MANITOBA PUBLIC UTILITIES BOARD

Re: MANITOBA HYDRO'S APPLICATION
FOR APPROVAL OF NEW ELECTRICITY RATES
FOR 2010/11 AND 2011/12

Before Board Panel:
Graham Lane - Board Chairman
Robert Mayer, Q.C. - Board Member

HELD AT:
Public Utilities Board
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Pages 5829 to 6048

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--- Upon commencing at 9:34 a.m.

THE CHAIRPERSON: Okay. Good morning, everyone. This is the morning we have Dr. Kubursi and Dr. Magee with us. Good morning, gentlemen. Mr. Wood, if you want to introduce the witnesses and welcome them this morning.

MR. GAVIN WOOD: Good morning, sir. I understand there's some preliminary matters this morning before we go ahead.

THE CHAIRPERSON: Thank you. Ms. Southall...?

MS. ANITA SOUTHALL: Actually, over to Ms. Ramage for Manitoba Hydro to respond to some undertakings, as I understand it.

MS. PATTI RAMAGE: Okay, I'll catch that volley. And Manitoba Hydro this morning has distributed a number of undertakings, and I thought we'll just very quickly run through them to get them on the record. The first, Manitoba Hydro Undertaking number 96. It's updating the chart at page 155 of Tab 66 in the Board counsel's book of documents, and that we have as Exhibit 126.

--- EXHIBIT MH-126: Response to Undertaking

number 96

MS. PATTI RAMAGE: Next, Undertaking number 97. Manitoba Hydro's updating the chart at one -- page 156, I assume that's of the Board counsel's book of documents, regarding budgeted costs and actuals that are expected to be incurred, and that's Manitoba Hydro 127.

--- EXHIBIT MH-127: Response to Undertaking number 97

MS. PATTI RAMAGE: Next, Manitoba Hydro 113, and that's an explanation of the Risk Matrix, and that's Manitoba Hydro 128.

--- EXHIBIT NO. MH-128: Explanation of the Risk Matrix

MS. PATTI RAMAGE: Next is Manitoba Hydro 114, and that's a breakdown on the -- of the most recent approved estimate of 3.28 billion with respect to Bipole 3, and that's Manitoba Hydro Exhibit 129.

--- EXHIBIT NO. MH-129: Breakdown of the most recent approved estimate of 3.28

billion with respect to Bipole 3 re Undertaking Number 114

MS. PATTI RAMAGE: Following that is Manitoba Hydro Undertaking number 120, which has been assigned Exhibit 130, and that deals with accounting adjustments built into the Corporate Strategic Plan regarding OM&A cost per customer target.

--- EXHIBIT NO. MH-130: Accounting adjustments built into the Corporate Strategic Plan regarding OM&A cost per customer target re Undertaking number 120

MS. PATTI RAMAGE: Next is Manitoba Hydro Undertaking number 125, which is a recalculation of the response --

MR. ROBERT MAYER: Ms. Ramage, could you just slow down a moment. I'm not...

(BRIEF PAUSE)

MR. ROBERT MAYER: Okay. We're back,

back online.

MS. PATTI RAMAGE: Okay. Okay. Sorry, Mr. Mayer. I was just trying to fly through this so we could --

MR. ROBERT MAYER: I can see that.

MS. PATTI RAMAGE: -- get to the business at hand, but I skipped Manitoba Hydro Undertaking number 124, which deals with announced closures and their impact on the forecast, and that's Exhibit 131.

--- EXHIBIT NO. MH-131: Announced closures and their impact on the forecast re Undertaking Number 124

(BRIEF PAUSE)

MS. PATTI RAMAGE: Next is Undertaking 125, which is Manitoba Hydro's recalculation of it's response to RCM/TREE Manitoba Hydro First Round 3, assuming export electricity displaces power generated by combined-cycle gas turbine generation in the US, and that has been assigned Exhibit 132.

--- EXHIBIT NO. MH-132: Response to RCM/TREE Manitoba Hydro First Round 3, assuming

export electricity displaces power generated by combined-cycle gas turbine generation in the US re Undertaking Number 125.

MS. PATTI RAMAGE: Manitoba Hydro Undertaking number 126 is RCM/TREE's Pre-Ask number 3, and that's been assigned Exhibit Manitoba Hydro 133.

--- EXHIBIT NO. MH-133: RCM/TREE's Pre-Ask number 3

MS. PATTI RAMAGE: Manitoba Hydro Undertaking 127 is RCM/TREE's Pre-Ask number 7 and that's been assigned Exhibit Manitoba Hydro 134.

--- EXHIBIT NO. MH-134: RCM/TREE's Pre-Ask number 7

MS. PATTI RAMAGE: Manitoba Hydro Undertaking 128 is RCM/TREE's Pre-Ask 8 and that's been assigned Exhibit 135, or Manitoba Hydro 135.

--- EXHIBIT NO. MH-135: RCM/TREE's Pre-Ask 8

MS. PATTI RAMAGE: Manitoba Hydro

Undertaking number 129 is Manitoba Hydro's provision of Mr. Chernick's commentary from the 2008 GRA to its external consultants conducting the review of the Cost of Service Study. And that -- dealing with that subject is Exhibit number Manitoba Hydro 136.

--- EXHIBIT NO. MH-136: Manitoba Hydro's provision of Mr. Chernick's commentary from the 2008 GRA to its external consultants conducting the review of the Cost of Service Study re Undertaking Number 129

MS. PATTI RAMAGE: Manitoba Hydro Undertaking number 130 is Manitoba Hydro was to advise of the criticism that Manitoba Hydro has of Mr. Chernick's testimony in regards to allocation of substation costs, and that's Exhibit number Manitoba Hydro 137.

--- EXHIBIT NO. MH-137: Manitoba Hydro was to advise of the criticism that Manitoba Hydro has of Mr. Chernick's testimony in regards to allocation of

substation costs

MS. PATTI RAMAGE: Manitoba Hydro Undertaking 131, Manitoba Hydro was to determine and respond to whether the calculation process for doing the forecast is confidential. And that answer is provided at Exhibit Manitoba Hydro 138.

--- EXHIBIT NO. MH-138: Manitoba Hydro was to determine and respond to whether the calculation process for doing the forecast is confidential re Undertaking Number 131

MS. PATTI RAMAGE: Manitoba Hydro 132 is dealing with concordance between RCM/TREE Exhibit 10 and page 22 at RCM/TREE Manitoba Hydro First Round 3(e)(3), Attachment 2, and that's Exhibit Manitoba Hydro 139.

--- EXHIBIT NO. MH-139: RCM/TREE Exhibit 10 and Page 22 at RCM/TREE Manitoba Hydro First Round 3(e)(3) Attachment 2 re Undertaking Number 132

MS. PATTI RAMAGE: Manitoba Hydro Undertaking 133, which is assigned Exhibit number 140 is dealing with whether analysis has been done to determine what effect upstream incentives have on take-up rates.

--- EXHIBIT NO. MH-140: Dealing with whether analysis has been done to determine what effect upstream incentives have on take-up rates re Undertaking Number 133

MS. PATTI RAMAGE: Manitoba Hydro Undertaking 135 deals, again, with upstream, the upstream incentive involving co-funding feasibility studies for implementation of energy efficient technologies and whether that's occurred. That's Manitoba Hydro Exhibit 141.

--- EXHIBIT NO. MH-141: The upstream incentive involving co-funding feasibility studies for implementation of energy efficient technologies and whether that's occurred re

Undertaking Number 135

MS. PATTI RAMAGE: Manitoba Hydro Exhibit 135, which is Exhibit 1 -- Manitoba Hydro 142 is Manitoba Hydro was to provide a spread -- a spreadsheet analysis perform -- performed comparing Xcel's energy programs to Manitoba Hydro's programs.

--- EXHIBIT NO. MH-142: Spreadsheet analysis performed comparing Xcel's energy programs to Manitoba Hydro's programs

MS. PATTI RAMAGE: Manitoba Hydro Undertaking 136, Manitoba Hydro was to provide the energy rating for the revised Manitoba building code related to the Power Smart New Pro -- New Home Program, and that's Manitoba Hydro Exhibit 143.

--- EXHIBIT NO. MH-143: Revised Manitoba building code related to the Power Smart New Home Program re Undertaking Number 136

MS. PATTI RAMAGE: And finally, Manitoba

Hydro Undertaking number 51 is Manitoba Hydro was to provide the review conducted with respect to Bipole 3. The response there is at Exhibit Manitoba Hydro 144. And that is the undertakings of Manitoba Hydro completed during the break.

--- EXHIBIT NO. MH-144: Review conducted with respect to Bipole 3 re Undertaking number 51

THE CHAIRPERSON: Thank you, Ms. Ramage.

Okay, Mr. Wood. If you wouldn't mind introducing the witnesses, and we'll swear them in, and then you can start your direct.

MR. GAVIN WOOD: Yes, sir. I -- I have the pleasure of introducing Dr. Atif Kubursi and Dr. Lonnie Magee to the hearing. If they could be sworn.

THE CHAIRPERSON: Mr. Singh...?

INDEPENDENT EXPERTS PANEL:

DR. ATIF KUBURSI, Sworn

DR. LONNIE MAGEE, Sworn

THE CHAIRPERSON: Thank you.

MR. GAVIN WOOD: Sir, by way of background, and with Mr. Singh's assistance, there is so far two (2) exhibits that have been filed by KM, as I'm going to refer to the fellows hereafter. Exhibit KM-1 is the Terms of Reference and KM-2 is the evidence of the doctors, which we'll generally refer to hereafter as the KM report.

--- EXHIBIT NO. KM-1: Terms of Reference
--- EXHIBIT NO. KM-2: Evidence of the Doctors, the KM Report

MR. GAVIN WOOD: There's two (2) additional documents that I'd ask be marked as exhibits at the outset. One is a set of response papers that had been circulated some weeks ago to everyone. You'll recall there was a discussion early on in the hearing concerning those response materials and, as I understand it, there's no opposition to them being filed, and I'd ask that they then be marked as KM-3.

THE CHAIRPERSON: Very good.

--- EXHIBIT NO. KM-3: Response Papers of KM

MR. GAVIN WOOD: And then, sir, last --

last week, there was a document that was released to everyone.

MR. ROBERT MAYER: Mr. Wood, slow down a little bit.

MR. GAVIN WOOD: Sure.

MR. ROBERT MAYER: Mr. Wood, we have several documents relating to Dr. Kubursi. I'm wondering which one you just tendered as an exhibit.

MR. GAVIN WOOD: The one I -- I just tendered, sir, is a re -- a re -- a series of response papers. There's four (4) subtabs to them.

MR. ROBERT MAYER: I -- I -- we may be looking at the same document. I have something entitled Direct Examination with Respect to the Kubursi-Magee Report Question Areas.

MR. GAVIN WOOD: Yeah, sorry.

MR. ROBERT MAYER: It's dated May.

MR. GAVIN WOOD: Sorry, sir. I think Mr. Singh is just bringing them up to you now --

MR. ROBERT MAYER: Oh.

MR. GAVIN WOOD: -- the one that we just referred to.

THE CHAIRPERSON: No surprise that we were surprised.

MR. GAVIN WOOD: Thank you. Mr. Singh,

could I have one (1) of those, please? Thanks so much.

THE CHAIRPERSON: So the one we're talking about is entitled Response Papers of KM.

MR. GAVIN WOOD: Dash 3, sir.

THE CHAIRPERSON: And there's four (4) tabs: A, B, C, D?

MR. GAVIN WOOD: That's correct.

THE CHAIRPERSON: And that will be number 3.

MR. GAVIN WOOD: Yes. And -- and then the -- the document that Mr. Mayer was just referring to is headed Direct Examination with Respect to the Kubursi-Magee Report - Question Areas, and it's May 2011. You'll see that the gentlemen will largely be working from that document today, and I'd ask that it be marked as KM-4.

THE CHAIRPERSON: Yes.

--- EXHIBIT NO. KM-4: Direct Examination with Respect to the Kubursi-Magee Report - Question Areas

MR. GAVIN WOOD: And if it's satisfactory, just to distinguish it as -- as we go along, I'm -- I'm generally just going to refer to it as the Direct Examination. And if I could bother everyone,

then, to turn to the first page of the -- the Direct Examination, KM-4, first with regards to the matter of qualifications at page 2.

EXAMINATION-IN-CHIEF BY MR. GAVIN WOOD: (Qualification)

MR. GAVIN WOOD: Dr. Magee, would you briefly set forth your education?

DR. LONNIE MAGEE: Yes. I received a B. Math, majoring in statistics, from the University of Waterloo in 1979, and received an MA and PhD in economics from the University of Western Ontario in 1984.

MR. GAVIN WOOD: And Dr. Kubursi as well please.

DR. ATIF KUBURSI: I received my BA in economics from the American University of Beirut, and then an MSC and a PhD from Purdue University.

MR. GAVIN WOOD: Gentlemen, you'll confirm for me that attached and marked as a schedule to one (1) of the answers to undertakings are your -- your CVs, and I just briefly would refer those. They are -- they are found at PUB-KM-1, and they're -- Dr. Kubursi's is first, it's -- it's set forth, as I say, at Schedule 1, and Dr. Magee's is set forth behind it, again, under -- under Schedule 1. And we'll come back to them in a moment.

Dr. Magee, going on to page 2 -- 3, sir, where are you currently employed?

DR. LONNIE MAGEE: The department of economics at McMaster University.

MR. GAVIN WOOD: And Dr. Kubursi...?

DR. ATIF KUBURSI: Yeah, I'm at the department of economics at McMaster University. I'm an emeritus professor, but I also teach in the arts and science program as an adjunct professor. I also serve as president of Econometric Research Limited.

MR. GAVIN WOOD: I -- I understand that's a private consulting firm?

DR. ATIF KUBURSI: It is a private consulting firm specializing in statistical econometric and impact analysis.

MR. GAVIN WOOD: Thank you. Dr. Magee, going on to the latter part of page 3, if you would set forth in some detail, sir, the highlights of your CV. I -- I don't think you need necessarily turn to it if -- if you want to work from -- from this, and if you need to, please feel free to turn to it as well.

DR. LONNIE MAGEE: I've been at McMaster in the -- as a faculty member in the economics department since 1983, so I think I'll -- I'll just touch on some of the aspects of that job that seem relevant here. The

three (3) main components of the job are re -- research, teaching, and administration.

Research -- my research focussed on econometrics, which is statistics applied to economics, basically. The kinds of data that we examine are both survey data and observational data. Observational data, meaning you just look at what would have happened anyways and -- or at least someone -- some ste -- someone recording the statistics looks at what's happening anyway and writes down numbers, and then you look at it later, as opposed to experimental data. So I'm mentioning that because that bears similarities to a lot of the data that we'll be talking about here.

And, also, a lot of my research has involved running simulations and analytic or mathematical examination of properties of different statistical procedures.

Teaching. I think my main teaching responsibility has been the graduate level econometrics course. Those students have a great placement record going on to work in federal government departments, Bank of Canada, provincial governments, research institutes, some private sector.

They all are required to write a research project, which is an applied statistical study on a topic

of their choosing. And so over the years I've probably supervised and assessed about between three (3) and four hundred (400) of those projects.

Administratively, I've been a grad chair for seven (7) of the last ten (10) years, so there's some budgetary work there involving allocating money according to the budgetary restrictions, with lots of people wanting more money than we're able to give them. So even though there's a lot of zeros taken away from those numbers compared to the numbers here, I think similar kinds of issues.

And I also want to mention two (2) years recently served on the Ontario Council of Graduate Studies Panel, which is a group that -- arm of the government that meets in Toronto once a month to evaluate graduate programs, decide whether to approve them or allow them to continue, and it involves reviewing documents that are prepared by the department themselves as well as external assessments. So it struck me as being a similar kind of situation to what we're in here.

MR. GAVIN WOOD: Thank you. More particularly, sir, appreciating the -- the work that's been done with the KM report that's been produced, what expertise in particular do you bring to having done that work and -- and what expertise do you bring for the

assistance of the -- the Board?

DR. LONNIE MAGEE: The -- a lot of the statistical work was carried out by me. And, also, as a kind of a general -- sharing the general background in -- in economics with Atif but with different -- you know, being educated at different places with different experiences, we found it very fruitful to discuss the issues -- the economic issues as we proceeded, so.

MR. GAVIN WOOD: I -- I -- when, I understand Dr. Kubursi approached you to take part in this project, what particularly were -- were you able to offer in terms of expertise to -- to work on it?

DR. LONNIE MAGEE: Statistics and econometrics.

MR. GAVIN WOOD: And then, as I've said, your -- your CV is attached to one (1) of the -- the first answers of -- to the -- the PUB IRs that were put to you. And you're certainly available to answer any questions, should anyone have, concerning that CV?

DR. LONNIE MAGEE: Yes.

MR. GAVIN WOOD: Turning to you now, Dr. Kubursi. I appreciate there's a short synopsis at page 4 of your direct examination. If you could answer somewhat similar questions now in -- in terms of what expertise you bring to bear that -- that caused you to produce the

KM report and -- and attend here today offering yourself as an expert.

DR. ATIF KUBURSI: Yes. I -- I started teaching 1964. The graduate schools in the United States, unlike Canada, graduate students handle all the teaching. Professors are reserved only for graduate courses. The first course I taught was law and economics, and this is because I had completed three (3) years of law simultaneously as I was studying economics. And, specifically, I was teaching microeconomics production systems.

And then, in 1967, I taught full-time at essentials of college, which was close to Purdue. And from there I came to McMaster in 1969. In 1969 all the way to '82 I was produce -- I was teaching primarily mathematical economics and production systems. And then gradually I moved into macroeconomics and development economics.

In 1974/'75 I was a senior academic visitor at Cambridge University, where I was also tutoring, and also had the chance to teach with one (1) noted professors' economic distribution.

In 1982 I served as senior development economist at the United Nations Industrial Development organization in Vienna, primarily dealing with industrial

systems, industrial management, and feasibility studies.

In 1989 to 1998 I was a member of the Institute for Social and Economic Policy at Harvard University, taught primarily and was the coordinator of the Harvard water project. And I served in 2002 as the chief of economic analysis division in the United Nations Economic and Social Commission of Western Asia. The United Nations has five (5) regional commissions: ECE for Europe, ECA for Africa, S -- ESCAP is called basically the Economic and Social Commission for Asia Pacific, and ECLAC, which is Latin American Caribbean. ESCWA is one (1) of these five (5) region commissions belongs directly to the UN Secretariat.

And then, in 2006, went as deputy executive secretary, and the war broke out and I fell into the position of the executive secretary, which is literally at the undersecretary-general level.

My specialization in economics has always been in areas of impact analysis, forecasting, analysis of production systems. I've done quite a bit of work in optimization of systems, and I've also conducted studies involving risk. I mean, being in the Middle East, risk is part of daily bread, and I've done quite a bit of country risk and had to basically work on risk issues extensively.

Water is a very important issue, too. The Middle East is known for probably abundance of oil, but should really be known for shortages of water, and particularly variability of water, given that the reliability of water, which is the amount of water that presumably exists nine (9) out of ten (10) years, is less than 5 percent, and this is even an exaggerated number.

I bring to the table many studies at even the industrial level. I've conducted this study on whether Sears should engage into the gas and home central program they have. They were considering whether they would sell gas home to home within that program, and there was issues whether they will be engaging, ex -- you know, exposing themselves to unnecessary risk having to basically write contracts for fixed-price deliveries when the price of gas was a very variable one. And I had to go through major assessment of VAR, the value at risk, that they would be exposing themselves to.

And -- and in other respects, I would have -- you know, qualify myself that I was a consultant for many departments, ministries in Canada, whether in Ontario, PEI, New Brunswick, Alberta, and particularly Ontario. I worked with every ministry they have from the Natural Resources to Ministry of Energy and TEIGA, which is Treasury, Economics and Intergovernmental Affairs, in

-- in areas of input/output, econometric forecasting, budget preparation, the typical assignments that economic consultants would be engaged in.

MR. GAVIN WOOD: Thank you. You surprised me. You were going to hide the fact that you have a law degree, but --

DR. ATIF KUBURSI: I don't have a law degree, and I discovered the -- the good life outside of law very easy.

MR. GAVIN WOOD: Sir, with regards to hydrological matters, could you tell the -- the Board of -- of any involvement you've had in -- in that field?

DR. ATIF KUBURSI: Well, I -- I would not say I was in hydrological. I was dealing with water systems, and the water systems that we were working with were primarily ones that would manage water allocations, particularly in regions where water is very scarce among different sectors.

One (1) of the most disturbing issues in the Middle East is 80 percent of the water is allocated to agriculture, and there is very little left for residential uses. And as water became more scarce, actually it dropped in less than thirty (30) years to less of a third of what used to be. In 1970, the average cubic metre per person was around twelve hundred fifty

(1,250) and went down to five hundred (500) cubic metre per person per year.

The other issue is the role of prices. Physical scarcity in the region is also joined by what we call economic scarcity. There is no place in the Middle East where they use what we call efficient prices. Most of the people typically use water at a metered position, irrespective use. You -- you get a 1-cubic-metre pipeline and you could run it all day long without being charged for the exact use. There was no continuous metering.

The issue was to what extent can one devise economic pricing that would reflect scarcity of this water and would allow people to make rational decisions on this allocation of extremely scarce resource in a more rational way.

MR. GAVIN WOOD: Thank you. Similar question to Dr. Magee. Your -- Your CV has -- has been provided through an answer to an IR, and certainly you confirm it and are available to be questioned on it if -- if -- sorry, and -- sorry.

Do you have this CV available and -- and, should it be necessary, you can be questioned concerning it?

DR. ATIF KUBURSI: Yeah, I'll be

prepared.

MR. GAVIN WOOD: Okay. Finally, Sir, in terms of Dr. Magee and -- and the expertise he brings to this project, why did you approach him to become involved?

DR. ATIF KUBURSI: Well, first and foremost, he's a nice guy. But besides that, he is absolutely well known. He's a renowned econometrician with extensive experience, and what exactly I thought would be necessary here.

Two aspects; one is time-series analysis. We're talking about variability of water flow and over a continuous string of time, from 1912 all the way to 2005, when I first came in; maybe 2007.

The other thing is that he is also known to be a probability expert, a person who can take numbers and fit to them probability density functions and would be able to tell you what would be the confidence levels at different estimates of probabilities.

MR. GAVIN WOOD: Thank you for that. With that then, Mr. Chair, point 1-D. I'm at page 4 of the direct examination. I'm requesting that Drs. Kubursi and Magee be certified as experts in the areas set forth at that page.

THE CHAIRPERSON: Thank you, sir. Ms.

Southall, do you have any questions on this?

MS. ANITA SOUTHALL: I don't have any questions on qualifications. Thank you.

THE CHAIRPERSON: Mr. Williams...?

CROSS-EXAMINATION BY MR. BYRON WILLIAMS: (Qualification)

MR. BYRON WILLIAMS: Perhaps just a question of clarification, and perhaps Mr. Wood can assist me. In terms of Dr. Magee, is -- is Mani -- or are you seeking to qualify him on -- under item number 1, i.e., economics desi -- statistics, including time-series analysis, or do you go -- so I'm just seeking clarification, Mr. Wood, in terms of . . .

MR. GAVIN WOOD: I -- I think that's fair, Mr. Chair. The -- the -- I think there's clearly -- we've -- and we tried to set it out in the qualification stage. And -- and certainly in the -- in the direct examination I think you'll see Dr. Magee is -- is -- will be answering questions with regards to 1(I) on that page.

MR. BYRON WILLIAMS: And just for -- to -- along that, in terms of Dr. Kubursi, is it roman numeral II, or are you seeking for -- for all?

MR. GAVIN WOOD: For -- for both in his case.

MR. BYRON WILLIAMS: With that clarification, and also thanking counsel in terms of his questions regarding hydrology, my clients have no objections to the qualifications as presented.

THE CHAIRPERSON: Thank you, sir. For MIPUG, Mr. Hacault.

CROSS-EXAMINATION BY MR. ANTOINE HACAULT: (Qualification)

MR. ANTOINE HACAULT: I have a couple of questions of clarification also of both doctors. Am I correct in understanding that neither of you have previously consulted for a hydro-electric utility specifically?

DR. ATIF KUBURSI: No, I -- I consulted with Ontario Hydro. And I was with the Energy Board and Minister of Energy, and in several respects to -- with hydro in third-world countries. And -- and Ontario Hydro I -- I basically worked on impact of energy conservation, and this was also part of the -- what's now known as Smart programs, what would be the economic return on some of the -- the DSM activities.

We also had to do some forecasting of prices of energy, particularly related to alternative energies because we were suggesting at the time that there are substitution possibilities, and that these

should be exploited.

But the substitution possibilities would not be worth considering unless we see that there are consumer responses to them. If the price change does not provoke any response on the part of the consumers, then probably one should not be changing these prices.

MR. ANTOINE HACAULT: And in what years did that consulting occur?

DR. ATIF KUBURSI: Over a number of years, but particularly in the '80s.

MR. ANTOINE HACAULT: About when did it end then, in the late '80s, or...?

DR. ATIF KUBURSI: I -- I would say more towards the late '80s.

MR. ANTOINE HACAULT: Is this the first time you're qualified as an expert in a hydro-electric rate utility hearing?

