

Hearing Transcript

**REFERENCE TO THE BOARD
RATE MITIGATION OPTIONS AND IMPACTS
MUSKRAT FALLS PROJECT**

October 7, 2019

PRESENT:

The Board:

Board Members

Darlene Whalen , Chair
Dwanda Newman, Vice-Chair
John O'Brien, Commissioner

Board Counsel / Staff

Jacqueline Glynn, Board Counsel
Maureen Greene, Q.C., Reference Counsel
Sara Kean, Assistant Board Secretary

Parties:

Nalcor Energy /

Newfoundland and Labrador Hydro

David Eaton, Q.C., Counsel – Nalcor
Geoff Young, Q.C., Counsel – NL Hydro

Newfoundland Power

Kelly Hopkins, Counsel
Liam O'Brien, Counsel

Consumer Advocate

Dennis Browne, Q.C. – Consumer Advocate
Stephen Fitzgerald, Counsel – Consumer Advocate

Island Industrial Customer Group

Paul Coxworthy, Counsel
Denis Fleming, Counsel

Witnesses:

Synapse Energy Economics, Inc.

Robert Fagan
Dr. Asa Hopkins
Melissa Whited

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1 (9:00 a.m.)
 2 CHAIR:
 3 Q. Good morning, everybody. Happy Monday. I
 4 understand there's no preliminary matters,
 5 so I guess we'll go straight to you, Ms.
 6 Greene, and you can introduce the first
 7 presentation for today.
 8 GREENE, Q.C.:
 9 Q. Thank you, and good morning, Chair and
 10 Commissioners. I'd like to first begin by
 11 introducing the panel. Start with Bob
 12 Fagan. Mr. Fagan, could you please
 13 introduce yourself and give a very brief
 14 outline of your background and experience as
 15 it relates to the work you did for the Board
 16 for this reference.
 17 MR. FAGAN:
 18 A. Good morning, everyone. My name is Bob
 19 Fagan. I'm a Vice-President at Synapse
 20 Energy Economics. I've been at Synapse for
 21 about fifteen years. I have a Mechanical
 22 Engineering Degree and I've been an Engineer
 23 and an Energy Analyst for onward of thirty
 24 years now working in this field. As it
 25 pertains to this reference, my primary

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1 qualifications have to do with modelling of
 2 the economic aspects of electric power
 3 systems, and I also have an extensive
 4 background in energy efficiency or
 5 conservation and demand management, and the
 6 general nature of wholesale market
 7 constructs throughout the United States, and
 8 extensive experience working in the Maritime
 9 area, primarily resource planning in Nova
 10 Scotia and Prince Edward Island
 11 jurisdictions.
 12 GREENE, Q.C.:
 13 Q. And have you presented as an expert witness
 14 in other proceedings?
 15 MR. FAGAN:
 16 A. Yes, I've been an expert witness roughly
 17 nineteen states at the Federal Energy
 18 Regulatory Commission and in five provinces
 19 – I think six provinces including this
 20 province.
 21 GREENE, Q.C.:
 22 Q. Thank you. Dr. Hopkins, could you similarly
 23 give a brief outline of your background?
 24 DR. HOPKINS:
 25 A. Sure. Good morning. My name is Asa

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1 Hopkins. I'm also a Vice-President at
 2 Synapse Energy Economics. I've been at
 3 Synapse for almost three years. My training
 4 is as a physicist. I have worked in energy
 5 efficiency for the US Federal Government at
 6 the US Department of Energy, and I ran
 7 what's called the State Energy Office,
 8 equivalent to some portion of the Ministry
 9 here for the US State of Vermont for five
 10 years or so, including developing energy
 11 policy across energy supply, energy
 12 efficiency, electrification, and overall
 13 decarbonisation efforts for the state,
 14 including crafting its comprehensive energy
 15 plan. Since moving to Synapse, I have
 16 worked on electrification and
 17 decarbonisation projects and energy
 18 efficiency in a number of different states.
 19 I've testified as an expert witness in
 20 Vermont and in Quebec, as well as now here
 21 today.
 22 GREENE, Q.C.:
 23 Q. Thank you, and Ms. Whited.
 24 MS. WHITED:
 25 A. Good morning. My name is Melissa Whited.

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1 I'm a Principal Associate at Synapse Energy
 2 Economics. I've been at Synapse for ten
 3 years. I work extensively on electricity
 4 regulation topics, as well as rate design,
 5 and I've testified before seven state
 6 commissions and the Federal Energy
 7 Regulatory Commission. I've also worked on
 8 rate design issues in Nova Scotia, Prince
 9 Edward Island, and Quebec, in Canada, and
 10 now also in Newfoundland. I've presented on
 11 rate design issues before the National
 12 Association of Regulatory Utility
 13 Commissioners in the United States, and I
 14 have a Masters of Arts in Agricultural and
 15 Applied Economics, as well as a Masters of
 16 Science in Environment and Resources.
 17 GREENE, Q.C.:
 18 Q. Thank you. Before we begin your
 19 presentation, I understand, Mr. Fagan, that
 20 there are two corrections you'd like to make
 21 to your report.
 22 MR. FAGAN:
 23 A. That's correct.
 24 GREENE, Q.C.:
 25 Q. The first I'd like to bring up is page 60 of

Page 5

1 your report.

2 MR. FAGAN:

3 A. Yes.

4 GREENE, Q.C.:

5 Q. And could you please outline the correction

6 you would like to make?

7 MR. FAGAN:

8 A. Yes, the correction is in the heading for

9 Figure 24. Instead of the word

10 “residential”, that should be “commercial”.

11 GREENE, Q.C.:

12 Q. The second correction I understand is on

13 page 149 of your report in Table 76, is that

14 correct?

15 MR. FAGAN:

16 A. Yes, that’s correct, Table 76, and this

17 pertains to the second row, the value listed

18 there for annual heat pump electricity use.

19 Instead of 29,613, that value should be

20 10,768. We made this correction in response

21 to an informal inquiry by Newfoundland

22 Power, their first informal inquiry response

23 question, and I just neglected to get this

24 changed for the September 25th revision to

25 the report.

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1 GREENE, Q.C.:

2 Q. Thank you. If we go now to your

3 presentation, as you just mentioned, your

4 report was revised on September 25th of this

5 year and your presentation essentially

6 reviews your findings in your report, is

7 that correct?

8 MR. FAGAN:

9 A. Yes.

10 GREENE, Q.C.:

11 Q. First if we could begin, I would like you to

12 outline what were the areas or issues on the

13 reference questions that Synapse was asked

14 by the Board to review and analyze?

15 MR. FAGAN:

16 A. Yes. This slide outlines the scope of our

17 analysis. The reference questions asked us

18 to determine whether or not it’s more

19 advantageous to maximize domestic load or to

20 maximize exports. Essentially in our

21 modelling, our electrification scenarios

22 look at the effect of increasing domestic

23 load, and our conservation and demand

24 management scenarios cause consumption to be

25 lower and, therefore, exports sales to be

Page 7

1 higher in the province. The second question

2 had to do with the energy and the capacity

3 balances from Muskrat Falls Project required

4 to meet load and what would be remaining for

5 surplus energy and capacity. We directly

6 compute in our modelling processes what

7 remains for export from Muskrat Falls after

8 accounting for the Island and Labrador load

9 requirements, and the overall resource

10 capabilities in the province. The third

11 question asked about the potential

12 electricity rate impacts associated with the

13 options in question one, and we compute

14 these impacts from all of our scenarios

15 relative to a base case where no

16 electrification or no CDM measures are

17 taken. Because of the material effect on

18 consumption associated with electrification

19 or CDM, we also looked at the corollary

20 effect of a reduced oil and gasoline use in

21 the electrification cases, and the bill

22 impact effect, average customer bills across

23 all of our scenarios.

24 GREENE, Q.C.:

25 Q. If we could move then to a summary of your

Page 8

1 overall findings with respect first to your

2 work that you did on growing revenue

3 opportunities?

4 MR. FAGAN:

5 A. Sure. Our summary finding, there’s no magic

6 bullets for mitigation arising from

7 electrification or increased export sales.

8 These are all predicated on customer actions

9 which occur slowly over time, but can have

10 significant effects in the long term.

11 Electrification is the biggest factor that

12 would mitigation rate increases because

13 essentially you sell more energy to cover

14 the fixed cost associated with the Muskrat

15 Falls Project. You know, we do note that

16 the oil and gasoline savings that arises

17 from electrification is sort of the new

18 money that’s available to help reduce the

19 bill effect for customers. We definitely

20 note that these benefits can be distributed

21 unequally depending upon who’s in a position

22 to electrify and in which sectors. So

23 programmatic efforts and policies can help

24 to address any inequities that might

25 otherwise result when thinking about who

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1 would benefit from electrification. We also
 2 find that CDM and demand response in
 3 multiple forms is particularly important,
 4 given the concerns about possible capacity
 5 expansion costs in the province. CDM will
 6 reduce peak consumption and it will also
 7 reduce the peak megawatts, so it avoids
 8 those potential expansion costs and it also
 9 has the effect of increasing export sales.
 10 It can exacerbate the rate increases, but it
 11 can result in lower bills. Essentially,
 12 customers pay bills. If the rates are
 13 higher, but their overall consumption is
 14 lower, their net bills can be lower.
 15 GREENE, Q.C.:
 16 Q. Can we carry on to the next –
 17 MR. FAGAN:
 18 A. Continuing, rate design and existing
 19 policies and the Muskrat Falls Projects
 20 surplus, we did find that rate design could
 21 be a potentially powerful tool to shape
 22 consumption patterns and improve the
 23 outcomes for customers. We did find that
 24 the lower cost and the simpler
 25 implementation of smart electric vehicle

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1 charges in lieu of a full scale automatic
 2 metering infrastructure to monitor hourly
 3 loads would be least regrets, but it is
 4 possible that a broader application of Time-
 5 of-Use rates using a set of automated
 6 metering infrastructure to measure on an
 7 hourly basis could potentially be economic,
 8 depending upon some of the details of
 9 exactly how much it costs and how those
 10 benefits accrue across the different rate
 11 classes. We critically note the importance
 12 of both the federal and the provincial
 13 policies to help. The policies, as we
 14 outline in the report, specifically address
 15 fuel switching, energy efficiency, and
 16 rebates for electric vehicles, all of which
 17 will directly impact the electrification and
 18 the CDM costs and effects that you see in
 19 our report. We do note that the overall
 20 surplus from Muskrat Falls Project is of
 21 sufficient quantity to fully support the
 22 higher level electrification efforts that we
 23 model in our analysis. We note on Reference
 24 Question 3, that we do show rate and bill
 25 impacts for all of our model scenarios.

