



## COMMISSION OF INQUIRY RESPECTING THE MUSKRAT FALLS PROJECT

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Transcript | Phase 1

Volume 7

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*Commissioner: Honourable Justice Richard LeBlanc*

Wednesday

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**CLERK (Mulrooney):** This Commission of Inquiry is now open.

**MS. O'BRIEN:** If you could just activate your mic, please, by – thank you.

Madam Clerk.

**CLERK:** Do you solemnly affirm that the evidence you shall give to this Inquiry shall be the truth, the whole truth and nothing but the truth?

**MR. STRATTON:** I do.

**CLERK:** Please state your full name for the record.

**MR. STRATTON:** Paul Stratton.

**CLERK:** Thank you.

**THE COMMISSIONER:** You can be seated there, Sir.

All right. Ms. O'Brien?

**MS. O'BRIEN:** Thank you. Good morning.

Welcome, Mr. Stratton. We are going to get to your testimony in just a few minutes, but we have a few house – couple of housekeeping items from yesterday that I'd begin with. The first is for Mr. Warren. Yesterday, Mr. Warren, you had referenced P-00077, which is our exhibit, but that was the – was Nalcor's submission to the PUB in November of 2011.

And you had mentioned that some of the topics that you are – you were giving evidence on, including the PPA, the return on equity, internal rate of return – were covered in that document. I was wondering if you could please provide us with a cite in that document to assist us.

**MR. WARREN:** Sure. So, again, Exhibit P-00077. It starts on red page 48.

**MS. O'BRIEN:** And is that page 48 of that document, as –

**MR. WARREN:** Yes.

**MS. O'BRIEN:** – opposed – okay. So that would be, Madam Clerk, page 56 of the Exhibit.

**MR. WARREN:** No. Page 48, sorry.

**MS. O'BRIEN:** Oh, it is –

**MR. WARREN:** Right.

**MS. O'BRIEN:** – page –

**MR. WARREN:** Right.

**MS. O'BRIEN:** – 48 –

**MR. WARREN:** Yeah.

**MS. O'BRIEN:** – of ours – sorry. Okay. Thank you.

**MR. WARREN:** And it starts on line – the sections starts – line 7.

**MS. O'BRIEN:** Great. And it goes on for a couple of pages from there. Is that correct?

**MR. WARREN:** Yeah, it ends on the bottom of page 50.

**MS. O'BRIEN:** Wonderful. Okay.

Thank you very much for that. And we also have a housekeeping item for Mr. Moulton, I believe. Mr. Moulton, I understand you wanted to give the Commissioner some clarification on some testimony you provided yesterday?

**MR. MOULTON:** Yes, that's correct.

When I was asked about the escalation rates that were used in DG3 – did they come from Investment Evaluation or the LCP – I said I didn't know. And so, I went and checked yesterday evening, and as it turns out, the escalation rates were provided by LCP, and the explanation – they refreshed the escalation rates.

Big thing was, we wanted to make sure that the escalation rates were consistent with all the various generating alternatives that we were considering in the – in both cases. And the other point to make is that: the same escalation rates were used in both the Isolated Island case and the Interconnected case. So they were consistent.

**MS. O'BRIEN:** Okay. And when you refer to LCP, you would mean the project management –

**MR. MOULTON:** Yes.

**MS. O'BRIEN:** – team –

**MR. MOULTON:** Yes.

**MS. O'BRIEN:** – that you were referring to yesterday?

**MR. MOULTON:** Yes.

**MS. O'BRIEN:** Okay. Thank you for that clarification.

Mr. Stratton, we understand that you are a senior market analyst with Newfoundland and Labrador Hydro?

**MR. STRATTON:** Yes, that's correct

**MS. O'BRIEN:** And you're the person who prepared the load forecasts that were used for the CPW analysis at both DG2 and DG3, is that right?

**MR. STRATTON:** I am.

**MS. O'BRIEN:** Great, thank you.

So if you could maybe go over just briefly for the Commissioner what your education and work history is leading up to you having that position at Newfoundland and Labrador Hydro?

**MR. STRATTON:** Sure. I graduated from Memorial University with two degrees: a degree in statistics – Bachelor of Science – and I completed a Bachelor of Arts in economics after completing my degree in statistics. I began employment at Newfoundland Hydro in 1989, and at that time I was the economist reporting to Mr. Steve Goudie. Mr. Goudie was the manager of economic analysis at that time, and our primary responsibility in that department was to prepare load forecasts for the province.

**MS. O'BRIEN:** So that's what you've been doing essentially for your entire career?

**MR. STRATTON:** I've spent 29 years now preparing load forecasts for the company; yes, I have.

**MS. O'BRIEN:** Okay. And do you take any special courses to become a load forecaster? Or is this something that you learn on the job?

**MR. STRATTON:** You learn on the job, but there are also courses that you can take through institutes. So I would have attended forecasting courses through EPRI, which was the Electric Power Research Institute in the United States. And there would be other groups that sponsor educational programs for load forecasting.

**MS. O'BRIEN:** Okay. And so when would – when was the last time that you would have done a load forecasting course?

**MR. STRATTON:** It would have been in the 1990s. Yeah.

**MS. O'BRIEN:** Are you able to be more specific than that, or just sometime in that decade?

**MR. STRATTON:** I would think it would have been around – I started in '89. I would have been doing – those courses would have been completed in the first few years of my employment there. So I would think it would be '91, '92.

**MS. O'BRIEN:** Okay.

Okay, Madam Clerk, could you please bring up P-00135, page 25? And this is actually Grant Thornton's PowerPoint presentation, but this slide here does a breakout of the components of the load forecast, Mr. Stratton, and I thought it might be of assistance to you for the next series of questions.

Can you please explain, to the Commissioner, what – you know, how you generally do a load forecast? What are the components of it?

**MR. STRATTON:** So the majority of the effort in preparing the load forecast is in relation to preparing the load forecast for the utility loads and by the utility loads I mean the retail loads of Newfoundland Power and the retail loads of Hydro's rural service territory on the Island.

Each of those groups or – both Newfoundland Power and Hydro rural have two components; one being the residential load requirements, and the second being the general service or the commercial requirements. So those are – most – the majority of the effort is spent with respect to those loads because those are the loads that we model with our econometric models.

**MS. O'BRIEN:** Okay.

And we'll get into that in some detail; so, just looking at this diagram here, you're talking about the utility load. So the domestic service here these would be residential customers?

**MR. STRATTON:** The domestic service would be residential customers, that's correct.

**MS. O'BRIEN:** And so many of these would be customers of Newfoundland Power but also there are some of those residential customers who are rural customers of Newfoundland and Labrador Hydro, is that right?

**MR. STRATTON:** That's correct. Hydro's rural customers are generally in the – predominately in the northern – north coast, Great Northern Peninsula and along the south coast and they represent probably about 10 per cent of the total customer and load base of the utility load.

**MS. O'BRIEN:** Okay, thank you.

And then you just talked about the general service. So, again, this is divided between Newfoundland Power's customers as well as Newfoundland and Labrador Hydro's customers.

**MR. STRATTON:** That's correct.

**MS. O'BRIEN:** And just general service, can you just give us some examples of, you know, who makes up that group?

**MR. STRATTON:** So general service customers are very – what we call a heterogeneous group. They make up a very broad base of customers. So examples of those loads would be, well – this building that we're in, that would be a general service load. It could be a grocery store, could be a restaurant –

encompasses all the buildings, generally – and it could be a fish plant.

**MS. O'BRIEN:** Okay.

So, businesses, generally.

**MR. STRATTON:** Generally businesses, yes.

**MS. O'BRIEN:** Okay.

And then so we see – so those components make up the utility load and then we have another component here, the industrial load. Can you please explain what the industrial load is?

**MR. STRATTON:** So the industrial load on the Island at – when we were preparing the forecast for DG2 and DG3 – we were forecasting the long – in the long-term we were forecasting the requirements for four customers, the largest being Corner Brook Pulp and Paper –

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** – also known as Kruger, situated in Corner Brook.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** Then there was the oil refinery – North Atlantic Refining – at Come By Chance.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** The third would've been the new processing plant at Long Harbour for Vale, for processing the nickel ore out of Labrador. And the final would be Praxair, which was an – producing oxygen to facilitate the ore processing at Vale.

**MS. O'BRIEN:** Okay, so the Praxair industrial customer was linked to the refinery –

**MR. STRATTON:** It was directly linked to –

**MS. O'BRIEN:** – in Long Harbour.

**MR. STRATTON:** – (inaudible) processing.

**MS. O'BRIEN:** Okay.

I had a note that there was another one, Teck's Duck Pond. Can you –

**MR. STRATTON:** Yes, so Teck was a small mine in around the area of Buchans. So at the point, we would've been forecasting that mine to close – I think at DG3 we were forecasting that mine to close at the end of 2014.

**MS. O'BRIEN:** Okay.

And did it ultimately close at approximately that time?

**MR. STRATTON:** It was one year later when it actually shut their operation.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** Yup.

**MS. O'BRIEN:** All right.

So when we're talking about the industrial load at both DG2 and DG3, we were – you were really looking at primarily those four customers –

**MR. STRATTON:** That's correct.

**MS. O'BRIEN:** – that you've mentioned? Okay.

**MR. STRATTON:** For the – beyond the two or three years it was those four customers.

**MS. O'BRIEN:** Okay.

So all these components together make up the – here it's referred to as the energy demand forecast, but this is the load forecast that we're talking about?

**MR. STRATTON:** Correct.

**MS. O'BRIEN:** Okay.

And just to put it in simple terms, as I understand this, what you're really trying to do when you're doing load forecasting, you're trying to predict how much electricity that all of us here in the province are gonna need in the future, and you're doing that, sort of, day by day, month by month, year by year.

**MR. STRATTON:** The load forecast as part of the DG2 and DG3 analysis, and our standard long-term load forecast, is a load forecast of the annual requirements –

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** – for the province.

**MS. O'BRIEN:** Okay.

So let's perhaps start with the residential component of the forecast. What – generally, what kind of data do you use in order to come up with the domestic load?

**MR. STRATTON:** So domestic load is – there's two components to the domestic load. The first component would be your customers; how many customers you're gonna have. And the second component would be the average consumption level that those consumers use.

So for the customer forecast – you're driving the customer forecast with a forecast of housing starts.

**MS. O'BRIEN:** Okay, so housing starts, okay. So that would be new houses built?

**MR. STRATTON:** That would be new houses built –

**MS. O'BRIEN:** That would be new houses built.

**MR. STRATTON:** – exactly.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** And you're preparing the average energy forecast based on forecasts of personal disposable income.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** Price – both electricity and furnace oil.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** And the other, they would be the primary components, so prices and personal disposable income.

**MS. O'BRIEN:** Pardon?

**MR. STRATTON:** Prices and personal disposable income would be the main drivers of that average consumption level.

**MS. O'BRIEN:** Okay.

And so I know we heard yesterday that one of the – the price of electricity was definitely one of the inputs that you received from Mr. Warren's group. But can you just explain for us why the price of electricity and the price of furnace oil, why are those inputs that you can consider in the domestic service forecast?

**MR. STRATTON:** Okay, well, people's consumption of electricity varies with the price level of that product, right? And in the context of Newfoundland, furnace oil is also important, and the reason furnace oil is important in Newfoundland is because it's the – I'll back up. The domestic load is made up of – primarily it's made up of – or predominately it's electric heat and hot water load. So that accounts for roughly half the consumption level of the residential customer base, and the rest of the load would be made up of your dishwashers, your washer loads and your lighting loads.

So in the context of Newfoundland, we don't have natural gas, so the one energy substitute that people can use to heat their homes is furnaces that rely on furnace oil. And that's why it's always been a critical energy price for Newfoundland, in terms of load forecasting.

**MS. O'BRIEN:** Okay.

So just to – so understand – so personal disposable income levels, the idea being – generally speaking, of course – the more disposable income people have, the more likely they are to turn up the heat, use more electricity, generally?

**MR. STRATTON:** Correct.

**MS. O'BRIEN:** Okay. And then if the price of electricity is higher, people are more likely to turn down their thermostats?

**MR. STRATTON:** Yes, and that relationship between price and the amount consuming electricity is included in our residential models.

**MS. O'BRIEN:** Okay, and that's price elasticity?

**MR. STRATTON:** That is the price elasticity effect, so ...

**MS. O'BRIEN:** Okay, and we're going to get back to some more questions on that.

And generally, as I understand it, for the price of fuel oil, so – furnace oil – so that if furnace oil got very expensive, then people are more likely to convert over to electrical heat and, thus, drive up the electricity-use forecast.

**MR. STRATTON:** That's correct. And across our history, the electric heat load has been increasing on our system since the '70s – since the 1970s.

**MS. O'BRIEN:** So most –

**MR. STRATTON:** So –

**MS. O'BRIEN:** – new houses these days have been – are being built with electrical heat?

**MR. STRATTON:** Yes. And in the period prior to DG2 – to the preparation of the DG2 and DG3 forecasts, prices were – the energy prices were such that people were – people building homes were putting in – were – the penetration rate of electric heating those homes would have been 90, 95 per cent on average.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** So it's very high. People use electric heat in this province.

**MS. O'BRIEN:** Okay.

And so let's go to the general service – the commercial general service – so these are the input – or the, sorry, the businesses. What are the most important inputs for your load forecast for this component?

**MR. STRATTON:** So there are two key inputs to driving the general service forecast. One is the

gross domestic product for the province, and the second component would be the investment in commercial building space, so – which is akin to housing starts for your residential customer.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** It's the amount of buildings that are being built.

**MS. O'BRIEN:** Thank you.

If we could please bring up, Madam Clerk, Exhibit P-00077, page 30.

This is actually a page from Nalcor's PUB submission, which we've already referred to, and there's a list here. And this is on a section called "Key Forecast Assumptions and Drivers."

Mr. Stratton, can you just give that a quick review and let us know is this – was this an accurate list? I know this document was done for DG2; would this also be accurate for the forecast you did for Decision Gate 3?

And if it's of assistance, I believe at tab 2 of the book in front of you, you do have this document in hard copy if you – I – you're – I know you're a bit distanced from the monitor.

**MR. STRATTON:** Oh, I'm good.

All those assumptions would be – would reflect the assumptions in DG3.

**MS. O'BRIEN:** Okay. Thank you.

So you talked about some macroeconomic data, so you've talked about gross domestic product; you've talked about personal disposable income levels, new housing starts. Where do you get that data from?

**MR. STRATTON:** Hydro has always – or has been relying on those – what we call macroeconomic forecasts from the Department of Finance, from the Government of Newfoundland and Labrador. And we've been relying on those forecasts since the mid-1990s, I believe, around that time frame. Prior to that, we were relying on economic forecasts from a forecaster out of Ottawa called Informetrica.

**MS. O'BRIEN:** Called – sorry, what was the name?

**MR. STRATTON:** Informetrica.

**MS. O'BRIEN:** Okay.

And why in the mid-90s did you switch from using the Informetrica data to using data from the Department of Finance of the Government of Newfoundland and Labrador?

**MR. STRATTON:** Well, during the 1990s Hydro went through a period where – basically where there was a big emphasis on controlling costs and we were trying to reduce our costs.

So the cost of the service from Informetrica, I don't know what the amount was, but we approached the Government of Newfoundland to see if we could access their forecast, and they were able to offer us a forecast service at a – basically at a better price. So that was the driver of it, but we – over the years we've stuck with them because we've gained confidence in their forecasts.

**MS. O'BRIEN:** Okay.

If we could please, Madam Clerk, go to Exhibit P-00014, page 34.

So at this page of Grant Thornton's report, they reference a couple of additional sources of macroeconomic forecast data. So they reference here the Conference Board of Canada and as well as Statistics Canada; they make some reference to the National Energy Board. Are these – are you aware of these other sources?

**MR. STRATTON:** I'm aware of the Conference Board of Canada forecast. Statistics Canada wouldn't provide macroeconomic forecasts.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** And the National Energy Board, they – actually, I'm not certain where their forecast would come from. I know they do forecasting but I don't know what their inputs – where there was – if they were creating, they were doing their own or if they're contracting that out to other sources.

**MS. O'BRIEN:** Okay.

So have you ever made use of any of the – any macroeconomic forecasting data from other sources since the mid-1990s?

**MR. STRATTON:** No, we've always relied on the Government of Newfoundland for our macroeconomic forecasts.

**MS. O'BRIEN:** Okay, okay.

So is that – you know, some people might think, well, you know, it might be better to get data from more than one source and, you know, take an average of them or do some comparison of them. Have you ever considered doing that? If not, why not? And if you have, please explain to us what you've done.

**MR. STRATTON:** Okay, so I think we would – I would have considered it, but what matters to the load forecast. An average forecast is not necessarily a better forecast. I mean what makes the forecast more accurate is a more accurate economic forecast. Now, we had more confidence in using the government forecast than the other sources that we could have used and there were reasons why that was.

And when we initially contracted with government for those forecasts, we had learned and understood that the Government of Newfoundland had invested a lot of time and energy and resources into building a macroeconomic model for the province. So, over the years, we developed a good – a working relation with them. We began to understand that their work – they were doing really good work which increased our confidence in using them.

**MS. O'BRIEN:** Okay, all right, thank you.

Now, I understand that you prepare a load forecast of what's – I understand you refer to as a planning load forecast annually. Is that correct, you do it every year?

**MR. STRATTON:** Yes, generally once a year.

**MS. O'BRIEN:** And, normally, how far out into the future do you forecast?

**MR. STRATTON:** The standard time element of the forecast would have been 20 years.

**MS. O'BRIEN:** Okay.

Now in the case of the forecasts that you did at Decision Gate 2 and Decision Gate 3, I understand those were a much longer period. How far out did you forecast in those two cases?

**MR. STRATTON:** For DG2 and DG3 we – I was asked to prepare a load forecast that encompassed 50 years.

**MS. O'BRIEN:** Fifty years?

**MR. STRATTON:** Fifty years.

**MS. O'BRIEN:** And so let's look at DG3 in particular. When would you have prepared your load forecast for the purposes of DG3?

**MR. STRATTON:** DG3?

**MS. O'BRIEN:** Yes.

**MR. STRATTON:** I would have prepared that – it was during the spring of 2012.

**MS. O'BRIEN:** Okay.

And what was the last year of your forecast?

**MR. STRATTON:** That forecast – well, the first forecast year would have been 2012, so it would have went 2012 to 2032.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** I believe.

**MS. O'BRIEN:** That's only a 20-year period; I thought you said you'd gone out 50 years?

**MR. STRATTON:** No, okay, so I guess one distinction is that our macroeconomic forecast would have went out 20 years. So we would have forecast with our model, our standard modelling approach, 20 years and then we would have extended that forecast to the period 2067, I believe.

**MS. O'BRIEN:** To 2067?



**MR. STRATTON:** Yes.

**MS. O'BRIEN:** Okay. So that was really a 50-year period starting in 2017.

**MR. STRATTON:** Yes. That's correct.

**MS. O'BRIEN:** Okay, but you had been doing this work –

**MR. STRATTON:** Yes, yes.

**MS. O'BRIEN:** In 2012 you would have forecasting out for the period from 2017 to 2067.

**MR. STRATTON:** Yes, right.

**MS. O'BRIEN:** So, essentially, 56 years into the future. Is that –?

**MR. STRATTON:** Yes, so it would have – yeah, I – yes, I had that mixed up. It wasn't 50 years from the starting; it was 50 years to encompass the starting point of all – or the completion of Muskrat Falls.

**MS. O'BRIEN:** Okay. Thank you.

So why was the – this 50-year window selected? You know, why did – why was the decision made? Do you know why the decision made was to forecast out the 50 years from 2017? We know what the start date was. That was the anticipated, you know, date that Muskrat Falls would come online, but why the full – why 50 years? Why was that chosen?

**MR. STRATTON:** My understanding was because it reflected the life of the assets.

**MS. O'BRIEN:** Mr. Moulton, is there anything that you'd like to add because I do know that this might be in your wheelhouse?

**MR. MOULTON:** The – I went back and actually looked and the – we've been using the 50-year forecast for looking at some of the interconnection to Labrador cases, well, before I got really into the generation planning. We also did – there was a study done in 1998 as well. So we haven't really been able to discover where we actually started with the – doing the 50 year right out to the end.

But I think it was – everybody was done. It covered the life of the asset, the Labrador-Island Link so it took us to the end of that. I think what happened we did do some shorter runs, say, to, I think, like 2047, 2053 in doing DG2. But what would happen then it was, well, let's see what it looks like if we go out to 2067. So, eventually, we just started saying, well, we'll just do the 50-year run.

**MS. O'BRIEN:** Okay.

**MR. MOULTON:** So that's –

**MS. O'BRIEN:** Okay. Thank you very much.

Mr. Stratton, I'm going to come back to you now and talk a bit about your – the method of forecasting that you do for your electricity load. Now, you mentioned it earlier. So for the residential customers and the general service customers – or essentially the businesses – I understand what you use is called a statistical regression methodology, or sometimes referred to as an econometric methodology. Is that right?

**MR. STRATTON:** That's correct.

So the distinction between statistical regression and the econometrics is that econometrics is the application of statistical regression to economic data.

**MS. O'BRIEN:** Okay.

So I'm going to lead a bit in the questioning here, and I'm only able to do that because I've already interviewed you and you have done a fair bit to educate me on this.

So I understand that this method that you do, with the Newfoundland and Labrador Hydro, is sometimes referred to as a top-down approach. Is that correct?

**MR. STRATTON:** That's correct.

**MS. O'BRIEN:** Okay.

And I'm going to keep referring to it now as the top-down approach.

**MR. STRATTON:** So, and I want to clarify one point with respect to our top-down approach

because it may enlighten people a bit more about how we do it. So it's a top-down approach, but our top-down approach also incorporates end-use details. And those end-use details are with respect to the electric heating for the domestic class, as well as the hot water consumption. And the reason why we've detailed those two end-uses in our modelling approach is because they represent the major share of load.

**MS. O'BRIEN:** Okay.

And so, generally, is it fair to say that the top-down approach relies on – you look back at historical trends?

**MR. STRATTON:** That's correct.

So with regression, you're explaining the historical variation in the consumption levels based on the historical variation in the input variables which would be to a person's disposable income and the prices.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** Amongst other variables, but –

**MS. O'BRIEN:** Okay.

So essentially, you look at sort of this big picture economic data and you look how changes in that data – you know, changes in the price of furnace oil, changes in the price of electricity. Changes in that data have affected energy or electricity consumption in the past and you see what the trends are, and then you take that information that you've learned and apply it to the future to say: okay, well, this is our forecast for those inputs in the future and this is thus how we expect consumers to react in terms of their energy consumption. Is that a –

**MR. STRATTON:** That's a good summary of –

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** – how it's done.

**MS. O'BRIEN:** All right. So we'll call that one now the top-down approach, to make it simple.

**MR. STRATTON:** Yes.

**MS. O'BRIEN:** And so – now, an issue was raised, I believe, in Manitoba Hydro International's report for the PUB during their review of the DG2 numbers, and I'm just going to summarize it here, but essentially that they stated that while the top-down approach was not best practice, they said the best practice was to use an end-use modelling technique which is more of a bottom-up approach. Is that right?

**MR. STRATTON:** That's correct.

**MS. O'BRIEN:** Okay.

So could we go to Exhibit P-00048, please, Madam Clerk, page 10.

So this is the paragraph that I was just referring to here. I'll give it a little highlight. So they ultimately concluded: "Best utility practices would incorporate end-use modeling techniques into the forecasting process so that electricity growth can be quantified for all major domestic end-uses."

So can – Mr. Stratton, can you just give us – we just talked a bit about how the top-down approach works. Can you just give the Commissioner a brief overview on, you know, this end-use modelling, this bottom-up approach, how that works?

**MR. STRATTON:** Sure.

**MS. O'BRIEN:** Thank you.

**MR. STRATTON:** So an end-use model is – starts from the bottom. So you determine through surveys and studies how much – how many appliances, how many lights, how many stoves; so it's a listing of all the energy-consuming devices, say, in a residential home. And then you – you're – you estimate then what the electricity consumption level is for each of those end uses, and then you project how many of those end uses are – you expect them to be in the future.

So you're adding up the consumption levels for – of all the end uses to come to build up your loads.

**MS. O'BRIEN:** Okay.

So you start out with – then, I guess, have to do a lot of surveying of homes and collect a lot of data in the present day and to get a sense of, you know –

**MR. STRATTON:** So with end-use forecasting, you have to be continually updating your models through surveys because you have to know how many of those end uses are in each of the homes, and that changes through time.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** So it's more – it's much more costly because you have to put much more research into developing that forecast.

**MS. O'BRIEN:** Okay.

Other than Manitoba Hydro International, whose report we've just looked at, have any other utility experts reviewed Newfoundland and Labrador Hydro's practice on the method of forecasting?

**MR. STRATTON:** Yes, they have. Both assessments were completed after the outage inquiry. So one was prepared by Ventyx corporation, and another analysis review was completed by Power Advisory LLC, which was prepared on behalf of the provincial government.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** And both of those reviewed our practices, and both of those reviews indicated that there wasn't – there weren't compelling reasons for us to change from our forecast approach to go to an in-use approach.

**MS. O'BRIEN:** Okay.

And we've heard a bit about Ventyx before. I believe this is the company that made the Strategist software that Mr. Moulton told us about yesterday?

**MR. STRATTON:** That's correct.

**MS. O'BRIEN:** Okay.

And so those reviews, just – I understand the Ventyx report was done in 2014 and the Power

Advisory LCC [sp LLC] one was done in 2015. Is that right?

**MR. STRATTON:** That's correct.

**MS. O'BRIEN:** Okay, thank you.

So now we are a few years past Decision Gate 3 now. Is Newfoundland and Labrador Hydro still using the same forecasting methodology that it did back in 2012?

**MR. STRATTON:** Yes, we are.

**MS. O'BRIEN:** Okay.

All right. So do you agree with Manitoba Hydro's assessment here that a bottom-up approach is essentially not best utility practice?

**MR. STRATTON:** I wouldn't consider it best practice. I would consider it an alternate practice that can give you a load forecast that provides different information, because an end-use forecast can provide you detail on the loads in the forecast period. So it can be viewed as being more informative. So you can see where the loads are and what's growing. But in terms of being better able to predict what's actually going to occur, there's no guarantee with an end-use forecast that it's going to provide you with a better forecast.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** So that's what was critical to our decision making, to keep forecasting with the approach we were using.

**MS. O'BRIEN:** Okay, thank you.

Madam Clerk, can we please go back to Exhibit P-00135, page 25.

So, Mr. Stratton, you've just described to us in some detail your methodology for doing the domestic service and, what I understand to be, the general service components that make up the utility load. I'd like to talk now about your methodology for doing the industrial load component of your forecast.

So this is where – you've already described to us, it's really made up of four major consumers,

that's the group. How do you do the forecasting? What method do you use to do the forecasting for that component?

**MR. STRATTON:** So because our industrial class of customers is a very small group of customers, 'cause it's only – well, for the forecast period it was only four customers, essentially. There was no possible way to apply statistical methods for producing those forecasts. So we've always relied on the input from those customers to project out their loads.

**MS. O'BRIEN:** So, essentially, you call them and ask them questions? Is that what you mean when you say you rely from – input from those customers? How do you get that input?

**MR. STRATTON:** Yeah, so we would have – well, in the early days we would have called them and spoke to them, and in later years we would have sent emails to them and requested that they provide us with an updated load forecast for their operations.

**MS. O'BRIEN:** Okay.

And is that what you would have done for the DG2 and DG3 load forecasts as well?

**MR. STRATTON:** Yes, we did.

**MS. O'BRIEN:** Okay. And do you do any verification of the information that they give you?

**MR. STRATTON:** So we look at their – what they input to us and we would look at that for the reasonable – check the reasonableness against their historical consumption levels. And if we thought that they were – they – that it looked too high or too low, we would have communicated with them to try to get an understanding of why it was. And if we felt that they were being overly optimistic in their loads, we may have made some modest adjustments to their load.

**MS. O'BRIEN:** Do you recall if that happened at DG2 or DG3?

**MR. STRATTON:** I believe, we – at DG3 there weren't any real concerns with their loads that

they were forecasting so we used them basically as they were given to us.

**MS. O'BRIEN:** Okay.

And I know you mentioned very briefly that the Duck Pond – Teck's Duck Pond mine. And that was only a very – I understand, a very, very small part of your load because you were anticipating, even in 2012, that it would shortly be closing down. But do you do any other verification for customers, mining customers?

**MR. STRATTON:** So for – well, in the case of a mine, yes, it's a different type of industrial customer because you can – you're able to look at the reports on the ores that are – that the mine has proven basically. So you can use the proven ore amounts to determine whether or not – whether, when the – when you would expect that mine to close, right?

**MS. O'BRIEN:** Okay, so you look at how much, what their reserves are, what they – you expect they still have in the ground.

**MR. STRATTON:** Yes.

**MS. O'BRIEN:** And you extrapolate out as to when you think that would be exhausted?

**MR. STRATTON:** We would rely on proven resource estimates that would be published on their websites.

**MS. O'BRIEN:** Okay. Thank you.

**MR. STRATTON:** And then we would – we knew what their production levels were, what their plants were capable of producing and then we would test what they were saying based on that.

**MS. O'BRIEN:** Okay. Thank you.

Now, do you – this is all very – describes some very complex methodology, particularly for the utility load. Do you rely on any special software to do that? Is this something that you have – do you do models that you've just developed in-house? Can you just tell us, you know, how it's actually done?

**MR. STRATTON:** Okay, so the load forecast model, which is made up of mathematical equations and identities, they would be housed in a software and we use a software called EViews and that's –

**MS. O'BRIEN:** Sorry, what's the name of it?

**MR. STRATTON:** EViews, E-V-I-E-W-S.

**MS. O'BRIEN:** Thank you.

**MR. STRATTON:** Okay? And that software allows you to develop a model and solve it using – because to solve the load forecast model you have – it has to be iterated to produce what they call a simultaneous solution, so it's a detailed look.

**MS. O'BRIEN:** So we – but you do use software and –

**MR. STRATTON:** Yeah, we use it –

**MS. O'BRIEN:** Yes.

**MR. STRATTON:** We use it –

**MS. O'BRIEN:** Complex –

**MR. STRATTON:** Yes.

**MS. O'BRIEN:** – models to do this.

**MR. STRATTON:** Yes, right. So that – and that houses the regression work that we do.

**MS. O'BRIEN:** Okay. Thank you.

I'd like to ask a few questions now about how you do the long-term forecasting, particularly at DG2 and DG3. You know, how you extended what was normally for you – what – your normal work would be a 20-year forecast, how you went about extending it out ultimately to a 56 years.

**MR. STRATTON:** Yeah.

**MS. O'BRIEN:** So for the residential and domestic service components of the load, these two circles right here, I understand that you extended those in a similar way. Can you just please explain to the Commissioner how you –

what you did to extend that component of the forecast out to 2067.

**MR. STRATTON:** Okay, so we didn't have available a macroeconomic forecast that was extended to 50 years, so we had to apply our knowledge based on our experience in forecasting. I guess then the primary element of extending the forecast was that we felt it needed to be conservative.

So there were two components of the load; one was how much electric heat was – could be – was there left to be converted on the Island. And the reason why that was important was because the electricity prices and the furnace oil prices were such that people were going to – people would continue to convert to electric heat. So at the end of the 20 years, we established how much electric heat base was left to be converted.

So we extended the forecast based on the existing growth of the last five years. Once the loads achieved full conversion of electric heat on our system, we changed the growth level to reflect a conservative growth level. And that conservative growth level matched our lowest period of growth in our history, so it coincided with the load growth during the 1990s.

**MS. O'BRIEN:** Okay.

I'm going to go over that again, just because it is, of course, complex and it's important. So you had economic forecasts that were 20 years of forecasts.

**MR. STRATTON:** Correct.

**MS. O'BRIEN:** So you did your initial – the initial 20 years of your load forecast you did in the same manner that you've described as you usually do a forecast.

**MR. STRATTON:** That's correct.

**MS. O'BRIEN:** Okay.

Then you looked at the last five years of that 20-year forecast.

**MR. STRATTON:** That's correct.

**MS. O'BRIEN:** And you said – you made the assumption that in that last five years, not all the houses and businesses in Newfoundland and Labrador that might convert over to electric heat have done that yet, we're still getting a lot of rapid growth in the electric heat area.

**MR. STRATTON:** And we knew that because that's part of the data detail in our model. So we knew what the saturation level was at that point in time.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** So that – so if that would have been at 68 per cent of homes with electric heat, then we established how much we – how much electric heat we – I wouldn't say believe, but how – we estimated how much it would – what the saturation level would peak or flatten out at and that –

**MS. O'BRIEN:** So where did you think it would – like, what percentage? So if at the end of your 20 years, 68 per cent of homes had electric heat, at what point did you consider it – consider the market saturated with electric heat?

**MR. STRATTON:** Right, so to establish that – and it was between the completion of DG2 and DG3 that I did some research on where other provinces that had a high – low electricity prices and high electricity. So Quebec was the jurisdiction that had just as much electric heat as we did and their system was saturated at 75 per cent, I believe. It was either 75 or 80 per cent, it was in that range.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** So that's the marker, that's the point that we chose.

**MS. O'BRIEN:** Okay.

So you considered to grow the – you considered, after the 20 years you extended the load forecast out, accounting for growth in additional electric heat up to the point that the Newfoundland and Labrador market would have whatever it was, 75 or 80 per cent, of the houses using electric heat.

**MR. STRATTON:** Correct.

**MS. O'BRIEN:** Oh.

**MR. STRATTON:** So we knew how much load was associated with electric heat. So we – once the load forecast – after accounting for customer growth, how much – we knew when the system was saturated with electric heat.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** (Inaudible.)

**MS. O'BRIEN:** And how did you extend out your customer growth?

**MR. STRATTON:** So we – well, we didn't extend out customer growth in that because it was high level – it was a high level. We weren't growing customers, but what we did was we looked at – well, we looked at the lowest customer growth level, and then we – and we – then we did the math of saying how much energy an average customer was using at that point, and that was the extension for that class.