DR. ATIF KUBURSI: Yeah, this is the first time.

MR. ANTOINE HACAULT: And -- and that's true of both doctors, is that correct?

DR. LONNIE MAGEE: That'S correct in my case, too.

(BRIEF PAUSE)

MR. ANTOINE HACAULT: Based on your previous answer then, am I correct that it's the first time that you would be reporting on hydro-electric production systems, as opposed to the demand side, as you indicated?

DR. ATIF KUBURSI: Yes, that would be correct.

MR. ANTOINE HACAULT: And it -- would it also then be the first time that you would report on hydro-electric optimization models? Is that correct?

DR. ATIF KUBURSI: That would not be correct. Let me explain. I've -- I've looked at production system optimization models for a couple of utilities; one (1) is in the middle east, and another one (1) in Africa.

There we were basically and fundamentally trying to minimize generation costs and establish avoided cost prices.

MR. ANTOINE HACAULT: And so that involves the markets in those countries, not in Canada?

DR. ATIF KUBURSI: That would be correct.

MR. ANTOINE HACAULT: Thank you. Those are all the questions that I have.

THE CHAIRPERSON: Thank you, sir. I don't see Mr. Anderson here, so Mr. Gange for RCM/TREE.

MR. WILLIAM GANGE: Yeah, I have no questions. Thank you.

THE CHAIRPERSON: I don't see Ms. Pambrum. Ms. Ramage for Manitoba Hydro?

CROSS-EXAMINATION BY MS. PATTI RAMAGE: (Qualification)

MS. PATTI RAMAGE: Yes. Thank you. Manitoba Hydro recognizes Dr. Kubursi and Magee as experts in the areas of expertise outlined on page 4.

We do have a couple of questions we'd like, again for clarification, to provide some context on what their expertise allows them to do, and where there may be limitations. And I'll address these to you, Dr. Kubursi, but Dr. Magee, feel free to jump in if I've mixed up your two (2) areas.

Dr. Kub -- Kubursi, you've indicated you have expertise in optimization models. When developing an optimization model, you would need to understand or recognize key relationships, and turn them into constraints in the model, and you have expertise in -- in doing that, is that correct?

DR. ATIF KUBURSI: Yeah, that's correct. I mean, the issue here is not just purely the constraints, although it's important. There are also what we call commodity balances, constraints on demand

and supply by the different sectors because they are different users.

There's upper-bound and lower-bound constraints, but it's also the objective function. What do you ultimately optimize. We optimize consumer surplus, producer surplus, the sum of the two (2). Would you optimize on net revenue or would you optimize on minimization of costs? And each and every one (1) of these objective function specifications will have different implications.

MS. PATTI RAMAGE: You would be typically working with your client, or a subject matter expert, to gain an understanding of the business in order to model it. Would that be correct?

DR. ATIF KUBURSI: Absolutely. I mean, this is not the work of only economists. In -- in many respects, this is ultimately the joint product of engineers and economists and technicians actually. I mean, this is a situation where you have to bring different types of knowledge to bear.

MS. PATTI RAMAGE: So -- and -- and prior to commencing this work, and that's the work I mean with respect to the Public Utilities Board hearing we're at here today, you didn't have specific knowledge of the issues Manitoba Hydro faces in its power-system

operations. Instead, the knowledge you've gained with respect to those power-system operations is primarily based on interviews with Manitoba Hydro personnel. Would that be correct?

DR. ATIF KUBURSI: Well, in -- in many respects, yes. I -- I had the general familiarity before of the issues involved in any production system, whether it's oil, whether it's electricity, even widgets and -- and -- and things. You know, one (1) of the things that I've done when I was at Purdue is I've taken four (4) courses in industrial engineering, and they were all basically fundamentally concentrated on production systems and the way things -- but I would admit, too, that my familiarity with Manitoba Hydro was not extensive, and I learned quite a lot from my discussions with people at Manitoba Hydro.

MS. PATTI RAMAGE: Would it be fair to say that your expertise in optimization modelling and the ability to opine on Manitoba Hydro's models, we shouldn't be confusing that with expertise in Manitoba Hydro power system operations? Would that be correct?

DR. ATIF KUBURSI: Yes, it would be, but after a year and a half on the job here, which I thought will only take two (2) months, I guess -- no, no complaints. You don't pay very well, but there's no

complaints. But the point that is -- but the story is, I learned quite a bit, and, you know, I -- I honestly would -- would say that my familiarity with production systems of Hydro's proven to be very small after I finished working with you.

MS. PATTI RAMAGE: Thank you. And -- and the same question that would apply to water management: You have general understanding of different water management principles of the past, but you acquired a -- a great deal of knowledge over the last year with respect to Manitoba Hydro's from Manitoba Hydro personnel, is that correct?

DR. ATIF KUBURSI: Well, that -- that would be correct. I mean, every watershed has its own specificities and exceptionalism, and Manitoba Hydro was an incredibly rich area, having all these disparate, different climatic zones and different watersheds. But the water-management issue of how much you keep in reservoir, how much you release, how do you anticipate the levels that you would have to release, these are, honestly, common problems everywhere. They become more so in areas like Manitoba Hydro. It's 95 to 98 percent dependent on hydro. What happens to water is all what counts.

MS. PATTI RAMAGE: You would look,

though, to Manitoba Hydro for beyond those common principles, for example, stakeholder issues, something like that, that would be something that you didn't come in with? That would be something Manitoba Hydro would have had to identify for you, is that correct?

DR. ATIF KUBURSI: It's not correct. I worked as an economist for the Board of Economists of IJC, the International Joint Commission, and my whole work was basically -- and they use what they call 58-D, which is a marker in Lake Ontario, and they will try to make sure that this marker of 58-D is the optimum one, and optimum in the sense that they have satisfied all the stakeholders.

People who use the lakes, the Great Lakes, for transportation would like to have a high level because then they can use larger whole ships that would save them more trips. People who produce hydro would like to have head, which means they really need elevation. Cottagers and marina people, they like it low because it destroys their beaches. And what we really have to do here is basically try to satisfy the multiple stakeholders, and by God, what I learned at IJC is far more complex than your problems here. Besides, we have to deal with the Americans, and not easy people to deal with.

MS. PATTI RAMAGE: You didn't -- you didn't create a model that -- that modelled those specific Manitoba Hydro issues, though, stakeholder issues, I think you've said, cottage owners on the -- on the waters, the public safety issues, those sort of issues, is that correct?

DR. ATIF KUBURSI: No. I mean, we had to actually develop different types of models than you have here. What we really needed there is a metric, and what we tried to do -- and -- and we really had the same problem because we needed to know exactly, you know, the precipitation, the -- the inflow versus outflow and precip -- and, you know, and evap -- evaporation.

We had to develop what we call extended cost-benefit analysis to see if we were to look at the beach holders, the beach owners, and these people are going to lose land. If we look at the Hydro people, we like to really see that if we give one (1) extra foot of water, what would it mean in terms of extra generation of power at the given prices versus what would the utility that people would lose? And we have to estimate at that time at the average cost per foot of land. And, you know, it's very expensive around some of these things, especially Lake Ontario and other places. So there was -- there were more micro-type, you know, modellings.

MS. PATTI RAMAGE: Just to clarify, that's what you did in Ontario, correct, not Manitoba?

DR. ATIF KUBURSI: No, it's not Ontario only; it's Ontario, Michigan, and Ohio, Indiana. I mean it was the IJC, but not in Manitoba, no, no, no. We didn't come that far.

MS. PATTI RAMAGE: Okay. I think that's all the questions Manitoba Hydro has. As I indicated, Manitoba Hydro has no objections whatsoever to these gentlemen being qualified as experts. We just wanted to get an understanding or gain an understanding of -- there -- there's a line in here, and we're trying to hone in on it. And I thank Dr. Kubursi for his answers.

RULING (Qualification)

THE CHAIRPERSON: So be it. We look forward to the doctors' evidence. Mr. Wood, do you want to --

MR. ROBERT MAYER: You'd better say that they're qualified.

THE CHAIRPERSON: Yeah, and they are qualified as requested. Mr. Wood...?

EXAMINATION-IN-CHIEF BY MR. GAVIN WOOD:

MR. GAVIN WOOD: Thank you, sir. The --

the next section in the direct examination will go through somewhat more quickly. Dr. Kubursi, would you, at the top of page 5, be kind enough to explain how you came to be involved in this project?

DR. ATIF KUBURSI: I guess it must be my association with Mr. Roger Cathcart, who had approached me even in -- sometime in October or September, asked me if I have done anything on risk analysis. And I -- I didn't take it extremely seriously, so I said, Of course, I've done that. And no consult would turn a job. But all of a sudden, you know, it was extremely specific. It was talking about hydro and droughts and things, and I -- I was a bit hesitant, although I've -- I've done the work.

But then ultimately I was invited to come in January, mid-January. I think the 19th of January I came here where I made the presentation on enterprise risk management and fielded lots of questions from Mr. Bob Peters, Chairman Mr. Graham Lane and Mr. Mayer. And there was also, I think, a third member.

Afterwards, I thought -- I was told by Mr. Lane that I would be offered the job, and I was very happy to accept it.

MR. GAVIN WOOD: And we've already touched on this, but how did you come to have Dr. Magee

involved in the -- in the project?

DR. ATIF KUBURSI: Well, I -- I knew this was a very large undertaking, and I also recognized that multiple expertise would be required. And I could easily understand from my limited knowledge of whatever risk and enterprise management, I mean, there are going to be incredible assignments and -- and challenges in fixing probability estimates, and I wanted to have somebody who is an expert in probability estimation and in time-series analysis.

I looked at the water flows and the fact that it is so variable. And I just took one (1) look, I remember, about the variability of water flows, and I knew that this is going to be a statistical process of sorts, and it would be quite important that somebody who is versed and an expert in this area with particular credentials would be extremely important, and I could think of no better than my colleague, Lonnie Magee.

MR. GAVIN WOOD: Dr. Magee, why did you become involved in this project then when you were approached?

DR. LONNIE MAGEE: Well, Atif described the problem -- or the project to me in February, 2010, and it sounded interesting. And so that was one (1) obvious reason. But, also, I've -- I've known Atif for -

- since I was in the department in '83, and we've always had a good relationship, but I've never worked with him on something before, so I thought it would -- that would -- that would be a good experience that way as well.

MR. GAVIN WOOD: At that time, sir, I -- I understand you -- you didn't have access to the terms of -- of reference, that that -- that would have come later?

DR. LONNIE MAGEE: That's right. I think the terms of reference were two (2) or three (3) months after that.

MR. GAVIN WOOD: So you would have been given a general understanding at -- at the time that you came onboard?

DR. LONNIE MAGEE: That's right.

MR. GAVIN WOOD: Going on at the bottom of page 5, Dr. Kubursi, the terms of reference are -- are referred to there. One (1) convenient point where they can be file -- found is at page 1 of the KM Report, the -- the basic report of these gentlemen.

If I could bother you just briefly to turn to page 1 of your actual main report, and I don't expect you to go through them in any detail now, but rather your -- your overall conception of what the Board has called upon you to do, sir, and which I'm sure you -- you hope

you've been able to respond adequately to.

DR. ATIF KUBURSI: Yes. We found that the Order 30/'10 and Schedule C defined in a very succinct way the various undertakings that this project would -- would involve, but primarily is focussed on risk management and concepts, procedures, activities.

And always to look at best practice, and see to what extent this risk management, and its best practices, apply to Manitoba Hydro. So first you have to -- and it was the first order of business, is to look at best practice, look at the literature on risk management, and then look at and evaluate all these reports.

There were several reports that had been written and were available on risk management, particularly affecting risk management at Manitoba Hydro.

We also had to look at the water supply data, and we -- we saw pictures of it but we did not see this data, but this time there was a specific reference to the supply data over time that existed between 1912 and 2005 at the time, and also the way this data was generated, the way it comes together.

We had to also review and get all the information from Manitoba Hydro, that it was part of our undertaking, and the overriding thing was that we are independent experts, that we provide objective assessment

that would be open to every, and different groups, and that our overriding commitment is to obtain all the relevant data, and to see all the stakeholders.

We were also to look at the -- specifically the operation of, and business risk that MH would -- and is likely to face, and to prepare quantification.

I mean, it was a major responsibility that we don't only look at these risks as just numbers, or issues, but that we would engage in actual quantification of these risks, and that we would also provide our own views on how this risk would be identified, quantified, and reported, and mitigated, and that we should really remain always as consultants, and resource people, to the different Intervenors, and should be prepared at any time to respond to these things.

And that we ultimately have to provide a report, and write a report, on the seven (7) items that were ident -- identified, and that we will participate as independent witnesses.

MR. GAVIN WOOD: And at the bottom of page 5, and then the top of page 6 of the direct examination, you've -- you've both attempted to summarize the -- the most essential parts of what you -- you both brought to the project, and it's there, and -- and we can

move on from that.

Two (2) things I did want to ask you though, sir, is -- and of course Dr. Magee may want to respond as well to this, there -- there has been frankly some indication, some questioning of whether the project that you were being asked, the royal you, the two (2) of you, were being asked to do, was -- was too much, too comprehensive, given the resources that were available to yourselves.

Firstly, do you have concerns in that regard, that you did have adequate resources to carry out the terms of reference adequately, and if you wanted to comment further on the scope of the project, and -- and just how substantial it was.

DR. ATIF KUBURSI: Yeah. No question the scope was wide, and the challenges were, in many respects, important, and not, you know, simplistic. But we knew all too well that this is a doable thing. I mean -- and the way we were told, and I appreciated this right at the beginning, that you have to tell us what resources you need, and we'll be prepared to provide these resources. And we want you to have full access to Manitoba Hydro people and data, and that we give you and enable you with all the necessary requirements.

I -- I felt very comfortable at this. And

in may respects, the fact that we did it is itself testimony that -- that it was not -- it's a doable thing, and we did it.

MR. GAVIN WOOD: Anything further, sir?

DR. LONNIE MAGEE: Yes, the -- the terms of reference are very broad, but we also interpreted them as being flexible so that we weren't -- didn't feel obligated to, say, give the last word on everything that you could possibly imagine falling under the terms of reference, which would be impossible.

So we decided to learn as much as we could and take what we already knew, combine those together and try to say constructive things that -- and organize them according to the terms of reference.

DR. ATIF KUBURSI: I -- if I may. I mean, I knew all too well that much of what's happening here is going to fall quite a bit on me because I knew of the time the professor -- that Lonnie Magee was still teaching, and he's the chair of the graduate studies and things. But I was comfortable, and I knew all too well -- and, in hindsight, I'd say it was really a very good working relationship that I -- when I needed Lonnie he was always available for me.

MR. GAVIN WOOD: The -- the other thing that I wanted to just put on the table right at the

outset is the person that we're going to, for understandable reasons, refer to as the NYC. Sir, did -- this is to Dr. Kubursi.

Did you see your role as to largely consider the NYC's concerns under those terms of reference?

DR. ATIF KUBURSI: There's no question that there were lots of rumours and there were lots of propositions here about -- that the NYC had made certain claims. And we wanted to come at it in a very objective and independent way when we knew all too well that we would like, and we would seek and spare no effort, to listen to NYC and to see what are her claims and allegations, how did she arrive at these claims, and how did she put forward these things.

Because at that time and under your guidance, Gavin, that we should not look at KPMG; we should not look at any of the documents because at that time there was still some concerns. But we knew all too long and all along that we need to seek and meet and avail ourselves of her positions.

MR. GAVIN WOOD: What about the -- the specific question though? Did you see your role as largely considering her concerns?

DR. ATIF KUBURSI: No, we had much

broader concerns. I mean, the issue of looking only at her was she was one (1) of the parties, but in no way did we really see that our commitment, job, and assignment was solely to examine and see, you know, what she claims and the counterclaims. No. I mean, the issues were far too -- more defined in broader terms and more reasonable terms than ju -- just evaluating what one (1) single consultant had come up with.

MR. GAVIN WOOD: And just for the Board, there -- there was a reference to not looking at KPMG report, and -- and that'll come in in the next few minutes if you'll bear with us on that rather than jumping into that.

Sir, beginning at page 6 Dr. Magee and yourself then, over the next pages, try to explain to the Board and -- and to all the parties participating, through to page 8, the initial steps that you took; it -- it's set forth there. And appreciating we have considerable to go through today, would you just briefly comment on the initial steps you took that -- and such.

DR. ATIF KUBURSI: There's nothing brief for professors, but I'll try. We're programmed to speak for fifty (50) minutes on anything. But the -- the -- all right. But -- but I came five (5) times.

MR. GAVIN WOOD: Are you sure you don't -

- are you sure you don't have that law degree, eh?

DR. ATIF KUBURSI: No, no. The prices are too low. The -- the -- I came five (5) times, and I -- I would like to put for the record that all the parties we talked to were open, helpful and forthcoming. I met extensively with many staff from Manitoba Hydro, and many times, several times, even on the same issues. I came one (1) time in February alone, and then I came with Lonnie another time. We came and attended the conference.

Manitoba Hydro has been always forthcoming. They spend quite a bit of time. There wasn't a single person we wanted to see that Ms. Ramage was not able to deliver on it, and when we had some particular issues, I recognized that Mr. Cormie had come all the way to Burlington to meet with us to explain these things.

We gained a lot from these meetings, and we met with everybody, with all the components. I mean, we -- we went with the corporate ech -- you know, higher echelons, with Mr. Warden, Mr. Adams. We met several times with Mr. Cormie. We met with Don Deviaene and Ms. Huskins -- Hoskins in the risk management. We met with the --

MR. GAVIN WOOD: But -- but, with -- with

respect, sir, that -- that's set forth at pages 7 and such, and rather than going through them individually --

DR. ATIF KUBURSI: I was going to show off how many names I remember.

MR. GAVIN WOOD: Well, but let me -- let me ask you another question, though: What about material sets and such? How did you -- what did you receive? How did you assemble that material and -- and work with it?

DR. ATIF KUBURSI: There was a process and we respected it. We went first through you and then to Ms. Ramage, and we got most of the things we want. Once in a while, you know, we got a bit of surprise. We discovered some model that we didn't know about, but it -- it turned out it was not so important. But we -- and I'm sure our colleagues at Manitoba Hydro would tell you we did not leave a stone unturned. We wanted to know, and we probed as much as we can, and we got quite a bit of cooperation.

And we met, by the way, with also Mr. Singh, with the consultants from the Board. We -- we felt that there are more than just the stakeholders that Mani -- Manitoba Hydro, you know, represents. We met also with Mr. Antoine Hacault, with Mr. Bowman, with other people, too. We tried to be as open as we were, given the mandate from the Board that we should be open

and available to others, and should seek to get as much information as we can get.

MR. GAVIN WOOD: Concerning the consultants with the Public Utilities Board, why were you involved with them directly, sir?

DR. ATIF KUBURSI: Well, I mean, there were lots of issues that we wanted clarification, and we wanted to hear their take on it. We knew that Mr. Cathcart is a recognized expert; I worked with him on a number of issues, and I recognize his expertise and abilities in financial matters. I was also quite impressed with Mr. Larry Buhr's knowledge of hydrology and numbers of waters. We were -- we had two (2) ears and we want to use them to the full extent.

MR. GAVIN WOOD: Finally, before asking Dr. Magee to comment on this, if I could turn everyone to page 7, and item D under Dr. Kubursi there, page 7. No, you're -- oh, yeah. I notice there's reference to you attending on a Dr. Michael Proctor.

Could you explain what that involved, sir?

DR. ATIF KUBURSI: I knew all along that MISO is a very important node that -- that we need to understand. I know that Manitoba Hydro is a unique utility in terms of the ratio of exports to generation, I mean 31 percent, and it could be corrected, and that 80

percent of this is in the MISO market, either with, you know, counterparties or in the day-ahead or real-time trading in the opportunity market.

And MISO's quite important, and I recog -- realized and recognized early on that it would be important for me to learn more about how this system -- it's a new development, it came about in 2005, and that it would be worthwhile going and seeing how the system -- what models do they use, what do they mean by -- thanks -- by this node prices and marginal prices?

And I was quite lucky that the person they nominated to see is Dr. Michael Proctor, who came to Purdue when I was leaving, and we met literally for -- months before, you know, I left and he stayed, and it was really good to see him back.

And we spent a very extensive intensive two (2) days, where he shared openly, and very generously, all the systems they have. I learned a great deal from that, and I valued this, and he was open, and -- continuously open, and I had called on him several times to explain things when I felt I did not get it from the first time.

MR. GAVIN WOOD: Finally, sir, just in terms of the -- the way in which Dr. Magee and yourself functioned, should the Board understand that you would

periodically come here as you required to interview people or assemble materials, your work was done back at your home office in Burlington?

DR. ATIF KUBURSI: Yeah. Most -- most of the work was done at my home office.

MR. GAVIN WOOD: And, Dr. Magee, and I don't suggest you necessarily have to, but is -- is there anything you wish to add to what Dr. Kubursi has just explained to the Board?

DR. LONNIE MAGEE: Well, I could just reinforce that -- that the contacts with people that -- that I had were all very positive, and were a subset, but a large subset of the ones that Atif has described.

Two (2) trips to Winnipeg, meeting many people at Hydro, and also Roger and Larry at -- at PUB, and in -- during the workshop sessions, met with some of the in -- Intervenor group's representatives.

MR. GAVIN WOOD: Thank you. Turning to page 8 then, and dealing specifically with contacts with the NYC at Section 3(d), sir, I'm sure that the Board has noticed that there's an Appendix A, which consists primarily of a set of emails between the NYC and myself.

You had mentioned a few moments ago, and I just want to clarify something -- or let -- let me maybe start in, and then I'll ask you this. Why was it

important to you that you have an opportunity to meet with the N -- NYC if at all possible in this project?

DR. ATIF KUBURSI: Well, as I said, we realized right from the outset that -- and it was basically press reports and rumours that the NYC had made some serious allegations, and had different thinking on the risk assessment and risk practices at the Manitoba Hydro.

And it would be important, and I -- we thought it would be only fair that we listen to this strand and this position. And it would be far more important to hear it from the mouths, you know, from the horse's mouth rather than to wait for the rumours.

And we were all too happy, and I remember you -- you know, that we told you, and you were very gracious in trying to arrange this, and we were quite happy, you know, at the time we learned that she would be willing to meet with us, and we insisted that we go there without any prejudgment, or prejudicial, or prior information, giving her the full platform, full chance to explain her position without any preconditions.

And even went as far as saying, and giving you the empowerment. I mean, saying look, if you need us and you want -- she wants a confidentiality agreement, restriction agreement, because we -- we could gather very

quickly that she was so obsessed with intellectual property, that even if she whispered to you, Good morning, that maybe she had signed a royalty agreement on it. I mean, it -- it was a -- a willingness on our part to do whatever it takes so that we would listen to this person.

MR. GAVIN WOOD: Okay. And bits and pieces. Small -- small pieces. There's a reference in the emails that Dr. Magee and yourself hadn't reviewed certain materials, that -- particularly the KPMG report and materials that we -- that you understood the NYC had -- had produced over the course of the previous two (2) or three (3) years.

DR. ATIF KUBURSI: Right, the --

MR. GAVIN WOOD: To begin with, that representation certainly was true?

DR. ATIF KUBURSI: Yeah.

MR. GAVIN WOOD: Why -- why did you determine to approach her in that manner, without having mat -- materials reviewed before you -- you attempted to see her?

DR. ATIF KUBURSI: Well, for a number of reasons. Things pertaining to us and things pertaining to her.

To her, because we recognize all too quick

that she is extremely jealous and very protective of her ideas and feels that anybody who would come to know what she is doing is likely to exploit it commercially later on. So we were quite sensitive to this and we respected that.

The other one (1) is that we are independent consultants. We want to hear every side to the issue and she is one (1) side, not the only one (1), but at least she's one (1) side, an important side, and we wanted to give her a full chance to discuss and convey her position.

MR. GAVIN WOOD: Thank you. Now ultimately you did attend actually with myself to meet with the NYC. Dr. Magee was -- was not present. What happened that he wasn't there?

DR. ATIF KUBURSI: Well, actually, when we -- we were here, if you remember when we got -- we were attending a conference that was organized by Manitoba Hydro. We were in Winnipeg when we learned that she finally wanted to see us and she wanted to see us immediately, if you recall.

So we were prepared, I mean, if she wanted to meet us hanging from a tree at that time, we were prepared. And we very quickly arranged, you know, the meeting. But we discovered that our cosmopolitan

colleague didn't have a passport with him, so we had to -- - we had to arrange a passport and we could not get it in time. And she insisted that she wants to see us on that weekend, if you recall, but she couldn't see us on Saturday, so we went on Sunday, on the 5th --

MR. GAVIN WOOD: And, Dr. Magee, I understand you stood in line trying to get a passport on Thursday or Friday of that week?

DR. LONNIE MAGEE: Yes, PUB kindly provided a letter indicating the urgency of the situation and it did help. I did get a passport, but it was a couple of days too late.

MR. GAVIN WOOD: Okay. And then -- just -- and I appreciate it that you've -- you've set out the -- the background at page 8, the section 3-D. Dr. Kubursi, though, is -- if I could just summarize, I understand that the NYC was prepared to meet with you starting on the Sunday of that week and then through the Monday and then the Tuesday?