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1 GREENE, Q.C.:
 2 Q. You’ve already outlined that you looked at
 3 the potential for export sales, and your
 4 finding is that it is better to increase
 5 electrification in the province because
 6 revenue is higher from internal sales. I
 7 was hoping to expand and explain your
 8 findings on expert sales?
 9 MR. FAGAN:
 10 A. Yes, that’s correct, essentially you can
 11 obtain increased revenues if you sell more
 12 energy, more electricity, internal than
 13 selling on the export market primarily
 14 because the export market prices are
 15 relatively low, they don’t represent firm
 16 capacity and energy transfers. It’s mostly
 17 more of a non-firm short term energy market.
 18 We did look at whether or not it’s better if
 19 export market prices are particularly
 20 higher. Things do look much better if export
 21 market prices are higher, but we don’t have
 22 any particular basis to think that the
 23 export markets are - prices for export
 24 markets are going to be from the medium
 25 level that we model in our analysis. We do

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1 note that when you do maximize export sales
 2 if you were to do electrification, the total
 3 amount of export sales, you know, could rise
 4 to more than 200 million dollars a year by
 5 the end of the decade, and that includes the
 6 effects of both the Muskrat Falls and recall
 7 energy export sales. Those export sales are
 8 much lower, but you electrify rising to 141
 9 million by the end of the decade, but what’s
 10 coupled with the minimal revenues from
 11 export sales is much higher revenues from
 12 actual electrification of revenue streams
 13 within the province. Our modelling takes
 14 into account the combination of both CDM and
 15 electrification effects, and the overall
 16 volume and the overall pattern of sales will
 17 vary depending upon which combinations of
 18 electrification, CDM, and rate design we
 19 see. As I just noted, we do show
 20 sensitivity on market prices that you can
 21 see increases export revenues on the order
 22 of 75 million dollars higher by 2030
 23 relative to our base case on export sales if
 24 prices were to be higher, but also note that
 25 the other side of that envelope, if export

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1 market prices were lower, you would see a
 2 reduction in the revenues received relative
 3 to our base case.
 4 GREENE, Q.C.:
 5 Q. How did you determine the appropriate
 6 forecast of the export pricing to use in
 7 your modelling?
 8 MR. FAGAN:
 9 A. We received confidential data from Nalcor on
 10 a forecast of export market prices. Those
 11 export market prices are forecast for
 12 essentially the New England and Nova Scotia
 13 markets through export paths by way of
 14 Quebec, and export paths by way of Nova
 15 Scotia. Those export market prices are
 16 generally pegged to the price of electricity
 17 in the North Eastern US, especially in New
 18 England, and those prices tend to be tied to
 19 the effect of natural gas prices on
 20 electricity prices in that region. The
 21 numbers that they provided are not
 22 unreasonable. If anything, electricity
 23 prices in the North Eastern US are likely to
 24 be lower than what we may see right now
 25 because there continues to be downward

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1 pressure on those prices due to the
 2 availability of less expensive natural gas
 3 and due to the increasing level of both
 4 solar and wind resources in the North
 5 Eastern United States, all of which put a
 6 damper on the market prices seen in that
 7 region.
 8 (9:15 a.m.)
 9 GREENE, Q.C.:
 10 Q. So as I understand your answer, you're
 11 starting point were the forecast provided by
 12 Nalcor, but you applied your own judgement
 13 and analysis to determine if they were
 14 reasonable and representative of the market,
 15 is that correct?
 16 MR. FAGAN:
 17 A. Yes, we do think that they are reasonable.
 18 We did look at fundamentals from the US
 19 Energy Information Administration, annual
 20 energy outlook, which forecasts both short
 21 and long term prices, and the numbers which
 22 are more detailed from Nalcor do represent,
 23 in our opinion, a reasonable indication of
 24 what prices are going to look like in the
 25 future.

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1 GREENE, Q.C.:
 2 Q. Okay, you've already mentioned that you not
 3 only looked at the impact on rates of
 4 increased electrification, and CDM, and
 5 export markets, you also looked at the
 6 impact on customer bills, and can you
 7 explain why you did that and what it showed?
 8 MR. FAGAN:
 9 A. Yes. Essentially, with increasing levels of
 10 CDM, either promoted by a programmatic
 11 expansion or prompted by customers doing
 12 their own actions now in the anticipation of
 13 higher prices, that has a significant effect
 14 on the average annual consumption for a
 15 given customer. Certainly anyone who
 16 electrifies, be it at the residential or at
 17 the commercial institutional level will see
 18 significant increases in the consumption at
 19 their facilities. Those two effects means
 20 that it's critically important to also look
 21 at the quantity consumed, in addition to the
 22 price that applies for a given customer.
 23 That's why we looked at bills, and in the
 24 case of electrification scenarios, it's also
 25 important that it serves an additional well

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1 of savings available from reduced
 2 expenditures on oil and gasoline. Though
 3 the reference questions clearly say rate
 4 mitigation, technically and economically
 5 it's critically important to also look at
 6 the bill effect associated with changes in
 7 consumption, not just the rate effects.
 8 GREENE, Q.C.:
 9 Q. In your slide here with respect to summary
 10 findings for rates, you reference a Synapse
 11 based case. Can you just briefly explain
 12 what that is?
 13 MR. FAGAN:
 14 A. Sure. Our portion of responding to the
 15 reference questions had to do with looking
 16 at changes on the demand side, increased
 17 sales through electrification, or increased
 18 export sales in part through CDM to make the
 19 increased energy available for export. So
 20 everything that we do is relative to a
 21 reference case, a reference load forecast,
 22 and a reference level of export sales, and a
 23 reference level of electrification. So all
 24 of our scenarios are compared to that
 25 reference level, so they're not absolute.

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1 What we're able to show clearly, for
 2 example, is in the high electrification
 3 scenario rates would be 1 cent per kilowatt
 4 hour lower by 2030, but what we don't show
 5 or we don't take on the task, is what is the
 6 absolute rate in 2030 because that will
 7 depend on what the total eventual revenue
 8 requirement is, and there's a number of
 9 things that both Liberty has looked at, and
 10 that still undergoing analysis suggests what
 11 that revenue requirement would be. So our
 12 focus was just to tease out the effect of
 13 the CDM, the effect of electrification, the
 14 effect of rate design, and how it influences
 15 the pattern of consumption, the pattern of
 16 export sales, and the resulting revenues
 17 that attach to those different patterns of
 18 consumption or sales.
 19 GREENE, Q.C.:
 20 Q. Is there anything else you'd like to say for
 21 your summary findings on rates and bills in
 22 Slide 8?
 23 MR. FAGAN:
 24 A. The last thing, we do indicate that it's the
 25 combination of scenarios that maximize

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1 electrification, but at the same time
 2 maximize CDM effects, in particular reducing
 3 the peak load exposure that the province
 4 will see. We do make a core assumption that
 5 flows from Hydro's Marginal and Generation
 6 Cost Study, that basically there is always
 7 value to reducing the peak load in the
 8 province. On the margin, there's both a
 9 short and a long term need for capacity. We
 10 do not directly look at reliability and the
 11 potential for the LIL to be out of service,
 12 but indirectly in assigning value to all
 13 peak shaving efforts, be they directly from
 14 conservation and demand management measures,
 15 such as heat pumps or shown improvements
 16 that reduce peak, or be they flowing from
 17 demand response, which is a shorter term
 18 reduction of peak, both of those peak
 19 shaving actions come with a value of
 20 capacity that we use the number that's in
 21 the Marginal and Generation Cost Study, and
 22 that's a critically important point to make
 23 to support our findings that it's the
 24 combination of both electrification and CDM
 25 that provides the best benefit for

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1 customers.
 2 GREENE, Q.C.:
 3 Q. One of the reference questions also asked
 4 the Board to review the amount of capacity
 5 and energy that would be available for
 6 internal use and export use, and your next
 7 slide addresses that question. Can you
 8 please review your findings in that area?
 9 MR. FAGAN:
 10 A. Yes. The modelling tool that we used, which
 11 is the same tool that Hydro used, the PLEXOS
 12 Production Cost Modelling Tool, is
 13 essentially a way to keep track of the
 14 generation, the consumption, and the flows
 15 in an economically and technically correct
 16 manner. So what we find is that if you look
 17 just at Muskrat Falls, you cover the
 18 requirements on the island, that you end up
 19 with surplus energy availability that ranges
 20 on the order of 1.7 to on the order of 2.1
 21 terawatt hours, and that's what the
 22 beginning portion of this slide shows, which
 23 comes from Table 41 of the report. At the
 24 same time, Muskrat Falls is on the order of
 25 5 terawatt hours, recall energy quantities

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1 are on the order of 2 terawatt hours, so
 2 depending upon how you do the basic energy
 3 balances, the total revenues, the total
 4 quantities available for export sales
 5 actually ranges up to 3.5 terawatt hours if
 6 you take both recall and Muskrat Falls into
 7 account, and that's essentially what this
 8 table is just showing that the range of
 9 surplus for export sales depends on whether
 10 or not you count both recall and Muskrat
 11 Falls, or you try to look just at Muskrat
 12 Falls.
 13 GREENE, Q.C.:
 14 Q. One of your principal findings is that
 15 increased energy usage or electrification is
 16 the most beneficial opportunity to increase
 17 revenue to offset the rates. Could you on
 18 the next slide just give a brief overview of
 19 what your analysis showed for the
 20 electrification potential?
 21 MR. FAGAN:
 22 A. Yes. We focused on the electrification
 23 potential in two sectors; buildings and
 24 transport. What this slide shows is that by
 25 2030, under certain assumptions for

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1 basically penetration of electric vehicles
 2 and conversion of electric resistance
 3 heating – I’m sorry, conversion of oil
 4 heating to either heat pump, or in some
 5 cases electric resistance heating, could add
 6 up to 600 gigawatt hours per year, and
 7 that’s on a provincial basis of on the order
 8 of 9,000 gigawatt hours per year. The
 9 savings that you see from this essentially
 10 stem from oil savings, which ramps up to on
 11 the order of 244 million dollars per year by
 12 2030. The direct contribution to revenues
 13 associated with this electrification, taking
 14 into account the costs of incentives for
 15 heat pumps and the cost for electric vehicle
 16 charges, for example, ranges from in the
 17 early years to 67 million dollars up to on
 18 the order of 134 million by 2030 for the
 19 high electrification case. I’m sorry, that
 20 was the direct contribution to revenues as
 21 the slide indicates. The net mitigation is
 22 on the order of 10’s of millions of dollars
 23 from the high electrification scenarios,
 24 reaching upwards of 50 million dollars net
 25 by 2030 for the high scenario. This slide

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1 represents the peak load additions
 2 associated with electrification. I’ll note
 3 that these are the additions you see on
 4 peak. These totals are not necessarily
 5 coincident with the island’s winter peak.
 6 That coincident is a little bit lower than
 7 the 147 you see here. It’s more on the
 8 order of 100 megawatts. This just shows the
 9 variation in the addition to peak seen
 10 across the different types of
 11 electrification by transport or by building
 12 sector.
 13 GREENE, Q.C.:
 14 Q. You’ve already mentioned that you also
 15 studied Conservation Demand Management, and
 16 can you explain why that was important here
 17 because again it seems almost
 18 counterintuitive if we need to grow revenue,
 19 why do you focus on reducing demand? So can
 20 you just briefly explain that and what you
 21 found?
 22 MR. FAGAN:
 23 A. Sure. The primary value in the CDM, and the
 24 demand response, is the ability to shave
 25 peak. If you retire Holyrood, you have a

Page 23

1 situation where you potentially have a
 2 capacity problem on the island, thus any
 3 demand side resource that can contribute to
 4 mitigating that capacity problem has value.
 5 Now it also saves energy and it saves energy
 6 primarily during winter hours, and depending
 7 upon how the programs have done, and whether
 8 or not you use rate design, the energy
 9 savings you see from CDM can free up energy
 10 for export sales during some of the higher
 11 priced hours in the winter. Most of the
 12 export market prices are higher during
 13 winter hours, and generally higher during
 14 peak winter hours rather than off-peak
 15 winter hours. So that’s why CDM and demand
 16 response become particularly important as
 17 you move into an era where you have plenty
 18 of energy, but you have some concerns about
 19 capacity.
 20 GREENE, Q.C.:
 21 Q. And could you just show your findings?
 22 MR. FAGAN:
 23 A. Sure. This slide just shows that the peak
 24 savings that we find stem from both
 25 conservation demand management, as

Page 24

1 conventionally known in the Province, and
 2 also from demand response, and this would be
 3 demand response separate from the
 4 interruptible curtailment capacity that
 5 currently exists in the Province, and then a
 6 significant portion of this is potentially
 7 available from the effects of heat pumps
 8 displacing or supplementing the use of
 9 electric resistance heating. As we show on
 10 later slides, the heat pump technologically
 11 is a superior way of getting heat from use
 12 of electricity.
 13 GREENE, Q.C.:
 14 Q. And of course, these – if you do focus on
 15 CDM and demand management response, these
 16 types of programs add additional cost for
 17 the customer and for the utilities. Did you
 18 consider costs in your analysis?
 19 MR. FAGAN:
 20 A. We did. Essentially on the island, because
 21 of the capacity value associated with peak
 22 shaving, that peak shaving coming from
 23 either DR or from conventional CDM, the
 24 programs tend to be fairly cost effective
 25 with a benefit cost ratio from the utility’s

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1 perspective of on the order of 3.0.
 2 The core inputs into this computation
 3 is what is the value of export sales that
 4 get freed up from CDM and what is the value
 5 of capacity if you peak shave on the island.
 6 The costs shown here, basically are
 7 amortized CDM program costs based on basic
 8 rubrics for the cost of more aggressive CGM
 9 programs. There's sort of a wide range on
 10 how you could actually implement more
 11 aggressive CDM. So the costs that are seen
 12 here could vary. You could certainly – you
 13 would want to maximum participating customer
 14 contributions to any CDM measures so these
 15 costs could be lower.
 16 Alternatively, you can use CDM program
 17 design as a way to address the potential
 18 inequities that can occur through folks who
 19 are less able to have the capital to make
 20 improvements in residences or commercial
 21 businesses for CDM. But we generally find
 22 that because of this capacity value, the CDM
 23 and the demand response are particularly
 24 important and particularly economically
 25 valuable.

