BRITISH COLUMBIA UTILITIES COMMISSION

IN THE MATTER OF THE UTILITIES COMMISSION ACT
R.S.B.C. 1996, CHAPTER 473

And

British Columbia Hydro and Power Authority
British Columbia Utilities Commission Inquiry
Respecting Site C

VANCOUVER , B.C.
October 13th, 2017

TECHNICAL INPUT PROCEEDINGS
VANCOUVER

BEFORE:

D.M. Morton,	**Commision Chair/Panel Chair**
D.A. Cote,	**Commissioner**
K.A. Keilty,	**Commissioner**
R.I. Mason,	**Commissioner**

VOLUME 13

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1 **VANCOUVER, B.C.**
2 **October 13th, 2017**
3 **(PROCEEDINGS COMMENCED AT 9:03 A.M.)**
4 THE CHAIRPERSON: Good morning. Thank you for joining
5 us as we open the first of two scheduled technical
6 input presentation sessions.
7 My name is Dave Morton and I'm the Panel
8 Chair for the Site C Inquiry and I'm also the Chair
9 and CEO of the British Columbia Utilities Commission.
10 With me today are my fellow Site C Inquiry panel
11 members, Dennis Cote on my left, Karen Keilty on my
12 right and Richard Mason on Ms. Keilty's right.
13 These technical presentation sessions are
14 intended to provide the panel with an opportunity to
15 ask questions and hear further submissions of parties
16 who submitted data and analysis during the first phase
17 of the inquiry. The panel's priority today is to
18 ensure that our questions are answered, and as such,
19 in some cases, our questions may proceed or interrupt
20 presentations, and we apologize for that, but time is
21 limited and, as I say, we really need to get our
22 questions answered.
23 Those presenting today have all been
24 invited by the panel to do so. While the sessions are
25 open to the public, there will not be additional
26 speaking opportunities beyond those that have been

prearranged.

Mr. Bemister will help with organizing speakers and other logistics and his team is over here recording and transcribing these sessions. The live audio will be streamed from our website, siteCinquiry.com and following these sessions, all presentations will be transcribed and posted with the rest of the inquiry documents.

The panel is aware of the circulation of the unredacted Deloitte report filed in the first phase of the inquiry. The information redacted in the Deloitte report was done so to ensure that current and future negotiations between BC Hydro and its suppliers were not compromised as a result of this information being publically available and thereby potentially causing a rate impact, an impact for ratepayers. The panel still considers the information confidential despite its inappropriate disclosure in the press. The panel may redact or refuse presentations or portions thereof that contain reference to the confidential information.

Each individual representative of an organization who is presenting today, or answering questions, must please identify them by stating their first name and spelling their last name for the transcription record.

With that, we're ready to open this technical input session in Vancouver on October 13th, 2017 and our first speaker, please, begin your presentation. Thank you.

Proceeding Time: 9:06 a.m. T02

SUBMISSIONS BY CLEAN ENERGY ASSOCIATION OF BC (CEABC) (#0289):

MR. AUSTIN: My name is David Austin, I'm representing the Clean Energy Association of B.C. A-U-S-T-I-N. I have with me Jim Weimer, W-E-I-M-E-R, who is a consultant for the Clean Energy Association of B.C. and Stephen Cheeseman, C-H-E-E-S-E-M-A-N, who is a director of the Clean Energy Association.

In terms of questions, direct them firstly to me, and then if I think that one of the other gentleman can do a better job of answering, I will refer it to them.

THE CHAIRPERSON: Thank you, Mr. Austin, on that note I'll just ask the panel if there are any questions at the outset that we have? Or should we move on with the presentation? Please go ahead sir.

MR. AUSTIN: Before we go into the presentation, we have two housekeeping matters. The first is when we filed Exhibit F18-5 there was a mistake in the formatting and the table of contents doesn't refer to the conclusion. So, we would like to be able to file an

1 amended F18-5 that corrects that minor error. There
2 is no other changes, no changes in content.
3 The second thing, in Exhibit F18, page 19,
4 section 5, we've done an analysis of the spring
5 freshet flows on the Peace River in relation to the
6 Site C project. We have asked in the rate design
7 application process for an analysis of the spring
8 freshet flows. It still hasn't appeared anywhere to
9 our knowledge. And second of all, the question the
10 panel asked was specific in terms of those freshet
11 flows. The answer was not specific, so we've made
12 assumptions, and in a sense we've generated our own
13 analysis of spring freshet flows. It may or may not
14 be correct. So, we just wanted to make that clear,
15 that we have done that analysis and generated our own
16 freshet flows for the purpose of that section of the
17 submission.
18 THE CHAIRPERSON: Thank you, sir, it is fine if you wish
19 to file the amended document too.
20 MR. AUSTIN: Thank you. This is going to be a machine
21 gun type presentation, because we know time is
22 limited. But this table in a sense is the core of
23 what the Clean Energy Association or IPPs have been
24 concerned about with respect to Site C.
25 **Proceeding Time 9:08 a.m. T03**
26 If you look at the first line, upper left-

1 hand corner, it says, "Before rates plan changes, and
2 Site C has got a unit energy cost of $83 per megawatt
3 hour". We do not know how that $83 a megawatt hour
4 was generated, because we have never had access to BC
5 Hydro's financial model that generated that number.
6 So, we want to make that perfectly clear.
7 In terms of understanding how you should
8 analyze the project, we start at that top line. Those
9 top-line numbers are model-generated numbers. And
10 then once you have the model-generated number, then
11 there is adjustments after that generation for
12 purposes of calculating the unit energy cost. We're
13 not going into the details of how you should or
14 shouldn't calculate a unit energy cost in this part of
15 the presentation. The point that we would like to
16 make here is, there is no less than eleven adjustments
17 to the model price. That's unheard of anywhere in the
18 United States and Canada.
19 And that is what we're trying to get at in
20 much of our information, as what are fair adjustments,
21 and what are adjustments that make no sense
22 whatsoever? We're not going to go through in this
23 presentation all eleven adjustments. In some cases
24 there's even more, depending on how you've done your
25 analysis. We just want to point out it's adjustments
26 to the extreme.

If we think of terms of those adjustments, one of the adjustments was an adjustment to Site C price. And there's a subtraction of $26 a megawatt hour in relation to impact of equity return in dividend charges. So, that's the ten-year rate plan adjustment.

And what we want to point out there is, that ten-year rate plan was in effect at the time that the Harry Swain panel looked at Site C. But that $26 a megawatt hour adjustment was never made for any of the numbers that BC Hydro filed in that process.

They were using weighted average cost of capital in that process. There was some disagreement between the Clean Energy Association and BC Hydro with respect to calculation of weighted average cost of capital. There's no point in going through that again. The Site C joint review panel was not equipped to handle financial discussions or disagreements. But we would like to point out that that $26 a megawatt hour adjustment was never on the table in relation to the Site C joint review panel analysis. It popped up after that Site C joint review panel process was finished, and it was used for the purposes of the decision to advance Site C.

Some of the basics about our disagreement with that $26 a megawatt hour adjustment are contained

1 in our submission. And our last submission in
2 particular, because it has the -- a paper, an expert
3 opinion, that covers a lot of that material.
4 And we can summarize it really quickly. If
5 we look at the top line of this slide, you'll see debt
6 rate, debt finance to equity rate, equity finance,
7 weighted average cost of capital. That's how Site C
8 was analyzed and our expert's report, by Dr. Boyer,
9 says that's in his view how it should be analyzed. So
10 there's a large difference in numbers.
11 And I think I could summarize this in
12 fairly simple terms, although Dr. Boyer's paper
13 contains a lot more information than these very simple
14 terms. When Site C was analyzed as against the
15 alternatives, the whole concept of the risks inherent
16 in a large hydroelectric project were parked by the
17 side of the road. And when financial analysis is done
18 and done properly, you don't do that.
19 What we often hear is, the government's
20 cost of borrowing is cheaper, therefore IPP projects
21 are more expensive. That is not accurate in relation
22 to a proper evaluation as between alternatives,
23 because the cost of borrowing and the government's
24 cost of borrowing has got nothing to do with risk, in
25 relation to a specific large hydroelectric project.
26 **Proceeding Time 9:13 p.m. T04**

It's got something to do with what happens post-financial analysis and including risk, but not at the time that the analysis is being undertaken. And to look at it from an IPP perspective, it would be the equivalent of a large IPP developer, and some of them have much larger balance sheets than BC Hydro and excellent credit ratings, analyzing its project on the basis of its borrowing cost. No equity included, no debt included -- no equity included, simply its debt cost. And if it did that, it's going to come to some very erroneous conclusions most of the time.

Capital is scarce. It has to be allocated properly. Risk has to be taken into account in that analysis, and the way Site C has been analyzed, with respect to that particular adjustment, risk has been totally parked.

In terms of an IPP with a large balance sheet, it can do a proper project analysis putting in the risk factors, and then comparing that to other projects it has the opportunity to invest in. It can then pick the best project. Then for the purposes of actually financing the project, as opposed to analyzing the project, it could hold that project on balance sheet until it is built and most of the risk taken out, and obtain a cost of debt that would be very close to BC Hydro's, which is the government of

1 British Columbia.
2 So that's the key concept. There's the
3 concept of risk and then there's a concept of what
4 cost of borrowing you could obtain in the financial
5 markets.
6 So there are a fair number of IPPs who have
7 access to long-term debt at, or very close to the
8 price of BC Hydro's long-term debt. But that is not
9 how you analyze a project for the purposes of
10 comparing it to alternatives.
11 THE CHAIRPERSON: Mr. Austin?
12 MR. AUSTIN: Sure.
13 THE CHAIRPERSON: As I understand it then, you're saying
14 that you shouldn't use the impact on ratepayers or the
15 economic impact on ratepayers as the way to analyze
16 alternative projects. As I understand it, BC Hydro's
17 position is that they are barred from developing wind
18 and geothermal and any other alternative project, so
19 the only project that they can develop essentially is
20 a hydroelectric project.
21 So if they develop the hydroelectric
22 project, this is what ratepayers will pay, and if they
23 don't develop the alternative projects, then
24 ratepayers will save another amount. So it's not an
25 analysis, as I understand it, that's based on risk,
26 but based on what ratepayers will pay.

MR. AUSTIN: I think you'd have to ask BC Hydro that question because ultimately the ratepayers are going to pay whether it's an IPP project or Site C. So there's going to be impacts on ratepayer projects.

What we are saying is when you're looking comparing the alternatives, factor in the different risks of the projects. Then you can go on and look at it in terms of ratepayer impacts. Because, as I've said, let's take a wind project for example, 60 percent of the cost of the wind project effectively comes in a box. It's a wind turbine, a tower, and some blades. There's not a lot of risk associated with that, because it's a contract price.

In terms of the foundations for a wind project, if I have problems with a particular site in terms of a foundation, I can move the foundation to some extent, or I can drop a tower site. I can't do that in relation to a large hydro project.

So you have to start factoring in the different risks when you are doing that comparison. If my wind project completes, I've got a long-term electricity purchase contract with BC Hydro, then I can look at my ratepayer impact. I can look at what BC Hydro is going to be paying the IPP over the term of the contract which will typically be 20 to 25 years.

1 **Proceeding Time: 9:18 a.m. T05**
2 In terms of Site C, my ratepayer impact is
3 going to be the as-built cost in both instances, and
4 my long term operating cost. The IPP contract
5 contains the long-term operating cost, so that is how
6 I can look at my ratepayer impact in relation to say
7 for example the wind project, and in terms of Site C I
8 have to look at my as-built, plus my long-term
9 operating costs.
10 And we have made this point continually,
11 that something like a 70-year period defies logic.
12 Because nobody can estimate what is going to happen
13 over the term of 70 years. And in our submissions we
14 have said, look at the bond market. What's the normal
15 -- what's the maximum length of bond issues in the
16 market? Typically, that's around 40 years. There are
17 some outliers where occasionally you get some issue
18 that has got a longer term than that.
19 We also say look at the fact that the water
20 licence for Site C only goes for 40 years. So, that's
21 another metric in terms of my risk analysis framing
22 the time period.
23 THE CHAIRPERSON: Thank you, sir.
24 MR. AUSTIN: This slide, just as a quick demonstration
25 of, if there is no return on equity, is there any
26 equity in Site C? Because the government said no

return on equity for 70 years. So, what we're saying is, if you're going to do that, are we -- you're saying that all there is is a hundred percent debt, what's happening is all the risk associated with that development is being put on the debt. So, 100 percent debt actually equals 100 equity with no return. In other words, the two concepts merge.

There is the concept of the tilting of the table. And if you think in terms of the first slide that I showed you, when you have all those adders, let alone whatever is in the model that came up with that $83 unit energy price at the plant gate for Site C, which is essentially the point of integration into BC Hydro's system, which is Peace Canyon, there is 11 items after that. And one of the items is this idea of the intermittency of renewables and we'll use wind as example.

We fully appreciate that these projects are intermittent, but how much are you going to charge or assess in a sense of penalty with respect to that intermittency? And in the case of BC Hydro's analysis, it can be $10 a megawatt hour, for the purposes of the first slide I showed you. It's got a capacity adder of $5 a megawatt hour, and that is for the term of that unit energy cost analysis.

Then when you look at how BC Hydro has

1 analyzed some of their portfolios, they've said
2 because the resources within a particular portfolio
3 are intermittent, then there has to be thermal backup.
4 Then there is another $5 a megawatt hour wind
5 integration charge on that. You don't need two
6 charges for the same thing. And then on top of that,
7 BC Hydro Site C project gets a capacity credit. So
8 essentially that it the third time you've accounted
9 for the intermittency of a renewable such as wind.
10 When the Site C project was originally
11 envisaged, it was thought that the domestic demand
12 would be consistent with its output. Well, that
13 hasn't happened. And so now when you read BC Hydro's
14 answers and material, there is often mention of the
15 value of Site C's capacity and its flexibility. And
16 in Exhibit F18-5, on page 7, and this is the only
17 passage out of our submission that I will pay direct
18 attention to. There is a quote from a BC Hydro
19 response to an undertaking in the Joint Review Panel
20 process.
21 **Proceeding Time 9:23 a.m. T06**
22 And it's the second paragraph from the bottom of the
23 page that says,
24 "The project generating units are expected to have
25 approximately 25 percent more hydraulic discharge
26 capability than G.M. Shrum and Peace Canyon generating

units, providing for some ability of generation shaping for load and market opportunities at Site C." However, its sensitivity of generation to hydraulic head -- translated in English, which is when the reservoir is drawn down, there is not as much pressure to push the water through the turbine so the electrical output drops.

If you've ever had a blockage of your pipes in your house, one of the things to do is fill up a bathtub with as much water as you can and pull the plug and see if that water pressure won't push that plug out. The lower that bathtub level goes, the less pressure. That's exactly what this sentence says.

It also goes on to say, "Its high sensitivity of generation to hydraulic head water pressure would lead to the project being used for shaping in lower preference over other facilities." Site C is not a rock star capacity project and it's not a rock star flexibility project.

The rock star flexibility and capacity projects are on the Columbia, and that's referred to in the paragraph immediately above. And that's what a lot of people don't understand, is that Site C has got limitations. It is not -- does not have a lot -- a high head, meaning the height of the dam is not that high, and it's the third in a row. So it essentially

1 becomes a run-of-river project.
2 The point that I wish to make is, that's
3 not the Clean Energy Association of B.C.'s assessment
4 of Site C. That's BC Hydro's assessment of Site C.
5 The next thing that we want to touch on
6 very briefly is that even if Site C was a rock star in
7 terms of capacity and flexibility, the market for
8 capacity and flexibility is California. Alberta is
9 very much a stand-alone type of jurisdiction. You
10 have to get your product to the California market. BC
11 Hydro has produced some figures in terms of the
12 capacity that's available in the transmission lines to
13 get it to California. Powerex has got some firm
14 bookings on those lines. But remember, the downstream
15 benefits that Powerex administers on behalf of the
16 province of British Columbia also have to get onto
17 those lines if they're trying to sell into the high-
18 priced -- if prices are higher in California.
19 There is a keyhole. There is a constraint.
20 There is not any broad access for getting capacity or
21 flexibility to the California market. There is not a
22 market for that in the U.S. Pacific Northwest, because
23 their system is very similar to our system. Alberta
24 wants to develop its system very much on a stand-alone
25 basis.
26 In terms of the construction side of Site

C, we want to point out that the geotechnical risks are just starting. IPPs who build run-of-river projects know all about geotechnical risks. They go across my desk and have been for the last 15 years. It's one thing to estimate the cost of a project above ground. Below ground, it's a totally different story. Anything can and does happen.

We have one point in terms of civil contract number 2, which is the next-largest contract, and I'll refer to it as the "contrary" contract. According to BC Hydro's website, a Request for Proposals was issued to three -- four proponents who had been previously short-listed. So you go through a beauty contest, you pick your preferred proponents, and then you say to them, "Here's the Request for Proposals. Put your prices in."

Well, according to the website, that was supposed to have happened in September, 2017 or thereabouts. There should be prices in with respect to those proposals. Now, subsequently - and these can be found in the reports that BC Hydro has been filing with Site C - subsequently it says, "Requests for Proposals being prepared". And then another quarterly report, the most recent one, was "Requests for Proposals were issued in 2016."

There's a trail of bread crumbs there that

1 should be followed to find out if bids have come in
2 and what those bids are in relation to the estimated
3 contract price.
4 **Proceeding Time 9:29 a.m. T07**
5 It could be that the bids came in and they
6 were too high and BC Hydro wanted to amend the request
7 for proposals, but when Mr. Chris O'Riley says in his
8 letter that there's potential for higher costs in
9 relation to the concrete contract, our view on that is
10 that's the equivalent of the weather forecaster saying
11 there's a potential hurricane warning.
12 There's two project maximums when you are
13 building a project that you have to pay attention to.
14 The first one is the day you announce your project is
15 the best day for the project. After that, everything
16 goes downhill. If you somehow think that if you are
17 in a tough patch in your project development, there's
18 going to be sunny days ahead, 99 times out of 100, the
19 developer is deluding themselves.
20 The second maxim is don’t get emotionally
21 attached to your project. And the way developers
22 frame that one is by saying, don’t let your dogs
23 become your pet.
24 We've got a brief slide about declining
25 costs of alternatives. They are declining, and the
26 Clean Energy Association of B.C. and CANWEA have filed

1 a report in that respect. The author of that report
2 is going to be here later on this morning, so I would
3 think it best that he go through the declining cost of
4 alternatives. But they are real, and the way to look
5 at Site C is you are locking into a fixed price
6 contract for 70 years, so think of it in terms of
7 inflation. So let's say it goes like that.
8 Because of the declining cost of the
9 alternatives, I've got alternatives that are going
10 down like that. So eventually they'll bottom out, but
11 if they bottom out here, the difference between -- the
12 delta between the two is the while elephant quotient,
13 or the stranded asset quotient. It's real. It's
14 coming. And you probably have been told this in some
15 of your sessions throughout British Columbia, but the
16 Premier of Quebec has said no more large hydroelectric
17 projects. He understands what's happening in terms of
18 the alternatives.
19 The alternatives are going lower in price
20 and Site C is not. And to put it another way, with
21 respect to the cell phone in your pocket, if I offered
22 you a 70-year contract for that, would you take it?
23 And that's exactly what BC Hydro is doing in relation
24 to Site C, and that's why we say 70 years doesn't make
25 any sense. It's way too far out there.
26 Dr. Boyer and the Clean Energy Association

of B.C. are far more comfortable with a 40 year period for the purposes of analyzing this project and paying for it.

We have done some work on the declining cost of the alternative portfolios but, as of yesterday, we recognized that there's an opportunity to go into far more detail on that, and we just, in this particular instance, want to point out that there are alternative portfolios that can meet the demand that BC Hydro is showing.

Those portfolios should be viewed in terms of the demand, not Site C. Because Site C has got this horribly inflexible component to it. It's an all or nothing proposition. Whereas the alternatives can be brought in to far more closely match demand. So that you don't get a large overhang like you did when the Revelstoke project, the last large hydro project that BC Hydro built, came into service. The full output of that project wasn't taken up for about 18 years. So then you have to deal with essentially trying to sell it into the export market, trying to forecast those revenues, and on the basis of what we know today, there is going to be a lot of losses in relation to selling that electricity versus the price of actually generating it.

Proceeding Time 9:34 a.m. T08

1 Finally, in terms of alternative portfolio,
2 the concept of the greenhouse gas emissions from
3 single-cycle gas turbines has been totally overblown.
4 We've covered that in our submission. Those single-
5 cycle gas turbines will probably be at most on two to
6 three percent of their maximum output in any year.
7 Subject to any questions the panel has,
8 that's the Clean Energy Association of B.C.'s
9 submission, and thank you very much.
10 THE CHAIRPERSON: Thank you, Mr. Austin. That's fine,
11 thank you very much.
12 I didn't mention earlier, we'll be going
13 until noon today -- noon this morning. We'll try and
14 take a break about halfway through. But otherwise
15 we'll just continue with the next presenter, thank
16 you.
17 MR. AUSTIN: And I notice I made my target of half an
18 hour.
19 THE CHAIRPERSON: Yes. Much appreciated, sir, thank you.
20 Do you need a little time to set up, or are
21 you good to go at this point?
22 MR. ELIESEN: Well, if the CEA will loan us their laptop,
23 I'll just move this in, unless there's --
24 THE CHAIRPERSON: Two minutes, yes.
25 **(PROCEEDINGS ADJOURNED AT 9:35 A.M.)**
26 **(PROCEEDINGS RESUMED AT 9:36 A.M.)** **T09**

1 THE CHAIRPERSON: Please go ahead, sir.
2 **SUBMISSIONS BY MR. ROBERT McCULLOUGH (#0290):**
3 MR. McCULLOUGH: Good morning. My name is Robert
4 McCullough, M-C-C-U-L-L-O-U-G-H. Chairman,
5 Commissioners, thank you very much for the invitation.
6 I'll sit down. I just thought I would stand to
7 introduce myself.
8 THE CHAIRPERSON: Thank you. And I'll just ask the
9 panel at the outset if there's anything that you want
10 to ask before we start?
11 Okay, please go ahead, sir.
12 MR. McCULLOUGH: By the nature of this process, some of
13 this will be repetitious. I'll watch your eyes to see
14 if you've seen it too many times and skip over it
15 quickly.
16 THE CHAIRPERSON: Okay. Thank you.
17 MR. McCULLOUGH: Let me start by talking about
18 Commission A-22. You proved that to us just recently
19 I believe, in the attempt to make sure we have very
20 little sleep. We have gone through it. We think it
21 is excellent. In fact, I was a bit envious. It's in
22 more detail than we were able to provide and it
23 appears to have been thoughtful.
24 I would certainly provide more detailed
25 analytics because -- let me comment quickly. The only
26 issue I might have with it is, one, that it may be a

bit conservative. The Pacific Northwest on the U.S. side has 40 million acre feet of storage. British Columbia has 40 million acre feet of storage.

My apologies.

We've seen no analysis that we are storage limited in British Columbia. The author of that report proposed adding more batteries to add to the storage. That may not be required. On the U.S. side we have ten times as much wind as exists in British Columbia. We are not facing storage constraints per se. Our major constraint on the wind has to do with the fact that delivery point for much of the wind is at the bend in the Columbia River as it heads towards Canada. There's a transmission constraint out of that area accentuated by two base load plants. One already scheduled for removal, a second that's reaching the end of its expected life expectancy.

That 1500 megawatts constitutes a problem with transmitting wind out of that area. So, one of comments will be, have you been too conservative. But I compliment you for being conservative, that's the right way to go.

Let me then note that I have called this presentation "Knee Deep in the Big Muddy". Now, it's always dangerous to have humour in a technical presentation, but as you know, the world expert on the

process that you are now in has recently gotten the Nobel Prize, and the reason he has is because Dr. Thaler has analyzed this incredibly painful process for us.

It is very difficult for us to make decisions halfway through a project. The inertia built into our mind always wants to go ahead with something now that it's started. I've been through this professionally on both sides of fence, as proponent and as decision-maker, and I have to tell, I sympathize with the sheer amount of difficulty and pain this has. But the right answer is to go with the economics, and I can say that when closed the nuclear plant in Oregon fifteen years ago -- twenty years ago now, I sat in on making that decision, and it was just as difficult as the decision before you now.

The reference to "knee deep in the big muddy" is a famous anti-war song by Pete Seeger. When I proposed that as a theme, my staff said, "Who is Pete Seeger?" So I hope we're not facing that problem.

And basically it is simply a tongue-in-cheek song about a military patrol trying to cross a large Louisiana River. The captain always says go forward and then after he steps into the quicksand and drowns, the sergeant says, "I'm in charge now. We're

1 going back."
2 That is the right answer. And as it turns
3 out, Dr. Thaler himself identified that as the theme
4 song of this particular decision-making process.
5 **Proceeding Time 9:42 a.m. T10**
6 So I'm going to start walking through this
7 alliance. Some of them you know by heart by now. And
8 you can stop me at any time, just say, "We know that."
9 Because I know you do.
10 So here is a picture of Pete Seeger, if
11 you've forgotten him. Sadly, he's dead now. And Dr.
12 Thaler, who interestingly enough I intersected with in
13 my yeas at Cornell. He was a lowly assistant
14 professor and I was an even more lowly teaching
15 assistant. You could tell the difference between us
16 in those days because he had a window and I didn't.
17 Apparently he's gone further with his life than I did.
18 Okay. Policy inertia. Our basic problem
19 is that there is no bad guy in this process. We
20 started planning Site C 30 years ago, when I was an
21 executive at Portland General. We turned down an
22 ownership percentage. I can remember sitting in the
23 board room. It is an expensive project.
24 In the economic context of ten years ago,
25 prices were very high. Oil hit 150. I think we can
26 all remember how heady those days were. Natural gas,

1 $10. That's changed. The technology of fossil fuels
2 has changed immeasurably.
3 At the same time, bulk power markets give
4 us a lot more options. And so we have prices at mid-C
5 that are quoted everywhere in the world. You know,
6 open up the papers and newsletters everywhere and see
7 that, and it's a mature market. We have forward
8 markets and derivatives. We have vastly more choices.
9 Renewable resources amaze me. I frankly
10 was a cynic on renewable resources until two or three
11 years ago. But the fact is, assembly-line
12 manufacturing means that the more of them we do, the
13 better we get. They come off an assembly line. I
14 passed by a train as I drove up to Longview the other
15 day with a new wind farm. It was a hundred cars of
16 wind farm that was going up to Olympia. It will be in
17 operation next year. $50. That power is for sale
18 right now. So this is not speculation, but it is
19 surprising shifts. The fact is, Site C was simply
20 overtaken by events.
21 I'm not going to describe our
22 qualifications. Suffice it to say my grey hair speaks
23 for itself. I've been around a long time. We have
24 worked on hydro projects, both developing and
25 opposing, across Canada. I do not have a vested
26 interest one way or the other. The question is,

1 what's best for ratepayers? Other people here have a
2 stronger environmental sense. I will leave them to
3 make that speech.
4 We've restricted our comments to areas
5 where we thought that we had a comparative advantage;
6 areas that we ourselves worked in. So we don't have
7 the breadth of some of the commenters. But I will
8 state that we actually have on-the-ground real-life
9 understanding of what we did comment on.
10 There is the load forecast. I had a
11 meeting with the Superintendent of Seattle City Light,
12 a large publicly-owned utility. And his entire focus
13 was on the decline of load growth. And he commented
14 repeatedly how much he hated LED lamps. And the fact
15 is that our load based on illumination is declining by
16 90 percent. LED lamps are simply that good.
17 That's impacting every utility in North
18 America. Hydro-Quebec, an area where we do a lot of
19 work, is facing this same flat load growth experience.
20 A lot of it is industrial. We just have gotten better
21 at industrial projects. And what that means is that
22 we make paper with less energy. We do chemicals and
23 steel with less energy. So there are a lot of
24 changes, we're just not seeing the load growth in that
25 sector.
26 Two areas of load growth in the BC Hydro

area were of interest to us. First was LNG, the second was paper.