DR. ATIF KUBURSI: Right. Right. We arrived Sunday, and Mr. Wood and I we went to dinner with her. And --

MR. GAVIN WOOD: Well, let's -- let's just take it -- my understanding, as I recall, we -- your -- you and she met through Sunday afternoon and evening,

largely with her somewhat getting to know you and -- and frankly, making sure you were the -- the real enchilada, that you could talk at her level, to be blunt about it?

DR. ATIF KUBURSI: Yeah. Yeah. And -- and -- and we were -- were -- you know, I mean, it was a very open discussion and a technical discussion in many respects. I think Mr. Wood is correct, she was trying to see if we had any knowledge that we pretend to have and she was asking many questions. We -- we also qualified because I carried late George with me through the streets of New York. If you don't know George, George is her bird. And it -- it --

MR. GAVIN WOOD: You weren't -- you weren't going to do that to me.

DR. ATIF KUBURSI: Well -- well, you carried the baby.

MR. GAVIN WOOD: I carried --

DR. ATIF KUBURSI: But, I mean --

MR. GAVIN WOOD: The --

DR. ATIF KUBURSI: Yeah.

MR. GAVIN WOOD: The NYC has a -- a -- a young child -- and that I ended up babysitting on the Sunday so that you could -- you could meet with her.

DR. ATIF KUBURSI: Yeah, we met for three (3) hours and --

MR. GAVIN WOOD: Okay.

DR. ATIF KUBURSI: -- she was quite open actually. I mean, I was kind of surprised.

MR. GAVIN WOOD: Okay.

DR. ATIF KUBURSI: And --

MR. GAVIN WOOD: Did -- did the real work with her started, in terms of exchanging matters on Manitoba Hydro, on the Monday, sir?

DR. ATIF KUBURSI: Yes, it started on a Monday. She came to our hotel and we met -- she was quite open in -- in her special way. I mean, open in the sense that she was quite generous in making pronouncements and generalizations. Nowhere was she willing to explain at lengths the methodology and the way she reaches these conclusions or allegations.

And it went very well because she could outline exactly her concerns, which I will go through in details, but issues about drought and the estimation of drought, the governments, the lack of existence of a middle office. She was also all to generous to make snide remarks here and there, but I just -- you know, we dismiss all these things. The substance was -- was good and -- and -- and we were able to get quite a bit of things for her until I made the big mistake. It was really my mistake.

And she asked us if -- you know, what are you doing. Are you going into the nitty gritty?

I said, Yes, Lonnie and I, we're trying to sketch a model that integrates the financial and the power generation and the delivery. And the minute I mentioned models, she felt like we are pre -- you know, preparing or developing an alternative to her system, she withheld everything. It became an absolute mummy. I mean, she -- we could not get anything from her. She was prepared to talk about the weather, about the world, but nothing in any specific terms.

And we tried, Gavin and I, in different ways, trying to unlock this jam and even to explain to her that nothing of the sort. We're not preparing an alternative model to your system, and that we would not -- and prepared to even write and sign agreements to the extent that anything we hear from you we will not use for years. It became extremely difficult to take things.

We -- we met on Tuesday. But, again, almost a rehash of all the positions that she had made in general terms, nothing very specific, no calculations, no methodology the day before.

MR. GAVIN WOOD: Thank you for all of that. And -- and I appreciate, and I think the Board does, that you've summarized the situation at pages 8 and

9. Just briefly possibly before the break, sir, just going on to pages 9 and -- and 10, there's a further indication of further work that was -- was carried out, further people that were seen and -- and such.

And I -- I don't think it's necessary to take any time with that. At page 10, Dr. Magee, please, at the top there you -- you make reference to writing of programs and such. Could I ask you to explain that in particular, please.

DR. LONNIE MAGEE: Yes, this was to carry out both the estimating the coefficients in the statistical models and to generate the numbers in the simulations. So I just -- I mention there that I use GAUSS programming language just because that's what I'm used to using, but there are many other programs that would have done this. It's basically a program that just carries out mathematical calculations and is designed to -- to work well with random number generators and matrix operations.

MR. GAVIN WOOD: And then, finally, gentlemen, the -- the KM report is produced in mid-November of -- of 2010 based on all of the -- the work set forth in the prior pages of the direct examination?

DR. ATIF KUBURSI: Absolutely. As you can tell, this is a joint product. I mean, it's very

hard to really say you did this, you did that, and things, but it's a joint project. And we produced the -- the report very quickly, the early ten (10) days, and it was a requirement that we share it with --

MR. GAVIN WOOD: And we'll go on to that --

DR. ATIF KUBURSI: We'll go over that.

MR. GAVIN WOOD: -- possibly after the break.

DR. ATIF KUBURSI: Yeah. But, I mean, if -- in details, what happens that, with the exception of Chapter 4 --

MR. GAVIN WOOD: Well, maybe -- maybe we'll just pause for a moment.

DR. ATIF KUBURSI: Sure.

MR. GAVIN WOOD: Did you want us to go on, sir?

THE CHAIRPERSON: I think we'll take the break now.

MR. GAVIN WOOD: Yeah.

THE CHAIRPERSON: Thank you very much.

--- Upon recessing at 10:49 a.m.

--- Upon resuming at 11:09 a.m.

THE CHAIRPERSON: Okay, folks, let's get going again.

CONTINUED BY MR. GAVIN WOOD:

MR. GAVIN WOOD: Sir, going on then at -- at page 10 of the direct examination. At 5(b) of that material the Board is made aware of who wrote the various chapters initially. Dr. Kubursi, I had cut you off just before the break, but in -- without going through it in detail, overall, whose work product is the KM report?

DR. ATIF KUBURSI: Well, it is both Kubursi and Magee. I mean, this is a joint product. It's very difficult to partition it; this is for this person's contribution and this word is somebody else's. We work jointly and very closely together.

I, typically, with the exception of Chapter 4, wrote the first drafts, but then Lonnie went over them and made contributions, made comments, made changes, edited, and then came back to me. I mean, it was an interactive, joint product in every single respect.

MR. GAVIN WOOD: Thank you. And then, at page 11, there's another name introduced at section 5C, Mr. Graeme MacQueen. I don't -- it would -- you'd possibly take that, sir, what -- who was Mr. MacQueen?

DR. ATIF KUBURSI: Right. Mr. MacQueen is a colleague of ours, is a professor of philosophy and religious studies at McMaster. He's noted for being a very competent writer. His PhD is from Harvard, he's contributed -- published numerous articles. He looked at the style. He really looked at it, and we wanted that two (2) pairs of eyes to see that economists do not write only for other economists, that if there were any places where he felt that it had too much jargon and had complicated presentations we had asked him to pinpoint it, and he did a good job.

MR. GAVIN WOOD: Thank you. Was Mr. MacQueen involved in the content of the KM report?

DR. ATIF KUBURSI: No, he was not. I mean, this was totally outside his realm of expertise.

MR. GAVIN WOOD: Sir, if I could turn, then, to section 5-D, and here to the Board if -- if I could bother you to look to page 20 of the -- of the Direct Examination as well, we've decided it's best to combine those two (2) sections together so that you -- you understand the overall of -- of how the report came to be finalized.

To begin with, sir, there was a form of confidentiality agreement that was entered into by Dr. Magee and yourself, is that correct?

DR. ATIF KUBURSI: That's correct.

MR. GAVIN WOOD: And it's found at the answers to undertaking of IRs of PUB-KM-1, Schedule 2 -- Schedule 2 of that, and -- and I appreciate it's there. Why did that document come about, Dr. Kubursi?

DR. ATIF KUBURSI: Well, there were concerns that, inadvertently or negligently, we might divulge confidential data, commercially-sensitive data. And we had to deal with future prices, with terms and conditions in term sheets and contracts, and Manitoba Hydro felt that this is material that they are obliged, with their counterparties under contracts, not to divulge, and they wanted to make sure that we would not divulge either. These are terms and conditions in contracts, these are about commercial prices, commercially-sensitive data.

MR. GAVIN WOOD: Thank you. And specifically, sir, at page 3 of that confidentiality agreement that again is set out at Schedule 2 of the PUB-KM-IR-1 materials, Section 4 references review of reports. This is a somewhat unusual situation. Just -- I appreciate it's set out there and there's no need to go into it in detail, but what were the mechanics once -- once your draft report was prepared vis-a-vis Manitoba Hydro and yourselves?

DR. ATIF KUBURSI: As you can appreciate, we were a bit reticent in the beginning that we would give our report to Manitoba Hydro before it's shared with everybody else. But we also accepted the principle that there may be confidential materials that need to be redacted, and that we would like to see that Manitoba Hydro would go over some of the facts.

So there was also issues of verification of facts. So confidential material, commercially-sensitive data and issues of facts. But we reserved the right that any issue that we considered to be matters of opinion, that this would be up to us whether we accept it or not.

MR. GAVIN WOOD: And then -- and then turning to page 20, section 5G of the direct-examination, just for the convenience of the Board and -- and the Intervenors and such, you -- you see that the draft version of the KM report came over to MH in two (2) installments on November 8 and November 12th, 2010.

You -- you see that, sir?

DR. ATIF KUBURSI: Yes, absolutely. As you know, we -- we did not see the KPMG Report until probably late October. I mean, we had very limited tim - - time to finish the entire report. And we tendered the possibility and Manitoba Hydro was gracious to accept

that we will do it in two (2) installments.

So we send them Chapters 1 to 4 and then sent the remaining chapters on a later date, the first one (1) November 8, the second installment came November 12th.

MR. GAVIN WOOD: And then just directly below that at page 20, there's reference to two (2) letters from Manitoba Hydro, Ms. Ramage and Ms. Boyd noticed just in the last couple of days to the Board that there is actually three (3) letters that came back from Manitoba Hydro, no -- not two (2), and that's an oversight on -- on my part.

The -- the third letter is in the middle and there's a -- there's a letter of November 12th, 2010 where Manitoba Hydro commented on aspects of the report and then one (1) on November 15th. They're set -- attached as -- set out at Schedule 3 of PUB-KM-1. And then the other letter that I overlooked is November 14th, 2010.

So -- and I've -- I'm going to ask that in those circumstances it be marked as -- as a separate exhibit. How it -- how it breaks down is the first letter deals with Chapters 1 to 4 -- the draft Chapters 1 to 4. The letter of November 14, 2010 deals with Chapter 5 of the draft, and then the letter of November 15th,

2010 deals with Chapter 6 and 7.

So if I could ask, Mr. Chair, that this -- this additional document possib -- it would be easiest with -- with the -- the memo from Ms. Boyd to myself be -- be marked as Exhibit KM-5, please.

(BRIEF PAUSE)

THE CHAIRPERSON: It'll just be a moment, Mr. Wood.

(BRIEF PAUSE)

THE CHAIRPERSON: Would you mind repeating the exhibit number?

MR. GAVIN WOOD: That would be Exhibit KM-5.

THE CHAIRPERSON: Thank you.

--- EXHIBIT NO. KM-5: Memo from Ms. Boyd to Mr. Gavin Wood

MS. ANITA SOUTHALL: Mr. Wood, before you go on, I've just noted for the record that you're referencing the direct evidence of Doctors Kubursi and

Magee in section 5G as page 20, and I believe it's page 21.

MR. GAVIN WOOD: Oh, 21. Thank you.

CONTINUED BY MR. GAVIN WOOD:

MR. GAVIN WOOD: Those -- those -- those letters really speak for themselves, sir, but you go on at page 21 in -- in your direct-examination to explain your -- Dr. Magee and your response to the -- the -- it's the three (3) letters.

DR. ATIF KUBURSI: Right.

MR. GAVIN WOOD: There's no -- there -- it is -- it is the case that the draft report was adjusted as a result of the receipt of those three (3) letters?

DR. ATIF KUBURSI: Yes, we redacted a number of pages that -- that were already in the report. And --

MR. GAVIN WOOD: And -- and what about with regards to content?

DR. ATIF KUBURSI: Well, content we were a little bit reticent to see -- there were issues that were raised about verification of facts, which I accepted, but there were areas where we thought there were matters of opinion and matters of judgment, and we

felt that this would be left in the report because this reflected the conclusions and the assertions that we would like to make, and we wanted to retain them.

MR. GAVIN WOOD: The -- the letters are -- are available to everyone, and -- and people can judge for themselves and possibly cross-examine you over them.

Could I ask though, ultimately, did Manitoba Hydro have a second kick at the cat, so to speak? After you got the letters and the -- the report -- the KM Report was adjusted as a result of those letters, was there any further back and forth between Manitoba Hydro and yourselves?

DR. ATIF KUBURSI: Not that I recall.

MR. GAVIN WOOD: So then the KM Report that gets released is after you've taken into consideration those three (3) letters?

DR. ATIF KUBURSI: The one that we accepted, yes.

MR. GAVIN WOOD: And then if I could bother you to come back now to page 11 of the direct examination. And there, sir, at section 5(d) there's reference to the specific redactions that occur in the report.

Do you see that?

DR. ATIF KUBURSI: Yes.

MR. GAVIN WOOD: And I don't think it's necessary to go through those in detail. I would ask though, basically and in summary for the Board, what did the redactions generally in -- involve that Manitoba Hydro had requested come out of the report; what in -- what information and such?

DR. ATIF KUBURSI: Yeah, this were information that relate to future prices, to terms and conditions in the contract, and certain curtailment of provisions and the specification of these curtailment conditions.

We felt that these are legitimate concerns, and we redacted them. There was one (1) which included data at the very end; this was the flow data that was redacted. We felt maybe this was a matter over which one could have counter arguments, but we -- we redacted them.

MR. GAVIN WOOD: Going on to the next page of the direct examination, 5(e), there's reference to changes to be made, if any, to the KM Report. Firstly, sir, and I appreciate there's a lot of stuff coming at everyone, but in the response paper, which has been marked as KM-3, section A deals with addendum and corrections to the KM Report.

Do you see that, sir?

DR. ATIF KUBURSI: Yeah.

MR. GAVIN WOOD: Okay. My understanding, though, from obviously what's set forth in the direct examination at page -- at section 5(e) -- sorry, that -- sorry, that what's set out at section 5(e) supercedes section A of -- of the response paper.

Wha -- what you've done over the next three (3) pages is more comprehensive than the corrections that initially were set forth in section A of the response paper?

DR. ATIF KUBURSI: That's correct.

MR. GAVIN WOOD: So the bottom line is that to see any changes to your report one should look to section 5(e) of the direct examination?

DR. ATIF KUBURSI: Exactly.

MR. GAVIN WOOD: Okay. Appreciating again, sir, that it's -- it's set forth there in some detail, would you summarize for me what changes Dr. Magee and yourself wish made to your -- the KM Report.

DR. ATIF KUBURSI: Yes. We first wanted to elaborate further on our recommendation, that the various suite of models, the collection of models at Manitoba Hydro can be put on a common platform and can be made -- can be harmonized and made consistent with one another. And we outline, as you can see, about eight (8)

conditions or eight (8) benefits that this would entail, which, if you want me, I could go through, but, I mean, they are spelled out in the -- section 1.

The other one, and I would like my colleague, Lonnie, to -- to explain, there were some mistakes that were reported and I would like to correct and to further elaborate on, particularly on the calculation of the probability of a one (1) year, a five (5) year, a seven (7) year, and also the estimate of what we believe to be the actual drought course that would be associated with these things. We also --

MR. GAVIN WOOD: One (1) -- one (1) sec.

DR. ATIF KUBURSI: Sure.

MR. GAVIN WOOD: If you can just break it down. Thank you. Just break it down. Firstly, you referenced the common platform.

DR. ATIF KUBURSI: Right.

MR. GAVIN WOOD: Okay. And as I understand it, the reason for that is you appreciate that Manitoba Hydro is disinclined to accept that recommendation?

DR. ATIF KUBURSI: Well, I mean, there were some questions about it. We felt like probably we would like to elaborate and further argue some of the benefits that we failed to do in the report and expand on

it a bit in response to the fact that Manitoba Hydro felt that this may not really be necessary.

MR. GAVIN WOOD: So -- so just for the Board to understand, that recommendation holds?

DR. ATIF KUBURSI: That recommendation holds.

MR. GAVIN WOOD: Dr. Magee, with regards to page 13, section 2 of section 5(e) of the direct examination, would you comment on the -- the corrections that are to be made to the KM Report?

DR. LONNIE MAGEE: Yes, there are various probabilities here that are estimated of different drought events that are coming from a simulation exercise where the -- the statistical model that was estimated fitted to the data was then used to generate a long series of hypothetical numbers. And those are then -- after that, it boils down to kind of a straightforward counting up exercise to come up with the -- the probabilities.

So to be honest, I -- I've already forgotten what -- why the original numbers were wrong.

DR. ATIF KUBURSI: I can clarify this. It was my mistake because I reported a hundred when it was actually ten (10) to the si -- six (6). We took a million repeated samples of '94 data and then did the

counting. The way I put it, it was like a hundred. And, actually, it was ten (10) to the six (6). But then it -- it was my mistake.

MR. GAVIN WOOD: I wonder maybe you should do that once again just to be sure that that's clearly on the record.

DR. ATIF KUBURSI: The way the probability is calculated is that we have '94 year flow data of water. And then you look -- typically, you say, All right, this is the '94, and how many of these represented low water flow, let's say three (3) of them.

So you say the probability of a low flow would be three (3) over ninety-four (94). This is what ICF and others have done. We said this is not probably the best way to do it. What you really need to do is to take samples, repeated samples, as if you're picking things at random and see how many of these things can you do wi -- with the -- the million.

And then in this million we counted every place, what of the simple mech -- statistical mechanism gave us low flow years, and we averaged these things, and these were the basis of the probabilities that we're reporting here.

MR. GAVIN WOOD: And -- and then the -- the error that you made, sir?

DR. ATIF KUBURSI: The error that I made is that I reported this as if we only took a hundred when, in fact, as you can see on page 13 of the evidence, is nine nine nine comma nine nine six (999,996); it's nine hundred ninety-nine thousand nine hundred and six -- ninety-six (999,996) repeated things. Okay.

MR. GAVIN WOOD: And -- and so, Dr. Magee, as I understand it then, in the report the -- these numbers should be substituted for the ones that are found in the -- in the actual report. Is that correct?

DR. LONNIE MAGEE: Yes. I think there might be some of these that are additions that were not--

MR. GAVIN WOOD: M-hm --

DR. LONNIE MAGEE: There wasn't a number corresponding to that in the original report.

MR. GAVIN WOOD: And I appreciate we're going to be going through the actual re -- report later, and we can reference it then.

And then, Dr. Kubursi, at the -- at the bottom there's item 3 estimating the risk of droughts in 2015 and 2020.

Can you explain why that reference is there?

DR. ATIF KUBURSI: It was part of the questions that came from PUB and have asked us if we can

run the same methodology which is using at-risk -- using IFF, the integrated financial forecast, for 2015 and 2022 using low flow, and that's why we did it. And we thought, since we did it and it was not in our report, we might as well add it.

MR. GAVIN WOOD: And -- and you're available to be questioned on it, if -- if necessary?

DR. ATIF KUBURSI: Yes, sir.

MR. GAVIN WOOD: Okay. Then, going on to item 4, Water Flow Predictions: Alternative Methodologies.

Dr. Magee, to begin with, what -- what is the purpose of this -- this chart that -- that you've prepared?

DR. LONNIE MAGEE: It -- it was -- it's based on Chapter 4, the different models presented there. It was suggested to prepare a table that summarizes the basic features of those models, and so that's what the -- the table is about.

The -- the first row, historical simulation, is -- is the current method, which -- which is one (1) of the standard methods, and then we were suggesting some others, and just described their -- what we see as their advantages and disadvantages in the following lines. And they're described in more detail in

Chapter 4.

MR. GAVIN WOOD: This section -- or subsection 4, is it actually an addition to the report, then, or is it more of just a -- a handy guide?

DR. LONNIE MAGEE: A handy guide.

MR. GAVIN WOOD: It -- that is, it doesn't actually change any of the content of the report, is that correct?

DR. LONNIE MAGEE: Correct.

MR. GAVIN WOOD: Thank you. If I might, then, going back to more mundane matters, at section 5F, there's a series of answers to IRs that were provided.

And briefly, as I understand it, Dr. Kubursi, you were both in -- involved overall in -- in that series of answers, is -- is that correct?

DR. ATIF KUBURSI: That's correct.

MR. GAVIN WOOD: And what we've tried to do is show the -- the ones that we felt Dr. Magee's particular expertise required him first to answer, and then you were both thereafter involved in -- in all of the answers?

DR. ATIF KUBURSI: That's correct.

MR. GAVIN WOOD: Just to finish off one (1) train of thought in terms of further involvements.

After the report came to be issued, I

understand, Dr. Kubursi, that you took an opportunity to meet with Manitoba Hydro staff in mid-January of 2011, and that's set forth at 5F(ii). What was that about, sir?

DR. ATIF KUBURSI: We had made a statement in the report that, although we saw actual demonstrations of HERMES, we did not see an actual demonstration of how the SPLASH system worked, and Manitoba Hydro was gracious enough that I was able to come and visit and spend a day with them, and we went through actual demonstrations of SPLASH.

MR. GAVIN WOOD: Thank you. As well, there was, during the course of the fall -- actually, prior to the production of the KM report -- an attempt to meet again with the NYC. That's referenced at (iiii) in that section, and it's -- it's set forth.

But, could you tell me, to begin with, why did Dr. Magee and yourself have me attempt to arrange another meeting with the NYC?

DR. ATIF KUBURSI: As you recall, the first meeting, we tried to meet with the NYC having seen nothing of her work, and not even the various appendices that reflected Manitoba Hydro's responses to the allegations of NYC. By this time, we saw the public document that was produced by NYC, and she has two

hundred and forty-six (246) points, and we went through them --

MR. GAVIN WOOD: And can I -- just to be clear, so I don't forget, what other -- would you have seen by then the KPMG report?

DR. ATIF KUBURSI: We have seen the KPMG report.

MR. GAVIN WOOD: And -- and there's going to be reference to a large number of reports later in the direct examination.

Generally, you would have seen all of that material by the attempts to go back and -- and meet again with the NYC. Is that correct?

DR. ATIF KUBURSI: That's correct, sir. I mean, what we have really now seen are all the points that counterparties and other parties have commented and have evaluated and have dismissed some of her allegations. We felt that it's only fair that we let her defend her allegations and the counter-allegations.

And it would be quite useful and helpful for her to explain her side of the -- of the issues. And -- and we felt that there were now tangible statements and actual numbers that she had produced. Before they were all, you tell us. This time we're told. We have something that she has produced. We have seen what

others have evaluated and have responded to this. We wanted to see if she would be able to elaborate and can explain herself, and give her side of the issues.

MR. GAVIN WOOD: And as I understand it, sir, there were serious allegations made in the public document that frankly concerns you?

DR. ATIF KUBURSI: Sorry, concerns us?

MR. GAVIN WOOD: That -- that you -- you wanted to -- to -- to talk to her about?

DR. ATIF KUBURSI: Yeah. No, of course. I mean, she had elaborated on every single aspect of her concerns about risk-management practices, procedures, calculations, governance, all sorts of issues, long-term contracts, even calculation of the -- the probability of a drought and -- we wanted -- there are lots of questions that we were able to put on the sides that we would like to broach and discuss with her.

And we felt that this is probably the best opportune time now that we have seen what she's saying, not that we were just going to hear her. Now we have seen and we've seen what others have said. It would be only fair and nice, and it would be quite helpful, we thought, that she would be given the chance to explain, to elaborate, to maybe demonstrate why she has reached these conclusions.

MR. GAVIN WOOD: And was it your intention to take Dr. Magee on -- on this trip if it could be arranged, rather than the -- the babysitter?

DR. ATIF KUBURSI: Well, I don't know about the babysitting, but we were hoping, and I think my colleague was quite happy to -- to join me.

MR. GAVIN WOOD: There's a -- an Appendix 2 to the -- the set of -- to the direct examination consisting of primarily emails between the NYC and myself. And I think there's a -- a couple of letters from her as well in there. The -- the bottom line is what, sir, in terms of the at -- attempts you had me make to -- to have you and Dr. Magee attend in -- in New York again?

DR. ATIF KUBURSI: She was quite reticent. Actually, she went overboard asking us to cease and desist from reading anything and that we will be included in her lawsuit infringement over intellectual property rights. I mean, it became too complicated. We asked Gavin, please, I mean, spare us.

MR. GAVIN WOOD: At -- at the sec -- the sixth to the last page of that material, given that there is a -- a later letter of some pages from the NYC, but in an email, sixth-last page, October 28th, 2010, I asked you, sir, after providing you with the last of a series

of emails from her, I quote:

"It looks as is -- as if we've exhausted ourselves with her. Agree?"

You see that there, sir. And what instructions did you give me at that point?

DR. ATIF KUBURSI: Yeah, I -- I saw that and at that time, honestly, in exasperation we gave up. We -- we -- we -- we -- I -- I remember, I -- we thought there's no gain here. She seems extremely reticent and unwilling. And it -- it would be a waste of time and our efforts to believe that she would be forthcoming.

MR. GAVIN WOOD: I want you to be blunt with the Board though, as I know you will be in the next couple of hours for me.