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1 GREENE, Q.C.:
 2 Q. So, we've just reviewed at a high level the
 3 areas that you reviewed for the Board and
 4 now I'd like you, at that same high level,
 5 to summarize your findings in terms of the
 6 reference questions that you did some
 7 analysis on.
 8 MR. FAGAN:
 9 A. Sure. In short, increasing load through
 10 electrification, improving energy efficiency
 11 and using demand response to reduce peak and
 12 allow for increased export sales leads to
 13 the best possible outcomes for customers.
 14 (9:30 a.m.)
 15 It allows for the sale of the remaining
 16 Muskrat Falls surplus to external markets
 17 and the CDM effect helps to prevent a need
 18 for future capacity expansion costs.
 19 We model a lot of different scenarios
 20 to try to tease out differential effects
 21 between the different combinations of
 22 electrification, CDM and rate design effects
 23 and essentially, we find that some
 24 combination of those three things,
 25 aggressively pursuing electrification, using

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1 CDM to peak shave and at the same time using
 2 rate design to provide incentives for
 3 consumption, preferably during off-peak
 4 periods of time, results in the best
 5 customer outcomes. What we clearly show is
 6 that there more than enough surplus
 7 available from Muskrat Falls to support
 8 these electrification needs.
 9 I will note that in all of our analysis
 10 we assume the LIL is in service and we
 11 assume the LIL is providing energy and
 12 capacity of the LIL. To the extent that
 13 that would not be the case then you begin to
 14 perturb the findings that we've seen,
 15 although the capacity value would become
 16 even more important under any situation such
 17 as that.
 18 GREENE, Q.C.:
 19 Q. You've already indicated earlier in your
 20 presentation that the impact on rates
 21 overall with the most optimistic of your
 22 scenarios of electrification and CDM would
 23 not help with the rate mitigation problem.
 24 Is it correct that by 2030 the most that
 25 this would produce would be about a cent a

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1 kilowatt hour off the domestic rate? Is
 2 that generally what your analysis showed?
 3 MR. FAGAN:
 4 A. That's correct. The rate impacts themselves
 5 are significant, but they're not large.
 6 GREENE, Q.C.:
 7 Q. But overall, in terms of the appropriate use
 8 of energy and maximization of the resource,
 9 this is what you believe is the path forward
 10 for us here in Newfoundland?
 11 MR. FAGAN:
 12 A. Yes, absolutely.
 13 GREENE, Q.C.:
 14 Q. So, now we're going to look at a little bit
 15 more detail about what work you did to
 16 support those overall findings, and the
 17 first one we look at would be – and you've
 18 already mentioned that you model scenarios.
 19 Can you describe generally what you did and
 20 why you did it?
 21 MR. FAGAN:
 22 A. Yes. We wanted to model the interactive
 23 effect of rate design, increase CDM and
 24 electrification. The patterns of
 25 consumption associated with electrification

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1 are different from the patterns of energy
 2 savings associated with CDM and both those
 3 patterns, in addition to underlying existing
 4 load patterns, can be shaped by rate design.
 5 So, in order to economically capture the
 6 variant patterns of consumption in export
 7 sales, we used a model that looked at things
 8 on an hourly level and then multiple
 9 scenarios just allowed us to mix and match
 10 different levels of rate design and
 11 different levels of electrification or CDM.
 12 I mean, essentially there's infinite
 13 permutations of scenarios that we could have
 14 modelled and we had to try to narrow that
 15 down. We still ended up doing scenario
 16 analysis on roughly 38 different
 17 combinations, which is quite a lot to try to
 18 discern the differences.
 19 GREENE, Q.C.:
 20 Q. And if we could go to your next slide. This
 21 is – this slide illustrates the results of
 22 what we chose as the key illustrative
 23 scenarios that you ran. So, could you
 24 please explain what this table shows?
 25 MR. FAGAN:

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1 A. Sure. The results for all the scenarios are
 2 contained in the report. We do have
 3 listings of the effect across all 30 some
 4 odd scenarios. But essentially, we just
 5 chose a handful of scenarios to show the
 6 general pattern for CDM, for electrification
 7 and for the effect of rate design, time of
 8 use rates or the use of electric vehicle
 9 smart chargers. And what this shows, this
 10 presents five different metrics. One is
 11 just the change in utility revenues.
 12 Essentially utility revenues will increase
 13 with electrification and they'll decrease
 14 with CDM.
 15 GREENE, Q.C.:
 16 Q. And this – and excuse me, this is the change
 17 from your base case reference?
 18 MR. FAGAN:
 19 A. Yes.
 20 GREENE, Q.C.:
 21 Q. It's always in a comparison to what your
 22 reference case is?
 23 MR. FAGAN:
 24 A. Yes, that's correct. All of this is a
 25 change from the reference case. So, for

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1 example, if the rates are – if the rates end
 2 up being set at, for example, 17 cents in
 3 2020, the effect of a high electrification
 4 scenario would be to reduce the rate by on
 5 the order of eight-tenths of a cent per
 6 kilowatt hour and that's shown in this
 7 second row, the second set of columns.
 8 Conversely, under a high CDM only
 9 scenario where you don't do any
 10 electrification other than the small amounts
 11 that are in the base case, you would see
 12 increases in rates on the order of 1.4 cents
 13 per kilowatt hour by 2030.
 14 But what's coupled with that rate
 15 increase, as shown in the last two columns
 16 of this table, is generally a reduction in
 17 total energy expenditures and a reduction in
 18 the average energy expenditures on an
 19 average customer basis. And that's what
 20 this shows.
 21 So, the last two columns capture the
 22 effect of reduced consumption and the effect
 23 of increased consumption but oil savings.
 24 Whereas the first column captures the effect
 25 of changing export sales and also changing

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1 internal sales associated with the level of
 2 CDM or electrification that's used.
 3 GREENE, Q.C.:
 4 Q. And when you looked at the average energy
 5 expenditures, that's for all customers? Is
 6 that correct?
 7 MR. FAGAN:
 8 A. That's correct. This does not reflect, and
 9 as we note in the report and as we noted in
 10 the summary slides in this presentation,
 11 this does not affect – sorry. This does not
 12 reflect the distribution of these effects
 13 across rate classes or across sectors.
 14 Depending upon what sort of cost allocation
 15 is used from Muskrat Falls, for example,
 16 depending on the specifics of rate design
 17 approaches, depending upon how Governmental
 18 policies are implemented. All of those
 19 things can affect essentially the
 20 distribution of the benefits and the costs
 21 and to try to guess at exactly what that
 22 would look like at this point in time would
 23 be premature. We wanted to primarily answer
 24 the reference questions on the whole to get
 25 an indication of what makes the most sense,

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1 increasing export sales, increasing domestic
 2 load and get a rough idea of what that
 3 quantitative effect would look like.
 4 GREENE, Q.C.:
 5 Q. So, if we could take just Scenario 12A where
 6 we see the average rate mitigation by 2030,
 7 it's there in red, which is just over a cent
 8 a kilowatt hour. That would show what we
 9 just talked about. Is that correct that if
 10 there is increased electrification, the
 11 Delta Utility revenues increase in 2025,
 12 2030, and the average rate, cents a kilowatt
 13 hour, would go down? Is that correct?
 14 MR. FAGAN:
 15 A. Yes.
 16 GREENE, Q.C.:
 17 Q. That's how we are to read that table?
 18 MR. FAGAN:
 19 A. Yes, that's correct.
 20 GREENE, Q.C.:
 21 Q. Okay. So, if we can go to the next table?
 22 MR. FAGAN:
 23 A. Yes. This table essentially presents the
 24 components of the change in utility revenues
 25 that we saw on the prior table and it

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1 indicates that the effect on revenues comes
 2 from not just the increasing revenues from
 3 electrification or the decrease in revenues
 4 if there's improved energy efficiency, but
 5 it also comes from the change in export
 6 revenues that would be seen and it also
 7 comes from whatever costs might be incurred
 8 to implement the CDM or to implement the
 9 electrification policies and it also takes
 10 into account the change in exposure to
 11 capacity costs that the Province would see.
 12 So, for example, if we look at that
 13 same 12A, scenario 12A, the export revenues
 14 actually decline in scenarios where you have
 15 a lot more electrification because you're
 16 using the energy internally as opposed to
 17 exporting it. But the internal revenues
 18 increase significantly. There is a cost
 19 associated with those electrification
 20 policies, although in our accounting, we do
 21 not include the \$5,000 per vehicle Federal
 22 rebate, for example. We do include the cost
 23 associated with heat pump incentives and
 24 electric vehicle charging stations that
 25 would be required. We also note that for

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1 that scenario, there's a net increase in
 2 peak load. So, you do have exposure to the
 3 need for additional capacity costs and
 4 that's as you can see in the 20 – both 2025
 5 and 2030.
 6 So, essentially, this table breaks down
 7 the components to get to the net mitigation
 8 effects of the change in utility revenues
 9 that you see.
 10 GREENE, Q.C.:
 11 Q. If we could turn now to the more detail with
 12 respect to your work for the load forecast.
 13 Did you consider the impact on the forecast
 14 load of a significant increase in price?
 15 MR. FAGAN:
 16 A. Yes, we did. It's a tricky matter. With
 17 the projected rate increase that the
 18 Province is looking at, it's very difficult
 19 to use the traditional econometric
 20 estimating techniques, which basically look
 21 back and see how consumption has changed as
 22 prices have changed. But all of that occurs
 23 within a particular band width of price
 24 increase and the band width of price
 25 increase we're talking about now renders

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1 that method a lot less effective and a lot
 2 less certain.
 3 So, essentially, you can think about
 4 well, what options are in front of people
 5 and the options that are in front of people
 6 are switching from electricity or changing
 7 behaviours or changing technologies to use
 8 less electricity. And those types of
 9 responses are reflected in Hydro's forecast,
 10 what they call their low rate forecast,
 11 which contains a particular price elasticity
 12 that's essentially a relatively higher price
 13 elasticity than you might see if you just
 14 looked at conventional econometric
 15 estimating techniques.
 16 So, based primarily on that and it –
 17 based on that, the Hydro's forecast is not
 18 an unreasonable forecast. We do think that
 19 they were a little bit – that they estimated
 20 a little bit high in some of those out
 21 years. Newfoundland Power, for example,
 22 estimated just a little bit lower. So, as
 23 you'll see in the subsequent slide – I'm
 24 just going to jump two slides up. As you'll
 25 see in this slide, for example, the dotted