On the LNG front, the question is very simple. LNG is probably the simplest technology of a major industrial facility I've ever seen. It basically involves the compression and refrigeration of a gas into a liquid. It's basically your home air conditioner, made a little bit larger. The economics is entirely based on the cost per million tonnes per annum.

Projects with a low cost per million tonnes per annum are going ahead; those with high costs are not.

Proceeding Time: 9:47 a.m. T11

Leader in the trade is Cheniere, they now have two LNG terminals in operations and further trains in construction. They are coming in at 500 to 600 in audited financial documents. You are going to open their annual report and see that number.

The British Columbia projects are more expensive. They are coming in at 1,000 plus. Why is that? Cheniere is using brownfield sites in Louisiana and Texas. That means the infrastructure is already there. They are next to the natural gas production. They actually have the expertise in construction and operation of the sites here that British Columbia do

not. Again, it is no one's fault. The fact is, they were first, they are moving quickly, they are in the market, they have sold billions of dollars of natural gas already. We have not.

We have focused on LNG Canada. I apologize for focusing on them. I'm sure they are a fine company, but the fact is they are reporting in the press that they're $1,222 US for MTPA. They are out of the market by over a factor of 2. They are not going to be built.

On the paper front I don’t need to tell you that the paper industry is in steep decline. One of our clients in Washington just closed one-third of their capacity. That was the largest newsprint producer in North America. That machine will be going down within the week. All this means is that with the exception of the *Globe and Mail*, and the *New York Times*, local papers are having a hell of a hard time, they are cutting back on production and the plants are closing. This is not a growth sector. Both of those reasons indicate that the BC Hydro load forecast is overstated.

This chart, which a member of the press described to me as a hockey stick, shows the blade part, which is a flat load situation for BC Hydro for the last decade. That is the same chart at Hydro

Quebec. It is the same chart as the City of Seattle. The Bonneville Power Administration is showing 8 percent reduction in its firm primary loads next year. This is not because we are falling apart, it's because the technology is changed. We're doing a lot more with a lot less electricity. Even in a boom Bonneville is going to show 8 percent less of their primary sales next year than they did this year.

This chart, of course, came from Deloitte, and it really speaks for itself. No one runs a business without having an enthusiastic belief in its future. Every utility manager I know and have worked for has that feeling. But the fact is, you can still be a success and face up to the fact we are not going to have rapid growth in this particular commodity. And this chart from Deloitte demonstrates that enthusiasm meeting that reality very adequately.

Alternative resources. Let me stress, this is not an area that I am speculating in. We have clients installing solar now in Indiana. We have worked on wind projects. The fact is that we have gotten very good at production line issues. In a recent presentation that I had elsewhere, I reminded people that calculators, when we went to college, cost hundreds of dollars. Today they are so cheap you have to go search for one, and we install them on people's

telephones. This is not magic. This is a question of economies of scale and production efficiency. That has now hit the market on these resources.

The Deloitte price seemed high to us at the time. I'm not being critical on it, but they did seem high. Let me stress, there is no magic force-field between Washington State and British Columbia. You can walk across that border. I have walked across the border. The technology is the same, the geography is the same, the weather is the same, the wind is the same. We have five times as much wind in Washington State as we have in British Columbia.

Proceeding Time 9:52 a.m. T12

Of course, this is true across Canada. Several of the provinces have massively more wind than British Columbia. What is happening here is a world-wide revolution. It's not simply here, it's everywhere.

I tend to use Lazard, which is an investment house in New York City, and there are other good sources, NREL, which is the government-sponsored research institute, certainly the U.S. Department of Energy, and a variety of Canadian sources. The reason why I prefer Lazard is they don't give a damn who wins, they want to go finance the projects. They compare all of the finances for all of the generation

1 types. These are actual transactions. They do not
2 speculate, they simply accumulate the transactions.
3 The chart in front of you is straight out
4 of the most recent Lazard report. They have no reason
5 to accentuate one over the other. The fact is, we're
6 talking about an 85 percent reduction in solar.
7 By the way, I just find that amazing
8 considering my almost 40 years in the industry. I
9 would never have believed that to have happened.
10 Whereas I wouldn't have believed that fracking would
11 reduce the price of natural gas to less than $1 in
12 Alberta. Equally amazing. On wind, 66 percent,
13 equally amazing.
14 Let me stress, Lazard takes actually
15 transactions, generates weighted averages and reports,
16 and this is their effort to describe the industry so
17 that investors come to them to invest in these
18 projects.
19 And by the way, there are similar charts
20 for every different type of generation. But these are
21 the two that have shown this dramatic change.
22 The last area where we have a comparative
23 advantage is the Mid-Columbia. The Mid-Columbia has
24 been around for 30 years. I helped start the Mid-
25 Columbia market as a boy. We went to FERC, we got
26 permission to have market pricing. That started right

here in the northwest power pool. That was regarded as very adventurous in 1987. It is now the largest such market in the world, it is a completely open outcry market. Unlike some of the other markets, it is not subject to bureaucratic management. It is distinctly a *laissez faire* undertaking. It is so deep that it has futures and derivatives on all the major exchanges. For the next ten years I could take out my cell phone and actually buy a block of power for 2025. The price is out there. They might want more than my credit card, but the fact is we don't have to speculate on those prices.

The market after 2025 pretty much goes into the over-counter market. I, myself, have negotiated a deal with -- in fact involving British Columbia some years ago that went on 17 years. So these are not improbably prices.

This past year was the lowest year in the history of wholesale energy prices. Next years' foreign market is lower. The year after that is lower. Now these are not forecasts, these are actual offered prices in a deep and mature market.

The situation in natural gas is not much different. We don't particularly care in the market what colour the electrons are, but the fact is that that natural gas is providing alternatives that are

driving down market prices all across North America. This is showing up in British Columbia hydro export prices. And there's nothing magical about it, we simply site the NEB reports and we've fallen dramatically since 2007 and 2008, and we're going to continue to fall.

For reasons not immediately clear to me, British Columbia's hydro forecasts are not very good. I believe they are vintaged. That is always a problem, and I'll talk a little bit about vintaging in a moment. But they also are very inaccurate for the next decade.

Proceeding Time 9:57 a.m. T13

And I have to note the level of inaccuracy is surprising. Thirty percent in off-peak prices. Less so in on-peak prices. But if we actually are making a massive calculation, of which this is an element, they need to be corrected.

If we were in a full regulatory case, there would be cross-examination and filed testimony. We could go into this in detail. But under no circumstances would we go for a forecast that's inconsistent with real-life firm prices. I mean, it's just inconceivable.

So I'm going to insert a slide here, if I have the Chair's permission, and talk a little bit

about vintaging and deployment. For most of my life as a utility executive and as a utility consultant, we've always had to drive before the headlights. It's very scary. Major coal unit is four to six years, a nuclear unit is ten years, a hydro unit is usually something in the order of ten years. We have to actually be forecasting out a long way.

We don't do a very good job of forecasting. I was testifying in front of the New York Senate when oil reached its highest price. U.S. Senator Cantwell during the break said to me, "It must be the hearing, it's started to fall." Well, it was $150 that year. It was $30 by December. Now, obviously that was speculative forces and perhaps some gaming. But the point is, I didn't have a clue that the 150 would fall to 30, or I'd be far too rich to come to this proceeding, and I would have bought a Caribbean island of my own, hopefully one further to the west, and be drinking pina coladas.

But we are not there any more. We are not forced to deal with vintaging on forecasts, we're not forced to deal with long-term commitments. We can actually order a complete wind farm. We can have it shipped here by rail. We can have it installed within one to two years. This gives us an enormous ability to manage our needs and our resources.

1 And that's going to change our industry
2 considerably. We are littered at the moment in North
3 America with antiquated plants. Our unfortunate
4 president wants to maintain them for reasons no one
5 understands. I saw from the industry press two more
6 major coal plants were closed in Texas - a state that
7 voted for him - just today. And the fact is, we built
8 the wrong resources at the wrong time, innocently,
9 logically. Very correctly, except the world changed.
10 And so moving to something that we can
11 build in one to two years really does reduce our risk,
12 allows us to tailor. It's a deployment issue. And
13 I'll be -- even the single-cycle combustion turbines
14 that people elsewhere in North America build can be
15 built in one to two years. In the Northwest power
16 pool where we live, it was so surplus on capacity for
17 now into the foreseeable future, you can't sell
18 capacity. I checked whether Powerex had sold any
19 capacity on the west coast, and it was minuscule.
20 And that's going to continue for quite a
21 while, according to the authoritative materials from
22 the North American Electric Reliability Council, who
23 have the legal responsibility for maintaining that.
24 So the bottom line, BC Hydro is over
25 forecast on construction costs now by over a billion.
26 That's the almost $400 million we saw earlier, and now

1 the $610 we just heard about.
2 And they offset some of that by some
3 interest-rate forecast assumptions that we've not
4 audited. They may be correct, they may not be. I'm
5 not going to argue one way or the other. Load
6 forecast is clearly overstated. The resource costs
7 are higher than they are next door. Now, that's
8 pretty critical evidence. If we believe that British
9 Columbia cannot build a wind farm for the same price
10 that Governor Inslee in Washington can, there's
11 something wrong. With the same technology, bluntly
12 the same culture, the same level of expertise, the
13 same workers, the same terrain.
14 This is the case of behavioural economics.
15 If we were lucky, Professor Thaler would come and
16 lecture us on that himself. I wish he would. But the
17 bottom line is, these are tough decisions. Well, we
18 realized we've started down a path, and the economics
19 has changed.
20 **Proceeding Time: 10:02 a.m. T14**
21 And let me close with a quote from Paul
22 Samuelson, also Nobel Laureate. And there has been an
23 argument in the industry for many years whether John
24 Maynard Keynes, also someone smarter than I am, said
25 "When my information changes," he remembered the
26 Keynes and said, "I changed my mind. What do you do?"

1 Well, that is the question on the table. The
2 information has changed. You are on the sharp end
3 here of having to consider those changes to make a
4 decision. I don't envy you. I have participated in
5 the closure of a nuclear plant, it was a painful
6 decision for me. This will be a painful decision for
7 you. But you need to be driven by the data, and the
8 data is very clear.
9 Thank you, Chairman, I'm done.
10 THE CHAIRPERSON: Thank you sir.
11 COMMISSIONER KEILTY: Mr. McCullough, have you had a
12 chance to review BC Hydro's reply submission,
13 specifically appendix C, where they comment on some of
14 your submissions?
15 MR. McCULLOUGH: I haven't seen that yet, no ma'am.
16 COMMISSIONER KEILTY: Thank you.
17 COMMISSIONER MASON: Mr. McCullough, you mentioned that
18 you and your firm have been involved in hydro power
19 projects, both as a supporter and as somebody looking
20 against the economics. Could you perhaps tell us
21 about the most recent major hydro power project that
22 you did support from an economic point of view? Tell
23 us something about it?
24 MR. McCULLOUGH: Indeed. Our clients in Hudson Bay are
25 the Grand Council of the Cree. They are a very
26 unusual Aboriginal group. They have been effective in

1 changing Aboriginal rights across Canada. They have
2 an enormous economic base, and they have worked to co-
3 develop projects within Hudson Bay, and I've worked on
4 two of the projects that they've developed, which are
5 diversions into the LeGrande River.
6 The approach was very similar to what we're
7 doing now. Very detailed economic studies. The
8 projects by the standard here were simple, in that we
9 already had much of the infrastructure in place, and
10 so it was a question of diverting water into the
11 LeGrande, and of course we needed to put in dams to do
12 that, and then there were hydroelectric processes on
13 the dams.
14 All the information was public to the
15 participants. Almost all of it was public, period.
16 The projects are now in place, and they're operating
17 quite well, and within budget. They are enormously
18 cheaper, but that was simply because there was a
19 comparative advantage. And we were talking about a
20 system that was already in place.
21 I also worked a little earlier on the
22 projects coming out of Manicouagan Reservoir in
23 Quebec. Those projects equally had an infrastructure
24 advantage. And so that is in place, and is operating
25 within budget and very well. It's rather attractive
26 in a world in which you have a lot more knowledge

1 going in than we have here. The problem on the
2 geology, for example, was not an issue in that area.
3 And so the geological problems that we're now seeing
4 at Site C and are certainly seeing in Newfoundland,
5 were simply absent, which was excellent.
6 And of course one of the great advantages
7 was that the timing was more attractive. These were
8 between five and 10 years ago, so we didn't have this
9 dramatic change that was going on simultaneously.
10 I've also worked on hydroelectric projects
11 in the United States, but those are mainly repowering
12 projects. Repowering is almost always profitable for
13 a hydroelectric. I noticed Deloitte commented on
14 that. They were entirely correct. And in that case,
15 all the information is public, there are no
16 infrastructure issues. It simply is a question of
17 ordering the new equipment and installing.
18 COMMISSIONER MASON: Those first three projects that you
19 mentioned, you don't happen to recall the levelized
20 cost of energy associated with them, do you?
21 MR. McCULLOUGH: I'm going to guess, because I don't, I
22 don't have that in front of me. But, it would
23 probably be in the order of 40 to 50.
24 COMMISSIONER MASON: Thank you.
25 MR. McCULLOUGH: It is not strictly apples to apples, I
26 will admit. There is a big difference between a river

1 diversion on a system that is already in operation,
2 and what we have here.
3 COMMISSIONER COTE: Just one question. I believe I heard
4 you say that we are pretty good at forecasting future
5 market prices about 10 years out. Is that true?
6 MR. McCULLOUGH: No, but we can buy the power ten years
7 out. So I don't have to forecast it. I can actually
8 call up Morgan Stanley or Powerex and put it in order,
9 and it will be delivered 10 years from now, at a set
10 price. And that's the right economic calculation for
11 us, because we know that our magic 8 ball is limited.
12 I, by the way, keep a magic 8 ball on my desk to
13 remind me that my forecasting is limited.
14 But the good news about mature and deep
15 commodity markets is I don't have to make that guess,
16 so long as there is a deep market out there, and get a
17 firm estimate of what those prices are all the way
18 out.
19 **Proceeding Time: 10:08 a.m. T15**
20 COMMISSIONER COTE: Thank you.
21 THE CHAIRPERSON: Thank you, sir.
22 MR. McCULLOUGH: Thank you very much.
23 THE CHAIRPERSON: Much appreciated.
24 Mr. Eliesen, do you need any set up time,
25 sir?
26 MR. ELIESEN: I do not.

1 THE CHAIRPERSON: Okay.
2 MR. ELIESEN: I truly am old school
3 THE CHAIRPERSON: That's great. That's the thing about
4 being old. Please go ahead, sir.
5 Do we have any questions to lead it off?
6 Okay, please go ahead sir.
7 **SUBMISSIONS BY MR. MARC ELIESEN (#0291):**
8 MR. ELIESEN: Thank you very much. Good morning,
9 Commissioners. My name is Marc Eliesen. Marc, M-A-R-
10 C, Eliesen, E-L-I-E-S-E-N. It's a pleasure to meet
11 with you this morning on the unceded territory of the
12 Tsilehwatuth, Squamish, and Musqueam First Nations.
13 I prepared a brief presentation based on my
14 second submission to the Commission, which runs
15 roughly 50 pages, titled "Further Evaluation of the
16 Need for the Site C Project." And after my
17 presentation, or during, certainly I look forward to
18 addressing any questions you may have.
19 Before I begin, I would like to
20 congratulate the panel, and the Commission staff, and
21 Deloitte, for the hard work and due diligence
22 undertaken to date.
23 THE CHAIRPERSON: Thank you, sir.
24 MR. ELIESEN: There has been a limited time for this
25 inquiry, but in my judgement, the panel's effort to
26 obtain the information required has been exceptional.

1 Listening to your audio of the public hearings
2 conducted throughout the province, it is an
3 understatement to say that this issue is of critical
4 importance to many British Columbians, and to First
5 Nations people. The vast majority of those who have
6 come before you have expressed their desire to see
7 this project cancelled, and the site remediated.
8 I appreciate that the Commission has been
9 asked to evaluate the impact of Site C on ratepayers.
10 However, there are equally important issues outside
11 the scope of your review that at some point must be
12 properly addressed. I hope the provincial government
13 will do so when it considers your final report. These
14 issues are First Nations rights, environmental
15 impacts, and agricultural land use.
16 When BC Hydro submitted its 866 page report
17 on August 30th, it declared that it expected, and I
18 quote, "to complete Site C on time and on budget." BC
19 Hydro also claimed that it did not expect to use the
20 $400 million reserve held by the B.C. Government.
21 Five weeks later on October 4th, BC Hydro president and
22 chief operating officer Chris O'Riley, informed you
23 that Site C will be delayed by one year, and its cost
24 increased by $610 million.
25 It's hard to fathom how senior management
26 at BC Hydro could be caught unaware. After providing

1 assurances to the Commission, that Site C was on time
2 and on budget, just 35 days later, the project is a
3 year delayed, with the $440 million reserve not only
4 tapped out, it has been exceeded by $170 million. BC
5 Hydro has not been accountable or transparent with the
6 people of British Columbia.
7 BC Hydro has not been accountable or
8 transparent with this Commission of inquiry. BC Hydro
9 hoped that the hidden project timeline it has been
10 working toward would protect it. BC Hydro believed
11 that by working to its own hidden project schedule, it
12 could get Site C past the point of no return. Once
13 past the point of no return, BC Hydro believed that
14 there would be no choice but to continue with this
15 ill-conceived project, regardless of mounting costs or
16 project delay.
17 BC Hydro has failed. Two years into the
18 project, Site C is 9.6 over budget and a year delayed.
19 Not 7.3 percent over budget, and on scheduled as BC
20 Hydro would have the Commission believe. This is
21 because BC Hydro has two sets of costs, and two sets
22 of schedules for Site C. The first is BC Hydro's
23 final investment decision hidden budget. The second
24 in the provincial government, public, final investment
25 decision budget.
26 The two sets of budgets allow BC Hydro to

1 pick and choose which budget, costs and timing it
2 would slide between for much of the time this
3 commission of inquiry has been on going. The two
4 sets of budgets facilitated BC Hydro's attempts at
5 contingency manipulation.
6 **Proceeding Time 10:08 a.m. T16**
7 They also created confusion around the
8 actual burden of interest during construction, when
9 there should not have been any. I'm pleased to say
10 that with Deloitte's research, your preliminary report
11 and questions BC Hydro has been required to address,
12 the situation has been exposed sufficiently for the
13 Commission to get a good handle on the extent of BC
14 Hydro's mismanagement of Site C.
15 BC Hydro's current and continued project
16 mismanagement can only lead to a conclusion that the
17 project will reach at $12 billion before it is
18 complete. This cost is consistent with the high range
19 presented in the Deloitte's report.
20 Now, let me take a minute to explain in
21 more detail. When BC Hydro presented its final
22 investment decision to cabinet in December 2014, the
23 provincial government increased BC Hydro's project
24 schedule by a year to a 2024 in-service date.
25 Expanding the schedule by a year, Cabinet recognized
26 inflation and interest cost pressures and added $175

1 million in inflation and interest cost to the budget.
2 The provincial government also recognized the need for
3 PST of $200 million.
4 What this means is that B.C.'s final
5 investment decision budget should have been adjusted
6 to reflect to the government's approval and it should
7 have developed detail work plans and costs to reflect
8 a 2024 in-service date, but it did not. Instead, BC
9 Hydro took the $175 million related to the one year
10 extension and used it to pad it's 2023 in-service date
11 plan.
12 The utility continued to work towards its
13 hidden cost and schedule that the province did not
14 publically announce. BC Hydro pretends, even in its
15 October 11th submission that it's 2023 in-service date
16 budget is $8.335 billion. But removing the extra $175
17 million for inflation and interest related to a year
18 later, we find that BC Hydro's budget is actually
19 $8.16 billion.
20 Mr. O'Riley has told the Commission that
21 costs have increased by $610 million. This takes the
22 project cost to $8.945 billion, an increase of 9.6
23 percent over BC Hydro's budget of $8.16 billion. This
24 exceeds total project contingency including the
25 provincial reserve by $170 million.
26 What Mr. O'Riley fails to mention is that

when project milestones are missed, such as the planned river diversion upon which contracts have been let, the cost to complete rise significantly. Certainly much more significantly than the costs would have been expected for a planned 2020 river diversion date.

What I am advising is that because BC Hydro has always worked towards an in-service date of 2023, the failure to meet river diversion in 2019 has a significantly higher cost than if the target had been working toward river diversion had been 2020.

BC Hydro's efforts to reach a point of no return for this project have added costs to the project which have not yet been properly identified or calculated and would not have been incurred if BC Hydro had been working toward the publicly announced plan. It would be one thing if the schedule was working toward was 2024 with a potential for an easier diversion time line, but when the entire project is predicated on what is now a missed milestone, contractors have leverage, great leverage. Claims mount and costs rise.

The Commission has been asked to examine whether BC Hydro will meet a 2024 in-service date. It is important for the Commission to recognize that the provincial final investment decision budget upon which

that in-service date is based has not been estimated with the level of detail and reliability that BC Hydro's final investment decision budget is.

BC Hydro finally admitted in its responses that the provincial final investment decision budget lacks the detail necessary to undertake comparisons to its performance measurement budgets or perform reliable earned value measurement. Given BC Hydro's level of mismanagement to date, this project will miss the 2024 in-service date as well.

Proceeding Time 10:17 a.m. T17

In my more than 40 years of experience working in utilities, when major projects were being constructed, such as the Manitoba Hydro Limestone generating station, I have never seen or experienced a situation where there are two sets of budgets and two sets of schedules.

BC Hydro is experiencing significant ongoing challenges with its main civil work contract. It's relationship with Peace River hydro partners is deteriorating. BC Hydro failed to contemplate a joint venture partnership. It failed to build the cost and management challenges related to such arrangements into its budget process.

We also know that BC Hydro failed to properly vet one of the partners, Petrowest. Problems

with Petrowest should have been obvious, particularly since within a month of letting the contract, the media was reporting that Petrowest was in serious financial trouble. The level of discord between hydro management and the remaining partners in Peace River Hydro partners has reached such a level of dysfunction that the two entities are engaged in a public debate and battle over cost and schedule. How can the Commission expect anything but further cost and delay in the remaining seven years of construction?

In summary, BC Hydro is 9.6 over budget and one year behind schedule with seven years remaining and two important contracts yet to be let. The factors that led to the situation we have today and the work yet to be done points directly to a capital cost of at least $12 billion, and particularly given the geotechnical realities of the site, one year further construction delay.

Now, what else do we know? We know that factors that led to BC Hydro's inability to prepare reliable forecasts for project costs and schedules are present in other T-forecasting responsibilities. BC Hydro is overly optimistic in its interest rate projections and is quick to claim interest during construction savings long before it is even remotely advisable or prudent to do so.

In its August and October reports BC Hydro estimates $350 million in interest during construction "savings", and inappropriately allocates this amount to work related contingency. Responses to Commission questions also tells us that BC Hydro's interest rate sensitivity could result in as much as a billion dollars, $1 billion, in unforeseen costs.

BC Hydro should not be adjusting the interest during construction account, and it certainly should not be allocating so-called savings to project contingency. Doing so simply masks BC Hydro's divergence from plan and frustrates plan to performance monitoring.

We also know that BC Hydro has a history of aggressively overestimating electricity demand in its residential, commercial and industrial markets. In particular, BC Hydro's view of potential LNG project demand is overly optimistic. It is unlikely this demand will materialize given current market realities. If LNG demand does materialize, residential ratepayers will bear a significant burden. In November 2014 the provincial government assured ratepayers that LNG projects would bear their cost of service. Just two years later it was announced that LNG projects would be heavily subsidized.

BC Hydro also underestimates likely rate

1 increases. BC Hydro continues to behave as if it will
2 not be held accountable for the cost of service
3 related to its debt load, deferral accounts and its
4 purchase commitments through independent power
5 producers.
6 The need to address the impact of these
7 issues is looming, particularly given the Auditor
8 General's recent report and qualified opinion. Any
9 evaluation of the impact of Site C on ratepayers must
10 first be undertaking from the perspective of rate
11 increases needed to cover the cost of service. And
12 then the impact of Site C later on top. It becomes
13 clear that the elasticity of demand for electricity is
14 much more sensitive to an approach that reflects the
15 reality than an approach designed by BC Hydro to mask
16 it.
17 **Proceeding Time 10:22 a.m. T18**
18 BC Hydro's costs, rates, and demand
19 approach to forecasting exaggerated the need for Site
20 C and underestimates the negative impact on
21 ratepayers.
22 Finally, I recognize that the Commission
23 has stated they may give little weight to the
24 experience of other major electricity projects in
25 Canada. In my report I provided to the Commission an
26 explanation to show that there is no contradiction in

the statements made by Deloitte or myself respecting the cost and delay of Muskrat Falls, and the figures I provided are the correct figures, while Deloitte's are a subset.

Hopefully this clarification removes any concern the Commission may have that cost and schedule figures provided for other projects are not reliable. The evidence specific to Site C reveals that the project is already experiencing significant cost overruns and delays. Still, there is a relatively limited construction history for Site C, and this does not give the Commission much to work with. Drawing on major projects in Canada under similar conditions can assist the Commission in determining what the future is likely to hold for Site C.