Does the fact that you weren't able to -- to -- to meet with her again, and given the limitations of the first meeting that you've certainly put out on the record, does that limit, or limit significantly -- I want you to answer both parts of that -- that the -- the work that you've been able to do in the -- in the KM Report and the subsequent documents that we've put before the Board?

DR. ATIF KUBURSI: I'm going to quote Oscar Wilde, you know, about his second marriage. He says a second marriage is a triumph of hope over

experience. So it was -- it was triumph of hope over experience.

MR. GAVIN WOOD: You promised you weren't going to do that one either.

DR. ATIF KUBURSI: But I -- I thought we'd try again, but we should have known first. On -- on the second one though, honestly not. I mean, given our experience. I -- I don't know. I mean, we wanted to give her every chance, and we -- we bent backward, forward, every which way to see if she would be willing despite our, you know, difficult experience the first time. We still thought and hoped that maybe she would come to her senses and she would really share and openly with us. We exhausted all possibilities.

But, frankly, I mean, looking at her work, the two forty-six (246) points in the calculations and the things, and the way she had reached these conclusions in three (3) or four (4) lines without any elaboration, if anybody in -- is right -- in her right senses would look at these things, you can get more from them.

MR. GAVIN WOOD: And -- and I appreciate that answer. But more specifically now, any limitations on -- on the -- the report that the Board should be aware of as a result of you not being able either, frankly, at the first meeting or the subsequent attempts to get

certain information from her?

DR. ATIF KUBURSI: In a perfect world it would be quite desirable to -- to hear from a party to defend her claims and other things. But, as I said, in total exasperation, after repeatedly trying, I mean, any sensible person would come to a conclusion that if she was forthcoming and willing and I don't want to say able, she would have really been forthcoming; she didn't.

MR. GAVIN WOOD: Thank you. We go on in the direct --

THE CHAIRPERSON: Mr. Wood, if you could just hold one (1) second. Dr. Kubursi, the New York -- or NYC's concerns over her intellectual property, in your view, are they or could they be considered justifiable?

DR. ATIF KUBURSI: This is very legitimate questions. And at one (1) time I was even asked about this by your counsel. There was a certain piece of information that she had claimed intellectual property over that I know are in the public domain. So certainly there are certain elements where she has not explained ela -- elaborated on that might be construed to be generated by a methodology that is her own.

I was willing to give her that benefit of the doubt, but on the majority of things they were nothing more than the variance, co-variance method, and

elements that are, for all practical purposes, so available -- so widely available in the public domain. They're in any statistical textbook or referenced in any standard elaboration on risk management.

THE CHAIRPERSON: Did you provide the NYC the view that you've just indicated to us?

DR. ATIF KUBURSI: No, I -- I -- you know, there was no chance, you know, like to -- to tell her, Look, you know, what you're really saying -- we were extremely sensitive with her, trying every which way not -- especially have learned that I made that boo-boo of telling her that we are thinking of developing a model. And we got into this complete frenzy that we are trying to supplant and compete with her to sell Manitoba Hydro an alternative system of risk-calculation management to hers, which was never our intention and had no knowledge of anything or -- or intention even doing this.

THE CHAIRPERSON: Thank you, sir.

CONTINUED BY MR. GAVIN WOOD:

MR. GAVIN WOOD: Just going on then in -- in terms of summing up now on -- on the -- the production of the KM Report, and I don't need you to actually review it, but just for the Board's knowledge, you've set out the -- the various reports that -- the fourteen (14) of

them that were -- were included in your -- in your review, and -- and we'll be coming back to that later this afternoon in terms of what you did with them and incorporating materials from them into the report.

DR. ATIF KUBURSI: Yeah, that's correct.

MR. GAVIN WOOD: Okay. If we might then, turn specifically now to Section 6-A, and if I could ask Dr. Magee just -- I -- I appreciate it's really set forth there, but if you could just briefly explain, Lonnie, how the whole construction of the report came about.

DR. LONNIE MAGEE: We set up our chapters to correspond closely to the terms of reference. So, as you can see there in 6-A, well, we had an introductory chapter, and then Chapter 2 addresses the first point in the terms of reference and so on up to -- Chapter 6 deals with two (2) of the points in the terms of reference, and -- and then the last three (3) points in the terms of reference are not conducive to chapters and reports. But generally, it's meant to match up with the terms of reference.

MR. GAVIN WOOD: Okay. And in that regard, the Board and all -- all intervenors should understand that, in terms of roman numeral vi, the -- the Summary of Conclusions and Recommendations VII, that's really a compilation of the summary of the conclusions

and recommendations found throughout the report. Is -- is that fair for the -- the Board to understand?

DR. LONNIE MAGEE: Yes.

MR. GAVIN WOOD: If we could then turn now, Board members, to the actual KM report.

MR. ROBERT MAYER: Be -- before we go there, Mr. Wood, I -- I'm sure that what I'm about to raise isn't all that important, but it puzzles me with three (3) people -- two (2) people reviewing this report at least and somebody editing it.

Page -- I'm going now to the report. On page 176, we start with number 1 of fifteen (15) findings, and you'll see finding number 15 at page 220. Then, if we go to page 221, we've lost one (1). We've -- we have arrived at fourteen (14) findings that are summarized below. And then you go through that and you find that finding number 7 from the previous findings has been skipped altogether. And then, if you go to page 285, you've still got fourteen (14) findings, and the fifteenth seems to have gone missing, never to be found again.

And I don't quite understand that, because -- if I have a minute -- finding number 7 deals particularly with the predictive accuracy of HERMES, and that's set out on page 186.

DR. ATIF KUBURSI: Mr. Mayer, the trouble is that when we produce our report for here, we changed the margins, so we have different pages than you do. But --

MR. ROBERT MAYER: Oh.

DR. ATIF KUBURSI: -- but the minute you're saying, you know, we're looking at the findings, but we could find, you know, everything. So page -- your page, you know, for finding 7 is different here, but you're looking at finding number 7?

MR. ROBERT MAYER: Yes.

DR. ATIF KUBURSI: Yeah. All right. You want us to talk about it?

MR. ROBERT MAYER: No, I -- I don't. I want to know how it ended up getting -- that -- that this appears to be the last time we find finding number 7 because you're -- you're reporting only fourteen (14) findings on the rest of the -- on the rest of the report, and there are fif -- and you -- there are fifteen (15) when you first set them out, as you have done. Then it would appear to me, from my best reading, is that finding number 7 disappeared from there on in, and I wondered why that was.

MR. GAVIN WOOD: Possibly they could review that over the noon hour, sir. Thank you for that

point, and -- and we'll check it, and -- and they'll -- as -- as you can appreciate, we're going to go through it this afternoon, so we'll come back to that.

MR. ROBERT MAYER: Thank you.

CONTINUED BY MR. GAVIN WOOD:

MR. GAVIN WOOD: With -- with that then, if we could go on at Section 6-B. Just find yourself for a moment, Dr. Kubursi. And specifically, if you could summarize the purposes and -- and -- and such of Chapter 1 of the actual report.

DR. ATIF KUBURSI: Yeah. Thank you. Yeah. The first chapter, as you appreciate, is setting the general framework that we wanted to analyze the specific, special, unique characteristics of a public utility.

We automatically found ourselves that we're doing and dealing with a complex issue. The issue is that you have a business entity and, at the same time, an entity whose shareholders are the people of Manitoba, unlike any other business, and whose general mission is to serve the people of Manitoba.

So you have basically here a dual function. A commercial business enterprise that has to generate sufficient revenues, if not maximum revenues,

and at the same time a -- an enterprise that has to serve the public interests whose shareholders are the people of Manitoba.

We also felt that there were other unique attributes. This is a hydro that is with all the characteristics in economics we call a natural monopoly. You can get every company to come and join in and enter this business. The capital requirements building dams, the generators are prohibitively expensive so that you can't possibly get free entry and exit, and this automatically puts this entity in a situation we call natural monopoly.

There are also so many economies of scale and scope that you don't want to waste by having duplicates and duplication. But the minute you are in such a position, a monopoly with no competitors, it automatically bestows on this business a terrible economic muscle that the people of Manitoba would like to see moderated, modulated by a regulatory regime, and there is no entity where our public utilities have operated without this regulatory regime.

It's not about ideology, it's about the technology, about the structure of the market that would call for this. So here we have the dual functions, the natural monopoly. It's also characteristically dependent

on a very variable situation. You depend on weather. You depend on the environment. You depend on water. The reliability, stability, predictability, are all very complex and difficult things to expect.

You also have a situation in which this is a very serious, important and substantive economic node in the economy of Manitoba. You rarely find this. I mean, Manitobans are absolutely and naturally should think of this node the same way Albertans would think about their oil, or anybody would think about a very serious, important contributors to their economy. The health of this industry is about the health of the economy of Manitoba.

So these complications automatically put us into a framework where we have to be quite careful about the way we look at this heavy dependence on hydrology, this natural monopoly, this duality of structure.

And this has implications. We found right of -- at the outset for risk management. First and foremost we have really three (3) issues that are typical of any corporation, but they become so important when you talk about a public corporation. The principal agent problem, all right, you have a principal, which is the people of Manitoba. The agent is Manitoba Hydro. The

principal -- the principal has different objectives, or probably have different perspectives than the agent.

In any corporation the shareholders may want the maximum profit and return, but a manager might want to expand the size of his bureau, or the manager of personnel would like to have the least amount of turnover. The sales manager would have the maximum revenue. All these objectives do not necessarily come out to be consistent of what the shareholders want. And in a public utility what the objectives and the various departments which Manitoba Hydro seek may not really be consistent, totally coherent with what the people of Manitoba want. So this is the situation.

Regulatory regime would like to really have the maximum amount of information. They can't possibly get all the information, are not in a position to know all the information or the expertise that Manitoba Hydro possesses. There is an asymmetry of information. If Manitoba Hydro or any corporation does not -- do not -- is not willing to share this information, the regulators, the shareholders are not privy to it. There is asymmetry of information implicit in any of this relationship.

Then there is the issue of what we call moral hazard in the sense that the public in Manitoba and

in the name, the government, or other regulatory agencies, would guarantee certain activities, like they insure the debt, and they have a stake in the health and performance, direct six thousand (6,000) jobs, maybe indirectly twenty thousand (20,000) jobs, that are contingent on the health of this entity.

So here, what we really have is a situation in which this insurance, this guarantees by the public may, and no necessity here, but may, and one has to be careful about this, invoke, give incentive to the performer to engage in greater risks than is the appetite, exposure, and willingness to undertake on the part of the public.

And this misalignment possibility becomes an important one and would require that the regulatory agencies would always have to make sure that they align their tolerance of risk, their exposure to risk, their assessment of risk with those that they think are representative of the public and not the choices of the insured, the agent itself.

And that possibility of misalignment is a very important one and should provoke and necessitate on the part of the regulatory board or the government, others, that they remain vigilant to make sure that the agent is working in the best interest and in a manner

consistent and aligned with the tolerance and appetite and expectations of the principal.

So these were the -- the main issues that we have to grapple with and deal with, and felt that they really need to be set right at the outset because they define the general framework that explains the concerns for quantification, the -- you know, the whole focus on the issues of risk management, that there is here a very implicit issue to make sure that there is coherence, there is consistency, there is alignment, there is symmetries that we need to look for, ensure, create the mechanisms and the governance systems that would make the operation of this public utility in the best interest of the people that are the owners and clients at the same time of this corporation.

THE CHAIRPERSON: This is probably a good point to have the lunch break because at one o'clock I believe we have a presenter, do we not? Okay, so we'll take the break.

MS. ANITA SOUTHALL: That's correct.

THE CHAIRPERSON: We'll come back at 1:00 and we'll have the presenter. Is there just one (1) presenter?

MS. ANITA SOUTHALL: I'm just looking at Mr. Hacault. I believe it's a representative of MIPUG.

Yeah.

THE CHAIRPERSON: Okay. Very good. We'll see everybody at 1:00.

MS. ANITA SOUTHALL: Thank you.

MR. BYRON WILLIAMS: Mr. Chairman, if I could just ask of Mr. Wood the -- we thank him for the provision of the -- the direct evidence. The scanned pages 15 and 16 are very difficult to read; those are the -- the histograms. And it's impossible to read the means or -- or the minimums and the maximums, and I was just wondering if it would be possible to get clean copies provided.

I -- I've checked with a couple colleagues, and I think it's -- it's just not restricted to ourselves as well.

MR. GAVIN WOOD: I -- I'll take -- I'll take a look at Mr. Williams' copies and see -- his copy and see if mine is better than -- than his.

DR. ATIF KUBURSI: No, we can bring you a new one.

MR. GAVIN WOOD: One (1) -- one (1) way or the other, we can get better copies made.

THE CHAIRPERSON: Very good. So they'll take that as an undertaking and we'll take the break.

--- UNDERTAKING NO. 140: Doctors Kubursi and Magee to provide better copies of scanned pages 15 and 16

(INDEPENDENT EXPERT PANEL RETIRES)

--- Upon recessing at 12:00 p.m.
--- Upon resuming at 1:00 p.m.

THE CHAIRPERSON: Okay. Welcome, everybody. My understanding is is we're going to have a presentation from MIPUG, Mr. Turner.

Ms. Southall, is that what's on now?

MS. ANITA SOUTHALL: Yes, Mr. Chairman, that's next.

THE CHAIRPERSON: Very good. Mr. Turner, anytime you're ready.

MR. ANTOINE HACAULT: There's just a preliminary matter. I think we've distributed to everybody a present -- presentation. And as a housekeeping matter, I -- I would suggest that we would mark that as MIPUG Exhibit 13. I think that's the next number.

THE CHAIRPERSON: Okay, that's fine.

--- EXHIBIT NO. MIPUG-B: Presentation

MS. PATTI RAMAGE: If -- if I could just jump in. I think it should probably be an exhibit for identification purposes because it's not actual evidence.

THE CHAIRPERSON: It's not evidence, right.

MR. ROBERT MAYER: Has anybody been keeping track of lettered exhibits, which is what do when they're for identification?

THE CHAIRPERSON: Just put ID behind it.

MS. PATTI RAMAGE: I was going to guess 'A' because I think it's the fir --

MR. BYRON WILLIAMS: 'B'.

MS. PATTI RAMAGE: Oh, 'B'?

MR. BYRON WILLIAMS: I think, but I think there's been one (1) before it.

MS. PATTI RAMAGE: See, we told Ms. Fernandez she didn't need to be here, and look what happened.

THE CHAIRPERSON: I'll defer to the legal beagles. Do we want 'B' or 13? We'll sort it out.

Mr. Hacault, do you have another introductions or can we go to Mr. Turner?

MR. ANTOINE HACAULT: No. So Mr.

Turner's a plant manager at Canexus in Brandon, and he's been the chairman of MIPUG since 2000. And it's my pleasure to introduce him this afternoon to make the presentation.

THE CHAIRPERSON: Okay, welcome again, Mr. Turner. Welcome back.

MR. BILL TURNER: Thank you.

THE CHAIRPERSON: Longest hearing that PUB has ever experienced, so it's good to see your face again. Do you -- you can start at any time, sir.

PRESENTATION BY MIPUG - MR. BILL TURNER:

MR. BILL TURNER: Okay. Good afternoon, Mr. Chairman and Vice-chair. As stated, my name is Bill Turmer -- Turner, and I am the plant manager at Canexus in Brandon. I have been the chairman of MIPUG since the year 2000. There is the slide presentation, and as we get into the slides I'll try and list the slide numbers so that I'll give a little bit more information and background to the slide itself.

Slide number 2; MIPUG's an association of ten (10) major industrial companies operating in Manitoba. Most of the members belong to the general service large greater than 100 kV class, while a few belong to the general service large, 30 to 100 kV class.

Presently, MIPUG member companies are Canexus Brandon, Vale Thompson, HudBay Minerals Flin Flon, Enbridge Southern Manitoba, Gerdau Ameristeel of Selkirk, ERCO Worldwide out of Hargrave, Coke Industries Brandon, Tolko Industries, The Pas, Griffin Wheel Company Winnipeg, and TransCanada Southern Manitoba Keystone.

We would like to thank the Board for the opportunity to address Intervenors, the Manitoba Hydro panel, and the Board itself today.

On slide number 3; first I'd like to start by noting some of the benefits MIPUG industries bring to Manitoba and Manitobans in general.

MIPUG Industries employ in excess of four thousand (4,000) people directly in the province; those are high value jobs. On average, wages and salary awarded by MIPUG Industries are over eighty-three thousand (83,000) per year, more than twice the average industrial wage in Manitoba, which is around forty thousand (40,000), according to employment standards Manitoba.

MIPUG industries have assets with a replacement value of over $2 billion in today's dollars and these assets must be maintained in order to keep production processes running.

In addition, MIPUG members support countless numbers of regional networks of secondary industries and contracting services and their employees through which MIPUG Industries order supply parts, materials, and professional and trade services.

Workers earning high industrial wages have spent money on retail goods and hospitality services in their communities. Indirectly, more employment opportunities are created in these sectors. Secondary economic benefits of MIPUG industries are difficult to measure, but they are important, especially when one considers the fact that most MIPUG industries are situated in rural and northern areas of the province.

Indust -- industries such as Vale, Tolko and HudBay Minerals account for a large part of the employment opportunities in the north. Municipalities in the provincial and federal governments benefit from MIPUG members as well. Corporate taxes are estimated to be in the range of seventy-five (75) and a hundred million.

Individual employees of MIPUG industries pay in excess of 50 million collectively to the provincial and federal governments in personal income taxes.

We have not completed a detailed survey in recent years. However, with Tembec shut down, I've used

approximate values. If anything, these are conservative values and probably would be higher if we did the full detailed analysis. MIPUG industries also make considerable donations to charities on an annual basis.

On slide 4; in order to contribute to Manitoba economy in the long run and remain competitive in a global marketplace, MIPUG industries must protect specific interests. These interests are related to the challenges they face.

The purpose of MIPUG is to allow industries to work together on issues related to rates and electricity supply in Manitoba. As such, MIPUG has participated as an Intervenor in Manitoba Hydro General Rate Applications since 1988, and the review of Centra Gas acquisition in 1999 and the review of Manitoba Hydro's major capital projects in 1990.

On slide 5; returning to the challenges faced by MIPUG industries, for the most part these challenges relate to being geographically isolated for markets. Reliable transportation networks to import raw materials for manufacturing are important. So is keeping avenues open to export goods to various markets.

We estimate that around 60 percent of MIPUG products are exported globally and that, overall, 90 percent of products made by MIPUG Industries are sold

outside of the province.

The steadily appreciating Canadian dollar also makes it difficult to keep manufacturing costs low and continue to be competitive. We will be elaborating on some of the specific challenges that we face here at Canexus later on in the presentation.

On slide 6, MIPUG industries must protect key interests in order to remain competitive in external markets. Access to a reliable sup -- supply of energy is critical to running production processes. Depending on the industry, interruptions in power supply can translate into thousands of dollars of lost revenue when a production line shuts down or causes spoilage.

Restarting the production line after shutdown can also be very costly. Part of the reliable energy is continuing on Manitoba Hydro -- is counting, pardon me, is counting on Manitoba Hydro to maintain and, when necessary, update their regeneration and transmission infrastructure.

Stable and predictable energy rates are critical. We all sign contracts with buyers every fiscal year and we must estimate our product prices based on our production costs knowing that we can rely on paying a certain amount of -- for energy is -- in a given year.

If rates were to fluctuate dramatically

from year to year, we would risk alienating our buyers, because that volatility would be reflected in our product prices.

Slide 7; MIPUG members look to ensure stable rates at the lowest reasonable cost. In this General Rate Application, as in the past rate applications, MIPUG has expressed an interest in keeping firm power rates relative to the cost of providing service to that specific class. Revenue-to-cost-coverage ratios for each class should be moved within the zone of reasonable at 95 to 105 percent. Currently we sit at 112 percent.

To keep rates predictable and stable, the Cost of Service Study should be a reliable, verifiable method of assessing costs for each class. Reviews of the Cost of Service Study and rate design should be conducted to ensure that they continue to be reasonable and appropriate.

Slide 8; the downturn of markets all over the word -- world in the fall of 2008 changed the economic landscape MIPUG industries operate in. The downturn placed significant market pressures on MIPUG members. As we've discussed in the hearing, the load growth initially projected in IFF-08 for the top twenty-six (26) consumers has been delayed by about fifteen (15)

years in IFF-10, a very significant change of circumstance from that originally forecasted.

In some cases, MIPUG members had to implement efficiency measures to maintain -- remain competitive and, in another case, a plant closure was scheduled. You'll be hearing about efficiencies and cost-cutting measures from another MIPUG presentation in June.

I'll just carry on then and talk about the -- the Canexus plant itself. Just -- I labelled mine just Stability of Hydro Power Cost and Reliability Essential to Viable Operation. That is reflective in most of the industries that are represented in MIPUG, and maybe moreso with industries like ourselves and the -- the ERCO plant at Hargrave.

Canexus, as well as all other chlorate producers utilizing the electrolytic process, we all have different processes, but they all relate to the same: It takes electricity to boil off water in order to produce our product. Electricity accounts for approximately 65 to 70 percent of our variable costs. That is a huge cost to any of our producers, and especially within the chlorate industry itself.

Salt is the next most costly raw material and accounts for approximately 18 percent of our variable

costs. The balance of our raw materials make up the remainder of the variable costs. Those other materials or some of the other products that we import into the Brandon plant, caustic and chlorine, soda ash and peroxide.

Where do these materials originate from, and how do we transport?

On page 11; salt, it's a residue of the potash industry. We consume approximately sixteen hundred (1,600) railcars per year, and we share that load between CN and CP Rail.

Caustic, which is manufactured in our Vancouver facility, there's approximately a hundred and sixty (160) railcars that are brought into our plant each year.

Chlorine, again, manufactured at our Vancouver facility, approximately seventy-five (75) railcars.

Peroxide, manufactured in British Columbia, and approximately forty-five (45) trucks per year.

Soda ash, manufactured in Wyoming, approximately twenty (20) trucks per year.

Something new that I put into the presentation this year is shown on -- on slide 12. This

gives a little bit better presentation of where the raw materials are actually coming from, and it was coincidence that we put a bigger triangle for the Hydro. That is our -- our largest cost raw material that goes into the manufacturing process, as you can see that we do have to transport these raw materials from fairly great distances abroad.

On 13; all Brandon chlorate produced is shipped by rail; that accounts for about thirty-three hundred (3,300) rail cars per year.

Brine sludge from cleaning up our salt supply is trucked to a secure landfill site at Virden, and that's approximately seventy-five (75) trucks per year.

Sulfate sludge is shipped in drums to Quebec for disposal, and that sulfate sludge can contain chrome, therefore, it's considered hazardous waste and we have to actually truck it to Quebec for disposal.

The next slide then, basically, shows where we ship our products to. We have a fairly wide and diverse portfolio of customers across mostly western Canada and into what I call that south-central eastern US part of North America. We do not export any of our product outside of North America, like our other facilities do, but Brandon's product basically goes from

coast to coast.

On 15; Brandon must compete with other Canexus plants, basically Nanaimo and Beauharnois. Brandon must also compete with other chlorate producers in North America: ERCO, Eka, Chemtrade, et cetera.

And on 16; you'll see where I've shown some of the other competitor plans that -- where we have to work and market our product to be -- remain competitive and stay viable in an operation. A fairly diverse group of companies, especially on the eastern seaboard, some out west, and the one in Saskatchewan.

On 17; chlorate competitiveness is determined by three (3) key considerations: power price stability and availability; salt price and availability; transportation to markets. Of the three (3), power is the most important due to the large volumes required for electrolysis. Canexus consumes about $49 million per year of Manitoba Hydro power, and we strive to utilize power efficiently.

We're continually trying to upgrade our process and approve the operation of that process. And when we talk about energy consumption, we talk about kilowatt hours per tonne of product produced. We have been able to improve our efficiency and reduce the power that we bring into the plant by about 250 kilowatt hours

per tonne; that's a fairly large volume of electricity that we have saved over the years by implementing energy efficiency within the plant site.

Canexus is one (1) of Manitoba Hydro's largest DSM customers. We can supply Manitoba Hydro with 168 megawatts of short notice curtailment. Basically, there's three (3) -- three (3) types of -- of curtailment; the 'A' -- we utilize the 'A' and the 'R' within Brandon. On five (5) minutes notice we can shut down and give Manitoba Hydro the power that they need to satisfy their demands for reliability and/or export.

Canexus and Manitoba Hydro have worked well together to make this a win/win program for both parties. And I say that with all sincerity because it has been a lot of work to develop the programs that we've got. And we've had to work out some of the wrinkles in it over the years, but, overall, it has been an excellent program for both parties.

In 2010 Canexus achieved an all time high production record exceeding three hundred thousand (300,000) tonnes up here, and mostly that was exported to the USA.

Canexus currently has several large projects in -- in stages of development, working with Manitoba Hydro to replace the hydro line between Canexus

and the GS to allow more consistent power loading.

Currently, we do get trimmed back if -- if there is a shortage of power in southwestern Manitoba. Hopefully this line replacement then will alleviate that and we can run a more steady operation. Once completed, it will allow Canexus to increase plant capacity and allow load swings in the facility to improve the operating efficiency. And that's one (1) of our goals is to try to further improve the efficiency of the operation so that we consume less electrical energy.