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1 line represents Hydro’s forecast and you’ll
 2 see that for the first five years, our base
 3 forecast is essentially the same as Hydro’s
 4 forecast, but we do think that the trend
 5 that has been seen in the Newfoundland Power
 6 service territory is more predictive of what
 7 might occur in the latter portion of the
 8 period. So, we essentially see a flat to
 9 slightly declining energy forecast
 10 trajectory.
 11 We did also look at some other
 12 trajectories in addition to our scenarios.
 13 For example, an extreme load trajectory,
 14 representing a price elasticity twice as
 15 high as what Hydro used in its low rate
 16 case, would show a decline by an additional
 17 1500 or so gigawatt hours by 2030, which
 18 would be a fairly steep and significant
 19 decline.
 20 But what this graph also shows is that
 21 under aggressive levels of CDM, the decline
 22 can also be fairly sizeable. So, to some
 23 extent, declines coming from price response
 24 are – they’re not that different from
 25 declines coming from CDM. The CDM is the

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1 mechanism that people will take to reduce
 2 their exposure to bills essentially.
 3 Just to back up, this just reflects our
 4 underlying base forecast that we saw on that
 5 slide and it is broken down by the
 6 components, Newfoundland Power and rural and
 7 the Industrial sales. So, you can see what
 8 the actual total requirements look like.
 9 Likewise for peak load, we essentially
 10 apply the same principles. You know, we see
 11 a peak load on the island that’s similar to
 12 Hydro’s forecast of peak load out ‘til about
 13 the middle part of this coming decade. But
 14 when we see price response pressures to
 15 indicate that the peak will not grow quite
 16 as fast as Hydro forecasted them to grow out
 17 to 2030 in their low rate forecast case.
 18 GREENE, Q.C.:
 19 Q. So, as an indication of the impact that the
 20 significant price might have on customers if
 21 there is no rate mitigation, you model the
 22 extreme low load? Is that correct?
 23 MR. FAGAN:
 24 A. That’s correct. And what you see with
 25 extreme low load, I mean, the net effect of

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1 extreme low load would be that rates would
 2 have to go higher, but that bills would
 3 actually likely go down because that’s
 4 what’s happening. The consumption change is
 5 dramatic or more dramatic than it otherwise
 6 is. What comes with that extreme low load
 7 scenario is an increase in export sales to
 8 make up part of the revenue, but you do
 9 still have – but you will see a greater rate
 10 increase if that extreme low load scenario
 11 were to come to pass.
 12 GREENE, Q.C.:
 13 Q. So, if we go to slide 25, please. Here you
 14 showed a typical winter day peak and why is
 15 that important?
 16 MR. FAGAN:
 17 A. This is just important to point out that
 18 there’s two periods of the day when the
 19 island sees its peak, in the morning and in
 20 the evenings, and there’s not much of a
 21 difference between what those levels might
 22 be at the beginning of the decade and the
 23 end of the decade, based on our reference
 24 forecast. But primarily, this is just to
 25 point out that there is room for selling

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1 additional export sales or internally to
 2 electrification load during the periods of
 3 the day that are not peak, overnight and
 4 midday essentially.
 5 (9:45 a.m.)
 6 So that just indicates that rate design
 7 needs to take this pattern explicitly into
 8 account when thinking about the policies
 9 that rate design – the ability for rate
 10 design to affect consumption. You want to
 11 save consumption during the peak periods and
 12 you want to promote consumption or export
 13 sales during the off-peak periods.
 14 GREENE, Q.C.:
 15 Q. Okay. The next slide, slide 26 is a busy
 16 slide. What’s that supposed to tell us?
 17 MR. FAGAN:
 18 A. The main thing that this slide tells us, the
 19 report presents this slide plus similar
 20 slides for other scenarios and it just
 21 allows you to see the changing amounts of
 22 export sales during off-peak hours. It’s
 23 basically a tally of the energy balance in
 24 the Province, and you’ll note that the heavy
 25 thick line, that’s at the top of the gray

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1 area, is the same pattern that we saw in the
 2 previous slide. That’s the island load
 3 pattern. But that the total supply capacity
 4 available for export market sales is greater
 5 than those peak needs and what you’ll see is
 6 that generally, they’re able to sell a lot
 7 more, as much as they can, during the on-
 8 peak periods and sell less during the off-
 9 peak periods because the on-peak periods
 10 come with greater potential for revenue.
 11 GREENE, Q.C.:
 12 Q. So turning now to electrification, which is
 13 the most significant opportunity to increase
 14 revenue in your analysis. I want to look
 15 just at a little bit more detail and you
 16 already discussed how you looked at
 17 electrification for buildings and for in the
 18 transportation area. So, Dr. Hopkins, could
 19 you just outline a little bit more about how
 20 you did that analysis?
 21 DR. HOPKINS:
 22 A. Sure. In transportation, we looked at
 23 predominantly electric vehicles, both light
 24 and medium duty vehicles. You see that
 25 described as LDV and MDV. Medium duty

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1 vehicles are things like delivery vehicles
 2 and buses. We also looked at the potential
 3 for further electrification of the port here
 4 in St. John’s, although you’ll see on the
 5 slides that that’s a pretty minimal effect.
 6 Building electrification, we looked at
 7 conversion of oil heating to electric
 8 heating for residential and for small and
 9 large commercial buildings. We’ve modelled
 10 that as conversion to heat pumps. Whereas,
 11 for institutional use, in particular
 12 Memorial University where the demand for
 13 very high heat is more likely, we modelled
 14 that as conversion to electric resistance.
 15 We developed low and high
 16 electrification scenarios within each sector
 17 and those scenarios are designed to give a
 18 bookend sense of what the impacts on the
 19 electric system might be from lower or
 20 higher electrification.
 21 GREENE, Q.C.:
 22 Q. Okay. Those were the assumptions that you
 23 used for each of your scenarios and did you
 24 – when we go to slide 31, you also looked at
 25 costs that would be associated with

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1 increasing electrification. Is that
 2 correct?
 3 DR. HOPKINS:
 4 A. That’s correct. So, we looked at the costs
 5 that might come through various types of
 6 programs. For example, the electric vehicle
 7 incentive, although we assumed that that
 8 incentive would be covered by the Federal
 9 Government. We also looked at heat pump
 10 incentives and also the costs for installing
 11 charging stations.
 12 GREENE, Q.C.:
 13 Q. Okay. So, if we go to slide 32, we see the
 14 results of your analysis. Could you just
 15 explain them briefly, please?
 16 DR. HOPKINS:
 17 A. So, this is the high electrification
 18 scenario. The units are the total energy by
 19 year. Different sectors are able to
 20 electrify at different rates. So, you see
 21 Memorial University replacing one and then a
 22 second boiler as assumed and modelled by us
 23 that relatively early institutional
 24 buildings, again, moving relatively earlier.
 25 You get to see the relative scale of

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1 residential, small and large commercial
 2 buildings, which are substantial but much
 3 smaller than the institutional load, partly
 4 because there’s fewer square feet that we
 5 assumed would electrify and partly because
 6 those buildings are electrifying with heat
 7 pumps, which use a lot less electricity per
 8 amount of heat delivered.
 9 Transportation sector has a somewhat
 10 different adoption shape, as you see, with
 11 the market developing much more towards the
 12 latter end of the period. This reflects the
 13 increasing availability of different
 14 electric vehicle models as they become more
 15 available and also reductions in cost in
 16 electric vehicles presuming to make adoption
 17 faster later in the period.
 18 The next slide is the low scenario
 19 case. The shapes are similar, but the
 20 values are substantially lower, just for
 21 lower rate of adoption. Only one boiler at
 22 Memorial University and a much slower
 23 adoption of electric vehicles.
 24 GREENE, Q.C.:
 25 Q. Okay. So, if we could go to slide 34 where

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1 you talk about the cost impacts. Could you
 2 please explain this slide?
 3 DR. HOPKINS:
 4 A. Sure. We looked at – you know, there’s a
 5 question for electrification, will people
 6 actually do it, but does it make sense for
 7 customers to actually electrify their end
 8 uses. So, we looked at that in two
 9 different ways. One, this slide shows the
 10 aggregate. So, if you look at buildings,
 11 for example, the figure here, in aggregate
 12 across all of the buildings are the folks
 13 paying the energy bills in these buildings,
 14 are they paying less if they electrify than
 15 they would if they were using – heating
 16 using oil.
 17 So, the two high cases shown here, for
 18 example, the high oil and high heat pump,
 19 shows the total spending on fuel, depending
 20 on which fuel those folks were using for
 21 their buildings and you see that the heat
 22 pump case is substantially lower than the
 23 oil case. A general sense that in
 24 aggregate, consumers in the Province would
 25 be saving money by switching from oil to

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1 heat pumps.
 2 GREENE, Q.C.:
 3 Q. Okay.
 4 DR. HOPKINS:
 5 A. The other two that – the other way that we
 6 looked at this, shown here and on the next
 7 slide. This is for electric vehicles and
 8 the following one for heat pumps, looks at
 9 the individual customer economics. So, if
 10 you assume, for example, in the electric
 11 vehicle that a EV owner finances a new
 12 electric vehicle over five years and
 13 depending on whether gasoline is higher
 14 forecast or lower forecast prices, based on
 15 Canadian federal forecast data, generally
 16 speaking that folks who would get an EV
 17 would pay a little bit more, negative
 18 savings, increase in cost, while they’re
 19 paying off the vehicle. But then for the
 20 balance of the life of the vehicle, they
 21 would see substantial savings from charging
 22 their vehicle with electricity rather than
 23 driving on gasoline. It’s obviously more
 24 cost effective to drive an electrical
 25 vehicle if the price of gasoline is higher

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1 and the rate design, which Ms. Whited will
 2 discuss later, does make some effect from
 3 the electric vehicle owner’s perspective. A
 4 more favourable rate is available to them in
 5 terms of time of use or some sort of
 6 incentive rate, the more favourable the
 7 switch is.
 8 GREENE, Q.C.:
 9 Q. And you also looked at the impact for heat
 10 pumps, is that correct?
 11 DR. HOPKINS:
 12 A. That’s correct. So, this is the same
 13 calculation, but for a single home heating
 14 with a heat pump using—again financing over
 15 five years, using Newfoundland Power’s
 16 existing loan product. If oil prices are
 17 high, then the oil savings relative to
 18 electric basically pays for the heat pump
 19 over the course of the first five years and
 20 then it’s all savings from there on out.
 21 So, you could see that this, if oil prices
 22 are high, it would be quite economical for a
 23 household to switch to using heat pumps. If
 24 oil prices are lower, it’s a little bit more
 25 break-even where there’s some additional

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1 costs while you’re paying off the system and
 2 some savings later, but it’s a little bit
 3 closer to 50/50.
 4 GREENE, Q.C.:
 5 Q. Moving now to CDM and Demand Response, can
 6 you briefly describe how you did that
 7 analysis and what it showed?
 8 DR. HOPKINS:
 9 A. Yes. So, we were interested, as Mr. Fagan
 10 described, predominately in the savings that
 11 could come from lower peak load and avoided
 12 capacity costs, but many kinds of CDM
 13 measures are also result, of course, in
 14 energy savings. So, we looked at a base
 15 case, a low case and a high case. The base
 16 case is basically a continuation of current
 17 levels of programs, minimal adoption of heat
 18 pumps and the savings that embedded
 19 essentially in the elasticity response that
 20 Mr. Fagan described before. And then, the
 21 low and high cases reflect incremental
 22 additional CDM and heat pump installation.
 23 We did, also did a low and a high case for
 24 demand response. We looked at that from an
 25 end-use model, so building up from potential