**MS. O'BRIEN:** Okay.

So you went out until you got to this – the saturation point for electric heat, and then, you're saying after that, you looked back at Newfoundland and Labrador's – Newfoundland and Labrador Hydro's forecasting history –

**MR. STRATTON:** Mm-hmm.

**MS. O'BRIEN:** – so that would have been back to 1968 or so. Is that right?

**MR. STRATTON:** Over the actual history.

**MS. O'BRIEN:** Pardon?

**MR. STRATTON:** The actuals of –

**MS. O'BRIEN:** The actuals, okay, what actually happened.

**MR. STRATTON:** The historical record and the –

**MS. O'BRIEN:** The historical record. And you said, okay, at what point there – I take it over the historical record, electricity use has always grown from year to year. Is that correct?

**MR. STRATTON:** Yes, it has.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** So there was a period of slow growth in the 1990s.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** And that was associated with the closure of – it was the northern cod closure.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** So that impacted the economy and our economy was stalled for several years. And during that period is when we experienced the lowest customer growth, and the – that's the period that we choose.

**MS. O'BRIEN:** Okay, so you – that was growth but modest growth, certainly, the least you'd ever experienced in the history –

**MR. STRATTON:** We would've – yes, we would have characterized it as modest growth.

**MS. O'BRIEN:** Okay.

And then that's what you used to extend your load forecast out – that rate of growth – right out to 1950 – 2056.

**MR. STRATTON:** 2067, correct.

**MS. O'BRIEN:** Yes, sorry.

2067, my apologies. Okay.

Okay. And as part of this did you assume then that the – essentially, the economy of Newfoundland and Labrador would continue to grow throughout the 56-year period you were forecasting?

**MR. STRATTON:** That was an implicit assumption –

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** – in doing a customer growth forecast that the economy would continue to grow.

**MS. O'BRIEN:** Okay.

You've described what you did. How did you come to make that decision of how you were going to do it? So for example, is this something that other utilities have faced, you know, having to do a load forecast out for a 50-year period? Did you consult with anybody else? Was this – you just used your in-house knowledge? How did you make the decision about you were going to accomplish the task?

**MR. STRATTON:** I used my experience as a load forecaster.

**MS. O'BRIEN:** So did you check with any other utilities at all?

**MR. STRATTON:** No, I did not canvas other utilities, no.

**MS. O'BRIEN:** Okay.

Do you know if there's other methods for doing this used by other utilities, other methods for extending out a forecast over such a long period?

**MR. STRATTON:** There are other methods. One could just apply the growth rate. I know in other jurisdictions, people use just the last year's percentage growth and apply it out for the duration of the forecast. I wouldn't have – that would not have been appropriate, because over the long period, you get compounding effects because of the growth rate. So our approach was – we considered it to be more conservative.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** And I guess the other point to make there is that it was a low period of growth, so there was not a lot of growth in that forecast beyond that point.

**MS. O'BRIEN:** Okay, thank you.

So that – you've explained to us how you extended out the utility load component here of the forecast. So let's go now to the industrial load component. How did you extend that out to 2067?

**MR. STRATTON:** So the industrial forecast – because we have no knowledge of when or if a new customer would come on the system and we didn’t have any knowledge as to when or if the existing customers would close, our view of – or our approach to the industrial forecast was to just extend those loads out to the length of the forecast. Because you weren’t able to apply a statistical approach to forecasting because they’re one of – they’re all individual, and you didn’t have a sufficient sample size to be able to prepare a regression analysis or another approach.

**MS. O’BRIEN:** Okay.

So you did your usual method of doing your initial 20-year forecast for this component?

**MR. STRATTON:** Correct.

**MS. O’BRIEN:** And then you just took what it was in year 20 and you just held that straight right out to 2067. Is that right?

**MR. STRATTON:** That’s correct.

**MS. O’BRIEN:** Okay, so you assume that there was no – you lost no customers; you gain no industrial customers?

**MR. STRATTON:** So I would characterize that as we didn’t increase our industrial load and we didn’t reduce our industrial load.

**MS. O’BRIEN:** Okay.

And – as I understand what you’re saying, that part of this – so you don’t know when you could get a new industrial customer, that’s hard to predict into the future. You don’t know when there’s gonna be new mineral deposits discovered or a new operation’s gonna open up in the future.

**MR. STRATTON:** All you know is that there’s opportunities for those – for new load – industrial load, but you don’t know when –

**MS. O’BRIEN:** Okay.

**MR. STRATTON:** – and you don’t know what scale.

**MS. O’BRIEN:** Okay, so you assumed –

**MR. STRATTON:** We assumed it would be just flat.

**MS. O’BRIEN:** Okay.

Now, I wanna pick up one point that was discussed by Grant Thornton. Now, they raised in their report that the 2011 annual report for Vale SA included a projected exhaustion of Voisey’s Bay open pit in 2023. And – now, I understand that Voisey’s Bay mining operations are in Labrador, and they are not – that’s not your – they burn diesel and generate their own electricity up there.

**MR. STRATTON:** Correct.

**MS. O’BRIEN:** But what – the customer on your industrial load is the refinery in Long Harbour?

**MR. STRATTON:** Correct.

**MS. O’BRIEN:** Okay.

So first of – so when you were looking at extending out, you know, the customer – the Long Harbour refinery throughout this period, did you take in any consideration of the mining reserves for the Voisey’s Bay mine in Labrador?

**MR. STRATTON:** Well, the mine was instrumental in establishing the processing plant in Long Harbour, but the – we made the assertion, I guess, that the level of investment for that processing plant in Long Harbour was in excess of \$4 billion. It was a \$4-billion processing plant of ore. It was at tidewater. It wasn’t inextricably linked, or extricably linked, to the ore body in Labrador.

And I guess the – when it first opened we – it – they were processing ore from Indonesia, which was a long distance away. So if – so we made the assertion that, well, if that plant – if they were gonna invest that much money in a plant, that plant was able to process ore from many regions in the global economy.

**MS. O’BRIEN:** Okay.

**MR. STRATTON:** Yep.



**MS. O'BRIEN:** So did you – I mean, one need only – you can look at the website, I guess, for the Long Harbour Processing Plant, and they do refer to these two operations as an integrated operations, but what you're saying is you made – you would just assume, look, they've invested a lot there down on Long Harbour. Even if the ore is exhausted in Voisey's Bay, they're gonna still bring in ore – ore from other places, 'cause they've got the deepwater port, as Mr. Simmons referred to earlier, and they can bring it in by boat.

**MR. STRATTON:** Well, the level of investment indicated that they were there for a long term.

**MS. O'BRIEN:** Okay.

Did you contact anyone at Vale to, you know, get any input from them on that assumption that you were making?

**MR. STRATTON:** Well, we didn't have a long-term vision from them, no.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** Yeah.

**MS. O'BRIEN:** So you didn't do any checking with Vale on that assumption?

**MR. STRATTON:** No, we did not.

**MS. O'BRIEN:** Okay.

Now, again, I know that you said that one of the other major customers on the industrial load was Corner Brook Pulp and Paper, and that's owned by Kruger Inc. So – and that one you continued right out through to 2067. We had a little bit of evidence about this already, yesterday, I believe. So Nalcor has a Power Purchase Agreement with Corner Brook Pulp and Paper and you actually buy power from them from a biomass cogenerating plant that they have. Is – that's correct, is it? It might be Mr. Moulton who's better able to answer that.

**MR. STRATTON:** No, I'm able to. That's correct, yeah, yeah.

**MS. O'BRIEN:** Is that right, Mr. –?

**MR. MOULTON:** Yes, that's correct.

**MS. O'BRIEN:** Okay.

So looking at the – your system plan, Mr. Moulton, for going through, you know, for the DG3 – we'll stick with that – you made the assumption that you'd stop purchasing power from Corner Brook Pulp and Paper, the cogeneration power after 2022, 2023. Is that –?

**MR. MOULTON:** In that, the PPA ends in that time frame, yes.

**MS. O'BRIEN:** Okay.

**MR. MOULTON:** And that's – and it's a small amount. It's a 15-megawatt plant.

**MS. O'BRIEN:** Okay.

And so why is it that you – like, Mr. Stratton is making the assumption that Corner Brook Pulp and Paper is going to be continuing to operate through to 2067. And then in terms of the power purchases, you assume that you're going to stop purchasing power from them in 2022, 2023. Can you just explain for us why that difference?

**MR. MOULTON:** They're not totally connected. Again, the – where we're purchasing power, where there's – Kruger has two sources of power. Their main source of power is hydro power from the Deer Lake power plant. This was the – it's a – we were talking about CTs and CCCTs yesterday. This is – they – the plant uses – the mill uses a lot of processed steam in its operations, so this kind of makes use of that.

They produce steam; they run it through a steam turbine and produce electricity which they sell to use. Then they use the steam that comes out of it as normal in their mill, but this unit doesn't have to be there. So, again, at the price of the current contract, it's – there were other less expensive sources of power available. So in 2023, when the current contract ended, we – it was not the, I'll say, the least-cost source of power to keep going with it, so we would assumed it would have ended.

**MS. O'BRIEN:** Okay. And I understand what you're saying; you're saying that they don't

need to sell us the power to keep on operating their pulp and paper mill?

**MR. MOULTON:** No.

**MS. O'BRIEN:** Okay.

Did – I know, Mr. Stratton, you said that you do contact your industrial customers. Did you have any contact with Kruger or Corner Brook Pulp and Paper to see if, you know – whether if they stopped earning money from selling power to Newfoundland and Labrador Hydro, would that affect the financial viability of their operations?

**MR. STRATTON:** No, I wouldn't have had any contact –

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** – reason for that.

**MS. O'BRIEN:** Okay. Thank you

Now, one of the point – and it was certainly raised by Manitoba Hydro International in their DG3 report and it was raised by Grant Thornton as well – is the industrial load can be a very volatile load component. In other words, you could have – you know, if we – you could have – if you had a brand new mine opening up, you could have a big, huge jump in that at any time. Or if you lost – you know, it's made up of four customers, so if you lost one of those, you could have a big drop. And it's very susceptible for – to big increases and big decreases, is that a fair characterization?

**MR. STRATTON:** It is.

**MS. O'BRIEN:** Okay.

And so you've explained, for the Commissioner, really clearly how you did it. You just took – we're just assuming no change, no gains, no losses. Do you know – are there other ways – if you have to forecast out what is a fairly volatile component of your load forecast out for that length of time, do you know if there are other ways, other methods, that you could've used that might've accounted for that volatility, as opposed to the straight-line method that you used?

**MR. STRATTON:** Well, it would've been impossible to apply the historical downturn to future because the reduction in load reflected the market conditions of those particular customers, and it didn't necessarily reflect the profitability or conditions of the remaining. So in terms of such a small sample, you just can't apply trends – the historical trends to that because it doesn't reflect the realities of their futures.

**MS. O'BRIEN:** Too small a sample group –

**MR. STRATTON:** Yes.

**MS. O'BRIEN:** – is what you're saying.

**MR. STRATTON:** They're one of.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** Yeah.

**MS. O'BRIEN:** Did you consult with anyone outside Newfoundland and Labrador Hydro? Like, did you discuss to any other utilities as to how they do really long-term forecasts of their industrial customers, other provinces or utilities that would have similar small – you know, a small customer group in that component?

**MR. STRATTON:** I didn't discuss it or search it out. Our methodology was one that was – we had been using for – since I started work there, and it was a philosophy or an approach that both myself and the previous manager of economic analysis had established as the approach that we should use, given the small sample size.

I do know, based on reviews of – I think, I believe it was MHI that had indicated that other jurisdictions use the same approach. The same approach is used by Alberta Power, I believe.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** So it's not – we're not the only ones using that approach.

**MS. O'BRIEN:** Okay. Thank you.

**MR. STRATTON:** Yeah.

**MS. O'BRIEN:** And you referred to the previous manager. That would be Steve Goudie who you initially started working under is –?

**MR. STRATTON:** Yes, that's correct.

**MS. O'BRIEN:** Yes, I just wanted to clarify that.

Okay. Thank you very much.

Mr. Warren, I'd like to go back to you for some questions, if we go back to some heavy numbers again. But we have heard evidence on – and we're going to hear a fair bit of evidence in – you know, over the course of this Inquiry on financing costs. And we – the terms IDC, or interest during construction, and AFUDC, which is allowance for funds used during construction, these are acronyms that the Commissioner is going to hear more than once. And so now that we have you here giving evidence, I thought it would be a good opportunity to get an explanation of what those terms mean, how they differ and how they are important to the CPW analysis.

**MR. WARREN:** Sure.

So IDC, as you noted, interest during construction, relates to the portion of debt that is drawn down during the construction period, the costs associated therein. So that would primarily be the interest cost of carrying debt during the construction. And what happens in that instance, for both Muskrat generation and the Labrador-Island Transmission Link, both had debt and was forecasting debt to be drawn during the construction period. So in both instances, that interest cost is added to the capitalized cost of the asset that's being constructed.

**MS. O'BRIEN:** Okay.

**MR. WARREN:** The allowance for funds used during construction is similar to interest during construction, but generally when we speak of AFUDC, it is in the regulated – it's in a regulated cost of service, or it's when you follow a cost of service. And it's related to the equity component that is being used or is available or is being drawn down during the construction period, so following a cost-of-service framework, similar to the Labrador-Island

Transmission Link, in that during the construction phase they are actually injecting equity. As that equity is being injected, the equity holder is earning a return on it based on the regulated – the way that the Labrador-Island Transmission Link is, it's based on what the board, the PUB, would be allowing – invest their own utilities; so Newfoundland Power in the current instance.

So during the construction period, as those equity amounts are being injected, it is accruing AFUDC. For Muskrat Falls, as I noted yesterday in my testimony, that is actually targeting an IRR. And that does not accrue any AFUDC; it's a part of the calculation of the cash flows that are being injected.

So when equity is called upon during the construction phase, it's a negative amount in your IRR calculation. And that then, once it enters into an operations phase, once Muskrat is in service, that's when revenues start and returns are returned to the equity holder. And when you look at the series of injections and then returns, that – when you discount that back – or it creates an internal rate of return of 8.4.

**MS. O'BRIEN:** Okay.

**MR. WARREN:** So the – that does not go into – there is no amount that goes into the capitalized cost for Muskrat, but the AFUDC amount goes into your capitalized total cost of the regulated asset, or the asset for the Labrador-Island Transmission Link.

**MS. O'BRIEN:** Okay.

And in the case of the Muskrat Falls and the LTA it would be captured in the PPA amounts, would it?

**MR. WARREN:** Correct. Yeah.

**MS. O'BRIEN:** The purchase amounts. So, essentially, just to summarize here, so this would be either interest that because you have to borrow money, you have to pay interest to your lenders for the money you've borrowed. And during construction you're investing into your project, it's not earning you any profit yet so – but you still have to pay the interest, so that has to be accounted for.

**MR. WARREN:** Yes.

**MS. O'BRIEN:** And then also, if you have equity, your own money that you're putting in, if you're investing it into a large project that's not earning any revenue, you've got – you've lost an opportunity to earn some interest yourself on that money. So the interest that, you know – it's accounted for, that you should be earning some money on that even during the construction period and you get that back once the system goes into operation and you're ultimately paid back the money that you should've been earning on your equity.

**MR. WARREN:** That's correct.

**MS. O'BRIEN:** Okay.

And so these are numbers that go and are accounted for in either the PPA amount that's needed, in the case of the Muskrat Falls generating station and the LTA, or the cost-of-service numbers that are needed in the CPW calculation for the LIL, and for other capital cost – in capital expenditures on the Isolated Island as well.

**MR. WARREN:** Correct.

**MS. O'BRIEN:** Okay, so it's all accounted for in there.

**MR. WARREN:** Yeah. All financing costs and related costs, including reserves and transaction costs of financings, all those financing costs have been included in all the CPW analysis that you see and the rates at the time of DG3.

**MS. O'BRIEN:** Okay.

So I'm going to stay with you, Mr. Warren, as well, and bring in another acronym. So we're going to hear lots of testimony on the FLG, or the federal loan guarantee. So we're not going to get into that in great detail here this morning –

**MR. WARREN:** No problem.

**MS. O'BRIEN:** – but is – for our purposes when we're looking at the CPW calculation, is it fair to say that by having the federal government guarantee, the money that was borrowed by Nalcor to do the Muskrat Falls Project, Nalcor

was able to borrow the money at a lower interest rate; they were able to get a better deal.

**MR. WARREN:** Absolutely.

**MS. O'BRIEN:** Okay.

And so that would've lowered the IDC, the interest-during-construction amount that would have to be paid.

**MR. WARREN:** Correct.

**MS. O'BRIEN:** Okay.

So when you did the DG3 – DG2 calculation, I understand that you did not consider the benefits of the federal loan guarantee at that time in the main calculation. Is that correct?

**MR. WARREN:** That's correct. If you actually look at DG2, it was very early, early days of discussions with Canada, so there was no formal documentation or anything like that. No formal ...

**MS. O'BRIEN:** Okay.

And – but when you got around to doing the CPW analysis for DG3 I understand that the benefits, in terms of the lower interest rate of the federal loan guarantee, were accounted for in the CPW calculation. Is that right?

**MR. WARREN:** That is correct.

**MS. O'BRIEN:** Okay. Thank you.

**MR. WARREN:** But, again, at that time discussions, negotiations and we actually had a term sheet completed by late 2012 as well.

**MS. O'BRIEN:** Okay. Thank you very much.

Mr. Moulton, if I could come back to you, please. If we could go to Exhibit P-00162, please, Madam Clerk.

So we've already looked at this yesterday, Mr. Moulton. So this is the generation plan for the Interconnected Island. And as you pointed out yesterday, this shows the Muskrat Falls and the LIL coming on stream in, I think you said mid-2017.

**MR. MOULTON:** That's correct.

**MS. O'BRIEN:** Okay.

And as I understand your testimony yesterday, that date which I – was it June 2017, precisely?

**MR. MOULTON:** It was the – I'll say mid-year. It was the June 30, July the 1st –

**MS. O'BRIEN:** Okay.

**MR. MOULTON:** – mid-year.

**MS. O'BRIEN:** Great. Thank you.

Who provided that date to you?

**MR. MOULTON:** That would have been the LCP project team.

**MS. O'BRIEN:** Okay, so this is what we've been referring to as the project management team (inaudible).

**MR. MOULTON:** Project management, yes.

**MS. O'BRIEN:** Okay.

Now is – so is it fair to say that as soon as Muskrat Falls power became available in the Interconnected Island scenario, that you would have stopped relying on – I know you said yesterday you'd keep Holyrood online for a little while just to make sure you didn't –

**MR. MOULTON:** We would –

**MS. O'BRIEN:** – you know, have any start-up troubles.

**MR. MOULTON:** Yes, we would stop producing power at Holyrood, but it would be – it would – we were calling it, we would keep it in warm standby. It would be available just in case something did go wrong with Muskrat Falls or the Labrador-Island Link.

**MS. O'BRIEN:** Okay, but to the greatest extent possible, as soon as Muskrat Falls came on, you would stop burning oil at Holyrood?

**MR. MOULTON:** That's correct.

**MS. O'BRIEN:** Okay.

**MR. MOULTON:** One point – I should clarify one point with that. Of course in – as we said, we would keep it there and take it out of service in a year or two's time. Of course to keep it there and for reliability purposes, there was – we had oil so there would be oil stored in the tanks in case we did have to use it. So, of course, before it was taken out of service, that oil would be – we'd run Holyrood and burn all of that oil –

**MS. O'BRIEN:** Sure.

**MR. MOULTON:** – to make use of it.

**MS. O'BRIEN:** So you didn't waste the oil.

**MR. MOULTON:** So we didn't waste the oil, so –

**MS. O'BRIEN:** It was already bought.

**MR. MOULTON:** But it was already bought, so yeah.

**MS. O'BRIEN:** Okay and that – was that accounted for in –?

**MR. MOULTON:** And that was accounted for, yes.

**MS. O'BRIEN:** Okay. Thank you.

So now if the Muskrat Falls power date was later – all other things being equal for the Interconnected Island scenario, if that Muskrat Falls date – if the date that had been provided to you by the project management team had been, you know, later sometime, say, in 2019, would that have had any effect on the CPW calculation for the Interconnected Island?

**MR. MOULTON:** I think, typically, you'd think it would, yes. But I'm not, without doing – there are a lot of factors involved and without doing the actual calculation, I wouldn't be able to conclusively say.

**MS. O'BRIEN:** Okay.

Would your best guess be that the effect of that would be that the CPW amount for

Interconnected Island would increase or decrease.

**MR. MOULTON:** As, again, I think so, but without knowing all of the details and everything surrounding it, I can't say conclusively.

**MS. O'BRIEN:** Okay, but it – are you saying more likely it would increase? I think that's what most people –

**MR. MOULTON:** I think so.

**MS. O'BRIEN:** – would think.

**MR. MOULTON:** I think so, yes, but there are a lot of factors that can come into things like that.

**MS. O'BRIEN:** Okay.

Now, Mr. Warren on the issue of dates, did you use – in the terms of what you had to do in terms of the financial modelling and the pieces of work we've heard you testify, did you use a Muskrat Falls power date as an input for your work?

**MR. WARREN:** Yes.

**MS. O'BRIEN:** And was it the same – did you use the same date of mid 2017?

**MR. WARREN:** Yes. July 1 was the effective start of the revenue.

**MS. O'BRIEN:** Okay.

And was that also provided to you, the same source as Mr. Moulton received it from?

**MR. WARREN:** Yes.

**MS. O'BRIEN:** Okay, thank you.

Now, I'm going to put the same question to you, if – for the course of your work and the revenue requirement that you would have been calculating, is – if a first power date had been provided that was later – say, sometime in 2019 – what effect, if any, would that have had on the revenue requirement that you were calculating for the CPW analysis at DG3?

**MR. WARREN:** It would likely increase it; however, as Mr. Moulton noted, it's really hard to definitively say it would have increased because, again, there are a number of inputs, variables in the financial models.

Predominately, the key driver there is timing of cash flows. So it depends on what was driving that extra – in your example, the two years would be, whether or not there would be significant cash flows remaining in the earlier years or if they were more timed towards the in-service date.

**MS. O'BRIEN:** Okay, thank you.

This is a question, I'm not sure if it's better to ask Mr. Warren or Mr. Moulton, so you can let me know. I want to talk about the operating and maintenance costs.

So we've already heard that operation and maintenance costs are something that needs to be calculated for the CPW because you don't only need to build things, you have to keep them running through the whole period out to 2067. Is that right?

**MR. WARREN:** Correct.

**MS. O'BRIEN:** Okay.

Madam Clerk, if you could please bring up P-00014 please, and I believe it's page 47.

So Grant Thornton went over this evidence with us and this was one of their findings that they reported was that at the time of DG3 that annual operation and maintenance costs for the Muskrat Falls Project was used – calculated and used at \$34 million per year. Is that correct? Is that the number that you used at DG3?

**MR. WARREN:** I'd have to confirm, but it definitely seems that's exactly what we would have used.

**MS. O'BRIEN:** Okay.

And they were pointing out that in an update that was done in 2017, that there was a – I'm gonna say, this is my word, but there's a significant increase there in the estimate to \$109 million annually for operation and maintenance of the

Muskrat Falls Project. And I'm going to get to it in a moment, I know there's been a further update since then, but let's talk about – go back to the 34 million first. Where did that number come from? Who gave you that number?

**MR. WARREN:** So the O&M costs for the Infeed scenario, in particular for Muskrat Falls and the Labrador-Island Transmission Link, would've come from the project management team.

**MS. O'BRIEN:** Okay.

Now I'm thinking that maybe – neither of you men are the right ones to answer this question. Do you have any knowledge as to how they developed that \$34 million number?

**MR. WARREN:** No direct knowledge, no.

**MS. O'BRIEN:** Okay.

And with respect to the update, the 2017 update to 109 million, are any of you men the right ones to ask questions about why the change in the numbers between 2012 and 2017?

Mr. Moulton.

**MR. MOULTON:** No.

**MS. O'BRIEN:** Mr. Warren.

**MR. WARREN:** I don't have the direct knowledge but I've seen some RFIs through the Grant Thornton process, but –

**MS. O'BRIEN:** Okay, but you're not –

**MR. WARREN:** – probably not the best person.

**MS. O'BRIEN:** Okay, thank you.

And, Mr. Stratton, I'm guessing you're definitely not.

**MR. STRATTON:** No, that's out of my area.

**MS. O'BRIEN:** Okay.

And just for the purpose of the record, Commissioner, I'm just going to let you know that we have received more information from

Nalcor that there was – there are more recent numbers that came out in March 2018, and we will be exploring those later in the evidence before you with people who are more familiar with how the numbers were calculated.

Mr. Moulton, my next question is for you. We –

**THE COMMISSIONER:** Just before you go on, seeing I don't take suspense very well, are you able to tell me what the new numbers in 2018 are, subject to us being told what they are –

**MS. O'BRIEN:** Yes.

**THE COMMISSIONER:** – at a later time, or is that something that –

**MS. O'BRIEN:** I'm going to give –

**THE COMMISSIONER:** – would be better left?

**MS. O'BRIEN:** I can give you my best memory of it, Commissioner. I don't have it right here on my figure – at my fingertips. I understand that for some of the basic operation and maintenance costs, it's actually come down a bit from the 109. There's a \$75 million number, is a number in my head, but then if you add on some more of – things to do with clearing, environmental monitoring and a few other things, it actually comes up to a little bit above the 1.9 million.

And I'm just gonna turn to Mr. Simmons and ask him – or maybe – 104 million is actually somewhere in my head as well. I don't know if he can give you a little more –

**MR. SIMMONS:** Yeah. Commissioner, I expect we will hear evidence on it. And part of this information, I think, has been disclosed as part of the general rate application proceedings before the PUB.

My understanding, and subject to correction from the evidence, is that the current figure, that's the equivalent of the 109, is more like 85 million. When we're – if we're trying to compare apples to apples on those. And I'm – that's subject to correction, but that's my current understanding of it.

**THE COMMISSIONER:** Thank you.

**MS. O'BRIEN:** Okay.

Mr. Moulton, the next question is on – you've already talked about Strategist and how you used that software to do your generation planning forecast, or your generation plan.

I just want to – Grant – put something to you. Grant Thornton raised it in their report that's up here on the screen, and one of the – I'm not actually gonna take you to the particular page, unless it's necessary, but one of the things that Grant Thornton did was they did some comparisons to how the Maritime Link was dealt with before the Nova Scotia UARB –

**MR. MOULTON:** Mm-hmm.

**MS. O'BRIEN:** – so their regulator, and what was done by Nalcor for the other portions of the Muskrat Falls Project. And one of the things that they noted in their report was that Nova Scotia had actually retained Ventyx, who's the maker of the Strategist software, to do their CPW calculation for the Maritime Link.

And we've had evidence now from you that Nalcor, Newfoundland and Labrador Hydro – you did the CPW calculation for the other portions of the Muskrat Falls, the Newfoundland and Labrador portions, you did that in-house –

**MR. MOULTON:** That's correct.

**MS. O'BRIEN:** – you didn't go to Ventyx.

So can you explain, please, for the Commissioner, why you did it in-house as opposed to going to the, you know, the experts who make the software to do it?

**MR. MOULTON:** Well, we had been using computer programs, various models for at least – well over 20 years before we did that. We'd been using Strategist to do the modelling; I think it was since 1998. So at that point it was 10, 12 years or more.

The model we were using, as we did talk yesterday, we – it was – it did not include the Maritime Link and it did not include sales to – out through Labrador as well. So, in essence, it was – we added the Muskrat Falls and the Labrador-Island Link as another generating

source. So, in essence, it was very, very similar to the annual models that we did – the annual analysis that we did every year.

So, again, we had been using the model for, you know, over 10 years. We were very familiar with it. And it was typically what we did. So, at that point, with no – not including the connections to the Mainland, we didn't feel that there was any need to get any outside expert help.

**MS. O'BRIEN:** Okay, thank you.

Commissioner, that would be a good spot for our morning break.

**THE COMMISSIONER:** All right.

Well, let's take 10 minutes then, please.

**CLERK:** All rise.

### Recess

**THE COMMISSIONER:** Thank you.

**MS. O'BRIEN:** Thank you.

**THE COMMISSIONER:** Ms. O'Brien.

**MS. O'BRIEN:** Hi Commissioner.

Before we begin, as a result of your questions about the more recent update on the operation and maintenance costs, counsel for Nalcor approached me during the break and we have identified a Nalcor created document that was provided, I believe, in response to a Grant Thornton question that we are gonna get created as an exhibit now. It would've ultimately been an exhibit, but we're gonna bring it forward, and certainly after the lunch break we'll probably have it ready to go into evidence.

**THE COMMISSIONER:** Perfect. Thank you.

**MS. O'BRIEN:** And before we pick up, I just wanted to ask one clarifying question to you, Mr. Stratton, just related to – someone raised something with me to the break and I wanna put it to you.



So when you use the saturation point for electrical heat, and you got that number from Hydro-Québec – or from the Province of Quebec, so that would be Hydro-Québec, and wondering – the question is: Is the power – is electricity in Quebec less expensive or more expensive than what you would be expecting – that what you were expecting at DG3 to – as a result of the Interconnected and the Isolated Island Option?

**MR. STRATTON:** Well, I never did a comparison of our rates versus theirs.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** So I wouldn't be able to comment on that.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** All I – what I can say is I know that the electric, or the – sorry, the rates in the province today are – would be higher than the residential rates in Quebec at this point.

**MS. O'BRIEN:** Our rates in this province are higher than they –

**MR. STRATTON:** Yes.

**MS. O'BRIEN:** – pay in Quebec?

**MR. STRATTON:** Yes.

But I would like to point out that the saturation of electric heat is not just based on that price, it's based on – it would be based on the relative price of electricity and furnace oil, which is the substitute for it. And so long as electricity is more competitive than the price of furnace oil, then one would expect that it would affect the ultimate, you know, saturation. Saturation wouldn't – I wouldn't think saturation actually has a lot to do with price. It really has more to do with substitutes: the amount of substitutes that are available for people to heat their homes.

**MS. O'BRIEN:** Okay, and –

**MR. STRATTON:** Okay?

**MS. O'BRIEN:** – did you do any comparison to the price of furnace oil in Quebec, or what other

substitutes might be there as opposed to this, before you adopted their saturation number for your analysis in this province?

**MR. STRATTON:** Well, I didn't do a comparison. But fuel oil prices in Quebec and the Island would be reasonably close. The only difference would be the transportation costs or any regulatory or, you know, costs to those prices, right?

But the – I would repeat that the saturation of how many customers actually use electric heat has more to do with the options available.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** Right? The fuel oil – the choices people have to heat their homes with. We settled on 75-80 because that was – we knew Hydro-Québec to be the highest point in the country, right? And we knew – also knew that the rates ahead of DG2 and DG – or DG3, were very competitive against furnace oil. They were – I mean, they were improving. The price of electricity compared to furnace oil was becoming more competitive through the forecast period.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** Okay?

**MS. O'BRIEN:** Thank you.

Mr. Warren, my next set of questions is for you. And this has to do with electricity pricing. So we've already had quite a bit of evidence about how your group, Investment Evaluation, provided the revenue requirement to Mr. Moulton's group, and the input in the CPW calculation, and so that was under either the PPA model or a cost-of-service model.

And I just want to, at a high level for you, to tell us the shape of the electricity pricing that you were providing compared for the Interconnected Island versus the Isolated Island. And I'm gonna ask us to focus on DG3 here for this questioning.

So for the Interconnected Island – so Muskrat Falls – in terms of electricity prices that you were providing, what was the general trend of

the price forecast that you provided to Mr. Moulton?

**MR. WARREN:** It was – it increased that in service to reflect the initial jump due to the high capital cost, but over time, based on just a gradual increase, it was basically a slight incline thereafter for the Interconnected scenario. So over the long term, it was a stable rate. In particular for the domestic user that's the rates that we focus primarily on; although, we would have done rates for various customer classes. We – our analysis was more focused on what the residential domestic customer ...

**MS. O'BRIEN:** Okay.

And I just want to clarify, I'm not sure – I have a note, obviously, here from – based on our interviews, and I just want to make – I'm not sure if we – I've –

**MR. WARREN:** Yeah.

**MS. O'BRIEN:** – got the same information. So what I'm hearing was initially when Muskrat Falls comes in service you get an initial increase, and sometimes, I think, that's been referred to as the "bump"?

**MR. WARREN:** Yeah.

**MS. O'BRIEN:** A bump in electricity rates. And then my note here was that – and then after that there was a – relative to inflation, actually, a slight decrease in –

**MR. WARREN:** Yes.

**MS. O'BRIEN:** – price over time. Is that right?

**MR. WARREN:** That is correct. So in nominal dollars –

**MS. O'BRIEN:** Yes.

**MR. WARREN:** – in nominal dollars it did increase, so the slides that you – or the rate projections that were provided during DG3 would've seen a slight incline. But if you actually expressed that in real dollars, accounting for inflation, they actually were fairly steady declining.

**MS. O'BRIEN:** Okay.

So that was for the Interconnected Island, what was it for the Isolated Island?

**MR. WARREN:** So the Isolated Island, again, you would've seen it escalating more significantly than the Infeed scenario and it was widening out as time progressed.

**MS. O'BRIEN:** So it didn't have the initial bump, no initial bump but it was an increase – relative to inflation, an increase in prices over time?

**MR. WARREN:** Yes, but my recollection is at DG3 it was a fairly similar type of step up based on fuel price forecasts, and I guess the initial early capital that was required that Mr. Moulton explained when he went through the generation expansion plan for the Isolated scenario. There was capital investments in the Isolated scenario –

**MS. O'BRIEN:** Okay.

**MR. WARREN:** – so that as they came on they would obviously bring the rates up as well.

**MS. O'BRIEN:** Okay. Thank you.

So we're going to get back to that because the price of electricity, as we've heard, feeds into this concept of elasticity. And that's something now, Mr. Stratton, I'm going to talk to you about. So we've had a lot of talk around elasticity but can you just explain for the Commissioner what that means?

**MR. STRATTON:** So price elasticity is a measurement of the relationship between the price of a good – I'm sorry, between the good demanded and what the price level is with all those things being equal.