In assessing likely future events, it's common practice to assess pre-existing conditions. The pre-existing conditions with BC Hydro are such that they send off warning signals that material delay and cost overruns for the remaining seven years of construction activity are not only very likely but almost certain. To ensure that B.C. ratepayers are not left with an unconscionable burden of significant electricity rate increases that will cause major economic harm to families and businesses throughout the province, Site C must be cancelled.

I thank you very much for your attention, and I look forward to any questions you may have.

THE CHAIRPERSON: Thank you, sir.

COMMISSIONER MASON: Mr. Eliesen, you've mentioned in your most recent submission that the Commission should rely on a figure of $12 billion as the eventual cost of Site C. I wonder if you could expand a bit on the rationale for that, and what basis someone might use to rely on such a figure.

MR. ELIESEN: By all means. I've gone into some detail in my 50-page submission that I made, but in summary it would be along the following lines. We are only two years of completed construction on a nine-year project. There are still seven years to go. In the two years, we have seen escalation of 9.6 percent, and culminating in the nine -- almost $9 billion. A 440 project reserve that was established and set aside by the provincial government for economy, or economic events, and inflation, and interest, has suddenly disappeared and in fact $170 million is over that.

When you look at what Deloitte and what the preliminary findings of the Commission have informed us, there are still major contracts still to be let. You've got three major contracts, one of which we don't know too much about, but there are two major ones still to be let.

1 And I am -- I forecast the kind of
2 difficulties that have been taking place with the
3 Peace River Hydro Partners will continue into the
4 future with these major contracts. Even the existing
5 major civil works contract with Peace River will
6 encounter significant problems in the remaining seven
7 years. There are still major geotechnical problems
8 still to be faced.
9 When I look at what's been happening in
10 other major hydro projects, whether it's in Manitoba,
11 with their Keeyask project, or with Muskrat Falls, we
12 see similar kinds of developments. There, for
13 example, the main civil contractor, Astaldi, so far
14 increased almost 50 percent from the original bid
15 price.
16 All of these factors lead me to believe
17 that we're going to be around the $12 billion mark if
18 this project continues.
19 COMMISSIONER MASON: Thank you. If I could add another
20 question, then. You've referenced both Keeyask and
21 Muskrat Falls projects, and thank you, by the way, for
22 reconciling the two sets of numbers that we have.
23 That was helpful.
24 I wonder if you could comment further on
25 what you see as the similarities and the key
26 similarities and differences between those projects

1 and Site C, and why you believe that that is
2 instructive for us.
3 **Proceeding Time 10:27 a.m. T19**
4 MR. ELIESEN: Well, in my paper I outlined four or five
5 factors in which I see similar problem areas. First
6 of all, both utilities, and I guess I can include the
7 Kiosk Generating Station in Manitoba as well, that the
8 utilities exaggerated their electricity demand for
9 these projects, and this is what I see has happened
10 with Site C as well.
11 There's not been a major hydro project
12 built for 20, 30 years in Canada. There have been
13 smaller projects in the province of Quebec but not of
14 the size of a Site C. In Manitoba, in fact the last
15 station, and that was a large one that was built prior
16 to Kiosk, is the one I was responsible for, which was
17 the Limestone generating station, and I don't mind
18 mentioning that it came in about 50 percent under-
19 budget.
20 Now, I won't take credit for the tremendous
21 management, but I will say that it was the only game
22 in town. In other words, it was started during an
23 economic activity across North America where there
24 were no major projects that were taking place and
25 people who have been on the project just wanted to
26 ensure that they had a cash flow, rather than they

1 made any money.
2 And the province of Manitoba and Manitoba
3 Hydro were quite fortunate to have a project that came
4 in a 1.4 billion compared to it estimated 2.1 billion.
5 But the third major factor is northern
6 projects, hydro projects are very difficult, and I've
7 seen in the past, given my many years of experience,
8 contractors don't have that kind of experience, and
9 that's another major factor related to it.
10 In the case of Site C, the folks who are
11 doing the main civil contract have never done northern
12 work of this nature and in fact have never built a
13 major hydro generating station.
14 The same thing with Muskrat Falls,
15 Astaldi. It had never done something like that
16 before.
17 An important variable which is often missed
18 is we live through, in Canada, many years of
19 significant hydro construction primarily in the
20 provinces of British Columbia, Manitoba and Quebec,
21 and you had very experienced people, construction
22 people working for the utilities.
23 As I mentioned in my paper, the last B.C.
24 major hydro project was Revelstoke, completed in 1984,
25 and a lot of that experience has retired or moved on,
26 and that, to me, is a very significant factor.

1 So all of these are responsible for what I
2 believe taking place, of major cost overruns and
3 scheduled when you are attempting a project of this
4 nature in Canada to day.
5 COMMISSIONER MASON: Thank you. One final question if I
6 may. During your time at BC Hydro Site C must have
7 been a topic of discussion. How was it handled and
8 resolved during your time with BC Hydro?
9 MR. ELIESEN: Well, it was actually. The project, as
10 you know, was before the BCUC in the early 1980s, was
11 recommended against or not going forward with. The
12 government of the day accepted the recommendations of
13 the BCUC.
14 It made its way over the years internally
15 to my desk in the early 1990s, where it was being put
16 forward and we had some in-depth discussions, analysis
17 related to it, and our conclusion was such that it was
18 going to be most expensive over-priced construction
19 project available.
20 Furthermore, the board of BC Hydro at that
21 time strongly determined that it impacted indigenous
22 rights, that it impacted severely environmental areas
23 and it wasn't a project that we were going to proceed.
24 And that's why in 1992 I issued a statement on behalf
25 of the Board of BC Hydro that Site C would not be
26 proceeded with.

1 COMMISSIONER MASON: Thank you very much.
2 **Proceeding Time 10:32 a.m. T20**
3 COMMISSIONER KIELTY: You mentioned in your remarks that
4 it was inappropriate for BC Hydro to allocate interest
5 savings to the contingency. Can you just expand on
6 that a bit, please?
7 MR. ELIESEN: By all means. And I go into considerable
8 detail in my submission to the Commission, in my
9 written report that was submitted. But the three
10 hundred and -- I guess it's a question of how you look
11 at interest during construction and contingency.
12 If you have Monte Carlo methods, and all
13 sorts of forms of monitoring and determining what kind
14 of contingency amounts are required for the
15 known/unknowns, you have an established procedure set
16 up. And if you determine, then, in the first just two
17 years of construction that you have these savings, or
18 what about the remaining years? And in response to
19 the Commission's own questions, BC Hydro came back and
20 said, "Well, we could have another billion dollars in
21 interest during construction costs."
22 In fact, as a result of Mr. O'Riley's
23 letter, they had another $162 billion as part of that
24 $610 billion overrun. So it's premature and imprudent
25 in the early years of your construction activity to
26 allocate so-called savings to other areas. And you

1 certainly shouldn't provide it's a contingency,
2 because it makes a mockery of the term "contingency".
3 And there are other factors that I
4 mentioned in my paper which in fact relate to what the
5 Commission questions have asked, or what the forecasts
6 will be. BC Hydro has surprisingly, in my view, a
7 longer-term forecast of interest rates declining.
8 Well, my judgment is different. I see the Bank of
9 Canada has reached -- has increased its basis points a
10 couple of times now, 25 times -- 25 basis points at
11 least each time. And there is talk of more increases
12 taking place.
13 So, forecasts are forecasts, obviously, but
14 I don't see a declining interest rate in the future.
15 With regards to the hedging program, that
16 has been undertaken on behalf of BC Hydro, hedging is
17 not free. And hedging is a cost. Now, I did not have
18 access to all the confidential information that
19 Deloitte did. I've assumed that when the
20 confidentiality agreement was signed, which I did
21 sign, that I would have access to it. But I did not.
22 It was only the material included within the report,
23 the Deloitte report itself.
24 But even without it, I managed to get
25 certain access to information which suggests to me
26 that a hedging program doesn't give the kind of relief

that BC Hydro is suggesting with regards to the rest of the borrowings that are required for Site C projects.

COMMISSIONER KIELTY: Thank you.

THE CHAIRPERSON: Thank you very much, sir.

MR. ELIESEN: Thank you.

THE CHAIRPERSON: Appreciate it.

We'll take a short break now, and is the B.C. Pulp and Paper Coalition here? Are they? So we'll come back about quarter to and get started then. Thank you.

(PROCEEDINGS ADJOURNED AT 10:35 A.M.)

(PROCEEDINGS RESUMED AT 10:44 A.M.) **T21**

THE CHAIRPERSON: Please take your seats.

Gentlemen, please being. Thank you.

SUBMISSIONS BY BC PULP AND PAPER COALITION (#0292):

MR. LINDSTROM: Okay. My name is Bob Lindstrom. I'm with the B.C. Pulp and Paper Coalition. On my right is Carlo Dal Monte with Catalyst Paper, and they're the largest pulp and paper company on the coast. And on my left is Robert Thew, he's with Canfor Pulp which is the largest pulp company in the interior.

THE CHAIRPERSON: Did you get all the names okay? And spelling?

MR. LINDSTROM: Oh, sorry.

1 THE CHAIRPERSON: I wonder if you could just slow it down
2 with the name and the spelling of your last names too,
3 please?
4 MR. LINDSTROM: Okay, sure. My name is Bob Lindstrom, L-
5 I-N-D-S-T-R-O-M. On my right is Carlo Dal Monte, D-A-
6 L M-O-N-T-E. And on the left is Robert Thew. Robert
7 T-H-E-W.
8 THE CHAIRPERSON: Thank you, sir. And do we have any
9 leading -- or questions to lead off with? No?
10 Okay, please go ahead, sir.
11 MR. LINDSTROM: Okay, thanks. Okay, I think you're going
12 to find us fairly confined. I mean I think we put a
13 submission in and I think the questions came back
14 primarily around biomass power, so that will be the
15 topic of our conversation here.
16 Just for your information though, pulp and
17 paper of course is a major economic driver is B.C. We
18 have 11,000 direct employees, primarily in rural
19 communities. And we're a major part of the forest
20 industry, right? So we're a big part of that.
21 From an electrical perspective, B.C. is the
22 largest bioenergy producing region in Canada,
23 primarily in our facilities. And in regard to biomass
24 EPAs and our submission, BC Hydro has under EPA
25 contracts about 730 megawatts or about 2600 gigawatt
26 hours per year of power. That number is a little bit

1 higher than you would expect because half of that
2 basically is our internal consumption, our internal
3 generation.
4 We did cover all of our key attributes in
5 our submission, but, you know, obviously we believe
6 we're firm, we're renewable, we've got
7 dispatchability, we can do shaping. There's a lot of
8 things we can do with our power that make it quite
9 unique and useful to BC Hydro.
10 Also as you should be aware, that in
11 regards to electricity, the pulp and paper sector is
12 the largest industrial group for BC Hydro's industrial
13 base. So of all constituents, we have to have a
14 balance approach here, because we're both a generator
15 and a consumer.
16 And the primary issue that we're dealing
17 with is from the BC Hydro planning documents, both the
18 IRP and the revenue application. They're essentially
19 only going to renew -- their plan is to only renew
20 half the power at half the price, in simple terms.
21 That probably means no renewals, because that would
22 not be an acceptable level for us.
23 We do thank the Commission for recognizing
24 the value and attributes of biomass in these hearings
25 and I'll address the two questions that were posed to
26 us. Now, one was about fuel supply risk and the other

one was about pricing.

So under biomass fuel supply risk, we obviously have a different view than Hydro, okay? First of all, all the companies we represent have contractual arrangements or are integrated companies who have their own control of their own fibre flows. It is in the judgment of these companies, right, who have the EPAs, who are experts in the fibre procurement business, right? That access to biomass fiber is a very manageable risk. If you think about the forests, how it flows, half the harvest basically goes to lumber products and wood products, the other half of the harvest basically goes into chips, hog fuel, residuals. We manage that side, okay? So we're in -- our group, our industry tends to look after almost half the harvest of the -- in B.C. So I think we have a pretty good understanding what happens here.

Secondly, these companies take all the fiber price and supply risk and there are liquidated damages if they can't meet their obligation. So not only do we think it's manageable, but we take the risk.

Third, we believe there's more biomass to come out of the forest through better harvesting, okay? And that is also reflected in what the B.C. government is saying. The B.C. government forest

1 ministers have had mandates for many years now to
2 increase the utilization of forest, i.e. bring more
3 fibre out.
4 **Proceeding Time: 10:49 a.m. T22**
5 And the current government is proposing a
6 carbon tax on slash burning. And they obviously
7 believe, and we believe, there is more fibre to come
8 out. Otherwise, why would you be pursuing a carbon
9 tax on slash burning? So, we believe there is more
10 fibre to come out. Obviously it is not all going to
11 be economic, but we believe it's there, or a good
12 chunk is there.
13 Fourth, the biomass supply is dependent on
14 regions. Not every region is the same. And for
15 instance, the coast is very much an oversupply
16 situation in a moment here. And also, our boilers,
17 which are part of our integrated process, deal with a
18 lot more quality variations than other companies can.
19 So, in some cases, we're the only natural outlet for
20 biomass.
21 Fifth, our industry continues to improve
22 its energy efficiency. We continue to work on
23 combustion efficiency, and all sorts of different
24 things that improve the amount of generation we can
25 get out of a pound -- or a tonne of biomass. So,
26 those are also positives that will let us stretch a

1 tonne of biomass into more power.
2 And lastly, there is about two million
3 tonnes, which is a little more than -- that covers all
4 of our EPAs, two million tonnes along that is exported
5 from this province as pellets. Right. So, again,
6 that is what I'm -- you know, that goes there for
7 carbon reasons, and other commercial reasons, but
8 that's leaving our province today. So, our overall
9 opinion is the biomass risk is manageable.
10 On the biomass costing, we believe that BC
11 Hydro is overstating their costs of biomass power.
12 They are essentially looking at greenfield sites. The
13 forest industry, our mills are large energy users,
14 energy generators, we're large complicated sites. But
15 in that we utilize that infrastructure to make sure
16 that we extract the benefit of every pound of steam
17 and energy we consume. So, we have a lot less
18 capital, we've got lower operating costs, we've got
19 less permitting issues, because we've got all those
20 things on site. So, we have the infrastructure that
21 we can attach on to for biomass generation that would
22 be lower than a greenfield site. And so therefore, we
23 believe that using a greenfield application is not an
24 appropriate way of looking at our cost structure.
25 The other hand, it's a hard to give you a
26 definitive answer on what the price is, because every

1 mill is a little different, and every mill will look
2 at maximizing what they can. So, in our view again, I
3 can't give you an exact price. But what we can say, I
4 guess, put some boundaries on it, is that there have
5 been some bio energy tender bids in this process
6 before, a number of years ago. And I think they are
7 good indicators of probably the upper limit of where
8 you might see biomass power prices going in the
9 future. Obviously it would be some sort of negotiated
10 process, or a bid process we'll have to go through.
11 Go through to make sure they get the best deal for
12 biomass power.
13 So, we believe, I guess in summary, we
14 believe that BC Hydro should not only renew all of the
15 expired EPAs, which will happen over the next number
16 of years, some starting as early as the end of this
17 year, right? But work with our industry to provide
18 additional biomass power.
19 We believe that, you know, our industry is
20 more than prepared to sit down with BC Hydro, right?
21 And go through a robust negotiation or some sort of
22 process where we can bring out all of the attributes.
23 Again, we can -- we are semi-dispatchable. We can
24 work on things at capacity. We've got a shaping
25 things we can do. There is lots of things we can do
26 with biomass power, because of our integrated

1 facilities that others can't. You do need to have
2 some sort of discussions with Hydro or others on that
3 to make sure that those attributes are fully
4 appreciated.
5 And also the continuation of biomass EPAs
6 supports the entire forest sector. We are in a lot of
7 cases the only outlet, the only possible use of
8 biomass other than becoming a major environmental
9 issue, right? Don't forget we -- a lot of these power
10 plants were created to shut down the beehive burners,
11 right? And now that we've got those shut down, and
12 those are outlawed and can't get permits for those.
13 To think that you're now going to turn the tap off,
14 right? And have that go back into the environment is
15 not a very good scenario. So we're suggesting we are
16 the right solution, not only for power, but we're also
17 the right environmental solution, and we promote high
18 paying jobs in our communities as well, so.
19 On that note, we are more than open for
20 questions from the panel.
21 THE CHAIRPERSON: Yes, sir, I do have a question. You
22 said that BC Hydro is proposing to only renew roughly
23 half the contracts with your members at roughly half
24 the price. And I think I remember you also saying
25 then that that would be equivalent to no renewals,
26 because that's not economically viable for you. Do I

1 understand you correctly?
2 MR. LINDSTROM: Yeah, I think that's a generalization,
3 but that's what I would suggest.
4 **Proceeding Time 10:54 a.m. T23**
5 THE CHAIRPERSON: Right. So is it true then that BC
6 Hydro is your only customer, or only potential
7 customer for electricity, biomass generated
8 electricity?
9 MR. LINDSTROM: Yes, it is. Partly is regulations,
10 right? But I don't know who else we can sell to,
11 right? Other than ourselves, but partly that is
12 correct.
13 THE CHAIRPERSON: You couldn't do a point to point sale
14 to another customer within B.C. or sell it through
15 Powerex or otherwise?
16 MR. DAL MONTE: I thought retail access was kind of
17 parked.
18 THE CHAIRPERSON: Yes, I just wanted your confirmation
19 of that, that there's no other avenue available.
20 MR. DAL MONTE: To my knowledge there isn't. That
21 option isn't available.
22 THE CHAIRPERSON: Right, right.
23 MR. THEW: Under the EPA we're only allowed to sell to BC
24 Hydro. When the EPAs expire, then we have to get
25 access to the lines and that's all controlled by BC
26 Hydro. So they're really our only customer.

1 THE CHAIRPERSON: Okay. And the half price then, that
2 would -- so it would be more economic for you to
3 terminate your biomass operations, your biomass
4 generation operations than it would be to sell it at
5 half the price of the current EPAs?
6 MR. LINDSTROM: Well, we are suggesting those are really
7 the numbers that would make all the companies think
8 about generating at all, right? I mean, every company
9 will be slightly different on their own circumstance,
10 but in general, I don't think that's a feasible --
11 that's not an economic equation that makes sense for
12 our sector.
13 THE CHAIRPERSON: Right. Okay, thank you, sir.
14 It seems like that's all our questions.
15 MR. LINDSTROM: Okay, great.
16 THE CHAIRPERSON: Thank you very much, we appreciate it.
17 Wind Energy Association, do you need a few
18 minutes to prepare? Okay.
19 **Proceeding Time 10:56 a.m. T24**
20 MR. AUSTIN: Good morning, panel.
21 MR. DALTON: Good morning.
22 **CANADIAN WIND ENERGY ASSOCIATION (#0293):**
23 MR. AUSTIN: David Austin representing the Canadian Wind
24 Energy Association. And the two gentlemen here will
25 introduce themselves. And so I suggest that they do
26 that right now.

MR. NOLET: Good morning. My name is Jean-Francois and I am vice-president of the Canadian Wind Energy Association.

First, thank you very much to hear us today. CANWEA is the Wind Energy Association, national association, but we have offices across the country. We represent over 225 corporate members from -- we have B.C. based developers and service providers up to global developers and wind turbine manufacturers.

I am personally based in Montreal. We have offices across the country as well. And I am here with John Dalton from Power Advisory, he will introduce himself.

MR. DALTON: Good morning. As Jean-Francois said, my name is John Dalton, and that's D-A-L-T-O-N. I'm president of Power Advisory LLC, and Power Advisory LLC is a management consulting firm which focuses on the electricity sector. We have offices in Boston, where I'm from, and in Toronto and Calgary.

THE CHAIRPERSON: Okay. Do we have any questions that we would like to lead with? No.

Okay, please go ahead.

MR. DALTON: I will start, then. So I have provided a written submission. I'm going to cover that off at a high level.

1 THE CHAIRPERSON: Thank you.
2 MR. DALTON: Cover some of the most salient points. I'm
3 going to focus on two issues that the panel has posed.
4 The first is essentially downside risks of lower
5 electricity demand, and here I'm going to draw upon my
6 experience in terms of other electricity markets, what
7 we're seeing elsewhere. And the second is the cost of
8 alternative resources relative to Site C. And that
9 was really the primary area of my focus in terms of
10 the initial report which was filed on August 30th.
11 So, stepping back in terms of the downside
12 risks of electricity demand, I think it's first
13 important to kind of frame the issues in terms of BC
14 Hydro's demand-side -- BC Hydro's load forecast. And
15 their 2016, May 2016 load forecast reflects 2.6
16 percent compound annual growth rate, from 2018 to
17 2024. This is before DSM impacts. And that after DSM
18 impacts is a 1.8 percent compound annual growth rate
19 for that same period.
20 A number of parties have indicated that BC
21 Hydro has consistently over-forecast its load growth.
22 I think that's something important to reflect on and
23 to keep in mind. And to get to the panel's question
24 in terms of downside risks, my primary point here is,
25 these are very real risks. These are risks that we're
26 seeing in virtually all the electricity markets in

which I operate. As I indicated, I'm from Boston. We have in New England the ISO of New England, which is the system operator. They have a ten-year long-term demand forecast.

That ten-year forecast calls for a 0.6 percent decline in electricity consumption over this ten-year period. Also there is a corresponding, you know, tepid impacts in terms of peak demand. There is some marginal increase in terms of peak demand, but essentially a decline in overall electricity requirements.

COMMISSIONER KEILTY: Does that cover all customer segments?

MR. DALTON: All customers that they serve. And the market in New England is essentially 140 kilowatt hours. So considerably larger and it's composed of six different states, so there's quite a bit of diversity there.

THE CHAIRPERSON: And is that 0.6 percent annual, or 0.6 --

MR. DALTON: 0.6 percent annual decline.

THE CHAIRPERSON: Over ten years.

MR. DALTON: Over ten years. So it's markedly lower at the end of this ten-year period.

New York, similar declines. Not quite as strong as we're seeing in New England. I think it's

1 important to step back and say, "Okay, what's driving
2 these declines?" And there's two factors here. The
3 first is very strong investments in terms of energy
4 efficiency. And we have in the New England states
5 some of the -- Massachusetts was recently designated
6 as essentially the leading state in the U.S. in terms
7 of energy efficiency investments.
8 And essentially what we've been able to do
9 is to reduce electricity requirements at a cost of $35
10 per megawatt hour, consistently over time. And this
11 -- you have to make an investment here. It costs
12 something. But the impacts are there.
13 **Proceeding Time 11:01 a.m. T25**
14 COMMISSIONER MASON: Sorry, if I could just understand.
15 It's a very detailed question. Is that 35, $35 U.S.
16 or Canadian.
17 MR. DALTON: Excuse me. That is $35 U.S.
18 COMMISSIONER MASON: Thanks. And secondly, slightly
19 less detailed, can you give me an approximate
20 characterization of ISO New England in terms of its
21 mix between industrial, residential and commercial
22 load?
23 MR. DALTON: It's probably a third each. Probably
24 weighted a little heavier to residential and
25 commercial and less so industrial.
26 I think I would out point, though, from the

1 industrial side, they are often easier to work with in
2 terms of to harvesting this resource.
3 COMMISSIONER MASON: The DSM you are referring to.
4 MR. DALTON: Yes, exactly. Exactly.
5 So what's the second factor that's
6 contributing to this demand in terms of this reduction
7 in demand of electricity consumption? And it's behind
8 the meter solar. It's important to point out that in
9 New England, the solar resource that we have is
10 marginally better, not dramatically, marginally better
11 than what you have in B.C., but I would expect that
12 over time with the reductions in cost of solar PV that
13 there's going to be, you know, similar load risks
14 posed by solar in B.C.
15 I'm now going to jump to kind of the
16 secondary I'd like to focus on and that's the cost of
17 alternative resources relative to Site C. Three
18 areas, really, I'm going to focus on here. The first
19 essentially is BC Hydro has added to its alternative
20 portfolio a very high cost resource to provide
21 capacity, and this is pump storage hydro and I'll talk
22 about that in some detail.
23 Second is, essentially I feel like BC Hydro
24 has failed to consider the full range of cost
25 effective alternatives. They've focused the
26 alternative resource, the alternative portfolio on

1 wind. Wind has an important role to play, but there
2 are other low-cost resources out there.
3 And then finally I have some concerns in
4 terms of the wind integration costs that have been put
5 forward by BC Hydro.
6 So to step back and talk a little bit in
7 terms of pump storage. So pump storage is a very
8 high-cost strategy for providing capacity. I operate
9 in markets across North America. I'm not aware of any
10 pump storage projects that are under development or
11 being constructed right now. People are looking at
12 it, but the analysis -- BC Hydro's own analysis
13 indicates that the cost of storage when evaluated on a
14 capacity basis is 60 percent higher than the cost of a
15 simple cycle gas turbine, which is generally the
16 lowest cost resource for providing capacity.
17 I realize in B.C. there are some
18 constraints that are imposed by the *Clean Energy Act*.
19 It's my understanding, essentially, that based on the
20 gas burn, existing gas burn in B.C. that this
21 constraint is not binding. And I would not expect
22 that these simple cycle gas turbine units, which are
23 there for capacity, reliability purposes, operate
24 relatively a limited number of hours in the year are
25 going to represent a challenge in terms of the
26 constraints here.

The other very important resource to bring out in source of capacity that I feel hasn't been appropriately considered are demand response resources. And here I'm just going to focus in terms of one example. So we have in B.C., in BC Hydro service territory, and this is based on natural resources Canada statistics, 600,000 electric hot water heaters. Electric hot water heaters -- and we have also the benefit of an investment that's made with respect to smart metering. So there's communication between the utility and the home.

The incremental investment that would be required to use these electric hot water heaters to essentially respond to a signal from BC Hydro that they shouldn't be charging at that point, or heating water, would be essentially a connection from the meter to the hot water heater. That's relatively cheap. The big investments been made, and based on some quick math that I did, this resource, just for residential customers, there's probably more resource from the commercial side, could represent up to 500 megawatts of peak load reduction.

THE CHAIRPERSON: I'm sorry, if you were just about to go there, but do you have any suggestion of what the relatively low cost, as you put it, of that would be, of running a wire from -- presumably running a wire

1 from the smart meter to the hot water heater, and
2 you'd need some sort of switch, or maybe it's
3 wireless, I don't know.
4 **Proceeding Time: 11:07 a.m. T26**
5 MR. DALTON: A quick analysis I did anticipating such a
6 question --
7 THE CHAIRPERSON: Yeah.
8 MR. DALTON: -- might be $60 to $70 US.
9 THE CHAIRPERSON: Okay.
10 MR. DALTON: If you denominate this in terms of dollars-
11 per-kilowatt? In terms of the actual reduction you
12 can get from one electric water heater? It represents
13 about $100 per kilowatt. In terms of total capital
14 cost. This is about one-tenth the lowest cost
15 capacity resource, generation capacity resource of
16 peak. So, there is a very interesting opportunity
17 here, which hasn’t been capitalized on.
18 THE CHAIRPERSON: And do you have experience with
19 jurisdictions that have retrofitted that on any scale?
20 And if so, how do you incent people to do it? Is
21 there a cost -- would it be through a time of use
22 rate?
23 MR. DALTON: Exactly, and those are great questions. So,
24 one jurisdiction has looked at this quite seriously,
25 for a little bit different purpose, is Atlantic
26 Canada, where I spent a lot of time.

