, if you like, of one (1) of the diversity
15 contracts that is coming in in those years. So that's
16 why it's -- it's carrying on and is -- is at that
17 level. But it -- it doesn't show up under new proposed
18 because it's common to all the development plans.

19

20 (MOVED TO SLIDE 10)

21

22 MS. JOANNE FLYNN: Okay. From the load
23 and export commitment side of things. And what I've
24 got on the slide is looking at the -- the 2012 -- one
25 (1) of the 2012 supply demand tables. So first of all,

1 Manitoba domestic load is based on, in this case, the
2 2012 base load forecast, which -- which means it's --
3 it's based on -- so that 50th percentile type of -- of
4 load.

5 There's also a very small amount -- if
6 you look at -- at the table itself you'll see it's in
7 the order of -- well, no more than 100 gigawatt hours,
8 but starting at 10, 25, 30 gigawatt hours for
9 construction power for new hydro. So it's noticeable
10 enough that we make sure we -- we show it separately.
11 And, of course, depending on the development plan, it
12 will be there or not be there.

13 And then from -- in that -- in that sub
14 -- sub-total will also be the amount for -- of the DSM
15 forecast. So that's how DSM is reflected in the supply
16 demand tables as a reduction of overall requirement to
17 serve Manitoba load. So we've called that Manitoba net
18 load.

19 From that -- or -- of the next category
20 is really the exports. So either the contracted
21 exports that exist, or proposed exports. And there are
22 some contracts that contain what's called an 'adverse
23 water clause'. And that is where we are in low water
24 conditions. And Dave was talking about this as part of
25 the contract terms, that we do not have to deliver the

1 energy.

2 So one (1) of the examples would be for
3 the MP contract where it's a seven (7) by (16) product
4 if we have the water. So that's seven (7) days a week,
5 sixteen (16) hours a day. If we say that we are in low
6 water, it will be reduced to -- to the five (5) days a
7 week, sixteen (16) hours a day. So that adverse water
8 energy is red -- is subtracted out because when we are
9 in those dependable conditions we don't have to -- we
10 don't have to provide that energy. So we're not --
11 we're counting on not providing that energy when it --
12 we're in the lowest of flow conditions. And that gives
13 us our next exports.

14 From there we get our system surplus and
15 deficit. And then the other item that's on the
16 supply/demand tables is the exportable surplus. And
17 the two (2) items that are deducted to get us to
18 exportable surplus is one (1) Brandon Unit 5 because
19 under the Manitoba legislation, under the Climate
20 Change and Emissions Reductions Act, there are
21 restrictions on operating Brandon Unit 5 and we cannot
22 operate it to enter into long-term firm export sales.
23 So we take that available energy off. We can use it to
24 serve Manitoba load, but not to enter into new
25 contracts.

1 The adverse water that is shown here as
2 a reduction is again under some of the terms and
3 conditions of the export contracts, sometimes we can
4 financially settle. So we can leave the energy in
5 Manitoba and deal with the fact that we were supposed
6 to deliver to them on a financial basis. Again, we've
7 said, If we're doing that, we're on low water
8 conditions and so that energy would not be available
9 for resale either.

10 And that's all I was going to go through
11 on the tables. Are there any questions?

12 MR. BYRON WILLIAMS: Hi. Just --
13 sorry, Patrick. Did I bump you? Just on those tables,
14 if I look at the -- comparing the NFAT 2012 reference
15 to the NFAT 2013 update and if I -- I know that the
16 load forecast person will be coming later, but am I
17 right, that if I take the selected years '20/'21,
18 '23/'24, and '25/'26, that DSM is -- is lower in all
19 three (3) of those years for the -- the 2013 update?

20 MS. JOANNE FLYNN: Let me just find
21 where you are. So 2021/'22, is that one (1) of your
22 years, Byron?

23 MR. BYRON WILLIAMS: I -- I just peeked
24 at -- at three (3) of the years, '20/'21, '23/'24, and
25 '25/'26. It looks like, at a quick glance, that DSM is

1 lower under the update in all three (3) years?

2 MS. JOANNE FLYNN: Yes, you would be
3 reading the tables correctly. But, yes, I would remind
4 you that all the numbers are still subject to
5 confirmation.

6 MR. PATRICK BOWMAN: It's Patrick
7 Bowman. It is just related to the same set of tables.
8 The 2013 update lists different numbers for the base
9 load forecast and for the base DSM forecast, but they
10 both are referenced as the 2012 forecast, the same as
11 the previous version. Is that meant to be a new round
12 of forecasts, in fact, not 2012 again?

13 MS. JOANNE FLYNN: Correct. That --
14 that should be 2013, yes. Any -- any other questions?
15 Okay, is there one (1) more? Okay.

16 MS. NICOLE FITKOWSKI: I have Erick
17 Matthiesen.

18 MR. ERICK MATTHIESEN (VIA CHAT): Do
19 you have or is there a future prese --
20 it says:] Future presentation that shows a levelized
21 cost, megawatts per hour, for any of the new thermal,
22 hydro, or imports that can be used as a target for
23 competing alternatives or of other pricing schemes?

24 MR. ED WOJCZYNSKI: That's -- that's in
25 the submission. But I don't think we were going to

1 have it as part of the workshop. Joanne presented some
2 numbers this morning on costs, but that was sort of
3 some MISO old numbers, so we didn't see that as being
4 part of the two (2) days.

5 Are there any other que -- are there any
6 -- this is the handheld mic. It's a new kind. Are
7 there any other questions before we take the break?
8 And then, after the break, Lois Morrison will be
9 presenting on the load forecast.

10 Okay, well, why don't -- it's 2:42. We
11 said we'd start at 3:00 with the load forecast. So why
12 don't we just stick to that, it's a nice round number,
13 and take a break. And I guess most of us will be
14 hanging around if you want to ask us something on the
15 break anyways. Okay, thanks.

16

17 --- Upon recessing at 2:42 p.m.

18 --- Upon resuming at 3:00 p.m.

19

20 MR. ED WOJCZYNSKI: So if we could
21 perhaps get started. I -- I've got most people in the
22 room. I'll take a look out in the hallway.

23

24 (BRIEF PAUSE)

25

1 MR. ED WOJCZYNSKI: Okay. So let's get
2 started. And we have the illustrious Lois, who will
3 present on the load forecast. I do note that this is
4 not intended to be a DSM for -- presentation. I could
5 see we'll be getting into DSM with -- with -- in some -
6 - with some interesting discussion down the road, but
7 today's presentation is focussing on the load forecast
8 itself. Although, of course, there's always a bit of
9 overlap. Lois...?

10

11 PRESENTATION RE: MANITOBA HYDRO'S LOAD FORECAST:

12 MS. LOIS MORRISON: Okay. Hello,
13 everybody. I guess they'll bring up the presentation
14 shortly. And I've been allotted an hour and I will do
15 my darnedest to get through this as quickly as possible
16 so that we have an opportunity to discuss any topics
17 that might be of interest to everyone.

18

19 (ON SLIDE 1)

20

21 MS. LOIS MORRISON: And to begin with,
22 the load forecast is a key input into our Power
23 Resource Plan inter -- our integrated financial
24 forecast. It's a -- our forecast is prepared annually
25 and we make adjustments annually to bring it -- bring

1 into consideration the most current market information
2 at that time to present the most likely case.