**MS. O'BRIEN:** Okay.

So the – generally speaking, that the more something costs, the less likely our people are to buy it and the cheaper it is, the more likely they are to buy it.

**MR. STRATTON:** Correct, but it's about the responsiveness. Elasticity is a measure of the

responsiveness of how the product is demanded against the price. I guess –

**MS. O'BRIEN:** Oh –

**MR. STRATTON:** – some products are very responsive to price and other products are less responsive to price.

**MS. O'BRIEN:** Okay.

So if we could please bring up Exhibit P-00163, please, Madame Clerk. So this is a graph that shows – and this will probably assist you, Mr. Stratton, in explaining this a bit further. So what this is showing – so these are the – this is your energy – this is your load forecast that was done in 2012 so for Decision Gate 3. Is that right?

**MR. STRATTON:** That's correct.

**MS. O'BRIEN:** Okay.

And the blue is the Infeed or Interconnected Option, so that's the Muskrat Falls, so we see here more electricity being consumed. And the red is the Isolated Island and we can see they track very similar at the beginning and then it's slightly lower.

**MR. STRATTON:** Correct.

**MS. O'BRIEN:** Okay.

So can you explain how price elasticity would have fed into the models that you used for DG3? And if this graph is of assistance to you, please feel free to use it.

**MR. STRATTON:** So what the graph depicts is essentially the difference in the load forecast between the higher prices on the Isolated system versus the lower prices on the Infeed. And the effect of the lower price on the Infeed would have made the demand for electricity higher because more – there would be more residential customers consuming electricity and the overall level – or consumption level of electricity would be higher because of the elasticity effect of that lower price.

**MS. O'BRIEN:** Okay, so really, when we look at the difference between the blue line and the

red line here, is because of price elasticity, the effect of that.

**MR. STRATTON:** It is. There may have been some minor economic impacts but they wouldn't probably be visible in the chart.

**MS. O'BRIEN:** Okay.

So how do you determine what the price elasticity factor is? Where do you look that up?

**MR. STRATTON:** Okay, so because we're using a regression analysis and we're using electricity prices to explain the historical variation in the load through time, then we can interpret what that price elasticity is directly from those regression models. So we actually just calculate what it is.

**MS. O'BRIEN:** Based on historical trends.

**MR. STRATTON:** Well, based on what the model establishes as the – what – based on what the model says is the variation in our load history due to price.

**MS. O'BRIEN:** Okay. Thank you.

If we could go to Exhibit P-00014, please, Madam Clerk, at page 36. Thank you.

So this is the Grant Thornton sanctioning report that we've looked at. This is their section 1.6 on Price Elasticity of Demand. And their conclusion is here. They say: Based on our – I should be careful about that, their finding is here – based on our review we noted that Nalcor does not include price elasticity factors in its Newfoundland Power general service customers or industrial customers. So we'll stop there.

Is that a correct statement? I know you've talked about using price elasticity, but is it a correct statement that you do not use any price elasticity factors for the Newfoundland Power general service customers or the industrial customers?

**MR. STRATTON:** That's a correct statement. Yes, it is.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** Yeah, yeah.

**MS. O'BRIEN:** So their finding here was: We would expect these customers to respond similar to other customer sectors, I guess, in terms of price elasticity.

And a little further up here on this page – and it was reviewed by Mr. Simmons with Grant Thornton yesterday in his cross-examination, or perhaps it was the day before – where the explanation for why Nalcor doesn't use price elasticity for those two components is, I believe here, highlighted.

Can just – if you could just review those and tell us if that's correct and maybe in your own words just explain to the Commissioner why you don't use a price-elasticity factor for those components?

**MR. STRATTON:** Okay, so with respect to the general service customers, we don't use a price-elasticity factor because we've never, ever been able to establish a relationship between electricity prices and consumption levels for that customer class. So our models were never able to establish that there was a connection between price.

And that makes to – to us it made sense because in the Province of Newfoundland the only – electricity is considered an inelastic product for a lot of end uses; there's no substitutes. You can't substitute your power for lights. You can put in more efficient lights but you can't substitute it and you can't substitute the electricity used for computers. It's dependent on electricity so, therefore, there's little opportunity for to have a significant price impact for those types of roles.

And, I guess, in the context of Newfoundland, with respect to heating, there's – we only have furnace oil and furnace oil is not always competitive with electricity, depending on the period of time that we're looking at and we don't have cheap natural gas. Other jurisdictions would have cheap sources of natural gas which they could use for heating, right, and so they would likely have a higher and measurable price elasticity for that end use. But we don't and therefore our customers, in the general service category, choose to use electricity. And there is very little response to price levels over our history, okay? So that the general service.

On the industrial class, there's a similar reason that the energy that they use is process loads and it's not easily substitutable or if at all substitutable. And if you look at the historical record of their consumption patterns, they've always – they're flat. They consume power because they produce a product. And what changes their electricity use would be just their production level, and not – it's – there's no relationship to be established.

**MS. O'BRIEN:** So is this the same thing as saying that your belief is that these – the businesses in this province and the industrial customers in this province don't use less electricity when the price goes up?

**MR. STRATTON:** I would suggest that they – it's not measurable with respect to the historical period. It's not significant enough.

**MS. O'BRIEN:** Okay, but do you believe – do you have any opinion on whether that – whether it is an effect that exists or not? In other words, are you just saying, look, we can't do – we can't measure it statistically, therefore we don't –

**MR. STRATTON:** Well –

**MS. O'BRIEN:** – we can't factor it in; I can't calculate an electricity price factor to use, or were you saying that I just don't think it makes a difference?

**MR. STRATTON:** Well, what I've inferred from the evidence of the historical records is that it has little impact. If there is a price elasticity, it's so low it's not measurable.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** So there would be very little price response.

**MS. O'BRIEN:** Okay, so even if prices go up, your – the way you calculate it – that you don't consider that the businesses in the province and the industrial users would try to conserve energy, like, turn their thermostats down, you know, run the AC, air conditioning, less in the summer, those kind of things, to try to bring down their electricity consumption?

**MR. STRATTON:** So what I would – I guess they might do things like that. But in terms of what their energy is being used for, which is for production purposes, that you wouldn't notice it.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** It would be small.

**MS. O'BRIEN:** Okay.

Do you know what other utilities in Canada are doing with respect to price elasticity in, you know, the general service categories – so the businesses and their industrial customers?

**MR. STRATTON:** I have not canvassed other utilities. I have read plenty of literature on price elasticity over the years, and what one sees in the record of all the research is that the price elasticity can be very low or they can be somewhat higher. So they vary a lot depending on the jurisdiction.

**MS. O'BRIEN:** Have they ever – have you ever read anyone where they've – it's been considered that they've been non-existent? So no –

**MR. STRATTON:** Well, when I say non-existent, I mean very low.

**MS. O'BRIEN:** Okay, but –

**MR. STRATTON:** Yeah.

**MS. O'BRIEN:** But do you use – you don't use any elasticity factor?

**MR. STRATTON:** No.

**MS. O'BRIEN:** So even if it's low, you're calling it essentially zero?

**MR. STRATTON:** Well, I would be just – it would be just arbitrary if I assigned a number to it.

**MS. O'BRIEN:** Okay.

Next, Mr. Stratton, I'd like to talk about the fuel forecast. So we understand that the cost of fuel was a very important input to the CPW calculation. You've explained that –

**MR. STRATTON:** It is.

**MS. O'BRIEN:** – to us already. And we've heard from Grant Thornton already on this. I just wanna confirm that you would agree with the statement that the Isolated Island scenario was much more significantly affected by the cost of fuel than was the Interconnected Island, in terms of the CPW analysis.

**MR. STRATTON:** My reading is that that would be an accurate statement.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** Yeah, yeah.

**MS. O'BRIEN:** So can you tell the Commissioner how did you go about doing your fuel forecast?

**MR. STRATTON:** So our fuel forecasts were both for the Holyrood generating plant and for the furnace oil price forecast that we use in our load forecast models – were all linked to PIRA Energy forecasts. PIRA was – provided the long-term price forecast, or 20-year price – I believe it was a 20-year price forecast – for bunker C fuels, typical of the ones used at Holyrood, and for furnace oil. And we would take the PIRA forecast and extrapolate them to Canadian dollars and for our region.

**MS. O'BRIEN:** So PIRA is a company that's based in the United States that – this is one of their core pieces of business, is it? Doing the fuel forecasts out 20 years?

**MR. STRATTON:** PIRA are a very well-known and well-established firm who produces price forecasts –

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** – for fuels.

**MS. O'BRIEN:** Are there other firms or companies who do similar work?

**MR. STRATTON:** Yes, there are. Yeah. The US government, EIA, Energy – it eludes me now.

**MS. O'BRIEN:** That's okay. That's – we –

**MR. STRATTON:** And –

**MS. O'BRIEN:** – have a lot of acronyms going –

**MR. STRATTON:** Yeah.

**MS. O'BRIEN:** – around.

**MR. STRATTON:** And the – well, the National Energy Board have projections, but I'm not sure if it's theirs or not. But they – in the time of DG2 and DG3, that's – we would've been comparing PIRA's prices to the NEB and to EIA and perhaps – well, PIRA would provide a comparison of their price forecasts to other available forecasts, such as OPEC.

**MS. O'BRIEN:** Okay. Okay.

So that – you, I think, anticipated my next question. I was gonna ask, you know, why did you chose PIRA as the supplier, and did you do any comparison with other fuel forecasters, so I'm hearing you say that you did do some comparison.

**MR. STRATTON:** Yes.

**MS. O'BRIEN:** Can you just respond to why you chose PIRA and just explain a little bit more about how you did those comparisons –

**MR. STRATTON:** Yeah.

**MS. O'BRIEN:** – and for what purpose.

**MR. STRATTON:** So we had a long-established relationship with PIRA. It began back in the – when we were – back in the earlier work on Lower Churchill work when we were dealing with Quebec. And at that time, we were – we weren't using PIRA, but that – the PIRA forecast became known to us through that process, and so we researched the type of work that they did and how they established their price forecasts, and they had well-established fundamentals for doing that – for doing their price forecast. So I guess it was a confidence issue that we chose to use PIRA, and we've been using them ever since.

**MS. O'BRIEN:** Okay. And you did touch on it briefly, but what – you did some comparisons with other fuel forecasts.

**MR. STRATTON:** Yes.

**MS. O'BRIEN:** Could you just give the Commissioner a little bit more information about that?

**MR. STRATTON:** Right, so I guess the – we did a comparison – I don't recall the actual – I know we did one with NEB, but I guess, the comparison of PIRA's forecast to the – to all the mainstream price forecasts – sorry – at that time, were that it was an environment of high furnace oil – or high, sorry, high oil prices.

And none of them were – would have been distinctly different.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** Okay?

**MS. O'BRIEN:** All right.

**MR. STRATTON:** PIRA might have been – may have been a little higher than one or other –

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** – but they were all – it was environment of high price (inaudible). The view of the world at that point was that oil prices were high and they were going to remain high.

**MS. O'BRIEN:** Okay, thank you.

So you've said that PIRA provides a 20-year forecast, so can you explain – you had to go out to – you had to go out 56 years, essentially, so how did you extend out the forecast for that full period?

**MR. STRATTON:** So we didn't have a view on whether or not the prices would increase or decrease in inflation-adjusted terms, so we assumed that the, what we call the real price or the inflation-adjusted price, at the end of the period, would remain flat. Which we considered to be a, I guess, a – you're not saying it's going up, or you're not saying it's going down. You're just saying, okay, it is what it is.

**MS. O'BRIEN:** Okay, so –

**MR. STRATTON:** Right?

**MS. O'BRIEN:** – did you just take the price at 20 years, the end of PIRA's fuel forecast. You extended that out essentially straight into the future, but you were actually increasing it at 2 per cent compounded to account for inflation –

**MR. STRATTON:** Yes, it would have –

**MS. O'BRIEN:** – though, so that, in nominal dollars, it was –

**MR. STRATTON:** In nominal dollars, it would have been increasing by inflation, that's right.

**MS. O'BRIEN:** Okay, thank you.

And how did you make the decision to do that? I mean, did you consult with other people? Did – was this an internal decision that you made? How did you make the choice?

**MR. STRATTON:** Well, I believe the choice goes – you know, that – it's a – if you don't have a view and understanding of out that far, then it's a – from an economist point of view, it's a conservative view. You're not saying one or the other. You're just saying, well, here's where I know it is and that sort – now, we would have asked PIRA if we thought that that was a reasonable approach and I don't have – I don't know if I have the documentation, but I think they suggested that it was probably a reasonable approach.

**MS. O'BRIEN:** So was that you who consulted with PIRA?

**MR. STRATTON:** I'm not – and I don't recall if it was myself, or it might have been Steve Goudie, or – that had done that.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** Yeah.

**MS. O'BRIEN:** So we can look for that –

**MR. STRATTON:** Yeah.

**MS. O'BRIEN:** – work.

Okay, thank you.

So – all right, if we could bring up – go to page 49 of this document, please.

So I understand that PIRA actually publishes a number of different forecasts, Mr. Stratton – they do a high, a low, an expected and a – I forget the other word, it begins with R?

Reference – thank you, Mr. Learmonth. A reference.

So they do four different forecasts, generally – is that correct?

**MR. STRATTON:** They do – well, they do their reference forecast –

**MS. O'BRIEN:** Mm-hmm.

**MR. STRATTON:** – and then they interpret probabilities for a high and low forecast, and from that – probabilities of that high and low forecast, they can interpret, like, what the expected price is.

**MS. O'BRIEN:** Okay.

And which of those did you use when you did your forecasting for DG3?

**MR. STRATTON:** I wouldn't have been the one to – I produced all the forecast for investment evaluation to include in – so, I believe it was the reference – or, sorry I believe it was the expected price that was used at DG3.

**MS. O'BRIEN:** Okay –

**MR. STRATTON:** But I can't confirm – I would not be able to confirm that.

**MS. O'BRIEN:** I think Mr. Warren's gonna buzz in.

**MR. WARREN:** We used the reference case both at DG2 and DG3.

**MS. O'BRIEN:** Okay. Thank you.

And here in – we have here in Grant Thornton's report in the page I've just brought up, where a – expert report was received by Nalcor from

Westney Consulting on the fuel price forecasts. And this was an opinion that Westney gave, and Westney said that they – that you – they thought that – the note of the use of the expected value price forecast would be what they felt was consistent with their experience, with a variety of clients and conditions.

So, this was an opinion by Westney, essentially, that they felt based on their work with other clients and conditions that expected value might be used. I understand that you used reference value, and is it fair to say that the reference forecast was lower than the expected?

**MR. WARREN:** That is correct.

**MS. O'BRIEN:** Okay.

This opinion from Westney – did you have that opinion before you made your choice

**MR. WARREN:** I don't recall. It's possible; however, we would have maintained the reference case 'cause we had – my understanding again, Steve Goudie would have – who was my manager of economic analysis at the time – would have reviewed, I guess, possibly this scenario. I don't recall exactly, I can't say yes or no.

**MS. O'BRIEN:** Okay.

**MR. WARREN:** Would not be surprised if Steve would have been provided this feedback. But my understanding, my recollection of the discussions that would have been had at the time was: a, the reference was more conservative. However, Steve, being the economist, was much more comfortable using the reference case because it was based on PIRA's experience and its fundamental view of the forecast. Whereas an expected is just, basically a weighting average based on the probabilities – is a computed number.

**MS. O'BRIEN:** Okay, just maybe it would be helpful if we knew when – you know, obviously the DG3 choice to use the reference of DG3 – or DG2 would have been back in 2010. But when would you have been doing this work for Decision Gate 3? When would you have been providing Mr. Stratton with the fuel forecast for DG3?

**MR. WARREN:** My recollection, and – would have been around spring of 2012 as well.

**MR. STRATTON:** I believe it would have been the – yeah – well, it could have been as early as February or it could have been in May – actually I believe it was in May.

**MS. O'BRIEN:** Okay, so –

**MR. STRATTON:** It was the May PIRA forecast.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** Yeah. Mm.

**MS. O'BRIEN:** Okay, so – and that would have been in 2012?

**MR. STRATTON:** Yeah.

**MS. O'BRIEN:** Okay, thank you.

Our information is this opinion from Westney was received in July of 2012. So after that decision was being made. Do any of you three have any knowledge as to why that opinion was sought, sort of, after the fact, after the decision was made?

**MR. WARREN:** I don't.

**MS. O'BRIEN:** Do you, Mr. Stratton?

**MR. STRATTON:** No, I have no recollection.

**MR. MOULTON:** And I don't either.

**MS. O'BRIEN:** Thank you.

Now, Mr. Moulton, I'd like to go back to you to ask some questions about transmission.

**MR. MOULTON:** Sure.

**MS. O'BRIEN:** So we've obviously heard a lot from you already about generation –

**MR. MOULTON:** Mm-hmm.

**MS. O'BRIEN:** – so how we make the electricity. But, of course, ultimately for people to use it we have to get it to their homes and



their businesses and their industrial operations and whatnot, and so that obviously happens over the transmission system.

**MR. MOULTON:** Yeah, that's correct.

**MS. O'BRIEN:** Okay. And we've had Mr. Marshall come and speak to us last week and to explain to us some of those transmission components. But this would generally include switching stations, converter stations, the actual lines that run along the poles, that kind of thing.

**MR. MOULTON:** Yeah, and included – besides the – we usually separate the transmission into the high – transmission is usually called the high voltage part of that system, and the lower voltage – you usually see along the streets to get it finally to your home – is usually referred to as distribution.

**MS. O'BRIEN:** Okay, so when you come along the Labrador-Island Link, that's a high voltage DC line, we've heard about that.

**MR. MOULTON:** That's correct.

**MS. O'BRIEN:** And I think high voltage you can – it's a little more dangerous perhaps but you get less losses.

**MR. MOULTON:** You get less losses, yeah.

**MS. O'BRIEN:** Okay, but then when you come into the neighbourhoods and residential you drop the voltage – you drop it down a bit and you get it to the homes.

**MR. MOULTON:** That's correct.

**MS. O'BRIEN:** Okay.

Okay, so now Mr. Moulton I know that during this period DG2, DG3 you were in generation planning.

**MR. MOULTON:** Yes, that's right.

**MS. O'BRIEN:** Not transmission planning. You would've had counterparts, I understand, in transmission planning, but I do have some questions for you on transmission. But your background and your experience with

Newfoundland and Labrador Hydro would allow you to answer those questions, is that right?

**MR. MOULTON:** Well, I'll see with the questions of course, but my background is also in, as I said, in distribution, and I've worked at that for 30-plus years, and things like losses, they're similar.

**MS. O'BRIEN:** Okay.

So, Madam Clerk, can we please go to page 40 of this exhibit. And again, we're in the Grant Thornton report here.

So this was the section of Grant Thornton's report – we referred to it earlier, where they were doing a bit of a – they were doing a comparison between the Maritime Link's treatment before the Nova Scotia regulator and the treatment of the Newfoundland and Labrador portion of the Muskrat Falls Project.

And it's this section here, Mr. Moulton, that I'd like you to address. I've just highlighted it.

**MR. MOULTON:** Mm-hmm.

**MS. O'BRIEN:** So, Grant Thornton referred to this yesterday, and it essentially says that the, "NSUARB utilized transmission losses of 9.2%. This was higher than the transmission losses of 5.15% used in Nalcor's CPW analysis. Based on our analysis, 5.15% was considered acceptable; however, the impact of using higher transmission losses up to 10% would have resulted in a possible increase to the CPW of the Interconnected Island Option."

Mr. Moulton I'd like – are you able to give the Commissioner an explanation as to why Nalcor used a 5.15 per cent of transmission losses and why in Nova Scotia 9.2 per cent was used. And just to be clear, perhaps, we're talking about here the amount of power that's essentially lost through the lines as it's being transmitted, and it's essentially lost it as heat in the lines.

**MR. MOULTON:** In simplistic, yes.

**MS. O'BRIEN:** Right. We lose energy to heat.

**MR. MOULTON:** Yes.

**MS. O'BRIEN:** Okay.

So can you – are you able to provide the Commissioner with an explanation on the difference here?

**MR. MOULTON:** I am.

Actually, the NSUARB transmission losses of 9.2 per cent, they were looking at the losses from Muskrat Falls right to Woodbine in Nova Scotia, the full length. The 5.15 that we use in Nalcor's CPW were only the losses from Muskrat Falls to Soldier's Pond, there in St. John's. So they were two different – they are different because they represent two different parts of the transmission lines; two different links of the transmission line. In fact, the 5.15 is kind of included in the – makes up part of the 9.2 per cent.

**MS. O'BRIEN:** Okay.

So, when we look at the transmission loss percentage, from what I understand you're saying is that all other things being equal, if we have two identical transmission lines, but we run one for twice the distance of the other line, we would expect the percentage of transmission losses to go up.

**MR. MOULTON:** Yes.

**MS. O'BRIEN:** To be higher.

**MR. MOULTON:** That's correct.

**MS. O'BRIEN:** The longer the line, higher the transmission losses.

**MR. MOULTON:** That's correct.

**MS. O'BRIEN:** Okay, thank you.

Also, in the same report and on the same page, but this time a question for Mr. Warren, and that's on the discount rate, and I'll just highlight that here for us.

So, again, Grant Thornton has noted here that the NSPML – so this the Emera entity that's dealing with the Maritime Link – used a discount rate of 5.95 in their study, based on a cost of equity of 9 per cent and the cost of debt

of 4 per cent. In Nalcor's CPW, it used a discount rate of 7 per cent, which was based on its WACC, utilizing a cost of equity of 9.25 per cent and a cost of debt of 6.25 per cent.

So, I just understand the WACC is essentially a blended rate that includes cost of equity and costed debt together.

**MR. WARREN:** Yes. So, the weighted average costs of capital, WACC, is based on for NSPML, that was the special project vehicle, so it was just simply to do with the Maritime Link. Their cost of debt was 4 per cent, which was indicative of where they thought Canadian guaranteed debt would come in. So they would have the full 70 per cent of their debt; the only debt that is in that company would be guaranteed debt. Whereas, the weighted average cost of capital for our CPW analysis would be based on the regulated Newfoundland and Labrador Hydro's structure, which is 75 per cent debt and based on the existing debt and the forecast long run, being afforded just a provincial guarantee, provincially guaranteed debt, the cost there, obviously, is higher because it's not at triple A, and in the long term our projection was 6, 6¼, roughly.

**MS. O'BRIEN:** Okay. And specifically with respect – we talked about how you calculated it, but what does – in terms that we can all easily understand – what does discount rate do in the CPW calculation?

**MR. WARREN:** So, the discount rate is used to basically express in present terms future nominal costs. So it brings future nominal costs back discounted over the time series, back and it expresses it into a present value, present-value term.

**MS. O'BRIEN:** Okay. So, in the case of DG3, the DG3 CPW numbers that we've looked at many times now, they were expressed in 2012 dollars. Is that right?

**MR. WARREN:** Correct.

**MS. O'BRIEN:** Okay. So despite the fact, like some of those dollars were – would actually be spent in the year 2042, for example.

**MR. WARREN:** Yeah.

**MS. O'BRIEN:** So you'd use the discount rate to take into account the cost of the effects of inflation to bring that, whatever those 2042 dollars would be, in terms of 2012 dollars, essentially.

**MR. WARREN:** Yes.

**MS. O'BRIEN:** Okay. And I believe this is the case, whether we're talking Isolated Island or Interconnected Island, it would be the same effect. But, generally, if you use a higher discount rate, what's the effect on the current, you know, the CPW value, the 2012 dollar value?

**MR. WARREN:** So, if you have a higher discount rate, it will reduce the value. So it would, in a CPW analysis, it would be a lower cost.

**MS. O'BRIEN:** In 2012 dollars, I take it?

**MR. WARREN:** Yes.

**MS. O'BRIEN:** Okay. Thank you.

All right. The next area I'd like to speak to, I believe, it's going to be Mr. Moulton and Mr. Stratton who will be most knowledgeable. And we are going to be talking about conservation and demand management.

So, I'll bring up this exhibit, page 37, please, Madam Clerk.

I'm just going to read out this section of Grant Thornton's report here. I'm highlighting it lines 5 to 11: "Nalcor included Conservation and Demand Management ... as an alternative option but it was dismissed early as not viable to meet the growing demand stating it did not have much history with CDM and participant rates are low.

In Nalcor's report filed November 2011, to the P.U.B., Nalcor states that it is not explicitly incorporated utility sponsored CDM programs savings targets into its planning load forecast due to the uncertainty of achieving dependable firm outcomes. According to Nalcor in this report the response to CDM programs and initiatives has been modest and lagging targets."

So, there are footnotes, here in Grant Thornton's report, so footnote – the first paragraph is footnoted to 132 and again it is also to Nalcor's PUB submission.

So, first I'd ask you, is this information that's contained here that they're citing to your PUB submission, is that accurate?

**MR. STRATTON:** That's accurate to the best of my knowledge. Yes, it is. Yeah.

**MS. O'BRIEN:** Okay. Thank you.

So, I'm going to ask one of you to explain to the Commissioner what CDM is. Between the two of you, is there one of you better placed to do that?

**MR. STRATTON:** I can do that.

**MS. O'BRIEN:** Okay. Thank you.

**MR. STRATTON:** So CDM stands for conservation and demand management and it is the utility providing and paying incentives for its customers to install more energy-efficient technologies, and it could save either energy or demand, although the focus of most of the CDM work at Hydro, to date, has been energy focused as opposed to demand focused.

**MS. O'BRIEN:** What's the difference between energy versus demand focussed? Can you give us an example to help explain that?

**MR. STRATTON:** Sure. Well, energy is the – well, let's start with demand. Demand is a point-in-time power requirement. So, if you're doing a CDM program for demand, you're going to target saving megawatts so that you don't have to have as much peaking capacity. Whereas, energy conservation, you're putting in insulation so that over a time period you're saving energy.

**MS. O'BRIEN:** Okay.

Now, a little further down under the Findings and Observations section for Grant Thornton, it says: "Nalcor took into account technological improvements that reduce energy demands in their econometric modelling technique." And, I believe, yesterday, or the day before yesterday, in Mr. Simmonds' questioning of Grant

Thornton, he also referred to a technological factor that was, I understand, used by Nalcor.

Mr. Stratton, can you please explain to the Commissioner what a technological factor is?

**MR. STRATTON:** Okay, so the tech – we call it a technological factor, but what it is, is that we use a variable in our models to determine how much energy savings there were in the loads through time.

**MS. O'BRIEN:** Okay, so – oh –

**MR. STRATTON:** And I'm not sure if that's totally clear, but – so you're explaining your historical variation, just as you would with price, or just as you would with personal disposable income. There's a variable in there that also explains how people's consumption have declined through time.

**MS. O'BRIEN:** Is this because of technological advances?

**MR. STRATTON:** It would – well, technological advances. It would be akin to energy efficiency improvements.

**MS. O'BRIEN:** Okay.

So just to get this straight, so, you know, we've heard – Mr. Moulton has talked to us about CTs and CCTs. And you have to – when you do your generation plan you have to anticipate, you know, how efficient they're going to be and how efficient they're going to be, how much they're going to cost, those types of things.

And the idea is, I guess, over time, as we get improvements in technology, a CCT, you know, 20 years down the road may be more efficient than the CCTs that are on the market today. They might be cheaper, more efficient and that would – would that – is that the type of thing that would be captured in the technological factor?

**MR. STRATTON:** Well, the technological factor, for instance in our residential sector, would be the impact from – through the history would be the impact from people adding insulation to their homes, it would be the

impacts of people changing from – or, sorry, from incandescent bulbs to CFLs.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** And it would encompass people having more efficient refrigerators.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** So all those things, so it's all encompassed in one variable.

**MS. O'BRIEN:** Okay.

So, like, the – you know, we have mini-splits coming on the market in a big way now which are very energy efficient ways to heat your home. So that – those types of advancements in technology would be –

**MR. STRATTON:** They would be captured in that variable as we move through time.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** Yes.

**MS. O'BRIEN:** So is there a difference between CDM and using a technological factor?

**MR. STRATTON:** Well, the accounting of CDM in the load forecast can be done in different ways, okay?

So we were accounting for it in a technological change variable, right, but you – that was one approach. Another approach would be to use the estimates of the energy savings from your CDM programs. And you would just deduct that from your load forecast.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** So at the time of DG3 I had to make a decision whether or not I was going to reduce our loads any further than what my technological change variable was producing in the forecast period. So what I had – so I made my decision based on Newfoundland Power's forecast of their requirements, which had a deduction of – for CDM.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** And their forecasts were still higher than my forecasts for their service territory, okay? Because Newfoundland Power forecasts – they’re told requirements, just the same as I do, okay? So they had their forecast and they had the CDM deducted from it and it was a higher forecast. So I made a decision that if I was to make a further adjustment to my lower forecast, I may be under forecasting load.

**MS. O’BRIEN:** Okay.

So do some load forecasters use a deduction for CDM as well as a technological factor?

**MR. STRATTON:** I do not know the answer to that.

**MS. O’BRIEN:** Okay. But that was an option you thought was open to you to do both, but you just went with the technological factor. Is that a fair statement?

**MR. STRATTON:** I based our – the forecast of energy savings based on what the historical record was showing.

**MS. O’BRIEN:** And that’s –

**MR. STRATTON:** And extrapolated that into the future.

**MS. O’BRIEN:** And that – is that how you calculated your technological factor?

**MR. STRATTON:** Yes.

**MS. O’BRIEN:** Okay, so you calculated your technological factor by looking at your historical data.

**MR. STRATTON:** Well, the regression does it for me, I don’t – the regression did it. So I based it on what the regression was picking up – what the regression was picking up in history.

So a further point is that the issue of how I did the approach I took was reviewed by Manitoba Hydro International at DG2 and they didn’t – they believed that that was a reasonable approach.

**MS. O’BRIEN:** Okay.

Mr. Moulton, from the generation planning side, I understand that conservation demand-side management is something that can be used on the generation plan side as well. Can you please explain that to the Commissioner?

**MR. MOULTON:** Well, as Mr. Stratton has stated, you can use CDM or demand-side management to reduce the amount of energy required or the amount of capacity required. Again, if we priced CDM options and brought in some, if they reduced energy, that would typically mostly reduce fuel costs. If they reduced capacity, it would probably delay criteria violations and delay having to install additional generation.

**MS. O’BRIEN:** And so did you take into account any CDM in your – in doing your generation plan?

**MR. MOULTON:** We didn’t because we knew that Mr. Stratton was including this technological factor in his load forecast. So we didn’t, we basically considered that that kind of took care of it.

**MS. O’BRIEN:** Okay. Do you know if other utilities, even though they may be using a technological factor in their load forecast, also do system planning incorporating CDM techniques or taking into account CDM?

**MR. MOULTON:** I don’t know – I know other utilities do include CDM in their generation expansion. I’m not sure if they incorporate a technological factor in their forecast.

**MS. O’BRIEN:** Okay.

Mr. Stratton, when you and I had a – had an opportunity to talk in preparation for today, you had said to me that you weren’t a proponent of CDM. Could you just explain that for the Commissioner? You know, why is it that you’re not a big proponent of CDM?

**MR. STRATTON:** Okay, well, I guess first I need to clarify that. That opinion is based on mine – my work, it’s my personal opinion.

**MS. O’BRIEN:** Okay.

**MR. STRATTON:** Okay.

**MS. O'BRIEN:** That's fine.

**MR. STRATTON:** It doesn't reflect Nalcor's or Hydro's, right?

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** Okay, and it's based on economic principles, and that the best message or the best approach to those issues are to set your prices correctly so that your prices of electricity are in line or are efficient. So long as you have efficient pricing, then people, consumers, have the right signal and they know the value of what the electricity is. And then they are able to make their own decisions about whether or not they want to purchase energy efficient products.

And, I guess, the added point is that so long as people have an efficient signal, they have the right message for pricing. And if you – once you go down the road of doing a CDM, it creates cross-subsidies between various rate users and various rate classes.

**MS. O'BRIEN:** Okay, just explain to me what you would mean by cross-subsidies. In other words –

**MR. STRATTON:** So your –

**MS. O'BRIEN:** – like the industrial customers may be paying for –

**MR. STRATTON:** Well, they may be –

**MS. O'BRIEN:** – subsidizing –

**MR. STRATTON:** They may be paying for some of the conservation that the commercial group are taking up and some – or, right, it just creates those issues. Whereas so long as you have an efficient price signal that reflects the value of your electricity, and so long as you educate – allow information to be out there for your customers to make the right choices then, to me, that's just a better approach.

**MS. O'BRIEN:** Okay.

If we could go in this exhibit to page 33, please, Madam Clerk. Taking us down here to this

section, starting at line 26. Again, we're in Grant Thornton's report.

"Conservation and demand management ... program adjustments over the long term were not factored into the load forecast. Marbek Resource Consultants Ltd. issued a report in 2008. The objective of this report was to identify potential contribution of CDM technologies to the residential, commercial and industrial sectors. This report notes that industrial customers have the potential to achieve substantial savings in CDM."

So first I'd like – could one of you explain why – this was a report that Marbek did for Nalcor or for Newfoundland and Labrador Hydro.

**MR. STRATTON:** So the potential study was basically to establish how much energy is out there that you can save, regardless of how much it costs.

**MS. O'BRIEN:** So this was a report that Newfoundland and Labrador Hydro asked Marbek to do?

**MR. STRATTON:** Yes, right. So it tells you the total potential if you were able to put in all the most efficient technologies that exist and how that would change your loads.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** Okay. What it doesn't take into account is how much it will cost you to implement such programs.

**MS. O'BRIEN:** Okay.

So they came up with – Marbek came up with ways that Newfoundland and Labrador Hydro might reduce the load but they didn't do the pricing on it. Is that –

**MR. STRATTON:** They wouldn't have included – they didn't include the pricing of how much Hydro would have to pay and to spend to promote and, you know, provide incentives to do it, no.

**MS. O'BRIEN:** Okay. And –

**MR. STRATTON:** So it was partial cost.

**MS. O'BRIEN:** All right.

So did – for the suggestions made by Marbek in this 2008 report, were any of those implemented by Newfoundland and Labrador Hydro?