1 So, there are four utilities there that got
2 together, put together a program called Power Shift
3 Atlantic. The focus of Power Shift Atlantic was a
4 little different. It wasn't focused on capacity
5 reduction, it was more in terms of wind integration.
6 So they would actually dispatch the resources in real
7 time to help. They reduce charging when wind output
8 was high, increase charging when wind -- excuse me,
9 other way around. So when wind output is high, they'd
10 increase the charging of the water heater. So that's
11 a area where it's being done.
12 THE CHAIRPERSON: Okay, thank you sir.
13 MR. AUSTIN: I just would like to add that this is not
14 year round, because your peak essentially in British
15 Columbia is a needle peak. So, it would only be two
16 weeks in a year, three or four days, we're just
17 looking at BC Hydro's dependable capacity period. The
18 rest of the year there is ample capacity in the
19 system. So that is something that is always
20 overlooked.
21 THE CHAIRPERSON: Thank you.
22 MR. DALTON: So, to move on, in terms of the failure to
23 consider the full range of cost effective resources,
24 I've talked a little bit in terms of demand response.
25 I'm going to go back to that a little bit, it's an
26 important point, because if you look at what other

1 markets, and I'm talking about many of the organized
2 electricity markets in which I operate. In New
3 England, for example, demand response resources
4 provide about 8 percent of the total capacity that is
5 used to satisfy peak load. It varies from year to
6 year, because we have auctions. And it's been down a
7 couple years ago to maybe as low as 4 to 5 percent.
8 And it is -- we see this in terms of how it
9 participates in these auction processes. It's the
10 lowest cost resource.
11 And in all of these markets, New York, the
12 PJM market, which is essentially the largest organized
13 electricity market in North America. Ercott, demand
14 response provides about anywhere from 4 to 6, up to 8
15 percent of capacity resources. It's a resource that
16 really isn't evident here in terms of B.C., and I have
17 -- I am surprised, frankly dumbfounded that it isn't a
18 resource that's used.
19 And I point this out because a big driver
20 here with respect to Site C is that there is this --
21 my understanding is this impending capacity need. So,
22 there are resources out there that can be deployed.
23 And one for the questions in terms of DSM is often
24 it's hard to access it. There are very well qualified
25 firms, that's their job. That's essentially their
26 business model is they deliver demand-side management.

1 And they are the ones who are participating in these
2 organized markets. And if BC Hydro were to issue an
3 RFP and say we want a contract for demand-side
4 resources, they would be I'm sure very happy to
5 participate.
6 COMMISSIONER COTE: Excuse me, sorry, where does BC Hydro
7 sit relative to the leading American companies or
8 jurisdictions with regards to demand-side management?
9 MR. DALTON: So that's a great question. It is probably
10 one I should have answered in terms of, so --
11 COMMISIONER COTE: I know New England is very high.
12 MR. DALTON: Yeah, so the number I originally framed was
13 the 2.6 percent before DSM compound annual growth rate
14 versus 1.8. So that indicates like .8 percent
15 reduction from energy efficiency or demand-side
16 management. The leading entities in the U.S. get
17 anywhere from 1.8 to 2 percent. So they do better
18 than twice what BC Hydro is able to do. And they're
19 doing this at that $35 U.S. per megawatt hour that I
20 quoted. And they've done that consistently for a long
21 period of time.
22 COMMISSIONER COTE: And how do the investment levels
23 compare, or do you know?
24 **Proceeding Time 11:12 a.m. T27**
25 MR. DALTON: They're much higher.
26 COMMISSIONER COTE: Obviously, yes.

1 MR. DALTON: You have to spend it to get that. But I
2 think the important thing is the $35 per megawatt
3 hour. So we are recognizing what that resource costs.
4 I think that, you know, from a Commission's
5 perspective, obviously, right, there's a bill impact
6 associated with that. You know -- I misspoke. It's
7 more of a rate impact. The bill should go down. Any
8 customer that participates in these programs is going
9 to have their consumption decline, but there's going
10 to have to be, you know, an increase in rates to pay
11 for this. And I realize that there's a large number
12 of industrial customers that might be worried about
13 that. You can address this in terms of making sure
14 you assign costs properly.
15 COMMISSIONER MASON: I wonder if I could just pick up on
16 your earlier point that there are firms that do
17 contract DSM, if you will, and utilities might use
18 them to achieve DSM savings. Do you have any examples
19 of jurisdictions in Canada where a utility has engaged
20 a firm like that?
21 MR. DALTON: So the Canadian model, there was some --
22 the issue is, in Canada, there aren't the same
23 organized markets that we have in the U.S. So that's
24 one thing that kinds of frustrates the ability of
25 these firms to participate. But there are firms that
26 do participate and are active in Alberta, and in

1 Ontario where there are organized electricity markets
2 that provide more demand response and less demand-side
3 management. Demand response is generally easier to
4 contract for. There's not the same verification
5 issues.
6 COMMISSIONER MASON: Thank you.
7 THE CHAIRPERSON: Please continue.
8 MR. DALTON: So one of the things that we -- and I'm just
9 going to reiterate some of the points I made in our
10 report, but -- and there's -- the experience, what's
11 been the experience in terms of cost reductions that
12 we're seeing in terms of some of these alternative
13 technologies. And based on my analysis I feel like
14 these cost reductions aren't being fully reflected in
15 terms of some of the costs that BC Hydro is putting
16 forward for alternatives.
17 So we've outlined in our report, in I think
18 a very comprehensive fashion, our estimate as to
19 what's the cost of wind in B.C. and that's $68 per
20 megawatt hour. And if you contrast that BC Hydro's
21 estimate, it's about $85 per megawatt hour. And I
22 think that there's some differences here as in our
23 number is for 2024, BC Hydro's number is -- I think
24 it's 2018 dollars. So there's a little bit of
25 difference there.
26 But I think that, you know, we've outlined

what's happening with respect to the wind energy industry. You know, there's dramatic increases in terms of the turbine sizes. We're seeing higher heights for towers. These are reducing project capital costs and increasing project capacity factors. And that's driving down the cost of wind of projects.

I've recently participated in an RFP process that a client issued for wind in Atlantic Canada. I wish I could disclose some of that pricing there. It's dramatic and it gives me confidence in terms of the numbers that I'm putting forward here.

The final point in terms of -- that I'd like to talk about in terms of the emission of some of the cost-effective resources. There has been some discussion this morning in terms of the fact that BC Hydro is only assuming 50 percent of biomass and 75 percent of hydro is recontracted. These are likely to be among the lowest-cost resources that are available. Essentially the capital has been largely invested. This is probably less true for biomass because there is a significant incremental cost associated with the fuel. But for a hydro project, that capital has been invested. And it's crazy to shut down a hydro project because they can't get a contract with BC Hydro, and that's essentially what's implied when you're assuming that you're only going to contract with 75 percent of

1 these hydroelectric IPP projects.
2 **Proceeding Time 11:17 a.m. T28**
3 Finally in terms of moving off the wind
4 integration costs, earlier this morning there was an
5 outlining of the various cost components that BC Hydro
6 has considered, and these essentially are adders to
7 the plant gate or the point of interconnection costs.
8 And these costs represent about $17 per megawatt hour,
9 and this was a 25 percent increase in terms of the
10 unit energy costs that I calculated for wind. So
11 these are meaningful.
12 I think it's important to point out in
13 terms of -- the assumption here, and it's indicated
14 that this is because that energy has to be delivered
15 to the Lower Mainland. And it's my understanding, we
16 were previously engaged by BC Hydro to look at the
17 standard offer program, it was identified there that
18 for the standard offer program BC Hydro was moving
19 away from regional pricing. The regional pricing
20 previously reflected different prices based on where
21 you're located. And the rationale for moving away for
22 regional pricing was the notion that there are a
23 number of different load centres across BC Hydro that
24 need additional energy and capacity, and it's not
25 appropriate to assume that all resources are being
26 delivered to the Lower Mainland. So I think that

there's kind of a conflict here that needs to somehow be reconciled.

Final point in terms of just to summarize some of my points. You guys have a very difficult job. I'm glad I'm serving as a consultant. I think that, you know, the challenge here is that BC Hydro is asking the province to make a very large investment in a project, under a time frame that's quite aggressive. And the driver of this time frame is a need for capacity. Capacity essentially is relatively inexpensive to provide. You can build, as I said, simple cycle gas turbines to provide that capacity resources. Better than that, you can realize the demand-side resource potential that I believe is here in B.C. And I just -- I think that, you know, one needs to just reflect in terms of, you know, why is this risk being undertaken under this time frame based on this identified need? And I think that one of the consequences of this is we're going to get, or you will be receiving 5 terawatt hours of energy. That energy is going to have to find a home and it isn't all going to end up in B.C. That's shown by BC Hydro's actual analysis. That's going to have to end up in terms of export markets. And based on my look in terms of electricity markets, I feel like there's very meaningful risks that need to be considered with

1 respect to the prices that are going to be realized in
2 these export markets. There's lots of low cost energy
3 resources, low marginal operating cost resources,
4 solar, wind, that are being developed elsewhere. And
5 that is not going to increase market prices. That's
6 going to reduce market prices.
7 So appreciate your attention.
8 THE CHAIRPERSON: Thank you, Mr. Dalton. We recently put
9 out a sample alternative portfolio, I think it was A-
10 22 if I'm not mistaken, exhibit. Have you had an
11 opportunity to look at that? That's okay if you
12 haven't.
13 MR. DALTON: I have not.
14 THE CHAIRPERSON: That's okay.
15 MR. DALTON: I'm hoping that I will be asked to take a
16 look at it and comment on it.
17 MR. NOLET: Yeah, and I can confirm that we will comment
18 on it by the 18th.
19 THE CHAIRPERSON: Okay, great, thank you.
20 THE CHAIRPERSON: Do you have any further questions?
21 Thank you very much gentlemen. Appreciate
22 it.
23 MR. NOLET: Thank you.
24 THE CHAIRPERSON: This brings us to the end of the
25 schedule for this morning, but given the time the
26 Panel would be prepared to move into the afternoon

1 schedule and that would probably take us up till a
2 little bit before 12 o'clock. Our first presenter on
3 my list for this afternoon is BCOAPO.
4 MS. WORTH: If I could just ask for about five minutes.
5 I'm just waiting for my co-counsel in Saanich.
6 THE CHAIRPERSON: Absolutely. And if that's inconvenient
7 I can move down this afternoon's list. I'm not sure
8 if anybody else is here though for the afternoon. So
9 why don't we take five -- yes, sir?
10 MR. DAUNCEY: And I'm here and I --
11 THE CHAIRPERSON: Okay, and sorry. Guy Dauncey, okay.
12 MR. DAUNCEY: Guy Dauncey.
13 THE CHAIRPERSON: Thank you. So let's take five minutes.
14 **(PROCEEDINGS ADJOURNED AT 11:22 A.M.)**
15 **(PROCEEDINGS RESUMED AT 11:30 A.M.)** **T29**
16 THE CHAIRPERSON: Please be seated. Thank you.
17 MS. WORTH: Thank you for your indulgence on the timing.
18 As you can see, my co-counsel has arrived.
19 THE CHAIRPERSON: Well, thank you.
20 MS. WORTH: So we're ready to get going, if you're ready.
21 THE CHAIRPERSON: Any time.
22 **SUBMISSIONS BY BCOAPO (#0294):**
23 MS. WORTH: Great, thank you. I'm here to make
24 submissions on behalf of the intervener and
25 stakeholder groups known collectively in processes
26 before this tribunal as BCOAPO *et al*. As was the case

of preliminary submissions --

THE CHAIRPERSON: Excuse me. If you could just introduce the two of yourselves for the record.

MS. WORTH: Certainly, sorry. My name is Leigha Worth, W-O-R-T-H, here as counsel. And my co-counsel is Erin Pritchard. That's P-R-I-T-C-H-A-R-D.

THE CHAIRPERSON: Thank you.

MS. WORTH: So, as was the case in our preliminary submission, these groups include the B.C. Old Age Pensioners' Association, Active Support Against Poverty, the Tenants' Resource and Advisory Centre, the Together Against Poverty Society, and the Council of Senior Citizens' Organizations of B.C.

Now, what has changed between now and when we made our preliminary submission in writing, was that the Disability Alliance of B.C., who is normally one of our clients of BC Hydro processes, has given us instructions to add themselves to this group of organizations. So it is on that basis that we make the following submissions in support of the BCUC's efforts in regards to the Site C inquiry.

Now, I've been practicing regulatory law for quite a number of years, but I've never had the opportunity to speak to the Commission about a project of the size, the cost, and complexity of the Site C Dam. Dams like this are obviously not common

1 projects. And if memory serves, the last one was the
2 Revelstoke Dam, and that was completed in 1984, well
3 before I even finished school, let alone law school.
4 So it goes without saying that many of those here
5 today are probably in the same boat that I am.
6 This feels like an occasion that calls for
7 speech of some weight, to reflect the huge scope and
8 impact of this project. Maybe something based on the
9 same as "Friends, Romans, countrymen," speech from
10 Shakespeare. But I'm not here to bury Caesar or to
11 praise him. I'm limited to friends, British
12 Columbians, countrymen and women, lend me your ears.
13 I come to speak to Site C, not to bury or praise it.
14 It lacks the same Shakespearean poetry, but
15 for sure it does accurately reflect the position I'm
16 here to take, or rather, not to take, on this project.
17 This is a thorny issue, one fraught with countless
18 issues and agendas, and the record is unfortunately so
19 incomplete, as the Commission has noted, that we are
20 unable to assess the options, to take a position on
21 this project.
22 Before I get into the meat of my
23 submission, I would like to acknowledge the
24 Commission's efforts in the handling of this inquiry.
25 BCOAPO appreciates that the panel and staff have done
26 a Herculean amount of work in a very short time frame.

1 And the Commission is obviously taking its role in
2 this inquiry very seriously.
3 Now, the Commission's September 20, 2017
4 preliminary report identified a number of areas where
5 there is not enough information to draw the necessary
6 conclusions. And, in addition, it requested
7 additional information be provided in time to be
8 considered before its final report is drafted and
9 issued.
10 BCOAPO wishes to take this opportunity to
11 put on the record that a failure to provide that
12 information would hamstring the Commission and defeat
13 the core purpose of this inquiry.
14 Now, in the interests of clarity, BCOAPO's
15 submissions are organized around several areas in the
16 preliminary report where the panel identified a need
17 for additional information and/or invited parties to
18 make further comments.
19 The first question in the OIC asked, after
20 the Commission had made an assessment of the
21 Authority's expenditures on the Site C project to
22 date, is the Commission of the view that the Authority
23 is respecting the project currently on time and within
24 the proposed budget of 8.335 billion, which excludes
25 the $440 million project reserve established and held
26 by the province.

Proceeding Time 11:35 a.m. T30

Now in our view this is a far more complex question than it originally appears. It does, in fact, require that we follow the Commission and its example to look at two additional issues.

The first is whether BC Hydro has completed all of the work that had been scheduled to be completed by this point in time, and whether to date BC Hydro is on budget. But the second issue is whether there is the expectation that BC Hydro will be able to complete the project on time and on budget.

The Commission considered both questions in its preliminary report, and while the second question was not explicitly raised in the OIC, it is, in our opinion something that is absolutely necessary to be answered in order to properly address the core questions of this inquiry.

And in the preliminary report this panel also found that the project was, as of June 30th of this year, on time for a final in-service date of 2024, but unfortunately, as everyone knows here, we have in meantime had a letter from Chris O'Riley confirming that BC Hydro will not be able to make its timeline for the 2019 river diversion.

That calls into question whether BC Hydro's assurances that the project will remain on time are in

1 fact going to be borne out in reality.
2 This delay in the start of the river
3 diversion is going to consume the entirety of the one-
4 year time float that was built into the current
5 schedule based on the differences in the FID and PMD
6 final in-service dates. So any additional delays
7 would inevitably put the project behind schedule. At
8 this point it appears there are multiple issues, both
9 in terms of civil works challenges and the
10 receivership proceedings concerning the contractor's
11 partners that do pose, in our opinion, a significant
12 risk to this project's schedule.
13 It goes without saying that these
14 additional risks need to be further assessed and
15 considered using realistic measures and expectations,
16 not overly optimistic assertions not often borne out
17 in reality or in the experience of other utilities who
18 have engaged in projects of similar nature, size and
19 scope.
20 Thus far the panel has concluded that it is
21 not yet in a position to determine whether the project
22 will remain on schedule for completion by November
23 2024. That is, of course, that conclusion that was
24 reached before the letter from BC Hydro talking about
25 the delay.
26 We submit that this was, at the time, one

of the most positive ways that one could possibly interpret and present the facts gleaned.

We further submit that even before BC Hydro's admission that it would not make the 2019 diversion date, it was clear that the project was unlikely to remain on schedule, and now that possibility is really more of a certainty.

This delay raises the question of costs and budget. BC Hydro has indicated it is adding $610 million to the total forecast project cost generating a new project cost of 8.945 billion. Now, "billion", that's a word that we have all used in this inquiry with surprising ease. But it's also a word that needs to have the appropriate amount of attention paid to it. Billions have significant rate impacts. Billions are not drops in the bucket. Billions make a big difference, particularly to our clients, and even hundreds of millions can do that.

In the preliminary report, the panel also stated that it was unable to determine whether the project is on budget, which was a reasonable conclusion based on the information that was before it at that time. Now, given the additional cost caused by this delay, it is also clear that this project cannot be found to be on budget. We now have a revised budget figure of $8.945 billion.

1 BC Hydro cannot, at this late date, change
2 the budget number by 610 million to avoid having this
3 overrun drawn from the contingency and yet assert that
4 it is now going to remain on budget.
5 Further, there were strong indications that
6 even without the cost of the river diversion delay,
7 the project was going to be over-budget. Deloitte
8 noted in its report that BC Hydro had already
9 committed 45 percent of the total budgeted cost to
10 contingency, which is a percentage significantly
11 higher than the 22 percent of the total budget spent
12 to date. So without any tools, aside from common
13 sense, it is easy to see how this would raise red
14 flags amongst the stakeholders and ratepayers.
15 **Proceeding Time: 11:39 a.m. T31**
16 And indicate that there is a significant risk and a
17 significant ongoing risk of rising costs.
18 In addition to the costs associated with
19 the anticipated construction delay, the Commission
20 noted in its preliminary report that Deloitte had also
21 raised concerns that BC Hydro had underestimated the
22 cost of major contracts. And the Commission made
23 similar comments in its own analysis stating,
24 "The Panel is concerned that BC Hydro is
25 already forecasting to use 1 billion of
26 contingency, two years into an eight year

1 project."
2 This is 26 percent over the original cost contingency
3 of 794 million, and is 84 percent of the revised cost
4 contingency of 1.195 billion.
5 With large, outstanding cost pressures
6 still upon the project, such as the two major
7 contracts not yet having been awarded, and the
8 challenges with the main civil works contractor, it
9 seems that the forecast of using 1 billion in cost
10 contingency will increase.
11 We submit that particularly now, the
12 Commission's questions to BC Hydro regarding the risks
13 and adequacy of the contingency provisions going
14 forward are critical.
15 The amounts that BC Hydro has added to its
16 contingency are also in our submission at risk due to
17 the rise in interest rates. While BC Hydro claims
18 that it has locked in historically low interest rates
19 by hedging 50 percent of its forecast future debt
20 issuances from fiscal 2017 to fiscal 2024, there is
21 still an issue, a live issue regarding the other 50
22 percent.
23 The Canadian government's recent move to
24 increase interest rates occurred sooner than many
25 forecasters had predicted, and we submit that this
26 panel should consider the most recent interest rate

1 forecasts for the other 50 percent. And how they
2 compare to the optimistic assumptions used by BC
3 Hydro. And this would allow the Commission to further
4 flesh out its assessment of this project's likely cost
5 compared to the original budget.
6 Finally, it bears mentioning in our view
7 that the comparisons BC Hydro has made between Site C
8 and smaller projects, to say that it will be on
9 budget, are not particularly instructive. This is, as
10 I've noted before, a larger scaled project with
11 correspondingly larger geotechnical, engineering,
12 contract, and other risks, creating a much greater
13 risk of cost overruns.
14 Now, the second question the OIC asks, what
15 are the costs to ratepayers of suspending the Site C
16 project, while maintaining the option to resume
17 construction until 2024, and what are the potential
18 mechanisms to recover those costs?
19 In answer to this question, BC Hydro and
20 Deloitte provided some somewhat similar estimates.
21 1.1 billion, and 1.143 billion respectively. This
22 panel concluded that 1.1 billion is reasonable, but
23 did note that the estimates were class 5, which has a
24 broad accuracy range, meaning it cannot necessarily be
25 relied on as accurate.
26 Now, this is something that gives my

clients, as the most economically vulnerable group, no small amount of heartburn, like so many of the figures bandied about in this inquiry. I think it is important to note at this point too, that it appears the 1.143 billion from Deloitte includes $260 million for remobilization in 2024-25, which would in our view more correctly be included as part of the cost to restart later. Also the Deloitte estimate does not include interest costs incurred during the suspension period, nor the cost of inflation. This is a significant issue as a result, we submit that there needs to be a better definition going forward of what activities and costs are captured in the cost to suspend and maintain. It is not clear from comparing BC Hydro and Deloitte's estimates that the Commission is going to be able to make an apples-to-apples comparison.

As you will see, the difficulty in comparing BC Hydro's analysis with that of Deloitte, and the need for the apples-to-apples comparison referred to in the Commission's preliminary report is a recurring theme going forward in our submissions.

So, what is the cost of restarting this project after suspension? There is a wide range of estimates for those costs, with BC Hydro estimating a cost of 1.7 billion, whereas Deloitte came in with a

1 cost of 260 million. 200 million plus a 30 percent
2 contingency. In its preliminary report, the panel
3 found it was premature to reach a conclusion as to the
4 total costs for the project in the event it is
5 suspended and restarted at a later date.
6 **Proceeding Time 11:45 a.m. T32**
7 Noting that the differences arise in what is meant by
8 "re-start and complete", which makes the estimate
9 really difficult to compare. Deloitte solely
10 considered costs to re-start the project, while BC
11 Hydro considered the entire cost to restart and
12 complete the project. Again, this is comparing apples
13 to oranges. Sometimes it felt like I was reading a
14 report where apples were actually being compared to
15 watermelons.
16 Another example of what makes this an
17 apples to oranges or apples to watermelons comparison
18 is that BC Hydro included the impact of inflation in
19 its analysis, while Deloitte did not. This is a
20 significant concern to our clients because it makes it
21 impossible for anyone to make an informed, properly
22 prudent assessment of the various options.
23 Now, the third question asked, what are the
24 costs to ratepayers of terminating the Site C project,
25 and what are the potential mechanisms to recover those
26 costs? BC Hydro's estimate of 7.3 billion included

2.1 billion of costs prior to termination, 1 billion in demobilization and site remediation costs, and then the balance was attributed to alternate electricity supply costs.

BCOAPO agrees with the Commission that the cost of replacement energy, i.e., alternative energy and capacity, is better considered separately. And we look forward to reviewing those modified figures in the near future.

With respect to the Site C demobilization and contract termination costs, it is important to establish whether they are nominal or real dollars, both when comparing the Deloitte and BC Hydro reports, and also for the purposes of inclusion in any subsequent economic evaluations. It is clear that the Deloitte report excludes, for example, inflation impacts. But it's not completely clear that BC Hydro's does.

We submit that it is also clear whether BC Hydro's present value is the same as Deloitte's, no interest and no inflation. This depends on how the present-value calculation is done. Once again, this raises the issue of needing assurances that it's possible to do an apples to apples comparison, and that it's simply not present at this time.

Assuming assurances can be given that the

1 costs are calculated and quoted on a similar basis,
2 the Deloitte and BC Hydro estimates are not that
3 different. And on the basis of that assumption, we
4 would agree with the panel's finding that both
5 estimates are reasonable without endorsing either.
6 And that an appropriate estimate for remediation costs
7 is 662 million.
8 Now, the fourth issue that we wished to
9 address is BC Hydro's current load forecast, and the
10 ability of BC Hydro to meet load with its existing and
11 committed resources.
12 The Commission noted that in making its
13 application determination set out in the terms of
14 reference, established in OIC number 244, the
15 Commission must use the forecasts of peak capacity
16 demand and energy demand submitted by BC Hydro in
17 July, 2016 as part of its fiscal 2017-fiscal 2019
18 revenue requirement application.
19 The Commission also directed BC Hydro to
20 submit updated demand forecast information and in the
21 preliminary report the panel has found it is not yet
22 in a position to make its finding on the impact of
23 recent industrial developments, for example, the
24 impact of changing LNG, on the load forecast.
25 The panel has noted, correctly, that BC
26 Hydro's history of over-forecasting is an issue, and

has invited submissions on the implications of historical over-estimates, and the accuracy of the industrial load forecast. And we agree it is important to take seriously BC Hydro's overly optimistic history of forecasting, and submit that it is reasonable to assume the current forecasts are also likely to be wrong in much the same manner.

In our view, it is important that there is a clear understanding of the risks, and this clearly triggers a need to understand the risks and impact of BC Hydro's forecasts being too high.

The panel also noted its concern with BC Hydro making higher economic and disposable income growth assumptions in the longer term, relative to other sources like the Conference Board of Canada. In the load forecast report, Deloitte noted that BC Hydro's consultants' load forecast, with no LNG plant, closely matches that of the Conference Board of Canada. So this suggests that the major difference between the two is the optimistic outlook for LNG. And that a large amount of the forecast industrial load is based on those LNG prospects.

There needs to be a much stronger case for LNG assumptions before this Commission panel should accept them. Clearly, more information on that is needed.