3

4 (MOVED TO SLIDE 2)

5

6 MS. LOIS MORRISON: When -- when I was
7 asked to present today, I was asked to present about
8 the...

9

10 (BRIEF PAUSE)

11

12 MS. LOIS MORRISON: This is going to be
13 a little awkward for me. I'm used to being able to
14 move around. And being tied to one (1) spot is a
15 little uncomfortable.

16 So -- so I was asked to come and talk to
17 you today about our 2012 forecast and the methodology
18 or how we produce our -- our forecasts. And I'm also
19 going to speak a little bit to variability and
20 accuracy, which is also a very key consideration in any
21 forecasting, and then provide a brief update on the
22 2013 forecast.

23 As I mentioned, we update our forecast
24 annually, and we have just recently completed the
25 update to the forecast to reflect the 2013 information.

1

2

(MOVED TO SLIDE 3)

3

4

MS. LOIS MORRISON: So when we
forecast, we forecast each sector individually. So we
-- when we're preparing our forecast we prepare our
forecast for our residential sector, our general
service mass market sector, and our general service top
consumers.

10

And with those forecast -- and each of
those forecasts are done in a dif -- with a different
methodology, a methodology that suits those markets
specifically. Each forecast also starts from actual
data. So for the 2012 forecast we would start the
forecast from the actual consumption that was realized
in the '11/'12 fiscal year.

17

18

(MOVED TO SLIDE 4)

19

20

MS. LOIS MORRISON: So I'm going to
talk to each sector individually. The first sector I'm
going to speak to is the residential sector. And as I
mentioned, we start with the 2011 actual data. And in
the -- we use the weather-adjusted actuals for the
'11/'12 fiscal year. The consumption in that year was

25

1 7,114 gigawatt hours. What we are forecasting the
2 growth to be in the -- under the 2012 forecast is we're
3 forecasting it to grow to 9,760 gigawatt hours in
4 2031/'32. This represents a growth of approximately
5 1.6 percent per year over the next twenty (20) years.

6 The primary drivers of growth in the
7 residential sector are population. And under the 2012
8 -- under our most recent forecasts is the market share
9 of electric heat. And I'll go into more discussion
10 about that later on in the presentation.

11

12 (MOVED TO SLIDE 5)

13

14 MS. LOIS MORRISON: So I'm just talking
15 -- going to talk briefly about the methodology for the
16 residential sector. In the residential sector, we --
17 the -- the market itself is relatively homogenous. And
18 as a result of that, we do our model based upon a end-
19 use forecast. And with that -- so we look at -- within
20 the residential sector, we look at the end uses and
21 forecasts up from those end uses.

22 The key data that we bring into that
23 analysis is our economic out -- from our economic
24 outlook, we bring in our customer forecasts. We bring
25 in our energy price forecasts for electricity and

1 natural gas. We also bring in customer -- information
2 from our customer information database, energy
3 consumption and such.

4 And we also bring in information from
5 recently completed residential energy use surveys. We
6 regularly survey the market to get an idea as to what
7 customers are using, what they're -- what the
8 saturation of different appliances are, how they use
9 those appliances, and such. All of that information is
10 used to produce the residential end-use forecast. That
11 survey and billing information are inputs into our
12 conditional demand analysis, which provides us with our
13 average usage per appliance.

14 So then we take our customer saturations
15 -- sorry, we take our custom -- our -- our forecast for
16 customer growth, and we allocate that out to -- to what
17 we believe -- what -- we allocate it out to growth
18 within Winnipeg, south gas-available area, and the nor
19 -- and the non-gas-available areas. And then we build
20 our forecasts up from there.

21 And we allocate based on the saturations
22 from our surveys what the end use -- what the average
23 usage is within each of those sectors forward. After
24 we've produced this forecast, we subtract the forecast
25 savings as a result of future codes and standards -- or

1 future savings as a result of current codes and
2 standards in place.

3 Standards such as -- or codes such as
4 the energy component of the Part 9 building code, which
5 requires elevated insulation levels and a number of
6 other measures, those are all incorporated into a
7 reduction that reduces this forecast to represent that
8 -- those improvements as a result of codes and
9 standards. The other thing that we do at this point
10 is, we add on the forecast for electric vehicles for
11 this sector.

12

13 (MOVED TO SLIDE 6)

14

15 MS. LOIS MORRISON: So I mentioned
16 briefly what's driving growth. So -- so really the --
17 the key components driving growth in the residential
18 sector are the population. And, as you can see, this -
19 - this graph is demon -- is -- is depicting the annual
20 population growth that we've seen historically --
21 that's the blue line -- and what the forecast growth
22 under the 2012 forecast was for future growth.

23 And we can see that in the years leading
24 up to the -- or the lead -- the years after
25 approximately 2005/2006, we're seeing a substantial

1 increase in the number of customers -- or the number of
2 people moving into Manitoba. And that forecast is
3 going forward at -- it represents a -- a growth of
4 about 1.2 percent per year in the future.

5

6 (MOVED TO SLIDE 7)

7

8 MS. LOIS MORRISON: The other item that
9 I spoke to that's driving growth in Manitoba is a
10 increased market saturation of electric space heat in
11 areas that have gas available. And these are the
12 results from our 2009 residential energy use survey,
13 where we identified that there was an increasing
14 penetration of electric heat for space-heating purposes
15 and for water-heating purposes in the marketplace.

16 And this was driving some of the
17 increase in our forecast. It was not driving the
18 substantial portion. As I mentioned, the population
19 drives the majority of the growth in our -- in our
20 forecast. Or the population forecast drives the
21 majority of our growth. This contributes to the
22 growth.

23 So you can see in the south gas
24 available area, houses built in 2005 to 2009, 63
25 percent of the homes built were installing electric

1 heat for space-heating purposes, whereas in previous
2 years that was closer to approximately half. So this
3 was what was -- what we were observing.

4 The other item that we're observing is
5 an increase in electric water heat. And this is a
6 result of changes in regulations for natural gas
7 furnaces. And we discussed this at length during the
8 electric GRA hearing related to the requirement for no
9 more chimneys. Sorry, there's not a requirement for a
10 chimney as a result of the high-efficiency furnaces
11 going in. As a result, the builder's choice, in most
12 cases, is to put in an electric water tank. We're also
13 seeing some of the market where the replacements are
14 going in where customers are being up-sold to electric
15 water heating.

16 Now, I'm going to jump ahead a little
17 bit. We've made adjustments in the 2013 forecast to
18 address some of these issues that were raised as a
19 result of these findings.

20

21 (MOVED TO SLIDE 8)

22

23 MS. LOIS MORRISON: So now I'm going to
24 talk a little bit about the general service mass
25 market. Now, the general service mass market is all of

1 our commercial and industrial customers except for the
2 top consumers, or the -- the seventeen (17) largest
3 consumers in Manitoba. So this would encapsulate all
4 of the other commercial and industrial customers.

5 And again, for this forecast we would
6 start with the 2011 actuals. So in 2011/'12 we had
7 actual consumption of 8,270 gigawatt hours. That then
8 is forecast to grow under the 2012 forecast to 11,497
9 gigawatt hours, which represents an average growth of
10 1.7 percent per year over the next twenty (20) years.

11 The factors that drive growth in the
12 commercial and industrial, or the general service mass
13 market are, population and GDP.

14

15 (MOVED TO SLIDE 9)

16

17 MS. LOIS MORRISON: So speaking to how
18 we do our forecast for the general service mass market,
19 as I mentioned, each sector is done with a different
20 approach, and that approach best reflects that market.