**MR. STRATTON:** So I would characterize Hydro's CDM, which is in conjunction with Newfoundland Power, as there being – it's a modest amount of conservation and demand management.

**MS. O'BRIEN:** The – would you expect that the impact of CDM to increase with electricity rates? So if electricity rates are higher, would you expect, then, the impact that CDM can have on your overall system would be greater?

**MR. STRATTON:** So if you had higher electricity prices, yes, you would likely have higher uptake in your programs.

**MS. O'BRIEN:** Okay.

And to the extent – I know that Newfoundland and Labrador Hydro has done some initiatives, like the takeCHARGE program is one that any of us who have consumed media might have, in this province, might have seen. Have they had any impact?

**MR. STRATTON:** I don't work in that department, so I don't know what the results of it – they would have estimates of what the energy amounts that they've saved to date is; they would.

**MS. O'BRIEN:** And so is there estimates, to your knowledge, that there have been savings?

**MR. STRATTON:** There would be because they know how much technology they put in.

**MS. O'BRIEN:** Okay.

**MR. STRATTON:** Okay.

Now what I don't know is if their analysis of the achievements were based on engineering estimates or if they were based on more thorough evaluations.

**MS. O'BRIEN:** Okay.

And I guess you have to – one of the other things you have to look at is if you have energy savings but you have to look at the price of running the programs, too, I think, to take your earlier point.

**MR. STRATTON:** Correct.

**MS. O'BRIEN:** Right. Okay.

Okay. Mr. Moulton, I'd like to talk to you about integrated resource planning. So I don't believe we've heard much on integrated resource planning yet, but as we hear – at the Commission we've been preparing for this Inquiry. It's certainly an area that we've become – we've read about. Can you just explain for the Commissioner, what is integrated resource planning?

**MR. MOULTON:** Well, what we're doing typically right now, it's called, I'll say, supply side planning; where we're basically looking at satisfying criteria and load by (inaudible) generate and supply side generation.

Typically, integrated resource planning is a couple of things. One is – one of the factors was, yeah, you would look at including more CDM options, more demand side management options, but one of the other things as well would also – it would also look at bringing, I'll say, more stakeholders into the planning process – contacting, having committees of stakeholders looking at everything. So it – and again, it would end up being a much more involved process.

**MS. O'BRIEN:** Okay.

Does Newfoundland and Labrador Hydro, Nalcor – do you use integrated resource planning?

**MR. MOULTON:** No, we don't.

**MS. O'BRIEN:** Okay.

Can you explain to the Commissioner why you don't?

**MR. MOULTON:** We don't think we've – some history we've – it was in the, I think, 2001 general rate hearing or general rate application, it was brought up by an intervenor about us

using integrated resource planning. And at that time we had the opinion that it – again, as I say, it's usually – it's a much more, I'll call it, owner's exercise to do a full integrated resource plan. It takes a lot longer; it takes a lot more time, a lot more resources. And at the time we didn't think that the – we would – the results wouldn't be worth spending all the extra time and resources to carry it out.

So that was in front of the Public Utilities Board at that time. I think, again – it came up again in the 2006, 2007, and I think it came up in the 2013. Anyway, it came up – it was suggested by, I think, some of the intervenors that we do it that way. It was brought up in front of the Public Utilities Board and they did have the option, if they had wanted to, they could have suggested that we carry out our generation expansion process using integrated resource planning, and they didn't.

And our argument in all the cases was, as I've said, we didn't think that the results would be worth the effort.

**MS. O'BRIEN:** Okay, thank you.

And when you said 2006, 2007 and you – then you also referred to 2013, these would be general rate applications –

**MR. STRATTON:** That's correct.

**MS. O'BRIEN:** – going before the PUB –

**MR. STRATTON:** Yes.

**MS. O'BRIEN:** – in those years.

Okay, thank you.

Madam Clerk, same exhibit, page 35, please.

So this is a section of Grant Thornton's report they have headed section 1.5 Oversight Quality and Control. And I'm just going to read out this paragraph here: "The load forecast was prepared by Nalcor's Senior Market Analyst. According to the Senior Market Analyst *'there is no official QC process, except that it's (I guess) the process is you are forecasting performance.... There is no formal process of saying yes that forecast is a good forecast or that forecast is approved.'*"

So first, to clarify, the Nalcor senior market analyst, is that you, Mr. Stratton?

**MR. STRATTON:** Yes, that's correct.

**MS. O'BRIEN:** So you're being quoted here.

**MR. STRATTON:** Yeah.

**MS. O'BRIEN:** Okay.

And QC here, this would be quality control. Is that what you're referring to there?

**MR. STRATTON:** That's right, yes.

**MS. O'BRIEN:** Okay.

And I'm – before I ask you the question, I'm just going to take you to a few more lines here, where they review here, if I go to line 32. So this was – Grant Thornton writes: "During our audit, we asked Nalcor to describe the internal review process of the load forecast conducted. The following response was provided by Nalcor."

And they give a quote here: The development and completion of long term planning load forecasts resides with the System Planning Department's Market Analysis Section at the time of completion of the 2010 Planning Load Forecast and the 2012 Planning Load Forecast... As such, there was no formal review and acceptance of the load forecast but instead, an open communication and discussion of load forecast results between the analysts involved.

Who – Mr. Stratton, who would be the other analysts involved at the 2012, which was for DG3, and the 2010 that was DG2?

**MR. STRATTON:** So when I prepared that response, I was referring to, well, Mr. Moulton and to the rates analysts that resided in Investment Evaluation –

**MS. O'BRIEN:** Okay.

So who –

**MR. STRATTON:** – at the time.

**MS. O'BRIEN:** Who was that?



**MR. STRATTON:** Oh, she – that would have been Anne Dwyer.

**MS. O'BRIEN:** Okay.

And then, just up here, I'm just going to go back here to the previous page.

"Nalcor's Manager of System Planning indicated the following" in "his review of the load forecast:

"I would review it but I mean I'm not a load forecaster. There would have to be something grossly wrong with it for me to you know. We put faith in people that we have there. The methodologies that we use have been reviewed by people that know – and accept it as being reasonable. If I had to sit down and do a load forecast – no, I wouldn't know where to start."

The manager of system planning, is that you, Mr. Moulton, that's being quoted here?

**MR. MOULTON:** No, that was – sorry, no, at the time that was Paul Humphries.

**MS. O'BRIEN:** Paul Humphries. Okay. Thank you.

So generally what we're seeing here – coming out here – is, as I understand it, no formal oversight or quality control, but I believe what's described here in Nalcor's response would be a, say, a more informal talking between other people at the office. Is that fair to say?

**MR. STRATTON:** So it's correct that there wasn't a formal process. So – but – I guess there's – I probably neglected to say it during that interview that – or I may have said it – that the outcome – or the review of the load – even though it wasn't formal, there would have been interaction between myself and Mr. Stephen Goudie, and – who was the manager of economics working out of Investment Evaluation.

Mr. Goudie had – he was my manager prior to moving to Investment Evaluation, and he had extensive knowledge and background in load forecasting. So he would – and he actually did the load forecast prior to my over – taking over that job function.

So during the DG2 and DG3, and in the preparation of all forecasts prior to that period, Stephen would have been the person who reviewed the results of my forecasting, and we would have talked through anything that – any issues or – if there were any.

So he had the ability to review both my assumptions and my outputs and be able to discern from looking at that whether or not there was any issues or concern with that forecast.

**MS. O'BRIEN:** Okay.

So, Mr. Goudie – I think we've heard evidence before. So when you started with Newfoundland and Labrador Hydro in 1989, you would have started working under Mr. Goudie is that right?

**MR. STRATTON:** I reported to Mr. Goudie, yes.

**MS. O'BRIEN:** Okay.

So to the extent you were learning on the job – you were learning from Mr. Goudie, and then he eventually moved on to another job within Newfoundland and Labrador Hydro, and you took over his former position.

**MR. STRATTON:** That's correct.

**MS. O'BRIEN:** Okay.

Do you know what other utilities do in terms of their load forecast? I mean, do you know if other utilities have a formal quality control or quality assurance framework for their load forecasts?

**MR. STRATTON:** I do not.

**MS. O'BRIEN:** Okay.

Mr. Moulton, are you – do you know?

**MR. MOULTON:** No, I don't know.

**MR. STRATTON:** I would like to add one further comment on – during the DG2 and DG3 process. At DG2, Manitoba Hydro International did a very comprehensive review of our – all of our models, of all of our data inputs and the assumptions and the resulting loads, and their

conclusion was that the load forecast was prepared on an appropriate basis.

**MS. O'BRIEN:** Yes.

**MR. STRATTON:** Yeah.

**MS. O'BRIEN:** Okay.

And I know – and Manitoba Hydro International's reports have actually been filed as exhibits, and people from Manitoba Hydro will be called as – Manitoba Hydro International will be called as witnesses later on. So the Commissioner is aware of that work and will become more aware of it as time goes on.

Mr. Moulton, I'd like to talk to you a little bit about whether – the question: do we need the power? I'm borrowing that line from a paper published by the Government of Newfoundland and Labrador prior to sanction. Madam Clerk, can we have Exhibit P-00070, please?

So this was a paper published by the Government of Newfoundland and Labrador, the title here is: *Do We Need the Power?*

And, Madam Clerk, can you jump me to page 3, please? Thank you.

Just want to clarify something here with you. I just gotta find my quote.

Okay, right here.

So here it says: "New generation is required to meet future Island demand. Newfoundland and Labrador Hydro's 2012 Planning Load Forecast indicates that by 2015 the province will be challenged to reliably meet peak demand in the winter months and, post-2019, there will not be sufficient energy supply to reliably meet demand throughout the year."

And I'm going to ask you to hold that thought there. So here – but the years here were 2015 that the challenge will arise, and then in – after 2019 there would be – there would not be a sufficient supply.

Madam Clerk, can you bring up P-00005? And this is a timeline, actually, that was prepared by the Commission. So it's just to help us organize

our – some of the testimony here and how things happened.

And there is a note here in July 2010, so this is on the timeline. Slightly different dates here. It says – this is in 2010. It says: "NL Hydro releases annual Generation Planning Forecast showing generating capacity deficits – an inability to meet peak loads – starting in 2015. Energy deficits are also forecast starting in 2021."

So, Mr. Moulton, to the best of your knowledge, I know we have 2015 and then 2019 and 2021, but are these true statements here? Are these statements accurate?

**MR. MOULTON:** Yes, to my knowledge they are accurate. I would like to point out, as I described in my testimony yesterday, when we say energy deficits are also forecast, that would mean we were talking about firm energy –

**MS. O'BRIEN:** Okay.

**MR. MOULTON:** – so the ability. So that wouldn't say that, in an average year, we wouldn't have enough electricity to keep the lights on. That would just say we would be violating our firm-energy criteria so that if we got to that point, and we went into one of these dry sequences as we were talking about –

**MS. O'BRIEN:** Yeah.

**MR. MOULTON:** – that we wouldn't have enough. So from a criteria and a reliability point of view, yeah, we were violating our criteria. So that's – when we say energy deficits are – and the same thing with the other comment saying about 2019.

**MS. O'BRIEN:** Okay. And these – I know we talked about it yesterday, but your criteria, really, you're supposed to provide lowest-cost power but it's got to be reliable.

**MR. MOULTON:** Well –

**MS. O'BRIEN:** So these are how you set your standards for meeting the reliability?

**MR. MOULTON:** But the lowest-cost power has got to – it's got to be able to meet the reliability criteria.

**MS. O'BRIEN:** Right, okay, thank you.

But was 2010 the first time that Newfoundland and Labrador Hydro in its planning forecast was predicting a deficit?

**MR. MOULTON:** Well, I think, as we've seen, our – typically our forecasts were increasing. And I'll say if you've got a 20-year forecast that's increasing pretty well every time you do an analysis, there's going to be some point, at that time, that you're going to run into deficits in your capacity and/or energy and that you would expect that – that, yeah. So, again, I'll say pretty well every – to answer your question, sorry, pretty well every time you do an analysis you would come and say, okay, it looks like here's when we're going to run into our deficits. That was part of the exercise. So, no, we did identify deficits in earlier years.

**MS. O'BRIEN:** Okay, and I'm just going to take you through a few of those just because – just want to make sure that the evidence is clear because we have different documents saying slightly –

**MR. MOULTON:** Yes.

**MS. O'BRIEN:** – different things.

Madam Clerk, if you could please bring up P-00165.

And, Mr. Moulton, I believe this is an exhibit that was filed by Newfoundland and Labrador Hydro before the PUB reliability review more recently in 2014. And this was a question that was posed to Newfoundland and Labrador Hydro to ask them to state when Hydro first became aware there could be a capacity deficit and the amount of the deficit at that time.

And the result here, the answer here by Nalcor says: "A capacity deficit was first identified in the 2008 Strategist results, with the deficit projected to occur in 2012." So this is – we're a couple of years earlier than 2010 now. So was this the first time, though, in 2008?

**MR. MOULTON:** No, I think there were – I went back – I didn't go back any farther than 2005. I looked at our 2006 and our 2005 generation issues reports and they both identified upcoming deficits –

**MS. O'BRIEN:** Okay.

**MR. MOULTON:** – around these time periods.

**MS. O'BRIEN:** So, when this answer provided by Newfoundland and Labrador Hydro identified it as a first, you're – is that incorrect?

**MR. MOULTON:** I think it's – we'll say it's incorrect that we did identify it earlier, but I think we also have to look at the context of when and why this RFI was asked and responded to. I think – could you just put this page back up to the –

**MS. O'BRIEN:** Yes.

**MR. MOULTON:** – the question, please?

**MS. O'BRIEN:** Yeah.

**MR. MOULTON:** So this was the – in response to the Island system supply issues and power outages, basically DarkNL. And it was asking why we hadn't, to date, initiated an application to build additional capacity – so I think – and when we first became aware of it. So this is, I think, I'll say 2014 or around that time period.

So I think the idea was to say that, yeah, we had identified it, it wasn't just a year or two or at this time. The thing was we had known about it for a time period. So I think we had said 2008 was the first time. If we'd had said 2006, it wouldn't have – from the context of the answer to this question it really wouldn't have made a difference. It was more a point of, yes, we've known about it for a number of years.

**MS. O'BRIEN:** Okay. There's just one final document that I want to bring up but it's consistent with what you've just said in mentioning the 2006.

**MR. MOULTON:** Yeah.

**MS. O'BRIEN:** P-00164, please, Madam Clerk. Thank you.

So what we're looking at here, I understand this is Newfoundland and Labrador Hydro's 2007 generation planning forecast. Is that right?

**MR. MOULTON:** Of 2006 Generation Planning Issues and includes – forecast includes the generation expansion plan and some other things.

**MS. O'BRIEN:** Okay. Thank you.

So I'm just going to go here, so I'm in the Executive Summary here.

**MR. MOULTON:** Mm-hmm.

**MS. O'BRIEN:** So this one here says: "Based on examination of the Island's existing plus committed capability, in light of the 2006 Planning Load Forecast and the generation planning criteria, the Island system can expect capacity deficits starting in 2012 and minor firm capacity deficits starting in 2014 and increasing thereafter."

**MR. MOULTON:** Yeah.

**MS. O'BRIEN:** So it was – at least this idea of the deficit was that we know it was at least identified as early as 2006.

**MR. MOULTON:** That's correct.

**MS. O'BRIEN:** Okay and at that time I understand the years projected were 2012 and 2014.

**MR. MOULTON:** Yes, and things change in forecasts; the – Vale coming on and their exact timing, of course, we had the shutdown of the Grand Falls mill later on. So, you know, every year you're doing it the forecast changes, other factors come into play.

**MS. O'BRIEN:** Sure. And the shutdown of the Grand Falls mill would have had a major impact on that.

**MR. MOULTON:** Yes. And, as I was saying, that was one of the ideas – as you can see, it's right up front in the Executive Summary, one of the reasons we did the reports every year, because conditions changed. And that was a very valuable piece of information to know that,

okay, when will we have to look at adding additional generation.

**MS. O'BRIEN:** Okay. Thank you.

If we could go to Exhibit P-00014, please, Madam Clerk, at page 38?

Okay. I want to talk to you, Mr. Moulton, a bit about reliability. So they, Grant Thornton here, gives some explanation that Newfoundland and Labrador Hydro's plan was to have sufficient generation – generating capacity for targeted loss-of-load hours of no more than 2.8 hours per year, and sufficient generating capacity to supply all of its firm energy requirements with firm system capabilities.

So these are the – these are the requirements that you've talked about previously.

**MR. MOULTON:** The criteria, yes.

**MS. O'BRIEN:** These are your criteria. Okay.

So we know that in early 2014 we had a series of power outages that's become known as DarkNL.

**MR. MOULTON:** Mm-hmm.

**MS. O'BRIEN:** And following that I understand a process was started before the PUB where the reliability of our electrical system was analyzed. And they did some work looking at it sort of now in the present day, and also looked forward to, you know, post-integration of Muskrat Falls.

**MR. MOULTON:** That's correct.

**MS. O'BRIEN:** Okay.

And so did – as a result of that work that was done before the PUB – and I understand they had a consultant, Liberty Consulting Inc., who did some investigation into our electricity system. Was there any changes made in the Interconnected Island system as a result of that work that was done in 2014?

**MR. MOULTON:** It's been a continuing process. And I'll say for the last year or so I've been kind of out of that area and I've kind of switched jobs but, yes, there were some changes.

One of the things, from a probabilistic statistical point of view, one of Liberty's findings, given our small generation base, that while LOLH was still a good measure, it was also useful to look at a measure called, I think, reserve capacity.

**MS. O'BRIEN:** Okay and I think it's –

**MR. MOULTON:** Yes.

**MS. O'BRIEN:** – detailed a bit there.

**MR. MOULTON:** Yes.

**MS. O'BRIEN:** So the reserve – to increase your reserve level. So this is another way, another measure of reliability that can be taken into account?

**MR. MOULTON:** It is. Yes.

**MS. O'BRIEN:** Okay.

**MR. MOULTON:** And one of the reasons we use LOLH, of course, I think as I stated yesterday with the forced outage rates, thermal units usually have much higher forced outage rates than hydro units, and the LOLH calculations take that into consideration when you're looking at the capacity you'll get out of a unit, where reserve margin doesn't really. So that's one of the reasons we were using LOLH but, no, after that we added, yeah, reserve margins as well.

**MS. O'BRIEN:** Okay.

**MR. MOULTON:** And I think later on we had another one, the expected unserved hours; again, another measure, which also took into – given our transmission, that also took into account some of the effects of the transmission system on the generation system as well.

**MS. O'BRIEN:** Okay.

So from the Commissioner's point of view here in phase 1 of this Inquiry, when he's looking at the sanctioning decision –

**MR. MOULTON:** Mm-hmm.

**MS. O'BRIEN:** – I think this additional – I understand that there were changes made to the Interconnected Island generation plan –

**MR. MOULTON:** Yes.

**MS. O'BRIEN:** – as a result of this reliability work –

**MR. MOULTON:** Yes.

**MS. O'BRIEN:** – that was not anticipated in the plan as you analyzed it at DG3. Is that correct?

**MR. MOULTON:** That's correct.

**MS. O'BRIEN:** Okay.

And so I think the most important question for our purposes here was these additional – these changes that had to be made which I would assume would have added cost to the Interconnected Island system –

**MR. MOULTON:** Not – well, maybe.

**MS. O'BRIEN:** Okay.

**MR. MOULTON:** Maybe, not necessarily. But I think the thing we should look at – I think one point was that we did use – the criteria that were used were exactly the same in both the Interconnected Island and the Isolated Island cases.

**MS. O'BRIEN:** Okay.

**MR. MOULTON:** So they were treated the same.

**MS. O'BRIEN:** The changes – trying to get – are these changes something that could have been anticipated at the time of – in 2012, when you were doing the DG3 work? Or did best practice change standard – applicable standards change since that time that required this extra work? I think that would be an important question to get your thoughts on.

**MR. MOULTON:** You know, a number of utilities, depending on their system, use LOLH; they use reserve margins, typically, they – you know, you can use a combination of both. We had been using LOLH for – I think a study was –

I'm trying to think now – was done in the – I'll say – late '80s, that when we had decided to go to the LOLH metric and we had been using it for that time period, it – we'd had it in front of the Public Utilities Board for that number of years. It had been looked at as a metric for our criteria by a number of – I'll say – different outside companies, different consulting companies. And, you know, everybody was that – everybody was happy at that time that it was a reasonable criteria measure.

**MS. O'BRIEN:** Okay. Thank you.

Commissioner, we're at the lunch break. I do not have many further questions for these witnesses. I do have one last section that – to go over with them, so I expect to be finished my direct examination very shortly after the lunch break. It is possible we could take a – as there is a – I think, a reasonable chance that we may be done with these witnesses today, I think it would be agreeable to counsel here, who I've canvassed, if we took a shorter lunch break; if you're agreeable to that.

**THE COMMISSIONER:** Okay. I don't see too many people objecting here. So what we'll do –

**MR. BUDDEN:** I hate to be the one everybody is mad at, but I don't particularly want a shorter lunch break because I've got a lot of information to absorb here.

**THE COMMISSIONER:** Okay.

**MR. BUDDEN:** So I don't mind taking a few minutes off, but what were you contemplating?

**THE COMMISSIONER:** Well, I wasn't contemplating five minutes.

**MR. BUDDEN:** Yeah.

**THE COMMISSIONER:** So have no fear of that.

I think what I'd probably do – well, there are a couple of things we could do here. You know, I'm very alive to the issue that we can finish these – you know, there's a thought that we can finish these witnesses today. Now, that means that obviously many of us can get back to our offices and whatever.

So there's two things. We can make a shorter lunch break, which is one option that I would do. And the other is that we can sit beyond 4:30 this afternoon 'til 6-6:30, if we need to, to finish it. Which is what I probably will do.

So would you be agreeable, Mr. Budden, to – normally we come back at 2 o'clock, so if were to come back at quarter to 2?

**MR. BUDDEN:** Sure, that'd be fine.

**THE COMMISSIONER:** Good.

So with Mr. Budden's consent then we'll, basically, come back at quarter to 2 and then we'll – we may go late depending on how things go this afternoon.

Good. Thank you very much.

We'll adjourn now.

**MS. O'BRIEN:** Thank you.

**CLERK:** All rise.

### Recess

**MS. O'BRIEN:** Thank you, Commissioner.

Before we broke for lunch, I had spoken about making a further exhibit with respect to the most recent information from Nalcor regarding the operation and maintenance costs. It turns out that is actually already an exhibit, so it has been entered as Exhibit P-00128.

Okay. So we are gonna talk now about the sensitivity analysis. So I'll start with Mr. Moulton, and I'll ask Madam Clerk to please bring up P-00014 at page 54. Thank you.

So this is from the Grant Thornton report, and the page here we have – this is a table entitled: Summary of Sensitivities at Decision Gate 2, and we've already had some testimony with regard to this.

Mr. Moulton, can you please tell us how were the different scenarios for the sensitivities that were run at Decision Gate 2 – how were they chosen? So, for example, how was it decided to run a sensitivity on an annual load decreased by

880 gigawatts and to run the various PIRA forecaster? You know, who decided, or how was it decided what various scenarios to run for sensitivities?

**MR. MOULTON:** We ran – I'll say my department – we ran some of them or we – a lot of the – actually, I think, most of the sensitivities in DG2 were actually run by – in IE, in Investment Evaluation.

**MS. O'BRIEN:** Okay.

**MR. MOULTON:** So, but I'll go back to one, like the annual load decreased by 880 gigawatt hours. That was to represent the loss of an industrial customer.

**MS. O'BRIEN:** Okay. Any particular industrial customer that resulted in the 880 gigawatt hours being chosen?

**MR. MOULTON:** Well, that would be, most likely, Kruger.

**MS. O'BRIEN:** So the –

**MR. MOULTON:** Corner Brook power.

**MS. O'BRIEN:** Corner Brook Pulp and Paper.

**MR. MOULTON:** Or Pulp and Paper, sorry.

**MS. O'BRIEN:** And there's two – on that topic, there's two that are similar, but I don't understand why they are different.

So, one here is annual load decreased by 880 gigawatts hours and then there's another one: loss of 880 gigawatt hours 2013 forward. And one here results in, essentially, there being no difference in the CPW calculations and the other one does still have a difference of 408 million. Can you explain the difference between those two?

**MR. MOULTON:** Yes. This table is a combination of sensitivities collected from the MHI report and the Nalcor submission. The –

**MS. O'BRIEN:** And that would be the Nalcor submission to the PUB?

**MR. MOULTON:** To the PUB, sorry.

**MS. O'BRIEN:** Okay.

**MR. MOULTON:** The loss of – the annual load decrease by 880 resulting in a difference of 408, that's the actual correct one. The loss of 880 gigawatt hours 2013 forward – if I've got this correct – that came from the initial – I'll call it publication – of the Nalcor submission to the PUB.

It was discovered that there was an error in that, which was corrected and the report and the page of sensitivities, the correction, are on the PUB web page under Muskrat Falls Inquiry. So, actually, that one shouldn't – that's wrong. It was also noted in a couple of RFIs that they were wrong and it was corrected.

So, the 408 is the correct one and the one that says it is incorrect. But, as I say, it was corrected and was corrected in Nalcor's submission, but I think that got – that would have, I assume, was taken from the initial publication without the correction.

**MS. O'BRIEN:** Okay. And I'm gonna ask Mr. Warren questions in a few minutes, but I'd like to ask you a few further questions, Mr. Moulton.

So there was two here: moderate conservation of 375 gigawatt hours and then aggressive conservation, and these are the resulting numbers over here, the difference in the CPW analysis here.

We've talked about conservation and demand management this morning at length. Is, you know, is that what these two sensitivities were trying to get at?

**MR. MOULTON:** I would think so. Mr. Stratton may be able to better –

**MR. STRATTON:** Well, I can – what I can say is that the – those results of the analysis would have been the result of doing various thresholds of CDM.

**MS. O'BRIEN:** Okay. So, you didn't include CDM in the analysis itself but you ran some sensitivities to show what you would expect to be the impact if you did moderate CDM and if you did aggressive CDM?

**MR. STRATTON:** Correct. So, it reflected what we – what was estimated to be the cost of doing the programs to achieve those results.

**MS. O'BRIEN:** Okay. So, if you did a CDM, we see here – we'd have to scroll up here, but this is the Interconnected Island, a CDM had no effect on the CPW for the Interconnected Island but it did have an effect for the CPW value for the Isolated Island. Is that right?

**MR. WARREN:** My understanding is, again, as Mr. Moulton just indicated, a lot of these sensitivities were part of the evolution of, I guess, the analysis during DG2.

My recollection is the modern and aggressive conservation actually came from the Navigant report, and it was in response during their procedures. They felt that there should be some sensitivities CDM. My understanding is that Navigant worked with the team to, I guess, come up with a couple of scenarios. And I think they wanted to just, I guess, look at what the impact of the 375 was on the isolated, I guess.

**MS. O'BRIEN:** Okay. But is the point not being, Mr. Warren, that even with conservation taking place, because we have to pay for the Muskrat Falls Project no matter how much energy is being produced, that that's why the CPW for that scenario didn't change?

**MR. WARREN:** At first glance I would agree with you, but I'd have to just confirm.

**MS. O'BRIEN:** Okay. Thank you.

We have the – another sensitivity run here on additional wind. Can any of you speak to what this particular sensitivity was trying to capture?

**MR. MOULTON:** Again, the –

**MR. WARREN:** (Inaudible.)

**MR. MOULTON:** Sorry.

**MR. WARREN:** I'd have to confirm, but I think that was in response to a PUB RFI.

**MS. O'BRIEN:** Okay. So you could put in – is the idea here you could put in some additional

wind that would bring down the CPW by, you know, approximately –

**MR. WARREN:** Yes.

**MS. O'BRIEN:** – 500 million on the Isolated, but bringing in additional wind wouldn't change the CPW of the –

**MR. WARREN:** No, you'd have the fix costs and –

**MS. O'BRIEN:** Fixed costs.

**MR. WARREN:** You wouldn't –

**MR. MOULTON:** And lots of excess energy.

**MS. O'BRIEN:** Thank you.

The federal loan guarantee – so we see a sensitivity here. And, Mr. Warren, just taking it from your evidence earlier this morning, this is because the impact of the federal loan guarantee wasn't considered in the base case for DG2.

**MR. WARREN:** That's correct.

**MS. O'BRIEN:** Okay and we know it was in DG3.

Here is another one I'd like to look at in a little more detail: Holyrood to 2041, then CF – is that Churchill Falls?

**MR. WARREN:** Yes.

**MS. O'BRIEN:** Okay, then Churchill Falls power, after that at market price.

So can you explain to me why this sensitivity was run and how was it run? How did you calculate the effect of continuing on with Holyrood to 2041 and then using Churchill Falls power at the market price?

**MR. WARREN:** My understanding, again, it was my group that very likely performed these calculations. My understanding of the process that they would have followed at that point would have been to – again, this is probably in response to an RFI through the PUB process and they would have followed, I guess, in the Isolated scenario, the costs to get to the 2041



based on Mr. Moulton's generation expansion plan. And then looked at bringing the LIL, a link similar to the Labrador-Island Transmission Link, into service around 2041 and bring the energy over that based on forecasted market prices at the time.

**MS. O'BRIEN:** Okay and what would you have used for the forecasted market price?

**MR. WARREN:** I believe it was just forecasted prices based on PIRA, based on the market price that we were seeing at the time period.

**MS. O'BRIEN:** So would that have been at one of the American hubs, for example?

**MR. WARREN:** Yes, I think it would MISO, but I would have to confirm that –

**MS. O'BRIEN:** Okay.

**MR. WARREN:** – definitively.

**MS. O'BRIEN:** Okay. And would you have taken into account transmission costs or do you –?

**MR. WARREN:** It would factor in, yes, the transmission costs to get it to, I guess, to CF. I think it would. I'd have to confirm that.

**MS. O'BRIEN:** Just, I guess, the point is if the power was being generated at Churchill Falls –

**MR. WARREN:** Yes.

**MS. O'BRIEN:** – and you were pricing it based on the hub price, say on the Eastern Seaboard, New York or somewhere like that.

**MR. WARREN:** Yes.

**MS. O'BRIEN:** So the cost of getting the power from Churchill Falls to getting it to market, that price at the hub would have to include the tariffs and transmission costs coming down from Churchill Falls to get it to New York or Massachusetts or wherever you are?

**MR. WARREN:** I don't recall. I wasn't intimately involved in the modelling of that transaction, but at a minimum it would include

the transmission costs from Churchill Falls to Soldiers Pond.

**MS. O'BRIEN:** From Churchill Falls to Soldiers Pond?

**MR. WARREN:** Yes.

**MS. O'BRIEN:** Okay, but you don't know how you factored that in looking at the hub price.

**MR. WARREN:** Into the market price.

**MS. O'BRIEN:** Okay.

So, here though, when we see this you still determine that that option was more expensive than the Muskrat Falls Option as it was calculated at DG3?

**MR. WARREN:** Yes.

**MS. O'BRIEN:** Okay, by the 1.2 billion approximately.

What about other ways of meeting power needs to 2041? So you've done a sensitivity here on extending Holyrood out to 2041, did you look at any other scenarios, other ways to meet our power demand until 2041 such as, you know, larger CCTs, doing expansion to existing hydro sites on the Island? Any other scenarios looked at?

**MR. MOULTON:** I'm trying to remember but I would think that we would have looked at – there would have been some kind of generation expansion to doing that or going out to 2041. I'm trying to think – or maybe not because, well, we would have had to look at – I think part of that one was keeping Holyrood intact and keeping it operating until 2041. So I think that we had looked at the generation expansion with the Isolated Island going out that far. So I think as part of that, it was that, yeah, this is the least-cost way of doing that.

**MS. O'BRIEN:** But – sorry, to be clear, are you saying you looked at other ways to get to 2041 other than relying on Holyrood?

**MR. MOULTON:** Well, I think as – I'm trying to remember here. I'm – yeah, it's – I'm not really sure. As – I think even as part of our, I'll

say, the original base case, you know, we would have looked at it and said, okay, if we decide to shut down Holyrood and put in a CCCT in the early years, that would have been part of the process.

**MS. O'BRIEN:** Okay.

**MR. MOULTON:** So that –

**MS. O'BRIEN:** What about expansion of already-existing Island hydro sites? So, for example, information we have is that there is at least the possibility physically to do an expansion, add additional turbine or turbines at both the Cat Arm site and the Bay d'Espoir site. Is that accurate?

**MR. MOULTON:** That's correct, but that would – these expansions would only be for capacity, only for megawatts. There's no plans in these to change the actual reservoir system so the amount of rain and snow falling that was going to be captured within the reservoirs would stay the same. So except for maybe a very little small gains in losses – or inefficiencies I should say – from building something new, you would get exactly the same energy out of it. You wouldn't get any more energy out by adding the extra turbine at Bay d'Espoir or Cat Arm.

**MS. O'BRIEN:** If you did do that, though, add extra turbines at those sites, would that allow you to add more wind into the system? The idea being at peak times you would be able to get more energy out of the water there when –

**MR. MOULTON:** Yeah, and also – I wouldn't know without doing the calculation.

**MS. O'BRIEN:** Okay.

**MR. MOULTON:** Yeah, it's –

**MS. O'BRIEN:** Did you – when you were putting your inputs into Strategist for the expansion plan, did you price up and put in the possibilities of doing the expansions at Cat Arm and Bay d'Espoir?

**MR. MOULTON:** At the time, to my knowledge, no, we didn't.

**MS. O'BRIEN:** Okay.

The carbon pricing on fossil fuel – so that's the next one there, could – sorry. Could one of you – is one of you able to explain? I think this is to get into the ideas of a carbon tax. Is that correct?

**MR. MOULTON:** Well, a cost of carbon which, again, might not be a tax. There were – you know, there were other things of – there were other methods suggested, cap and trade. There were many – there were different methods suggested or on the go at the time from Kyoto on forward.

So that wasn't – but, again, we'll call it carbon tax. What would – what does producing carbon cost you? Okay, yeah, we can say it from that point of view. So, yes, that was a sensitivity to look at that. Yes.