1 Deloitte noted that the price elasticity
2 assumptions are low, relative to estimates, from other
3 sources. And in our view it is patently unclear how
4 to disentangle the impacts of price elasticity and DSM
5 -- that is, to what extent does the inclusion of DSM
6 separately account for some of what would be price
7 elasticity impacts. This too requires some serious
8 consideration because it will impact the case for Site
9 C.
10 Now, BC Hydro assumes no real rate
11 increases after the rate plan period. In the face of
12 an aging suite of capital assets and changing business
13 needs that we hear about often at regulatory hearings,
14 it must be challenged by the Commission and other
15 parties because allowing this, like other deficiencies
16 I have already identified in my submissions, to remain
17 as part of the utility's case without sufficient
18 evidence to back it up is both dangerous and
19 irresponsible.
20 The panel asked for input from BC Hydro and
21 others on the downside risk of a lower load forecast
22 over a 70-year horizon. And in our view, the downside
23 or negative risk of a lower load forecast is linked
24 primarily to the financial impact of having committed
25 too much capacity and energy relative to what is
26 actually needed.

1 This risk is aggravated when the resource
2 commitments come in large units due to the nature of
3 the technology, and when the fixed costs are really
4 too high. Both of the preceding are issues with Site
5 C.
6 We further submit that mitigation by
7 electrification has its own risks which we can see,
8 for example, in the current debate regarding E-plus
9 rates.
10 **Proceeding Time 10:54 a.m. T23**
11 Also, as Deloitte pointed out, given the
12 current economics, electrification by a conversion of
13 gas to electric heat is unlikely. Mitigation by sales
14 to other markets is dependent on market price, and
15 also whether the surplus is firm.
16 We agree that the risks of relying on
17 mitigation through sales is a dangerous strategy and
18 it can be affected by a number of factors that BC
19 Hydro would have no influence over, including market
20 conditions and these days, U.S. government policy
21 regarding off-coal emissions.
22 BC Hydro's narrative is that we are unable
23 to use all of the energy produced by Site C, so it can
24 be sold on the market at a profit using its forecast
25 of export prices relative to the cost of Site C to
26 support this assertion. But we note the sale of

1 surplus energy is only profitable if the market price
2 is truly higher than the unit energy cost of Site C.
3 The question of the export issue becomes critical
4 where, as the case may well be here, there is a
5 significant surplus.
6 We submit that there are problems with both
7 BC Hydro's export price forecast, as well as the UEC
8 used for Site C. Utilities such as Manitoba Hydro
9 have been consistently over-optimistic as we've heard
10 in recent years regarding future export prices. In
11 fact, every year the forecast is getting lower.
12 Also, only dependable surplus can be sold
13 as firm with capacity values. Overall the panel
14 should not rely on escalating export prices, or an
15 assumption of that escalation to support the economics
16 of this project. Rather we submit that the panel
17 should proceed with caution when relying on export
18 prices. The Commission should perhaps engage in a
19 sensitivity analysis to see if the analysis changes to
20 export prices and to see if they come down.
21 BC Hydro seems to confuse principles that
22 should be applied in an economic analysis of
23 alternatives. For example, excluding self-costs,
24 using common social discount rate for all options,
25 versus the principles that should be used in assessing
26 impact on ratepayers where there is inclusion of sunk

costs and the use of BC Hydro's capital costs and including the net income, if not impacted.

The UEC used for Site C is $34 per megawatt hour which includes an adjustment for the fact that the B.C. government has frozen net income requirements. That takes it down by $26 per megawatt hour, and then there's a credit for avoiding termination which brings the price down $9. The preliminary report raises questions about the validity of this $34 UEC and we share those concerns. Specifically, we note there's no rational reason for the termination credit in the impact calculation for rates.

Sunk costs are a cost of ratepayers and these should be included in the rate impact analysis, and including net income costs, legitimate to exclude from rate impact analysis, but not from an economic analysis. However, is it realistic to assume that the current limits on dividends are going to last for 70 years? In our view, it's not.

Alongside the questions about the validity of this UEC, the panel should question the validity of the export prices BC Hydro is relying on for mitigation plans. If that export price falls below the UEC, the cost to ratepayers is going to increase. It's not at all clear that the surplus energy can be

1 sold at a profit, as I've said, and if the surplus
2 energy is not sold at a profit, the UEC for the
3 ratepayers goes up, since UEC is based on total energy
4 output.
5 And we note that the UEC is based on -- we
6 note that because the UEC is based on total energy
7 output, it's valid as a cost to ratepayers only if
8 that energy is used to serve those ratepayers.
9 The fifth issue that we're going to address
10 related to BC Hydro's alternative portfolios and
11 specifically the cost of a sample portfolio including
12 wind and pump storage and in particular the UEC, that
13 the portfolio compare with the UEC for Site C.
14 Now, we are aware that the Commission has
15 put out an alternatives document, and we are not,
16 unfortunately, in a position to make any comment on
17 that today, but we do intend to do so within the time
18 line that was allowed.
19 THE CHAIRPERSON: Thank you.
20 **Proceeding Time 11:56 a.m. T13**
21 MS. WORTH: This Panel found that BC Hydro's analysis of
22 the adjusted UEC before that was too opaque to be of
23 value, and BCOAPO has to agree. The Panel made a
24 number of requests to BC Hydro for clarification that
25 BCOAPO strongly supports.
26 Again I feel the need to ask for

clarification whether we're determining UECs as a measure of impact on rates and ratepayers, or as an economic comparator. The two are quite different and will influence the treatment of some costs and the discount rate used. There needs to be a clear explanation as to what the various adders are, and if or how they are applicable to each of the alternatives, and where they have been included. Issues with the current material provided by BC Hydro include, for Site C, where and how the allowances for firm transmission and network upgrade have been included in their analysis; should offsite for termination in some costs be included as a negative here, or better reflected as a cost if the alternatives are chosen? And for the alternative block UEC there appears to be double counting of capacity costs as they are supposedly reflected in the integration costs adder but then added again.

Now, the sixth issue asks: Given the energy objectives set out in the *Clean Energy Act,* what if any other portfolio of commercially feasible generating projects and demand-side initiatives could provide similar benefits including firming, shaping, storage, grid reliability, and the maintenance or reduction of 2016-2017 greenhouse gas emission levels, to ratepayers at a similar or lower unit energy cost

as the Site C project? This question really raises similar issues to those that we raise in relation to issue number 5.

Now, in regards to this question, the Panel found that BC Hydro's assumptions were not sufficiently well documented in order to allow it to make determinations regarding the appropriateness or cost of alternative portfolios. In our view the parties have raised several valid issues regarding the time framing used, which is 70 years; the life of the WAC Bennett Dam; and the discount rate, which is linked to the purpose of the analysis. And the pricing of alternatives, particularly when being added in the later years.

Our final issue, and this is one that is particularly important for our client, is the project's ultimate cost to ratepayers. It is at this point unclear what Site C is going to do to rates. Comparisons of continuation, suspension, and termination alternatives have been made using various metrics, including the present value of the revenue requirement, cumulative rate increase, and nominal costs. Cumulative rate increases are not a good impact measure if they only look at the long term. This will mask the short-term rate increases. We submit that present value is better at indicating

1 impact, but the measure is also rather opaque because
2 there's no sense of really what the impact is.
3 We submit that the Commission's analysis
4 needs to look at the rate increase profile over time,
5 both cumulative and annual changes. The types of
6 sensitivity analyses undertaken by Baker and BC Hydro
7 are important to understanding the robustness of the
8 results drawn from the mid-range forecasts.
9 So unfortunately, as I said when I began,
10 my clients are not in a position to take a position on
11 this project, but I hope that our submissions today
12 have been instructive to the Commission Panel on what
13 issues our clients remain concerned about, and those
14 issues that we hope BC Hydro and the Commission Panel
15 will be able to resolve before this Panel issues its
16 final report.
17 Subject to any questions, those are our
18 submissions.
19 COMMISSIONER MASON: Thanks very much. If I could just
20 ask one clarification on your final paragraph, I
21 think. You were recommending how you or your clients
22 felt the rate impact should be presented.
23 MS. WORTH: Yes.
24 COMMISSIONER MASON: I wonder if you could just repeat
25 that for me. That was the -- I think you were
26 suggesting that the rate impact should be presented in

1 the either annual or cumulative rate increases or bill
2 increases. Can you just clarify that for me, please?
3 MS. WORTH: What I was suggesting is actually the
4 Commission should actually take a look at both, the
5 cumulative rate increase over time and the annual
6 changes. Because if we're in a situation where we
7 have a cumulative, solely a cumulative look, we can
8 have something where in Situation 1 there is almost an
9 equal amount of rate increases over the period of
10 time, and that has a certain cost impact to
11 ratepayers. But if those -- let's say there's 20
12 percent. So each year over a 10-year period there's
13 roughly 2 percent or slightly less. But if that 20
14 percent is front loaded to the first two years, the
15 amount that ratepayers will pay is significantly more
16 over that same time period. So the
17 **Proceeding Time: 12:00 p.m. T35**
18 So the reason that we're making the
19 suggestion about both cumulative and annual changes is
20 to take into account that discrepancy between the two
21 scenarios.
22 COMMISSIONER MASON: Thank you.
23 MS. WORTH: Thank you.
24 THE CHAIRPERSON: Thank you very much.
25 So, it is lunch time now, we'll come back
26 at 1 o'clock, and Allied Hydro Counsel of B.C. will

1 lead the way. Thank you.
2 **(PROCEEDINGS ADJOUREND AT 12:01 P.M.)**
3 **(PROCEEDINGS RESUMED AT 1:01 P.M.)** **T36**
4 THE CHAIRPERSON: Okay, can we please be seated? Thank
5 you.
6 And it looks like we're ready to go.
7 Gentlemen.
8 **ALLIED HYDRO COUNCIL OF BC (#0295):**
9 MR. PEPPARD: Well, thank you very much. My name is
10 Wayne Peppard. I'm the business representative for
11 the Allied Hydro Council of British Columbia.
12 THE CHAIRPERSON: Okay.
13 MR. PEPPARD: With me today is Chris Feller. Chris is
14 the president and business manager of the cement
15 masons, and Mr. Lorne Sivertson, who we have employed
16 as our consultant to address the issues around Site C.
17 The Allied Hydro Council filed its Site C
18 review on the 21st of August, and we are comprised of
19 17 international unions formed in 1961 by Premier
20 Bennett to supply labour for the Two Rivers policy.
21 As such, our members have been employed under
22 agreements to create or construct all of the legacy
23 dams, and more recently, since 1993, under agreement
24 to build all of the upgrades to 7 Mile, Mica,
25 Revelstoke, Stave Falls, the Arrow Lakes generating
26 plant, the Brilliant expansion and Waneta, and we are

1 currently out on the John Hart project under agreement
2 as well.
3 Lorne is advisor to AHC on this Site C
4 issue, and formerly he was the CEO of Columbia Power
5 Corporation, where he was responsible for managing the
6 planning, permitting, financing, and development of
7 800 megawatts of hydro power projects in the Kootenay
8 region. The AHC has reviewed the BCUC preliminary
9 report, and we're prepared to speak directly to the
10 questions that you have posed. With that, I'll turn
11 it over to Lorne.
12 MR. SIVERTSON: Thank you, Wayne. Yes, I'm Lorne
13 Sivertson. If I could proceed.
14 THE CHAIRPERSON: Yes, please.
15 MR. SIVERTSON: So as requested by the panel, we will
16 focus on the preliminary report, and that's what we're
17 addressing our comments to.
18 THE CHAIRPERSON: Okay.
19 MR. SIVERTSON: And so the first question was the on-time
20 question. And the panel, in its report, said among
21 other things, but the panel cannot yet say if there
22 will be a 2024 completion date.
23 The Allied Hydro Council says BC Hydro has
24 an inconsistent record for on-time projects. BC Hydro
25 needs to improve project management. AHC also
26 believes that the procurement process used on the Site

1 C project has contributed to delays. The Allied Hydro
2 Council suggests that using a design/build, and the
3 Allied Hydro Council, Columbia Hydro Constructors
4 agreement with proven records for on-time or better
5 would be more effective.
6 The AHC notes that as of October 5, BC
7 Hydro says despite the schedule slippage Site C can be
8 completed in 2024.
9 The second question on the list, is it on
10 budget, Site C on budget. And the panel, among other
11 things, said the panel does not have sufficient
12 information to say on that point, at this point. The
13 Allied Hydro submission that we gave you in August
14 said that Site C costs indeed have escalated at an
15 average annual rate of 3 percent from the 1980
16 estimate of $3.2 billion to the June estimate of 2017
17 of 8.8 billion. Now, 8.95 billion. But that is an
18 average annual escalation rate of 3 percent, which is
19 roughly the consumer price index.
20 The estimates presented by Deloitte and
21 Eliesen and some others have in-service costs of up to
22 $12 billion for Site C. However, they do not account
23 for the $3 billion of sunk costs. Going forward, the
24 focus should be on the remaining costs to complete,
25 which now appears to be roughly $5.8 billion without
26 cost overruns.

1 Allied Hydro Council says that examples
2 shown of project cost overruns in the Deloitte report
3 and elsewhere are all government-owned utility
4 projects. Other forms of project procurement can work
5 better. Projects using design/build procurement and
6 the AHC Columbia Constructors' Agreement have a better
7 record, such as the Columbia power project, where the
8 capital cost for a megawatt of capacity averaged only
9 one-third those for the BC Hydro projects.
10 **Proceeding Time 1:06 p.m. T37**
11 The third question that we've looked at was
12 to suspend the project, and the Panel said, "The Panel
13 cannot reach a conclusion on this at this point." The
14 Allied Hydro Council agree on the suspension costs as
15 shown in the BCUC report, but add that the BCUC should
16 not ignore the cost of finding replacement energy
17 supplies which will likely be equal to or higher cost
18 than Site C and without all the benefits and likely
19 with delivery delays. Projects take a long time to
20 get permitted.
21 The fourth issue was terminating the
22 project, and the Allied Hydro Council agrees with the
23 Panel on the Site C sunk costs of about 3.2 billion.
24 AHC submission says that terminating a project could
25 result in significant lost benefits, but does not
26 provide a cost assessment of those lost benefits as

the Panel has pointed out. However, AHC argue that security of energy supply, low greenhouse gas power sources and support for other renewables are matters of existing B.C. public policy not needing a cost assessment. It's public policy. They are goods.

AHC August 21st submission has a table showing the unit energy cost of Site C and alternatives, and we believe this is the only submission to clearly do so. And I should point out all the costs we've shown in the report and subsequently are all Canadian dollars. We are using Canadian dollars, unlike some of the presenters today using U.S. dollars, which confuses the issue.

The Allied Hydro Council has demonstrated in material provided to the Panel on October 10th we submitted by a form of letter, that should Site C be replaced by wind or run-of-river hydro power projects, when using the Deloitte submission capacity capital cost estimates, and the O&M cost estimates for these energy sources, and using the average scale of a BC Hydro independent power producer project goes with electricity purchase agreements, it would require 17 wind power projects, and that would be at a capital cost of $4.1 billion for those 17, or it would require 34 hydro plants at a capital cost of 7.5 billion. These costs compare to the Site C cost after deducting

1 sunk costs of, again, roughly 5.8 billion.
2 The analysis that we prepared for the Panel
3 on this matter goes on to show that the unit energy
4 costs for wind alternatives is about $104 a megawatt
5 hour. Again that's using Deloitte's numbers. We took
6 those and they showed ranges. We took the averages in
7 those ranges and multiplied that by the capacity -- by
8 their availability. So it would be 104 for wind.
9 Hydro power would be $132 a megawatt hour. And the
10 unit energy cost for Site C is $105 a megawatt hour.
11 And without consideration again, we point out --
12 without consideration of the other costs that are
13 involved with the alternatives: lack of storage, lack
14 of dispatch, and needed transmission.
15 The current load forecast and the Panel
16 said there's much uncertainty on long-term forecast.
17 Allied Hydro Council agrees that long-term electricity
18 forecasts have uncertainty, and we agree that LNG
19 demand is an important consideration as, as someone
20 pointed out, demand elasticity. And the Panel has
21 questions for BC Hydro on that.
22 In the studies that we have looked at, AHC,
23 we are aware of a short run in residential electricity
24 demand elasticities of minus .02 and long run of minus
25 .07. And that compares to the BC Hydro estimates
26 shown by the BCUC in their report of minus .05, so not

1 far off what a lot of other studies shows.
2 Despite what some submissions say, a BC
3 Hydro forecast does not rely on LNG demand. They show
4 for the period under review about 22,600 gigawatt
5 hours, and that comprises 3.6 percent of total 2036
6 electricity demand.
7 **Proceeding Time 1:11 p.m. T38**
8 But it is about 19 percent of demand growth according
9 to the BC Hydro's forecast from 2017.
10 And I should point out that the LNG
11 included in the Hydro forecast are not a lot of
12 projects. It's the Fortis Tilbury plant, which I
13 believe is under construction, the Woodfibre plant in
14 Squamish and that's just for ancillary needs. So
15 there's not a lot of electricity for LNG.
16 At one point in time there was going to be
17 20 LNG plants in B.C. No, that's not going to happen,
18 but there will be at least two. And Hydro, I think,
19 we believe is fairly conservative in that regard.
20 The BC Hydro forecast through 2024 and
21 2036, their forecast would see a need in 2024 for
22 about one Site C in electricity and capacity, and in
23 2036 the need is for about three Site Cs. And so
24 it's not alternatives or hydro. If it is hydro, it's
25 still alternatives. They are still needed, a
26 substantial amount of alternatives.

1 Allied Hydro Council believes electricity
2 vehicles could be a significant upside risk, and point
3 to Mark Jaccard's *Vancouver Sun* article of September
4 12. He, there, was referring to Canada's emission
5 targets, saying that BC Hydro forecast does not -- and
6 I quote "does not assume that B.C. reduces its
7 greenhouse gas emissions by 25 to 30 percent by 2030
8 and by 55 to 75 by 2050. When we adjust," Jaccard
9 says, "we find that BC Hydro has understated the
10 demand for electricity by about three terawatt hours.
11 That's about three million megawatts in 2025 and 10
12 terawatt hours in 2035. Note Site C is about 5
13 terawatt hours.
14 And the sixth point was handling surplus
15 energy and capacity, and Allied Hydro Council
16 suggested that there are surpluses in Site C in early
17 years. That indeed could be a benefit in exports to
18 Alberta which is shutting down its coal-fired plants
19 and looking for green sources, and it could be to
20 Alaska, which is not connected to the North American
21 grid. They burn diesel fuel and Alaska generate
22 power, and the cost per megawatt there is about $350 a
23 megawatt hour. So there's a transmission line going
24 very close to Alaska now, the one that BC Hydro built
25 up to the northern mining area. About a 150 kilometre
26 connector could hook Alaska into that market and that

1 could be an interesting opportunity for B.C.
2 Allied Hydro Council agree with Deloitte
3 that the future price at mid-C, and we heard a lot
4 about that earlier being very low, and it has been low
5 for a long time, but no one pointed out that that is
6 heavily impacted by government wind subsidies. Those
7 companies are mostly all on take or pay contracts and
8 so if the utility doesn't take them, they pay them
9 anyways. So that shuts down a lot of power from other
10 sources, and it's highly subsidized.
11 Deloitte said that the price at Mid-C could
12 rise substantially in the future, not too distant
13 future too. They said $94 a megawatt hour, which is
14 roughly the cost of a combined cycle gas turbine
15 which, in fact, in most part of United States is now
16 the marginal source of power. Burning natural gas in
17 a combined cycle gas turbine is really setting the
18 price in a lot of areas. It's not permissible under
19 B.C. public policy, but it is indeed the cheapest
20 source of power. It's $75 a megawatt hour at
21 relatively robust prices. But if the subsidies were
22 gone, prices will rise to what it costs to generate
23 power in Oregon and Washington State. And those
24 prices would be about the same level of Site C cost,
25 in the hundred dollar range.
26 Alternative energy portfolios, and the

1 panel has said BC Hydro, their only consideration of
2 wind and pump storage as alternatives is not
3 appropriate. And Hydro should consider those that
4 Deloitte has indicated, and they indicate quite a few.
5 **Proceeding Time 1:15 p.m. T39**
6 Allied Hydro Council agrees BC Hydro's
7 consideration of only wind and pump storage as
8 alternatives is an information deficiency and says the
9 alternatives and the capital and O&M costs shown by
10 Deloitte are pretty good. They're appropriate. But
11 they didn't show unit energy costs for those sources.
12 They showed capital cost ranges, operating cost
13 ranges, but they didn't sort of go down and say,
14 "Here's the UECs for wind and solar," and so on.
15 We did that. We used Deloitte numbers to
16 provide capital costs and unit energy cost comparison,
17 which has been provided to the panel. And Allied
18 Hydro Council notes that BCUC have -- agree with our
19 position not to include the downstream benefits as an
20 alternative. Our position for that is, they are
21 essentially imports of power, and that's again, that's
22 public policy of self-sufficiency, and also they
23 depend upon the Columbia River Treaty. And given
24 current affairs in America, one would not trust them
25 to last very long. They could be -- the United States
26 could walk away from the Columbia River Treaty with

1 notification. So they're not dependable.
2 The cost of energy, the panel finds BC
3 Hydro assumptions for determining the cost of Site C
4 power are not well explained and have asked for more
5 information. AHC fully agrees with the panel that BC
6 Hydro's assumption for determining the cost of Site C
7 power are not well-explained, and that the discount
8 rate, financing, and project life assumptions distort
9 the unit energy cost analysis.
10 However, Allied Hydro Council goes on --
11 points out in its submission when the project life of
12 Site C is reduced from 70 years to 50 years, when the
13 discount rate, which was artificially low, is
14 increased to a real 8 percent, and when the sunk costs
15 of 3 million are used, and when the reliable costs and
16 benefits alternatives are considered, completing Site
17 C with the unit energy cost and the $100 range, is
18 still the best choice for ratepayers and the B.C.
19 public.
20 And the final thought, the final issue,
21 that we took out of the panel's report was the cost
22 for ratepayers. And the panel says it's not yet in a
23 position to assess cost impacts to ratepayers from
24 continuing, from suspending, or from terminating
25 construction.
26 Allied Hydro Council relied on many sources

of information. We relied on solid facts and our extensive experience in preparing our BCUC submission, and in reviewing the preliminary report of the BCUC and other submissions. We understand the panel wants more information and we have tried to provide it. In particular, on alternatives costs.

We have found that those submissions opposing Site C completion rely on one or more of three arguments: the first one being, future electricity demand will be flat or falling; the second one being, Site C costs are high and will be rapidly rising; and the third being alternatives to Site C are readily available at equal or lower costs, and have equal or greater benefits.

The factual support for these assertions is far from conclusive. AHC have carried out an analysis that shows this last assertion on the unit energy costs to be incorrect. AHC, however, must point out that the submission by David Vardy does contain very instructive information for the panel on project management and procurement, which reflects that of the AHC submission.

In concluding its Site C submission, AHC said that suspension or cancellation of Site C should not -- would not serve the public or ratepayers' interest. It went on to recommend that the province

1 should take the positive position, positive decision,
2 to proceed with Site C. The AHC stands by this
3 conclusion and its recommendation.
4 Thank you.
5 THE CHAIRPERSON: Thank you, sir. I have a couple of
6 questions.
7 MR. SIVERTSON: Yes.
8 THE CHAIRPERSON: Concerning your submission
9 approximately October the 11th, I think --
10 MR. SIVERTSON: Yes.
11 THE CHAIRPERSON: It's at 24-2.
12 MR. SIVERTSON: Yes.
13 THE CHAIRPERSON: So I'm looking at the alternative
14 energy sources to Site C, your table of costs per
15 megawatt hour.
16 MR. SIVERTSON: Yes.
17 THE CHAIRPERSON: So a couple of questions. Do you have
18 the work -- can you make the worksheet for that
19 available?
20 MR. SIVERTSON: I could. I could. And again, I took the
21 numbers -- this was -- there are two attachments
22 there. It was alternative energy sources for Site C,
23 which that was in our submission of August 19th, first
24 page.
25 **Proceeding Time 1:20 p.m. T13**
26 And then I went on to take information from

the B.C. submission when they filed their report, and that was the second page, and tried to extract what I could about what they were saying. And I took the Deloitte submission and did the same thing. I took what I read from their submission and the Clean Energy Association.

THE CHAIRPERSON: Okay.

MR. SIVERTSON: And then the final -- there's another two or three page document called "Replacing Site C with Wind or Hydro Power."

THE CHAIRPERSON: Right.

MR. SIVERTSON: And I think that's the one you're going to.

THE CHAIRPERSON: Okay.