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1 savings and adoption rates in heating,
 2 lighting, hot water, refrigeration, et
 3 cetera, and amortized the costs of the
 4 resulting CDM Programs over seven years as
 5 is the current practice here and calculated
 6 out the benefit cost values that Mr. Fagan
 7 described already in the summary.
 8 GREENE, Q.C.:
 9 Q. So, if we go to slide 39, that just outlines
 10 the assumptions that you used for adoption
 11 rates for your various scenarios, is that
 12 correct?
 13 DR. HOPKINS:
 14 A. That’s correct, yeah. The adoption rates
 15 are generally higher in the residential
 16 sector as they have been historically and
 17 higher in Newfoundland than in Labrador.
 18 I’ll just mention that this lower figure
 19 here is the same one that was corrected in
 20 the report.
 21 GREENE, Q.C.:
 22 Q. Right.
 23 DR. HOPKINS:
 24 A. The figure here is—that chart corresponds to
 25 the commercial case rather than to the

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1 residential case.
 2 GREENE, Q.C.:
 3 Q. Okay. On slide 40, you then have a slide
 4 that shows a heat pump performance and
 5 potential savings. Is that correct?
 6 DR. HOPKINS:
 7 A. Yes, that’s correct. So, a large fraction
 8 of the potential CDM savings in the province
 9 have to do with the adoption of heat pumps,
 10 and the reason why heat pumps present such
 11 substantial savings with respect to electric
 12 resistance heat is illustrated in the figure
 13 here in which the—which is from real data of
 14 major performance of heat pumps in real
 15 homes in cold climates. The Y axis is the
 16 coefficient of performance, essentially the
 17 efficiency of the heat pump where one is a
 18 hundred percent efficient or equivalent to
 19 electric resistance. And you can see that,
 20 you know, at freezing, the coefficient
 21 performance is well over two and a half.
 22 It’s even over one and a half down below
 23 minus 20. So, there is substantial
 24 potential savings even on the coldest days
 25 from the adoption of heat pumps. We did

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1 discount the potential savings that could—
 2 that technical data would imply and assumed
 3 that folks would, in fact, fall back on
 4 electric resistance heat perhaps more than
 5 they need to. Then the technical data would
 6 imply in order to be conservative about just
 7 how much savings might be achievable. So,
 8 you can see the discount in the table at the
 9 bottom between the full savings and the
 10 average savings reflects that correction for
 11 a conservatism.
 12 GREENE, Q.C.:
 13 Q. Okay. And the next slide shows the summary
 14 of savings?
 15 DR. HOPKINS:
 16 A. Yes, so this is those three cases, the base
 17 case, low case and high case total amount of
 18 achieved savings. Base case continuing
 19 programs would save on the order of 400
 20 gigawatt hours by 2030, whereas the low case
 21 adds about 130 gigawatt hours on top of
 22 that. And the high case is about 300
 23 gigawatt hours above that and that’s the
 24 sort of the classic CDM portfolio separate
 25 from the heat pumps. And heat pumps are

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1 shown in the lower chart where the low-end
 2 base case assumptions for a CDM used a low
 3 penetration assumption for heat pumps, where
 4 heat pumps save, I mean, somewhat over 150
 5 gigawatt hours by 2030. In the high case
 6 where if Newfoundland were to follow the
 7 trajectory of some European jurisdictions in
 8 which heat pumps have become essentially the
 9 default replacement for electric resistance
 10 heat, then you might save as many as 700
 11 gigawatt hours by 2030.
 12 GREENE, Q.C.:
 13 Q. Turning now to a little more detail on the
 14 low forecast. On slide 43, previously we
 15 talked about the energy balance. Slide 43
 16 shows us the capacity that would be
 17 available after, with muskrat Falls. That
 18 slide 43 excludes recall. And can you
 19 explain that recall is and why you chose to
 20 show the capacity without the use of recall?
 21 MR. FAGAN:
 22 A. Yes, Muskrat Falls is on the order of 800
 23 megawatts. The recall block is on the order
 24 of 225 megawatts. So, there’s a significant
 25 amount of capacity available in Labrador.

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1 Essentially, you need a sizable portion of
 2 Muskrat Falls across the link to meet the
 3 requirements on the Island on the peak
 4 winter days. And that’s what this slide
 5 essentially shows, that on the order of 600
 6 megawatts is required across the link from
 7 Muskrat Falls in order to meet the
 8 requirements which leaves a few hundred
 9 megawatts available for export. Essentially
 10 the capacity for export, either by way of
 11 the Island path towards Nova Scotia and New
 12 England or by way of the Quebec path,
 13 depending upon the total of capacity that’s
 14 flowing and the prices through those two
 15 paths. The second slide which represents
 16 including recall, essentially makes, if you
 17 make the presumption that the recall
 18 available after meeting Labrador
 19 requirements under a base forecast for
 20 Labrador, there is additional remaining
 21 capacity from the combination of recall and
 22 TwinCo assets in Labrador such that there’s
 23 an additional hundred megawatts available
 24 for export. So, the net amount of export
 25 capacity available from the combination of

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1 recall capacity and Muskrat Falls is on the
 2 order of 300 megawatts. Whereas if you just
 3 look at Muskrat Falls, the amount is on the
 4 order of 200 megawatts. So, these slides
 5 are analogous to the energy slides that were
 6 presented earlier.
 7 GREENE, Q.C.:
 8 Q. Okay.
 9 (10:00 a.m.)
 10 MR. FAGAN:
 11 A. The next two slides just present the total
 12 export volumes and the total export revenues
 13 associated with the surplus energy tied to
 14 all of the resources, both Muskrat Falls and
 15 the recall block. So, what this indicates
 16 is in our base case, you know, going out
 17 towards 2030, you see that the annual
 18 available export sales are on the order of
 19 3.5 terawatt hours. And what you see at the
 20 bottom of the slide is in the high
 21 electrification case, there’s 500 gigawatt
 22 hours less available because you’re
 23 consuming that internal. And in this
 24 scenario is where you may have an extreme
 25 low load or the effect of just high

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1 aggressive levels of CDM. You see the
 2 exports sales volumes rising to 4.5, to an
 3 extreme level, as much as 5 terawatt hours
 4 in an extreme low load case. The revenues
 5 that are tied to those volumes essentially
 6 follow the same pattern as the volumes
 7 themselves. So, in the high electrification
 8 case, there’s less revenue that you’re
 9 receiving from export sales on the order of
 10 140 million by the end of the decade, and
 11 conversely, in the high CDM case, for
 12 example, the export revenues in total rise
 13 to on the order 200 million dollars by the
 14 end of the decade.
 15 GREENE, Q.C.:
 16 Q. Okay. So, turning now to rate design, Ms.
 17 Whited, can you—why is it necessary to
 18 consider rate design when we’re talking
 19 about electrification and CDM?
 20 MS. WHITED:
 21 A. So, there are several things that rates do.
 22 They can encourage customers to shift their
 23 consumption to certain hours of the day.
 24 And so, we wanted to look at rate design and
 25 how it can shape customer load in order to

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1 maximize export revenues to the highest
 2 value hours or specially to minimize peak
 3 demand, especially for new electrified
 4 loads. Rate design can also be used to
 5 encourage electrification. If you can
 6 provide a lower rate on the off-peak hours
 7 that encourages customers, for example, to
 8 adopt electric vehicles and charge them
 9 during the off-peak hours. So, we looked at
 10 several different designs and we made sure
 11 to base those on marginal costs so that the
 12 off-peak rates were always set above
 13 marginal cost. So, to go into a little bit
 14 more detail, we looked at rate design as a
 15 tool to do several different things:
 16 increase adoption of electric vehicles and
 17 other beneficial technologies that can
 18 easily be shifted; reduce the peak demand
 19 and then reap all the benefits in terms of
 20 avoided capacity costs; and again, to shift
 21 consumption on the Island to those hours
 22 that have lower export prices so that you
 23 can maximize export sales during the high-
 24 priced hours. We considered three different
 25 options primarily. One was the time-of-use

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1 rates with critical-peak pricing for all
 2 customers. We did a combination of time-of-
 3 use and critical-peak pricing because you
 4 get a lot more capacity benefit from
 5 critical-peak pricing than just time-of-use
 6 alone. So, it was our assumption that it
 7 would be much more cost effective to that.
 8 The second option that we considered was
 9 time-of-use rates, only for transportation,
 10 for electric vehicles and this can be done
 11 through the use of smart chargers. And it
 12 could avoid the need to do a full roll-out
 13 of advance metering infrastructure. And
 14 then, finally, we looked at some incentive
 15 rates, lower priced flat rates for
 16 electrical vehicles to encourage the
 17 adoption of those technologies. The charts
 18 on this slide show some stylized examples of
 19 time-of-use rates and critical-peak pricing.
 20 And what happens is that the critical-peak
 21 pricing actually gets layered on top of the
 22 time-of-use rate. The time-of-use rate that
 23 we used was a two-period-time-of-use-rate
 24 model with the peak hours between 6:00 a.m.
 25 and 11:00 a.m. and then again from 4:00 p.m.

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1 to 9:00 p.m. The critical-peak-pricing
 2 rate, that would only be called a few times
 3 per year and it would have a much higher
 4 price during those hours. So, moving on to
 5 slide 51, we looked at the effects of time-
 6 of-use pricing on electric vehicles in other
 7 jurisdictions. In particular, we looked at
 8 this example from Detroit Edison as to how
 9 electric vehicles respond to time-of-use
 10 rates. And because electric vehicles are a
 11 large load and they can be relatively easily
 12 programed to automatically charge off-peak
 13 hours, and most driving actually does not
 14 occur during off-peak hours, it's a fairly
 15 easy load to shift and it has quite a large
 16 impact. So, this slide here just shows the
 17 flat rate in the light blue. A lot of
 18 people on a flat rate have no incentive to
 19 charge off-peak, so they simply plug in when
 20 they get home from work. If you implement a
 21 time-of-use rate, then that's the darker
 22 blue line. You can see there that most of
 23 the charging starts to occur after the off-
 24 peak rates come into play late at night, so
 25 11:00 p.m. and throughout the middle of the

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1 night. So, that helps you avoid charging
 2 during the on-peak hours and so it gives you
 3 a capacity benefit. So, what we have found
 4 from our rate design analysis was that time-
 5 of-use rates for electric vehicles make a
 6 lot of sense since you can shift a lot of
 7 load fairly easily and you can also
 8 implement time-of-use rates without doing
 9 full advanced metering infrastructure. You
 10 can use those smart chargers to roll out the
 11 time-of-use rates for EVs at a lot lower
 12 cost. This can also help incentivise
 13 transportation electrification, so helping
 14 to get to a higher electrification scenario.
 15 The time-of-use rates, plus critical-peak
 16 pricing with advanced-metering
 17 infrastructure has a reasonably positive
 18 impact, but we recommend doing a little bit
 19 more analysis to dig into the actual cost of
 20 that advanced-metering infrastructure. We
 21 assumed a 300-dollar-per-meter all-in cost
 22 based on recent experience across the
 23 Canadian Provinces and a little bit in the
 24 United States. That could be tested by
 25 issuing an RFP and getting more accurate

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1 pricing. And then, looking at how customer
 2 load actually would respond in the province
 3 through doing some pilots. We looked at
 4 examples from Quebec and from Ontario and
 5 from the Northwest United States to estimate
 6 how customers might respond under time-of-
 7 use rates with critical-peak pricing, but
 8 there's been very little overall analysis in
 9 winter-peaking territories. So, it would be
 10 very advantageous to gather some data on the
 11 ground here in Newfoundland just to verify
 12 those assumptions.

13 GREENE, Q.C.:

14 Q. So, just to summarize on rate design, I
 15 understand that you did not come up with
 16 specific rates that you are recommending,
 17 but your analysis was more in terms of
 18 directional as opposed to a specific rate
 19 design. Is that correct?