**MS. O'BRIEN:** Do you know what actual – you're saying there's various ways to look at the price of carbon, I understand that. Do you know what way you looked at it to do this particular sensitivity?

**MR. MOULTON:** I think it was, if I remember correctly, it would be – I'll say something like a carbon tax – a cost per ton of producing carbon, yes.

**MS. O'BRIEN:** Okay.

**MR. MOULTON:** So in that – it would be – it would've been – so basically what we did was look at the fossil fuel in both cases that were consumed to produce electricity. And I calculated the amounts of CO2 emissions that would come from these fuels, and then I gave it to Mr. Goudie, and he looked at adding the – whatever the cost per ton he used, and I'm not sure exactly what he used at the time. He used that to develop what the additional costs would be in both cases.

**MS. O'BRIEN:** Okay, so this would be Steve Goudie, the same Mr. Goudie?

**MR. MOULTON:** Yes.

**MS. O'BRIEN:** So he's the one who would know – okay – what the pricing was used? Okay, thank you.

We're gonna look at – so we have here – we've looked at this table already, and I won't go over it in any more detail now. But we have some – there was – I just wanna point out though, at DG2 there was some scenarios run where you changed multiple variables.

So fuel decreased, together with an annual load decrease, together with a capital cost increase. And there was, you know, a scenario done for the three there and another scenario done where two variables were changed. Who would've been responsible for running these, shall we say, combined sensitivities – combined factor sensitivities at DG2?

**MR. WARREN:** My understanding based on preparation for this was, again, these were ones that were in response for RFI's through the PUB review process. My understanding is it would've been with the IE evaluation team, working along with Mr. Moulton, in particular for those that factored in any changes in load.

**MS. O'BRIEN:** Okay, thank you.

Madam Clerk, could you please bring up Exhibit P-00121 and go to page 186, please?

**CLERK:** Page 86?

**MS. O'BRIEN:** 186.

So this is a Decision Gate support package that was prepared for the Gatekeeper going through Gate 3, but I'm not going through the full exhibit now – it's rather a long one. I'm just interested in looking at this Appendix B to it, which was the "Decision Gate 3 Deliverables." And if I go to the next page, I believe. Okay.

So these were items that had to be produced, I understand it, for the – that had to be delivered to the Gatekeeper for his evaluation prior to moving through the Gate, is that how you would understand it, Mr. Warren?

**MR. WARREN:** That's fair.

**MS. O'BRIEN:** Okay, so here we see there's items 14, 15 and 16. We have various sensitivities. These are on fuel, price interest rates and costs. And your name is the leader on all three of those items. So can I take from that

that it was your responsibility to make sure that those sensitivities got run and delivered to the Gatekeeper?

**MR. WARREN:** Correct.

**MS. O'BRIEN:** Okay, thank you. Madam Clerk, can I please go back to Exhibit P-00014, page 55.

So we're going to move away from Decision Gate – oh sorry. We've moved away from Decision Gate 2, now these are the sensitivities that were run, as we understand it, as Decision Gate 3. And again, we're back in the Grant Thornton report, and we've already looked at this page of the exhibit.

So here we do indeed see some sensitivities being run at Decision Gate 3 for fuel, for increase of the capital expenditures, so construction cost, and also three having to do with interest rates. And then there's one on carbon pricing.

So Mr. Warren, did you prepare, or your group prepare – you know, you as leader – prepare the sensitivities that we're seeing on this table?

**MR. WARREN:** Yes.

**MS. O'BRIEN:** And would that also include the carbon pricing one?

**MR. WARREN:** Yes.

**MS. O'BRIEN:** Okay.

**MR. WARREN:** So with respect to the carbon pricing, in preparing in particular the sensitivities, to discuss the sensitivities at Decision Gate 3, I kind of dug around into older files to try to get some background into it, and the carbon pricing was – as Mr. Moulton just indicted, he was able to provide a number of tons CO<sub>2</sub>, carbon dioxide, emissions. And in reviewing a couple of those files of it, we were able to determine the cost to both the Isolated and the Interconnected Island scenarios using pricing that Navigant had provided in 2011.

And it was indicative; it was actually a conservative compared to some other information that Mr. Goudie had left in his files,

based on where – I think at the time they were looking at some target pricing for coal emissions. But not using the coal emissions but this – these lower amounts it generated, and that was – starting in 2020, was the assumed target start for a price on carbon. And it was around \$30, just a little under \$30 in 2020 dollars at –

**MS. O'BRIEN:** Per –

**MR. WARREN:** – the time.

**MS. O'BRIEN:** Per ton?

**MR. WARREN:** Per ton.

**MS. O'BRIEN:** Okay, thank you. All right, so that explains – so here, of course, we see this is the base case up here, so we see a very, very small effect on the Interconnected Island but quite a significant effect on the Isolated Island. That's because more – far more –

**MR. WARREN:** Based on –

**MS. O'BRIEN:** (Inaudible.)

**MR. WARREN:** – based on the implementation of 2020, obviously we'd still have some diesel in the Interconnected –

**MS. O'BRIEN:** Sure.

**MR. WARREN:** – along with the burn off of Holyrood in 2022, I believe.

**MS. O'BRIEN:** Great. Okay, I understand that. So that's why we see the bigger impact here. Okay, thank you.

So in terms of the other sensitivities that were run, the expected PIRA, low, high, the plus 10, plus 25, minus 10 on the capital expenditures, and the various interest rates sensitivities run, was – were you responsible, Mr. Warren, for selecting which of these to run – you know, what particular sensitivities to run?

**MR. WARREN:** No, I left it with Mr. Goudie, who was my manager of economic analysis. He would've provided the initial cut. I reviewed it, and they seemed reasonable based on what I'd seen there.

**MS. O'BRIEN:** Okay, so can you tell me one of the – you know, one of the notes pointed out in Grant Thornton was that at DG3 there was, you know, you didn't run a, say, a plus 30 per cent. There was – the maximum increase was a capex of 25. There was no combined cases – you know, what if fuel went –

**MR. WARREN:** Yeah.

**MS. O'BRIEN:** – down to the low but capex increased to the – you know, plus 10 per cent.

Why did you not run some, you know, more sensitivities commensurate as to what was done at DG2 –

**MR. WARREN:** Yup.

**MS. O'BRIEN:** – and why not run some combined sensitivities like had been done at DG2?

**MR. WARREN:** So on the plus 30, I'm not sure if Steve would've been – Mr. Goudie would've been aware of that indication of the plus 30. That said, plus 25 is fairly consistent with that. The other aspect which kind of ties into the grouping, again, these are indicative – they were meant to be indicative à la carte – what I would call à la carte options, which if you wanted a combination of any of these items, you could roughly see what the differences were and come up with a cumulative – a combination.

**MS. O'BRIEN:** A combination –

**MR. WARREN:** So, for instance –

**MS. O'BRIEN:** Yes.

**MR. WARREN:** – for an example would be, if you were looking for a plus 30, you could look at the difference of the plus 10 and multiply the difference at the plus 10 three times and that would give you an indicative preference for a plus 30.

**MS. O'BRIEN:** Okay. To do that the person doing it would have to know that there was a linear relationship at play here.

**MR. WARREN:** Yeah. So that would be demonstrated, like, if you look at the plus 10

capex and the plus 25, you could see that the plus 25 is roughly 2½ times the plus 10.

**MS. O'BRIEN:** So you'd have to know to kinda do that math though and that calculation to determine that there was a linear relationship before you'd know that you could test other sensitivities this way.

**MR. WARREN:** Yes, similar to what, I think, in separate exhibit, I believe, counsel asked or the Commission asked Grant Thornton. They were able to do those type of calculations for a combination between fuel and capex.

**MS. O'BRIEN:** So, are you saying here you could – by this, how – if you could just explain to the Commissioner how would I know if I wanted to run PIRA fuel low and increase capex 10 per cent – we'll take an easier one, one that's right there – how would I do that?

**MR. WARREN:** You would – so if you were looking for increase capex – I'd have to check the calculations but roughly it would be the difference of 2,412, which is your base case –

**MS. O'BRIEN:** Mm-hmm.

**MR. WARREN:** – less the 2,152, so – or you can just start at the 2,152 because that's your base. And what was the fuel that you were looking for?

**MS. O'BRIEN:** If you did PIRA fuel low – I was just taking an example.

**MR. WARREN:** Okay.

Well, let's – so low, let's start at the low, sorry, because it's just easier to do mental math; 584 is your starting point. So you know that the low is going to bring you down to a 584 preference. Then you see the difference between 2,412 and 2,152 –

**MS. O'BRIEN:** Mm-hmm.

**MR. WARREN:** – which is 260 million, and you take 260 million off your 584 and that's \$324 million.

**MS. O'BRIEN:** Okay.

Mr. Warren, I'm going to put to you that is – I'm sure for you that's quite, you know, that's something – you have comfort running those kind of numbers in your head and working that out, but why not for other people reading and trying to make decisions based on the sensitivities and analyze them, why not just run a bunch of other cases so they could just look at a table and see them?

**MR. WARREN:** We were asked to – or as the deliverables list indicated, we selected a few factors, some of the more important factors, and provided this as an initial cut and that's – that satisfied the, I guess, the Gatekeeper's requirements.

**MS. O'BRIEN:** Okay.

If we could maybe just go back to Exhibit P-00121, page 186, again, please, Madam Clerk.

So here is the list of – and so this is the Decision Gate 3 deliverables, but I understand that these deliverables were also given to the House of Assembly, not just the Gatekeeper. Is that correct?

**MR. WARREN:** Yes.

**MS. O'BRIEN:** Okay, and so when we scroll down here, on the list for the House of Assembly are the – it just says sensitivities here. It doesn't give you any direction as to what particular sensitivities –

**MR. WARREN:** That's right.

**MS. O'BRIEN:** – to run. And then when we get down here – and we'll come to this in a couple of minutes, but there was other deliverables that were specifically for the Gatekeeper –

**MR. WARREN:** Okay.

**MS. O'BRIEN:** – in addition to what the House of Assembly was receiving. But do you, I mean, do you think that complex analysis that you just went through for us and, you know, how you can do the combined sensitivities, do you think it's reasonable that, you know, Members of the House of Assembly would be able to look at that table, understand how to do that, know they could do those combined sensitivities? You know,

is that a realistic expectation of Members of our House of Assembly?

**MR. WARREN:** I'm sure about whether or not it's a realistic or non-realistic expectation. Any information that was provided to anyone, we were more than welcome – or more than willing and able to run any sensitivities based on any feedback that we received.

I guess, what you – the list that you see there is the initial series of sensitivities that we provided and –

**MS. O'BRIEN:** Did anyone come back to you asking you to run more?

**MR. WARREN:** I don't think – no. No.

**MS. O'BRIEN:** Okay.

And, likewise, – sorry, if we could please go back to again, P-00014, page 55, Madam Clerk.

So here – so, similar, I guess the same answer here is at DG3 you'd showed the break-even point for pricing on oil. I think we saw it was a decrease of 44 per cent at DG2. Is – I'm just anticipating your answer, based on what you've already said – is the reason why you didn't do the break-even point here for fuel, again, because you expected people would be able to calculate that?

**MR. WARREN:** Yeah, I'm not sure exactly the thought process on this initial cut.

**MS. O'BRIEN:** Okay.

All right. If we could go to P-00015, please, page 2, Madam Clerk, page 2. Thank you.

So this is an exhibit that we looked at with Grant Thornton, and they did the combination of various capex sensitivities and fuel sensitivities. And I understand that would've been – they would've been relying on what you've already said to us, that there's a linear relationship here, and they would've been relying on that linear relationship. They knew to do the things that you have just described to us to do, and this is the result that they came up with.

Have you had a chance to review that, Mr. Warren?

**MR. WARREN:** Yes.

**MS. O'BRIEN:** And are you generally satisfied that the results as presented by Grant Thornton are accurate?

**MR. WARREN:** Yes. I didn't have the opportunity to run the scenarios for the plus 50 or the plus 75 capital costs.

**MS. O'BRIEN:** Okay.

**MR. WARREN:** But for all the other scenarios we were able to recalculate and take that in.

**MS. O'BRIEN:** And the ones you weren't able to verify, it's because you didn't verify them, not because – it's not that you verified them and you found them to be wrong, you just didn't get a chance to verify them yet?

**MR. WARREN:** Correct.

**MS. O'BRIEN:** Okay.

So, this is showing like, I believe, what we have here is the base case, which was this one as was pointed out by Mr. Malamed. And so in – of the other cases run, we have six cases where essentially the two options break even and 18 cases where the Isolated Island remains the highest, like it is in the base case, and 10 cases – sorry, where the Isolated – yeah, 10 cases where the Infeed actually is higher than the Isolated. Is that a fair summary?

**MR. WARREN:** At a high level, yes. I wouldn't have –

**MS. O'BRIEN:** Okay.

**MR. WARREN:** – calculated those numbers but –

**MS. O'BRIEN:** Okay.

**MR. WARREN:** – I trust you.

**MS. O'BRIEN:** Thank you.

Now, if we could go back please to P-00121, page 189. So a little further down, this is – we're in the DG3 deliverables again, and a little further down here, as I pointed out earlier, there was some additional requirements for DG3 Gatekeeper requirements, which would've included those ones for House of Assembly required above, and then some additional ones here.

And number 3 on this list is: additional sensitivities – loss of Island, industrial, Maritime Link, additional Labrador load. So these would be some load sensitivities, I take it. That the –

**MR. WARREN:** Yes.

**MS. O'BRIEN:** Okay. And we did see at DG2, there was a number of load sensitivities run, like what would happen if we varied the load. And as Grant Thornton noted in their report, there was – they didn't find any load sensitivities run at DG3.

Were any load sensitivities – and I guess Mr. Moulton this might be for you – were any sensitivities on the load run for DG3?

**MR. MOULTON:** To my knowledge there weren't. And I went back and checked through all my files, checked through emails, and I could not find any evidence that any load sensitivities were run for DG3.

**MS. O'BRIEN:** Okay.

And, Mr. Warren, I just wanna make clear. I understand that you – in Investment Evaluation, you could actually run sensitivities on fuel, and capex and interest rates, but you – am I right – you could not run sensitivities on load. Is that correct?

**MR. WARREN:** To run the sensitivities, you'd have to have Mr. Moulton run it through Strategist.

**MR. MOULTON:** That's correct.

**MS. O'BRIEN:** You know, with respect to that point, Mr. Moulton, I just wanna – you know, we have talked about a 50-year load forecast and that is a very long period over which to do a load forecast. And the evidence, that I understood, as

it came out yesterday that Manitoba Hydro considered even, like, a 1 per cent variation in your forecast to the actual is considered acceptable in the world of forecasting. Is that right?

**MR. STRATTON:** That's the – what they expressed as being a – I guess, the standard, yes.

**MS. O'BRIEN:** So in any given year. So if you multiply that effect over 50 years – I mean, your load forecast, you could still be within Manitoba Hydro International's acceptable range and, you know, 1 per cent a year over 50 years, worst-case scenario, you could be off by 50 per cent. I know that's the extreme and worst case, but that's what it amounts to, isn't it?

**MR. STRATTON:** Well, if you do this – if you just do that math, yes. But it doesn't – I guess it doesn't necessarily mean that your forecast is wrong.

**MS. O'BRIEN:** No –

**MR. STRATTON:** Yeah.

**MS. O'BRIEN:** – I understand that.

But given the fact that your – you know, that forecasts are known to be, you know, there – even good forecasts have variability and a tolerance that's acceptable. And given that the effect of that variability is magnified the more years you're forecasting over, does, you know, anyone on the panel have an answer as to why the load sensitivities would not have been run before the decision was taken to sanction the project?

**MR. MOULTON:** No, I don't.

**MS. O'BRIEN:** Okay. Mr. Stratton?

**MR. STRATTON:** No, I don't know the answer to that question.

**MS. O'BRIEN:** And Mr. Warren?

**MR. WARREN:** I don't know.

**MS. O'BRIEN:** Okay.

Just have one of – just a few more questions. Grant Thornton, P-00014, please, Madam Clerk, page 24.

I just wanna talk to you both – or to the panel on these two numbers here – whoops – this number here and this number here. So this is a table that Grant Thornton has taken and put in the report and – but it actually came from a package to the board of directors of Nalcor Energy in November 2010, so this was just prior to the DG2 – the Gate 2, I believe. And there is a CPW calculation that has been done for inputs from Hydro-Québec and then from imports for – from the New England ISO, via the Maritime Link.

Does anyone on the panel: Can you speak to how this CPW was calculated for these two options?

**MR. WARREN:** In preparation for today, I tried to go through former models and all – and documentation with respect to this. My understanding from going through that documentation, this – so the imports from via Hydro-Québec, the initial set up was to use the information that we had in the Infeed scenario and remove the Muskrat Falls generation costs and then to layer on a cost of the energy that was required based on market price forecasts that we had through the PIRA forecasting service that we had and it was – the end result was that 11,559.

**MS. O'BRIEN:** Okay.

And would it be a similar answer for the New England coming through the Maritime Link?

**MR. WARREN:** Similar, other than we would've removed the Labrador-Island Transmission Link on top of the Muskrat Falls generation site and layered in the cost of the Maritime Link at that time – the estimates at that time and layered in the costs to get to source the energy from any ISO marketplace; again, using market-based pricing that we would've had from our forecast service.

**MS. O'BRIEN:** Okay.

And, of course, both these options – when we just look at the CPW, both of these options are financially more attractive on the CPW number

than is the Isolated Island Option. The difference here – whereas the difference between Muskrat Falls and the Isolated Island at DG2 was the 2.1 billion, the difference between the Muskrat Falls and Hydro-Québec was 1.5 billion and over here with New England the difference was 1.6 billion.

Do you know why more work wasn't done or do – does anyone on the panel have information as to why these latter two options – imports from Hydro-Québec and New England – were eliminated by Nalcor prior to doing – going through DG2?

**MR. WARREN:** So again, I wouldn't have made the ultimate decision, but having reviewed the presentation from which this was excerpted, my understanding is it's based on the risk profile and the reliability; I guess, the other lines therein.

**MS. O'BRIEN:** Okay, so the reliability of supply from those sources.

**MR. WARREN:** Yeah, and I think further documentation would be in the Exhibit P-00077, during – which is Nalcor submission to the PUB in advance of the DG2 process.

**MS. O'BRIEN:** Okay.

**MR. WARREN:** I believe it's around page 100, red page 100, I think is where we start talking about import options.

**MS. O'BRIEN:** Okay. Thank you, that's helpful.

And one final question from me. It's been pointed out that the CPWs for Gull Island and Muskrat Falls were the same at DG2. Is that an error? Or can you explain why that's the case?

**MR. WARREN:** I think we just used it as the base. We knew it was going to be higher cost to build the Gull Island, but based on the amount of energy that you'd have to either spill or monetize, it – the additional cost wouldn't have factored in for the supply. It would've been just further cost that instead of updating all the capital cost and associated information there, we just said: Okay, well, at a minimum, let's just leave it flat to that.



**MS. O'BRIEN:** Okay. Thank you.

**MR. WARREN:** Just as a follow-up, on the Isolated Island, I guess, one of the – earlier question was the imports, the two import options were lower than the Isolated Island. I think you'd have to, kind of, look at, kind of, the – I believe the – my understanding at that time was the Isolated Island – we were trying to – through Mr. Moulton's process – was to optimize what was the least-cost option available without any interconnection. The imports via HQ or NEISO would've been an Interconnected. So one way to look at it is: What is your least-cost Interconnected Option? And that would've been Muskrat Falls, as well, right – the 10,114.

**MS. O'BRIEN:** Okay. Thank you.

Those are my questions for you gentlemen. Thank you very much.

Other counsel will have questions, as may the Commissioner.

Thank you.

**MR. WARREN:** Thank you.

**THE COMMISSIONER:** All right.

Government of Newfoundland and Labrador.

**MR. RALPH:** No questions.

**THE COMMISSIONER:** Concerned Citizens Coalition.

**UNIDENTIFIED MALE SPEAKER:** Want some water?

**MR. BUDDEN:** I'm good thanks.

Good day, gentlemen. My name is Geoff Budden, I'm the lawyer for the Concerned Citizens Coalition which, as you may know, basically was recently incorporated by a number of individuals who for some years have been following and critiquing the Muskrat Falls Project.

I'd like to start just by asking each of you – perhaps I'll start with Mr. Stratton – what you did to prepare for your testimony here today,

what you reviewed, who you met with and so forth.

**MR. STRATTON:** So as part of my preparation, I would have reviewed most, if not all, the work that I had done leading in to the work that was required at DG2 and DG3.

In terms of meeting, do you mean Commission staff or –?

**MR. BUDDEN:** Well, that would be – I would assume you've met with Commission staff.

**MR. STRATTON:** Yes.

**MR. BUDDEN:** Who within Nalcor might you have met with?

**MR. STRATTON:** Nobody.

**MR. BUDDEN:** Okay.

And who is your immediate supervisor, Mr. Stratton?

**MR. STRATTON:** Presently?

**MR. BUDDEN:** Yes.

**MR. STRATTON:** That would be Mr. Moulton.

**MR. BUDDEN:** Mr. Moulton.

Okay. Well, next Mr. Moulton, the same question. Other than Commission staff, who might you have met with to prepare for your testimony? What may you have done?

**MR. MOULTON:** Well, I met with Commission staff; met with Grant Thornton staff because, in essence, supplying information to Grant Thornton was again part of reviewing all of my work. It was a review and preparation for that. And met with our legal counsel. And within Nalcor it would have been mainly myself and Mr. Stratton. I don't think anybody in particular within Nalcor.

**MR. BUDDEN:** Okay.

And by your legal counsel you mean Mr. Simmons?

**MR. MOULTON:** Mr. Simmons, yeah, and Ms. Martin, yes.

**MR. BUDDEN:** Okay, thank you.

And, Mr. Warren, the same questions.

**MR. WARREN:** Very similar; just reviewed emails, documentation, our counsel. I would have spoke with some of my colleagues throughout the process, including my direct supervisor, Derrick Sturge, who is the chief financial officer, just on trying to get recollection of various points in time.

**MR. BUDDEN:** Okay.

And I forgot to ask you, Mr. Moulton, who is your direct supervisor?

**MR. MOULTON:** My direct supervisor currently is Ron LeBlanc, the vice president of transmission and distribution and NLSO. During the time of this, my direct supervisor, and also Mr. Stratton's direct supervisor, was Mr. Humphries, manager of system planning.

**MR. BUDDEN:** Paul –

**MR. MOULTON:** Paul Humphries.

**MR. BUDDEN:** Paul Humphries?

**MR. MOULTON:** Yes, that's correct.

**MR. BUDDEN:** Thank you. Okay.

Mr. Stratton, most of the next round of questions will be mostly directed at you; though, if the other individuals feel that they can answer it and you can't, I don't have a concern about that.

Perhaps we could turn to Exhibit P-00014, which is a Grant Thornton report, to page 35. And we've discussed it, but I just would like to return to further down that page from line 21. Perhaps you could review that, perhaps even read it out loud, just the rest of that page and the first two lines of the next page.

That'd be you, Mr. Stratton. Or, since it's harder for you to read, perhaps Mr. Warren can read.

**MR. WARREN:** "The load forecast was prepared by Nalcor's Senior Market Analyst. According to the Senior Market Analyst *'there is no official QC process, except that it's (I guess) the process is you are forecasting performance.... There is no formal process of saying yes that forecast is a good forecast or that forecast is approved.'*"

**MR. BUDDEN:** And continue for the rest of that page, please.

**MR. WARREN:** Sorry.

"Nalcor's Manager of System Planning indicated the following regarding his review of the load forecast: *'I would review it but I mean I'm not a load forecaster. There would have to be something grossly wrong with it for me to you know. We put faith in people that we have there. The methodologies that we use have been reviewed by people that know – and accept it as being reasonable. If I had to sit down and do a load forecast – no, I wouldn't know where to start.'*

"During our audit, we asked Nalcor to describe the internal review process of the load forecast conducted. The following response was provided by Nalcor:

*"The development and completion of long term planning load forecasts resided within the System Planning Department's Market Analysis Section at the time of completion of the 2010 Planning Load Forecast (PLF) and the 2012 PLF... As such, there was no formal review and acceptance of the load forecast but instead, an open communication and discussion of load forecast results between the analysts involved."*

**MR. BUDDEN:** Okay, thanks.

Just to scroll back, perhaps, Madam Clerk; the senior market analyst, Mr. Stratton, that would have been? Who would that have been, the senior market analyst?

**MR. STRATTON:** Yes, that would have been me, yes.

**MR. BUDDEN:** That would have been you, of course. And we've already heard that Mr. Goudie, I believe, or was it Mr. Humphries, was

the manager of system planning. Mr. Humphries wasn't it?

**MR. STRATTON:** Mr. Humphries would have been the manager of system planning and Mr. Goudie was the manager of economic analysis that – within the investment evaluation department.

**MR. BUDDEN:** Okay, fair enough.

The reference there, which we've already discussed, to the Nalcor's critique about the lack of quality control and review, I guess firstly, what does – what do you take that as meaning, quality – not the lack of, but what do you – what does quality control and review mean to you in this circumstance?

**MR. STRATTON:** Well, to me it would probably mean that there's no review of the load forecast by other personnel.

**MR. BUDDEN:** Okay.

And you have testified, if I understand you correctly, and I – if I miss a detail here don't hesitate to correct me. I don't want you to – to put words in your mouth, but you did discuss your findings with Mr. Goudie. Is that correct?

**MR. STRATTON:** So –

**MR. BUDDEN:** Your load forecast process –

**MR. STRATTON:** Yes.

**MR. BUDDEN:** – and findings.

**MR. STRATTON:** Yeah. So Mr. Goudie and myself, we – given that Mr. Goudie came from the load forecasting background, he was the manager for many years and he would have mentored me when I first started there. So I guess it was an informal process, but Mr. Goudie had the knowledge and expertise to look at the outputs and the inputs going into our load forecast and was able to detect if anything was out of the norm or something didn't look right to him.

**MR. BUDDEN:** Okay.

**MR. STRATTON:** So –

**MR. BUDDEN:** Was any other input sought or given from anybody other than Mr. Goudie into your load forecast?

**MR. STRATTON:** In terms of the inputs, the – well he – all the inputs and the outputs would have been reviewed by MHI. The personnel that they had to review that forecast came from a load forecasting background with many years' experience. So he would have reviewed all our data, all our models, and the outputs and the assumptions going into those forecasts.

**MR. BUDDEN:** Okay.

Did your load review forecast go through multiple drafts?

**MR. STRATTON:** Well, there – the process of load forecasting involves starting with an updated economic forecast and an updated price – or energy price forecast. So you run that through and check all your data, obviously, and you wouldn't know – you'd only rerun as part of the iterative process of doing the supply plan and then the load forecast.

**MR. BUDDEN:** Sure.

**MR. STRATTON:** Yeah.

**MR. BUDDEN:** I'm thinking of something a little different. I'm thinking – by drafts, I'm thinking, did you have what you regarded as a completed load forecast and as a result of input from anybody else with respect to perhaps some of the variables used, reworked it to produce a further draft.

**MR. STRATTON:** There certainly would have been discussions about the assumptions going in and factors about the forecast; I would have had discussions with Mr. Goudie about that before I even started. But in terms – I don't know if I would have run numbers and then changed it based on discussion. I don't recall doing that.

**MR. BUDDEN:** Okay.

Do you preserve working copies of your load forecasts, your working papers, you know, the materials that you would have used to generate the ultimate forecast?

**MR. STRATTON:** Generally all – well, not all forecasts are – that are run are saved, but the majority would be, yes.

**MR. BUDDEN:** Okay.

**MR. STRATTON:** Right?

**MR. BUDDEN:** So if – so you, presumably, would still have those working papers?

**MR. STRATTON:** Oh yes.

**MR. BUDDEN:** Okay. Thank you.

My understanding is you went to work with Hydro in 1989 and you took specific load forecasting courses down in the States in the early '90s. Did I get that right?

**MR. STRATTON:** That's correct, yeah.

**MR. BUDDEN:** Okay and what were the courses you did?

**MR. STRATTON:** I don't remember the details of the actual details because there's different aspects and types of forecasting that one can avail of. I know it was an EPRI-sponsored event.

**MR. BUDDEN:** Sorry.

**MR. STRATTON:** An EPRI –

**MR. BUDDEN:** Right, yeah.

**MR. STRATTON:** – I forget the name. And it would have been in relation to forecasting. Yeah and other than that, I – it's been a long time.

**MR. BUDDEN:** Of course, yeah.

And have you done refresher courses or workshops, seminars, gone away for additional training in the 25 years or so since you completed those courses?

**MR. STRATTON:** Well, the methodologies that I've been using are the same methodologies that I've been using across the period, so I'm not sure if – I wouldn't consider that to be necessarily relevant.

**MR. BUDDEN:** Okay.

Perhaps we could have Exhibit P-00125, page 25, which is the handy sort of graphic we were looking at earlier. Okay, the graphic that I'm thinking of, I think it's a little further down the page.

**MS. O'BRIEN:** Mr. Budden, I may be able to help you. Which graphic is it that you're looking for?

**MR. BUDDEN:** It's one, there's a series of bubbles on it.

**MS. O'BRIEN:** Yes, thank you.

Madam Clerk, if you could please go to P-00135, page 25.

**MR. BUDDEN:** Okay.

**MS. O'BRIEN:** Oh, this is the one you want, sorry.

**MR. BUDDEN:** Sorry, that wasn't, actually.

**MS. O'BRIEN:** Yeah. Were you looking to show the components of a load?

**MR. BUDDEN:** That's correct.

**MS. O'BRIEN:** Yes.

**MR. BUDDEN:** Yes, that's the one.

**MS. O'BRIEN:** Yes, there we go.

**MR. BUDDEN:** Thanks.

The – in that particular instance the – you ran through the components and I think I got housing starts, personal disposable income and a few others. Can you just tell me again what those are?

**MR. STRATTON:** So the main drivers of that – of the domestic forecast would be the number of housing starts, which drives your customers. And for the average consumption levels it would be personal disposable income, income levels, and then price levels, including the price level of electricity.

And it wouldn't be in the – the price of oil wouldn't be a regression but it's used to determine the actual forecasted load.

**MR. BUDDEN:** Okay, sure.

And the theory there being if the price of oil goes up or goes down, that will impact on the electricity –

**MR. STRATTON:** It's –

**MR. BUDDEN:** – load forecast.

**MR. STRATTON:** It's relative prices, that's correct, that determine people's preference for using electric heat or having a preference for some other.

**MR. BUDDEN:** Okay.

I understood under – if I understood you correctly there were four – the industrial load there really consists of four specific plants. That would be correct, would it not?

**MR. STRATTON:** That's correct.

**MR. BUDDEN:** And, again, could you just run through those for us?

**MR. STRATTON:** Okay, so the largest load on the Island within the forecast would've been Kruger in –

**MR. BUDDEN:** In Corner Brook.

**MR. STRATTON:** – Corner Brook, followed by Vale at the Long Harbour processing plant, followed by North Atlantic refining's oil refinery and the smallest load element would've been the Praxair –

**MR. BUDDEN:** Okay.

**MR. STRATTON:** – oxygen-producing plant.

**MR. BUDDEN:** And I'm jumping ahead a little bit but I understand, and correct me again if I'm wrong, when you were doing your 50-year load forecast, am I correct in that you assumed that these four industrial users would continue to exist throughout that period of time; none would

drop out and none would be added. Am I correct on that?

**MR. STRATTON:** So we kept the loads the same. We didn't increase industrial load or we didn't decrease industrial load.

**MR. BUDDEN:** When you say increase or decrease, do you mean relative to utility load or do you mean in some absolute sense?

**MR. STRATTON:** Well, whatever – the industrial forecasts were – once the Vale load reached its peak requirement, then that was flattened and then they were all flat. They didn't change. They didn't change through time. So that amount of load was just carried through to the end of the 50 years.

**MR. BUDDEN:** Okay.

**MR. STRATTON:** Mmm.

**MR. BUDDEN:** And you didn't do that because you had any special knowledge or confidence that these four facilities would continue unchanged over that period of time or that others would or wouldn't be added, you just did it because that was all you could do, given the information available to you?

**MR. STRATTON:** I think that's a fair assessment.

**MR. BUDDEN:** Okay.

The – when you're talking about your forecast are you talking in terms of peak-use forecast or forecast in some sort of annualized basis, or is that a relevant factor at all in this discussion?

**MR. STRATTON:** So there's two elements coming out of the forecast: one is the energy requirements and the second requirement would be the demand – the peak-demand requirements.

**MR. BUDDEN:** Right, yes.

**MR. STRATTON:** Yes.

**MR. BUDDEN:** And the theory being that you need to have enough energy there for that cold supertime in February, whatever the case might be.

**MR. STRATTON:** You had to have – well, Mr. Moulton can speak to this a bit better than me, but you had to have – ensure that you had enough capacity to meet peak-demand requirements.

**MR. BUDDEN:** Okay.

The assumptions you made and the information, I guess, you put into this, to what degree, if at all, did you consult with any of the experts at Newfoundland and Labrador Power? Is that something you would ordinarily do as part of your forecasting exercise?

**MR. STRATTON:** There was a relationship between myself and my counterpart at Newfoundland Power. And we would discuss – well, we would share our forecasts for their service territory; it wouldn't be every year but on occasion, and sometimes when they requested it. And we would generally ask them for their forecasts. Actually, we – and, actually, as part of another forecasting exercise, called our operating load forecast exercise, they would have to – they would provide their load forecast which was for – but it was for a period of five years. So we were always – we could always see that their forecasted energy requirements were –

**MR. BUDDEN:** Okay.

**MR. STRATTON:** – based on their load forecast model and their assumptions.

**MR. BUDDEN:** Okay, so that wasn't, I assume, a formalized process; it was just two guys who knew each other, worked together, would speak to each other to get comfort in their own predictions?