21 Now, in the general service mass market,
22 the -- the market itself is less homogeneous. There's
23 more sectors that use energy in different ways. And as
24 a result, what we do here is, instead, we do a forecast
25 of customer growth based on an econometric model. And

1 so what we do is we take information from -- again,
2 from the economic outlook, the number of residential
3 customers, and the Manitoba GDP, and for each
4 percentage change in the gross domestic product and the
5 -- and the number of customers, we have a change in the
6 number of commercial cus -- commercial industrial
7 customers, or general service mass market customers.
8 So that forecast of customers, or that increased number
9 of customers.

10 What we do then is we take that
11 forecast, and based on historic distribution among the
12 four (4) rate categories that Manitoba Hydro has for
13 general service, we allocate them out. Tho -- we
14 allocate that growth out among those four (4)
15 categories. And then we apply the five (5) year
16 weather adjusted average use for each of those four (4)
17 rate categories to create the forecast overall for the
18 general service mass market.

19 Those are all accumulated together. And
20 then we -- again, we remove the forecast for the impact
21 of future codes and sta -- standards, and we add on the
22 forecast for electric vehicles.

23 Byron...?

24 MR. BYRON WILLIAMS: Yes, it's Byron.

25 It's -- this question will be familiar to you from the

1 last GRA. But you've -- Hydro's, I -- I think, been
2 telling us that they're looking at rate increases exp -
3 - expected 3.95 percent for each of the next seventeen
4 (17) or eighteen (18) years.

5 And for this particular aspect of the
6 marketplace, how does the load forecast account for the
7 consumer reaction to price increases? Like, most
8 American models I've seen factor in some elasticity in
9 terms of demand, and I'm just trying to refresh my
10 memory in terms of for this marketplace what you did.

11 MS. LOIS MORRISON: Under the 2012
12 forecast we had a component where we looked at the
13 price differential between electricity and natural gas
14 on the residential sector. And that was more so to
15 determine whether people made a fuel choice for space
16 heating to be electric or gas. That was what -- that's
17 where we found a relationship in past analyses.

18 In the general service mass market
19 sector we regularly go back and look at, okay, what
20 could be influencing growth, what could be influencing
21 fuel choice, things like that. And what we have found
22 to-date in our analyses is that there isn't a strong
23 relationship between price and growth in the commercial
24 sector.

25 We've traditionally had markets where

1 our -- our prices have been -- managed to be -- the
2 price increases have been relatively stable, and
3 increasing in -- in stable increments. And so that may
4 be what's driving that lack of a relationship, but
5 generally we haven't seen that relationship arise in
6 any of the past analyses that we've done from looking
7 at the historical data.

8 MR. BRUCE DUGGAN: Can you tell me what
9 the average rate of increase has been say for the last
10 ten (10) or twenty (20) years? Like -- like if -- like
11 Byron says, if it's projected at three point nine (3.9)
12 --

13 MS. LOIS MORRISON: M-hm.

14 MR. BRUCE DUGGAN: -- what's it been
15 the last decade or so? Do you know?

16 MS. LOIS MORRISON: In terms of the
17 growth in the commercial sector?

18 MR. BRUCE DUGGAN: No, the rate
19 increase.

20 MS. LOIS MORRISON: The rate increase?

21 MR. BRUCE DUGGAN: Like if the rate
22 increase has been, I don't know, 1 percent and now it's
23 suddenly going to go to 4 percent...

24 MS. LOIS MORRISON: I don't know that
25 off the top of my head as to what our average rate

1 increase has been annually over the last ten (10),
2 twenty (20) years.

3 MR. BRUCE DUGGAN: I guess I'm -- I'm -
4 - I have to say I'm -- I'm kind of dubious about the
5 idea that there is no relationship, or no reliable
6 relationship between price increase and demand.

7 MS. LOIS MORRISON: I'm not saying that
8 there isn't one. What I'm saying is that to-date the
9 analysis that we've undertaking, looking at the
10 historical growth and there -- the -- the factors that
11 may be determining it, there is a greater relationship
12 -- statistically there's a greater relationship between
13 the population growth and the GDP, as opposed to the
14 price of electricity and natural gas.

15 MR. BRUCE DUGGAN: But the -- the
16 problem, it seems to me, that the PUB is going to face
17 without some kind of calculation like that, is they're
18 going to have to decide whether or not it's in the
19 province's best interest to spend \$20 billion on a
20 capital investment. And the alternative -- one of the
21 alternatives --

22 MS. LOIS MORRISON: M-hm.

23 MR. BRUCE DUGGAN: -- is to raise the
24 price. And I think we would agree at some rate of
25 raise that capital expenditure becomes unnecessary

1 because people cut back. We just don't know where that
2 is.

3 MS. PATTI RAMAGE: I think we are
4 getting into the area of argument and cross now --

5 MR. BRUCE DUGGAN: Sorry, I --

6 MS. PATTI RAMAGE: -- if you can just
7 keep the questions on the material --

8 MR. BRUCE DUGGAN: Yeah. I am trying
9 to understand how you calculate load without factoring
10 in the effective price. It seems to me --

11 MS. PATTI RAMAGE: But I think you got
12 the answer...

13

14 (BRIEF PAUSE)

15

16 MS. LOIS MORRISON: Regis would like
17 the mic.

18 Mr. Gosselin...?

19 MR. REGIS GOSSELIN: There's been a
20 policy change at the federal level with respect to
21 immigration, which occurred late last year. And I -- I
22 guess you've assumed -- for the purposes of your
23 projections you've assumed that there's been -- there
24 will be no impact related to that policy change?

25

1 (MOVED TO SLIDE 10)

2

3 MS. LOIS MORRISON: So what we see here
4 is what we had forecast -- what we had as the forecast
5 for population under our 2012 forecast. And that --
6 that forecast is a compilation of forecasts that we
7 purchased from vendors that provide these types -- that
8 sell forecasts. And this was, you're right, correct,
9 before the federal government made adjustments to their
10 -- their immigration policy. What we've done since, as
11 I mentioned, is we -- every year we update our
12 forecasts based on what is the more current and new
13 information, and therefore we've adjusted our '13
14 forecast to reflect the new updated forecasts that we
15 are being provided by the people that we purchase
16 forecasts from.

17 And so skipping ahead, yes, there is a
18 reduction in the forecast for population. As I
19 mentioned here, this represents about a 1.2 percent
20 average increase in population. Under the revised
21 figures, they're forecasting a 1.1 percent increase as
22 opposed to the one point two (1.2).

23 So there's still an increase projected
24 in the forecast for population in Manitoba, but it is
25 at a -- at a slightly slower rate.

1 (MOVED TO SLIDE 11)

2

3 MS. JOANNE FLYNN: As I mentioned, one
4 (1) of the driver's for growth in the general service
5 mass market where we found a relationship, or a
6 stronger relationship, when we look back at our
7 historical growth, is that as our population grows, and
8 our number of residential customers increase, the
9 number of commercial services and indust -- our -- our
10 commercial customers, or our general service mass
11 market, also increases. And that is -- it makes sense
12 when you think about the fact that the more people and
13 the more houses in Manitoba, the more services that
14 come to meet the demands of those people in those
15 houses: more schools, more public -- more healthcare.

16 So these types of services will move in
17 to meet the need of the growing population. And so
18 that is where we -- that's where that factors into that
19 part of the forecast.