20 MS. WHITED:

21 A. That's correct. We did test some specific
 22 rates just to understand what the impact
 23 would be on customers who were not
 24 participating in those, for example, EV
 25 time-of-use rates, and we did present those

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1 results in the report, but overall the
 2 results were based on assumptions regarding
 3 shifting of load from overall results in
 4 other jurisdictions, not on specific rates.
 5 GREENE, Q.C.:
 6 Q. Okay. Turning now to your overall
 7 observations from the work that you did.
 8 Mr. Fagan, what are the take-aways that we
 9 should take from your analysis?
 10 MR. FAGAN:
 11 A. I think the points listed on this slide have
 12 generally been covered in the presentation
 13 this morning, but at the highest level,
 14 policy supported electrification and
 15 enhanced CDM including the main response
 16 makes the most sense for customer outcomes.
 17 Electrification clearly has the highest
 18 mitigation value because of its increasing
 19 load to contribute to paying for fixed
 20 costs. The CDM is critically important
 21 because of its ability to help avoid future
 22 expenditures in capacity needs, and at the
 23 same time, it does allow increased levels of
 24 export sales and it helps to reduce bills at
 25 individual facility levels because of

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1 reduced consumption. As Melissa had
 2 indicated, rate design guided by the high-
 3 level analysis we show here can lead to the
 4 most efficient price signalling. The
 5 analysis we did captures that, in large
 6 part, but by capturing what the effective
 7 export sales look like when you have
 8 different levels of rate design and you
 9 shift the buckets of consumption internally
 10 to allow for greater levels of the export
 11 sales. We do note existing levels of
 12 industrial curtailment and potentially
 13 increased levels of that for demand response
 14 is critically important. That's a winter-
 15 peak capacity or peak-load shaving measure
 16 that doesn't necessarily involve a reduction
 17 in energy consumption and that's
 18 particularly important given the concerns
 19 about capacity needs in the future. You
 20 know, we note that it is better to do
 21 electrification as opposed to just maximize
 22 the exports sales, but at the same time,
 23 there's significant value in increasing
 24 those export sales. Essentially, the peak-
 25 shaving benefit of CDM helps to pay for most

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1 of it and then you also are able to sell
 2 more energy externally when you've
 3 implemented the CDM. So, while
 4 electrification is best, I'm not trying to
 5 minimize the importance of maximizing the
 6 export sales. As Melissa indicated, the
 7 time-of-use rates using smart charging for
 8 electric vehicles seems to make the most
 9 sense initially, but a little bit more
 10 careful analysis, you know, could reveal
 11 that broader use of AMI could make sense for
 12 the province. And then, lastly, but
 13 certainly not least, the government—federal
 14 and provincial policies have a significant
 15 effect on reducing the costs for energy
 16 efficiency and for electrification.
 17 GREENE, Q.C.:
 18 Q. If your findings are generally accepted,
 19 what would you recommend be the next steps
 20 to do further analysis?
 21 MR. FAGAN:
 22 A. Well, essentially as you would expect, based
 23 on the information and we've provided, the
 24 specific policies around electrification
 25 would need to be developed. Certainly, the

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1 form of incentives that might be used for
 2 equipment such as heat pumps would be
 3 important. I mean, for example, a policy
 4 discussion could revolve around how much of
 5 an incentive are you providing for heat
 6 pumps and are there minimum standards for
 7 those heat pumps that you're looking at? Do
 8 you couple provision of heat-pump rebates
 9 with, you know, a requirement to, you know,
 10 to try to improve building shells at the
 11 same time? EV charges. Figuring out where
 12 and how many. We have a general sense of
 13 the total number of charges you would need,
 14 but exactly where they end up going in, and
 15 as I note below, the rate structures that
 16 would apply to those would be important.
 17 So, developing the CDM Programs themselves,
 18 what we have seen is that the enchantment of
 19 CDM Programs would be significantly—it's a
 20 significant bump up in your CDM activity is
 21 what we would be recommending. The
 22 development of those programs, it's full of
 23 a lot of detail. Essentially CDM Programs
 24 in part can help to address inequities that
 25 otherwise arise. You know, in a large part,

Page 65	<p>1 the CDM Programs exist because of the market</p> <p>2 barriers that in place for people doing</p> <p>3 energy efficiency on their own. Otherwise</p> <p>4 all of this stuff would just be done. So,</p> <p>5 you know, in a way, you look carefully at</p> <p>6 how those programs can help to transform the</p> <p>7 market, and at the same time provide, in</p> <p>8 particular for customers who have less</p> <p>9 access to capital, addressing inequities</p> <p>10 that might otherwise—that have already begun</p> <p>11 to show up because most likely the heat pump</p> <p>12 installations that have already occurred are</p> <p>13 not occurring at the level of the lowest</p> <p>14 income customers, for example, in the</p> <p>15 province. And then, certainly looking</p> <p>16 carefully at rate design approaches is going</p> <p>17 to continue to make a lot of sense.</p> <p>18 Certainly, an initial form of TOU pricing</p> <p>19 for EV load is sort of the easiest rate</p> <p>20 design policy to implement on a quicker</p> <p>21 timeframe. And then, continuing to give</p> <p>22 careful attention to the monies that are</p> <p>23 available federally and the provincial</p> <p>24 policies that support electrification and</p> <p>25 increase energy efficiency would be</p>	Page 67	<p>1 today where I think, as we work through this</p> <p>2 over the next, certainly the next decade,</p> <p>3 the area that you’ve looked at more closely,</p> <p>4 we’re going to need to understand better.</p> <p>5 Those three, electric vehicles, the dynamics</p> <p>6 around the heat pump phenomenon that we’re</p> <p>7 seeing and how important that’s going to be,</p> <p>8 and also some rate design implications of</p> <p>9 CDM. If I could start with electric</p> <p>10 vehicles, Ms. Sheppard, if you could perhaps</p> <p>11 turn to page 45 of your September 30 report?</p> <p>12 And there’s a table there, Table 14. And</p> <p>13 what I see there is the amount of stock in</p> <p>14 the low scenario and the high scenario that</p> <p>15 you expect to occur for electric vehicles by</p> <p>16 2030 and there’s a fair bit of variability</p> <p>17 there, one and a half percent and seven and</p> <p>18 a half percent. And I wonder if I can next</p> <p>19 take you to page 41? And there’s a footnote</p> <p>20 at the bottom of the page 43, and if you can</p> <p>21 just scroll up, just a little, so we can see</p> <p>22 where the reference is through the footnote?</p> <p>23 Thank you. It says, “Synapse use</p> <p>24 Newfoundland’s historical pre-29 electrical</p> <p>25 vehicle adoption rate to develop the early</p>
Page 66	<p>1 critically important. So, those are the</p> <p>2 four broad groupings of next steps that we</p> <p>3 see.</p> <p>4 GREENE, Q.C.:</p> <p>5 Q. Okay. Thank you, Panel. That concludes my</p> <p>6 questions, Chair.</p> <p>7 CHAIR:</p> <p>8 Q. Thank you, Ms. Greene. Mr. Young?</p> <p>9 YOUNG, Q.C.:</p> <p>10 Q. Thank you, Madam Chair. Good morning,</p> <p>11 Panel. My name is Jeff Young and I’m in-</p> <p>12 house counsel for Newfoundland and Labrador</p> <p>13 Hydro. Thank you very much for your report.</p> <p>14 I think you’ll probably agree with me that</p> <p>15 there’s a lot of information in there, but</p> <p>16 more to the point perhaps is you’ve</p> <p>17 identified a number of areas where we need</p> <p>18 still more information. Would you agree</p> <p>19 with that?</p> <p>20 (10:15 a.m.)</p> <p>21 MR. FAGAN:</p> <p>22 A. Sure, of course. The reference questions</p> <p>23 bounded what it was that we were doing.</p> <p>24 YOUNG, Q.C.:</p> <p>25 Q. Right. And I’d like to explore three areas</p>	Page 68	<p>1 portion of the technology curve.” The</p> <p>2 footnote is to an article which is</p> <p>3 interestingly called, “Looking For a Place</p> <p>4 to Plug In”. The reference in the article,</p> <p>5 the article is about 18 months old, and it’s</p> <p>6 about the number of electric vehicles in the</p> <p>7 Province at the time and this was your</p> <p>8 starting point, correct? I note that in the</p> <p>9 article it said there’s roughly 500 hybrid</p> <p>10 vehicles and 122 full electric vehicles 18</p> <p>11 months ago. Infancy, I would suggest to</p> <p>12 you. We’ve got a long way to go even to get</p> <p>13 to your low-case factor of 10, in fact.</p> <p>14 MR. HOPKINS:</p> <p>15 A. Yes, that’s true, the market is very much in</p> <p>16 its early stages here and that’s what the</p> <p>17 low case is, you know, for Newfoundland to</p> <p>18 lag five years behind the Canadian Federal</p> <p>19 targets for adoption of EVs.</p> <p>20 YOUNG, Q.C.:</p> <p>21 Q. Right, and it occurs to us that there might</p> <p>22 be a big of a “chicken and egg” question</p> <p>23 here. If you have no chargers, you will</p> <p>24 have no electric cars. If you had no</p> <p>25 electric cars, you’ll have no chargers. You</p>

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1 said it just a moment ago that you have an
 2 idea as to how many electric chargers we
 3 might need to have installed, but you
 4 haven't really looked into exactly where
 5 they would be. What's your sense of that?
 6 What's the numbers?
 7 DR. HOPKINS:
 8 A. If you could go to page 53 of the report,
 9 Table 15, the number of chargers are shown
 10 here on this chart. So there's level 1
 11 chargers and fast chargers and we see that
 12 they have relatively low case adoption for
 13 the province would need relatively fewer
 14 chargers, but to avoid setting barriers for
 15 the high case, you would need substantially
 16 more chargers. The other fast chargers
 17 might be, you know, stretching here, from
 18 here west, you know, it's a stretch across
 19 the island, for example; whereas, the level
 20 two chargers might be more scattered around
 21 in workplaces, retail establishments, et
 22 cetera.
 23 YOUNG, Q.C.:
 24 Q. And as I mentioned, we're kind of late
 25 coming to the table here, so I imagine

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1 there's a fair bit of research we can look
 2 to or at least just observations we can look
 3 to from other jurisdictions as to their
 4 experiences in this regard.
 5 DR. HOPKINS:
 6 A. Yeah, a number of places that have higher EV
 7 adoption in Newfoundland and, you know,
 8 including much more advanced markets and the
 9 models that we used to develop these numbers
 10 are calibrated to what has been developed in
 11 other places and to transportation modelling
 12 in other places. It has tended to happen in
 13 the US earliest where states that are
 14 actively advancing electric vehicle adoption
 15 have pressed to remove this barrier quite
 16 aggressively. There are a number of states
 17 that have as many charges already as you
 18 might need to have even ten times as many
 19 vehicles as they have on the roads. One of
 20 the characteristics of EVs is that many
 21 folks are able to charge them at home and so
 22 you don't need nearly as many electric
 23 vehicle charging stations as you would need
 24 gasoline fueling stations, but it's getting
 25 exactly to that "chicken and egg" question

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1 you mentioned, it is generally thought that
 2 seeing electric vehicle charging stations
 3 around and knowing that the chargers are
 4 available and that there's one near your
 5 work or there's one near where you shop is
 6 an important psychological effect to get
 7 folks to be willing to accept the idea that
 8 they're going to be able to drive their EV.
 9 YOUNG, Q.C.:
 10 Q. I wonder if we can pull up slide 35 from
 11 this morning's presentation? Thank you.
 12 The third bullet there, it says, "Electric
 13 grate design or incentive rates have
 14 moderate impact on customer economics." I'm
 15 going to make an assumption and ask you to
 16 respond to it, that the economic advantage
 17 of having an electric vehicle verses other
 18 fuel sources is sufficient that you don't
 19 need to incent it too much to happen, so the
 20 time of use considerations you're bringing
 21 to the table are really about shaping the
 22 load to avoid the peak, is that right?
 23 DR. HOPKINS:
 24 A. I would say there's two effects, definitely
 25 the shaping the load piece is essential to