**MR. STRATTON:** We would –

**MR. BUDDEN:** Or was it more formalized?

**MR. STRATTON:** We would have discussions to talk about how their assumptions were different than our assumptions feeding into the forecast, because we were relying on economic forecasts from the provincial government and Newfoundland Power's forecast was relying on forecasts from the Conference Board of Canada. So myself and my – the Newfoundland Power counterpart would discuss if there were

differences in our loads and try to understand how those – why those differences – why they were there.

**MR. BUDDEN:** Okay, that might be a good time – perhaps we could turn to – back to Exhibit P-00014 and page 34 I believe it is.

I note there, if we look at line 10 and 11 on that exhibit – perhaps you could just read those? They're short, so it might be as well to read those out loud.

**MR. STRATTON:** The Conference Board of Canada, the CBOC, "projected housing starts during 2027 to 2031 from" 827 – or "826 to 530 units (36% decrease) respectively, while Nalcor has projected 1,505 to 1,230 units (18% decrease) respectively."

**MR. BUDDEN:** Okay, that's quite a significant difference, you would agree, Mr. Stratton?

**MR. STRATTON:** It is a significant difference in those forecasts.

**MR. BUDDEN:** Yes, I mean, I know, in particular, the gross housing starts is down – in the CBOC model, it's talking 530 units, while you guys, based on the GNL figures, were projecting well over twice that, two and a half times that, really.

**MR. STRATTON:** So it wouldn't have been uncommon to see how low our housing starts from a Conference Board of Canada forecast compared to the Newfoundland Government forecast. And I would've had conversations with my counterpart at Newfoundland Power on that exact issue over the years.

And we were always – again, I shouldn't speak for him – but we would've been troubled and wondered why those numbers went so low, because they weren't consistent with the economic forecasts that we were using.

**MR. BUDDEN:** Okay –

**MR. STRATTON:** Or the government forecasts.

**MR. BUDDEN:** Okay, and you're a trained economist. You obviously know the Conference

Board of Canada. You know what it is as an agency and its reputation.

**MR. STRATTON:** Yes, I do.

**MR. BUDDEN:** So you don't regard that as low-quality information?

**MR. STRATTON:** It would – I wasn't in – I didn't have knowledge of what all the inputs were for the forecast. We had confidence in – more confidence in the Government of Newfoundland and Labrador forecast.

And the reason, which I mentioned this morning – we started with them in the '90s, and when the government was putting in – or investing a lot of time and energy and money into developing a good macroeconomic forecast, they had people working for them that were very knowledgeable. And I guess the confidence factor came from the fact that the people doing the forecast within the province were here. They lived in the Newfoundland economy. They were grounded here. They knew what was happening in the economy.

**MR. BUDDEN:** Well, that's –

**MR. STRATTON:** And my –

**MR. BUDDEN:** Sorry. Go ahead. I'm sorry.

**MR. STRATTON:** Sorry. And my – I guess my view of it – the Conference Board of Canada is that I didn't have the same level of confidence in their forecast because the provincial forecast coming out of the Conference Board of Canada would've been a forecast that was part of a broader Canadian forecast, okay?

**MR. BUDDEN:** Though I would take issue with that, Mr. Stratton. This is a specific forecast for housing starts in Newfoundland, I presume.

**MR. STRATTON:** It is, but I guess my point is that the Conference Board is a mainland forecasting service, and they're not grounded here in Newfoundland, so that to me was, I guess, a confidence issue.

**MR. BUDDEN:** Your colleague at Newfoundland Light and Power thought otherwise, though.

**MR. STRATTON:** I don't believe that that he was able to partake of the government forecasts.

**MR. BUDDEN:** Okay.

**MR. STRATTON:** Yeah.

**MR. BUDDEN:** So I won't beat the point to death, but I guess what I'm saying is you were aware that your major customer was using other data for at least one of the significant variables, but yet, you were relying on the GNL data.

**MR. STRATTON:** So we would've always compared our forecast and at least across the medium term, which Newfoundland Power were doing, which was a five-year forecast. Over the history, our forecasts were never materially different. There were always differences, obviously, but they were never significantly different.

**MR. BUDDEN:** Okay.

**MR. STRATTON:** And I believe at the time of DG2 and DG3, their forecasts were actually somewhat higher than ours.

**MR. BUDDEN:** You would, however, acknowledge that that clearly is a material difference, those housing starts?

**MR. STRATTON:** It is a different forecast, I agree.

**MR. BUDDEN:** And a material difference in forecasting?

**MR. STRATTON:** It is a material difference in the forecast, yes.

**MR. BUDDEN:** Okay.

So housing starts is one you would acknowledge is a very important factor in determining future – a future load forecast?

**MR. STRATTON:** The housing start forecast determines how many – the cut – the amount of customers in the province.

**MR. BUDDEN:** Okay.

**MR. STRATTON:** Yes.

**MR. BUDDEN:** The other factors which you use – the next paragraph there, which is 12 to 14, discuss one of those. Again, we have CBOC figures, and looking at those, would you acknowledge that's, again, a fairly substantial difference between the two forecasts – the two projections?

**MR. STRATTON:** Can you just repeat the question, please?

**MR. BUDDEN:** Course. If we go to lines 12 to 14, which immediately follow, there we're discussing the Conference Board of Canada figures for population increase, and Grant Thornton compares it to the GNL – or what they call the Nalcor figures, but which I presume are based on the GNL data which you've been provided with?

**MR. STRATTON:** Yes, we were relying on the GNL forecast of population, yes.

**MR. BUDDEN:** Okay. Were you, at the time you were completing this forecast, aware of this, you know, rather significant difference between what the Conference Board of Canada is projecting and what Newfoundland, Government of Newfoundland's in-house forecasters were predicting?

**MR. STRATTON:** I wouldn't have been aware of it, because we weren't subscribing to their service.

**MR. BUDDEN:** Okay. And that's yet another significant variation I guess it would be, you would agree?

**MR. STRATTON:** In terms of the load forecast, the population numbers are not – they're not significant in – they're not the driver of load, the overall population. They change the intensity of the average consumption levels, but they're not the driver of loads. It's the housing start forecast that drives the load.

**MR. BUDDEN:** Okay.

So of all the factors you considered, is housing starts the most significant for load forecast?

**MR. STRATTON:** It's not the most significant factor. The more significant factor would be the

energy prices which determine the actual market share of electric heat.

**MR. BUDDEN:** Okay.

**MR. STRATTON:** Because our –

**MR. BUDDEN:** Well –

**MR. STRATTON:** – our forecast is – our load is 50 per cent energy for heating.

**MR. BUDDEN:** The – did you consider in your – in this load forecasting, the wisdom of perhaps bundling a number of different data sources, the CBOC, the Newfoundland figures, perhaps others and perhaps coming out with an average that – as pollsters sometimes do. Is that a technique that had occurred to you as a good one going forward?

**MR. STRATTON:** I did not consider doing that because our confidence was in the Government of Newfoundland (inaudible).

**MR. BUDDEN:** Okay.

So essentially, you were going to live or die with the Government of Newfoundland figures?

**MR. STRATTON:** I believed it to be a more credible forecast –

**MR. BUDDEN:** Okay.

**MR. STRATTON:** – given the other assumptions.

**MR. BUDDEN:** Sure.

Did you at any point have feedback from any individual who was suggesting, look, the figures you are generating here are lower than we would expect or like; can you go back and have another crack at them? Did you get any feedback like that from anybody within your employer?

**MR. STRATTON:** No, nobody.

**MR. BUDDEN:** So this is your work product?

**MR. STRATTON:** It is entirely my work.

**MR. BUDDEN:** Okay.



The next questions I have are on the specific issue of attempting to do a 50-year forecast.

In your evidence to Ms. O'Brien, you – and I didn't write it down word for word, but I understood, this was not something that you were doing in the normal course of your work, this was specifically intended to generate numbers so as to be able to do a comparison of these two options: Interconnected versus Isolated.

**MR. STRATTON:** That's correct.

**MR. BUDDEN:** Okay.

**MR. STRATTON:** Yeah, (inaudible).

**MR. BUDDEN:** Had you ever had the need to do a 50-year forecast of this nature before, or have you done one since?

**MR. STRATTON:** I've not done one since that far, but I have extended my load forecast out to longer than the 20 years.

**MR. BUDDEN:** Okay. Who specifically requested of you, Mr. Stratton, that you do this 50-year, plus-year load forecast?

**MR. STRATTON:** So I'm not really certain. It would have either come from Mr. Humphries, who was my manager at that time, or it may have come from Investment Evaluation through Mr. Goudie.

**MR. BUDDEN:** Okay. Did you express any reservations or concerns that it might be impossible or, at least, unlikely to be accurate or predictive to attempt a 50-year load forecast?

**MR. STRATTON:** I don't recall expressing any concern. I completed a forecast of that time – of that length because I was asked to do it.

**MR. BUDDEN:** Okay.

**MR. STRATTON:** (Inaudible.)

**MR. BUDDEN:** I'm not asking if you refused to do –

**MR. STRATTON:** Yeah.

**MR. BUDDEN:** – the job assigned to you –

**MR. STRATTON:** Yeah.

**MR. BUDDEN:** – I'm just asking did you give feedback suggesting, look, what you're asking me to do here is getting quite speculative.

**MR. STRATTON:** I'm not certain if I would have made any sort of indication to people about the length of the forecast. It was a requirement of – it was a requirement to do.

**MR. BUDDEN:** Okay.

You, typically, in the course of your job, would be doing these load forecasts for briefer periods of time. I'm correct in that, aren't I?

**MR. STRATTON:** Sorry, can you repeat?

**MR. BUDDEN:** This would be a typical requirement of your job in line with your training and so forth to do load forecasts for briefer periods of time.

**MR. STRATTON:** For shorter periods of time? Yes.

**MR. BUDDEN:** Yeah.

**MR. STRATTON:** Yes.

**MR. BUDDEN:** Fair enough.

You – if I understand this correctly – you did a load forecast in the conventional way up to the 20-year mark. Am I right so far?

**MR. STRATTON:** That's correct.

**MR. BUDDEN:** What did you do after the 20-year mark?

**MR. STRATTON:** So after the 20-year mark, we – well, I guess, the first thing was that we wanted to present what we believed or what we considered to be a conservative load forecast beyond the 20 years that was driven by the macro-economic forecast. So at DG3, we estimated what the remaining electric heating load that would exist in the system and then we established what a low growth of load would be

for the province. And we based that on the historical data from –

**MR. BUDDEN:** You based –

**MR. STRATTON:** – the 1990s.

**MR. BUDDEN:** I'm sorry, you based it on ...?

**MR. STRATTON:** We based that on the load growth that occurred in the 1990s after the cod moratorium, which was the lowest point of growth in the province at that time.

**MR. BUDDEN:** Okay.

**MR. STRATTON:** So that's – so what we did is we added two factors. We added a – essentially, we added a heating load, and once that heating load was saturated and fully subscribed to, then the growth rate only reflected a modest amount of load growth that was – assuming that the economy would continue to grow.

**MR. BUDDEN:** So you basically assumed, look, things in Newfoundland can't get any worse than they were in the 90s in terms of the economic growth?

**MR. STRATTON:** That would have been the implicit assumption, yes.

**MR. BUDDEN:** Okay. Hopefully you're right.

A couple of things here I want to talk about, but one of them is the saturation point you spoke about using the – and if I understood you correctly, you researched and you thought Quebec was the appropriate comparison to use. Am I right so far?

**MR. STRATTON:** I did, I believed it was a reasonable benchmark –

**MR. BUDDEN:** Okay.

**MR. STRATTON:** – for the saturation of electric heat.

**MR. BUDDEN:** You would concede, however, that Quebec is in a very different power circumstance than is Newfoundland for the average consumer?

**MR. STRATTON:** So, the use of that statistic was based on the view that so long as oil – or so long as electricity prices were competitive with oil, which the data supported that, and based on the continual and increasing penetration of electric heat in the province, that there was no reason for that to discontinue.

**MR. BUDDEN:** But within that there would be an assumption, if I'm not correct, that the price relationship between electricity and furnace oil in Newfoundland would be similar to that relationship in the Province of Quebec?

**MR. STRATTON:** No, it had no bearing on the energy prices in Quebec, it –

**MR. BUDDEN:** You sure?

**MR. STRATTON:** What – well, yes, because it was demonstrated by our high saturation rate that we were – 95 per cent of new customers were installing electric heat, which was higher than our saturation rate at the end of the period, and the relative price of electricity to furnace oil was only improving in the longer run.

**MR. BUDDEN:** Was only –

**MR. STRATTON:** Was improving. So, the competitiveness of electricity was improving. It wasn't getting any – it was getting worse, it was getting better.

**MR. BUDDEN:** Okay.

**MR. STRATTON:** So, therefore, that was the rationale. So long as the oil prices are going to remain high and electricity prices were going to reflect the forecast that we had, there would not have been much incentive for people to stay on oil.

**MR. BUDDEN:** Okay.

**MR. STRATTON:** They would have chosen to go to electric heat.

**MR. BUDDEN:** Okay.

The – I take it that if you had had the data available from PIRA or the other forecasting agencies you would have used that to go straight

out to the 56-year mark. I'm correct on that, I assume.

**MR. STRATTON:** Yes, I would have, yes.

**MR. BUDDEN:** Okay, so –

**MR. STRATTON:** If I had been able to have access to an extended forecast from another consultant, yes, it would've been considered. Yes.

**MR. BUDDEN:** Okay. And – but the fact is, however, that PIRA, for example, and similar agencies really don't attempt to forecast beyond, in that case, 20 years.

**MR. STRATTON:** At that time, I believe, PIRA was preparing 20-year forecasts.

**MR. BUDDEN:** And nothing longer than that?

**MR. STRATTON:** At that point, I don't think they were. But I'm not 100 per cent sure, it may have been, like it could've been 25 years or – but they weren't doing a 60-year forecast, of course, no.

**MR. BUDDEN:** Sure. So you were trying to do – and again I'm sure it wasn't easy, but you were tasked with preparing a forecast that went almost three times as long as the major forecaster for oil, which was one of the major components of what you're trying to forecast.

**MR. STRATTON:** So we – as I discussed this morning – we took a view that there would not be any change. It was a *ceteris paribus* price forecast of oil beyond the PIRA forecast.

**MR. BUDDEN:** Okay. So you basically went as far as PIRA dared go and then you assumed there'd be no change for 46 – 36 years after that?

**MR. STRATTON:** That's correct.

**MR. BUDDEN:** Okay.

How confident are you in the load forecasting for, say, 2050?

**MR. STRATTON:** I would not – I wouldn't hazard to guess what the probability of that is.

**MR. BUDDEN:** Okay.

**MR. STRATTON:** But what I would state is that it was – the load forecast was predicated on the macroeconomic assumptions at that time.

**MR. BUDDEN:** Yes.

**MR. STRATTON:** That was forecast on the basis of high oil prices. And our – and the Newfoundland economy reflected those assumptions. And beyond the 20-year forecast, based on the macro forecast, we considered that our projection beyond that was conservative.

**MR. BUDDEN:** Okay.

Of course, in the '90s you had economic growth being what it is, but population growth in the '90s may be very different than it will be in the 2030s, for example. You would acknowledge that?

**MR. STRATTON:** Population projections change, yes, through time.

**MR. BUDDEN:** Yes, of course.

**MR. STRATTON:** Yes

**MR. BUDDEN:** Yeah.

You just said you weren't able to do a – I guess, if I understood you correctly, a probability – attach a probability to your forecast. Are there any – can you attach any kind of – can you support that forecast in any way; give a plus-minus, any other statistical characterization of it?

**MR. STRATTON:** I'm not aware that any load forecast would have that sort of statistic associated with it.

**MR. BUDDEN:** Okay.

**MR. STRATTON:** At least I've never – I've never read about a forecast having an assigned probability to it. Not – not in those regards – not with respect to different economic assumptions.

**MR. BUDDEN:** Sure.

**MR. STRATTON:** 'Cause I don't – I'm not – I've never – I don't know how one would do that.

**MR. BUDDEN:** Okay.

The – so what you – the load forecast you ultimately signed off on, anticipated, if I understand you correctly, that the consumption in 56 years will be roughly half again what it is now. Am I correct on that?

**MR. STRATTON:** I don't have the numbers in front of me, but I'll –

**MR. BUDDEN:** What, if any, consideration did you give to technological advances that may occur in the 2030s or 2040s?

**MR. STRATTON:** So we had a technological variable in our models that would have been projected to the end of the period – the 20-year forecast period.

**MR. BUDDEN:** Yes.

**MR. STRATTON:** And – there would not have been a factor beyond that applied, because we were taking – we were just – we were – the load forecast extension was just – was a high level load forecast. So we weren't taking into account how – a whole host of factors. We were looking at what the worst-case historical load growth was and applying it.

**MR. BUDDEN:** So if I understand you correctly – and I may not, but if I understand you correctly you had a variable that I assume is built into the program, or it was fed into the program, that accounted for technological evolution over the next – or the 20 years from when this was done.

**MR. STRATTON:** That's correct.

**MR. BUDDEN:** And what happened after that, to that technological variable?

**MR. STRATTON:** Well, the model – we weren't modelling with our econometric model out past 20 years.

**MR. BUDDEN:** Okay.

**MR. STRATTON:** We were just doing algebra and adding amount of load to the forecast.

**MR. BUDDEN:** So that – does that assume a technological – that that variable continues to the end of the period or only that continues for 20 years and then, it's just extrapolated from there?

**MR. STRATTON:** I think it would assume that everything was constant at that point.

**MR. BUDDEN:** Okay, so just a pure exercise of extrapolation. Okay.

Did – was any particular consideration given to, perhaps, the impact of global warming?

**MR. STRATTON:** I believe there was.

**MR. BUDDEN:** How?

**MR. STRATTON:** Well we have a variable in our model that accounts for heating degree days.

**MR. BUDDEN:** For –?

**MR. STRATTON:** Heating degree days?

**MR. BUDDEN:** Okay.

**MR. STRATTON:** Which is – it explains the – it's one of the (inaudible), explains change in your load due to weather change.

**MR. BUDDEN:** Okay.

**MR. STRATTON:** Okay? So I – I'm not a hundred per cent certain on this, but I know at some point we projected those heating degree days to decline through time –

**MR. BUDDEN:** Okay.

**MR. STRATTON:** – because of global warming.

**MR. BUDDEN:** So are you saying here – and you know, this is a very serious matter we're trying to figure out here – that the forecasting model that you employed does factor in the impact of global warming, or that you think it may but you're not sure?

**MR. STRATTON:** I don't know if I – if it was included at DG2 and DG3, but at this point I would have to go back and check my models.

**MR. BUDDEN:** Okay.

What in your mind, as a professional forecaster – how would you distinguish forecasting on the one hand from speculating or guessing on the other hand?

**MR. STRATTON:** I would consider forecasting to be a person takes all his knowledge that he has acquired and he applies that to the best of his ability in his work.

**MR. BUDDEN:** Fair enough.

If I were asking you to give a forecast for a hundred years out, would you attempt to do that? Do you think it could be done?

**MR. STRATTON:** A forecast can be done.

**MR. BUDDEN:** Okay.

**MR. STRATTON:** Yeah.

**MR. BUDDEN:** Do you think a reliable forecast could be made for the energy consumption of Newfoundland for a hundred years from now?

**MR. STRATTON:** I think one can do a forecast of it.

**MR. BUDDEN:** Okay. A reliable forecast?

**MR. STRATTON:** I wouldn't comment on whether it's reliable or not.

**MR. BUDDEN:** Okay. But you do believe that you have produced a reliable load forecast; that is reliable, and should be relied on by the government and people of Newfoundland through 2069 or thereabouts.

**MR. STRATTON:** I believe what I prepared was a forecast based on the economic assumptions and the energy prices that were forecast at that time. And that I – that the – my – the extension to that forecast from all my experiences was that that would have been a conservative forecast.

**MR. BUDDEN:** So you believe it to be reliable?

**MR. STRATTON:** For the purposes of the analysis, I believe it was the right forecast.

**MR. BUDDEN:** Okay.

You've indicated that price elasticity did factor into your forecast for domestic users; I'm right in that, aren't I.

**MR. STRATTON:** That's correct, yeah.

**MR. BUDDEN:** But not for industrial users?

**MR. STRATTON:** No, we would – there was no adjustment for price changes to the industrial class, no.

**MR. BUDDEN:** Okay, and if I understand you correctly for commercial users it wasn't a factor there either.

**MR. STRATTON:** It wasn't included in – for the commercial sector because we could never establish a statistically significant price factor for that group.

**MR. BUDDEN:** Okay. And I think your argument there – or not your argument, your evidence was that you could find no evidence that commercial use was elastic. You believe it to be inelastic.

**MR. STRATTON:** I do.

**MR. BUDDEN:** Okay.

Of course, if a business closed or simply decided not to open that wouldn't be reflected in an elasticity analysis of this sort, would it?

**MR. STRATTON:** I'm not sure I understand your question.

**MR. BUDDEN:** Okay it's not a major point. The process that you have used to include price elasticity in your analysis is that one that one would find in other utilities, or – how does it compare it to what other utilities use?

**MR. STRATTON:** I've never – I don't have a published set of elasticities for the utilities. I know I've done a great deal of reading on load

forecast that would have talked about elasticities and what I – my observation about price elasticities was that they could be higher or lower but, generally, in the short-run at least, they're inelastic.

**MR. BUDDEN:** Okay.

And in more technical terms we're talking about – and we're all agreed here that your model is – has built into it an acknowledgment that there's a price elasticity for domestic users. What particular variable or factor or price or data point did you use?

**MR. STRATTON:** Well, the regression relies on the historical electricity prices; actually, to be specific, it's the marginal electricity price. So it's the price for the last kilowatt hour purchased.

**MR. BUDDEN:** Okay.

So if the price went up by 10 per cent a kilowatt hour, how would that factor into your model? Can you discuss it in terms like that?

**MR. STRATTON:** Okay, so because there's a variable – a price variable in our equations, if the price went up by 10 per cent, that would affect the average use of the domestic customer. So if it was an increasing price, it would lower the consumption level and if it was a decreasing price, it would increase the average consumption level.

**UNIDENTIFIED MALE SPEAKER:** Good answer.

**MR. BUDDEN:** But it's not an absolute relationship, I assume. If the price goes 1 per cent, use doesn't drop 1 per cent; goes up 4 per cent, doesn't drop 4 per cent or anything like that.

**MR. STRATTON:** Right. No, so there's an estimate of the – or an elasticity estimate within – from our electricity price is – we have to evaluate it and that is 0.35, which means that a 1 per cent increase in price would lead to a 0.35 decrease in average energy use. That would be the short-term impact. The longer term impact would depend on how the relative prices between electricity and furnace oil –

**MR. BUDDEN:** Okay.

**MR. STRATTON:** – how it changes those.

**MR. BUDDEN:** Okay.

**MR. STRATTON:** And we've never ever estimated what those elasticity – impact of that was.

**MR. BUDDEN:** And you're talking about it in binary terms; you have electricity off the grid or you have furnace oil. Is anything else factored into your analysis?

**MR. STRATTON:** We were relying on furnace oil because it was the most likely substitute for electricity.

**MR. BUDDEN:** Okay.

And from 2011 or '12, when you did this, as far into the future as your information was, it would remain a binary relationship or a binary choice between oil and electricity. That's what I'm suggesting, that's your belief.

**MR. STRATTON:** Sorry, I don't know if I'm interpreting ... do you mean that it was either one or the other?

**MR. BUDDEN:** That's why – by binary that is what I mean, yes. So as far ahead as you predicted, it would always remain that a choice between oil or electricity in your model.

**MR. STRATTON:** If there were no other fuel choices, you know.

**MR. BUDDEN:** Okay.

When do you anticipate taking the afternoon break, Mr. Justice?

**THE COMMISSIONER:** Is this a good time for you?

**MR. BUDDEN:** I think it is.

**THE COMMISSIONER:** Okay, well let's take 10 minutes then and we'll –

**MR. BUDDEN:** That'd be fine. Thank you.

**THE COMMISSIONER:** – continue after 10 minutes. I’m going to keep it at 10 minutes too.

**CLERK:** All rise.

### Recess

**THE COMMISSIONER:** It’s nine-and-a-half minutes and everybody’s back.

Mr. Budden, when you’re ready.

**MR. BUDDEN:** We – I only have a couple of more questions for you, Mr. Moulton – sorry, Mr. Stratton. Then I’ll have a few for Mr. Moulton.

With respect to CDM, you explained – you indicated this was your personal opinion, but as you are the forecaster I’m interested in pursuing it a little bit. You indicated that you were not generally, if I understand you correctly, sold on CDM programs because – and again, I’m – this is what I believe you’re saying. You believe the market will set a reasonable price and it doesn’t need the incentive programs to do that.

**MR. STRATTON:** So long as the price of electricity is set at the efficient price level; so the price level that it should be from an economic perspective. There shouldn’t be any requirement to subsidize energy efficiency because people should be able to make their own decisions.

So I guess my view is that we’re – because that creates, or can create – it doesn’t necessarily do it, but can create cross subsidies between customer groups and classes, that if electricity is priced at what the efficient economic price of it should be, and so long as people have the education and the information that they can make the right decisions, then they should decide whether or not they make those decisions.

**MR. BUDDEN:** There’s two points there. One is they also need the resources to make those decisions, to insulate, to get heat pumps, so forth. You would acknowledge that?

**MR. STRATTON:** So as the utility – this is my own personal views. That if the utility is pricing its electricity at the proper cost, then that’s the – that’s what it needs to do.

So, I guess, from a – now, from a social perspective, that would be – that could be government’s.

**MR. BUDDEN:** Sure.

And in the same vein, a utility may – particularly if you happen to be on a isolated island off the grid, there may be – a utility may have a desire to suppress demand by bringing in these programs. It may be for the benefit of the utility in not having to bring on more expensive power and so forth; or, perhaps, there may be circumstances where the power simply isn’t there.

**MR. STRATTON:** I’m not sure I understand your flow there.

**MR. BUDDEN:** Okay.

**MR. STRATTON:** Can you just repeat it one more time?

**MR. BUDDEN:** Sure, the – one benefit of the CDM programs is that it would lower load forecast, because if people are availing of all these energy-saving devices it’s less strain on the system in terms of what is – the system must produce.

It’s more Mr. Moulton’s issue, not yours. But you would agree, in general principles that is the case?

**MR. STRATTON:** If – yes, with higher levels of conservation there would be less load.

**MR. BUDDEN:** Okay.

**MR. STRATTON:** Yes.

**MR. BUDDEN:** If we can turn to page – rather – yeah, page 37, P-00014, and line 26. If you could read – actually, read lines 25 and 26. They’re pretty short.

**MR. STRATTON:** “CDM incentive based programs appears not to have been included as a factor in load forecasting, either as a load reduction or as a resource option. As a result, load forecast may have been overstated.”

**MR. BUDDEN:** Okay.

Was it your decision, as load forecaster, to not include CDM in your load forecast going 50 years out?

**MR. STRATTON:** So my forecast would have included energy efficiency for the first 20 years because it included a technological variable, which was reducing consumption through time.

**MR. BUDDEN:** But it did not include CDM incentive based programs. Am I correct on that? Or, rather, is Grant Thornton correct on that?

**MR. STRATTON:** I didn't explicitly deduct energy savings from my load forecast, no. I didn't deduct the takeCHARGE estimates of energy savings from my load forecast.

**MR. BUDDEN:** Okay.

**MR. STRATTON:** But – and the reason I didn't do that is because my forecast was lower than Newfoundland Power's forecast for the first five years, and that forecast had deducted it.

**MR. BUDDEN:** Okay.

Do you – now you've had a bit of time to think about this, obviously. Do you accept that last sentence, quote, "As a result, load forecast may have been overstated" by the choice you made?

**MR. STRATTON:** I believe my forecast was the best forecast.

**MR. BUDDEN:** Okay.

So you reject that criticism.

Pardon?

**MR. STRATTON:** I stand by my forecast. That –

**MR. BUDDEN:** Okay.

**MR. STRATTON:** – it reflected the expected energy savings –

**MR. BUDDEN:** Okay.

**MR. STRATTON:** – that I expected.

**MR. BUDDEN:** Sure.

If you had your time back and you were redoing this forecast now – I know it's difficult to do that, but this was 2011 or 2012, again, whenever you did this forecast – would you do anything different?

**MR. STRATTON:** No.

**MR. BUDDEN:** Okay.

**MR. STRATTON:** No.

**MR. BUDDEN:** That, I believe, are all the questions I have for you, unless something pops up. I do have a handful for Mr. Moulton.

Mr. Moulton, you've already indicated you have a bachelor of engineering. You graduated in 1986?

**MR. MOULTON:** 1985.

**MR. BUDDEN:** '85. Electrical engineering?

**MR. MOULTON:** Yes.

**MR. BUDDEN:** Okay.

And you also went back and did an MBA at some point, about five years after that.

**MR. MOULTON:** Well, I graduated in 1995 with an MBA.

**MR. BUDDEN:** Okay.

And you spent your whole career with Newfoundland Hydro, and now Nalcor?

**MR. MOULTON:** Yes.

**MR. BUDDEN:** Okay.

A couple of things that you said in your evidence that I just want to explore a little further. You were speaking to the difference that was used, the percentile difference for transmission loss that the Nova Scotia public utility used a figure of 9.2, while the Newfoundland one used a 5.15 figure. And, if I understood you correctly, you're attributing their higher number simply to the fact that more power would be lost on its journey from



Muskrat Falls to its final destination in Nova Scotia.

Do I understand you correctly?

**MR. MOULTON:** Well, when I – I think from the question, it looked like that the question or the comments in that report were, basically, keep saying that for these were the same numbers – these were numbers for a given section of transmission line.

**MR. BUDDEN:** Why would Nova Scotia care about transmission losses before the point of which it was delivered to the beginning of their installation in a, you know, on the Newfoundland side of the Gulf?

**MR. MOULTON:** Well, the delivery point for the terawatt hour of power that they're getting – they're gonna get annually, that delivery point for that is at the Muskrat Falls bus.

**MR. BUDDEN:** Okay.

**MR. MOULTON:** So they would care. So that's – that's where, I'll say, we supplied the electricity and – so they, you know, they would care about the losses 'cause that would affect what they would receive in Nova Scotia.

**MR. BUDDEN:** Okay. Fair – that's correct. I accept your point. And so you're saying, in your view, the distinction between the 5.15 and the 9.2 is simply the 5.15 plus whatever Nova Scotia also experiences in loss, adds up to 9.2.

**MR. MOULTON:** I won't say they exactly add up, but what I'm saying is the 9.1 where from – for to get the power from Muskrat Falls to Nova Scotia; the 5.15 was to get the power from Muskrat Falls to Soldiers Pond in St. John's.

**MR. BUDDEN:** Sure. Gotcha.

**MR. MOULTON:** So they're two different ...

**MR. BUDDEN:** You used a rather catchy term to talk about what was gonna happen to Holyrood after Muskrat Falls comes online, and you called it, what, a slow warm down or what's the term you used?

**MR. MOULTON:** I call it warm stand by.

**MR. BUDDEN:** Warm stand by. What does that actually mean?

**MR. MOULTON:** Well, a thermal plant – if a thermal plant such as Holyrood is shut down completely, the cool down, shut down completely, I think it takes a period of like 10 days to get it back in service.

**MR. BUDDEN:** Okay.

**MR. MOULTON:** So in the case if you need it quickly, 10 days is a long time. So I think you can do various things, and I was saying keep it in a warm stand by and I think that would mean that you could – you'd keep the water in the boilers heated up, these type of things. And I do forget the exact time, but you could maybe bring it on – back in say four to six hours.

**MR. BUDDEN:** Sure. Yeah, so a reasonable response time to a DarkNL-type crisis.

**MR. MOULTON:** Exactly, yes, you –

**MR. BUDDEN:** Yeah.

**MR. MOULTON:** Yeah, so you could – you would be able to respond to something like that with it, yes.

**MR. BUDDEN:** Sure.

What would the long-term plans be for Holyrood, or what was anticipated as the long-term plan for Holyrood once the Muskrat Falls came online and – through Soldiers Pond, et cetera?

**MR. MOULTON:** The long-term plans were to keep it in stand-by warm or different levels of stand by, depending. I'll say for a year or two, a winter or two until – to make sure the reliability of the Labrador-Island Link and Muskrat Falls were established, and at that point, decommission it.

Now, we – the two things: the Unit 3, the generator from that would be maintained – retained as a synchronous condenser, and as I mentioned this morning as well, then the remaining fuel – before it was decommissioned – the remaining would be used to produce electricity, and then it would be dismantled.

**MR. BUDDEN:** Okay.

**MR. BUDDEN:** So the assumption is: you'd wait a year or two to make sure that the power can truly be reliably delivered from Muskrat Falls, across Southern Labrador, under Strait of Belle Isle, then across the –

**MR. MOULTON:** Yes.

**MR. BUDDEN:** – waters of Newfoundland to Soldiers Pond?

**MR. MOULTON:** Mm-hmm.

**MR. BUDDEN:** Your responsibility is to – is for load – for generation. That is –

**MR. MOULTON:** It was –

**MR. BUDDEN:** – your responsibility.

**MR. MOULTON:** It was at that time, yes.

**MR. BUDDEN:** It was at that time.

Is that realistic, given the – what's involved from a technological point of view? Somewhat the novelty of the – what is being proposed? The consequences if there is no backup? If there's a problem with, say, the cables under the Gulf?

Do you really see a decommissioning of Holyrood anytime soon?

**MR. MOULTON:** I do.

**MR. BUDDEN:** Okay.

**MR. MOULTON:** I do. I think that the project as planned – there are backups to the cables there. For example, there are three cables across –

**MR. BUDDEN:** There's a third one, isn't there? Yes.

**MR. MOULTON:** There are – not only that – so if we lose one, we can use the – we still have the two, so we'll still be operating normally. And even if we lose the second one, you're still able to get, I'll say, 75 per cent of the normal power across that line.