20 The other thing that we mentioned, and
21 this is rather intuitive, is that if we are forecasting
22 growth in the economy in Manitoba, then likely there
23 will be growth in the number of commercial and
24 industrial customers.

25 So our forecasts have provided us with

1 an increase that we're anticipating seeing slightly
2 more than 2 percent growth in the near term, and then
3 averaging out to be about 1.9 percent growth in the
4 years following on average.

5

6 (MOVED TO SLIDE 12)

7

8 MS. JOANNE FLYNN: The other item of
9 interest -- and as I mentioned the primary driver's for
10 growth in the general service mass market sector are
11 population and GDP. However, what we're also seeing --
12 is that customers today are using more energy than
13 customers in the past.

14 So if you look at the -- the 1, 2, 3, 4
15 -- fourth column over from the left which says --
16 states "Average Use in Kilowatt Hours Per Customer,"
17 and you look at the 2011 which is the bottom row,
18 you'll see that the average customer in 2011 was using
19 1,000 -- 126,000 kilowatt hours a year, and then if you
20 compare to each year prior, those are five (5) year
21 increments, you can see that they were using
22 substantially less.

23 So what we are seeing is that of the
24 customers that are connecting in more recent years, and
25 the average use of the customer is increasing over

1 time.

2

3 (MOVED TO SLIDE 13)

4

5 MS. JOANNE FLYNN: Going to the general
6 service top consumers sector. Again as I mentioned
7 everybody is treated -- everybody is forecast in a
8 little bit different way. The -- what is consistent is
9 we do start with the '11/'12 actuals for the sector.
10 In 2011/'12 the top consumers consumed 5,531 gigawatt
11 hours. This is forecast to grow to 7,698 gigawatt
12 hours in 2031/'32. This represents a growth of 1.7
13 percent annually over the next twenty (20) years. Over
14 the last twenty (20) years this sector has grown by
15 1,800 gigawatt hours.

16

17 (MOVED TO SLIDE 14)

18

19 MS. JOANNE FLYNN: So how we approach
20 this sector, as I mentioned, is -- is different. This
21 sector repre -- we have seventeen (17) con -- consumers
22 representing about twenty (20) -- thirty-one (31)
23 customers. So each customer is forecast individually.

24 We work with our major account reps and
25 our key account reps who work quite closely with these

1 individual customers to identify what their short-term
2 confirmed and committed projects and plans are to get
3 an idea as to what they're going to be doing over the
4 next few years.

5 So we're looking at about a one (1) --
6 about a three (3) -- one (1) to three (3) to four year
7 period. What are they -- what have they confirmed
8 they're going to be doing? What are their -- what are
9 -- what's in their actual plans?

10 And this includes any shutdowns,
11 cutbacks, any expansions, that type of -- of planning.
12 So those forecasts are then included in our short-term
13 forecast for those top consumers. But when we go to
14 look at the long-term, how do we forecast for this
15 sector from the long-term?

16 What we do is we -- we take an average
17 expected growth for all top consumers forecast
18 together. And that's what's been referred to as 'the
19 potential large industrial load forecast'. We
20 discussed it at the electric general rate -- rate
21 hearings. And that is where...

22

23 (MOVED TO SLIDE 15)

24

25 MS. LOIS MORRISON: I went back. Oh,

1 no, sorry.

2 So -- and -- and how we come up with the
3 potential large industrial load forecast is we look at
4 the historic load growth that we've seen in this
5 sector. This sector is very much influenced by the
6 economy for their specific sectors.

7 So the -- the primary metals and mining
8 sector will be primarily influenced by the economy for
9 that industry, not necessarily Manitoba alone. So
10 there -- there's things that driver their growth that
11 are -- that we feel that it's better to look at the
12 overall industry as a whole as opposed to trying to
13 predict each sector.

14 So we look at the -- the overall growth
15 in the his -- over the past twenty (20) years and what
16 have we seen. And so what we look at -- and we -- we
17 include in our analysis any customer -- Company
18 expansions. We include any cutbacks and shutdowns, and
19 any new startups that were greater than a hundred
20 gigawatt hours.

21 So just to draw your attention, so we
22 look at the last -- the last period of 2003 to 2012.
23 During that period of time we saw four (4) expansions,
24 one (1) new customer, and the loss of one (1) customer,
25 which was quite extensively discussed and has been

1 quite prevalent in the media.

2 Now, the net growth over that period of
3 time was 200 gigawatt hours. So even with the loss of
4 that substantial load we still saw a net growth in the
5 overall industry of 200 gigawatt hours.

6 The other section that we look -- the
7 other period that we're looking at here is the period
8 of 1993 to 2002. And during that period of time, we
9 saw five (5) expansions, three (3) new customers, and
10 the loss of one (1) customer. That growth over that
11 period of time was 1,600 gigawatt hours. So over that
12 total period of time, as I mentioned, we saw 1,800
13 gigawatt hours of growth.

14 Now, this growth, if you were to go back
15 five (5) years or ten (10) years before any one (1)
16 point on this graph, that growth or -- or contraction
17 would not have been represented in the individual
18 forecasts of the companies. And they -- so this is the
19 ty -- this is why we're looking at it from this
20 perspective.

21

22 (MOVED TO SLIDE 16)

23

24 MS. LOIS MORRISON: So we forecast --
25 for the potential large industrial load we use a -- an

1 estimate of a hundred gigawatt hours a year because we
2 can't predict specifically what year that large growth
3 -- that large load may arrive or -- or that -- that
4 shutdown may occur or that market contraction.

5 So what we do is we estimate an average
6 of a hundred gigawatt hours a year. And we -- every
7 year we revisit to see is that still a reasonable
8 approximation to use for forecasting for the general --
9 for the potential large industrial loads.

10 And so what you can see here is the
11 analysis that we prepared when we looked at the nine -
12 - the 2012 forecast. We looked at, okay, well, over
13 the last twenty (20) years we've seen growth of about
14 92 gigawatt hours a year. Is the hundred gigawatt
15 hours a year still reasonable? Yes. So that's why we
16 -- we use a hundred gigawatt hours a year.

17 The hundred gigawatt hours a year
18 represents 1.3 percent annually in growth. And the 92
19 gigawatt hours a year represented about 2 percent
20 growth annually in the years leading up to 2011/'12,
21 thirt -- 2011/'12.

22

23 (MOVED TO SLIDE 17)

24

25 MS. LOIS MORRISON: So as I mentioned,

1 all of these sectors add up. We add on transmission
2 losses, distribution losses. We add on some other
3 smaller loads, such as area roadway lighting, a number
4 of those things, to come up with our overall gross firm
5 energy requirements. This represents the future
6 requirements for our integrated system.

7 And what we're seeing here is that we
8 had consumed 24,367 gigawatt hours of energy in
9 2011/'12. We're forecasting it to grow to thirty-three
10 thousand four hundred and twenty-five (33,425) by
11 2031/'32. And this represents a growth of 1.6 percent
12 per year over the next twenty (20) years.

13

14 (BRIEF PAUSE)

15

16 MR. BYRON WILLIAMS: Hi, Lois. I'm
17 just curious if you've looked at what other utilities
18 are doing in terms of their future large industrial
19 load post-20 -- 2007? You -- you know, I've certainly
20 heard of some American jurisdictions that are -- are
21 revising their forward-looking estimates for large
22 load, more -- more materially than -- than you might --
23 might be doing.