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1 get maximal system benefit, but also getting
 2 to the psychological piece, even if the
 3 effects on rural customer economics are
 4 relatively minor, the simple existence of a
 5 rate targeted towards electric vehicles that
 6 can be marketed as such may, implies a
 7 certain level of acceptiveness and blessing
 8 for electric vehicles, that the utility
 9 supports them, that the policy is in support
 10 of them, et cetera, which may further
 11 encourage drivers to consider electric
 12 vehicles. It is cost effective today in
 13 many places for electric vehicles to be the
 14 vehicle choice and yet, they are only a
 15 small portion of the market, so pure cost
 16 effectiveness may not be enough and so
 17 sending other kinds of signals, whether it's
 18 through infrastructure, as we just talked
 19 about, or through rate structures that are
 20 particularly marketed and beneficial towards
 21 electric vehicles could be pieces of an
 22 overall package for encouraging
 23 electrification.
 24 YOUNG, Q.C.:
 25 Q. I accept the notion, so you're saying that

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1 if customers see it on their bill or
 2 information from the utility that there's a
 3 time infused rate that's tailor made for
 4 electric service, that puts the idea in
 5 their heads. Have you observed that as a
 6 trend, though, when it's been introduced as
 7 causing some sort of an uptake in electric
 8 vehicles or can you take that out of the
 9 other noise of what's happening in the
 10 marketplace.
 11 DR. HOPKINS
 12 A. I might ask Ms. Whited who has looked at
 13 electric vehicle rates in California to
 14 answer that one.
 15 MS. WHITED:
 16 A. I don't think that we've been able to tease
 17 that out, but it is, you know, California
 18 has taken approach that they want to ensure
 19 that rates are available that make electric
 20 vehicle fueling as cost effective or the
 21 same costs are lower relative to fueling
 22 with gasoline and so, for that reason, you
 23 know, they have really pursued lower rates
 24 for electric vehicles than you might
 25 otherwise see.

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1 YOUNG, Q.C.:
 2 Q. Thank you. I just make that observation
 3 because I can see how nicely it works to
 4 avoid supertime peak, as you've just
 5 described a few minutes ago. So, if for no
 6 other reason, we do it for that reason, I
 7 think, or certainly look at it for that
 8 reason.
 9 MS. WHITED:
 10 A. I could add one additional point is that the
 11 cost effectiveness of electric vehicles
 12 depends a lot on the gasoline price, you
 13 know, what the alternative would be, and we
 14 know that gasoline prices are volatile, so
 15 providing an electric vehicle rate or a time
 16 of use rate when you know that you can
 17 charge during off-peak hours gives you some
 18 insulation from that volatility of gasoline
 19 prices so that you're more assured of
 20 actually being able to see those savings,
 21 regardless of what the gasoline price is.
 22 YOUNG, Q.C.:
 23 Q. I'm just thinking about the way people line
 24 up at the pumps here when gas is supposed to
 25 go up, a response to a pricing was a real

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1 thing here for fueling a vehicle, however it
 2 occurs. I want to turn now to heat pumps, I
 3 have some questions about that. Can we turn
 4 to page 65 of the report please? And this
 5 chart is in your report; it's also in your
 6 presentation, and you've discussed it
 7 already to some extent and the point you
 8 raised is—a couple of points, I suppose, and
 9 I'll just make an opening comment, in this
 10 particular place you sit today, St. John's,
 11 it's a relatively temperate Canadian city,
 12 not without our cold snaps from time to
 13 time. Five years ago we had a doozy which
 14 you can Google or you can talk to Liberty
 15 about it, they'll tell you, but what I see
 16 here is, as you've remarked, around the zero
 17 mark and even down to minus 10, fairly flat,
 18 the coefficient, the advantage of the
 19 technology over resistance heat is quite
 20 solid, it's two and a half times.
 21 DR. HOPKINS:
 22 A. Right.
 23 YOUNG, Q.C.:
 24 Q. And it trends down to one and a half times
 25 at minus—it looks like minus 23. I'm just

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1 curious, is it linear if you extend it out
 2 further and went down, just say if you
 3 looked at a number, like minus 27 or
 4 something, just curious.
 5 DR. HOPKINS:
 6 A. I haven't seen actual measured data. If it
 7 goes down that far, some heat pumps have
 8 minimal temperatures at which they operate.
 9 One of the other things that is going on is
 10 that the capacity of a heat pump to the
 11 amount of heat that it can deliver tends to
 12 also be falling as the temperature goes down
 13 and so, that's part of the reason you would
 14 imagine that folks would keep their electric
 15 resistance heaters, if they have them and
 16 perhaps also the oil heat in al
 17 electrification context and to be able to
 18 make sure that they simply can deliver it.
 19 The amount of heat that the building
 20 requires as it goes up as it gets colder,
 21 the amount that a heat pump system, which an
 22 air source heat pump system can provide is
 23 falling as it gets colder and there's some
 24 cost overplay when you need some sort of
 25 other heat in the building. Now, it may be

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1 that that cost over point is only
 2 experienced for two or three hours and if
 3 your heating system can't quite keep up for
 4 two or three hours, so the temperature in
 5 your space falls by a degree or two and then
 6 you recover and that's fine, but generally
 7 speaking there's a lot of different kinds of
 8 things pulling in different directions at
 9 the low end of that range. My understanding
 10 is the so-called design temperature here in
 11 St. John's is in the range of minus 20 or so
 12 and that's a temperature at which the heat
 13 pumps are still performing quite well.
 14 YOUNG, Q.C.:
 15 Q. I would suggest to you it's more true of St.
 16 John's than other parts of the island and
 17 certainly the Province as your research in
 18 Labrador shows.
 19 DR. HOPKINS:
 20 A. Yes, that's true.
 21 YOUNG, Q.C.:
 22 Q. I wonder if we could see page 66, please?
 23 And there's a figure 28 on that page. So we
 24 see a fairly healthy uptake here. This is,
 25 I believe this is Newfoundland Power's

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1 customers and so by 2018, 18 percent of
 2 electric heat customers had heat pumps and
 3 the point you raised about the two different
 4 types of heating systems is what I want to
 5 understand a little bit better. As you've
 6 pointed out in your report, the vast
 7 majority and it's clear from this, the vast
 8 majority of heat pumps that people have
 9 installed here are the mini-split types, the
 10 ones that sort we see fairly commonly hung
 11 on the walls here in homes. At the bottom
 12 of the page there's a comment there, you
 13 say, I'm going to put words in your mouth, I
 14 know it's dangerous, last week someone got
 15 accused of treason for doing that, but you
 16 say essentially that to understand the
 17 effect of heat pumps you have to understand
 18 how they're used and I suggest to you that
 19 makes sense. I don't know if you've
 20 researched this particular—I'm going to give
 21 you anecdote that I know from several
 22 people, which I'm curious, I'll ask you to
 23 respond to, there are people who had oil
 24 furnaces and they installed heat pumps and
 25 then they said they had to get the house

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1 rewired to some degree for the heat pump and
 2 they realized that the oil furnace would be
 3 there as a supplemental heat, really,
 4 because most of their heat was coming from
 5 the heat pump systems they put in, so they
 6 converted their hot water radiation, oil
 7 fired furnace, to electric fired or electric
 8 fueled hot water radiation as a supplemental
 9 system. So in that scenario you've done--
 10 one of the things you are seeking to do, I
 11 suggest, you've electrified the customer,
 12 although this has already happened for these
 13 particular people, which will be a good
 14 thing for rate mitigation, but on the
 15 margin, they are not—when I say “on the
 16 margin”, I mean at those very cold
 17 temperature days, their backup heat system,
 18 the conversation we had a moment ago, is not
 19 fossil fuel, it's electricity, it's
 20 resistant heat, so what I'm curious about
 21 and I don't think we know enough about this
 22 yet and need to learn more is how that works
 23 with the peak hour, you know, those few
 24 hours in the year when it's very cold and
 25 peak use is high. I'm going to suggest to

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1 you and ask you respond to it because I know
 2 you've looked at this fairly closely, with
 3 respect to heat pumps and not driving the
 4 peak, would the kind of scenario I talked
 5 about just now, where people are moving away
 6 from oil so that they call electric
 7 customers first, with a heat pump, are you
 8 concerned about how you can manipulate the
 9 peak with that scenario?
 10 (10:30 a.m.)
 11 DR. HOPKINS:
 12 A. The electrification heat pump adoption
 13 discussion is looking at that type of
 14 situation in particular and in our
 15 electrification high case we imagine the
 16 folks not keeping their oil systems so that
 17 the case that's comparable to what you've
 18 just described, including the lower average
 19 coefficient of performance that comes at
 20 that coldest times. We didn't model in
 21 particular those folks switching over
 22 entirely to electric resistance backup, I
 23 would say that one of the things that might
 24 come in program design, when it comes to
 25 that, is trying to get systems to be sized

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1 well and incorporated well into the other
 2 heating systems in their homes to mitigate
 3 those peak effects to the extent that makes
 4 sense, that could come in the form of
 5 incentives, rates, other things. That's
 6 getting into details further than we went in
 7 our analysis, but we did look at that
 8 electrification case and the potential peak
 9 impacts of folks not keeping their oil
 10 system at all.

11 MR. FAGAN:
 12 A. And let me just supplement that, it is our
 13 understanding that Newfoundland Power is
 14 conducting load research studies. Those are
 15 critically important studies. I mean, for
 16 example, part of what those studies will do
 17 is help us determine to what extent is the
 18 anecdote that you described common or
 19 uncommon, but just getting a better handle
 20 on all of that gives us a better
 21 understanding of what type of peak
 22 reductions, for example, you could
 23 reasonable predict or model. So that type
 24 of analysis is important. Lack of that data
 25 doesn't reduce the overall effect of our

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1 findings, the importance of these patters,
 2 but that will be critical to help shape the
 3 type of policies that you may want to have
 4 in place to help minimize instances where
 5 peak load increases. You know, we do model
 6 peak load increases associated with
 7 electrification from an oil heated, the oil
 8 heated buildings.

9 YOUNG, Q.C.:
 10 Q. So just further to that, the tools you would
 11 use once we have this, and I'm thinking five
 12 or six years out now, would it be a critical
 13 peak pricing means of trying to address the
 14 peak or is there another means?

15 DR. HOPKINS:
 16 A. I'll draw an example, so in the low
 17 electrification case we modelled a case in
 18 which folks were offered an additional
 19 incentive to keep their oil system and to
 20 have the systems be interacted, rather than
 21 necessarily to switch to resistance and in
 22 that case to actually have folks keep the
 23 system they have and use it when it's below
 24 a certain temperature. So for example,
 25 Hydro Quebec has a dual fuel rate, it's just

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1 a standard rate offered that you can switch
 2 off of electricity when the temperature is
 3 below a certain level, they have an outside
 4 temperature sensor and whenever it's below,
 5 you know, minus ten or whatever, it switches
 6 over. So we modelled that kind of case in
 7 the low case, so I think there are a lot of
 8 different options with respect to the
 9 hardware that customer keep in their homes
 10 and whether it's an incentive structure or
 11 rate structure that would be intended to try
 12 to get the most system benefit, while also
 13 making economic sense for the customers.