**MR. BUDDEN:** Okay. So in your –

**MR. MOULTON:** So there is –

**MR. BUDDEN:** – professional opinion, decommissioning Holyrood wouldn't be an issue?

**MR. MOULTON:** Well, once – again, it's a – as you say, it's – I won't say it's a novelty. It's – lots of HVDC lines have been built in North America and in Europe, and over long distances. But, again, just – it is a new technology and, as you say, given the size of it, just to be prudent: yes, you keep Holyrood for a couple of years. But once you've established that the Muskrat Falls and the Labrador-Island Link run reliably, yes, at that point, you would decommission Holyrood.

**MR. BUDDEN:** Okay.

I believe those are all my questions other than, well, you were Mr. Stratton's supervisor, I believe, or you are now, aren't you?

**MR. MOULTON:** I am now.

**MR. BUDDEN:** Yes.

**MR. MOULTON:** But not at that time, no.

**MR. BUDDEN:** Okay. Do you have anything to add to any of his answers?

**MR. MOULTON:** No.

**MR. BUDDEN:** Okay. Thank you.

Perhaps, Mr. Warren, we can move on to you. I don't have a whole lot for you but I do have some questions

I'm going to be asking you some questions about the, I guess, the financing of the Muskrat Falls Project and how that is built into the calculations that have been produced and that we've been looking at these several days.

**MR. WARREN:** Sure.

**MR. BUDDEN:** Perhaps you could just run through, again, you explained it to Ms. O'Brien, I guess, in a nutshell, just tell me again how it is

that financing – obviously, financing is integral element to any project of this sort. It has to be built, has to be paid for 'til it can generate something.

**MR. WARREN:** Sure.

**MR. BUDDEN:** How is the financing built into that model to find the numbers we see?

**MR. WARREN:** Sure.

So, at DG3 we would have had a capital cost estimate of \$6.2 billion. Over and above that, there would be another \$1.2 billion estimated at DG3. So, the first component would have been \$800 million of interest during construction. So, the interest during construction is based on the forecasted issuances of the debt. It was the interest cost that was accruing.

For both Muskrat and the Labrador-Island Transmission Link, both those, the generation and the transmission, based on when the debt was issued, it started accruing interest. And for both of those projects, it increased the cost of the capitalized asset.

**MR. BUDDEN:** Okay.

**MR. WARREN:** Then there's approximately about \$200 million in what we would call AFUDC, which is allowance for funds used during construction, and that was towards the transmission, the Labrador-Island Transmission Link and –

**MR. BUDDEN:** So there – if I may stop you at that point – so that is – these terminologies reflect to distinct phases of the overall development, the AFUDC and IDC. You break them down?

**MR. WARREN:** Yes, that is during the construction phase.

**MR. BUDDEN:** Yeah.

**MR. WARREN:** So, during the construction phase you have a deck component, which is your interest during construction, and interest has to accrue; as soon as you draw it down it starts accruing interest. So that goes into the ultimate

ending capital asset, which you then recover through the mechanisms that are in place. So –

**MR. BUDDEN:** And those mechanisms are?

**MR. WARREN:** It's through – for Muskrat Falls it's through the supply price, through the Labrador-Island Transmission Link; it's through a regulated cost – a cost-of-service framework. So basically it's through a depreciation charge.

**MR. BUDDEN:** Okay.

**MR. WARREN:** So then you've got it – so that was \$800 million, then there's approximately \$200 million of allowance for funds used during construction, and what that relates to is on the cost-of-service framework – under the cost-of-service framework, similar to the debt. As soon as that's drawn down it's on the equity holder side. It's assumed once an equity holder puts in its investment it should be able to accrue based on the regulated return.

**MR. BUDDEN:** Okay.

**MR. WARREN:** And that's approximately \$200 million and then the last \$200 million is financing reserves. So as part of the, I guess, forecasted debt issuances there's reserves that are required by the lender to be put in place for debt – there's two – generally, two different types: debt service reserve account and a liquidity reserve account under Muskrat Falls.

**MR. BUDDEN:** Okay.

**MR. WARREN:** So at the end of the day, all those costs go into your capitalized asset and it is then recovered from the ratepayer.

**MR. BUDDEN:** Ratepayer.

The project obviously is not coming in at the anticipated date of July '19 – '17, I believe it was. What is the impact on those interest payments by scheduling delays, say, perhaps for two years?

**MR. WARREN:** So it depended on – so in actual fact or if – projection? What do you mean on –?

**MR. BUDDEN:** I would – answer both ways.

**MR. WARREN:** Okay.

**MR. BUDDEN:** See if I can appreciate the distinction.

**MR. WARREN:** Yeah, so in a forecast – it's hard to tell you what the forecast because it really depends on the timing of those – the debt issuance and the timing of when you actually require equity from your shareholders.

In actual, the extra couple of years pushes out expenditures, so you may not need the equity in the same schedule that you would've had at the time. Depending on the timing of the debt, if you've drawn down debt, it obviously accrues an extra two years, in your example, of IDC. And the AFUDC you're not sure, it depends on the timing of those cash – of those injections from your shareholder.

**MR. BUDDEN:** Okay. So –

**THE COMMISSIONER:** Just if I can, just – so let me understand this.

So let's assume for a moment – and this is fully an assumption – you start to build a hydroelectric dam, and you build the spillway, you build various pieces of that early on to try to get yourself dry ground in order to construct your powerhouse. So there's a fair bit of money that goes into constructing that. So that money is spent.

So tell us – what you've just said to me seems to make me understand that as soon as you draw down money, you're starting to pay interest on it.

**MR. WARREN:** Yes, either interest –

**THE COMMISSIONER:** Right. Or –

**MR. WARREN:** – or for the Labrador-Island –

**THE COMMISSIONER:** Right.

**MR. WARREN:** – you are attracting allowance for funds.

**THE COMMISSIONER:** Funds, right.

So assuming that if you had the schedule – if the schedule stays on time and it were to finish on time, then you would probably, likely be able to accurately forecast what those costs are gonna be. But if they extend out – and I'm just talking about those costs now, because I understand your point about the fact that other expenditures may be made later, so interest wouldn't ...

But assuming you would bring that out, say, two years, does this mean there's additional interest that's – or alternatively, the AFUDC that's got to be taken into account?

**MR. WARREN:** Again, it is kind of tied to the actual construction costs because that, kind of, is the tie to when you're actually looking for debt –

**THE COMMISSIONER:** Right, so –

**MR. WARREN:** – or equity.

**THE COMMISSIONER:** – but if you actually have construction, which is a significant amount of money, it may not be the – you know, it might be 20 per cent of the total project cost or 10 per cent, whatever it is – you still have to pay interest on that money –

**MR. WARREN:** Yes.

**THE COMMISSIONER:** – and you still have AFUDC.

Okay, good, I gotcha.

**MR. BUDDEN:** Okay.

The ROE is 8.4 per cent, am I correct on that?

**MR. WARREN:** The ROE is the return on equity –

**MR. BUDDEN:** Yes.

**MR. WARREN:** – which is generally under the regulated cost-of-service framework. For our DG3 estimates, looking – using the same methodology that we've used in prior to the DG3, we used the same kind of calculations similar to what Newfoundland Power – how Newfoundland Power would be calculating what their priority would be. Using a long-term forecast from the Conference Board of Canada

for interest rates and that, at DG3 that estimate was 9.25.

**MR. BUDDEN:** Okay.

**MR. WARREN:** Your 8.4 is an internal rate of return that is being earned on the Muskrat – it's the assumption at DG3 on the Muskrat Falls to calculate the supply price.

**MR. BUDDEN:** Okay.

And that's a rate of – you say it's an internal rate of return. And again, just for clarity, between who and whom? Like who is guaranteeing the return to whom?

**MR. WARREN:** So it's – the shareholder, in this case with Muskrat it's the Province of Newfoundland and Labrador, is being provided a return of the 8.4. So when you look at the injections of equity during the construction phase and then when in service is attained, you start getting revenue, and the net of revenue and costs and all – and your debt service provides you a return. So in the construction period there's injections and then when you hit in service you start returning equity – or returning dividends to the shareholder. When you look at that series of cash flows, it yields 8.4 per cent IRR. Now, the revenue comes from the ratepayer.

**MR. BUDDEN:** Okay. So we're giving ourselves a ROE of 8.4?

**MR. WARREN:** Correct.

**MR. BUDDEN:** And that assumes that the – there is a full take up of the power supplied, I presume?

**MR. WARREN:** So it's based on – so the shape of the returns and how it's – how the equity holder, the province, gets its dividends is based on the escalating supply, which is the – what I called yesterday – the Island strip, it's the amount of gigawatt hours that are being requested in the PPA by Newfoundland and Labrador Hydro. So we take that and then we use our financial models to calculate what's the supply price, knowing all the other costs that have to be incorporated, that will provide a

shape of dividends to the province to yield the 8.4 per cent IRR.

**MR. BUDDEN:** I do – I think this might be my last question, Mr. Commissioner, and it's one that I believe is most appropriately directed to Mr. Moulton. But if I'm wrong then anybody who feels they can answer it, feel free to.

I'd like to turn to Exhibit 00162. And my query there is – I guess I have two queries – I see there in the gap between 2015 and 2020 is anticipated for 2017 which, of course, was what was believed back in, at the time of DG3. I see two entries there: one for 900 megawatts LIL and the other for Muskrat, 824. Can you please tell me a little bit about what they represent?

**MR. MOULTON:** Well, the Muskrat Falls 824, that's the Muskrat Falls generating plant. And it will produce 824 megawatts of capacity.

**MR. BUDDEN:** Okay.

**MR. MOULTON:** The 900-megawatt Labrador-Island Link HVDC system, it has a capacity to take 900 megawatts at the Muskrat Falls end and transmit. It can take slightly more capacity than the Muskrat Falls plant can put out.

**MR. BUDDEN:** The excess, or the difference between the 824 and the 900, I presume that must be anticipated coming from the Upper Churchill.

**MR. MOULTON:** It could come from somewhere else.

**MR. BUDDEN:** Yeah, but –

**MR. MOULTON:** I'm not sure. I'm not sure exactly where it was anticipated in coming from at the time.

**MR. BUDDEN:** But where else could it be?

**MR. MOULTON:** There's always the possibility of bringing in power, say, from Quebec or from the market or on the spot market.

**MR. BUDDEN:** Okay.

But in any event, it's power that would have to flow from Churchill Falls down to Muskrat Falls and then on through the cable in the Strait of Belle Island.

**MR. MOULTON:** Yes. Well, not necessarily from Churchill Falls but, yes.

**MR. BUDDEN:** Okay.

But to get to – get from 824 to 900 it has to be Churchill Falls. I would – unless I'm wrong. Like, is there 76 other megawatts up there on in that –?

**MR. MOULTON:** No, but there's the line – and, again, whether you're talking contractually or physically, but there's a line between Churchill Falls and Hydro-Québec which goes to the North American grid. So, contractually, it could come from anywhere.

**MR. BUDDEN:** Yes, but it would have to flow down (inaudible).

**MR. MOULTON:** Past – no, but you said from Churchill Falls, I'm saying it could flow past Churchill Falls, yes.

**MR. BUDDEN:** Okay.

**MR. MOULTON:** So –

**MR. BUDDEN:** But you know what I mean, it's coming from Hydro-Québec down through the power line that has been constructed across the North Spur –

**MR. MOULTON:** Yes.

**MR. BUDDEN:** – into Muskrat Falls and further south.

**MR. MOULTON:** Yes.

**MR. BUDDEN:** Okay.

**UNIDENTIFIED MALE SPEAKER:**  
(Inaudible.)

**MR. MOULTON:** Yeah, any –

**MR. BUDDEN:** And the – I'll look a little further to 2032 and the – I see a new 50-

megawatt unit being added there. What's that about?

**MR. MOULTON:** That would be at the time for – I'm assuming at that time that would have been added. As I discussed earlier, we have our criteria for capacity and energy and that would have – the model would have said that, okay, with the load growth and forecast we would – if we didn't build anything there, we would be violating our criteria. So that was the least-cost option within the full plan to avoid violating that criteria.

**MR. BUDDEN:** Okay.

So from a capacity perspective, did your Strategist program model 900 megawatts flowing south or 824 flowing south?

**MR. MOULTON:** I'm trying to remember. What we actually modelled was the output at Soldiers Pond to the Island.

**MR. BUDDEN:** Okay.

**MR. MOULTON:** But I'm trying to remember which number, if it was based on the 900 or 824 less losses.

**MR. BUDDEN:** Okay, you're not sure –

**MR. MOULTON:** And right at this point I can't remember.

**MR. BUDDEN:** Okay, but you would acknowledge there is a significant difference in terms of if it's a 900 that additional cost has to be factored in.

**MR. MOULTON:** I don't know what the additional cost in – the incremental cost in building an 824-megawatt HVDC line versus a 900-megawatt DC line.

**MR. BUDDEN:** Sure.

**MR. MOULTON:** I couldn't comment on the incremental costs.

**MR. BUDDEN:** I'm not referring there to the cost of the line, I'm referring to that if the Strategist is modelling 900 megawatts and Churchill – rather Muskrat is only producing

824, then that model, if it's entering another 76 megawatts, the cost of those megawatts surely must also have to be accounted for in the model. You would agree with me there?

**MR. MOULTON:** They would have to be accounted for in the model, yes.

**MR. BUDDEN:** Yeah.

Those are my questions. Thank you, Gentlemen.

**THE COMMISSIONER:** Thank you.

Edmund Martin.

**MR. SMITH:** Gentlemen, Harold Smith's my name and I'm representing Mr. Martin, Edmund Martin. I'd like P-00254 to be brought up on the screen.

I'm asking if any of you gentleman had any input into this exhibit, P-00254?

**MR. WARREN:** That would be the work from Investment Evaluation.

**MR. SMITH:** Okay.

And would you be able to, perhaps, you know, explain what is the document, which is headed up: Net Benefits to Newfoundland at DG3? What is involved in this process or this particular document?

**MR. WARREN:** Sure.

So what the net benefits – what it tries to lay out is provide both the nominal and the present value of various benefits that are available under either the Isolated Island scenario or the Interconnected scenario, and then it provides kind of what the net benefit is between those two scenarios.

So, obviously, starting off at the top, the CPW is consistent with the \$2.4-billion CPW preference that we've been discussing here the past couple of days. What the CPW induced is – and this work was done within Investment Evaluation, but we also consulted with Strategic Concepts at the time to provide – and along with the Lower Churchill Project there. They have a member of staff who is versed in economic benefits, so it

was a collaborative project between those three parties. So the CPW induced is a factor based on the level of dollars that are being used for rates.

So what you see is the \$2.4 billion of net benefit because ratepayers, under the Interconnected scenario, doesn't have to pay – or their rates requirements, so the amount for electricity, is \$2.4 billion less present valued. It's \$723 million extra cash that is deemed that would be available and be a benefit to the end ratepayer users.

So ratepayers have more dollars in their jeans; they'll spend a little bit of the dollars that are in their jeans with economic benefits.

Income – direct, indirect and induced – is based on actually employing people during the capital process and through the operating phase. So what you see under the income is nominally – it's interesting, you see that, nominally, Isolated produces more income benefit because there's more capital dollars, nominal dollars, in the Isolated scenario, and it requires more operations as well. But on a PV basis, it's beneficial for the Interconnected scenario because a lot of those projects that are in the Isolated are in later years based on the generation expansion plan that Mr. Moulton went through earlier.

Dividends – this is a great line actually. It kind of ties back to Mr. Budden's questions to me. This actually provides an overview of the dividends that – so the return for not just the Muskrat Falls but also for the Labrador-Island Transmission Link. What you see there is the Interconnected provides 22 million – and, sorry, there's also regulated hydro. Dividends are also included in this.

So what you see is, again, on a nominal comparative basis, because we are paying more dividends to ourselves at DG3 under the Interconnected scenario, there's \$17.7 billion. Under the Isolated, it's a lot less simply because it has a lot of fuel built in and a lot of the costs are fuel-related, which – the province isn't getting dividends. It's only earning on the capital that you're investing in the plants.

Treasury is similar to the income line, but that is an estimation of what taxes the province would

receive under both scenarios. And what you see under that scenario, similar to the income, nominally it's – Isolated generates more tax dollars, but because of the timing issues, it actually provides – the Interconnected provides a lot more in present-value dollars.

Direct is actual direct – for both of these, direct are actual people who are involved, like workers, so the construction workers. Indirect would be people who are supporting that, and induced would be more like the economic – the fact that there's money in the economy induces other growth and other employment.

The export sales is under export, and that includes not just the export sales, but also ponding and other benefits –

**MR. SMITH:** Sorry, I'm sorry, I didn't hear. What –

**MR. WARREN:** Sorry, ponding. So ponding is a term of basically being able to shape your exports accordingly so that you can either import during off-peak hours, let your water rise up, and then when you get a better price during peak hours, you draw down your water, and you, basically, are able to generate additional revenue.

Water rentals – so the water rentals here is – the province has a water-power-rental charge based on I think it's either megawatts or gigawatt hours that produced, and this is the net impact from having Muskrat Falls. It basically provides the province another form of income. So over this period it's \$1.2 billion. Present value dollars, it's \$192 million.

**MR. SMITH:** One hundred and ninety-two million?

**MR. WARREN:** One hundred and ninety-two million, yes.

**MR. SMITH:** Thank you.

**MR. WARREN:** The carbon is similar to the sensitivity that we would have reviewed earlier this morning. It's under the same basis, but for those eagle-eye mathematicians out there, it is a little bit higher. The 627 present value, just a reminder of the sensitivity that we looked at had

carbon pricing starting in 2020. This one here has the carbon pricing starting at 2018. It's just to coincide with the in-service, kinda, date.

Carbon induced is – and what you see, sorry, under the carbon is – obviously, Isolated has a significant cost because it's burning fuel and emitting CO<sub>2</sub> a lot less than the Interconnected. But you see, Interconnected is impacted by the carbon. The carbon induced is – again, if there's extra – under the Isolated, if you're required to recover from ratepayers another 4.8 billion nominally or 627 million more, there's less dollars in their pockets, and they're not spending as much. So it's that type of a – again, using a factor – I think, again, this factor is 30 per cent as well.

And then, the Innu dividends is – as a part of the Interconnected and development of Muskrat Falls, the – under the terms and conditions of the Innu Benefits Agreement, the IBA [sp Impacts and Benefits Agreement], there's dividends that will be provided to the Innu. And again, that is about \$303 million; on a present value basis, it's 58 million.

So at DG3, when we were looking at this, it basically is a way to kinda see – look beyond, kinda, the ratepayer benefit that we had at the time and look at it more on the holistic benefit for the province as a whole. And so, in this regard, the 2.4 becomes \$7 billion.

**MR. SMITH:** Benefit?

**MR. WARREN:** Benefit.

**MR. SMITH:** Thank you, Sir. That's all the questions I have.

**THE COMMISSIONER:** Thank you.

Kathy Dunderdale?

**MS. E. BEST:** No questions. Thank you.

**THE COMMISSIONER:** Federal – sorry, Former Provincial Government Officials 2003 to 2015?

**MR. RALPH:** Mr. Williams has left.



**THE COMMISSIONER:** Oh, Mr. Williams has left? Okay. I guess he doesn't wanna ask any questions.

Julia Mullaley and Charles Bown?

**MR. FITZGERALD:** No questions.

**THE COMMISSIONER:** Thank you.

Robert Thompson?

**MR. COFFEY:** No questions.

**THE COMMISSIONER:** Consumer Advocate?

**MR. PEDDIGREW:** Good afternoon, gentlemen. My name is Chris Peddigrew. I'm representing the Consumer Advocate for the province; I'm representing the ratepayers of the province.

I'm gonna try to be as brief as possible. I know some of the questions I initially had for you were asked already by Ms. O'Brien, by Mr. Budden. So bear with me as I go through. I'll try to knock off as much as I can. If it's already been asked, I'll try not to ask again.

Just in terms of the questions that were asked by Mr. Smith a moment ago. Mr. Warren, when you talked about you were looking beyond the ratepayers for the benefits of the province as a whole, but who's paying? The money that goes into this that eventually gets paid out in the way of dividends, where does that money come from?

**MR. WARREN:** As noted, it was ratepayers. The ratepayer does make those payments. And the first line there was the 2.4 that, at the time, was the benefit for ratepayers.

**MR. PEDDIGREW:** I mean, you – when you talk about the benefits to the province versus the ratepayer, there's about 300,000 ratepayers in the province. Is that – would that be close?

**MR. WARREN:** Sounds reasonable.

**MR. PEDDIGREW:** Of a population of about half a million, so about three fifths of the province would be ratepayers.

**MR. WARREN:** Yep.

**MR. PEDDIGREW:** Just a point of clarification. Each of you works directly with Nalcor or with Hydro?

**MR. WARREN:** My mic's on, I'll say I'm a Nalcor employee.

**MR. PEDDIGREW:** Okay.

**MR. MOULTON:** I'm a Hydro employee.

**MR. PEDDIGREW:** Hydro?

**MR. MOULTON:** Hydro employee, yes.

**MR. STRATTON:** I'm a Hydro employee.

**MR. PEDDIGREW:** Hydro. Okay, thanks.

And, Mr. Stratton, you indicated that – and I forget the acronym, but it's a regulatory, utility-type school or training course that you did in the early 1990s. Has either one of, Mr. Moulton or Mr. Warren, done that sort of training?

**MR. MOULTON:** Not in load forecasting, no.

**MR. WARREN:** Not in load forecasting, either.

**MR. PEDDIGREW:** And is there a type of training that would be more specific to what you do in your job or is it – that's just load-forecasting education?

**MR. WARREN:** With regards to Investment Evaluation?

**MR. PEDDIGREW:** In the context of –

**MR. WARREN:** So –

**MR. PEDDIGREW:** – working in a utility.

**MR. WARREN:** – the – there are financial accounting courses that you can take, yes.

**MR. PEDDIGREW:** Specific to utilities?

**MR. WARREN:** To utilities? Yes.

**MR. PEDDIGREW:** Okay. And have you done any of those?

**MR. WARREN:** I've done some career development course or some training. I just, at the moment, don't recall whether or not it was utility-specific.

**MR. PEDDIGREW:** Not sure if it was utility-specific.

**MR. WARREN:** Yes.

**MR. PEDDIGREW:** Okay. And Mr. Moulton?

**MR. MOULTON:** Yes, I did do, a while ago, but I did do some courses in generation planning and the use of the Strategist program in doing this type of utility work.

**MR. PEDDIGREW:** About how long ago would that have been?

**MR. MOULTON:** I think between, I'll say 15 and 20 years, 10 and 20 years ago. I did a number of courses over – I think it – I know of at least three that I can think of right now.

**MR. PEDDIGREW:** Okay. And I know that the two of you have worked with Hydro for quite a number of years, I guess virtually your entire career Mr. Stratton, Mr. Moulton?

**MR. MOULTON:** That's correct.

**MR. STRATTON:** That's correct, yeah.

**MR. PEDDIGREW:** So this would be the first megaproject – the Muskrat Falls megaproject is the first megaproject you've worked on, is that correct?

**MR. MOULTON:** I did a little bit of – well, it was, I'll call it Muskrat Falls, but I did a little bit of work on the 1998 edition of the – of looking at interconnecting – Muskrat Falls interconnecting Gull Island at the time to Labrador.

**MR. PEDDIGREW:** Okay. The same – Lower Churchill?

**MR. MOULTON:** Yes.

**MR. STRATTON:** And the same would apply to me as well.

**MR. PEDDIGREW:** Thank you. And Mr. Warren.

**MR. WARREN:** This would be my first megaproject.

**MR. PEDDIGREW:** Mr. Warren, just a few questions for you.

In terms – I know you said earlier in your evidence, you said it was the Lower Churchill Project team that instructed you to use the P50 risk factor. Who specifically on the Lower project team was giving you that sort of instruction?

**MR. WARREN:** There was no instruction with respect to P50 or the probability. We were just provided the capital-cost forecast.

**MR. PEDDIGREW:** Okay, and by whom on the Lower – like who was your main contact on the Lower Churchill Project team?

**MR. WARREN:** For DG3, it was likely Jason Kean or it could've worked through the finance contact Mark Bradbury, at the time, but I think it was primarily Jason Kean would've provided the estimates.

**MR. PEDDIGREW:** There was some evidence yesterday about the limitations of wind energy versus hydro, and I guess the main limitation being that wind can, I guess, only be gathered when it's – when the wind is blowing.

What is the total amount of wind energy that can be used, that can be combined with hydro in the province? Is that a calculation or a study that's been done?

**MR. MOULTON:** I'll say – I won't say within the province it was looked at. I'm not sure what it would be for the Interconnected system that we're currently building, but the main study, there was a study done – I think by Hatch – and it's one of the exhibits, I can't remember exactly which one – when we looked at the – it was a study of the amount of wind that could be added to the Isolated Island, so for the Isolated Island case. And I'm thinking over a period of 15 or 20 years it was somewhere in the area of 250 megawatts of wind.

**MR. PEDDIGREW:** And you don't –

**MR. MOULTON:** And – sorry.

**MR. PEDDIGREW:** Sorry, go ahead.

**MR. MOULTON:** And at that point – and I think as I said yesterday, at that point it was not that you couldn't add more wind, but it wouldn't be economically feasible to add more wind.

**MR. PEDDIGREW:** Right. And is there any plan to, or has it been looked into, whether or not wind will be used post-Muskrat Falls, once Muskrat Falls is in operation?

**MR. MOULTON:** I think in the – I'm kind of out of that area right now, but from the work we did, we have our current wind farms, and what will happen, when we require – if we require more energy or whatever, again, a process, as was done here, a generation expansion, load-forecast process will be will be carried out and if these show to be least cost then we'll use wind, and if not, we'll use whatever's the least cost.

**MR. PEDDIGREW:** Madam Clerk, if we could open up Exhibit P-00256, please?

And, Mr. Warren, I believe this is a question for you, but across the – toward the bottom of the page there, all the inputs: load forecast, load shape, escalation series, fuel – all these various inputs, I guess the colour coding there, that means that the colour of the box is tied to the legend section there. So the information that would get input comes from, I guess, depending on which colour. So for load forecast, that would come from Mr. Stratton. Load shape would come from Mr. Moulton. Is that – so all the way across, that would hold true?

**MR. WARREN:** I believe so, yes, yup. That's correct.

**MR. PEDDIGREW:** Mr. Warren, when you were doing your calculations at DG3 and in relation to the management contingency reserve, I believe you referred to it yesterday as Ed's envelope, the evidence yesterday, I believe, was that you did not know what that amount was. Is that correct?

**MR. WARREN:** With respect to the strategic risk?

**MR. PEDDIGREW:** Yes.

**MR. WARREN:** That's correct.

**MR. PEDDIGREW:** Okay.

So how did you know what to factor in if you didn't know the amount?

**MR. WARREN:** I was asked for the – or I asked for the capital cost and it was provided to me by the project management team. I was aware that there was none there and it was a decision ultimately, I guess, made by the Gatekeeper to have the capital cost not factor in strategic risk.

**MR. PEDDIGREW:** And was it Jason Kean that would've given you that direction?

**MR. WARREN:** I don't know if there was any direction provided. It would've been – I would've requested from Jason – or someone from my team would've requested from Jason the capital cost assumptions to use and they were provided.

**MR. PEDDIGREW:** When doing your calculations for the power purchase agreements, again, was it – the numbers were coming from the Lower Churchill Project team. Is that correct?

**MR. WARREN:** Yes, the capital costs and the operating costs.

**MR. PEDDIGREW:** And again, was there a particular person on the Lower Churchill Project team that was giving you that information?

**MR. WARREN:** That would've been – my recollection at DG3 would've been Jason Kean.

**MR. PEDDIGREW:** If we could look at P-00077, Madam Clerk. And if we go to page 39, please.

Just in relation to the power purchase agreement model versus the cost of service model. Did you do any calculations of what the cost of service

would be for the Lower Churchill Project, based on a cost of service model as opposed to a PPA?

**MR. WARREN:** For the Labrador-Island Transmission Link?

**MR. PEDDIGREW:** Yes.

**MR. WARREN:** I don't recall. Nothing's striking me as that was a deliverable.

**MR. PEDDIGREW:** So were there any – was there any way to calculate, or were any study or calculations done about what the rates would be charged to ratepayers arising from Muskrat Falls? What they would pay per kilowatt hour?

**MR. WARREN:** So factoring in at DG2 and DG3, we would've taken the end resulting cost for Interconnected Island customers and we would provide rates analysis. Predominantly it was – a lot of the charts that we would've provided would've been focused on the domestic user, the domestic – yeah, user, sorry.

**MR. PEDDIGREW:** And what did you estimate that the cost per kilowatt hour would be for the ratepayer, domestic ratepayer?

**MR. WARREN:** I don't have those numbers readily available, sorry.

**MR. PEDDIGREW:** Can you ballpark it? I mean right now I believe it's somewhere between 11 and 12 cents per kilowatt hour.

**MR. WARREN:** At DG3 I think it was around 15.6 cents. I know that sounds very precise but it's around 15 or 16 cents.

**MR. PEDDIGREW:** Mr. Stratton, in relation to the concept of elasticity, during the examination by Ms. O'Brien you were explaining how elasticity was factored in. But do you know – did Nalcor or Hydro commission any separate elasticity studies besides, I guess, the analysis that you did in your forecasting?

**MR. STRATTON:** No, we didn't prepare any studies because the elasticity had been embedded in our model – analysis.

**MR. PEDDIGREW:** So no separate studies were commissioned by –

**MR. STRATTON:** No.

**MR. PEDDIGREW:** Was there ever a consideration given to how much per kilowatt hour ratepayers would be willing to pay? What price would cause people to start to leave electricity as a heat source?

**MR. STRATTON:** We would've prepared – I would've prepared – I would've done a couple of projections based on different rates.

**MR. PEDDIGREW:** And what did you have that calculated to be?

**MR. STRATTON:** So the finding that was prepared for Mr. Wade Locke at MUN, we tested or we – I tested the model for various different rate levels and that showed, I believe, that there would have to be – rates would've had to be 65 to 75 per cent higher than what they were forecasted to be, to bring – to eliminate sales – not decline, but eliminate the growth.

**MR. PEDDIGREW:** When you say eliminate, what do you mean?

**MR. STRATTON:** It means it would make the domestic sector go flat.

**MR. PEDDIGREW:** So you mean nobody would buy power?

**MR. STRATTON:** No, what I mean is that there wouldn't be any more further growth.

**MR. PEDDIGREW:** No more further growth.

**MR. STRATTON:** Yes. So basically it would – the electricity – the market share for electricity would flatten, right?

**MR. PEDDIGREW:** And you say 65 to 75 per cent above what projected rate?

**MR. STRATTON:** Would have been whatever the forecasted rates were for the analysis. So it would have been higher than what Mr. Warren has indicated.

**MR. PEDDIGREW:** So somewhere in relation to, I think, 15.6 cents so 65 –

**MR. STRATTON:** Yes.

**MR. PEDDIGREW:** – to 70 per cent higher than that before people would start to leave. Is that –

**MR. STRATTON:** Yes.

**MR. PEDDIGREW:** – what your calculations were –

**MR. STRATTON:** Yes.

**MR. PEDDIGREW:** – telling you?

In terms of general and commercial customers and businesses I think you've indicated that in your opinion that – or based on what you've seen based on historical evidence – that there's no indication that price has a significant impact on how much electricity general ratepayers will use. Is that a fair summary of your opinion?

**MR. STRATTON:** Yes.

**MR. PEDDIGREW:** Wouldn't you think that – I mean, at a certain price – once electricity hits a certain price that even businesses will look at how much power they use, whether there may be alternate sources of power.

**MR. STRATTON:** I would agree that at a certain price level they would, yes –

**MR. PEDDIGREW:** And is that a study –

**MR. STRATTON:** Right?

**MR. PEDDIGREW:** – that Hydro carried out?

**MR. STRATTON:** No it wasn't.

**MR. PEDDIGREW:** Mr. Stratton, are you aware of a recent elasticity study report that was prepared by Professor James Feehan that was recently submitted to the Public Utilities Board.

**MR. STRATTON:** Yes, I've read the report.

**MR. PEDDIGREW:** Okay, and I believe – and I don't have the report with me now – but Mr. Feehan has concluded that when electricity approaches somewhere near 17 cents that up to 60 per cent of domestic customers may start

looking for alternate sources of heat. Is that your recollection as well?

**MR. STRATTON:** I don't recall that quote in the report. What I do recall from the report is that his elasticity measurement was, I believe, a 0.4 – between a 0.4 and a 0.5. And that my elasticity measurement would be a 0.3 to 0.35 and that – and so my – I concluded that his analysis was fairly close to what our models were indicating.

**MR. PEDDIGREW:** But higher.

**MR. STRATTON:** But somewhat higher, yeah. They were both – his elasticity – yes it was – inelastic, just as ours is.

**MR. PEDDIGREW:** Are you talking about in relation to general customers now or domestic?

**MR. STRATTON:** Domestic.

**MR. PEDDIGREW:** And so you said it was his –

**MR. STRATTON:** Our estimate?

**MR. PEDDIGREW:** No, so you said his study showed that it was inelastic?

**MR. STRATTON:** Yes. The – if the – well, the elasticity measurement of 0.4 to 0.5, I – that's what I recall in the paper that I read – and that is inelastic.

**MR. PEDDIGREW:** Okay. Mr. Feehan will be a witness eventually and we can canvass him further on the – I'll get his views on his report. I believe, and I'm not sure which one of you said this, that there were some discussions between – I think it might have been yourself, Mr. Stratton – between Hydro and Newfoundland Power about, I guess, power rates. Was there any discussion or did Newfoundland Power give any indication about what they felt the rate per kilowatt hour would be when customers would start leaving the system looking for alternate sources?

**MR. STRATTON:** No, Newfoundland Power never – I never had a conversation with Newfoundland Power about that specific issue. I do know that their elasticity estimates and their

models are consistent with the elasticity estimates of my model. At least I know that for domestic class. I don't know for the other classes if they have one, but I know for the domestic class it would be – it's consistent with our models.

**MR. PEDDIGREW:** That wasn't something you discussed with them?

**MR. STRATTON:** No.

**MR. PEDDIGREW:** Is it fair to say that you did not discuss that with them because you didn't envision that prices would increase after Muskrat Falls? I believe the evidence was that there'd be a slight bump after Muskrat Falls is brought on. Is that correct?