Our goal is to operate at a low kilowatt per tonne to reduce variable costs and minimize hydro waste. And I think that's the end of the presentation unless you have some questions.

Questioned by the Board:

THE CHAIRPERSON: Thank you, Mr. Turner. I do have a few, if you don't mind. And since we didn't give you any notification that we might have a few questions, if you're unable to respond, we'll understand.

With respect -- just taking the opportunity to the fact that you're here, with respect to the energy intensive industrial rate proposal, what feedback has MIPUG received from its members on the -- on the proposal before it?

MR. BILL TURNER: We're currently working with Manitoba Hydro on an alternate to the original EIIR rate. And I think at this point in time we're still having meetings. We just had another meeting here this week. We seem to be having meetings on a monthly basis trying to get to that point of -- of getting consensus between all the groups.

THE CHAIRPERSON: Does MIPUG support the original premise that under an EIIR scheme industrial consumption growth should come at the marginal cost of electricity?

MR. BILL TURNER: As a group, we're looking at the -- the time-of-use rate as a better means of controlling that -- that cost impact.

MR. ROBERT MAYER: We -- we've heard from other members of MIPUG that that's not a unanimous position. I believe when we last heard from Vale, they indicated that time of use was not helpful at all to them.

Now, that may not be an issue in four and a half (4 1/2) years from now when they shut down their refinery and the smelter, but are the rest of your members of the same view as you?

MR. BILL TURNER: I would rather go back to our intergroup and -- and poll all the members again -

- once again. And if you would like that answer, we can get it for you.

MR. ROBERT MAYER: I'm not sure how relevant it was. I -- if you had it off the top of your head, I would -- that would have been fine, but I -- I'm not going to ask you to go and poll everybody.

MR. BILL TURNER: Okay.

THE CHAIRPERSON: If there is to be consumption baselines established, how does MIPUG consider it be done; like percentage of historical consumption, credits for past DSM savings, upward adjustments to the baseline to account for greenhouse gas reduction initiatives, downward adjustments to the baseline for operational cutbacks?

Do you have any comments on that issue?

MR. BILL TURNER: Baseline numbers are difficult to -- to I think -- rate, I think for each individual industry. We've -- we've looked at consumptions over the years and trying to come up with that baseline is very, very difficult.

THE CHAIRPERSON: Does MIPUG have a position on new industry, or major new industrial expansion being assigned a -- a minimum consumption baseline?

MR. BILL TURNER: That, I think, has to

be determined yet.

THE CHAIRPERSON: You answered the other question that you had -- in a sense you've basically used your previous economic impact study.

You haven't done a new one (1) since?

MR. BILL TURNER: We haven't done a new one (1) since then, no.

THE CHAIRPERSON: Has Hydro proposed a new or amended Service Extension Policy to MIPUG?

MR. BILL TURNER: We've -- we've just started looking at that over the last two (2) meetings that we've had.

THE CHAIRPERSON: So that's an ongoing issue too as well?

MR. BILL TURNER: Yes, it is.

THE CHAIRPERSON: Does MIPUG appreciate IM -- or Manitoba Hydro's IIF-09/01 Financial Forecast Projection that average domestic rates would raise by -- rise by 66 percent by 2029?

MR. BILL TURNER: I would rather get the formal group to -- to respond to that.

THE CHAIRPERSON: Because we were wondering what MIPUG's view would be on the implications of such an increase, although, it's over a lengthy period of time.

MR. BILL TURNER: I would say it's high. It appears high, but I would rather -- rather have the group make a formal presentation on it.

THE CHAIRPERSON: It's not part of an application, it's just, you know, they -- they take a twenty (20) year outlook and look at it from that point of view.

You already answered the other question we had for it, you're still looking at the zone of reasonableness and wanting it to fit within the existing arrangement, correct?

MR. BILL TURNER: Right.

THE CHAIRPERSON: In this hearing you have agreed with the information that we've received at this hearing as well, that the forecast for industrial consumption has -- has been revised.

Do you have a view as to industrial growth going forward? In your presentation you talk about a fifteen (15) year deferral.

MR. BILL TURNER: Yeah, we -- I can talk about Canexus. We -- we did have to reduce rates in -- in 2009 and early 2010. I think there -- there has been some increase in some of the -- the smaller industries within Manitoba, but as a large general huge jump in increase, I personally don't -- don't think that that's

going to be happening.

THE CHAIRPERSON: Because you're -- you're slide talks about a fifteen (15) year --

MR. BILL TURNER: Yeah.

THE CHAIRPERSON: -- basically deferral as well, and that's -- does that take into account the HudBay and Vale --

MR. BILL TURNER: I think that -- that was reported by Vince Warden in one (1) of his --

THE CHAIRPERSON: So you've got it incorporated in your charts --

MR. BILL TURNER: Yes.

THE CHAIRPERSON: -- too? Okay.

MR. BILL TURNER: Yep.

THE CHAIRPERSON: Would MIPUG agree that events since IFF-09 was released, included a number of different events; like major increases in the forecasts for capital expenditures, a drop in opportunity electricity export prices fall off and natural gas prices. You refer to it in your brief, significant changes in the exchange rate with the US dollar. The industrial load, you've confirmed, and the fact that the term sheets have yet to be converted into firm contracts.

You're aware of all of these events?

MR. BILL TURNER: Yes.

THE CHAIRPERSON: Does MIPUG have a view on Manitoba Hydro's preferred Development Plan?

MR. BILL TURNER: I think we recognize that the industry has to grow eventually and that -- that we've seen over the years that -- that as domestic load increases, that Manitoba Hydro is going to have to expand as well.

THE CHAIRPERSON: You haven't put a lot of analysis into their -- the relative -- or the projections that surround the preferred development plan then?

MR. BILL TURNER: No.

THE CHAIRPERSON: The im -- potential impact for rates and things of that nature?

MR. BILL TURNER: There -- there's been some by our intergroup people, but I personally haven't delved into it that deeply.

THE CHAIRPERSON: Over the last, I think it's seven (7) or eight (8) years now, domestic customers have received across-the-board rate increases.

MIPUG doesn't prefer that particular approach; is that correct?

MR. BILL TURNER: I --

THE CHAIRPERSON: I'm referring back. I'm not -- it's not a trick question, because you were

talking about getting back within the zone. So if you were going to go --

MR. BILL TURNER: Right.

THE CHAIRPERSON: -- within the zone of reasonableness, one couldn't just continue with across-the-board increases.

MR. BILL TURNER: I think increases are a fact of doing business. Cost of living does go up every year. We find that in -- in our industry as well, so you expect some -- some degree of increase.

THE CHAIRPERSON: Does MIPUG accept that factors other than costs should be taken into consideration in setting rates for various classes?

MR. BILL TURNER: What would you include as "others"?

THE CHAIRPERSON: Environmental matters, things of that -- that nature.

MR. BILL TURNER: I think that would have to be reviewed as a group to -- to come up with a consensus amongst our group as well.

MR. ANTOINE HACAULT: Mr. Chair, if there's any of these questions which you feel you wish to have additional information which can't be answered today, we'd be more than happy to take those questions and provide responses, if that's the Chair's wish.

THE CHAIRPERSON: Okay. We'll --

MR. ANTOINE HACAULT: Just trying to be helpful.

THE CHAIRPERSON: We'll -- we'll think on that. Does MIPUG have any views on the relative cost allocation of incremental new generation and transmission revenue requirement between the various classes?

MR. BILL TURNER: I think that -- that is a part of the ongoing discussion on the time-of-use rate structures and that.

THE CHAIRPERSON: If demand concessions sought by a limited number of firms are made permanent, does MIPUG have a view on how the cost of those forgiveness, if you like, would be allocated among the various industrial classes and the cost of service?

MR. BILL TURNER: We, as a group, have not sat down and come up with a definitive answer on that, and I think if that's -- again, if that's a -- a question that you would like an answer on, we can meet as a group and -- and supply you with a formal response.

THE CHAIRPERSON: I think that would fall into Mr. Hacault's suggestions.

MR. BILL TURNER: Right.

THE CHAIRPERSON: Does your group support a variance from a long-accepted practice of an energy and

demand charge for electricity?

MR. BILL TURNER: Again, I'd want the group to -- the -- these are questions that we may not discuss on a -- on a monthly basis when we're in communication with one another.

THE CHAIRPERSON: We just thought we'd take advantage of the fact that you took the time to come down. We appreciate that.

Do you have anything else, Mr. Mayer?

MR. ROBERT MAYER: Yeah. More of a comment than -- than a question. I noted with interest on -- on page 18 that Canexus achieved an all-time high production record --

MR. BILL TURNER: Yes.

MR. ROBERT MAYER: -- in your output. I'm assuming that, at least for Canexus, any effects of the recession appear to have disappeared.

MR. BILL TURNER: This -- this past year was unique. We did have some curtailment in January, but after that point in time, then we did start to pick up a lot of our production capacity.

A couple of other things happened as well. One (1), we're limited by cooling, and if it starts to get a little bit hot or extremely cold, that does affect our production limits drastically. This past year

temperature-wise, we had all the stars aligned and -- and we were able to maintain a higher production rate than normal.

THE CHAIRPERSON: Thank you very much, Mr. Turner.

MR. BILL TURNER: Thank you.

THE CHAIRPERSON: We appreciate your presence and participation.

So we'll go back to Dr. Kubursi and Dr. Magee.

(BRIEF PAUSE)

INDEPENDENT EXPERTS PANEL RESUMED:

DR. ATIF KUBURSI, Resumed

DR. LONNIE MAGEE, Resumed

THE CHAIRPERSON: Any time, Mr. Wood.

MR. GAVIN WOOD: Thank you.

CONTINUED EXAMINATION BY MR. GAVIN WOOD:

MR. GAVIN WOOD: Picking up where we left off at section 6C of the Direction Examination, and specifically now to page 17 of the KM Report.

There's a number of findings, Dr. Magee, at that page with regards to a whole listing of improvements that you and Dr. Kubursi were suggesting in the report.

Would you briefly describe the principal ones of those to the Board?

DR. LONNIE MAGEE: Yes. There are, in our view, no -- no grounds to believe that there exists a serious material risk for blackouts in Manitoba. The financial losses stemming from a severe drought are large, can deplete accumulated retained earnings of Manitoba Hydro in less than three (3) years.

Regarding the models, we feel there -- the models are serving their purposes and can be relied upon for operational planning and long-term planning. We recommend certain courses of action for improvement -- further improvement, upgrades, authentication procedures, documentation, and integration of the models. We deal with that in more detail later.

The middle office is evolving, and we recommend that it be placed directly in the office of the senior vice-president for administration and finance and be charged with reviewing and quantifying all risks, including long-term contract risks.

Regarding the long-term contracts, we feel

they're -- they're well structured. We would like to see them staggered over time and diversified over a larger group of counterparties, recognising the challenges involved there.

And our exercise where we -- we quantify the -- the risks, we emphasise that the combination of -- of drought and high import prices is -- is -- that high import prices really compounds the negative impacts of drought, and so we show that effect without attempting to nail down a probability of such an event occurring.

There -- there are other -- oh, I have a few more. We argue in favour of trying to avoid massive borrowing. Having said that, we recognize that expansion of the system is necessary. The capital will be needed. And we -- we are in favour of a flexible view regarding the timing and the -- the scale of -- of the expansions.

MR. GAVIN WOOD: Thank you. Turning next to section 7 of the direct examination. Dr. Kurbursi, there's a appendix A to the report at page 290.

Would you explain the -- the purpose of -- of that appendix and -- and what it's specifically structured to carry out.

DR. ATIF KUBURSI: Yes. It concerns what we call risk eversion. Why are people risk adverse? And this has come from a mathematician called Bernoulli who

was actually explaining issues of why people have different appreciation or willingness to pay different amounts for a gamble.

His major insight was that value does not depend on price but on utility. The price is the same for everybody, but utility and the way people value things depends on their own circumstances and their own appreciation of things. But he gained basically two (2) insights.

He felt that this diversion between utility and value and utility and price comes from two (2) things; one, people have different aversions to risk, and as long as they have different appreciation of race and willingness to pay for it, and, two, that there is something called declining margin utility of wealth, which means that every additional unit of income or wealth would give positive utility, people appreciate it, but it increases at a decreasing rate.

And because of these two (2), people are -- feel differently about a dollar increase that they would gain than a dollar loss. People find it more painful to lose a dollar than to gain a dollar. And as long as this is true it really means that they will not enter into a fair gamble where the utility of loss is equal to the utility of gain.

They will be only prepared to enter into a gamble if the utility of a gain exceeds the utility of a loss. And the reason for this is because they value the dollar that they gain far less than the dollar they lose. And this risk aversion is at the very heart of what we were arguing in the first chapter, that maybe different circumstances for different individuals, and yet this aversion is different for the Utility than the citizens.

And then the issue would be to what extent can we arrange it in a manner that would make the Utility behave with respect to its risk evaluation, and risk exposure, and risk appetite in a way that would correspond and parallel those that are the risk aversion appetite of the people who are typically more conservative and typically more risk averse.

MR. GAVIN WOOD: Thank you. Turning now to the actual terms of reference and -- and the -- the chapters dealing with them as -- as were set out earlier at section 6-A of the -- of the direct-examination, and firstly now to Chapter 2.

Would you, Dr. Kubursi, summarize the first part of that chapter, Chapters 2.1 through 2.4?

DR. ATIF KUBURSI: Well, the first thing we started with is that now there is an increased recognition at every enterprise that business resilience

and business operations depend heavily on the appreciation of risk exposure and the ability of enterprise to manage its risks appropriately.

The whole study begins with what we call a Plato's dictum in the sense that the future carries more possibilities than would happen. And, therefore, prudence and prudent behaviour would take into account more possible outcomes in the future than would occur, and prepare for these adverse possibilities, because risk is about uncertainty, about inability to predict accurately the future.

And it's also about the fact that an action or inaction may affect outcomes of business objectives in an adverse way. And the way to deal with it would be to assess the likelihood of this and the consequences that would occur or would follow from this risk event occurring.

What we tried to do is -- as -- as much as possible -- to assess what we considered to be the best practice, and particularly best practice in other utilities. There is here a recognition right at the outset that there is no one-size-fits-all, and that there are different circumstances, and that these have to be taken into account.

A utility that depends on thermal does not

have the same risk exposure than one (1) that depends on volumetric amounts of water. And what we began saying there are certain steps and, and certain appreciations, and certain strategies that enterprise risk management will take into account, but this is not a one (1) shot deal. This is not window dressing.

This is about being a systematic process that would identify, assess, quantify, prioritize, mitigate, control, all significant risks, with a view to optimizing the balance between risk and return. That this is not that you continue to do -- I mean, if everybody would think about the possible risks and taking every risk into account, people would stay at home, would never do anything.

This is about, basically and fundamentally, assessing, identifying, measuring, and a way to optimize the balance between this risk course and returns. And this is -- as I said, this is a semantic thing. It's not something you do once, you do haphazardly, you do any way just to satisfy certain cosmetic things. It's serious things.

It begins with risk maps, and this is something that is quite important. You might want to qualify things in the sense that you put two (2) parameters and you put every event that is likely to

affect you on this map by trying to say every point on that map would have a probability of occurrence and has also a consequence. And then you try to see to what extent you can -- instead of looking at everything equally, to prioritize, to rank, and there you would find that you want to go to control maps.

Certain risks that you -- are part of your daily life and they're not going to have very large material consequences, you might as not -- might as well not spend too much time and money on these types of risk, but there are certain risks that have high probability of occurrence and can have very large consequences, and these have to receive a greater priority, more interest, more resources, more focus than the lower ones.

But there are also a few things that one needs to take into account when your prioritize these things, and it should not be just purely on issues of colour-coding and judgmental and emotional perception and digestion. Ultimately, risk management is about numerical quantification, that you need to basically and fundamentally be able to be in a position to assign a particular probability and looking at the distribution and see how this probability at the ninety-five (95) level, confidence level, or 5 percent, what would it entail.

It would also mean that you have to always assign responsibility for these risks. I mean, one (1) thing that we found to be extremely important, and one that we would recommend very strongly, is to have what we call the risk-assignment matrix. There should be, to every risk, a sense of ownership, that this begins at this level, and Mr. So-and-So or Ms. So-and-So would be responsible for it, and that there is these correspondences, and people know exactly what to do, and they have exact and clear procedures as how to report these risks and how to deal with these risks.

And we have also said that you don't do these things just as a matter of course or routine, that you have to have a purpose. You ultimately want to be in a position where you devise strategies to mitigate, deal, and spend resources, and be in a position to deal with it.

You also have to continuously monitor, track these components that work for you. This is not something you do once; you learn, you fine tune, you continue the evolving process. I mean, this is something that we also notice, that MH has an evolving system, and that it's growing and that there is now greater clarity and more focus, and this is something that has to continue and is something that we would encourage that it

would continue to be done.

What is also important for us is that you have to have a clear governance structure, that now it's taken for granted that there is a front office, a back office, and a middle office, and there is now a general recognition that the middle office would be the one entrusted with this.

And the story is that you need always cross-check. There should be checks and balances. It can't be done at the front office only; it has to be vetted, verified, and responded to by the middle office. And that this middle office position is quite important. It's not that it should be done at the middle office, but where in the middle office counts quite a bit.

Most corporations who have taken the risk management seriously have elevated the risk management to the top level. It has to be on the organization organogram or whatever word it is at the top level, in the senior vice-president office, and directly reporting to the senior vice-president's office, and that there is very clear lines of reporting and decision making.

It also takes into account that there should be preparation plans, and this is not just the drought preparation plan, but risk-preparations plans, in the sense that each and every unit of the organization

dealing with risk must know, must have drills, and they should go through these exercises.

And, also, risk management is a very professional thing. I mean, it would require statisticians, econometricians, and people that are called subject-matter experts. And the organization can benefit and would find it worthwhile expenditure of resources on beefing up the skill sets of people who can identify, quantify, monitor, and deal with risk.

And that the story is then we went and tried to see that if this best practice section that I've talked about were applied to the Manitoba Hydro on a piece-by-piece basis, on a point-by-point basis, how does the picture come about? We were happy with what Ma -- Manitoba Hydro is doing. We'd be happier to see it assign a responsibility matrix. That's something we did not find.

We would be far happier to see that there's an individual-responsibility matrix that we know corresponding to every risk, even in the CRMC, the Corporate Risk Management Report, that there would be a person or a name or an office corresponding to every colour-coded things that would report to the vice-president or the manage -- you know, the front office and to the corresponding middle office people.

We would be very happy to see that the MCP, which has really been a major contribution, and evolving one, and -- and a step in the right direction, where you have defined stop losses or statute of limitations and exact restrictions, that this would become part and parcel of the overall organization, and this kind of MCP -- MCP would be available to every other structure.

We want a beefing up of the middle office. We want --

MR. GAVIN WOOD: And -- and maybe -- I see you've turned the page again in the direct. Just -- just so that, for the record, we're all with you, you've now gone on to the recommendations --

DR. ATIF KUBURSI: Yeah, I'm -- I'm beginning with the recommendations.

MR. GAVIN WOOD: Right, at Chapter 2.5, which --

DR. ATIF KUBURSI: Right.

MR. GAVIN WOOD: -- which runs pages 47 through 51. And I think you're trying to -- not the -- the whole list of them, but just the major ones that --

DR. ATIF KUBURSI: No, no, just the most -- the major one. The -- the -- as I said, I mean, we find it extremely important that there would be an

individual responsibility matrix. We felt like the middle office should be beefed up, should be elevated to the highest level.

We also wanted to emphasize that you have the tools, you have already PRISM. You need to get also some other tools of risk that are coming on the market that would be also important to -- to put up. You have to beef the skill set of statisticians, econometricians.

Okay, forget the econometrician; get statisticians, but people whose life depend on estimating properly probabilities. And that is really quite important, and measures, back-to-market measures so that it's always at replacement cost, at market costs, and that this issue of SMEs, in every single corner there -- there would be a recognizable subject-matter expert that will be dealing with these things.

I can go on. We have about fifteen (15), but I'm sure you've seen them in the report.

MR. GAVIN WOOD: Yeah, and -- and they're set -- it's set forth there. Thank you. Turning next to Chapter 3 of the report beginning at page 52. This is at page 30 of the -- page -- page 30 of the direct examination at the bottom of the page there.

Dr. Magee, I -- I appreciate there's been earlier references to Manitoba Hydro models. I wonder if

you would briefly set out the -- the role of models and their importance for Manitoba Hydro as you -- you and Dr. Kubursi perceive it.

DR. LONNIE MAGEE: Yes, the models are used for operational and planning purposes. And they can be ordered across a spectrum, from -- or -- or some of them can, from short-term operational reasons or -- or uses to long-term planning uses. The -- these models all involve linear programming, which I think could be -- you could describe briefly as the -- involving relationships that are modelled linearly, but that have -- get cut off at certain points, so just the -- they're -- they're not straight lines that go on forever. It matters which -- when they cross, or whether one (1) is bigger than a certain number or not. And that's because of the nature of the -- the hydrological system, so they all share that aspect.

The short-term operational models need to be -- the relationships that are in the models that are programmed into computers that crunch the numbers have to be very accurate. And that's the -- the MO -- MOST is the name of the model, M-O-S-T, that is used for that purpose. And because of that it's -- the people that work the most with that are -- are located over in the -- the control centre.

And then moving into the longer-term models, the -- the equations, because they're describing relationships over longer periods of time by, you know -- cannot be as accurate, but they're still accurate enough for planning purposes and some of the -- most -- a lot of the inaccuracies that some of the variables that matter aren't known yet because they have to be -- we -- you know, they -- they occur in the future, like prices and interest rates and so on, and -- and water flows.

So moving into the long term then, generally the -- the programs, the models, are used more for planning purposes to see what would happen if we did this, what would the average outcome be, or the outcome over a variety of scenarios.

And so moving from the shortest-term model MOST, the operational one, to HERMES is the next one down the -- the spectrum, and then SPLASH is the -- the -- the next one down, SPLASH for longer-term planning, and then there's another one (1) that we looked at called PRISM, which is a -- has a more probabilistic structure built into it which is used for load forecasting and risk quantification.

MR. GAVIN WOOD: Thank you. Dr. Kubursi, you wish to comment on the -- the whole issue of Manitoba Hydro models as well?

DR. ATIF KUBURSI: Yeah, I mean, we ought to recognize that models at their best are simplifications. They're abstractions, generalizations. They cannot in any way capture the complexity of the underlying system. And specifically in economics and in ecology they are small changes. They're very sensitive to small changes in the sense that most of the systems depend on balances, equilibrium of opposing forces.

And then any minor little change would have a magnified effect on -- on the systems. And as such, one -- one has to be quite careful about the extent to which one relies on a model. There is no question about it that no person, no -- or persons, no matter how large the set may be, could replace a model. I mean there is no way in which persons, no matter what their expertise and experience can deal with such complex systems and -- I mean, HERMES, you are talking about seven thousand (7,000) more equations.

I mean, no person, no mind could possibly process these things. These are indispensable tools. We have recognized this and we were quite happy that they're being done. Now they're not only SPLASH, or MOST, or HERMES, we also have the load forecasting. We have the economic outlook. I mean, you have a whole family of models at Manitoba Hydro.

And the issue is that how do these models fit with one another. How do they speak to one another. How do they lie on that spectrum and how do the cohere together. These were the kind of questions that we were quite interested in.

And -- and most we recognize, I mean, these are really about hourly things, they check even twice an hour. And these are basically control and operation. When it comes to HERMES they are a little bit longer, but they have different time strips, but they -- still they are intermediate models. And then you go to SPLASH as Lonnie mentioned, you're talking about forty (40) years horizon and you're talking about a complete different use of the system, and that these multi-purposes may differentiate these models, but does this mean that they should be separate systems?

I mean, we came in and we tendered here a proposition, that these models need to cohere with one another, and that there is a community of modellers, that they should be speaking to each other, learning from one another, that there are economies of scale and scope from getting these people together.

We also felt that if you have different parameters in these models, and -- and sometimes it's necessary from these models. All right. I mean, the one

that, for example, NYC had mentioned is that the energy efficiency coefficient that translates water or head into power -- water flow into power. It's different in HERMES than it's in SPLASH.

Well, first of all, this is a non-linear relationship. I mean, if you look at the forebay minus the tail race times that efficiency divided by the quantity you put through, I mean, it's a non-linear system. It's a linear model; you have to linearize. HERMES keeps running them until they converge; SPLASH, they average them over the month. It's impossible to believe that the same coefficients are going to be the same for -- for both models, but these two (2) coefficients have risen and have awakened or have raised questions: Ah, the two (2) system may be incoherent and inconsistent. I mean, this perception, even when it's on a minor level, is something that would call that you want to look around and see to what extent you want to cohere the system.

You want also to make sure that they have and they're based on common sets of assumptions. You can't have perfect foresight in one and then another one source for late balances at the end as a solution of an optimization problem. I mean, there are issues, and we wanted to be helpful.

I mean, we felt that the systems at Manitoba Hydro are well done. They're run by excellent people, knowledgeable people with lots of expertise, commitment, dedication, and knowledge, but we wanted this to be more codified, we want it to be more documented, we want it to be vetted.