MR. SIVERTSON: And yes, again here we used the -- the facts there were we used Site C, The parameters provided by, or you know, 1100 megawatts, 51 -- as provided by BCUC, and then simply took then all the EPAs that are currently under contract with BC Hydro, which are quite a few. We took the wind EPAs, and there are seven of them, 702 megawatts, and then -- and there are 80 EPAs of hydro power, we took that as a fact and just divided that to get what the average energy would be for, you know, on those existing projects. And then looked at then the figures by Deloitte on the capital and operating costs for those

1 plants and just multiplied the capital costs by
2 numbers of plants. That's how we came up with the
3 full capital costs and how I came up using their own
4 end costs and their capital costs. We came up then
5 with the figures for wind, hydro, and Site C. And
6 indeed I can provide my numbers to you on them. I
7 gave you the numbers. I didn't give you the
8 calculations.
9 THE CHAIRPERSON: Okay. So to summarize, you're basing
10 -- are you basing the alternatives on IPP?
11 MR. SIVERTSON: Yes, yes.
12 THE CHAIRPERSON: The current price of IPP.
13 MR. SIVERTSON: Exactly. And it goes -- that's a factual
14 --
15 THE CHAIRPERSON: Sure.
16 MR. SIVERTSON: I mean I know the size of them.
17 THE CHAIRPERSON: Yes.
18 MR. SIVERTSON: So I didn't have to guess at what size an
19 average wind plant would be. I took what the existing
20 one is. I took the whole and just divide it by the
21 number and 2000 average. Same thing for the hydro.
22 How many hydro EPAs are divided by how many, you know.
23 THE CHAIRPERSON: Yeah.
24 MR. SIVERTSON: So that's how I got the scale of the
25 plant.
26 THE CHAIRPERSON: Okay, thank you, sir. My second

1 question is you were talking about mid-C price being
2 heavily impacted by subsidized wind.
3 MR. SIVERTSON: Yes.
4 THE CHAIRPERSON: I'm not sure if you were here this
5 morning or not, but this morning we heard that -- at
6 least I heard anyway, that it was being impacted by a
7 drop in demand. So do you have any comment on that?
8 MR. SIVERTSON: Yes, and I heard the same thing, and the
9 Oregon-Washington some years ago had a very concerted
10 effort to develop wind power projects, and the only
11 way they could get companies to invest in them was
12 give them, you know, very strong contracts. I think
13 they were all essentially take or pay contracts. And
14 so when the demand tails off, I mean, they get their
15 subsidies anyway, and so -- I mean at $35 no one -- I
16 don't think anyone is saying that the cost of a new
17 wind plant is $35 a megawatt hour. There's something
18 missing there and it's a matter of subsidy. And new
19 wind is going to cost 85 to 90 to 100. I heard
20 somebody say today up there, up here talking, and they
21 were quoting in U.S. dollars, $68 a megawatt hour for
22 wind. That was U.S. dollars. Convert that, about $84
23 Canadian. So that's about what it is, but it's
24 selling for half of that and because there are
25 subsidies.
26 If those subsidies disappear, the price of

1 power in most areas where it's not being heavily
2 subsidizes is now being set in the United States by
3 the cost of new combined cycle gas turbines. And at
4 current gas prices, which are low, that's around $70,
5 $75 a megawatt hour, and that is the marginal cost of
6 new supply, that's the lowest cost available, and the
7 price at mid-C is half that.
8 THE CHAIRPERSON: Okay. Thank you, sir.
9 COMMISSIONER KEILTY: You made reference to some
10 elasticity range. Did you provide references from
11 where -- which studies those related?
12 MR. SIVERTSON: Yeah, I can provide -- I mean these are
13 from, these are from -- most of them are U.S. studies,
14 but I've got some serious studies in -- yeah, there's
15 lots of studies around looking at electricity and
16 elasticities, and I can provide that.
17 COMMISSIONER KEILTY: Okay.
18 MR. SIVERTSON: For sure, I can do that straightaway.
19 **Proceeding Time 1:25 p.m. T41**
20 COMMISSIONER MASON: You made reference early on in your
21 presentation to different procurement methods that BC
22 Hydro used regarding the Site C project --
23 MR. SILVERTSON: Yes.
24 COMMISSIONER MASON: -- compared to some procurement
25 methods you might recommend yourselves. I wonder if
26 you could describe in just a little bit of detail how

1 those different procurement methods might shed light
2 on any possible future risks that BC Hydro might have
3 with regards to the two big procurements they still
4 have coming up.
5 MR. SILVERTSON: I've done quite a lot of work for
6 Columbia Power. We did design build, one of the first
7 power producers in Canada that used design build in
8 fact. But the difference -- BC Hydro, Manitoba Hydro,
9 Newfoundland Power all use something they call design
10 bid build. They do most the design, they go out and
11 get a bid and then they let a series of contracts.
12 Under design build what you do is issue a generalized
13 kind of pro forma, plus or minus kind of 30 percent,
14 with a description of what you want. Then the
15 contractor's allowed, the engineering designer
16 improves their design on it. And then they will enter
17 into a contract. Our experience has been, and it
18 still possible where they will be responsible for the
19 design and construction of a project and will bear all
20 or most of the risks. The owner does not bear many of
21 the risks. They might share some risk, but it is the
22 contractor that bears the risk. Do you pay a premium?
23 Yes, you may, but it's often a whole lot better.
24 Utilities, again, all use design bid build.
25 They keep in full charge, full control which -- and
26 the problem is there's no one party involved on either

1 side of the table, on the owner's side or on the
2 builder's. There's several contracts and
3 orchestrating them, what you want to have is one major
4 contractor, the builder responsible, calling the
5 shots, not five or six different companies call the
6 shots. And design bid build leaves you open to a lot
7 of change orders. The owner decides, "Oh, we should
8 have done that." Well, under design build not much of
9 that is allowed, and so you get what you agree to and
10 you're not changing as you go along.
11 Some change orders are necessary, but often
12 you want a different colour of paint on the wall, and
13 that costs a lot of money.
14 COMMISSIONER COTE: Do you think given the scope and
15 the size of this project, that somebody would have
16 been willing to take that one?
17 MR. SILVERTSON: Early on in this process, Site C --
18 having worked on a lot of projects, I talk to a number
19 of major contractors, if they would be interested in
20 submitting an unsolicited proposal to the province of
21 B.C. for design build for Site C, and they said, yes,
22 they would be interested.
23 It didn't go that way, and that question --
24 the relevant question at this point in time with the
25 project one-quarter built, is it still possible to
26 amend the procurement approach? I think it is. You

1 may not be able to go to full design build, but you
2 could -- I think there are improvements that we made
3 on the contractors -- on the owner's side in terms of
4 project management and you might still be able to do
5 some design build where there would be at least a
6 sharing of risk, not a full absorption of risk by the
7 owner.
8 COMMISSIONER COTE: Okay, thank you.
9 THE CHAIRPERSON: Okay. Thank you very much, gentlemen.
10 Appreciate it.
11 MR. SILVERTSON: Thank you very much.
12 **Proceeding Time: 1:29 p.m. T42**
13 Any time? Are you good? Thank you.
14 **SUBMISSIONS BY MR. DAUNCEY (#0296):**
15 MR. DAUNCEY: Good afternoon. I must say I am impressed
16 by the level of diligence that you are putting into
17 this process.
18 THE CHAIRPERSON: Thank you, sir.
19 MR. DAUNCEY: In those reports, the interim report, last
20 night's thing that came out, it's impressive.
21 Right, so I represent myself, but I also
22 effectively represent all those who have a huge
23 concern around the global climate crisis. So, the
24 context in which I started my work on this, with the
25 major submission I made to you back in August I think
26 it was, was premised on the reality of the climate

crisis. And I spent 20 years in the climate trenches. I've written two major books on climate solutions endorsed by top climate scientists. And my simple thing on this is, if you think you understand the climate crisis, and you happen to have that awful sinking feeling in your belly about how bad it is, you haven't actually understood how serious it is.

The impacts we're seeing today around the world are the result of emissions put out 40 years ago, because there is a 40 year delay. So, the increased intensity of the hurricanes because of the warmer waters in the Gulf of Mexico, the phenomenal ferocity of the fires in southern California, in Northern California right now. The increase in fires that B.C. is seeing every year, fueled by the pine beetle which is normally killed off at minus 40 temperatures, and because it has been warmer in Prince George, they are all thriving. So, it is a climate induced forest fire season we're seeing. Based on ** impacts from 40 years ago.

So, where we're heading for this right now is, 41 percent of climate scientists use the word "catastrophic" for the future outcome. And in addition to this, Steven Chiu who was secretary of energy under Obama back in 2009, he said that by 2050 there could be no food coming out of California at all

because of the melting Sierra Nevada snowpack. Combined with other factors like the unpredictability of droughts and stuff like that.

So, the food equation, although I know it's not on your list of what matters, is really important, because we're going to need -- California produces 50 percent of the fruit and produce, you know, for North America at the moment, and we're going to need access to farm land, which is why there is a really strong argument for not destroying farmland if there are other ways of doing it.

So, when I look at the need to address the climate crisis, the solution is on the basis that we're going to be morally responsible to future generations. The solution is 100 percent electrification of all transportation, of all buildings, and all industry. Luckily, because of tectonic plates and dams, we don’t need -- our electricity is effectively 100 percent zero carbon already, take aside Haida Gwaii and Fort Nelson, it's already, because the Campbell River plant is not running. So, it is already 100 percent. So that makes it much easier for us.

And so then when I looked at the implications for this, I said how much electricity do we need if we're going to electrify fully? Because

I've seen the arguments that says oh, BC Hydro is exaggerating, we don't need the power. I'm not going to go into those, because my conclusions are that we absolutely need more power.

When I took the full implications for transportation, assuming that we go to what is climate, climate-wise the moral thing to do, which is 100 percent electrification by 2040, and I scale through all the numbers for every form of transportation using known or how many kilowatt hours per 100 kilometers are needed, the total came to 27,000 gigawatt hours for full electric vehicles. That's like more than five times more than Site C will provide.

The incredible benefit of electric vehicles, which is not often referred to, is that they charge at night. 95 percent of all vehicles will charge at night. So, in terms of grid shaping, and demand shaping, there is immense benefits to the grid management as a whole, because they're not all suddenly all charging up at 5 in the afternoon. So the peak demand thing is really smooth. There is a huge demand smoothing thing that electric vehicles charge.

There is another 7,000 gigawatt hours for building retrofits, moving to a basically heat

1 pumping, LNG, plus super efficiency. And I haven't
2 any ability to estimate the industrial transition,
3 because industrial fossil fuel needs could go to
4 hydrogen, they could go to biomass, they could go to
5 electricity, but I assume 10,000 gigawatt hours.
6 So, I'm looking at a need for an extra
7 45,000 gigawatt hours. That's nine times more energy
8 than Site C will provide.
9 **Proceeding Time 1:43 p.m. T43**
10 So clearly, what I've done is, I'm oh, my
11 goodness. I'm internally not wanting to have to do
12 Site C because of the ecological loss. And I think,
13 "Oh, my goodness it's clearly needed." Then I said,
14 "If then we look systematically at what the
15 alternative portfolio looks like."
16 And starting off with demand-side
17 management, which is clearly the intelligent place to
18 begin because it is the cheapest form of power, and I
19 have -- I'm aware that the new alternative portfolio
20 came out last night. I can't read the spreadsheet.
21 It's got all mathematical formula and stuff to even
22 know what the comments refer to, so I hopefully
23 understand that by Wednesday.
24 But I am aware that — leaving that aside —
25 BC Hydro has, because of the current power surplus,
26 currently having reduced its DSM to 700 gigawatt hours

a year, but in 2013 under IRP option three, they managed achieve up to 8,300 gigawatt hours a year of saving by 2021 at a cost of 2 cents a kilowatt hour. I use cents per kilowatt hour, because to most people I know it's an intuitive better than per megawatt hour, but you can do the 1,000 adjustment.

That's -- so if they ramped up to a 2 percent of demand reduction through DSM, that would be a thousand kilowatt hours a year, a level already being achieved by industries in Vermont, California, Connecticut, who are achieving up to 2.9 percent. The efficiency of Vermont savings in 2008 were the highest in the U.S. at 2.5 percent of demand. So we know that those numbers are possible. And I fully support the B.C. Sustainable Energy Association's submission that without -- if we look at it without Site C portfolio, it should include all possible DSM savings that are cheaper than the cheapest supply side resource.

Now, a little bit more on demand side management coming up. But I also notice around demand-side management the -- it's not quite demand-side management. The demand response technologies that are possible in a digital world but not possible in a pre-digital world, there's a company called Restore which won the 2017 best practices award with

1 the North American Demand-Side Management, you know,
2 Institute. And they use a thing called FlexPond, a
3 data driven platform that enables utilities to
4 interact with residential, commercial and industrial
5 users. In seven years they have grown to 1.76
6 gigawatts of peak load management, selling 150
7 industrial customers worldwide and five of Europe's
8 largest utilities and grid operators. So the question
9 is, is BC Hydro really at the front of the curve in
10 terms of what's potential with demand response given
11 the speed of the digital revolution and what's
12 possible?
13 Also when it comes to demand-side
14 management, when we look at -- let me -- before I go
15 into that in detail, I want to just talk about an
16 aspect of that which is rate impacts causing energy
17 poverty, which is a subset of demand-side management.
18 It's a dimension of debate not being covered at all,
19 which I firmly should be included. The impact of rate
20 risers on low income households, including the
21 evictions of households for non-payment of utility
22 bills and people's children being taken into care
23 because their homes are too cold and pose a risk to
24 the children's health. Energy poverty is a real
25 concern for issues that affect the health, standard of
26 living, living environment and children of British

Columbians. 2007, almost 300,000 B.C. households, 70 percent of the population were living in energy poverty.

And last year, Andrew McLeod, award-winning B.C. author published a story in the *Tyee* called "Power Bills Rising". My clients are panicking. Tenants face a ten-day eviction notice from landlords if they can't pay the utility bill within thirty days, and then you have five days to pay the whole thing, or be evicted.

Keith Simmons, minister of Duncan United Church said that over the past 18 months more people have sought help from the church because they can't afford to pay their BC Hydro bills. Inability to rising hydro costs has a huge impact on low income people. Many people have to choose between paying rent, purchasing food or paying the Hydro bill. He said many families his church works worry that their children will be taken away from them and put into care if they can't pay for electricity for heat and to refrigerate food.

One advocate described providing candles to a disabled senior so he'd have light after BC Hydro cut off the power.

Clients who lose electricity risk having refrigerated and frozen food spoil. Many social

1 services clients are prone to opportunistic
2 infections. So not having proper nutrition can affect
3 their health, and drugs for HIV have to be
4 refrigerated. These are all externalized costs which
5 never show up in the BC Hydro cost models.
6 People often get behind in their bills in
7 the winter. If someone is heating with electricity in
8 the winter in the northern community the bills can be
9 enormous, because it's colder and darker. In Prince
10 George in winter it's impossible to survive without
11 heat and for clients with electric heating, it becomes
12 a life or death issue. Some of the cheaper places to
13 rent in Prince George are electrically heated. Low
14 income people move in because the rent is cheaper and
15 they don't realize until they've moved that
16 electricity costs can be $300 a month.
17 **Proceeding Time 1:39 p.m. T44**
18 And I have a friend in Ladysmith, where I
19 live, a woman in her 50s who suffers from the impacts
20 of birth rate of fetal alcohol syndrome, who lives in
21 an old Airstream trailer on $1100 a month, paying $700
22 a month in rent. Can't afford to have the heat on.
23 So she's living in 10 degrees Celsius temperature
24 throughout the winter. And I just -- you know, I
25 crawl with horror that this is happening in our
26 province, right?

So, price elasticity becomes so extreme at the low-income level that it's down to, you know -- the elastic band breaks, and demand is down to zero. Because, you know, you can't afford to pay. So under BC Hydro's current DSM measures for low-income families, tenants living in a house, townhouse, or manufactured home could qualify for an energy conservation assistance program to get free evaluation, free efficient light bulbs and shower heads, if they have the landlord's permission. And a little action kit with LED bulbs. But that's all. It's almost non-existent.

By contrast, in Illinois, Elevate Energy's multi-family program worked with landowners using a variety of best practices, served -- between 2008 and 2013, served 57,000 households, saved 16 million kilowatt hours. Their equivalent in B.C., with our smaller population, would be reaching 21,000 households. So BC Hydro could do far more through DSM to help low-income families save on their energy bills, while reducing overall demand. So I know that the impacts of rates is huge on low-income people, and on stressed small businesses, and on the pulp mills and stuff like that. But there are methods you can use for each of these targeted sectors through DSM.

So home energy retrofits need to be

1 drastically accelerated to tackle the climate crisis.
2 It's proven difficult in the past, because success
3 requires the parallel application of several different
4 best practices, including PACE financing - that's
5 property assessed clean energy financing - where the
6 cost of the retrofit is put onto your municipal taxes
7 and carries with the title of the property. So that
8 when you move house, it's -- you know, carries on for
9 the next 10, 15 years, whatever it is. In California
10 they are backed up with government-backed 40-year
11 loans, and offering the 5 percent return to
12 participating housing associations. You also need
13 one-stop shopping, so a single agency is responsible
14 for the assessment, the marketing, and the actual
15 doing of the whole thing.
16 You need insurance against modeled energy
17 non-performance. So, if an energy company said,
18 "Well, I don't trust the models that are coming-out of
19 the spreadsheets about how much they think we'll save,
20 in Ontario now you can take out insurance to cover
21 that risk. So that the money you invest in the
22 retrofit is secure, because insurance covers it if
23 your assumptions are wrong.
24 You need marketing through a trusted local
25 non-profit to get consumer buy-in, and you need real
26 estate agents trained in the marketable value of a

house that's been retrofitted for resale.

In Europe, the leading retrofit organization is called Energiesprong. They started in Holland, which is Dutch for "energy leap". Their approach to residential energy retrofits resulting in -- to get to zero net performance, they're doing it with no up-front capital cost to the owners. They've resulted in more than 6,000 residential net zero energy retrofits with 100,000 homes in hard commitments on the waiting list, primarily in affordable housing.

The Vero energy makeover includes a pre-fabricated exterior façade, new smart heating and cooling insulations, pre-insulated solar roofs, plants on the south side. Installation happens within a week. The home owners don't need to move out. Zero cost to the occupant due to saved energy bills, repair and maintenance costs. 30-year warranty on energy, and indoor climate performance.

Now being launched in Britain, France, Germany, north end New York State, which has set aside $30 million to develop the market through an organization they set up called Retrofitting New York.

So, the potential for building retrofits as a form of DSM, it's like BC Hydro has ignored the whole thing. They're just dancing with the tiniest,

1 cheapest, easiest, simplest things to do. It is
2 difficult. And I would favour, actually -- I mean, BC
3 Hydro exploring whether they should hive off the whole
4 DSM branch to have a separate agency called Efficiency
5 BC. And all the retrofit work of buildings through a
6 separate agency called Retrofit BC, similar to what
7 New York is doing.
8 And then a few examples on commercial
9 energy retrofits, from a colleague of mine, Scott
10 Sinclair, who runs a company in Vancouver called
11 Sinclair Energy Solutions, which is a 35(b)
12 corporation.
13 **Proceeding Time 1:43 p.m. T45**
14 They have a big, hairy, audacious goal to save their
15 clients a million tonnes of greenhouse gases within
16 one year. At VanCity's head office they reduced
17 natural gas consumption by 5,000 gigajoules of
18 greenhouses gases by 75 percent, simple -- for four
19 years. At the Jaw properties in Victoria they reduced
20 annual electric consumption by 30 percent. So this is
21 a typical commercial building, 30 percent energy
22 saving by the right technological interventions
23 without any subsidy at all.
24 But BC Hydro's head office on Dunsmuir
25 Street, the identified opportunities in working
26 partnership with BC Hydro to reduce total energy

consumption by 43 percent and greenhouse gases by 73 percent. At SFU South Science building they reduce electricity use by 20 percent. At Five Valleys Health facilities they saved over 230 kilowatt hours of electricity a year, with a one year payback on a quarter million dollar investment.

So there's massive potential for demand-side management to basically pick up all the slack if we're assuming no Site C and we're assuming they do the homework while we're still burning off the surface energy we produced at the moment. For the first, you know, three, four, five years the whole focus is on demand-side management.

This, then, means that when you're building an alternative portfolio, that portfolio needs to be time dynamic and not static in time. It's irrelevant what today's price of solar or wind is. What matters is what's the price of wind in 2024, 2027? And I believe that we need to rethink the whole way in which integrated resource planning is done to allow for the falling price of solar, of wind, of electric vehicles, of electric batteries, and of LED lights. All these things are falling because of technology uptake.

Solar, as part of a future portfolio, though right now it's selling for $3.25 a watt in B.C., is selling for $2.00 a watt in Germany. This is

nothing to do with the subsidies they have, but is the actual price. The only reason it's that much cheaper in Germany is they have greater market and labour efficiency. That's a levelized cost in Germany in Canadian dollars of 7.2 cents over 25 years, or 6.5 cents over 30 years, with today's deliveries in Germany.

If hydro prices continue to increase by an average of 3 percent a year, as they've done for years, by 2020 hydro customers could be paying 20 cents a kilowatt hour, making a sidestep to solar at 15 or 10 or 6 cents extremely enticing. B.C. Hydro's statement that prices won't rise between 2025 and 2036 seems really problematic, both because it impacts the rate of takeup to solar PV and also the public's price elasticity demand reduction. So either they've got -- I mean apart from the fact that their rate application has to be endorsed by yourselves as to what price needed is right, it's kind of presumptuous just saying, well, it won't increase prices at all.

At the utilities scale, Germany's Frauenhofer Institute says that utilities scale solar plants are producing energy today for 12 cents a kilowatt hour, and Greentech Media says that by 2020 that levelized cost could fall to 5.4 cents. And then with solar there's the new emerging role just to sort

of go completely, seemingly off base, of floating solar, which was a nice science fiction idea ten years ago but China has just installed the 40 megawatt solar plants on a manmade lake in Anhui province, generating 4.4 gigawatt hours a year, enough for 15,000 Chinese homes.

And if you took 10 percent of Lake Wiliston and you had a solar -- floating solar is like a plastic Lego kit. They click together and they float on the surface. So you can have freeze up and it would just float with that, and you'd then have some snow clearing. But 10 percent coverage of Lake Wiliston would provide 13,500 gigawatt hours a year, like 2 and a half times Site C, on 10 percent of one manmade lake. And B.C. is full of manmade lakes. We've got lots of them. The further south of them you go the less snow and freeze-up.

And here's the other interesting thing. From B.C. Hydro's perspective, a solar panel is an energy saving device. It's a DSM device. A heat pump, for which B.C. Hydro pays an $800 incentive, is in fact a solar heat pump because the air outside is heated by the sun. The industry doesn't market it as a solar heat pump because they -- well, because they are dumb. They should do that.

Proceeding Time: 1:48 p.m. T46

We'll assuming -- this is a DSM device, and apply the same funding of whatever the price is you're paying, 2, 3, 4 cents a kilowatt hour amortized over 15 years which I believe is kind of norm for other DSM measures. You can then -- you know, you're looking at a saving of 66,000 kilowatt hours for that single 4 kilowatt system over 15 years. That's a 4 kilowatt system giving you 4,400 kilowatt hours a year.

So, my suggestion then could be, that BC Hydro should consider a series of behavioral experiments on a limited geographical scale to see which works best as part of its DSM portfolio, offering $800 grants towards a solar installation of 3 kilowatts or more in one small area. Another area offering the equivalent of 100 such grants, or $80,000 invested in community wide solar marketing over a year, with a single website listing all solar installers with tools to self-assess and to assess the financial savings, see what it stimulates. And a third investment a travelling solar roadshow. And forget the fact that one is an energy generating device, and the other is energy saving, they're both DSM from a strict supply perspective.

When it comes to wind energy, I can't add anything more to what is being said here, but it is the last big contract in B.C. -- in Canada, was in

Quebec, in Canadian dollars, when they -- a tender for 446 megawatt hours on relatively hilly terrain was 6.3 cents Canadian, or 7.6 cents including transmission costs. And several agencies predict a price fall over 25 percent by 2025, offering a wind energy and an adjusted energy cost in B.C. of 8 cents.

This is why it's really meaningless to say what's the price of energy today if your portfolio is spanning out over 20 years or so, is bringing in wind in five years, or 10 years time. You can bring wind online within two to four years. Two years technically, four years if you've got all sorts of obstructed public hearings and stuff to go through. But a time dynamic portfolio management system seems to make more sense because we got this falling price scenario happening. It wasn’t the case 30 years ago.

Then, if we take geothermal, successful geothermal projects do need to be about partnership. Because the very high upfront cost of capital, means that it's very tough as an investor to put money into a call for power when you don’t know what's the bottom of the hole. So I do -- would suggest that BC Hydro explore a resource partnership with industry, and also with government. You and your interim report suggest a partnership with industry. Go a step further include government, include the Ministry of Energy and

1 Finance, could then explore possible lower interest
2 rates and capital investment tax advantages to reflect
3 the high upfront capital cost, against the long term
4 benefits of geothermal including its base load
5 advantages and dispatchability needs.
6 So, when you put all these things together,
7 my numbers show that it's easily possible to put
8 together an alternative portfolio that can reach that
9 45,000 extra gigawatt hours that's needed for 100
10 percent electrification. And yet there is many things
11 that can, you know, modify that. I mean the
12 government can drag its heels and clearly not get to
13 that, but from a climate morality perspective,
14 speaking on behalf of future generations, that's, you
15 know, absolutely what we need. It's the only moral
16 thing to do
17 In World War II, when America was attacked
18 at Pearl Harbour in December of '41, they had the need
19 to make a transition of their vehicle -- mode of motor
20 vehicle manufacturing to war thought. So, in today's
21 scenario, they say well let's do a study, that will
22 take a year, then we'll do a pilot that will take
23 three years, then we'll do hearings, that's five
24 years. In January 1942, the government said you have
25 one month to do a transition from making cars to
26 making tanks. And they achieved it. Because they saw

1 World War II as an emergency.
2 From my perspective, climate is emergency.
3 We need to be addressing it with every possible speed
4 we can, to electrify as fast as possible all of our
5 transportation, all of our buildings, and all of our
6 industry. And we're only a tiny fraction of the
7 world, but the role model -- the example you set, I
8 mean Holland is looking at 100 percent vehicle
9 electrification by 2025.
10 On the current scenarios we're looking at
11 up to 2 meter sea-level rise by the end of this
12 century. But once we get the 2 metres, you can't stop
13 the rest. You're looking at 25 metre seal level rise
14 that becomes scientifically inevitable by the laws of
15 physics. That puts 95 percent of Holland under water.
16 So they got a real motive to speed up electrification,
17 and they're discussing it. By law you will not be
18 able to buy a new vehicle that is not electric by
19 2025. Norway is saying the same by 2030. Britain and
20 Germany -- France and Germany just said 2040 in the
21 last while. China is about to announce a date around
22 2030 for full rapid electrification.
23 This is happening, and the speed of change,
24 you only see it if you know what journals to read. It
25 doesn’t often get reflected in the mainstream media.
26 **Proceeding Time: 1:53 p.m. T47**

So in conclusion to the whole thing, I think we need to examine the potential for time dynamic -- in portfolios, and not just the static ones, with static pricing, because of the rapid falling prices.

Secondly, and it is off your mandate I know, the current division of responsibilities between Ministry of Environment -- BC Hydro, Ministry Environment, Ministry of Transportation, Ministry of Municipal Affairs and BC Hydro is impeding the best use of resources to tackle the climate crisis.

For instance, BC Hydro has an internal conflict, they don’t want to discourage the use of gas, because that can substitute for electricity. Any further use of gas, and of LNG, and of co-generation plants is climate immoral. We should not be using any more fossil fuels, we should tight -- luckily the government policy says take all fossil fuel stuff off the page already. And we're failing to maximize energy efficiency for the same split responsibility kind of problems.

BC Hydro's mandate, as it's currently on the website simply says to generate and purchase reliable, affordable electricity for our customers. It really should be extended to embrace the energy rate conservation revolution, the building retrofit

1 revolution, the electric vehicle revolution and the
2 climate change mandate with as much vigour as we hope
3 the Ministry Environment will have. And that the
4 integrated resource plans in future really need to be
5 co-developed with the Ministry Environment's climate
6 action plan. Not done as a fill on their own as if
7 climate doesn't really matter. And incidentally I
8 notice that BC Hydro's board of directors has no one
9 on it with any climate or environmental experience at
10 the moment.
11 So, in conclusion if I am -- yeah, just one
12 minute. Financially, Site C will only be a win if it
13 comes in on budget, which based on BC Hydro's record
14 and the record of large hydro projects is highly
15 unlikely. We do need more power, of that there is no
16 mistake, unless you ignore the urgency of the climate
17 crisis. But we can find the power we need elsewhere
18 without a devil's tradeoff. We can do it without
19 sacrificing nature, without sacrificing farmland,
20 without sacrificing the treaty rights and cultural
21 wealth of the First Nations who have occupied that
22 land for thousands of years.
23 The belief that money is what matters most
24 is perhaps the defining error of our time of our
25 economic system and most MBA and economics courses who
26 train their students to think and act narrow-mindedly

in pursuit of financial gain, and to look on social and environmental losses as externalities, unfortunate collateral damage in the pursuit of monetary gain.