**MR. STRATTON:** So our base case models reflected the expected price levels that the project would ultimately cost ratepayers.

**MR. PEDDIGREW:** Right, so a slight bump after Muskrat Falls?

**MR. STRATTON:** Yes.

**MR. PEDDIGREW:** Followed by – taking inflation into account, followed by a slight decrease –

**MR. STRATTON:** Exactly. Yes.

**MR. PEDDIGREW:** – of rates.

**MR. STRATTON:** Yeah.

**MR. PEDDIGREW:** And so your assessment that load would continue to increase over the life of Muskrat Falls, that was based partly – or I guess it was never considered by you that prices might actually increase because of Muskrat Falls. That wasn't a factor that – or a scenario that you played out.

**MR. STRATTON:** So based on the sensitivity or based on the, I guess, the class estimate that it could be plus 30 per cent cost overrun. So I would've run a model run with a price increase of around that rate or that increase.

**MR. PEDDIGREW:** Mmm.

**MR. STRATTON:** And that would've told me that the economy was so strong at that time – that the forecast growth in the economy was so strong and the price of oil was expected to be so high that it would not have – it would have reduced growth, but it would not have reduced growth substantially. The system would have still grown.

**MR. PEDDIGREW:** Okay.

So just in relation to the follow-up on some of the questions you've been asked already about using Quebec as a comparator – and I believe you said in your evidence that oil prices between Newfoundland and Quebec would be somewhat similar.

**MR. STRATTON:** I would expect them to be somewhat similar, yes.

**MR. PEDDIGREW:** Right. And, therefore, you know, based on when customers purchase power or choose sources of power, they will do it based on the relative price compared to other sources.

**MR. STRATTON:** Correct.

**MR. PEDDIGREW:** My understanding is that the rate of electric baseboard heating in Quebec is approximately somewhere between six and seven cents per kilowatt hour which would be much lower than the price of oil.

**MR. STRATTON:** I don't know the rates – what that rate is in Quebec.

**MR. PEDDIGREW:** Right. Wouldn't you agree that that six to seven cents per kilowatt hour, versus 11 or 12 in Newfoundland right now and set to go higher, would make oil, relatively speaking – or sorry, electricity, relatively speaking, in Quebec much more attractive than oil?

**MR. STRATTON:** I would agree that the lower price would – one would expect there to be higher consumption levels because of that price.

**MR. PEDDIGREW:** But what I'm talking about is people – I think you talked about saturation, I believe, and you were using Quebec as a comparator to see when the market here would be saturated.

**MR. STRATTON:** So just, I guess, to reiterate, the price difference between furnace oil price and the forecast of electricity prices at DG2 and DG3 were such that electricity was more competitive. It was the cheapest price; it was the cheapest way to heat your house. And then from that perspective, people would continue to choose electric heat.

So the saturation level is not really about – the choice to use a saturation level wasn't about the relative price, it was that – what that confirmed was that people would continue to choose it and at a high rate. The overall saturation level would be dependent on – a certain group of people will not switch to electric heat. They may heat their homes with other sources of energy.

**MR. PEDDIGREW:** Right, but –

**MR. STRATTON:** So it's based on that as opposed to the differential.

**MR. PEDDIGREW:** Right, okay.

But I guess my point is that if you look – if you were using Quebec as a comparator, right?

**MR. STRATTON:** I used Quebec as a guide to say: What is the maximum saturation of electric heat that we might expect in the future.

**MR. PEDDIGREW:** Right, exactly.

**MR. STRATTON:** Yeah.

**MR. PEDDIGREW:** Trying to figure out what the maximum saturation level might be in this province –

**MR. STRATTON:** Yes.

**MR. PEDDIGREW:** – in Newfoundland and Labrador. But what my point to you is that the attractiveness of electricity relative to oil in Quebec would be higher, wouldn't it, than the attractiveness of electricity compared to oil in Newfoundland and Labrador, given the price of electricity in Quebec.

**MR. STRATTON:** It would, yes.

**MR. PEDDIGREW:** Okay. Thank you.

**MR. STRATTON:** Yes.

**MR. PEDDIGREW:** So would it be fair to say then as well, that if you're using Quebec as a comparator for saturation level – I'm trying to figure out when saturation level will be reached in Newfoundland – that it would be fair to expect that you may not have the same sort of uptake in Newfoundland as you would have in Quebec with respect to electricity?

**MR. STRATTON:** Well, that would be rate of uptake. Do you mean the rate of uptake?

**MR. PEDDIGREW:** How many people would use electricity versus oil? It's cheaper in Quebec than it is in Newfoundland, relatively speaking.

**MR. STRATTON:** But it depends on just the relative position of those fuels –

**MR. PEDDIGREW:** Right, but what I'm saying –

**MR. STRATTON:** – in any instance.

**MR. PEDDIGREW:** What I'm saying –

**MR. STRATTON:** So –

**MR. PEDDIGREW:** – is, relatively speaking, in Newfoundland it's more expensive than it is in Quebec, electricity compared to oil.

**MR. STRATTON:** Yes, it is.

**MR. PEDDIGREW:** Sorry, I'm just looking at some questions that have already been asked, so just if I can skip them I will.

Do either one of you know whether Hydro, Newfoundland Hydro, is currently completing a transmission line from Bay d'Espoir to the Avalon Peninsula?

**MR. MOULTON:** Not currently. It came into service last fall.

**MR. PEDDIGREW:** Okay.

And what is the purpose of that line?

**MR. MOULTON:** Oh, the – and I know I'm speaking a little bit, I'll say, outside, but from

what I know – the transmission line – that transmission line, of course, we hadn't – that was part of our bulk transmission system, transmission power around the Island. And our bulk transmission system really hadn't been added to since it was built in the late 1960s.

**MR. PEDDIGREW:** Sorry, I missed that last part. I can hear the rain, sorry. It's a bit hard to hear.

**MR. MOULTON:** Oh. No, the – that was part of the – that was built as part of our bulk transmission system, our, I'll say, big transmission lines. They can transmit a lot of power from place to place.

What I was going to say was that was the first addition to that transmission system, really since, say, the late 1960s. So from the – for the Interconnected Island system, yeah, part of it was – although we've a lot – you know, since the moratorium we have had a lot of load growth on the Avalon, so part of it was getting electricity from our hydro plants off of the Avalon onto the Avalon.

And it was also built, I think, as part of the, I'll call it, the stability of the Maritime Link, keeping – making sure that that operated reliably and stably. But there was – if we had not done the Interconnected Island, if we had stayed as an Isolated Island, that line was in the planning stages, I'll say, before this and it still would've been required. Either way, the line would've been required. Because load – and from an Isolated Island, again, load had grown on the Avalon Peninsula considerably since the moratorium, and there were times we had available generation off of the Avalon that we couldn't transfer to the Avalon.

**MR. PEDDIGREW:** When was the application made to the PUB to approve construction of that line, do you know? Was it pre-DG3?

**MR. MOULTON:** I'm not quite sure at the moment.

**MR. PEDDIGREW:** I'm assuming neither of you other gentlemen would know the answer to that question?

**MR. STRATTON:** No, I don't know the exact timing of that application.

**MR. WARREN:** I don't either.

**MR. PEDDIGREW:** Mr. Moulton, do you recall if that application was withdrawn by Hydro at a certain point before –

**MR. MOULTON:** There was no – and thinking, there was an application and it was – there was an application withdrawn, you're correct, and it was resubmitted later on.

**MR. PEDDIGREW:** And when was it resubmitted?

**MR. MOULTON:** Again, I'm not sure. And, again, that was the work of Hydro's transmission planning department, which I didn't work in. I was not a part of that department. I knew about it, but I'm not familiar with the exact dates.

**MR. PEDDIGREW:** Right, would it have been after Muskrat Falls was started, the construction?

**MR. MOULTON:** I think so. I think so.

**MR. PEDDIGREW:** I believe that may be all, but if you give me a moment, I've skipped over ...

Okay, yeah, that's everything. Thanks very much.

**THE COMMISSIONER:** Thank you, Mr. Peddigrew.

Before I move on, do you gentlemen need a break or can we keep going?

**UNIDENTIFIED MALE SPEAKER:**  
(Inaudible.)

**THE COMMISSIONER:** Okay.

All right, former Nalcor board members, nobody here for them?

**MS. G. BEST:** No questions, Commissioner.



**THE COMMISSIONER:** Okay, thank you. Sorry, I didn't see you.

Maritime – or not Maritime – Manitoba Hydro International?

**MS. VAN IDERSTINE:** No questions.

Thank you, Commissioner.

**THE COMMISSIONER:** All right. Nalcor Energy?

**MR. SIMMONS:** Thank you, Commissioner.

Gentlemen, it's been a long day so I won't keep you very long. So my questions are going to seem kind of random, because I'll have to just pick up on a few points from some of the other examinations that you've had, starting yesterday and running through to today.

But, first of all, I just want to make sure I understand, Mr. Stratton, your response to the last questions you had about saturation of the domestic electric heat market and how you were able to use the Quebec data for the level of saturation in their market and apply it to the Island of Newfoundland to assess what the level of saturation would be here.

So if I understand correctly, are you saying that what matters is not how much cheaper electric heat is to the alternatives, but that it is a fact that electric heat is cheaper than the alternatives, that motivates people to switch?

**MR. STRATTON:** That's correct.

**MR. SIMMONS:** Right. And that as long as there is a difference, people will continue to switch from one to the other is the assumption, is it?

**MR. STRATTON:** Correct.

**MR. SIMMONS:** Right. And that in Quebec the experience is that for whatever reason, after a point, even though electricity continues to be cheaper, people stop switching and you reach the point where you don't get any more relative growth.

**MR. STRATTON:** Correct. There's always people who would prefer to heat with perhaps oil.

**MR. SIMMONS:** Mmm.

**MR. STRATTON:** There's some people that would prefer to heat with wood. There could be – or I'm not sure if there's – I think there is some natural gas in Quebec, so that would be a factor as well.

**MR. SIMMONS:** Okay. Thank you.

So is that part of the reason why you are comfortable working with the Quebec saturation figures and using them for the extension of your 20-year load forecast into the longer period?

**MR. STRATTON:** Yes, it was.

**MR. SIMMONS:** Okay.

There's been some mention in everybody's evidence of a couple other Nalcor or Hydro, I think, people; one is Mr. Paul Humphries. And is Mr. Humphries still with Hydro?

**MR. STRATTON:** No, he is not. He's retired.

**MR. SIMMONS:** Okay and when did he retire? Does anyone know?

**MR. MOULTON:** I'm thinking around August 2016.

**MR. SIMMONS:** Okay.

And Mr. Goudie – is Mr. Goudie still with Hydro?

**MR. WARREN:** No.

**MR. SIMMONS:** And how long –?

**MR. WARREN:** He retired as well. I believe it was in 2013, early 2013.

**MR. SIMMONS:** Thank you.

There's been mention in some of the evidence of reviews that were carried out by Manitoba Hydro International and by Navigant. And the Manitoba Hydro International reviews in

particular, the first one was carried out in 2011 for the PUB and the second one carried out in October 2012 for the Government of Newfoundland and Labrador.

So, first of all, for you, Mr. Stratton, can you describe for me what sort of interaction you had with the people from Navigant and MHI when they conducted their reviews?

**MR. STRATTON:** Well, in the case of MHI, I would have been interacting with their – the gentleman who was responsible for load forecasting. And at that time he would have – he interviewed me and he would have discussed all the history of the system and to get a – and basically to ask all those questions so that he would have a full understanding of the electrical system and demand and energy in the province.

**MR. SIMMONS:** Okay.

**MR. STRATTON:** In the case of Navigant, I don't really recall now how much back and forth I had with them.

**MR. SIMMONS:** Mm-hmm.

In –

**MR. STRATTON:** But there would have been interaction obviously.

**MR. SIMMONS:** Okay. Do you know anything about the load forecasting experience or expertise that the gentleman from MHI had?

**MR. STRATTON:** The gentleman from MHI was the chief load forecast officer of Manitoba Hydro for many years.

**MR. SIMMONS:** Okay.

**MR. STRATTON:** And he had – well, I started work at – in Hydro in the late '80s and I would have – I knew from Mr. Goudie that during that period that he was the forecast officer. So he had substantial experience in load forecasting.

**MR. SIMMONS:** Okay. Did he discuss with you the methodology that you were using for preparing your load forecasts?

**MR. STRATTON:** He concluded that given the length of the time period that we were forecasting to, that our approach was a reasonable approach.

**MR. SIMMONS:** Okay. And did he explore with you both your 20-year forecast and the extension of it into the 50-year period?

**MR. STRATTON:** Yes, he did.

**MR. SIMMONS:** Okay. Did he explore with you the types of inputs that you were using and the sources of data you had for your forecasts?

**MR. STRATTON:** Yes, he did.

**MR. SIMMONS:** Okay. And the – was he aware of the econometric approach and the regression analysis method that you were using?

**MR. STRATTON:** Yes, he was, quite familiar.

**MR. SIMMONS:** Yeah and the software that you used in order to carry out those calculations?

**MR. STRATTON:** I'm not certain that he knew of the software.

**MR. SIMMONS:** Okay.

Mr. Moulton, the same question for you: What involvement did you have with the consultants from those agencies?

**MR. MOULTON:** Well, especially the first MHI review, they did a very thorough review. I would say that they went through it with a fine-tooth comb.

**MR. SIMMONS:** Mm-hmm.

**MR. MOULTON:** When they went through, they looked at all the inputs. They were very interested in making sure that the – you know, what's – they wanted to know how Strategist produced from the inputs what the outputs were. And we put together an exhibit that – for the base, the final base cases that actually showed that. And that information was given to Grant Thornton as well.

They also, besides wanting to know – you know, looking at the inputs and seeing if they were appropriate, they also wanted to ensure that I applied these inputs – these inputs were applied properly in Strategist, that I actually modelled the inputs properly.

So a gentleman, I can't remember his name, came to my office, sat down. And we looked at my computer and he spent two or three hours, and lots of subsequent, but he spent two or three hours, you know, basically saying how do you model this, you know, how exactly did you put in this, what did you put in there. Again, basically ensuring that the inputs that I said and the assumptions that we made were reflected in the modelling that we did.

**MR. SIMMONS:** Okay.

And did that gentleman have any prior familiarity with the Strategist program?

**MR. MOULTON:** Yes, to my knowledge he did. And from what he – the questions and type of things that he asked me he was, I'll say, an expert in Strategist, yeah.

**MR. SIMMONS:** Okay.

When – and you've mentioned then that you also provided information to Grant Thornton in the course of their investigation. When dealing with Grant Thornton, did you deal with anyone who had any similar prior knowledge of the Strategist system?

**MR. MOULTON:** Not to my knowledge.

**MR. SIMMONS:** Okay.

And, Mr. Stratton, in your dealings with Grant Thornton, was there anyone who had a prior knowledge of load forecasting who spoke to you or interviewed you about your load forecasts?

**MR. STRATTON:** I wasn't made aware that any of the individuals had load forecasting experience.

**MR. SIMMONS:** Okay, all right.

Thank you.

I have a question that's a very general question now about CPW. So I'll ask it and whoever can answer it, if anyone can, can you give it a try. So the CPW, cumulative present worth analysis, is a method for calculating or determining the value today of a range of costs that are going to be incurred in the future.

Now, my question is: What's the relationship between how far off in the future those costs are incurred and the effect of that on the valuation today? Everyone looks at Mr. Warren.

**MR. WARREN:** So the further away that the cost is in the future, the more it is discounted back. So it's an extra year of discounting. It's the time value of money, so an extra year down the road is another year that you've got to bring it back to the present. Based on your discount rate, it would obviously have a lesser impact.

**MR. SIMMONS:** Okay.

So a cost incurred far in the future contributes less to the CPW value than a cost incurred in the near future?

**MR. WARREN:** Yes. So a good case in point is the exhibit that I went through earlier this afternoon, just present valuing –

**MR. SIMMONS:** Uh-huh.

**MR. WARREN:** – which is the technique of deriving the CPW.

We saw that, nominally, the Isolated Island had more income. However, that income was in later years, so that when you actually discount them back into present value –

**MR. SIMMONS:** Mm-hmm.

**MR. WARREN:** – it actually had less value than the Interconnected Option.

**MR. SIMMONS:** So part of the predicting what's going to happen in the future in each of the Interconnected case and the Isolated case, depends on Mr. Stratton's extrapolated load forecast about what load is going to be in the future.

So can either of you comment on how important variations in the load forecast at the end of the predictive period are to the CPW, versus a variation early in the period?

**MR. MOULTON:** Well, they would be much, much, much less – they would have much, much less effect on the – especially going out 50, 60 years, they would have much, much less effect on the CPW.

**MR. SIMMONS:** So if you're calculating the CPW of two alternatives that reach out 50 years in the future, if there are inaccuracies in the load forecast at the distant end of those time periods, you're saying they have relatively smaller effect on the CPWs?

**MR. MOULTON:** That's correct.

**MR. SIMMONS:** Yeah, okay.

Question about industrial customers. There's been reference to, I think, a Marbek report, which looked at the potential for efficiencies in industrial customers. But was there any other work done by or for Hydro – Newfoundland and Labrador Hydro – or Nalcor in relation to assessing the potential for industrial customers to reduce their electricity –

**MR. STRATTON:** Yes –

**MR. SIMMONS:** – loads?

**MR. STRATTON:** – there would have been a study of industrial customers.

I can't recall the group that completed the studies, but the study entailed doing assessments of each of the industrial customer's properties.

**MR. SIMMONS:** Okay.

**MR. STRATTON:** So –

**MR. SIMMONS:** And what was the purpose of doing that?

**MR. STRATTON:** The purpose of that was – well, was twofold – to understand what potential there was there and to inform those customers of their opportunities for doing CDM.

**MR. SIMMONS:** So those studies, which were to try to identify electricity-cost-saving measures for those customers – they were communicated to Kruger, to North Atlantic Refinery and any other customers that were looked at?

**MR. STRATTON:** Yes, the ones that were completed would have been shared with those customers.

**MR. SIMMONS:** Right.

And do you know when that happened in relation – let's say in relation to DG2 and 3.

**MR. STRATTON:** I recall that it would have been before.

**MR. SIMMONS:** It was –

**MR. STRATTON:** Before.

**MR. SIMMONS:** – before? Okay.

**MR. STRATTON:** But I – I'd have to confirm, but that's how – I recall that it would have been pre-sanction and pre-DG2.

**MR. SIMMONS:** And of course the Vale plant in Long Harbour and the Praxair plant in Long Harbour are relatively new. Would there be any reason to expect that there was any substantial opportunity for electricity-cost-saving measures at those facilities?

**MR. STRATTON:** No, there would not be.

**MR. SIMMONS:** Yeah, and why would we think not?

**MR. STRATTON:** We would think that there would not be much potential because they would've been – they were a brand new investment, so they would – you would anticipate that they were using the latest technology.

**MR. SIMMONS:** Okay. Thank you.

Mr. Moulton, we've heard a fair bit about the Strategist program and the process of getting to a CPW number with the various iterations of runs through Strategist, taking the load-forecasting inputs, and the involvement of rates

and so on. Can you give me some idea how much time is involved in doing one iteration of this process, completing the circle?

**MR. MOULTON:** Well, it's – I'll go back – usually getting prepared to do a – getting prepared to do the full process, it'd probably take three or four months' work: collecting all the inputs, verifying them and getting – entering them into the program and making sure it ran.

My part in running, I'll say running one case – running – we had – we were running, I'll say, two case – we were running the Isolated Island and the Interconnected Island – typically, when I was running these cases from start to finish, going back and forth, they would probably take, I'll say, 12 or 14 hours to do a – that run.

**MR. SIMMONS:** So that's the computer processing time –

**MR. MOULTON:** Well, and –

**MR. SIMMONS:** – is it?

**MR. MOULTON:** – and some – some run, and again some input, some interaction between, I'll say, myself and the computer, some preliminary runs, but basically getting to the end. But I'd say the – I'll say the full process to run around an iteration – then, of course, once you got that information, you had to take the appropriate information out of Strategist and prepare it to send to the IE department.

**MR. SIMMONS:** Mm-hmm.

**MR. MOULTON:** So I'd say for to do both cases, prepare all the information, on my part, they were probably taking at least a week and, probably, to do the full iteration with all – you know, the full circle, two, three weeks, a month sometimes.

**MR. SIMMONS:** Okay.

**MR. MOULTON:** Again, depending.

**MR. SIMMONS:** So three months' work to get ready to start the process and each iteration could take two or three weeks in order to work through its process?

**MR. MOULTON:** Yes.

**MR. SIMMONS:** Okay.

Also for you, Mr. Moulton, you've described – you've answered some questions about line losses –

**MR. MOULTON:** Yes.

**MR. SIMMONS:** – the focus of it being the difference in the figures that are out there for –

**MR. MOULTON:** Yes.

**MR. SIMMONS:** – the transmission of electricity from Muskrat Falls to Soldiers Pond versus from Muskrat Falls to Nova Scotia, and you've spoken of the length of a line as being a factor.

Are there other factors that have to be taken into account to actually calculate the line loss on any particular – between any two particular points?

**MR. MOULTON:** There are many – I'll say a number of factors. Well, the physical construction of the line. The – how large or small a wire you use, the conductor that you use.

**MR. SIMMONS:** Mm-hmm.

**MR. MOULTON:** That has a big effect. The voltage level that you decide on has a very big effect. Other sources, again, just – we're saying the line, but within the full system you also have transformation between voltage levels, or in the case of the HVDC – the convertor stations – they also introduce losses. You could also build – we talked about synchronous condensers, we've mentioned these. I won't get into how, but building these at the end of the line can also reduce losses. So there are many different aspects that would come in to calculating the –

**MR. SIMMONS:** So aside from just the length of the line, which is different, there are other technological considerations that would come into play into actually calculating those numbers. So it's not as simple as taking the length of one line and saying if the line is twice as long the line loss is twice as much.

Would that be fair?

**MR. MOULTON:** No, it's not that simple.

**MR. SIMMONS:** Yeah, okay.

Mr. Warren, a question regarding the discount rates input into the CPW. I think this would be for you. And you've described – you've given us some description of how, I believe it was a 7 per cent discount rate –?

**MR. WARREN:** Yes.

**MR. SIMMONS:** –that was used?

And my question is: is there – is that just a number that's selected, just a choice – you're choosing seven instead of six – or is that a number that's derived somehow from other data, so that you find it instead of choosing it?

**MR. WARREN:** Yes, it's not a selected rate; it's a calculated rate, based on the regulated debt-to-equity ratio for Newfoundland and Labrador Hydro in this instance. Its targeted debt-to-equity ratio is 75 per cent debt, 25 per cent equity. So we use that as one input. We look at the cost of debt. As I noted in my response earlier, we would forecast the cost of debt using Conference Board of Canada forecasts, and we're looking at long-term rates.

Similarly we use the methodology that was consistent with Newfoundland Power for coming up with the anticipated long-term costs of equity, for that 25 per cent of equity. And that's how the number is calculated.

**MR. SIMMONS:** Okay. Thank you.

And, Mr. Moulton, one other question for you – there were some questions asked for – this afternoon regarding the thermal plant at Holyrood. And I don't know if you're the right person to answer these questions, but I'll try.

**MR. MOULTON:** I'll try.

**MR. SIMMONS:** Do you know how old the plant is?

**MR. MOULTON:** The plant was – I'm trying to remember now. I think the first two units, I think, were built in the – in around 1970, 1971. The third unit was built a bit later, and I think

the first two units were upgraded around – somewhere around 1979.

**MR. SIMMONS:** Okay.

**MR. MOULTON:** I stand to be corrected, but it's in that general time period.

**MR. SIMMONS:** Right. And do you know what, normally, the expected life of plant – generating plants of this type, is generally regarded to be?

**MR. MOULTON:** If they use – 30, 35 years.

**MR. SIMMONS:** Okay.

And what – is this a particular type of thermal generating plant? Is there a name for the technology in use in this one?

**MR. MOULTON:** This – I think you would call it a steam plant or a steam turbine. The turbines at Holyrood are called steam turbines.

**MR. SIMMONS:** Right.

**MR. MOULTON:** The fuel is burned to heat water which produces steam, and the steam runs through the turbines to produce electricity.

**MR. SIMMONS:** Right.

Do you know how many plants there are like that still in operation in North America? It may not be a fair question for you but –

**MR. MOULTON:** In very – well, again, most of the units, practically all of the units of that sort, are powered by coal.

**MR. SIMMONS:** Mm-hmm.

**MR. MOULTON:** And there are still lots of them in North America, to my knowledge.

**MR. SIMMONS:** Yeah.

**MR. MOULTON:** Oil-fired ones, like Holyrood – I'd say there's probably less than half a dozen in Canada, and very few in the United States. I remember when we were doing these studies for the electrostatic precipitators and scrubbers, trying to find representative

plants that had done the type, but it was hard to find them.

**MR. SIMMONS:** Okay.

**MR. MOULTON:** There weren't many.

**MR. SIMMONS:** The Isolated Island plan had time – expenditures included in it for the scrubbers and precipitators you just mentioned and also for some refurbishments over a period of time.

**MR. MOULTON:** That's correct.

**MR. SIMMONS:** Were there – had there been technical studies done to determine how long Holyrood could be kept alive through those refurbishments?

**MR. MOULTON:** I think it was a point of – I guess to a point of – from an economic point of view I suppose it's like the pair of moccasins that you replace three uppers and four bottoms; you still got a pair of moccasins, but you've – so if you're willing to spend enough money, I suppose, you could keep it going as long as you want, but, of course, at the end of that – it's typically considered from an economic point of view that, I'll say this 30, 35-year life, that's what it kinda refers to. It's that at that point, you'd be spending more money on refurbishment than you –

**MR. SIMMONS:** Right.

**MR. MOULTON:** – than – you'd be better off building something new.

**MR. SIMMONS:** Now, this may not be – you know, if this is not a question for you, just tell me, or for any of the other gentlemen, but back when these two options were being considered, Isolated Island and Integrated Island, was there an option just to do nothing or did something have to change in our electrical system in order to meet the needs in the future?

**MR. MOULTON:** Well, I'm not quite sure when you say nothing –

**MR. SIMMONS:** Mm-hmm.

**MR. MOULTON:** – we had a growing load and, you know, part of – as I explained with the generation expansion – part of the things were that different generating units, I'll say, reached the end of their life and were replaced.

So, no, I don't think an economic option would be to do nothing, no.

**MR. SIMMONS:** Mm-hmm.

**MR. MOULTON:** You'd – well, if you're gonna keep the generation plant that we had such as Holyrood, you'd have to keep spending a – and keep spending, I would think, increasing amounts of money to keep it reliable.

**MR. SIMMONS:** Okay. Good. Yup.

Thank you, that's all the questions I have, gentlemen.

Mr. Moulton, you –

**MR. MOULTON:** Can I just make one more, in response to Mr. Budden's last question to me?

**MR. SIMMONS:** Yes, please.

**MR. MOULTON:** I was thinking about it a little bit afterwards, I think the statement or question was kind of a – the extra 76 megawatts that were available on the Labrador-Island Link and what would it cost to get the extra 76 megawatts to put on that link.

And I was thinking about it a couple minutes after, I think, I answered; I'm not sure. What I was thinking about after, that 76 megawatts represents capacity. So the use of that would be at times of peak, or at times of peak when other generating equipment had broken down somewhere in the system.

So, I would agree that getting 76 megawatts to feed into that line on a unit basis would be, probably expensive, depending on where you got it from, but I would also think that you would only use it for a minimum number of hours at a time or a minimal number of hours for years, so that the absolute cost of it wouldn't be very great, wouldn't –

**MR. SIMMONS:** Okay. Thank you very much.

Thank you, Commissioner.

**THE COMMISSIONER:** Redirect, Ms. O'Brien?

**MS. O'BRIEN:** Thank you, Commissioner.

If I could please have up Exhibit P-00254, please?

Mr. Warren, these questions will be for you. This is an exhibit that was put to you by Mr. Smith, who's acting for Edmund Martin. I just want to be clear, when – what was this document prepared for? For what purpose was this document created?

**MR. WARREN:** It was a document that was – I think Mr. Martin, at the time, just wanted to have an understanding of looking at it at a bigger picture. What both of these scenarios – what type of benefits could be seen, not just for ratepayers but for all of the Province in which those ratepayers live as well.

**MS. O'BRIEN:** Okay.

Do you know when this work was performed?

**MR. WARREN:** I would think it was around late 2012.

**MS. O'BRIEN:** Okay.

And you mentioned that you worked with someone on the LCP project team who was versed in economic benefits. Who would that be?

**MR. WARREN:** That would've been Steve Goulding.

**MS. O'BRIEN:** Sorry, Steve –?

**MR. WARREN:** Goulding.

**MS. O'BRIEN:** Steve Goulding.

**MR. WARREN:** And on my side it would've been Mr. Steve Goudie.

**MS. O'BRIEN:** Right.  
So Mr. Steve Goulding. Okay.

Just to make sure I was clear from questions asked by Mr. Peddigrew, the money here that's going in to pay these benefits, this is money that's being collected from the Newfoundland and Labrador ratepayers?

**MR. WARREN:** Yes.

**MS. O'BRIEN:** Okay.

**MR. WARREN:** I guess it's the ratepayer that is – based on the business case as I understand it, the business case was that, just looking at it at DG3, there was a \$2.4 billion preference for the ratepayer. And yes, that is based on the rates at that time.

**MS. O'BRIEN:** Okay. So that's who's paying for it.

Okay. Now if this – just to make clear, this net benefits calculation that you've done here, is this – the factors that could affect the base CPW calculation, would those also impact the net benefits calculation?

**MR. WARREN:** I don't – just a little bit –

**MS. O'BRIEN:** So underlining this work is the assumption that the Isolated Island Option under the CPW analysis is preferential to the – sorry, the Interconnected is preferential to the Isolated by 2.4 billion?

**MR. WARREN:** Yes, and also it's – the core economic assumptions are based on what is baked – what I call baked –into the CPW calculation. So it's the – it's based on the level of capital costs that's in both generation expansion plans. It's based on the operating plan at that time, based – again, based in each of those scenarios, those generation expansion plans.

**MS. O'BRIEN:** Okay –

**MR. WARREN:** So if capital or operating goes up or down, you can anticipate that they probably would go up and down in a similar fashion.

**MS. O'BRIEN:** Okay.  
So if the underlying assumptions were changed such that the Isolated Island Option was the



preferred option on the CPW, then these net benefits would all change as well?

**MR. WARREN:** Not all of the benefits. So if – say, for example, Interconnected Island just was static – like, the dividends. The dividends don’t – they’re not tied – they’re tied to each of those scenarios, if – and it depends on the amount of equity that’s injected into the – it’s not like a simple, like, income.

**MS. O’BRIEN:** Sure. I understand –

**MR. WARREN:** But, yeah.

**MS. O’BRIEN:** – it’s not a direct 1-1 ratio, but –

**MR. WARREN:** No.

**MS. O’BRIEN:** – the underlying assumptions that affect one would also have some impact on the other?

**MR. WARREN:** Yes.

**MS. O’BRIEN:** Okay. All right.

Okay. And was this work – so this was done prior to DG3. Was this work that you did, was it reviewed by Manitoba Hydro International?

**MR. WARREN:** I don’t recall. I don’t think so.

**MS. O’BRIEN:** Are you aware whether –

**MR. WARREN:** Because I think it was later in 2012.

**MS. O’BRIEN:** Okay.

Do you know whether this work was reviewed by any independent consultants?

**MR. WARREN:** Not that I’m aware of, no.

**MS. O’BRIEN:** Okay.

**MR. WARREN:** Other than – sorry. Other than, as I noted in my initial response, Strategic Concepts was also used to help, I guess, by the two Steves – Goulding and Goudie – to help come up with some of these factors in that.

**MS. O’BRIEN:** That was a consultant who was involved with Investment Evaluation and with the project management team, Steve Goulding –

**MR. WARREN:** Yes.

**MS. O’BRIEN:** – to develop these numbers.

**MR. WARREN:** Yes.

**MS. O’BRIEN:** Yes. No, I understood that. I was just wondering –

**MR. WARREN:** Yes.

**MS. O’BRIEN:** – if anyone independent had reviewed it?

**MR. WARREN:** No.

**MS. O’BRIEN:** Okay.

And Mr. Simmons did ask Mr. Stratton and Mr. Moulton about their involvement with MHI. Did you have any interactions with Manitoba Hydro International?

**MR. WARREN:** Myself, personally, I don’t recall any interactions. At that time, it would make more sense for them to directly interface with Steve Goudie who had the 20, 30 years’ experience. He was obviously a much larger participant in the generation expansion plan process than I. And I was off doing other activities. I would, obviously, be tied in as Mr. Goudie’s supervisor, but Mr. Goudie’s 20, 30 years’ experience kind of led him into doing that type of work.

**MS. O’BRIEN:** Okay.

So you may not be the one to answer this, but I’ll ask anyway because you testified earlier that you were aware that no dollar values for strategic risk had been used in the capital cost estimates that were used for the CPW analysis. You personally were aware of that. You understood that to be in a separate envelope, as you say, controlled by the Gatekeeper?

**MR. WARREN:** Yes.

**MS. O'BRIEN:** Are you aware whether that information was communicated to Manitoba Hydro International?

**MR. WARREN:** I'm not aware.

**MS. O'BRIEN:** Okay, thank you.

Those are my questions.

**MR. WARREN:** Thank you.

**THE COMMISSIONER:** All right. Thank you, gentlemen.

So we're finished for the day. So our schedule now takes us back to St. John's starting Monday when Mr. Williams will testify.

So I want to thank the people in Labrador who have assisted us, particularly those individuals here at the O'Brien Centre. And also our technicians in the back who have kept things going. And I want to thank you, the counsel and the witnesses for providing us with the evidence.

I think that today was an example when something extremely complicated was very well explained by the witnesses as a result of the questioning by Ms. O'Brien and, as well, by counsel. So I appreciate that very much.

So we'll commence again on Monday at 9:30 in the morning in St. John's.

Thank you.

**CLERK:** All rise.

This Commission of Inquiry is concluded for the day.