24 MS. LOIS MORRISON: It's -- it's
25 something that we do keep in mind very closely when

1 we're doing our general service -- or our top consumers
2 forecast. The interesting thing -- and most of you,
3 I'm sure have heard this, is that during the economic
4 downturn a lot of other areas saw significant drops in
5 their industrial, or large industrial -- for the most
6 part the general service top consumers are industrial
7 loads.

8 We saw large drops in -- in their energy
9 use, there's no question. The interesting things is
10 that -- and -- that Manitoba rode it out, for the most
11 part, to -- we didn't suffer it quite to the same
12 extent. And a lot of that is because of the diversity
13 of our industrial sector. When you go to other
14 jurisdictions that have, say a really -- a very large
15 pulp and paper load, or they have a large
16 manufacturing, like vehicle manufacturing loads, those
17 centres really suffered quite drastically.

18 But when you look at Manitoba's top
19 consumers we seem to have a smattering of a little bit
20 of everything. As a result of that we tend to not have
21 as drastic drops but we also don't have the drastic
22 highs either, the drastic growth that you might see in
23 places like Alberta with the oil fields and such.

24 So we -- we are -- we are watching that
25 and we are cognizant of it. However, we don't think --

1 we think that we're going to be pretty much very stable
2 and see stable growth going forward similar to what
3 we've seen in the past. So -- but you -- you are
4 correct. And we do watch very carefully.

5

6 (MOVED TO SLIDE 18)

7

8 MS. LOIS MORRISON: So we -- we focus
9 quite a bit on energy, but we do also look at peaks.
10 So a lot of the changes driving growth that we've
11 discussed to date affecting energy also affect our
12 forecast for peak. In 2011/'12 under -- we had a peak
13 of four thousand three hundred and eighty (4,380),
14 that's a weather-adjusted peak. And we are projecting
15 that that will grow to 6,032 megawatts in '31/'32,
16 representing a 1.6 percent growth over the next twenty
17 (20) years, 1 per -- 1.6 percent on average.

18

19 (MOVED TO SLIDE 19)

20

21 MS. LOIS MORRISON: So we've -- we've
22 talked to -- to a great extent about what the forecast
23 -- how -- how we build our forecast and what we do for
24 -- what we're anticipating to see in terms of growth
25 under the 2012 forecast. But we recognize that -- that

1 inherent to all forecasts is uncertainty. And the
2 forecast represents Manitoba Hydro's best estimate of
3 what Manitoba -- Manitoba's future energy requirements
4 are going to be.

5 However, we do, as I mentioned,
6 recognize there's uncertainty. We use forecasts to
7 project what our forecast is going to be. And so as
8 such, what we do is a probabilistic his -- based
9 analysis based on historical variation in our energy
10 use, in our -- in our -- ba -- and what we do is we use
11 that to determine what future variability we might see
12 as a result of long-term economic effects.

13 So we look at the path and see how much
14 did our load vary as a result of economic factors. And
15 we say, Okay, well how much is our -- how much could
16 our forecast vary as a result of that going forward.
17 And that then drives how we present what varia -- what
18 levels could be presented -- or could be anticipated in
19 our forecast.

20 And so I -- I will apologize. This is
21 one (1) -- one (1) of the -- the things that happen
22 when you're working in two (2) forecasts at one (1)
23 time. The -- what we're looking at here is the --
24 actually the 2013 forecast variability, but it -- it
25 still represents the same information to the great

1 extent.

2 Under the 2012 forecast, our analysis
3 showed that the load could vary by anywhere from plus
4 or minus 2,555 gigawatt hours. And what that
5 represents is that -- or what that means is that, based
6 upon our probability analysis, there's a 10 percent
7 probability that the load could be greater than 35,980
8 gigawatt hours. So the -- there's only a 10 percent
9 chance that it could be higher than that in 2031/'32.

10 And there's a 10 percent probability
11 that the load could be lower than 30,870 gigawatt
12 hours. So there's only a 10 percent chance of the load
13 being outside of that parameter. So 80 percent
14 probability that the load will be within those bands.

15

16 (MOVED TO SLIDE 20)

17

18 MS. LOIS MORRISON: The other thing
19 that we look at, again on the theme of uncertainty,
20 given that uncertainty is inherent in all forecasting,
21 we are -- we're satisfied with the methodology that
22 we've undertaken. But to -- to make ourselves
23 comfortable, what we have done, and what we continue to
24 do, is look at how accurate have we been in the past.

25 So what we do is we go back and we look

1 how accurate was our forecast from five (5) years ago?
2 So for every single forecast we do, we go back and we
3 look. How did we do? And our objective is to be
4 within 1 percent for each year. So our objective for
5 our forecast five (5) years ago was to be within 5
6 percent. And our objective for our forecast ten (10)
7 years ago was to be within 10 percent. And what you
8 can see here is that, for the most part, our forecasts
9 have been within the 5 percent range, the majority of
10 them.

11

12 (MOVED TO SLIDE 21)

13

14 MS. LOIS MORRISON: Looking at the 10
15 percent -- the ten (10) year accuracy, again the
16 majority of our plans, or sorry, the majority of our
17 forecasts have been within the 10 percent range.

18

19 (MOVED BACK TO SLIDE 20)

20

21 MS. LOIS MORRISON: What you will al --
22 what you may notice, and it's much more prevalent on
23 the five (5) year accuracy chart because we -- we've
24 had this -- we've had staff look at this and say, Well
25 that looks strange. It looks like we're seeing this --

1 these -- these cycles of over-forecasting and under-
2 forecasting.

3 Well, it's not so much cycles of over-
4 forecasting and under-forecasting. What we do when
5 we're forecasting is we're forecasting average expected
6 economic growth or ac -- or -- or economic forecasts.
7 We're not forecasting a period of extended growth or
8 over -- or -- or extremely high growth or -- or an
9 economic recession. We're not -- we're -- we're -- our
10 forecasts are based upon a reasonably expected economic
11 growth.

12 So what you're seeing here is the result
13 of the five (5) year forecast being based on average
14 growth but these are unexpected economic events. So
15 when you look at 2012, you see the bar goes outside of
16 the 5 percent. Well, that's because five (5) years
17 before, no one predicted that in two (2) thou -- at the
18 end of 2008, we'd be looking at what's been
19 characterized as "the worst financial meltdown since
20 the Great Depression." And I'm taking that as a quote
21 from a report written for the US Government Financial
22 Crisis Inquiry Commission in 2011.

23 So these types of events we don't
24 forecast for. But that would be covered off within the
25 variability that I just talked to, is that we're trying

1 to -- to put ba -- bands around what economic impacts
2 there might be going forward into the future.

3

4 (MOVED TO SLIDE 21)

5

6 MS. LOIS MORRISON: So -- but we're
7 quite comfortable with our accuracy, and feel that the
8 -- that our forecast methodology is -- is working quite
9 well.

10

11 (MOVED TO SLIDE 22)

12

13 MS. LOIS MORRISON: So we talked a
14 little bit about -- and I'm hoping I'm not going too
15 far over time. We talked a little bit about the 2013
16 forecast, and how we've updated it for -- for the more
17 current market information. And so, just to touch on
18 the key points, the -- under the 2013 forecast, we are
19 projecting load to grow to -- to three (3) -- 32,667
20 gigawatt hours in 2032/'33. We do twenty (20) year
21 forecasts.