We felt that sometimes, because they're homegrown -- which makes it so easy because it's now a sense of ownership is defined over these models. But then, because they're homegrown, they need to be verified, validated, vetted with external authorities. We recommended that these would be subjected to continuous testing validation by outside and internal people, and that we create a community of modellers so they can learn from each other.

And we felt that -- and we tendered a very heuristic things in one (1) of our appendices -- I believe it's Appendix B, isn't it? Where we -- we -- we felt like maybe you could put all these things together, and we wanted to go beyond the linear specification. We felt like there's so many non-linear propositions that have been approximated linearly by successive iterations of running. Well, why don't you go directly to a non-linear system?

We felt that most of these models are

basically and fundamentally deterministic, but now you have PRISM. Instead of entering an array of prices, why don't you enter it as a probability distribution? Try to see if you can capture some of these uncertainties into the system, so it -- it's no longer just purely a linear and a deterministic model that may be some non-linear.

Now, we recognize -- we're -- we're not oblivious to this, you know, Lonnie and I have worked with these models -- that if you go to a non-linear system, it's far more difficult than a linear system. But increasingly, incredible new improvements have been made on some of these solvers. The World Bank uses GAMS, general applied mathematical systems; Tinbergen Group in Holland, they use AIMMS, A-I-M-M-S, and -- and these are huge solvers that are for non-linear systems.

You might have to cut maybe the size, but, my God, I believe maybe it's worth the price. You get non-linear results, because, you see, the system, you have options. Every time you use water, you could store it up to a limit, you could sell it, you know -- you know, I mean, you could let it through the system, you could spill it. I mean, the fact that you have to worry from one (1) period to the other, from one (1) season to the other, sometimes from one (1) week to the other, from one (1) hour to the other. You have a string of some

dynamic things. You -- you can model them by strips, time strips. And, Gavin, I see you would recognize this. But it would make a lot of sense if you have a dynamic balance system so that, you know, this is the amount of water that goes out, this is the amount that comes in, this is the precipitation.

I mean, you could model these things on a continuous-time basis. It makes a lot of sense. And if you can really introduce the element of uncertainty it would make a lot more sense. It may be more expensive. It may really require that you move out from the black box that you're on, but that's really maybe the price of progress, and then this is the way we evolve, this is the way we move forward.

And we would like, at least on a experimentation basis, that some of these ta -- you know, propositions to be entertained, to be taken into -- into account. Now --

MR. GAVIN WOOD: And -- and possibly, unless there's anything specifically further on -- by way of overall comment --

DR. ATIF KUBURSI: Well, I mean, you know, they have so -- so many models and --

MR. GAVIN WOOD: I -- I appreciate. And just -- just for everyone to be with us, at the bottom of

page 32 through to page 37 of the direct examination there's then a cross reference to a number of pages in the -- the KM Report where the -- the different models that you've just been referring to, gentlemen, are -- are detailed. And there's a set of more specific --

DR. ATIF KUBURSI: Recommendations.

MR. GAVIN WOOD: -- recommendations for each of those models. That -- that's certainly correct.

Could you tell me in -- in terms of what has -- has just been said by Dr. Kubursi in terms of the specific individual models, is there anything that stands out in that series of recommendations, or did they -- they largely stand ba -- based on what's set out in -- in your report and -- and as we've -- we've summarized in the -- in the direct examination, please?

DR. ATIF KUBURSI: I mean, no -- no question, I mean, we have -- like on page 33 and 34 in our report we have tendered some very specific recommendations on each of the systems, and then in combination. And these are already there, and I -- I don't need to maybe bother and bore my colleagues with.

But definitely, if I want to use some buzzwords here, I want coherence, consistency across models. I want a community of modelers. I want outside vetting and verification. I want, you know, development

of skills and legacy so that if one (1) person goes to the others, I don't want these models to remain as black boxes. I want basically come codification and documentation.

These are, you know, like bread and butter in terms of the modelling community. And I'm not in any way saying that Manitoba Hydro has any lack of recognition here. Maybe it's about resource a location. Maybe it's about making some steps into that direction, but this would be, in our view, quite helpful steps.

MR. GAVIN WOOD: And, Dr. Magee, is -- is there anything that strikes you particularly in terms of the series of specific recommendations concerning the various models that you would want to emphasize from either the KM Report or -- or from the -- the direct examination?

DR. LONNIE MAGEE: No comments regarding specific models, no.

MR. GAVIN WOOD: Let me then turn to section --

THE CHAIRPERSON: Mr. Wood, if you don't mind. Absent the reconation -- recognition and implemation -- implementation of your suggestions, would you consider it prudent to proceed with the preferred development plan?

DR. ATIF KUBURSI: In thi -- Mr. Chairman, I mean, this is, you know, a quite legitimate concern, I mean, in -- in the sense that what you are doing, we're really going from a Chrysler to a Cadillac. The Chrysler will take you to where you're going, but the Cadillac would get you more comfortable and probably a more predictable one because the Chrysler might break on you on the road.

I mean, in some sense -- I'm not saying anything bad about Chrysler here, okay, but -- okay, I -- I will use Volkswagen. Okay, but the point that is -- all right. But in some sense here, the issue of probabilistic models when you're talking about the future is something I feel strongly about.

I find that deterministic models, even when you entertain a number of -- and this is done at an -- of scenarios where you probe different things, that's fine, but these scenarios, unfortunately, they become arbitrary.

I mean, what is a pessimistic scenario. Who is determining what is this pessimistic or what is optimistic. I would have preferred that it would let this to be decided by a probability distribution, of all possible cases, a Monte Carlo thousand ones, then I feel a little bit more comfortable that I have mapped this --

all the possible alternatives that are likely to come, and what would be my proclivity to do something with a 5 percent or 95 percent level of confidence that what I'm doing is right on what I consider to be a safe proposition.

MR. GAVIN WOOD: Thank you. Turning then to page 37 of the direct-examination, Dr. Magee, and to section 9(g), please -- or pardon me, 9(f) first of all. This starts at page 104 in the KM Report. As -- as you can see, it's -- it's set out in the direct-examination.

Would you explain the electric load forecast role with Manitoba Hydro as you -- you refer to it in the -- in the -- the report and in the direct-examination?

DR. LONNIE MAGEE: The -- the load forecasts are crucial for planning purposes because of the central mandate of Hydro, the Utility to meet the -- the domestic load. So they have a -- a number of -- of regression models, principally that use information from a lot of surveys, technical and engineering information about changes in, you know, what the -- the -- the energy use of different kinds of appliances and so on, population growth and so on to project in -- what -- what the load is going to be.

And we were generally quite happy with --

with what we saw in that regard. Our suggestions would be 1) is to -- they -- they could experiment further with different specifications of the regressions and more --

MR. GAVIN WOOD: And -- and -- and, Dr, Magee, here --

DR. LONNIE MAGEE: Yes.

MR. GAVIN WOOD: -- every -- everyone is going on to --

DR. LONNIE MAGEE: Oh, sorry.

MR. GAVIN WOOD: -- page 116 of the report. Sorry to interrupt.

DR. LONNIE MAGEE: Okay. Regression is a -- is a linear equation that -- that's used to predict one (1) variable as a function of a -- a number of other variables. So, it's choosing these other variables that predict the one (1), which would be the load, is -- is the issue here, where different specifications could -- could be considered.

The -- also in -- in -- in thinking about how accurate -- excuse me, the predictions are, there's an extra source of uncertainty in -- in the predictions that comes from the fact that the coefficients in the regression models have to be estimated, and that source of uncertainty could be easily incorporated in their procedures. It would probably only have a small effect.

We would like -- this is linking back to Atif's point about bringing the -- the different model groups together more, that the load forecast group could be -- become part of this model -- a bigger part of this model community group and interact more with the other modelers.

One (1) of the -- weather is another variable that -- as -- as an example of one (1) of the other explanatory variables that even though it's hard to predict, it could be used as a -- as a variable in these procedures as a predictor.

MR. GAVIN WOOD: Thank you. And then, Dr. Kubursi, at section 9H, I'd ask you to comment on the overall recommendations as well, please.

DR. ATIF KUBURSI: I mean, two (2) things I'd like to add to Lonnie's points. He mentioned most of them. I would like to note with approval, and -- and we were quite satisfied that, in the load forecasting, there was an attempt here to survey households and know the vintage of the machinery and appliances, and incorporate this technical information in the forecast, and -- and -- and we note with satisfaction that this would be great.

There was an attempt on the part of people with the load forecast to -- to -- to map things by looking at the standard, at this is the error around the

coefficients from these regressions. We thought that was great, but it has to be also brought into with PRISM maybe, with the Monte Carlo routine on the possible outcomes that would come if you were to use a more generalized probing of the differences in the forecast. I thought that would really be, you know, quite helpful.

Weather is -- is -- is another thing. You know, I mean, the demand and load, you know, especially in the province of Manitoba, is very sensitive to climate, weather, to degree days and heating degree days. The involvement -- we saw that some equations had the weather but others not. It would be good -- it would make good practice if we were to use weather variables in all these equations. They're so crucial determinants of -- of -- of this, and especially that in HERMES you -- you get quite a bit of that.

MR. GAVIN WOOD: Thank you. Just briefly, this is the first time in the Direct Examination at top of page 39, we reference -- there was a series of response papers that were done.

Dr. Kubursi, it -- it references there pages 3 through 6 of the -- of section D of the response papers. This is dealing in response to the rebuttal that Manitoba Hydro had done, and this is now specifically with regards to the models, page 3 of that document,

please.

Just to be -- just so that the -- the panel -- the Board understands, why did Dr. Magee and yourself take some additional time to respond to Manitoba Hydro's rebuttal on the models and, more generally, on a number of matters that Manitoba Hydro had -- had raised after reviewing the KM Report? Why, in general, did you take that further time?

DR. ATIF KUBURSI: There were a number of issues that we wanted to maybe focus on and redirect the energies towards, all right? One (1) -- one (1) -- I take one (1) example. At one time, you know, we felt like precipitation is an important variable, all right? It -- it's -- especially month by month and for any knowledge of what will probably be transpiring, say, in April, and then what will happen if we were to look at the spring rain, that somehow some hydrological variables would be nice to have into the system.

So we were trying to, basically, argue that it would be nice to introduce some of these variables in the equations, especially, you know, we felt like the antecedent forecasts -- and this is when you use flow in one (1) year to be the basis for predicting flows in the next period, so you prepare yourself for what sort of expectation of releases that you might have to plan.

And what we wanted here is basically saying, Okay, it may be worth looking at expanding these regressions from dependence on one (1) variable to maybe more. I mean, when we ran our auto regressives, we found that more than one (1) leg was something that it would be worth looking at, so we wanted to be more helpful in this thing.

We also noticed that when we looked at the predictive capacity and accuracy of HERMES, that it predicts very well generation. It doesn't predict as well -- it's not bad, but it does not predict as well, and I'm emphasizing the word "as well" -- the revenues, net revenues of export or the costs. And we felt that if you do the forecasting say in the spring, you'll have completely different errors if -- that you made the same forecast in July, when you knew what the spring rain was.

So, I mean, all these things were indicative that maybe a different richer leg structure could be introduced into these equations. We also felt that maybe this linear structure is -- is something to -- to voice, so we came back to talk about this non-linear issues.

We -- we wanted the greater role for PRISM. We have the system. There's expertise being developed about it. Is it possible to integrate it with

the other system so that it's not left alone as an add-on but could be integrated with the -- with the other systems?

And then we came back and we argued for how important, how necessary, and what are the great benefits, and we mentioned eight (8) of them on page 5 that would come from a more coherent, consistent, integrated, one (1) platform set of models.

MR. GAVIN WOOD: And is it fair, sir, that the Board should understand that at thi -- at this finer end in terms of all the matter of the models, that there's a degree of disagreement bet -- between the -- the persons at Manitoba Hydro that have presented those -- that rebuttal paper and yourselves, and you're just taking an additional time in the -- the further response paper to explain to the Board what's joined in terms of issues between Manitoba Hydro and yourselves?

DR. ATIF KUBURSI: I -- I mean, I would characterize it that we probably should persuade them more. I mean, there is always comfort in keeping with a system that works well for you. And there is always reticence that of the people who have been using these models for years and have developed a great expertise to come and have professors come and tell them to do things otherwise.

All what we're asking them is basically and fundamentally to experiment, to entertain, to move a little bit forward on these things. We are quite satisfied with our systems. We are quite happy with what we've seen. We are quite happy and recognize the capacities, the skills, and the dedication of the people, but we wanted a little bit more.

And -- and I think from a very top of the line, one (1) of the best utilities in Canada and any place, that it would be worthwhile looking into making it non-linear, integrating these models, putting more stochastic things, getting all these models together creating a community of modellers vetting these things, documenting things.

I -- I think we wanted to earn our money. And I -- I thought we -- we -- you know, we're -- we're basically being positive. I thought our marching orders were to what extent can you come from outside, shake a little bit of fire here, and get things moving in a direction that you think would be beneficial and in the best interests of Manitoba.

MR. GAVIN WOOD: Maybe staying away from the car analogy thi -- this time, specifically in answer to the Chair, should this Board be confident or have concern that if Manitoba Hydro doesn't accept the whole

series of recommendations in the sixty (60), seventy (70) pages that we just quickly covered of the KM Report, that it is going, nevertheless, to be able to go forward confidently with its proposed capital -- series of capital projects over the next decade?

DR. ATIF KUBURSI: I -- I'm sure you all -- and it's not an understatement, some hesitation on my part, and this hesitation comes from three (3) reasons. I would not -- I cannot and I will not suggest that you base decisions solely on models, all right. These are instruments. These are tools. They inform decisions but cannot be relied upon totally and exclusively in making series decisions of the type we're on.

Two; I am co -- confident that what they have works, but it could be better made. And I thought there would be improvements and it would be worth looking, especially the probabilistic things when you're talking ten (10), fifteen (15), twenty (20) years horizons in the future.

Three; I would really like to see some sort of vetting coming out from modellers who have really great experience, who exist in universities or in practitioner offices and consulting houses, come in arm's length, not on the -- that would be able to basically vet and, you know, create a good evaluation and verification

of these models.

THE CHAIRPERSON: Is your argument, in your view, stronger because you're not talking about an ongoing status quo operation, but one (1) that's intending to spend say close to $20 billion over a period of ten (10) years?

DR. ATIF KUBURSI: Absolutely. I mean, if it was a minor adjustment of things, I think it -- it could be incorporated well with the system that have worked in the past, but now we're talking about something much bigger. And these models are extremely sensitive to small changes. What if you really start working with much larger changes.

THE CHAIRPERSON: Thank you.

CONTINUED BY MR. GAVIN WOOD:

MR. GAVIN WOOD: Sit back. Going on to page thir -- thir --

DR. ATIF KUBURSI: Do -- do I have the right to?

MR. GAVIN WOOD: I'm just afraid you're going to come out of the chair in a moment.

DR. ATIF KUBURSI: I'm not just speaking sitting down, that's what it is.

MR. GAVIN WOOD: There's a -- a good

friend of -- of mine in the room here today that I'll have to explain to him later, the lawyer that I'm up against next week, Dr. Kubursi, at times reminds me of him.

9(j), Dr. Magee, just briefly, if you'd be kind enough to explain to the Board the -- the role of -- the -- the -- the purpose of Appendix B, please.

DR. LONNIE MAGEE: Appendix B describes the -- the model that we use for our net revenue simulations, which contains three (3) subsystems linked to each other, or submodels, I suppose, hydrological, power generation and financial.

So, for example, the hydrological component is considerably simpler than it would be for some of Hydro's own purposes, but this -- this was made for a longer term kind of examinations of the effect on net revenue of different scenarios and different events.

So we -- we also let a lot of other variables, rather than setting them at specific values and looking at a limited number of scenarios, we let them be random variables and ran a large number of replications where the values of those variables were generated randomly by fitting distributions that described their actual -- or their behaviour as best as we could and seeing what happens to net revenue.

So the model isn't a -- a kind of black box proprietary thing, I don't think. It's just meant as a sort of a prototype suggestion of a way that -- that this could be done, something to both conduct our planning exercise with and as something that we think they might -- people at Hydro and others might find interesting.

MR. GAVIN WOOD: Something that could be employed.

DR. LONNIE MAGEE: Or used to develop something further and employed.

MR. GAVIN WOOD: And if I could then ask you to go on at page 128 of the -- the KM Report, and at page 39 of the direct-examination, to the findings with regard to the load forecast model as -- as Dr. Kubursi and yourself found them.

DR. LONNIE MAGEE: Okay. And if I --

MR. GAVIN WOOD: That -- that -- that's correct.

DR. LONNIE MAGEE: Okay. So I'll comment on the findings with regards to the economic outlook. This is something different. This is the -- the corporate strategic review division prepares an economic outlook, which is a -- you can think of it as a way of -- as -- as forecasts of the economic variables that need to

be taken into account when evaluating production and pricing decisions. Our view is that -- that it would be good if they didn't have to rely as much on a small number of external forecasts purchased from external consulting companies.

One (1) reason is that, if you take a variety of different forecasts from different companies, you're not able to account for the fact that the -- the forecasts of different variables are correlated, and if they're taken from different companies, we don't really know how those companies have -- they -- they've been created differently, and you won't have a good sense of -- of how the -- the forecasts are related to each other, or how the variables are related to each other, which is important in forecasting.

So we -- we would recommend that more economists, quantitatively skilled economists, join the staff or become involved in that process, and that the forecasts be more probablistic rather than focussing on a good/bad scenario that the Hydro would be in a good position to -- to do a more comprehensive kind of accommodation of -- of a whole distribution of forecasts, the same way that, say, at risk handles probabilities of unknown random variables.

Again, the -- this group -- it would be

fruitful to have them become involved more closely with the other groups of modellers at -- at Hydro, and that the -- their role, general role in the Corporation be expanded.

MR. GAVIN WOOD: Something further, sir?

DR. ATIF KUBURSI: I just want to echo Lonnie's position, but maybe raise a different perspective. I mean, the -- the worry we had there is that you bring multiple forecasters, all right? As you can see, they depend on Infometrica, Spatial -- Centre for Spatial Economics, the different banks, the Statistics Canada, Global Insight. The trouble here is that, if you take an average, what you're really saying is that you value all these people equally, but some of them probably are better forecasters of particular things than others.

The issue here is: To what extent would you depend on an average rather than on the collection or the best forecasting people with a record? And we just want to raise this issue, just as a question mark, is that: Don't depend on an average. Maybe some people have a better history than others, and -- and it would make sense.

The other one which Lonnie already mentioned and I think is quite important and it's no

longer done, because at one time, when I came here, there was really some issues here, but now I'm really happy to see that this is not done, is you take one (1) forecast from one (1) place, another forecast from another place, okay?

I'll give you an example: You take the interest rate from one (1) place and income from another place, when it could easily be that a higher income or a very strong growth is going to lead to higher interest rates. It's impossible and doesn't make any sense to use one that shows higher rates of growth and lower inflation or lower interest rate.

It doesn't make sense at all, because what Lonnie was trying to say is that these forecasts are made in the context of a coherent model, a consistent model. You can't pick one from here and one from there and assume that they're going to cohere together. It would make more sense -- and at one time, we went -- probably went overboard suggesting that maybe Manitoba Hydro, like Ontario Hydro, should develop its own forecasting model and -- and this maybe is too farfetched. Maybe Manitoba Department of Economics would love to do that, but maybe it's not in the cards.

But let's say this: You have to be quite versatile, very sceptical, very inquisitive when you use

these forecasts, and try to see if there is a track record, there is a history that you could use.

THE CHAIRPERSON: Dr. Kubursi, I'll just remind you that the day of the election, there's -- was a website called 308 something or other, and basically what it did, it predicted the seat distribution of the House of Commons after the election, which was held on May 2nd.

And what they did was they -- they took all of the people that -- all the various polls: Decima, Ekos, Nanos, et cetera, et cetera, et cetera. They added them all up and they divided them by whatever the number was. And they predicted seventy-eight (78) NDP seats and sixty (60) some Liberal seats.

So in the end you know what happened, the NDP got a hundred and two (102), or a hundred and four (104), a hundred and five (105), or whatever it was, and the Liberals got thirty-four (34). That was the result of adding them all together and just dividing.

DR. ATIF KUBURSI: Thank you, Mr. Chairman. I mean, you -- you've made my point, okay.

MR. GAVIN WOOD: What -- what about the Conservatives though?

THE CHAIRPERSON: They were out there too. Yeah, their forecast for the Bloc was ten (10) times higher on there based on the average than the way

it turned out.

CONTINUED BY MR. GAVIN WOOD:

MR. GAVIN WOOD: I -- I wonder if I might then turn us to Chapter 4 of the -- the report. This is set out at page 40 of the direct examination.

Dr. Magee, could you provide an overall perspective of what was set out to be accomplished in Chapter 4 of the report, please?

DR. LONNIE MAGEE: We start with a general look at different aspects of -- of prediction problems. What -- there are different things you could predict: means, quantiles, different things about the distribution.

I point out that it's very hard, maybe impossible, for anybody to say what the best method is. And so then -- we then show that there are some alternative ways of modelling and looking at the water-flow data, ways of generating hypothetical water-flow data to put into the model, and ways of trying to address the question of what is the distribution of -- of drought probabilities.

So even though we have some good data from Hydro when you're looking at -- on water flows, when you're trying to say something about the tail of the

distribution, in this case the left tail, the low end of possible water flow outcomes, even though you -- you might have ne -- you know, almost a hundred years, you don't -- you're not basing your statements about that tail on very much information.

So there's -- there are methods that have been designed to try to say whatever we can with a bit of extra structure on the assumptions about that issue as well, so that's -- and -- and then we will illustrate some simple examples of how those methods are used on the Hydro da -- Hydro data.

MR. GAVIN WOOD: And then I -- I would remind everyone that in terms of the -- the changes section of the direct examination materials at 5-E there's a charting, item 4, that Dr. Magee had referred to much earlier today. And I believe that's an attempt to chart the -- the work that's been done -- a simplified chart, of course, of the work that's been done in -- in Chapter 4, sir?

DR. LONNIE MAGEE: Yes.

MR. GAVIN WOOD: All right. And then Chapter 4 goes on, pages 157 through 163, to -- to deal with those alternates. Is -- is that correct?

DR. LONNIE MAGEE: Yes.

MR. GAVIN WOOD: Yeah, I'm sorry.

Actually, it's page 136 through 156, sorry.

Just it -- it's a little difficult to put in some of these response papers at any one (1) point, but I've asked you, Dr. Kubursi, at Section 10-B, to deal with Section C of the response papers dealing with Mr. Wallach's re -- report, and, specifically, his comments concerning the KM Report.

DR. ATIF KUBURSI: Yeah, Gavin, if -- if you allow me, I -- I'm going to deal with this, but just maybe add a couple of words to Lonnie's presentation.

I mean, Chapter 4, what we're really worrying about is that Manitoba Hydro has ninety-four (94), ninety-seven (97) years of water flows. And there were two (2) periods -- more than two (2), but two (2) specifically, where we had really low flow. These were in 1937-1942 and 1987-1992.

The issue is that do we really say that this minimum in 1937-1942 is the lowest on the record, and, therefore, is going to guide us to what we consider to be dependable energy. And what we wanted to say here, wa -- wait a minute, maybe this is good. I mean, as you can tell from the evidence presented by ICF and KPMG, said other utilities don't even use that long series, so this '94-'97 is really way beyond what is the average use.

We said, Wait a minute. I mean, there may be a statistical process, and this is really where Lonnie's expertise came to contribute. Can we run this thousands -- and I said a million time, actually, and can we look at the minimum at every time, and then look at the average of the minimum, and look at the frequency distribution.

We found that the minimum that is used by Manitoba Hydro, and there is an issue here whether it's the 1987, which is the lowest of the revenues, or the lowest of the flow, which will be 1937-1942, are -- are reasonable, and would they put us in a situation where we may get a bad surprise.

Fortunately, the results that Lonnie was able to find is that this minimum that we deal with is really inside that average of minima and that you could find that the 2.5 percent, correct me, Lonnie, if I'm incorrect here, of the frequency, that there could be minimum lower than that. We -- we were very happy with that.

I mean, I thought it allowed us to say, Manitobans, you can sleep at night knowing that there's not going to be a blackout because what we're really doing, we're doing something that is acceptable and well. This was really the basis of what we're doing, and using

two (2) statistical systems, not one (1).

He used the AR, the auto regressive, and he found that these coefficients, if you generate the statistical process they were all high T-scores, good R-squared, good P-values, all what you consider to be a good statistical graph. And then he was not satisfied, and -- and that's why we hired him.

He went down with the extreme value, which he told you he looks at the tail of the distribution, the left tail, which is the lowest, and tried to see if there are statistical properties from this that would corroborate. And low and behold, we found that even the extreme value statistics gave us results that were not different.

If I misrepresented you let me know.

DR. LONNIE MAGEE: Just to briefly clarify part of that. I think if -- if you think of the -- asking the question, suppose we go another ninety-four (94) years, what -- what is the worst drought likely to look like compared to what we saw in the historical record, what both methods said was, Well, it could be worse. It could be better than the actual worst drought that we saw in the last ninety-four (94) years, which I guess is not too surprising. But, on average, the worst drought over the next -- that you could expect over the

next ninety-four (94) years will be on average about the same as the worst drought that we saw in the last ninety-four (94) years.