The only grounds for favouring Site C over a portfolio of affordable alternatives is the financial argument based on the high stakes gamble that nothing will go wrong, the project will be completed on budget, and the willingness to accept the loss of nature, farmland and First Nations right as an unfortunate externality or the price of progress as some call it.

For many people, however, progress itself is becoming the price we're no longer willing to pay. Our civilization's fixation with material progress and never ending economic growth is a poison that is distorting our values and our ability to appreciate really matters. There has been a mindset change over the last 10 years. When that dentist killed the lion a year ago, there was a visceral shock that went through people. If he killed that lion 20 years before, no one would have given a damn. Site C dam 20 years ago would have been just a technical project. Because of the growing inner sense of despair, emergency, fear, worry that's going on, people know intuitively it is just wrong to flood nature and farmland when we don’t need to. With a revolution

1 happening in new digital, solar, and wind
2 technologies, we don't need to do that.
3 So, my personal view is that Site C dam
4 projects is an economic white elephant and a holdover
5 from the era when people had less regard for nature,
6 less regard for non-material values, and little regard
7 for Canada's First Nations.
8 Thank you very much.
9 THE CHAIRPERSON: Thank you, sir. Thank you very much.
10 Next on the list is AMPC?
11 **Proceeding Time 1:57 p.m. T48**
12 THE CHAIRPERSON: Is now convenient, gentlemen, or do you
13 need a short break. Yes. Oh, apparently we need a
14 short break. Be back in a couple of minutes, thanks.
15 **(PROCEEDINGS ADJOURNED AT 1:57 P.M.)**
16 **(PROCEEDINGS RESUMED AT 2:05 P.M.)**
17 THE CHAIRPERSON: Good afternoon, gentlemen. Yes, that
18 was you.
19 **SUBMISSIONS BY ASSOCIATION OF MAJOR POWER CONSUMERS (AMPC)**
20 **(#0297):**
21 MR. KEEN: Good afternoon, Mr. Chairman, Commissioners.
22 My name is Matthew Keen, spelled K-E-E-N, and I appear
23 on behalf of the Association of Major Power Customers
24 of B.C. or AMPC as we are typically known in the
25 acronym.
26 With me here today are Mr. Richard Stout,

1 S-T-O-U-T, principal consultant to AMPC, and Mr. Carlo
2 Dal Monte, D-A-L space M-O-N-T-E, who is chairman of
3 AMPC.
4 And so let me begin by saying that AMPC
5 appreciates the invitation to participate as part of
6 this inquiry. As you may be aware, but for the
7 benefit of the record, AMPC is a long-standing
8 industry association that represents about 80 percent
9 of BC Hydro's transmission level customers. It, or
10 its immediate predecessors have participated in every
11 BC Hydro rate hearing since 1981. Members'
12 consumption represents about 20 percent of BC Hydro's
13 total load. Members are major employers, active in
14 the forestry, pulp and paper, mining, electrochemical
15 and petrochemical industries.
16 We are cognizant, Mr. Chairman, of the
17 direction we received to focus on responding to your
18 preliminary report. Our remarks today will endeavour
19 to do that, and be focused.
20 THE CHAIRPERSON: Thank you.
21 MR. KEEN: First, though, to frame our submissions, we'd
22 like to be clear for the record that AMPC is not
23 taking a formal position concerning what this
24 Commission ought to recommend about going forward or
25 not with the Site C project. We recognize, in fact,
26 that your terms of reference do not ask you to come to

1 any final conclusion on that specific point.
2 What AMPC wants to do is help and provide
3 input on a few items where it is well placed to do so.
4 AMPC's priority is to see that the lowest-cost
5 generation option for BC Hydro proceeds, provided that
6 it satisfies reliability and public interest
7 standards. AMPC also supports standard regulatory
8 scrutiny of capital costs. Site C's costs should be
9 reviewed for prudence, if and when they enter rate
10 base, as part of typical utility practice.
11 When it comes to sunk costs, should the
12 project not proceed following this inquiry, the
13 Commission should likewise consider the prudence of
14 those costs. It might well be, as shareholder, that
15 the government ought to bear the burden of sunk costs
16 as a consequence of having forgone the scrutiny of a
17 CPCN proceeding.
18 As with an investor-owned utility, if a
19 project is ill advised and must be written off, the
20 shareholders should eat the cost. AMPC would like
21 your report to draw attention to that issue and follow
22 up on the comments made by the Industrial Electricity
23 Policy Review Task Force, and in that regard, I would
24 refer you generally to pages 10 through 13 of our
25 recent submissions and background, and that's Exhibit
26 F81-2.

1 Finally, AMPC submits that the rate impacts
2 of Site C, one way of the other, must be closely
3 managed by the Commission to avoid rate shock. And
4 before I turn to the specific items of the report that
5 we'd like to comment on, I do want to commend the
6 final aspect of AMPC's written submission to you, that
7 being the rate pressure that BC Hydro industrial
8 customers face.
9 As your submissions have mentioned, many
10 members fall into what is known as the EITE category,
11 being both energy intensive and trade exposed. EIT
12 means that energy is a significant cost input and it
13 is difficult to pass on energy price increases to
14 customers due to global competitive pressures.
15 **Proceeding Time 1:43 p.m. T43**
16 B.C. industry has long seen electricity
17 rates as a competitive advantage, but that is
18 changing. Hydro's rates have become less competitive
19 over recent years, and on the screen, you'll see a
20 graph that reproduced at top of page 7 of Exhibit F81-
21 2. Once having been in the first quartile of Canadian
22 industrial rates, they have now become more expensive
23 in most of the Canadian jurisdictions per the 2017
24 Hydro Quebec Survey.
25 So what that chart shows, panel, is an
26 erosion of competitiveness and that should, I think,

1 illustrate to you the need to find ways to mitigate
2 rate pressures, rate pressures potentially coming from
3 things like Site C.
4 So at this point we'd like to turn to a
5 couple of direct responses to some of the issues that
6 were canvassed in your preliminary report, and the
7 first up is load forecasting and price elasticity.
8 It's common ground that BC Hydro's historical load
9 forecast has been over-optimistic, and what's at issue
10 in the record currently is whether that pattern is
11 likely to repeat both in terms of things like LNG
12 related load and the current industrial load
13 generally, and we saw, I think, a good discussion of
14 that earlier this morning with the various
15 submissions.
16 AMPC's submission in this proceeding is
17 focused on price elasticity and the current general
18 negative 0.05 factor that's applied to all customer
19 classes. AMPC's view is that something more
20 conservative and something calibrated specifically to
21 industrial customers ought to be used by BC Hydro to
22 adjust its industrial load forecast.
23 BC Hydro, for its part, has explained that
24 it has a robust, customer-specific industrial load
25 forecasting methodology. It involves input from
26 third-party reports, commodity cycles and feedback

1 from key account managers, or CAMs as they're known.
2 And you can see that on the screen, pdf page 291 of
3 Exhibit F1-1.
4 That methodology in those inputs are fine
5 and appropriate, but what AMPC would say is that
6 customers don't tell their CAMS everything. CAMs miss
7 out on some of the special family time, in other
8 words, and that means that often bad news isn't
9 expected. And I'd refer you to the quote at the
10 bottom of page 7 of our second submission which quotes
11 from page 58 of your preliminary report. And I'll
12 turn you on the screen to the underlined passage. It
13 says:
14 "As with the earlier closures of other pulp
15 and paper mills, this closure was not
16 foreseen by industry experts."
17 And what's being referred to there is the recent
18 closure the Howe Sound Pulp and Paper, and also
19 referred to in the previous decade were the closure of
20 four large pulp mills. Those are BC Hydro's words.
21 And they're right. Those sorts of thing come as a
22 surprise. And that's one reason that AMPC thinks that
23 more conservative factor, elasticity factor ought to
24 be applied to the industrial load forecast.
25 You can see examples of that in the
26 Deloitte report, Exhibit A-9, page 75 where they

1 present a range of negative 0.16 to negative 0.27 in
2 the long run. BC Hydro mentions that it developed, in
3 the period spanning the introduction to the TSR rate,
4 a similar negative 0.16 factor. They've mentioned
5 during the RDA proceedings that further study would be
6 necessary to better calibrate that. We think that
7 effort should be undertaken, and in the meantime, you
8 should use something much more conservative than 0.05.
9 THE CHAIRPERSON: Do you have a specific suggestion or
10 are you getting to that?
11 MR. KEEN: I'm not qualified to do that. I think a
12 study is necessary, starting with the negative 0.16, I
13 think would be good. But we have the range
14 established by Deloitte that that's in the range,
15 that's Hydro's earlier work, but as we just mentioned,
16 it's dated and subject to some limitations.
17 THE CHAIRPERSON: Thank you.
18 **Proceeding Time 2:13 p.m. T50**
19 MR. KEEN: So, with that said, I'd like to shift gears a
20 little bit and turn to load curtailment.
21 The preliminary report specifically invites
22 comments on that issue and interruptible rates more
23 broadly. And if you look at page 9 of our second
24 submission, from the 11th, again, F81-2, you'll see a
25 quote from a JIESC final argument filed in December
26 2nd, 2008. JIESC was the name that AMPC previously

1 went by. J-I-E-S-C, for the benefit of the
2 transcript.
3 At that time, we were arguing for more load
4 curtailment to help address a capacity constrained
5 system. Exactly as we are today. But the level that
6 was being argued against at that time was 400
7 megawatts, on the basis that it was too small. And so
8 you compare that to today, where BC Hydro has
9 estimated that only 85 megawatts was available. We
10 disagree.
11 BC Hydro's recent pilot was over-subscribed
12 in its first year, and it delivered 126 megawatts.
13 And that was despite power blocks with unusual and
14 onerous conditions. In 2013, in its IOD, BC Hydro
15 contemplated a resource in the range of 382 megawatts.
16 Quebec currently makes use of 1,000 megawatts of
17 curtailment. And you'll see that on page 58 of the
18 Deloitte report, Exhibit A-9. And likewise there's a
19 discussion of a Manitoba program that you'll find
20 there.
21 So, simply put, curtailment is used
22 elsewhere. AMPC members have experience with it
23 elsewhere. And BC Hydro has successfully used it in
24 larger quantities with less onerous terms in the past.
25 And we think greater use ought to be made of load
26 curtailment in the system. And that's sort of DSM.

1 And so your assessment, panel, as you
2 consider alternative portfolios, should recognize that
3 as a real option.
4 And so with that, Mr. Chairman, I'm going
5 to wrap up. We'd like to leave you with four
6 takeaways.
7 First, the risk of rate shock is real.
8 Rate mitigation is important. Second, the prudence of
9 Site C costs and their unique circumstances have to be
10 looked at. Third, price elasticity and industrial
11 forecasting both have to be more conservative. And
12 then fourth, greater load curtailment is a real
13 opportunity that can and should be pursued, and your
14 portfolio assessment should recognize that fact.
15 So thank you, panel. Those are our
16 submissions. We'd be happy to respond to any
17 questions you have.
18 THE CHAIRPERSON: Thank you, sir.
19 COMMISSIONER MASON: In your references to load
20 curtailment, do you -- you've mentioned a number of
21 possible figures based on previous BC Hydro prototypes
22 and so on.
23 MR. KEEN: Mm-hmm.
24 COMMISSIONER MASON: Do you have any kind of figures in
25 mind for what's reasonably available within your
26 membership in the short to medium term?

1 MR. KEEN: Yes, I think you'll see towards the end of our
2 submissions, and I'll find you a page reference in a
3 moment, a range of 200 to 400 megawatts. And that
4 would be -- that would depend on the size of the
5 program structure. It would be a competitive bidding
6 process, you'd have to establish terms and conditions.
7 But that's the range.
8 COMMISSIONER MASON: Okay.
9 MR. STOUT: If I can just add to that, the amount
10 available will be very much a function of the terms
11 and conditions, the service, the duration, the notice
12 period. All those factors are the same. The duty
13 expected of the curtailed customer. So it's very much
14 a function of that. You could constrain to less than
15 100 megawatts if your terms and conditions are too
16 onerous. On the other hand, it could be 400 or more,
17 depending on those conditions. So, they need to be
18 closely looked at.
19 COMMISSIONER MASON: Right. Thank you. The other thing
20 going to the beginning of your presentation, you
21 mentioned that your members represent approximately 20
22 percent of BC Hydro's load. Do you happen to know
23 roughly the number of people employed in this province
24 by your members? To the nearest 10,000 or something.
25 MR. DAL MONTE: Well, I mean, the -- in terms of
26 membership -- no, we don't have that number, off the

1 top of our heads.
2 COMMISSIONER MASON: Okay. Fine.
3 MR. DAL MONTE: But we can get it and put it in.
4 COMMISSIONER MASON: Thank you.
5 COMMISSIONER COTE: Looking ahead, where do you --
6 looking at your members and where you see the need for
7 electricity growth, what do you see in terms of what
8 you're forecasting privately? In terms of your future
9 needs for your member companies.
10 **Proceeding Time 2:19 p.m. T51**
11 MR. KEEN: On a sector by sector basis, or what do we
12 expect cumulative member consumption to look like?
13 COMMISSIONER COTE: Yeah, well, just in general terms. I
14 mean are you seeing close? Are you seeing further
15 shrinking?
16 MR. DAL MONTE: I think -- so sector by sector on the
17 pulp and paper side, I mean the challenge primarily
18 right now is the market itself. So really it's, can
19 we preserve that load by transforming the product mix?
20 So that's the challenge of pulp and paper sectors
21 basically.
22 COMMISSIONER COTE: So basically you're talking no
23 growth, just trying to keep your head above.
24 MR. DAL MONTE: Yes, be successful, consuming the
25 gigawatt hours we consume right now. So that's the
26 pulp and paper sector.

1 I think the electric chemicals sector would
2 be in a similar -- because for them their input costs
3 are in the order of 75 to 80 percent based on
4 electricity. So they are hypersensitive to regional
5 disparities in electricity rates. So I think the
6 chart that Matt had presented there kind of gives you
7 a sense that the limitation of growth in B.C. is
8 really limited by the relative competitiveness of
9 electricity rates. There's really no regional
10 advantage aside from electricity access.
11 COMMISSIONER COTE: Okay.
12 MR. DAL MONTE: I think the big opportunity for growth
13 really is on the mining sector, and that's really -- I
14 think we've seen that and so we've got, you know, even
15 within -- the Mining Association of B.C. is a member
16 and they'll have members that are looking to expand
17 and interconnect. So I think that's where the
18 opportunity -- and we can't speak for CAPP, the
19 Canadian Association of Petroleum Producers. So
20 obviously that's another prime -- bigger growth
21 opportunity, but they intend to speak for themselves.
22 MR. STOUT: Just to add to what Carlo said, the mining
23 sector, the growth there is not only the opportunity
24 to open or expand mines but also to displace other
25 fuels, such as diesel through electrification. So we
26 think there are significant opportunities there as

1 well.
2 COMMISSIONER COTE: Okay.
3 THE CHAIRPERSON: Thank you, gentlemen. Much
4 appreciated.
5 Is the Canadian Centre for Policy
6 Alternatives here, sir? Yeah.
7 **Proceeding Time 2:21 p.m. T52**
8 THE CHAIRPERSON: Good afternoon, sir.
9 **SUBMISSIONS BY CANADIAN CUENTRE FOR POLICY ALTERNATIVES**
10 **(#0298):**
11 MR. LEE: Well, thank you for the Commission for the
12 invitation to speak. My name is Mark Lee. I'm an
13 economist with the Canadian Centre for Policy
14 Alternatives. Over the past decade my principal areas
15 of research has been climate change and energy policy,
16 but with a focus on greenhouse gas mitigation policies
17 in British Columbia.
18 During that time I led a six-year research
19 initiative, the Climate Justice Project, which
20 produced over 30 research reports. I was the author
21 or co-author of several of particular relevance to
22 this hearing, a report on clean electricity and
23 conservation published in 2012; a report on energy
24 poverty and housing published in 2011; a case study of
25 the City of Vancouver's Neighbourhood Energy Utility
26 in 2015 and I've also written extensively on the

1 economics of LNG projects proposed for B.C.
2 I think the BC Utilities Commission
3 preliminary report demonstrates why independent review
4 of megaprojects like Site C is so essential even with
5 the short timeframe imposed by the B.C. Government.
6 My original submission to this inquiry drew
7 on the analytical framework of clean electricity and
8 energy transition in the 2012 paper. My submission
9 argues that the Site C dam is not necessary and that
10 moving forward to completion is likely to have adverse
11 impacts on BC Hydro and ratepayers of all classes.
12 I came to this conclusion by re-estimating
13 electricity demand for B.C. in light of recent
14 developments. I then considered the potential impact
15 of more aggressive DSM policies and the need to
16 transition off of fossil fuels. Finally I considered
17 a range of alternative supply options to meet any
18 demand shortfall in the future.
19 In my remarks today I would like to
20 reiterate eight key findings in my submission in light
21 of BC Hydro's own submission, the second Deloitte
22 report and BCUC's preliminary report and alternative
23 portfolio.
24 First, the economic case for Site C rests
25 on projections of growing industrial demand for
26 electricity, in particular from natural gas extraction

1 and processing, including liquefied natural gas.
2 Residential and consumer demand has been flat and will
3 likely continue to be so, with growing population
4 offset by improvements in the energy efficiency
5 primarily of buildings. While the mania for LNG in
6 B.C. has long since faded, BC Hydro still anticipates
7 surging demand from LNG in the future. Table 11 in BC
8 Hydro's submission shows that oil and gas accounts for
9 68 percent of its long-term incremental demand and 75
10 percent of long-term incremental capacity.
11 The reality is that the economics of LNG
12 are abysmal. The cost of landing LNG on Asian shores
13 is higher than the price it would receive there. That
14 will continue for the foreseeable future due to large
15 new LNG capacity coming on line.
16 I would note that throughout BC Hydro's
17 submission the use of natural gas for generating
18 electricity is rightly frowned upon, but somehow they
19 see no problem in supplying increased amounts of
20 electricity to the natural gas industry. Assuming a
21 massive gas industry in 2050 is forecasting climate
22 disaster. It would also be contrary to B.C.
23 greenhouse gas reduction law, Canada's commitments to
24 the Paris agreement and a science-based carbon budget.
25 Second, BC Hydro has consistently over-
26 estimated demand for electricity and appears to have

1 inflated demand projections during the time frame when
2 Site C was being considered for approval. This, I
3 believe, is consistent with findings to date. The
4 second Deloitte report and BCUC's preliminary report
5 add further comments about BC Hydro's assumptions that
6 overstate future demand.
7 BC Hydro has assumed much higher GDP growth
8 after year 5 of the forecast. Their projections do
9 not consider any possible recessions over the two
10 decades ahead.
11 BC Hydro assumes hydro rates will not
12 increase between 2025 and 2036. BC Hydro uses a
13 demand elasticity estimate much less than estimates
14 made in the academic literature. Put another way,
15 higher prices are likely to reduce demand by more than
16 B.C. Hydro says.
17 These findings reinforce the case that
18 demand projections are over-stated and therefore
19 constitute a bias towards Site C.
20 Third, updated base-line projections of
21 electricity demand show that in the absence of Site C,
22 BC Hydro will have an electricity surplus until at
23 least the early 2030s.
24 **Proceeding Time 2:25 p.m. T53**
25 In my research for this I updated the mid-load 2017-19
26 RRA forecast to remove power from Site C on the supply

1 side and add only the incremental demand from wood
2 fibre LNG, while excluding other LNG demand. Other
3 demand growth from oil and gas extraction and
4 processing remain the same in this base case.
5 While this update accepts steadily growing
6 demand, in reality demand may be flat as in recent
7 years, or grow at a slower rate due to policy changes
8 and higher electricity rates. Nonetheless, my update
9 finds 8.3 percent lower total demand in 2032 than
10 presented by BC Hydro. The resulting surplus is in
11 the 5,000 gigawatt hours per year range up to 2023,
12 after which it steadily declines to a near balance in
13 2032.
14 Deloitte takes a similar approach to my
15 submission in re-estimating future load growth given
16 current information, the decline of LNG in particular,
17 and they conclude that demand in 2036 is likely to be
18 around 6,000 gigawatt hours less than Hydro's mid-load
19 projection.
20 Fourth, this surplus could be extended much
21 further in time if more aggressive conservation
22 measures are taken and if fossil fuel sectors and
23 their electricity demand are steadily wound down in a
24 manner consistent with climate action. BC Hydro
25 models five DSM scenarios and its current efforts are
26 based on the less aggressive Option 2, which itself is

moderated in the RRA. Because it's most consistent with the zero carbon society B.C. needs to become, I'm most interested in DSM Option 5. The Deloitte report comments that B.C. Hydro is below average in its DSM efforts when compared to U.S. utilities. Their demand estimate that I just referenced includes DSM Option 3, though they characterize potential as at least Option 3.

Wrapping up, DSM of course would entail expenditures but at much lower cost than Site C. Conservation is clearly the most cost-effective way of meeting new demand.

Now, in addition, estimated demand from fossil fuel industries amounts to about 6,000 gigawatt hours in 2032. I propose an alternative scenario for industrial demand that ramps down but does not eliminate electricity supplies going to fossil fuels and cancels the Woodfibre LNG project. These assumptions would align B.C.'s industrial activity with a stronger climate policy that is more consistent with our international obligations and domestic legislation. All together, these measures, plus the more aggressive DSM Option 5, leave the savings of almost 9,000 gigawatt hours by 2032.

Five. One area where BC Hydro may have underestimated demand is for the transition to

electric vehicles. I think the Deloitte report makes a similar comment with regard to electric vehicles. Transition to zero emission buildings I think is more complex and neither Deloitte nor I make estimates, although I would note that DSM Option 5 already covers much of this transition.

Many Site C proponents have simply assumed massive new electricity supply will be needed in the transition to zero carbon, therefore justifying Site C. I think peering so far into the future is highly sensitive to assumptions and vulnerable to technology shocks. More in updated research and modelling are needed to better understand electricity supply and demand implications of the transition to a zero carbon economy.

Number six. B.C. uses lesser conservation efforts than additional electricity demand can be met through upgrades to existing dams, smaller renewable generation sources, and community level energy alternatives. These options would better meet B.C.'s incremental needs at less risk and comparable cost to Site C. Ultimately as a province, B.C. has a choice between more aggressive conservation on the one hand and seeking new electricity supply on the other. So there's a trade-off. If new power is eventually needed in B.C., a number of renewable options could be

brought in that more gradually meet any shortfall between supply and demand. Some of these may be grid-based supply options, but others may be measures that reduce demand for B.C. Hydro electricity, like solar PV or district energy systems in urban areas.

The Deloitte report notes current BC Hydro facilities have expansion potential with additional capacity of 600 to 1,000 megawatts. They also review alternative supply options and costs. Neither the Deloitte nor BCUC preliminary report considered district energy, a development of which could displace demand for space and water heating which constitutes about three-quarters of household energy demand. Given that the City of Vancouver, among others, is planning on further developing its district energy network, the BCUC should also consider district energy in its final report. In my research the neighbourhood energy utility had cost-effective rates at $97 per megawatt hour in 2014.

The BCUC preliminary report rightly challenges BC Hydro for making spurious comparisons between the costs of proceeding with Site C and an alternative portfolio. I won't get into these in the interests of time, but I think they're fairly clear already.

Proceeding Time 2:31 p.m. T54

Number seven, completing Site C will lead to higher debt for BC Hydro and higher rates for all BC Hydro customers. This will increase energy poverty among B.C.'s low income households.

Neither the BCUC preliminary report nor Deloitte comment on energy poverty. My research has previously analyzed energy poverty in B.C. and finds that steep residential rate increases disproportionately impact lower income households that are already facing major affordability challenges.

BC Hydro and the BCUC recently rejected a lifeline rate for low income households, so additional residential price increases stemming from Site C would have an adverse effect on already marginalized groups in B.C.

Eight, rather than move ahead with Site C, a more fulsome process of evaluation of future supply and demand which must include conservation alternatives, supply options and BC Hydro's role in facilitating greenhouse gas emission reductions should be undertaken through the 2018 integrated resource plan exercise.

This final point is that a more sophisticated exercise of modelling and analysis is needed, but rooted in a similar framework to what I've outlined. The 2013 IRP was pessimistic towards

1 renewables and since then we've seen significant
2 technological change and falling costs.
3 The alternative portfolio released
4 yesterday, I believe is a step in the right direction.
5 I've only looked at it briefly, but I would note,
6 first of all, I believe it still accepts the growth in
7 demand that's unlikely to occur, so I encourage you to
8 revisit those. It seems to me that the high scenario
9 was completely unlikely, that the medium scenario was
10 probably your new high, the low scenario is probably
11 more your medium and you should add a new low scenario
12 before that.
13 The alternative portfolio only upgrades DSM
14 to option 2 and surely much more could be done given
15 the lower cost per megawatt hour that are achievable
16 there. There are no reductions in fossil fuel
17 demands, so I would ask that B.C. just consider how
18 they envision the world in 2040 or 2050 when
19 significant reductions in greenhouse gas emissions
20 will be required.
21 And grid based wind is the alternative
22 supply. I see no solar PV, district energy, all of
23 which would reduce demand for BC Hydro electricity.
24 No upgrade to existing dams to add new supply and
25 capacity. So I think those would be great if you
26 could include those in an updated alternative

1 portfolio.
2 THE CHAIRPERSON: Excuse me, sir. When you say there's
3 no reductions in fossil fuel demands, what do you mean
4 by that?
5 MR. LEE: I mean that projected for 2032, 6,000 gigawatt
6 hours are essentially allocated to LNG and the natural
7 gas industry.
8 THE CHAIRPERSON: And you are talking about BC Hydro's
9 load forecast.
10 MR. LEE: Yes.
11 THE CHAIRPERSON: Yes. But is that why you're
12 suggesting that we should use a lower load forecast.
13 Is that what you mean?
14 MR. LEE: Well, I mean, I would argue that, you know, if
15 we are -- to follow the spirit of the Paris agreement
16 and other lofty rhetoric we made around climate
17 change, there should be no natural gas industry or
18 only a very small one by 2050. So I mean, how we
19 reconcile those things is important. We have a
20 politician saying a lot of things around climate
21 change, but also wanting to increase fossil fuel
22 extraction and export.
23 THE CHAIRPERSON: Okay, thank you, sir.
24 MR. LEE: My final comment is that I think that the
25 narrow economic analysis from the review will also
26 need to be supplemented by a consideration of broader

1 environmental impacts to the project such as the loss
2 of agricultural land, as well as First Nations
3 concerns as part of the final decision. I realize
4 that is out of scope, but I feel like it's important
5 to say that. And that's my remarks.
6 Thank you very much.
7 THE CHAIRPERSON: Thank you, sir.
8 COMMISSIONER MASON: At the risk of inadvertently
9 repeating the question that my Panel Chair just asked,
10 I wonder if you could just repeat your comments
11 regarding the reduction in the use of greenhouse gas
12 and the -- sorry, natural gas and the effect that you
13 feel it ought to have on our alternative portfolio.
14 I'm not quite clear whether you are talking about
15 reducing load or looking at other alternatives. Could
16 you just repeat that for one more time?
17 MR. LEE: Well, I think, you know, what we need to do as
18 a society is have a managed and, you know, planned
19 transition off of fossil fuels and fossil fuel
20 industries. So, between now and 2050 we need to have
21 some process that gets us there.
22 So if you are assuming that electrical load
23 for the natural gas industry is including LNG, you
24 know, it's 6,000 gigawatt hours, you know, 2040 or
25 2050, somehow that has to be reconciled with, you
26 know, greenhouse gas emission reduction targets.