22

23 Now, of course everybody is going to be
24 interested in the '31/'32 year so that we can compare
25 it to the 2012 forecast. And so what I will say though
is that comparing it to the 2012 forecast, we are now

1 forecasting 32,600 -- sorry, 32,265 gigawatt hours by
2 '31/'32, which is down from the thirty-three thousand
3 four hundred and twenty-five (33,425) projected.

4 So in -- under the 2012 forecast we had
5 projected 1.6 percent growth annually over the next
6 twenty (20) years. Under this forecast, we're
7 projecting 1.5 percent.

8

9 (MOVED TO SLIDE 23)

10

11 MS. LOIS MORRISON: The same thing has
12 been observed in our projection for peak impact. We
13 are now forecasting the peak to grow to 5,860 -- sorry,
14 5,886 megawatts in 2031 which is down from the 6,032
15 megawatts under the 2012 plan.

16

17 (MOVED TO SLIDE 24)

18

19 MS. LOIS MORRISON: Now, what's --
20 what's leading to these changes, as we discussed
21 earlier, is that the population forecast has been
22 decreased. The increase in the population has been
23 decreased so the rate of increase.

24 So under the 2012 forecast what we were
25 seeing was a forecast of 1.2 percent on average going

1 forward. And under the 2013 it's been updated to be
2 1.1 percent on average.

3

4 (MOVED TO SLIDE 25)

5

6 MS. LOIS MORRISON: The other thing
7 that we have introduced under the 2013 forecast is we
8 have adjusted the forecast to reflect what we are
9 anticipating to see as a reduction as a result of a num
10 -- a number of heating fuel choice initiatives that we
11 are putting in place.

12 This is all arising out of the results
13 of the fuel-switching report, and we've talked about
14 this at the hearings and -- but we are -- as mentioned,
15 we are doing an education campaign for customers. We
16 are looking at changes or we've -- we are drafting
17 changes to our policies to encourage customers and home
18 builders to make the appropriate fuel choice that's
19 most economic for customers.

20 And so what we're seeing here is -- or
21 what I'm demonstrating here is that right now in
22 2012/'13 the market saturation in the Manitoba South
23 gas area for electric space heating is 47.8 percent
24 being electrically heated. Prior to incorporating these
25 adjustments we were anticipating that to grow to 54

1 percent. After these adjustments we're anticipating to
2 hold it if not reduce it to 46 percent.

3 So that's one of the -- the factors
4 that's contributing to the decrease in the 2013
5 forecast compared to the 2012 forecast.

6

7 (MOVED TO SLIDE 26)

8

9 MS. LOIS MORRISON: The same being said
10 also for electric water heating. We're also looking at
11 changes to help reduce the increased saturation of
12 electric water heating.

13

14 (MOVED TO SLIDE 27)

15

16 MS. LOIS MORRISON: And those are
17 contributing to a reduction in the 2013 forecast. And
18 what we can see here is if you look at the third line,
19 the energy forecast in 2031/'32, as I mentioned, under
20 the 2012 forecast we had projected thirty (30) --
21 reaching 33,425 gigawatt hours of load or energy
22 requirement.

23

24 That has been reduced by 1,159 gigawatt
25 hours under the 2013 forecast. What we're seeing is a
reduction in the ten (10) year annual growth rate from

1 450 gigawatt hours a year to 420 gigawatt hours a year,
2 and also a reduction in the percentage growth rate
3 correspondingly.

4

5 (MOVED TO SLIDE 28)

6

7 MS. LOIS MORRISON: For a comparison of
8 what that looks like graphically, since we've looked at
9 this a number of different ways, you can see that the -
10 - the red line is -- the -- the heavy red line in the
11 centre represents the 2012 forecast. The heavy yellow
12 line in the centre represents the 2013 forecast. And
13 the bands around represent that variability, or the --
14 the range of variability that we had talked about that
15 could result as a -- due to economic effects.

16 And, so what you can see here is that
17 the 2012 and '13 forecasts both fall within their
18 ranges.

19

20 (MOVED TO SLIDE 29)

21

22 MS. LOIS MORRISON: And finally -- I
23 think I'm finally, hopefully. Boy it's -- it could
24 only have been worse if you guys had booked this for a
25 Friday afternoon, right. I'd -- I'd have no one here.

1 The forecasts, as I mentioned, just to
2 sum up -- these are the points that I'd like to leave
3 us all with today. Our forecast is updated annually to
4 reflect the most current available data at that time.
5 We forecast -- our forecast models and methods are
6 adjusted whenever appropriate to make improvements and
7 to help us better understand how customers use energy.

8 And finally, our fore -- and finally,
9 what provides us with comfort is that our forecasting
10 accuracy over the long-term demonstrates that our
11 methodologies are reasonable and reliable.

12

13 (BRIEF PAUSE)

14

15 MR. REGIS GOSSELIN: In the Centra Gas
16 application that's currently being considered by the
17 gas panel at -- at PUB there was evidence submitted by
18 Centra Gas that they had changed their weather
19 adjustment formula to reflect a twenty-five (25) year
20 average as opposed to a ten (10) year average.

21 And I'm just wondering, the weather
22 adjustment formula that's being used by Manitoba Hydro
23 for the purposes of this submission, is there -- has
24 there been a change in the formula?

25 MS. LOIS MORRISON: No. We are

1 consistent between both the gas side and the electric
2 side. We use twenty-five (25) year weather adjusted
3 for both forecasts and have done so for a number of
4 years.

5 MR. PATRICK BOWMAN: Hi. Patrick
6 Bowman. To what extent, if at all, do you take into
7 account potential extensions of gas system or a broader
8 service area for the gas utility in -- in southern
9 Manitoba? Is there -- is it all -- at all built into
10 the -- you define the three (3) areas. But I didn't
11 know whether there was any change in the boundaries
12 between the areas assumed.

13 MS. LOIS MORRISON: With -- the south
14 gas area is the area you're referring to. And with
15 that we are -- we have allocated out based on
16 historical -- what we did was we looked at the
17 historical allocation of how -- how many gas houses are
18 put in or gas subdivisions are built and such.

19 And we then -- our forecasting -- what
20 we did with this under the 2013 is we essentially said
21 we -- we expected more of them to come into play as a
22 result of -- of our efforts.

23 But on the gas side of the business
24 there is a different feasibility model and there's a
25 different costing to bring gas in. And so we didn't

1 specifically say, Well -- we didn't go out and map, you
2 know, this town is this close to gas and it would cost
3 this much to bring service out to that point.

4 For the most part, any major gas
5 expansions at this point in time are very costly. And
6 when we've looked at it even in probably about --
7 thinking about -- it has to be almost ten (10) years
8 ago when we looked at it in the southwest corner of the
9 province, there -- we looked at a major gas expansion.
10 And the only way it would have been viable is if we
11 could have brought on board federal dollars to support
12 it. And so the original plan for that expansion was
13 made quite a bit smaller and focussed only on areas
14 where there was substantial load to support it.

15 So for the most part, I don't think
16 you're going to see major natural gas expansions beyond
17 where we are now. There's -- there has to be
18 population density to support it or a major industrial
19 load.

20 MS. NICOLE FITKOWSKI: Bill Harper has
21 a question.

22 MR. BILL HARPER (VIA CHAT): Is the
23 variability shown for the load forecast reflective of
24 just potential variation and economic GDP outlook?
25 Would it be greater if one also looked at possible

1 variations in population growth?