MR. GAVIN WOOD: Then if I could bother you to turn to Section C and the -- the response paper concerning Mr. Wallach's comments.

DR. ATIF KUBURSI: Yeah, I mean, Mr. Wallach has made some -- some very reasonable points, but he also was very unhappy about the veil of secrecy that he found in this rate hearing. He says that all this redactions, all this confidentialities, he could not make informed decisions, and he would have preferred -- and he -- he recounted his experiencing that in other hearings there were more information that was involved that would have allowed him to look at the statistical matters and the calculations, whether or KPMG, KM, and any other one.

But he made, nonetheless, and found it quite reasonable to make four (4) observations. One (1), he said I don't Manitoba Hydro's use of 1987 and 1992 as their lowest. He would have preferred that they would use 1937 and 1942, all right? Because that -- that represented probably different revenue and different times, different prices, but in terms of the flow, the 1937/'42 in his view were a more appropriate one to anchor your dependable-energy calculation.

The other thing he made -- he said Kubursi and Magee are wrong -- well, not wrong, but he told you not to believe them now. Even nicer: He said, Don't take their recommendation. He said that it's premature and that we have to do other things first, and -- and -- and -- and on this we agree with him, yeah. I mean, you have to look at DSM, better DSM, you have to look at different portfolio of renewables, yeah, greater efficiencies, great. We didn't think our recommendations were in any way a substitute for these things.

Actually, we -- we went to great lengths thinking that all the things we're recommending are very much contingent on Manitoba Hydro trying to have the cost of service at its lowest. Actually, we went even further and recommended that the whole objective of all these models that are used by Manitoba Hydro should seek to minimize the cost of operations, that this is really something they have control over because the market in which they operate, they really don't have a handle on setting the price. They're quantity constrained because they have to meet the load. In firm contracts, export contracts, they are constrained on the price and on the quantity, so the only thing left where -- where you could do something is to minimize costs, and we thought this would be -- he said it's premature, but we felt a little

bit unhappy with this.

Literally, he's arguing -- and we thought all these things were an insurance scheme -- he's really arguing saying, you know, Don't buy insurance until your house is on fire. I mean, we didn't think this is really -- all the issues here is basically to have this insurance in place on a prior basis, before things really happen, where you can possibly create the insurance capacity and have an ability and build up a cushion that will allow you to deal with these bad eventualities if and when they occur.

And we said we really need four (4) things, as you know, and I'm not going to go through them, because there will be room to do, but we said, Don't depend only on the retained earnings. Retained earnings have so many functions, they are absolutely looked at by rating agencies and others. I mean, the last thing you want is one (1) single drought to wipe everything out and then literally put you in a very compromised position in terms of your financial health.

To this we said, Okay, let's balance our water on a more conservative basis. Let's put a rider, transparent one, on the rates so that the partners everywhere, whether they're consumers or anybody else, would become partners in creating the risk fund that

would deal with these things. Mr. Wallach was not happy with this.

MR. GAVIN WOOD: Sir, I'm going on to Chapter 5 now, which is quite a different topic. I wondered if you'd like to take the afternoon break.

THE CHAIRPERSON: Yeah, I think we'd probably like a break, but I -- I -- I'm no mathematician, and I'm not an economist either, so here's a real layperson-type question. I know in this province, we oftentimes refer to floods, and we build the floodway to withstand the one (1) in seven hundred (700) year occasion, and they talk about the greatest flood known presumably because of -- I don't know how they know it, but is 1826.

We know, for example, that the Mayan civilization allegedly, some people claim, died out because of a hundred (100) year drought. I mean, we know experiences in Australia. I was there when the drought lasted well over a decade. A hundred (100) years in a -- in a planet that's been around for 4.6 billion if you don't believe in -- you don't believe in creationism, it's a pretty short period of time, isn't it?

DR. LONNIE MAGEE: Sure it is. The -- we're talking about a hundred (100) years I think mainly because that's the -- the length of time that we have

this data set to work with. As you -- as you extend further back, even for a system seemingly as stable as -- as a water system, you would get changes. So, in other words, the system's not stationary if you go -- you know, the ice age, we -- we would have had different water-flow systems. So I don't think there's -- and in economics we always have to worry about that too, where you're -- you -- you specify a model, you use data to estimate it, but if you go back far enough, well, you know, Germany was East Germany and West Germany. So if you're modelling Germany, all of a sudden you have a problem. So the world is changing.

So there's always that -- those changes in the -- the structure of what you're studying that -- that limits how far back you can go or what you can say. But another general -- another reaction to some of those things you were saying is that I think they get picked up by the media and become kind of viewed as facts, whereas I bet if a number of different people studied the problem they could all have legitimate approaches and come up with quite different results, but one (1) of them kind of gets picked up by the media and -- and gets -- often gets viewed as -- as more of a solid fact than it really is.

THE CHAIRPERSON: What you're saying basically is the modelling, even the -- multiple

possibilities has to be based on something?

DR. LONNIE MAGEE: Right, yeah. So it's important to -- in -- in a newspaper story you can't go into all the detail, but I guess in an academic setting or more -- where you have more time you'd want to lay out all -- everything about what you assumed, what you looked at that underlies your conclusion. And then, when two (2) people come up with different answers, they -- they can try to resolve or see why their answers are different.

THE CHAIRPERSON: Okay. We'll reflect on that, and we'll take the break now. Thanks.

--- Upon recessing at 2:53 p.m.

--- Upon resuming at 3:18 p.m.

THE CHAIRPERSON: As they say, time flies. Okay, Mr. Wood and the panel.

MR. GAVIN WOOD: Mr. Chair, we -- we -- the doctors and I had an opportunity to speak at the break, and we wondered that I -- it got a little ragged there at the end. I was pushing maybe a little too much. Does the Chair wish to just have them speak a moment further on what I might refer to as a Ba -- Black Swan event in -- in terms of the calculations?

THE CHAIRPERSON: That's what I was getting at, actually.

CONTINUED BY MR. GAVIN WOOD:

MR. GAVIN WOOD: I -- I wonder then, Dr. Kubursi, we -- we were talking at the break about that, the context of the -- those -- that questioning and the comments just before the break. If -- if you could elaborate on that, please.

DR. ATIF KUBURSI: I mean, it's -- it's probably more in the -- in the preview (sic) of Lonnie's things, but let me say this. We have only a hundred years of data. Actually, there were some questions whether the data before 1942 are acceptable or not because they don't have the same accuracy or reliability that some people have raised questions.

As you know, McCulloch (phonetic) and others said: Okay, forget about all these things. We need four hundred seventy-seven years (477) years. Let's go to paleoclimatic data and look at tree rings and things.

What we felt is that within the given hundred years that we have, and if you sample them over so many things, indeed we're going to get things that are embedded into the structure of this hundred years. If

things were to change, climate change or there is a structural break, this hundred years that we have sampled within will no longer be valid. You know, there may be things that would come that would be beyond what we have really been able to talk about, a Black Swan of the type that you're talking about.

But is -- what we thought is the extreme value distributions may contribute something to this. And -- and I maybe ask my colleague to -- to comment on this.

DR. LONNIE MAGEE: Yeah, I think -- I think the extreme value theory idea isn't quite the same as -- as a Black Swan event. It's -- it's more of a -- I see it as a way of saying something about what might happen a little bit off outside of the range of what you've already seen, assuming that the same process continues.

So if the weather system stayed the same as it has been, it's still possible that you could get a drought worse than what we've saw in the last hundred years, even if there wasn't any fundamental change in -- in the weather systems.

And -- and it -- it's that kind of situation that extreme value theory can -- can deal with. One (1) way of dealing with it, it can look at what's

actually happened and kind of poke a little bit outside the range of what you've already seen; whereas Black Swan events, my understanding is some totally unexpected combination of things that you've never seen before and -- I -- I think -- well, I know from when we were at the control centre we -- they were -- engineers were telling us about how they look at, you know, how -- imagining what if various components failed at the same time, what would they do.

You know, thinking through all kinds of different combinations of things that haven't happened before. So, I mean, within the -- the possibility of your imagination to -- to think of what could happen, you can study those, you know, what to do, but the Black Swan thing, you know, nobody -- the definition of it is that nobody even kind of imagined it happening before. So it's -- it's kind of a challenge in risk management to prepare for something that you can't even imagine.

So I -- you know, it kind of gets outside, I think, even the realm of probability theory. It's more just hunches and -- and trying to prepare for things as best you can.

THE CHAIRPERSON: In our practice and to do with auto insurance, they have something they call the rate stabilization reserve and it's supposed to be there

not for anything that can be expected, but for the unexpected, the experiences that have not occurred per se. I just only have one (1) other question in this series, and again it's from the layperson's perspective in a sense.

You focus on one (1) particular period, but we also know that the -- from '28 of, I think, to '41, didn't they have twelve (12) years of drought out of fourteen (14)? In other words, one (1) significant drought with a bit of a break, followed by another significant drought?

DR. LONNIE MAGEE: M-hm.

THE CHAIRPERSON: Sort of like flipping coins it would be like.

DR. LONNIE MAGEE: Yeah, that -- that -- but that -- that sort of thing could easily occur by chance in a -- in a system. You'd have to -- even though there's a hundred years of data, if you think of a drought as an event, there were -- we only have three (3) events to go by.

So it's just like if you're picking -- say randomly picking three (3) numbers from one (1) to ten (10), typically they won't be evenly spaced, two (2), five (5), eight (8), you might get a one (1), a two (2) and a six (6). It doesn't mean that there was anything

especially different about the numbers one (1) and two (2). It just so happened you -- you picked them that time, so.

DR. ATIF KUBURSI: We all recognize that this, you know, Black Swan came with this book, Nassim Taleb's thing. And the story he gave it was a bit funny, as you probably know, is that this turkey you keep feeding him every day and then one (1) day he expects that you're going to feed, and then you come and he slaughtered the turkey.

And he says that this is a situation that we have to be quite often. We don't have to be turkeys, all right, and we have to recognize that there are going to be extreme events with very low probability of occurrence, but with calamitous -- with incredible consequences.

And what he's really arguing and then he takes it to the pilots. And he said, you can't train pilots on smooth flying, that you possibly have to always expose these pilots to a situation where there are going to be extreme weather events and to see what's happening.

Now, what is the conclusion from this that he came out with, is that what you need here to do is to have a minimum regret strategy, is that you plan everything on average, but always be prepared for these

extreme events. He says, Look at the market. If we were to believe that diversifying an average risk is what we need to do, what will happen is that we will allocate our assets on an average basis, but then the market goes down by 10 percent and we lose the 10 percent. We could have -- it could go to 20 percent, and then we lose 20 percent.

In such circumstances, he says, well, probably a more prudent way would be to put 90 percent in secure assets, and take 10 percent and put it in the most extreme type of assets, high-risk assets. If the market goes 20 percent, you only lose 10.

So in some sense, what he was trying to argue is that there are strategies in risk management that could deal with these extreme cases, and what would this mean is that you put the largest risk-management investment into the average things that's happening, but keep a reserve that would allow you to weather even the most extreme case, and that's I think the -- the -- the argument that he was making, at least my understanding of it.

THE CHAIRPERSON: Well, not to prolong it, but I -- when you're talking about massive large expenditures, you -- you do tend -- I think it's fair to say that parties do have different views on risk, okay?

I mean, one party can be more aggressive than another.

After Rita and Katrina, for example, in -- in the United States, the natural gas prices exploded. I mean, half of the gas production in the southern Gulf states were -- was out, and part of the distribution system, and helped by a -- apparently by a Calgary trader -- Amaranth, I think the name was, anyway, the -- the price went up to pretty well fifteen dollars ($15) a gigajoule.

At that price, if it -- if it was sustained, it would be a significant economic blow to the consuming provinces as opposed to a producer province. And I can remember discussions at that time about -- the decision was taken at that time to moderate the rate increase, and some of the discussion around that time was, Well, if it stays at fifteen dollars ($15), the price is the least concern, in a sense, because you'd have 85 or 90 percent of the households un -- unable to pay for the fuel supply.

But it's just -- the subject of extreme events is -- is of considerable interest. We get into it a lot in the auto insurance.

MR. ROBERT MAYER: Well, what -- you know, nobody's -- we -- we've talked about extreme events, we've talked about Black Swan, we -- we've talked

about failures of Hydro's particular systems and what may happen, and if anything ever looked like a Black Swan event, it seemed to be the combination of the earthquake and the tsunami, both of which had never been seen together in -- in Japan.

I don't know how anybody plans for something like that in any kind of a system, and not only I don't know how, I don't -- well, I have no idea what it would cost to protect any kind of a system from that kind of an event. And other than squirrelling whatever money you have away somewhere that it can't be got at by whatever disaster you've been hit by, I don't know where you go to deal with that kind -- with -- with -- I mean, that had to be a Black Swan event if one has ever actually been seen by our neighbours.

DR. ATIF KUBURSI: Well, I'm glad you brought this, Mr. Mayer, because that's exactly what happened. What -- what the story is now about Japan is that they have targeted and took into account the worst hundred (100) years earthquake, and they multiplied it by ten (10) and reached eight point four (8.4), and made all the planning and all their insurance on eight point four (8.4), and they experienced an eight point nine (8.9).

And -- and -- and this is really where -- where -- where all the issues are. I mean, what Nassim

Taleb is saying, Keep that 10 percent whatever you do, and then make sure that you take that worst possible case, so that in the event it happens, with all this small, little probability, you are prepared.

THE CHAIRPERSON: Thank you. Mr. Wood...?

CONTINUED BY MR. GAVIN WOOD:

MR. GAVIN WOOD: Turning to page 41 of the Direct Examination, again, trying to put these things in some orderly context, Dr. Kubursi, I would ask you to turn to, firstly, Section 10(d) and the response paper 'B' to the work of Bowman and McLaren, and -- and then, in turn, to 10(e) and Section D, dealing with the first part of -- first parts of the response to the rebuttal of Manitoba Hydro.

If you could deal with Section B first, please.

DR. ATIF KUBURSI: Well, the two (2) issues Mr. Bowman and McLaren had raised -- and I already talked a little bit about it, but maybe it's worth maybe taking some time to reoutline the issues. Both Mr. Bowman and McLaren had felt that our suggestion that there should be rate adjustments and riders are probably not advisable.

And they felt that somehow we're arguing that we build a large reserve in retained earnings is perhaps an overkill. Well, I mean, the -- the issue here is basically that we don't want to depend solely on the retained earnings. And we still believe, given the calculation every five (5) year drought course and a seven (7) year drought course and the revised submission that they could be up to $4.3 billion and that one (1) of these droughts could wipe out the total amount of retained earnings.

So, in some sense, we felt like if you were to depend solely on retained earnings, you probably don't have enough. And if you depend on it even when it's enough, it's not advisable because retained earnings would be used for other things, and you don't want to totally devote it and reserve it for dealing with this; you have to compliment it, and we came up with three (3) complements to it. One (1) is the overrider that we talked about.

This by way of, let me emphasize again, inviting the consumers to be partners in a transparent way. You know that Ontario Hydro now, part of the bills we receive, one (1) of which is for the cost of generation delivery, but also there is a part in which we are, as residents of Ontario, participating in paying the

debt that Ontario Hydro had raised.

So, I mean, in some sense is it precautionary, but also a transparent partnership is created by inviting the consumers to be part of the group. The -- the other one is to maybe use more cautiously the water because water is energy and storage; it has value, and we're arguing that maybe a more prudent one. It is not only good for creating the reserve; it's also giving you a chance to probably be better prepared in the event a drought is taking place.

We also talk about really some sort of willingness to go into borrowing up to a particular level, but in a way that this would be a capacity facility that is available, that Manitoba Hydro could avail itself of it on a limited and devoted basis.

The -- the other point is they were unhappy with us suggesting that Manitoba Hydro should refrain from maximizing net export revenue. And we have suggested that probably they should target minimizing system cost, production cost, generation delivery.

And -- and we wanted this for a number of reasons; one is cosmetic. I mean, this is a public utility. The last thing you want to basically advertise is that it's using its natural monopoly position to maximize its profits or net income, net exports; whatever

word you want to give it. We thought that this perhaps is not a very appealing situation.

The second thing is more technical coming purely from microeconomics. The way the Manitoba Hydro operates, it's a price taker in the export market because it's a small participant and cannot influence the price. It's a price taker, and, in some of the contracts, is constrained quantity and price. And in the domestic economy it doesn't set its price, it has to come to you to get the price.

So if in all these cases there is only a limited amount, the opportunity market where it maximizes. Why doesn't it alternatively look at all these given production limitations. It minimizes the cost of production. That would probably be a more efficient, a more reasonable and, in our view, perhaps a more advisable realistic thing to do.

MR. GAVIN WOOD: And -- and then if you'd look to Section D of the same response paper, the -- the first two and a half (2 1/2) pages of the re -- response to the Hydro rebuttal, is there anything specifically you wanted to highlight there or -- I -- I think you've covered off the part at page 8, for example now.

And I think you've talked earlier about risk tolerance differences, so.

(BRIEF PAUSE)

DR. ATIF KUBURSI: Yeah, I want to emphasize two (2) things. One (1) is -- is the issue of -- and we're talking here primarily about wind being part of the dependable energy. I mean, we know, I mean, a reasonable argument could be made either -- either way. We -- we fell on the side of saying that since wind is not dispatchable, it's not a -- a way in which you could say let's -- let there be wind, there will be wind, it's not subject to decision options, that it -- it probably is not reasonable or legitimate to consider it to be part of the dependable energy. We were bold to consider it in this way. The fact that FERC, the Federal, you know, Energy -- the U.S. does not consider wind as part of its reliable sources, so this was really our position.

The other -- the other point, and maybe you want me to talk about it is in terms of the data, or you -- you prefer . . .

MR. GAVIN WOOD: No, I think later on.

DR. ATIF KUBURSI: Later on.

MR. GAVIN WOOD: Sorry, I -- I think we'll refer to that --

DR. ATIF KUBURSI: Okay.

MR. GAVIN WOOD: -- in -- in the norm --

in the due course.

DR. ATIF KUBURSI: Yeah. Yeah.

MR. GAVIN WOOD: Okay.

DR. ATIF KUBURSI: All right. So if you --

MR. GAVIN WOOD: Let me then -- sorry.

DR. ATIF KUBURSI: I was going to -- you mentioned that -- yeah, you mentioned that we talk about the misalignment issue. I mean, in no way did we suggest that Ont -- that Manitoba Hydro is trying to enrich or -- a group or itself on these things. All we were really suggesting that the way that the things are rigged, the way the things are run, if Manitoba Hydro were, for example, in a period of time when it's not yet so certain about what the likelihood of precipitation is going to be and it has this water, and instead of storing it, thinks that this is a time maybe to sell it and -- into the opportunity market.

Whatever returns that come from undertaking this risk is going to be Manitoba Hydro's. It's not going to pass to the consumers. And in some sense it may really be taking a position, in our view, that is more risk engaging than is the appetite and the choices of a more risk adverse citizenship that would have preferred really not taking these risks.

And therefore, there is a possibility of a misalignment not in the sense that somebody is enriching somebody else, that we would like to be voting and weighing on the side of caution rather than on more risk, just because we feel that the people of Manitoba are far more risk adverse than that proposition.

MR. GAVIN WOOD: Going on now to page 42 of the Direct Examination and now to a different matter of Chapter 5, if I might just first summarize for the Board and -- and the -- the counsel, the -- the first part of it dealing with the NYC has -- has, of course, been covered earlier today. And the -- the -- the attempts partially successful to meet with her.

Moving on to 10 -- 11(b), I'd ask you, Dr. Kubursi, to explain the format of how you approached the whole matter of the reports and -- and the NYC's concerns.

DR. ATIF KUBURSI: We mentioned earlier that we had fourteen (14) documents to go through. And we had several options. We could take every single report on its own. We go through it, we summarize it, we evaluate its evidence and its propositions, or we could group these together under general themes and then each theme with the issues that were raised and look at how each one (1) separately or in combination have dealt with

it. We opted for that.

We thought, let's look at themes and see what one party came up with, what another party came up with. And -- and -- and in many respects, we felt that this is a preferred one, because not all of these reports have touched on every aspect, and not all of them are of equal quality. So it's -- probably a more prudent and reasonable approach would be to look at themes, general themes, and collate all these things around themes.

It so happens, too, is that some of these reports were almost solely devoted to looking at another report and then looking at the pros and cons, and -- and we felt that maybe, as independent consultants, we'd look at the arguments, the counter-arguments, and come up with some finding or our assessment of the evidence and the claim, counterclaim, not engaging ourselves into the adversarial relationship, but passing what we consider to be reasonable judgment and evaluation on these.

So the way we organized it is to look at themes, and there were maybe, you know -- Mr. Mayer already caught us in this. You're absolutely right: There are fifteen (15), and we only reported fourteen (14), and there was number 7 missing, and I apologize. It's my mistake. So --

MR. GAVIN WOOD: And -- and we're coming

-- we're going to be coming up on that, sir, but the -- the themes that you're referencing --

DR. ATIF KUBURSI: Yeah.

MR. GAVIN WOOD: -- just -- just for the -- the sake of the Board, is -- is at pages 166 and one on -- on to 167, and it's summarized at page 43 of the Direct Examination.

What I was going to ask you then to go on to is section 11(c) of the Direct Examination, where I believe you attempt -- we've attempted to summarize the -- the approach taken at page 167 through 189 of the -- of the report.

DR. ATIF KUBURSI: Yeah.

MR. GAVIN WOOD: Could -- could you just, again, summarize that, please?

DR. ATIF KUBURSI: Yeah. I mean -- I mean, the major -- the major themes: We looked at the effectiveness and appropriateness and the predictive accuracy of the suite of models. There were some questions, whether from NYC or others, about the predictive power and the feasibility and accuracy and utility of some of the suite of models at Manitoba Hydro.

The second basic theme was, and a major one is: How important is the volumetric drought risk? And what would be the best metrics to measure this risk?

And what are the consequences likely to follow, whether of a one (1) year or a five (5) year or seven (7) years?

Then there are issues, and we thought the theme is quite important, is our risk governance: What's the relationship of the front office to the middle office? And who's responsible for what? And what mechanisms and procedures and policies and documents that exist that deal with this?

And then the fourth one was basically talking about risk management, actual risk management, in regards to production, generation, sales, merchant trade, human resource, finance, things that we -- we -- we dealt with, things we -- we felt like probably outside our -- you know, outside our expertise. Like human resource risk, we didn't deal with it, but we tried to deal with what we consider we can contribute something on, and -- and -- and especially we did not go beyond the fourteen (14) reports that came in. Unfortunately, the fourteen (14) reports, in their majority, concentrated on financial risks, and this had limited, therefore, in -- in some respects -- it defined boundaries for us that we had to live with.

And the fifth one, we -- we tried to talk about self-insurance, capital reserve adequacy. NYC had made a big issue of this and tried to assign a certain

amount of reserve capital to every risk they undertake, and -- and we wanted to comment on it.

So these are the broad five (5) things, but then we -- we went even deeper into these things. At every place, we tried to be as fair as possible by hearing what the NYC was really saying on any of these issues, and trying to see to what extent we can understand, unravel, deconstruct, or really construct in many places her arguments and see how we can evaluate them.

MR. GAVIN WOOD: And -- and for that matter, the -- and, for that matter, the other reports as well?

DR. ATIF KUBURSI: Oh, yeah, yeah. I mean, it was all fourteen (14). When any one of them had dealt with any one of the issues, we brought them in.

MR. GAVIN WOOD: Now, I -- I appreciate thereafter at Section 11(d) and -- and for a considerable number of pages in the actual report beginning at page 167 there's a detailed review of a number of matters. And just by way of format, as I -- I think Mr. Mayer had noted earlier today, there's eventually in each of these sections a finding made, and you've actually set it up in -- in a box. Tha -- that's correct?

DR. ATIF KUBURSI: Right. I mean, it was

a -- the gist of what considered to be the analysis that you went through. We tried to capture the most important and most salient and most relevant issues. And -- and in many respects, we were prepared to stand up and say our opinion, our evaluation led us to say the following.

MR. GAVIN WOOD: Let me -- and -- and I'm sorry, I'm throwing this at you, I think, at just a touch of a curve ball. But maybe before going on and asking you to highlight some of the most important of the findings -- and, again, I appreciate the -- the KM Report goes into them in detail and -- and it's set out there.

Overall, in terms of the concerns that the NYC raised in all of their complexity, and I believe again there's been an attempt to summarize them in the report, but, overall, your -- Dr. Magee, and -- and certainly yourselves, overall sense of the NYC's concerns. Just take your time, and in -- in terms of giving the Board an overall assessment as -- as best you are able to with the access you did have and -- and the documents that were available to you.

DR. ATIF KUBURSI: Let -- let me start by saying the following. I mean -- and -- and this is -- I don't know, Dr. Magee didn't have the same contact with her as I did. I -- I would -- I would honestly say, and looking at her CV, this is a new basically theoretical

physicist from Cambridge University; studied with Steven Hawking. I mean, thi -- this is not an average person; no question about it. Her education, her intelligence and things is without any -- any doubt.