1 COMMISSIONER MASON: So you are talking about reducing
2 BC Hydro's load forecast to the extent that was
3 incorporated in the alternative portfolio.
4 MR. LEE: Correct. Correct.
5 COMMISSIONER MASON: Okay, thank you.
6 THE CHAIRPERSON: Thank you, sir. Appreciate it.
7 Is Mr. Suzuki here?
8 MR. SMITH: My name is George Smith. I know Mr. Suzuki
9 and when I saw that you were moving faster than one
10 had assumed, I sent a message to him. At that point I
11 thought that 3:00 would have been -- rather 4:00 would
12 have been appropriate. So I know he's on his way but
13 I don't know if he's --
14 THE CHAIRPERSON: Okay, so you think he may be here at
15 3:00-ish.
16 MR. SMITH: That's my assumption.
17 THE CHAIRPERSON: Okay, so we'll take a break then and
18 come back at 3:00. Thank you.
19 **(PROCEEDINGS ADJOURNED AT 2:37 P.M.)**
20 **(PROCEEDINGS RESUMED AT 3:00 P.M.)** **T55**
21 THE CHAIRPERSON: Please be seated. Thank you.
22 He's come to ask us a question. You've
23 come to answer a question.
24 MR. DAL MONTE: I've come to answer a question because I
25 felt guilty that I'd left Commissioner Mason's
26 question unanswered.

So we directly -- our membership directly employs 50,500 direct employment based on 2016 data.

THE CHAIRPERSON: And that's a number you're not likely to forget soon, then right?

MR. DAL MONTE: Well, I wrote it down.

THE CHAIRPERSON: Okay. Thank you.

COMMISSIONER MASON: Hold on a second. So this is an even less fair question than the previous one, but since you're here. BC Hydro has modeled, and I use the word advisably, they have modeled no real rate increases after 2024 in their financial modeling in their ratepayer impact modeling. Have you as an association done any kind of modeling on the effect on those 50,500 jobs in the event that industrial rates should rise faster than inflation?

MR. DAL MONTE: No, we have not done that modelling, and it is difficult modelling to do among an association because its -- we're an association. We have aligned interests, but typically we are also competitors as well. So our intention is to survive, and thrive and keep employing those 50,500 employees.

COMMISSIONER MASON: Mm-hmm. Great.

THE CHAIRPERSON: Thank you very much.

Mr. Suzuki?

DR. SUZUKI: Do you want me to sit down here?

Proceeding Time 3:03 p.m. T56

1 THE CHAIRPERSON: Please do, sir. Yes. And thank you
2 for hastening your arrival. We appreciate that, sir.
3 **SUBMISSIONS BY DR. DAVID SUZUKI (#0299):**
4 DR. SUZUKI: Hello. That's fine.
5 Before I begin, I just want to acknowledge
6 that we're meeting on unceded traditional territory of
7 the Musqueam, Tsilehwatuth and Squamish First Nations,
8 who cared for this land and water for thousands of
9 years, something I think well worth thinking about for
10 all of us.
11 I want to thank you very much for allowing
12 me to take Dr. Faisal Moola's place. He wasn't able
13 to attend and I much appreciate having the opportunity
14 to fill in for him.
15 I have to say, ever since Mr. Harper was
16 our Prime Minister, I have to preface my public
17 remarks by saying I'm not speaking on behalf of the
18 David Suzuki Foundation or any organization. I'm here
19 as a concerned grandfather and an elder.
20 It's a privilege to have your attention,
21 and I don't want to repeat what you've already heard,
22 I am sure, from my indigenous and environmental
23 allies. I believe your committee and the issues you
24 confront are part of the unprecedented challenge of
25 what scientists now refer to as the Anthropocine
26 Epoch. The time when -- very recent time when we

1 human beings have become the primary factor altering
2 the physical, chemical, and biological properties of
3 the planet on a geological scale. There has never
4 been a single species able to do -- having the impact
5 on the planet as we are now. And we're doing it on a
6 massive scale and with unprecedented speed.
7 We are today the most numerous mammal on
8 the planet. When I say that in Australia, they're
9 astonished. There are more of us than any species of
10 rabbit, rat, or mouse. And we are adding almost three
11 times Canada's population to the human numbers every
12 year, and every one of us has to breathe air, drink
13 water, eat food, clothe and shelter ourselves. So we
14 have what is called an enormous ecological footprint.
15 It takes a lot of air, water, and land just to keep us
16 alive. When you add the amplification of our global
17 impact, by our technological muscle power, our
18 consumptive demand, and the global economy, we are now
19 altering the world as no other species has ever done.
20 Eighty percent of the planet's forests are
21 now gone. And if we continue at the rate we're going,
22 the last remnants will be gone will be gone within the
23 next two decades. The oceans cover 70 percent of the
24 planet - they're a mess. Species extinction is
25 estimated to be going on at the rate of up to 50,000 a
26 year. And of course we've used air, water, and soil

as a garbage can for toxic chemicals. It's not a surprise that the cancer agencies now say that half of all Canadians will suffer cancer at some time in their lives.

It wasn't long ago that mega-fires, the likes of which we've seen in British Columbia, in Australia, in Fort McMurray, in Portugal, in California today; hurricanes, drought, tornadoes, floods, even earthquakes were called acts of God or natural disasters. Not any more. We have taken the place of the gods, and none of these events is any longer natural.

This, I believe, is the context within which this committee is considering the fate of Site C. But if you are charged with focusing exclusively on economic issues, then that is the very heart of the problem. When you focus on economics - jobs, GDP, I just heard now how many tens of thousands of jobs are involved - then the game is rigged. There is no way that you can make a decision that makes sound ecological sense. Please remember the very word "economics" comes from the Greek word *ekos*, meaning "household or domain". The same root word as "ecology". Ecology is the study of our home.

The biosphere, where all life exists, and we -- but ecologists look for the conditions, the

1 laws, the principles, that enable a species, any
2 species, to survive over long periods of time. Not
3 **Proceeding Time: 3:08 p.m. T57**
4 Not a bad set of information to have.
5 Economics is the management of home. Now, you would
6 think any economist before embarking on some new
7 change or program would first consult ecologists and
8 say wait a minute, what are those ground rules, what
9 are the principles of sustainable living that you're
10 finding out? This is what it seems to me is a vital
11 starting point when we talk about economics. For more
12 than a decade Stephen Harper proclaimed "We can't do
13 anything about reducing greenhouse gas emissions, it
14 will destroy the economy." And by that he elevated
15 the economy above the very atmosphere that is the air
16 we breathe, that gives us our weather and climate.
17 This economy we now bow down to in
18 supplication is a human construct. It's not some kind
19 of force of nature, that we're powerless to do
20 anything about. Or that we must dedicate ourselves to
21 serve. The economy is absolutely dependent on nature
22 for its very existence. The air, the water, the soil
23 that gives us our food. Photosynthesis that gives us
24 our energy and biodiversity. Yet we elevate the
25 economy above that. And you think that -- and if you
26 think that is an extreme thing to say, to say the

environment comes way before the economy, if you think that I think that it's extreme to say we're always putting the economy above everything else, just check out any report today about the development of the tar sands, or about the development of new pipelines. It's all about economics. But the economy itself that you are supposed to direct your discussion and listening within, is fundamentally flawed.

In the 1970s I joined the Nlaka'pamux people of Lytton who asked me to help them stop logging that was proposed in the Stein Valley, which they considered theirs, and they considered it sacred. British Columbia had given a logging permit to Fletcher Challenge, a New Zealand forest company, and allowed them to log the Stein Valley. And I encountered it during these processes, I encountered the CEO of Fletcher Challenge. And when he realized who I was, and I realized who he was, what began as a courteous "Hello, how are you?" escalated into a screaming match, and he finally in frustration he said "Listen, Suzuki, are tree huggers like you willing to pay money for those trees? Because if you're not, they don’t have any value until someone cuts them down." And that is the nub of the problem. Because he is absolutely right.

In the economic system, if money isn’t

involved and exchanging hands, they are not considered to have any value. But where within that economic equation do we put something considered sacred? Do we marginalize sanctity of anything because it doesn't fit our economy? And those intact forest, represented by the ones in the Stein Valley and all over the world, provide services that make the planet habitable for animals like us. All of the green things in the oceans and on land remove carbon from the atmosphere and put oxygen back in it. Not a bad service for us. If they weren't there, there wouldn't be any oxygen, because oxygen is a highly reactive compound. There wouldn't be oxygen, and there wasn't oxygen in high concentrations in the atmosphere until plants evolved on earth. And to this day, it's plants that are creating the atmosphere we depend on.

When you lose the photosynthetic activity of a forest by cutting it down, what do economists say about that? You can tell me what they say. Please, I'm asking you, you're the experts on the economy. They say that's an externality. "We don't give a shit whether those services are lost, it's not in the economy." That forest is holding the soil so when it rains, the soil doesn't run into the spawning grounds of the salmon. That's an externality. Those trees are transpiring massive amounts of water into the air

1 and modulating weather and climate. Irrelevant to the
2 economy. The forest, as long as it's intact, is
3 habitat for countless other species of vertebrates,
4 invertebrates, plants, fungi and so on.
5 **Proceeding Time 3:13 p.m. T58**
6 All of that is absolutely irrelevant in a discussion
7 about economics, and so what kind of a discussion are
8 we really having about the biosphere, the home that we
9 inhabit?
10 I want to tell you a story. You know, in
11 the 1990s, remember Hong Kong was going to revert to
12 China and there was a lot of unrest in Hong Kong. And
13 I've lived in the same house now in Vancouver for over
14 45 years. In the 1990s I received a letter saying,
15 "Offshore money is pouring into Vancouver. Now is a
16 good time to sell your house and buy up." I had never
17 heard the expression "buying up". I didn't know you
18 start with a small starter house. You sell that, buy
19 a bigger house and keep on going.
20 I thought this property I bought was my
21 home. I mean you don't deal with it like just a chunk
22 of property. And so I thought if I was to put this on
23 the market, what are the things that make my property
24 my home, that have value to me? The first thing I
25 wrote down was that I invited my father-in-law and
26 mother-in-law to come and live us with they retired,

and when they did, my children have had gramma and grand-dad upstairs all of their lives. And I put that down that made that mine. I never imagined they live as long as they did, mind you. But anyway, there you go.

My father was a cabinet maker and when my wife and I first married he built a kitchen cabinet for our apartment. When I bought this house, I tore the cabinet out and put it in our house. Looks like hell in the kitchen, doesn't belong, but every time I open those cupboards, my father is there, and I put that down.

When my mother died we put her ashes along the fence along the water on a clematis plant and then my niece Janice died unexpectedly and we put Janice's ashes on that plant and every year when that clematis blooms, I know my mother and my niece are there, and I put that down.

My children have dragged over the years countless road kill, dead snakes and birds and squirrels and they buried them under our dogwood tree, so they have an animal cemetery and I put that down.

These are just some of the things that make my property my home, and to me they are priceless, but on the market, they are worthless, and that's the problem with this system that we are constantly

1 looking to to guide the steps that we take.
2 So I thank you for accepting Dr. Moola's
3 presentation, which is an estimate of the cost for us
4 to replace the services that nature performs in the
5 place that will be flooded by the dam at Site C.
6 These are called ecosystem services. This is a crude
7 estimate of the value of what will be lost. I say
8 "crude" because it's based on how much would it cost
9 us to do what nature is doing right now for nothing.
10 And many of things we can't do, like photosynthesis,
11 or pollination. So it's a very crude estimate, but as
12 you will see in looking at this, the value of the
13 ecosystem services lost by this dam far exceed
14 anything that can be returned economically today by
15 building that dam.
16 We have done an analysis like this for the
17 Lower Mainland around Vancouver. We've done this
18 analysis for the greenbelt around Toronto. We are
19 doing the analysis in Montreal. And again and again
20 we find that the ecosystem services, the value of
21 those exceeds anything economic in conventional terms
22 that could be returned in those areas.
23 It's our failure to reckon the loss of
24 ecosystem services that has put human beings on such a
25 destructive course all over the planet. There are, of
26 course, other ecological reasons to object to this

1 dam. I am not an ecologist but I asked Dr. David
2 Schindler, one of the pre-eminent water specialists
3 around the world, and I don't think you'd find anyone
4 who would disagree. He's one of the top scientists in
5 this area around the world, and I asked him to look at
6 what the impact that the dam at Site C would have in
7 terms of their ecological impact.
8 **Proceeding Time 3:18 p.m. T59**
9 And he included such things as the movement
10 of fish, the habitat of fish, the accumulation of
11 mercury and the impact of that ecologically, and so
12 on. And he submitted this, which I am now submitting
13 to you. This is an actual scientific document that
14 David Schindler has written for us.
15 Over and over we ignore or discount the
16 value of nature's services as we ponder the fate of
17 human development and programs. For example, Canada's
18 plans to reduce carbon emissions are inadequate, but
19 they are based heavily on the assumption that much of
20 the electrical generation of the future will come from
21 dams. Hydro bases. That hydro is clean and green.
22 And this is crazy. For one thing, we can't dam every
23 river in Canada, but it would require every major
24 river to be dammed. And it's too slow. What is
25 needed now is clearly very, very fast action to begin
26 to reduce our use of fossil fuels, and our carbon

emissions, and dams simply won't be built fast enough to be a part of that initial loss.

Schindler's work shows that hydro is not green and clean. Economists compound the egregious flaws in the economic system by promoting growth as its sole goal, and the very definition of progress. Ask any politician or business person how well they did or are doing now, and within a picosecond they'll talk about their success or failure in terms of growth. Growth of the GDP and jobs and profit. But growth is just a description of a system. Growth doesn't do you any good. It's a means to some other end, surely. But because we now equate growth with progress, nobody asks -- nobody wants to diminish progress, and so we no longer ask the important questions that I believe your committee should be looking at.

What is the economy? What is the economy for? Are there no limits? How much is enough? Are we happier with all this stuff? These, it seems to me, are the really critical questions that ought to be asked about economics.

My parents were married during the Great Depression. And that period had a huge impact on their lives, scarred them, and shaped their values, and their beliefs which they banged home to my sisters

1 and me. And they taught us, over and over again, live
2 within your means. Save some for tomorrow. Share,
3 don't be greedy. Help your neighbours; you may one
4 day need their help. You have to work hard to buy the
5 necessities in life, but you don't run after money as
6 if having more money or stuff makes you a more
7 important or better person.
8 Those were lessons taught to me because
9 they had learned those lessons through the
10 difficulties of the Great Depression. We seem to have
11 lost track of those instructions that came out of
12 those hard times.
13 Our home is the biosphere. The zone of
14 air, water, and land where all life exists. The great
15 astronomer Carl Sagan told us, "If earth is reduced to
16 the size of a basketball, the biosphere, the zone of
17 air, water, and land where all life exists, would be
18 thinner than a layer of Saran Wrap." And that's it.
19 That's all there is. It's fixed, it's finite, it
20 can't grow.
21 Steady growth within any finite system is
22 the creed of cancer, and the result, if one pursues
23 that end, is always the same, and that's death.
24 **Proceeding Time: 3:22 p.m. T60**
25 I'm going to show you why our pursuit for
26 endless growth is suicidal. Anything growing steadily

over time, whether it is the amount of electricity you need, the amount of garbage you make, the amount of water you use, the size of your city, number of people, anything growing steadily over time is called exponential growth. Anything growing exponentially will have a predictable doubling time, okay? If it grows at one percent a year, it will double in 70 years. 2 percent, it will double in 35 years. 3 percent, 24 years, 4 percent, 17 and a half years. That's exponential growth.

I'm going to give you an analog for earth. It is a test tube full of food for bacteria. That is planet earth. I'm going to put one bacterial cell in, and that's us, and it is going to start growing exponentially by doubling every second -- minute, sorry. So, at time zero, there is one bacterium. One minute there are two, two minutes there are four, three minutes there are eight, four minutes 16. That is exponential growth. And at 60 minutes, the test tube is completely full of bacteria and there is no food left.

When is the test tube 50 percent full? Well, of course the answer is at 59 minutes of a 60 minute cycle, it's only half full. So, at 58 minutes it is 25 percent full. At 57 minutes it's 12 and a half percent full. At 55 minutes of a 60 minute cycle

it is three percent full. If at 55 minutes one of the bacteria says, "Guys, we have got a population problem." The other bacteria would say "Jack, what the hell have you been smoking. 97 percent of the test tube is empty, and we've been around for 55 minutes." They'd be five minutes away from filling it. So, bacteria are no smarter than humans. At 59 minutes, they go "My God, Jack was right, we've got one minute left, what do we do? We need a megaproject, well don't give it to those economists, give it to those scientists." And in less than a minute -- you guys are really tough, I don't see a smile on your face. I'm trying to be funny as well.

So, in less than a minute those scientists invent three test tubes full of food. So, that would be like finding three planets completely habitable by human beings very close by that we could move to. So they quadruple the amount of food in space.

So, what happens? At 60 minutes of course the first one is full. 61 minutes the second is full, and at 62 minutes all four are full. By quadrupling the amount of food in space, you buy two extra minutes. You can't add any more water, air, or biodiversity to the planet. And every scientist I've talked to agrees with me, we are past the 59th minute. So, all of this talk about we have got to have more,

we've got to have jobs and dams and all of this stuff, is saying we've got to hurry what is a suicidal course.

Now, when I talk to business people and politicians, and I do address them occasionally, they get very angry. "How dare you say we're past the 59th minute? Look at our stores, they're filled with stuff. Look at our people we're living longer, we're healthier." I do not apologize saying we're past the 59th minute. We have created the illusion that everything is fine by using up the rightful legacy of our children and grandchildren. All in the name of keeping that economy growing. You can all think about where you live. Ask any elder that has lived there all their lives. What was it like when you were a kid. Everywhere you go in Canada, oh, they'll say, "It used to be so different. What used to be here isn't here anymore."

So, we cannot continue with this notion that growth is the be all and end all that we've got to drive and sustain indefinitely.

The consequences of the nine and a half years of a Harper government is the result of willful ignoring of the reality of climate change now confronts us with the consequences. We face the threat of climate change that is now endangering the

very survival of our species. And it is not me that is saying that. Eminent scientists are saying it is too late to avoid the extinction of our species by the end of this century. Think about that.

In 1988, I want to remind you, Brian Mulroney was re-elected Prime Minister.

Proceeding Time 3:27 p.m. T61

And to show he cared about the environment, he appointed his brightest star to be the Minister of the Environment, moved him into the inner cabinet. Anyone know who he was? Lucien Bouchard. I interviewed Lucien Bouchard three months later for a series I was doing called *It's a Matter of Survival*. And I said, "Mr. Bouchard, what do you feel is the most important environmental issue facing Canadians today?" This is 1988. And he said immediately, "Global warming." Well, that was impressive. And I said, "How serious a threat is it?" And these are his exact words. "It threatens the survival of our species. We have to act now."

1988, 300 scientists meeting in Toronto declared that climate -- they called it "global warming" back then. Global warming is a threat second only to all-out nuclear war to human survival, and called for a 20 percent reduction in greenhouse gas emissions in 15 years. That was it. That was the

moment. They used 1990 as the baseline. Get our emissions down by 20 percent within 15 years.

In 1992, the largest gathering of heads of state ever in human history met in Rio at the Earth Summit. In order to get George Bush, who didn't have a green bone in his body, George Bush Senior, to attend, he made them water down the target at Rio. So now it was, we will commit to stabilizing 1990 levels of emissions by the year 2000. Canada signed on to that, all the nations signed on to that, and of course we did nothing about it.

1997, Kyoto, I was there. Kyoto, finally it was agreed that the industrialized countries that had created the problem would cut emissions by 5 to 6 percent by 2010, at which time the rest of the world would be brought in to a longer-term agreement. In 2001, Jean Chrétien ratified on behalf of Canada, and I don't know what year it was, but Mr. Harper then pulled Canada, the only country to ratify Kyoto, pulled Canada out of that and instead modified the target base - the base against which the target is set - to 2005. So he allowed 15 more years of growth in our emissions before he said, "Okay, whatever we're going to reduce is now relative to 2005, not 1990."

The result, though, was that in 2015 not only was Mr. Harper booted out, Mr. Trudeau replaced

him and went straight to Paris, where the gathering of the largest group of heads of state ever in history met to acknowledge climate change is real, it's a very great hazard, and committed to a target of keeping our emissions below increasing temperature 2 degrees by the end of this century. And preferably towards one and a half degrees, which Mr. Trudeau not only signed, he embraced it and announced it loudly. This was what we were committed to, and all of the people like us, environmentalists, yelled and screamed with great joy at what Canada was now doing.

But what does the target set in Paris mean? It means that every aspect of the way we live - transportation, housing, cities, agriculture - every aspect of the way we live has to be re-examined within the context of this Paris target. And that's the challenge that is changed since the early discussions about the fate of Site C.

Proceeding Time: 3:31 p.m. T62

When I was a boy, and that was back in Vancouver in the late 1930s, if I wanted fruit or vegetables, my mom would go to the canned goods section. Today in Canada, a northern country, every city will give us fresh fruit and vegetables, year round. Bananas, coffee, sugar. Where the hell do we think that is all grown in Canada? It's not. We have

a food system heavily dependent now on industrial agriculture, which depends on big machinery. Chemical pesticides, artificial fertilizers, all derivatives of the fossil fuel industry, and a supply chain that is three to four thousand miles long. Cannot, simply cannot continue. We need to eat seasonally, and we have to eat locally if we are serious about the target at Paris.

The Peace River Valley, which will be flooded, should be in a carbon constrained world, should be the bread basket of the north. It makes no sense to have such a long supply chain when you've got that fertile valley there that has enormous potential of providing more local food to people in the north. And I'd like to say from me, in a carbon constrained world, that is the primary justification, aside from the indigenous and ecological issues, this is an issue that must be faced up to. It is insane, in a carbon constrained world, to talk about flooding, land that is so precious now in the food of the future of the north.

And let me end with a story. It seems at my age, as I am becoming a doddering old man, that all I do is sit around telling stories.

I was beginning my last year in college in the United States in 1957. And on October 4th, anyone

want to venture what happened on October 4th, 1957? We were shocked when the Soviet Union announced it had launched Sputnik. We didn't know there was a space program. And for anyone old enough to remember that time, it was a very frightening time. The Soviet Union was incredibly powerful, making ideological inroads in South America, in Southeast Asia, in Africa. They seemed very, very threatening, and in the months that followed, Americans then tried to launch their three rockets, army, navy, air force, and every one blew up on the launch pad, or shortly after getting into the air, in full television.

Meanwhile the Russians launched the first animal in space, a dog, Lyka. The first man, Yuri Gagarin. The first team of cosmonauts, the first spacewalk, the first woman, Valentina Tereshkova. They were way ahead. The Americans didn't roll over and say "Oh well, we can't afford to catch up, it will destroy the economy." They said "We have no choice, we've got to catch up with them." And in 1961, President Kennedy announced a plan to get to the moon and back within a decade. And he had no idea how they were going to do it. We have no idea how in the long run we are going to get out of the mess we're in. But we know the beginning is we've got to get off fossil fuels, and there are lots of low hanging fruit that

have to be harvested right away, that will get us on that downslope.

But I use this story to illustrate that the Americans didn't flinch when presented with this, and no one raised the issue of how much will it cost, or that we don't know how to do it. They just said "We've got to beat it." And look at the results? Looking every year when Nobel prizes in science are announced. Guess who wins the bulk of them? They are still Americans, because 50, 60 years ago Americans said "We gotta beat the Russians to the moon."

There is an annual NASA publication called *Spin Off* that documents every year dozens of technologies from GPS to 24 hour channels, to cell phones, to space blankets, the ear thermometers, I mean the list of things that came out of the space race, that no one -- they fell out without any anticipation.

Proceeding Time 3:37 p.m. T63

And I believe the challenge is to commit to getting our emissions off carbon, and we don't know how we're going to do it all in the end. But I guarantee there will be unexpected things that will result that we will say, "Oh my God, how stupid were we not to have started this sooner." This is a challenge of our time. Carbon constrained world. If

we want to survive as a species we've got to protect Mother Earth and nature's services that keep the planet habitable and bring our own activities under some kind of control.

Thank you very much.

THE CHAIRPERSON: Thank you, sir, thank you.

DR. SUZUKI: Thank you.

THE CHAIRPERSON: Dr. Suzuki, you made a reference to a paper there. Would you like to file that with us?

DR. SUZUKI: Yes.

THE CHAIRPERSON: Can someone --

DR. SUZUKI: I think Dr. Moola's already is there. This is Dr. Schindler.

THE CHAIRPERSON: Thank you, we'll make sure those get put on the record, sir.

DR. SUZUKI: Thank you very much.

THE CHAIRPERSON: Thank you very much for joining us. We appreciate your presentation and we appreciate your stories too. They're very good. Thank you.

DR. SUZUKI: Thank you.

THE CHAIRPERSON: So thank you. That brings us to the end, unless I'm mistaken, of our afternoon here, and we'll be reconvening again at nine in the morning. If anyone would like to come back even if you're not presenting, you're all more than welcome to join in the audience. Thank you for all of you who have made

a presentation. It's much appreciated and I wish you all a good weekend and a good evening. Thank you.

(PROCEEDINGS ADJOURNED AT 3:39 P.M.)

I HEREBY CERTIFY THAT THE FORGOING is a true and accurate transcript of the proceedings herein, to the best of my skill and ability.

A.B. Lanigan, Court Reporter

October 14th, 2017