2 MS. LOIS MORRISON: The -- the
3 variability is reflective of what we would deem to be
4 all economic factors. Like it -- it would include
5 population. It would include -- or population growth.
6 It would include changes in GDP. It -- what it
7 reflects is the ec -- is the economic effects outside
8 of weather, so what could -- what variability we could
9 see outside of weather.

10

11 (BRIEF PAUSE)

12

13 MS. NICOLE FITKOWSKI: Dave Lamont
14 says...

15 MR. DAVID LAMONT (VIA CHAT): Aside
16 from codes and standards, what assumptions were made
17 about energy efficiency programs?

18 MS. LOIS MORRISON: The energy
19 efficiency programs specifically are -- okay. The
20 future forward anticipated savings from the Power Smart
21 programs are represented as a separate plan. And as
22 Ms. Flynn mentioned, they are removed from the forecast
23 and -- as a separate line item.

24 What we deem is that any savings
25 achieved to date under our Power Smart plans are

1 reflected in the fact that we are using the starting
2 point as actual data for -- for the 2011 or the 2012
3 forward forecast. So any savings that have been
4 achieved under programs to date have already been
5 realized and are reflected in that actual value.

6 When we look at what's going forward, so
7 -- so the person who goes to insulate their home
8 tomorrow, those savings are reflected in the DSM
9 values. And those would then be taken off of the load
10 forecast under the analysis Ms. Flynn referred to.

11

12 (BRIEF PAUSE)

13

14 MR. REGIS GOSSELIN: In the -- in the
15 US data that I've seen published by the federal
16 government of the United States, they -- they were
17 listing the projections of energy consumption over time
18 for various regions of the United States. And -- and
19 the -- what they're projecting is considerably lower
20 than -- than what Manitoba Hydro is forecasting for
21 this particular preferred development plan.

22 So I'm thinking, for example, as I
23 recall, MISO is -- the MISO region is projected to grow
24 at 0.8 percent over roughly the same time frame that
25 Manitoba Hydro is forecasting double the growth. And

1 the MISO growth projection in itself is -- is in -- in
2 many cases higher than other regions of the United
3 States.

4 And I'm -- I'm -- I guess one (1) of the
5 questions that intrigues me is why would there be such
6 a signi -- significant difference between what you're
7 projecting at Manitoba Hydro relative to other nearby
8 regions, has an impact as well with the projected
9 demand by US counterparties. So in other words, it has
10 -- it seems at odds with what -- what is going on in
11 the United States, but it also suggests that there will
12 be less demand from MISO than would otherwise be the
13 case if -- if they had a higher projection.

14 Could you comment on that generally?

15 MS. LOIS MORRISON: I -- I can't
16 comment on the impact of a lower demand in MISO
17 territory but, yes, there are other jurisdictions that
18 are projecting lower growth. We are -- we recognize
19 that. But what we've been realizing in the grow -- is
20 that we have seen that increase of growth in Manitoba
21 and we -- a lot of our growth, as I indicated, is -- is
22 tied to the population growth and we are expecting to
23 see growth at a higher rate than other areas of Canada
24 when you -- when you look at the overall growth in
25 other jurisdictions in Canada where they're projecting

1 growth of around 1 percent per year annual growth in
2 population. And ours is at a higher rate. We're
3 projecting a higher rate. So based on the forecast
4 that we've -- we've purchased from different providers.

5 MR. ED WOJCZYNSKI: Maybe a -- a
6 comment on -- in the MISO -- and Dave or Joanne can
7 comment as well, but a -- a big factor in the MISO
8 area, aside from any load growth that's there is the
9 fact they're going to be shutting down so much coal
10 generation and they need to replace it. And even if
11 they had zero load growth there would still be a -- a
12 demand for resources. There's even nuclear plants
13 being shut down as well as coal, for example.

14 So it's -- the load growth, I'm not sure
15 that we've prioritized what the drivers are but I
16 certainly wouldn't want to -- I don't think Manitoba
17 Hydro is saying the MISO load growth is the big driver
18 on the export side.

19 MS. NICOLE FITKOWSKI: Dave Lamont has
20 a question.

21 MR. DAVID LAMONT (VIA CHAT): So is the
22 forecast you presented inclusive of this DSM or is it
23 just adjusted out later?

24 MS. LOIS MORRISON: This forecast is
25 inclusive of all codes and standards. It is adjusted

1 later to represent what we would consider being market-
2 based DSM efforts.

3

4 (BRIEF PAUSE)

5

6 MR. ED WOJCZYNSKI: Lois, I was just
7 talking to Louis here, and the other thing you -- I
8 don't think you mentioned about Manitoba different than
9 other jurisdictions from the load growth was the fuel
10 switching issue, right?

11 MS. LOIS MORRISON: Yes, but we're
12 putting initiatives in place to help mitigate that.

13 MR. ED WOJCZYNSKI: When you mitigate,
14 is that going to eliminate it or just reduce it?

15 MS. LOIS MORRISON: No, it -- it --
16 even -- even though we call it the 'south gas available
17 area', it's what I referred to earlier as, just because
18 it's called 'south gas available area', it doesn't mean
19 that every -- everywhere within that area can
20 economically access gas. So there will still be growth
21 of electrically heated homes in those areas.

22 MR. ROGER CATHCART: I have a very
23 quick question. Roger Cathcart. What report are you
24 referring to that shows the growth on immigration in
25 Manitoba being higher than other parts of the country?

1 And how does that tie out with the load growth found in
2 those jurisdictions? And have you reconciled the
3 relationship between load growth and immigration in,
4 let's say, Ontario, Quebec, British Columbia, versus
5 Manitoba?

6 MS. LOIS MORRISON: I will have to get
7 that for you. What I'm referring to is, based on
8 memory, a discussion I had with our economic analysis
9 group, who provided me with the information related to
10 our forecast and population. So that's outside of my
11 area of expertise. I apologize.

12 MR. ED WOJCZYNSKI: Maybe a small
13 tidbit, also is that, as I understand it -- we don't
14 have the economic analysis people here. But as I
15 recall, we are actually using immigration forecasts
16 that were lower than what the provincial -- the
17 province was officially forecasting. Because we were
18 tak -- trying to be realistic.

19 Is that -- do I recall that correctly,
20 Lois?

21 MS. LOIS MORRISON: It is lower than
22 what the province had been forecasting. What we do is
23 we purchase -- if I recall, again I'm going on memory,
24 which is -- we purchased three (3). I -- I think it
25 was three (3) forecasts we purchased. And we take a

1 consensus of those three (3) to produce the forecast
2 that we use for our -- for our load forecast.

3

4 (BRIEF PAUSE)

5

6 MS. LOIS MORRISON: And I should note
7 that the -- although we do talk a lot about the
8 immigration policy being a significant contributor to
9 that growth -- again I'm going on memory. The -- there
10 -- one (1) of the forecasters who provided us with a
11 forecast doesn't look at that policy. What they were
12 looking at was the requirement to meet future
13 employment needs related to people retiring, and people
14 aging, and -- and such like that.

15 So although we do talk a lot about the
16 immigration policy, one (1) of the -- it -- it's not
17 the only factor that's con -- included or considered in
18 the forecasts that we have purchased, and are a part of
19 that consensus forecast that we use.

20 MR. ED WOJCZYNSKI: Maybe just two (2)
21 other tidbits on this load growth side that the
22 illustrious peanut gallery of Dave and Joanne pointed
23 out. One (1) is that the -- the -- your -- the
24 forecast you'd be talking about in the MISO area, for
25 example, would be net of DSM -- of new DSM, whereas,

1 what we're talking about here, on a going-forward ba --
2 basis, does not yet have the new DSM in it. And so
3 it's a gross. And our historical load growth is also
4 net of DSM.