But this -- honestly, this education and this expertise did not come quite clear in the written reports that we got. And, in some sense, we were constrained to only examine one (1) single document given all the intricacies that we talked about in -- in the morning and her unwillingness to share things openly and freely.

We were literally forced to look only at the public document. In the public document she made two hundred and forty-six (246) claims, some of which are absolutely, I would say, unreasonable, all right, in the sense that they were not documented and that if she uses any estimation, if we tried to recalculate we did not come to the same calculations.

And when others, like KPMG or other people have attempted the same, they have also reached the same conclusion. But there were many points too where she has raised concerns that we felt they were justified. They were reasonable concerns. They were reasonable questions that would be worthwhile looking into them and dealing with them.

And I would go, as I go in details here, to point out some of these reasonable ones, as I would also go, as -- as we did in -- in the details here, to say some of these allegations are without foundation; they don't seem to jive.

Eve -- even when we do our own calculations, we can't come out. I mean, I give you one (1) glaring example. She has felt all the way through that volumetric risk is far below what Manitoba Hydro estimates. And she has done this, in our view, on a faulty presumption of looking at only one (1) year and assuming every year -- that drought only in one (1) year, and you have '94, then it's one (1) over ninety-four (94). Actually, she took only '93, so one (1) over ninety-three. Every event is independent, totally uncorrelated, and, therefore, the joint probability of this independent events is one (1) over ninety-three (93) times one (1) over ninety-three (93).

And if it's five (5) years then, she takes it one (1) ov -- you know, over ninty-three (93) raised to the power of five (5). And -- and -- and came up that you'll get a drought -- a chance for five (5) years from the sample -- like one (1) in 6.9 billion years or something like this.

I -- it didn't -- it didn't make any sense

at all. So in -- in -- in many respects what -- what -- what we wanted to do is to take very seriously, and we took very seriously her contentions and we subjected them to scrutiny and validation and tried to give her even the benefit of the doubt and see when we thought there was some element of reasonableness, we were not shy about saying, she raises reasonable concerns, valid concerns and we follow them through.

MR. GAVIN WOOD: And the Board then should understand that in terms of the findings that we're about to go through in -- in a summary way, where appropriate, her -- her concerns have been tested and -- and if found valid, have been incorporated into the findings?

DR. ATIF KUBURSI: Yeah, in -- in most cases yes. I mean, we took them very seriously and we followed through by analysing, by deconstructing, constructing, doing whichever way we thought it would be reasonable to give her the best benefit of doubt about her claims.

MR. GAVIN WOOD: Then going on to section 11(d), specifically of the direct at page 45, and -- and appreciating, again, that starts at page 166 of the report, the first finding, for example, ultimately being reached at page 176 and thereafter.

Would you -- would you summarize then over the next several pages the -- the -- the principle findings in whatever manner you -- you wish.

DR. ATIF KUBURSI: Yeah. I mean, her major claim was that the models that Manitoba Hydro uses are primarily faulty and they use faulty prices. And she calls them stale prices, that somehow -- old prices that -- somehow the MISO deregulated markets have come in and created new sets of prices, that they are not incorporated in HERMES.

And that this forecast that are generated by HERMES are based on this old decrepit prices. Our first finding found that these were not correct. I mean, we knew that HERMES make adjustments. It purchases these forecasts. It tries to adjust them. In many respects they have examined certain forecasts and felt that they were optimistic, they bring them down. If they found to be very pessimistic they might bring them up.

She made one (1) important recommendation which we felt may be reasonable, is in the sense that you should really -- Manitoba Hydro would be good to look at alternatives, one (1) of which is to construct what she called the forward price curves, based on expected prices, try to calculate the spot price.

We thought that she brought a point here.

She did not elaborate on it. We did not have any clue how she really suggesting this, but it made sense that you don't depend on one (1) alternative and that you probably need to look at this.

And -- and for all practical purposes whenever Manitoba Hydro buys a certain response for twelve (12) months, it uses one (1) month and then the next month it uses for twelve (12). I mean, we thought they were doing something with this, but we wanted it to be documented, formalized, so that we have really basis to believe that they are considering this alternative. So this was number 1.

On the second one the -- the issue that -- and I talked to you about it here, she was looking at the water flow data and she suggested that the accuracy of this water flow data be below -- before 1942 they're not good and she went and recommended discard all this data, don't use it, because it's not of equal quality to data from 1942 onward.

We -- we looked into it and KPMG has done this before us. They looked at these numbers before. They're coming from gauging stations. They were subject to interpretation. But like we wanted to see what sort of bias would this inclusion would do and we found the -- the inclusion bias sinks into the conservative lower

side. So if there were really any worry here that these numbers are there to -- in order to boost things and make things more optimistic, they're actually doing exactly the opposite.

So in many respects, we said, No, it would be quite important to keep the '94. We suggested that you should not be restricted to this '94, and felt that the kind of things that Lonnie has done in terms of sampling repeated samples of millions of these things would probably be a more appropriate way. So this was our finding number 2.

She was -- and I -- we thought it was reasonable that it would not be, on a optic level, a good thing that people could find that in HERMES and in SPLASH there are different production coefficients. It would make so -- more sense if these were to be rationalized and integrated. But we also looked and saw what other people calculated, and back of the envelope calculations that we went through, any changes in these or discrepancies of production coefficient, the impact on export revenue was so small that it was not, in our view, such a great, important point to make big hay out of it.

MR. GAVIN WOOD: And that's found at page 179 of the KM Report.

DR. ATIF KUBURSI: We -- we also felt in

-- in -- in -- in this finding, you know, finding 4, that -- and -- and -- and here she was suggesting that somehow there is a problem in the way -- the structure of the model. She did not articulate it well. We felt maybe she was talking, and -- and -- and this was really our view more than hers, is that it -- it would be really nice to bring in some hydrological information because she was in some sense arguing that the antecedent forecasts are probably heavily relied upon. And if you really look year by year at the statistical properties, particularly in number of months, we felt that, yeah, the T-score, which is the way we could tell whether that variable is a meaningful variable or not. Like, you usually test the hypothesis of a T-score of something that's high, it says that the inclusion of that variable and its coefficient is important, is different from zero.

And -- and we felt, yeah, okay, it was from zero, but we found that the R-squared, which is the goodness of fit of the whole equation, was still low, which gave us the impression -- and if I'm wrong, correct me, Lonnie -- that they're missing variables. And we -- we felt that an improvement can be made by maybe considering multiple lags or maybe putting some precipitation variables into the equation. Since it's a hydrological equation anyway, why would it make sense to

maybe include things? So we gave her the benefit of the doubt. I said, Yes, maybe antecedent forecasts could be supplemented and improved.

And in finding number 5 --

MR. GAVIN WOOD: Could I bother you just to amplify for the Board the reference to BC Hydro --

DR. ATIF KUBURSI: Yes.

MR. GAVIN WOOD: -- and Hydro Quebec there, please?

DR. ATIF KUBURSI: Yeah. I mean, we -- we -- we found that there were articles published by people who are at Hydro Quebec and people at BC and other aca -- academicians who were arguing and trying to say, Look, if you're dealing with models over time, it would make more sense to have dynamic specifications rather than the static one year to year, and that some of them are moving towards stochastic programming where they would maximize the expected value of something or minimize the variance of something.

So we felt that this is an area where it would be beneficial for Manitoba Hydro, and I've talked about it before, to -- to consider. It was not NYC that she brought these things, but since we felt that other people had brought it up in these -- in the -- in the -- in the various reports, we thought we brought -- would

bring it here.

MR. GAVIN WOOD: And that finding 4 is at pages 180 and 181, I noticed. Please go ahead.

DR. ATIF KUBURSI: The -- the model governance, I mean, there she was arguing very strongly about an improvement in the role of the middle office, and we felt that this was reasonable. She wanted the -- she was very much concerned about having more than one (1) pair of eyes looking at things. She always was arguing that you cannot be in the front office, the judge and the jury; that if you were to calculate certain things, it would be better that you give it to somebody else to vet it in the middle office, and that more than two (2) sets of eyes to look at things. And lone wolf, I mean, she is quite expressive about things.

MR. GAVIN WOOD: And -- and I think that middle office has been covered earlier today.

DR. ATIF KUBURSI: And -- and we have covered it earlier.

MR. GAVIN WOOD: Then going on to --

DR. ATIF KUBURSI: The -- the lake balance is --

MR. GAVIN WOOD: -- fi -- finding 6.

DR. ATIF KUBURSI: Yeah. The -- the lake balance is -- is an issue here. She found some

discrepancy between what she calls a Generation Estimate and HERMES solutions. But then we found that these are not as serious as she has purported them to be. But we felt that maybe some of the problems she's talking about -- and she did not mention this, and it's our view that maybe they're coming because of the fact that we're using static deterministic models, and it would have been better and things.

The -- the issue that there is also discrepancy between HERMES and SPLASH in the sense that SPLASH is predicated on the assumption that they know with certainty what the amount of water you need in the next period, and it's built in, whereas in HERMES the lake balances at the end of the period is a calculation from the optimization.

And there is an issue here in trying to see to what extent can you have a more coherent consistent dealing with this water balances. If predictive accuracy --

MR. GAVIN WOOD: Just -- just pause for a moment. Ju -- just so that the Board is aware thou -- those references to HERMES and SPLASH, are they also reflected in the earlier discussion of the models in Chapter 4 of your report?

DR. ATIF KUBURSI: Chapter 5.

MR. GAVIN WOOD: Chap --
DR. ATIF KUBURSI: Chapter 3 in our report.
MR. GAVIN WOOD: Chapter 3, sorry.
DR. ATIF KUBURSI: Yeah.
MR. GAVIN WOOD: But they -- they should understand that where the -- the matters you're summarizing now have been picked up on at other points where there's recommendations being made in your report?
DR. ATIF KUBURSI: Right. And -- and, Gavin, also we have -- as you can see, these are the summaries. They were four (4) or five (5) pages of discussion earlier that would take into details what we have summarized here.
MR. GAVIN WOOD: And they're -- they're certainly aware. I'm trying to follow it for them in the report as we go along, sir. Nu -- number 7 then, please.
DR. ATIF KUBURSI: Yeah, I mean, here, we -- we felt that back -- she has suggested back-testing. We -- we bought this. We thought this was a good idea, that in any forecasting you usually have to do forward testing and backward testing.
I mean, typically in models what they do, they estimate over a period. They get the coefficients. And then they say, Wait a minute, let's really look at

the models and leave the last three (3) observations away from the estimation and use the model to predict them because you have already the numbers, see if what the models would predict these values to be. And then you will be able to get the errors of forecast.

And if the model is predicting, well, these errors of forecast, all right, whether it is the absolute value -- errors means absolute value, errors or square of the errors is a test of the predictive accuracy of the model. So this back-testing, and she's suggesting that -- we felt that it was reasonable, and we called for it too.

MR. GAVIN WOOD: Then utility and relevance?

DR. ATIF KUBURSI: Yes. Well, in -- in some sense, she was suggesting, and we did not see any evidence of this, as if her means and models at Manitoba Hydro are directly used in the trading room, and that she was saying that the web trader was already reporting estimates and errors from HERMES.

We saw no evidence that -- that trading decisions are made solely or automatically on HERMES results. We felt that HERMES should and could and must inform decisions, but it's in no way a substitute for making the decision. They -- they just don't replace

traders who should really be informed and use this information, and on the basis of which they could make certain decisions, but these are not automatic things.

So her claim that HERMES and its mistakes are basically resulting in large trading losses we found not to be tenable.

MR. GAVIN WOOD: And, again, just so the Board understands how you approach these matters, would there have been a discussion with Hydro staff on an allegation such as the one you've just referenced?

DR. ATIF KUBURSI: Yeah, we -- we certainly talked to the people in the trading room, and we got enough comfort that they're not doing what she has alleged that they are.

MR. GAVIN WOOD: And that's found, sirs, at pages 186 and 187 of the main report. Then going on to the finding 9, please.

DR. ATIF KUBURSI: Yeah, I mean, she seems to have found that the drought cost in her view is overestimated and is used purposely, this overestimation, by Manitoba Hydro to mask what she considers the true risks which are in the long-term contracts.

So -- so she felt that the drought risks are exaggerated at Manitoba Hydro and are used as a pretext for covering up inefficiencies or greater

exposure in the long-term contracts. We did our calculations, and our calculations were actually higher not lower than Manitoba Hydro. The five (5) year and the seven (7) years, with a magnitude of between 500 million and 1 billion, our estimates are higher than those of Manitoba Hydro.

Her estimates are of between three fifty (350) and seven fifty (750) and then went up to one point two (1.2) are -- are low estimates. And -- and predicated on -- in our view on a wrong calculation of probabilities.

MR. GAVIN WOOD: And -- and what about, sir, the underlying serious allegation of misconduct on the part of Manitoba Hydro staff on that matter, any -- any suggestion of that in -- in your review with Dr. Magee?

DR. ATIF KUBURSI: We have no basis at all to believe that there is any misconduct on the part of the staff at Manitoba Hydro.

MR. GAVIN WOOD: In -- in regard to the matter we've just been discussing?

DR. ATIF KUBURSI: In -- in the matter of trading based on this or in exaggerating the cost of a drought.

MR. GAVIN WOOD: And then going on --

sorry, and going on at pages 191 and thereafter of the main report, at page 48 now, finding 10 of the -- the -- the direct, would you summarize that, please?

DR. ATIF KUBURSI: Yeah, I mean, there was almost a consistency among all the reports that the middle office should be elevated in importance and should be credited with more responsibilities, and that it should be beefed up with more staff and -- and expertise to do its job properly, and there was also, you know, recog -- recong -- recognition and recommendations on the part of most people that middle office should also be involved in long-term contracts and negotiations.

MR. GAVIN WOOD: And I -- I -- I think just going on now to the next section. I'll just pause for a moment and -- and confirm that Dr. Magee and yourself had checked at noon hour, and for some inexplicable reason, finding 7 got dropped later when you're dealing more in a summary with the findings.

So that's -- it just simply is a -- just an oversight --

DR. ATIF KUBURSI: An oversight on my part.

MR. GAVIN WOOD: -- on -- on -- on the part of yourselves and -- and my part, frankly, in -- in trying to review it for you afterwards. If -- if we

could then go on to page -- the bottom of page -- the -- the bottom of page 47 of the direct, Section 11-E. That's quite a long section in the --

DR. ATIF KUBURSI: I'll -- I'll summarize it.

MR. GAVIN WOOD: -- in the report, pages 191 through 220. Would you -- would you do that for me, please.

DR. ATIF KUBURSI: Yeah. I mean, there's wide discrepancy here between ICF, KPMG, Dr. Patchatoria (phonetic), Deloitte, and ourselves, and the NYC. I mean, the claims of NYC was that Manitoba Hydro should stop immediately any long-term contracts. That the terms of the contracts, the prices that were negotiated are all defective, they are far below what the spot prices were.

I mean, she was right on one (1) thing, in 2006/2007, the spot off-peak prices were really higher than some of the con -- but in every other year if you look at them in the whole sweep over the contract, the average price of the contracts were higher than the spot peak or off-peak prices for most of them.

So the -- the way the things came out is that her recommendations and assessment of the long-term contracts were a bit on the exaggerated side. And her recommendations were, to some extent, a -- a bit far-

reaching. They're not reasonable. I mean, completely stop any long-term contracts, cut out all the long-term sales.

Where she has really a point is that she wanted to make sure that whatever risk exposure -- and this risk exposure comes from the fact that, when you engage into long-term contracts, and in times of your inability to deliver, where you have to either fire expensive thermal or buy imports at congestion prices, that the exposure is extremely high, and that the losses become real, and that Manitoba Hydro must and should be always ready to assign what she calls reserve capital, risk capital to back up these exposures.

And here the -- the -- the situation is -- is important, and -- and in many respects, in our considered judgment at the moment, that the new term sheet that we saw, and reviewed only one (1) contract, that -- and these are all confidential, but it's our judgment that now there are worked into these contracts what we consider to be curtailment provisions that would allow a safety valve, and there is an upset price on heat rate that would protect, to some extent, not fully but to a good extent, the exposure of Manitoba Hydro in the long-term markets if they were able to sign contracts that would include all these provisions. At the moment,

you know, we saw these as part of the negotiation, and we felt comfortable with it and could address easily these things.

Now, the -- the issues that she dismissed very quickly -- and ICF we thought did a very thorough job -- is that these long-term contracts are part of the balancing act and the mitigation strategy in the sense that if you have a really diversified portfolio between a 50 percent or thereabout in long-term contracts and 50 percent in the spot market, you probably have a good balance between the two (2).

I mean, one -- without good fore -- foresight, knowing what the situation -- if we know that the price that we negotiate is going to be over the whole contract period, higher than what the spot prices are, I mean, it would be great to put 100 percent of your electricity into long-term contracts. If, on the other hand, you're going to have seller's regret in the sense that the prices might really turn out to be really, at the spot market, higher than the contracted one -- but nobody knows, and in such circumstances, it's prudent and acceptable, if not reasonable and totally advisable, that you would diversify.

I mean, the -- the -- my grandmother taught me that the best thing is don't put all the eggs

in one (1) basket, and there is no better place to do it than here. And -- and we felt that this is basically what was coming around.

THE CHAIRPERSON: Dr. Kubursi, is there a difference between entering into long-term contracts when the -- the capital assets that will be used to generate and transmit the power are in existence and the costs are all known, as compared to a situation where you have to build new generation and transmission and you don't know for certain what the costs will be?

DR. ATIF KUBURSI: If I understood correctly, Mr. Chairman, your question, there is no question here about the argument that has been advanced by ICF, and I understand also one that is defended by Manitoba Hydro, that in the absence of these long-term contracts, Manitoba Hydro would have itself to invest into this transmission, and has to go into areas over which it has no sovereignty and capacity to site and to engage in this activity; that these long-term contracts assure Manitoba Hydro that the counterparties would invest into these transmissions. And that in -- in -- these long-term contracts would not only assure the new investment in transmission facilities, but would also qualify the delivery of electricity as firm, and this has a higher priority on the transmission rights.

MR. GAVIN WOOD: I -- I think what --
THE CHAIRPERSON: I understand all of that. But I'm just asking, doesn't whether a particular long-term contract has a value or not depends in part on how much the -- you indicated before that one (1) par -- the primary objective of the Utility could be to produce the lowest cost production cost.
DR. ATIF KUBURSI: Right, right.
THE CHAIRPERSON: If the production costs were higher than the receipts, the long-term contract wouldn't necessarily be a good strategy, would it?
DR. ATIF KUBURSI: No, absolutely. If I -- let me see if I -- this is right. The argument here you're -- you're -- the question you're asking, Mr. Chairman, is that --
THE CHAIRPERSON: Just a hypothetical.
DR. ATIF KUBURSI: Is hypothetical. What -- what if the production costs are really higher than what the proceeds you're going to get? No matter whether you have transmission or not, the issue here is what are you recovering on these things. And -- and certainly it would not make sense. No utility is there in order to satisfy the demand of importers at the expense of its own viability and feasibility.

CONTINUED BY MR. GAVIN WOOD:

MR. GAVIN WOOD: And I think -- I think what the Chair wa -- was asking as well, Doctor, is is there, in your mind, a distinct difference if there's an existing capacity in a system to sell, in this case, out of province in long-term contracts versus entering into long-term contracts which are going to then require the utility to build facilities given things such as uncertainties of -- of the costs of -- of building those -- those facilities?

DR. ATIF KUBURSI: There's no question. I mean, the whole issue here would -- would boil down to what are the expected returns. And the expected returns would depend on a number of considerations, one of which is the future price of electricity and the future costs.

And the -- the issue here is to make sure that the expected net difference between this is large enough to pay you not only your production generation delivery cost, but also could compensate you for all the costs that you have to incur in order to build this.

THE CHAIRPERSON: Would you take into account the fact that the long-term contracts would be for only a percentage of the estimated service life of the new assets. In other words, the assured exports are of much shorter duration than the committed costs for the

new construction?

DR. ATIF KUBURSI: Yeah, absolutely. I mean, one of the strongest arguments why one would go into long-term contracts is that they usually pay for your fixed cost. And this fixed cost is over a much longer period. And it would make a lot of sense that you negotiate your contracts in a way in which you match the contract period for the amortization of your fixed cost.

THE CHAIRPERSON: You're suggesting something that would be normally found in a pension plan, where you match liabilities of assets with your pension obligations. Is that what you're saying?

DR. ATIF KUBURSI: Precisely. I mean, this is not a different problem.

MR. ROBERT MAYER: Dr. Kubursi, if I'm hearing you and the Chair correctly and our generating stations have a shelf life of a hundred years, surely you're not suggesting hundred year long-term contracts, are you?

DR. ATIF KUBURSI: No. I mean, depending on what generation stations we're talking about. I mean, no. I mean, what we're talking about is a longer period, as long as you can, because you're not going to amortize these dams and generating stations over a hundred years. Typically, you're trying to get this amortization on a --

on a shorter period.

What I would really like to argue here is that, if you can, try to match as far as you can. But, I mean, if it -- it lasts a hundred years and -- and we're going to amortize over a hundred years, I don't sign a contract for five (5) years. I mean, I'd like to really have some sort of symmetry between the period of maturity and the -- the period of amortization.

MR. ROBERT MAYER: But, Dr. Kubursi, we know that the -- we know that the generating stations do in fact last a hundred years. We know that the Company was relatively successful with -- I'm being -- in being -- I'm going to use a word I don't like much. I'm being relatively conservative when I suggest that -- that Limestone was a relatively successful project which appeared to have recovered most of its costs within a relatively short period of time, but that generating station is going to continue to provide power to Manitobans, and whoever else may need it at this point, for generations into the future.

DR. ATIF KUBURSI: Right.

MR. ROBERT MAYER: And at no time did we have a single existing contract, I don't believe, that actually could suggest we could pay for it out of the proceeds of that single existing contract.

DR. ATIF KUBURSI: No, no, you're -- you're absolutely right. I mean, okay, there are three (3) issues here. Let -- let -- let me maybe address them by -- by taking the three (3) issues. One (1) of the issues is that any utility has extremely large fixed costs. The variable cost is very low; the fixed cost is extremely high. You make it low by extending the life as long as you can.

The second idea is the fact that what is the amortization schedule that you're using. Are you using a linear line, so I would really take the useful life of the asset over one hundred (100) years or do I use a declining or double-declining -- if anything, I'm arguing it would be nice if we were to amortize most of this in as short a period as we can, and that if we can match the life of the long-term contract to meet at least that short-period amortization.

I mean, I know, I recognize, and I don't think it is in the realm of possibility that we -- we sign one hundred (100) year contracts. I mean, sometimes ten (10) years look to be a long period that people are not willing to go.

But nonetheless, what I really am arguing here is that if I'm able to get for the people of Manitoba the largest coverage of their asset amortization

in the period of the contract, that would be a -- a preferred one (1) if I were to elongate it in the presumption that this asset is going to last me for one hundred (100) years and that I'm going to get it with or without that long-term contract.

THE CHAIRPERSON: Mr. Kubursi, I -- I might be able to -- there -- there are two (2) possible ways, obviously, to recover costs, okay. If you build in advance of domestic need then you need some form of contract to cover the costs off. Once the domestic need develops then you have the local need.

So you're just -- as I hear you, I interpret it as saying that matching could involve two (2) phases, in a sense, but matching -- you're arguing basically for security of return. In other words the -- the argument for -- of building plants ahead of domestic need is that you're able to sell the excess capacity until the domestic need arises. Okay. You don't want to be selling contracts for export when you need it for domestic, so there's a -- a -- a matching there of some sort.

DR. ATIF KUBURSI: I -- I'm taking this into account. I mean -- you know, the strongest argument, why Manitoba Hydro is thinking of going into this decade of investment is on the presumption that we

will build it ahead of time so that we make the people who import our electricity pay the bulk of the early period where the amortization is probably fastest.

But in no way I'm suggesting that we're going to depend on these contracts to pay totally. I'm trying to say if I have a really choice, and if there are two (2) schedules, one (1) is steep and one (1) is flat, I would prefer, really, to structure my contracts in a way, especially if by presumption all my justification for going into this is that, oh, I need it in the final analysis for the domestic users, but my God, if I can really make people pay for it so that I have it for my future at much reduced costs, so much the better.

I -- I -- I'm going for the greedy alternative here.

THE CHAIRPERSON: I think, if you don't mind, I think we'll call it -- call it day. It's been an intensive day. Thank you very much --

DR. ATIF KUBURSI: Thank you.

MR. GAVIN WOOD: Thank you, sir.

THE CHAIRPERSON: -- to Dr. Kubursi and Dr. Magee and Mr. Wood. And we'll see you back tomorrow morning at 9:30.

MR. GAVIN WOOD: Yes, and --

THE CHAIRPERSON: So have a good night.

MR. GAVIN WOOD: -- just to give you -- everyone a sense, to -- the best estimate I would have now is we'd be about another hour and a half to finish the direct.

THE CHAIRPERSON: That of course depending on interjections.

(INDEPENDENT EXPERTS PANEL RETIRED)

--- Upon adjourning at 4:25 p.m.

Certified Correct

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Cheryl Lavigne, Ms.