5 So that changes the numbers slightly,
6 right?

7 MS. LOIS MORRISON: Yeah.

8 MR. ED WOJCZYNSKI: And the other thing
9 is, we were talking about low load -- low load growth
10 in the MISO area. But Saskatchewan next door, who as
11 we all know is doing quite well economically, they're
12 looking at 3.4 percent load growth over the next ten
13 (10) years, which is why Dave is talking to them, or
14 they're talking to Dave. So it -- and we're not
15 booming like Saskatchewan but we're actually doing
16 pretty well.

17 This is getting interesting. Some more
18 questions? Particularly, Lois really likes to be
19 grilled, so -- but seriously, are there some more
20 questions, either on what Lois has just talked about or
21 what any of the -- of the rest of us have talked about?

22 I see there's two (2) questions back
23 there. So you got things going, Lois.

24 DR. PETER MILLER: This is kind of on
25 the edge of what you talked about today, and it has to

1 do with the DSM potential study because many of the
2 methods are the same, are they not?

3 And what do you do differently with a
4 DSM potential study than you do every year here?

5 MS. LOIS MORRISON: A DSM potential
6 study is substantially different than what we do here.
7 Here we have set models. In the residential sector we
8 do do an end-use forecast but in the commercial sector,
9 industrial sector, we do not.

10 A DSM potential study looks at end uses
11 in particular for each sector. They look at what
12 opportunities might be available in the marketplace.
13 They look at when they're coming on. You look
14 specifically at growth rates. You look at -- more
15 specifically you look at equipment life and changeover,
16 whereas within the forecast here we aren't looking to
17 it in that great extent, specifically on the commercial
18 and industrial side. So it's a much greater
19 undertaking.

20 DR. PETER MILLER: And of course the
21 other question is: Will we see it?

22 MS. LOIS MORRISON: We are working very
23 diligently to ensure that it's filed with the NFAT.

24 MR. BRUCE DUGGAN: I'll see if I can
25 ask my question without it being a cross-examination.

1 That was not my intention.

2 Could -- could we ask in your
3 presentation to the PUB if you would include the rate
4 of increase that has happened? Like you -- you've gone
5 backwards and said, The -- the consumption rate has
6 grown by this much each year --

7 MS. LOIS MORRISON: M-hm.

8 MR. BRUCE DUGGAN: If you could
9 correlate that with how much the rates have increased.
10 So if the rates have -- and then project forward what
11 you see the rate increase is in the future. See if
12 it's -- if it's a significantly bigger rate increase --

13 MS. LOIS MORRISON: M-hm.

14 MR. BRUCE DUGGAN: -- you would think,
15 unless people have more money than they know what to do
16 with, there would be some correlation.

17 MS. LOIS MORRISON: I -- I wouldn't
18 disagree that there would be some correlation. I can't
19 quantify it for you because we don't have the data to
20 do so. We can look at it but we have to recognize that
21 certain sectors may not be as driven by that component.

22 It -- it depends on how much the energy
23 component represents of their cost of delivering
24 services. So all those things would come into effect.
25 But, yes, we can definitely --

1 MR. BRUCE DUGGAN: I'm just thinking
2 for the -- for the benefit of the PUB --

3 MS. LOIS MORRISON: Yeah.

4 MR. BRUCE DUGGAN: -- if they could
5 have that comparison.

6 MS. LOIS MORRISON: Yes. Yeah, I -- I
7 can put that in. But -- I can try to put that in.
8 I'll -- I'll see if we can do that.

9 MR. ED WOJCZYNSKI: Yeah. There's --
10 the -- the reality of us and our submission, if I can
11 just interrupt for a second here 'cause I'm responsible
12 for making sure we have a submission that's ready on
13 August 16th, I don't think anyone here wants us to file
14 it on August 31st -- we -- we have to meet that
15 schedule -- is we have a full plate to get done what we
16 already have on our plates.

17 MS. LOIS MORRISON: Yeah.

18 MR. ED WOJCZYNSKI: If there's
19 something to be added, I expect that doesn't slow down
20 getting what we already have on our plates done. Then
21 -- it sounds like Lois is saying she might -- she will
22 try to do that but I -- but right now I think it's more
23 important that Lois and her team finish reviewing and -
24 - and -- the study from the consultants and getting
25 that finished, and writing their chapter for the

1 submissions.

2 So if there's time left over then maybe
3 something additional but I don't think we can promise
4 that right now, Lois. You have to finish that
5 submission.

6 MS. LOIS MORRISON: Okay.

7 MR. ED WOJCZYNSKI: No, I'm serious.
8 That -- that's the struggle we're facing. That's not
9 to say, that kind of thing that's been talked about
10 can't be available for after the submission in whatever
11 means. We've got interrogatories. I gather there was
12 going to be a technical conference of some kind. I
13 don't -- I don't know where that stands. But I think
14 for the submission we can't really promise to do
15 additional work right now.

16 MS. LOIS MORRISON: Okay. Maybe what -
17 - can I -- Mr. Duggan, would it be all right then if I
18 were to promise to try to get that work done. If I
19 can't get it in the submission given that Ed's giving
20 me the evil eye and, yes, I -- I don't want to be
21 working any more weekends on this, that we try to get
22 that in after, that we would try to -- we would look at
23 it but it may not be in the actual submission then.

24 MR. ED WOJCZYNSKI: And I know that the
25 idea has been there wouldn't be supplementary --

1 supplementary filings. I -- let's not call this a
2 supplementary filing. This is giving you an advance
3 interrogatory response.

4 Would that be fair? Because otherwise,
5 we're -- we're not talking about supplemental filings
6 and supplemental filings because this process will
7 never end then.

8 MR. BRUCE DUGGAN: I don't have the
9 status to be -- to do an interrogatory. I just think
10 it would be helpful for them to know how much it's
11 grown in the past and how much you're projecting it to
12 grow in the future at some point, somehow.

13 MR. ED WOJCZYNSKI: Any other questions
14 that -- jeez, we have another nine (9) minutes,
15 according to my watch, but we don't need to take them.
16 I don't see anybody jumping up and down.

17 Is there anybody from the external?
18 Last chance. No?

19 Okay. The schedule for tomorrow morning
20 says nine o'clock. Oh, sorry. Sorry. Thank you.
21 Wednesday morning. I -- see how eager I am to... I'm
22 actually the first presenter. So as per the agenda,
23 we'll be talking about project description for the
24 projects and the preferred plan, then capital costs.

25 Mr. Bowen over there is going to be

1 presenting that. Then I'll come back with how we
2 selected the plans that we are evaluating and talking a
3 bit about them. And also, as per the request, I'm thi
4 -- I'm trying to remember who -- I think PUB made the
5 request, talking a little bit about how the power
6 resource plans have evolved from previous power
7 resource plans. So there'll be a little bit on that,
8 as well.

9 And then Joanne's going to talk a little
10 bit briefly about what information will be confidential
11 and not. So that is Wednesday. Any last questions or
12 thoughts before we wrap up? Going once, going twice,
13 three (3) times. Thank you. Have a good evening.

14

15 --- Upon adjourning at 4:07 p.m.

16

17

18 Certified Correct,

19

20

21 _____

22 Wendy Warnock, Ms.

23

24

25

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