14 MR. FAGAN:
 15 A. And as a compliment to what Dr. Hopkins has
 16 talked about, we did model the critical peak
 17 pricing effect also which can have an effect
 18 on any peak use essentially, but certainly
 19 to the extent that that type of a rate
 20 structure was in place. That goes a long
 21 ways towards mitigating whatever the effects
 22 may be, regardless of the policies you have
 23 in place around electrification and
 24 incentives to retain oil.

25 YOUNG, Q.C.:

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1 Q. Can we turn to page 125 of the report
 2 because I understand this one better, to
 3 some extent your answer addressed this, but
 4 the second bullet there on the page refers
 5 to the information from the Dunsky Report
 6 and it talks about the mini-split heat pump
 7 systems complementing but not replacing oil-
 8 heat systems as economic. So I'm just
 9 curious, perhaps you can discuss this
 10 because I'm curious what the customer would
 11 feel about that reference. Does the term
 12 "economic" in that sentence, does it refer
 13 to the overall or is that by a customer
 14 basis what makes sense?

15 DR. HOPKINS:
 16 A. I guess the "economic" there is being
 17 credited to Dunsky and I don't remember
 18 exactly how they were framing that.

19 YOUNG, Q.C.:
 20 Q. Fair enough, but the point you raised about,
 21 with the Quebec example a moment ago, is
 22 that one thing that possibly could be done
 23 is to make it economic for customers.

24 DR. HOPKINS:
 25 A. Right, looking at the actual customer

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1 economics of, example homes where they are,
 2 you know, how systems might integrate well,
 3 you know, mini-split systems tend to be good
 4 complements to radiator based systems and
 5 so, being able to displace some large
 6 fraction of oil use for when times when
 7 it's, you know, cold but not as cold, or in
 8 the most commonly used portions of the home,
 9 for example, you might put a single head in
 10 a large open living space and you use that
 11 to heat the home most of the time, except
 12 when you have guests and you turn the heat
 13 on in the back of the house, so you know,
 14 whenever the other kind of situations might
 15 arise. Houses are all unique; everybody's
 16 house has its own characteristics, but I
 17 think this is getting into the details of
 18 the kind of program design that would be
 19 reasonable to do when you're thinking about
 20 trying to actually figure out how to make
 21 something like this happen in practice for
 22 customers.
 23 YOUNG, Q.C.:
 24 Q. Thank you. So what I gather from what you
 25 just said and what was said a little bit

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1 earlier is that you have a fairly delegate
 2 balance to make here, you're trying to
 3 electrify, you're trying to get perhaps more
 4 heat pumps in the system, but you are
 5 concerned about the peak because that drives
 6 capital costs. So it's the program design
 7 you referred to, I think and you can confirm
 8 that or otherwise, which rolls that out, if
 9 I can put it that way, to make sure that you
 10 don't drive the peak with the hard –
 11 DR. HOPKINS:
 12 A. I would say that's a fair characterization
 13 of the kind of balance that you're trying to
 14 strike and there's a number of different
 15 kinds of levers, whether you call them
 16 programs or call them rates or call the
 17 policies, that you might pull on to try to
 18 reach for some combination that makes sense
 19 for the electric system, makes sense for
 20 family budgets, makes sense for the profits,
 21 makes sense for decarbonization, objectives
 22 that make—yeah, there's a lot of different
 23 things that might be pulling on the designs
 24 of those systems.
 25 YOUNG, Q.C.:

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1 Q. Right, thank you. Move on now to, well I'm
 2 calling it CDM and rate design, I'd like to
 3 explore this a little further. I wonder if
 4 we could look at the chart on page 7? It's
 5 in your presentation also, but I'm more
 6 familiar with your report, page 7 of your
 7 report. It's Table 1 on page 7. This chart
 8 is full of information, this is an excellent
 9 summary chart. If some people, if they read
 10 nothing else and they read this, I think
 11 they'd glean all from it, but there still
 12 might be some other important information to
 13 understand here. And just so that we can
 14 understand it, if we took just the first row
 15 across, which is No. 6, the high CDM case
 16 which I understand was there as part of the
 17 research, it's not necessarily what you're
 18 proposing or suggesting, but just so we
 19 understand it what we see is a fairly high
 20 rate increase, well a cent and a half less,
 21 one point four cents from that scenario and
 22 we see a revenue drop and corresponding
 23 total energy's expenditures drop in the
 24 third last column there, correct?
 25 DR. HOPKINS:

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1 A. That's right.
 2 YOUNG, Q.C.:
 3 Q. So what we're seeing there is a fairly high
 4 response to CDM which drives down the total
 5 energy which because the costs are fixed
 6 largely, not much from the incremental
 7 production cost, the rate has to go up to
 8 capture the difference, the unit rate.
 9 MR. FAGAN:
 10 A. That's correct, the rate goes up, overall
 11 consumption goes down, the level of export
 12 revenues shown on the complementing Table 2
 13 goes up in this scenario and then that gives
 14 you the overall utility effects.
 15 YOUNG, Q.C.:
 16 Q. The other thing that happens is that in
 17 scenario is some customers, even though
 18 they're paying higher rates, you were
 19 explaining earlier they could have lower
 20 bills.
 21 MR. FAGAN:
 22 A. I'm sorry, could you repeat that?
 23 YOUNG, Q.C.:
 24 Q. Yes, I certainly can. I think you said
 25 earlier that some customers, even with

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1 higher rates if they were able to
 2 participate fully in the CDM, they might
 3 actually have lower overall bills.
 4 MR. FAGAN:
 5 A. Yes, that’s exactly what this shows, the
 6 average customer. What this doesn’t show is
 7 the distribution of bill effect across all
 8 the different customer types.
 9 YOUNG, Q.C.:
 10 Q. Right, and that’s the point I want to
 11 explore a little bit because in this room
 12 all kinds of customers are represented,
 13 different classes and even within classes
 14 you’ll get differences amongst customers.
 15 So the other one that I found very
 16 interesting and we talked about this already
 17 this morning, you’ve talked about it, is 12A
 18 which shows a rate decrease and also lower
 19 average costs.
 20 MR. FAGAN:
 21 A. Yes.
 22 YOUNG, Q.C.:
 23 Q. So my question is, it’s a fairly simple one,
 24 when you’re pursuing the rate design that
 25 might work best and the, I suppose the suite

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1 of options you have, which is not just rate
 2 design, it’s also electrification and things
 3 of that nature, some of which can be done
 4 through rate design, but other programs and
 5 incentives can occur, would you—and I don’t
 6 know if your research has gone this far,
 7 would you look at using screening tests to
 8 decide which programs to use and I know you
 9 know more about this than I do, but it would
 10 be the rate impact tests, the RIM test or
 11 something of that nature, would that be then
 12 overlaid upon this analysis to come to what
 13 might be seen to be more fair, which is you
 14 wouldn’t want a particular kind of customer
 15 to bear a lot of the burden and pay higher
 16 rates, perhaps and have higher bills,
 17 because they can’t participate in the CDM.
 18 MR. FAGAN:
 19 A. Multiple parts to that question. You
 20 certainly can use screening tests. We would
 21 not recommend the rate impact measure test
 22 to be the primary screening test; we
 23 recommend a utility cost test and perhaps a
 24 total resource cost test to check that. The
 25 last part of your question, I mean, what

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1 we’re seeing in the high CDM case, for
 2 example, which highlights this because it
 3 doesn’t look at electrification, is that
 4 rates do indeed go up, but the average bills
 5 do indeed go down because consumption is
 6 dropping significantly so, and what a more
 7 careful look at program design would do
 8 would begin to tease out what’s fair. Who
 9 is going to see their consumption drop and
 10 why, and what can you do to ensure that all
 11 rate payers have access to the economic
 12 improvements so that the benefits associated
 13 with this average bill decrease can be
 14 distributed across as much of the customer
 15 base as is possible. Absent the CDM
 16 programs to the extent that you have a price
 17 response affect, those who don’t have access
 18 to the CDM programs are going to see the
 19 higher rates and no means to mitigate their
 20 consumption, other than straight up customer
 21 behaviour turning the thermostat down, for
 22 example. But I think if it is a complex CDM
 23 program design task to look carefully at how
 24 the CDM programs can address the inequities
 25 that otherwise are going to occur. Now you

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1 talked about 12A and you talked about 6,
 2 those are sort of the opposite ends of
 3 spectrum here. I mean, 12A excludes CDM
 4 effects and clearly shows net benefits. 6
 5 excluded any electrification and shows on
 6 average net bill benefits, but rate
 7 increases.
 8 YOUNG, Q.C.:
 9 Q. Yes, that’s right and I did indeed choose
 10 those two ends of the spectrum to show the
 11 point, yes.
 12 MR. FAGAN:
 13 A. Right, and I would just further leave you to
 14 look at the combinations because the
 15 combinations is all we recommend, that you
 16 need both, that clearly electrification is
 17 somewhat obvious, to the extent that you can
 18 electrify, you increase the kilowatt hours
 19 sold, but the critical importance of CDM
 20 comes in primarily on its capacity value,
 21 but at the same time it allows you to sell
 22 additional and it helps those customers who
 23 have no—it helps customers with their bills
 24 because it reduces there consumption and
 25 people pay the bills. They are exposed to

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1 the rate, but ultimately what they're paying
 2 is the combination of the rate times the
 3 quantities and we're talking about
 4 significance just in quantity.
 5 (10:45 a.m.)
 6 YONG, Q.C.:
 7 A. Accept that, but I guess the only question I
 8 have and this is, you know, the rate design
 9 choices and considerations for our future,
 10 are whether or not you have to somehow
 11 protect or certainly be aware of, be
 12 sensitive to the customers who can't easily
 13 participate in some CDM programs because of
 14 their circumstances, you know, I'll take
 15 what is not an uncommon demographic, in fact
 16 a growing demographic in this Province, is
 17 an aging couple, empty nesters living in a
 18 house without a lot of cashflow and not a
 19 lot of opportunities to pursue different
 20 kinds of fuel switching or CDM programs,
 21 things of that nature. I assume and as I
 22 said a minute ago, I know you three know a
 23 lot more about this than I do, but I assume
 24 that in other places there is some means of
 25 protecting or screening the programs to

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1 ensure you don't have untoward effects on
 2 that sort of demographic?
 3 MR. FAGAN:
 4 A. Yes, you've basically set the table for the
 5 challenges in front of the Province for the
 6 CDM program design, but what's important
 7 technologically, even those dwellings
 8 there's technological potential to improve
 9 the energy efficiency of the consumption in
 10 that space.
 11 YOUNG, Q.C.:
 12 Q. Agreed. Thank you very much, those are all
 13 my questions, Madam Chair.
 14 CHAIR:
 15 Q. Thank you, Mr. Young. Mr. O'Brien, do you
 16 want to –
 17 MR. O'BRIEN:
 18 Q. Thank you, Madam Chair. Good morning folks,
 19 Liam O'Brien on behalf of Newfoundland
 20 Power. I don't have too many questions for
 21 you, some of them might just follow up on my
 22 friend, Mr. Young's questions. One of the
 23 ones in that regard was with respect to the
 24 transportation electrification. I did have
 25 a follow up question on that and you've

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1 provided some additional information in
 2 response to Mr. Young's question. One of
 3 the questions I had was with respect to the
 4 direct current fast charging stations.
 5 There doesn't appear and I'm assuming you
 6 will agree with me at this point any sort of
 7 third party market for that in this Province
 8 and it seems to me that you would need
 9 government or utility intervention to get,
 10 to kick start those fast charging stations
 11 and that sort of thing, would you agree with
 12 me?
 13 DR. HOPKINS:
 14 A. I'm not as familiar with the specific market
 15 dynamics here, but generally speaking, yeah,
 16 jurisdictions across the US and in Canada
 17 have found the need to do some sort of, you
 18 know, priming the pump, getting yourself out
 19 of a catch twenty-two of charging
 20 infrastructure and –
 21 MR. O'BRIEN:
 22 Q. The "chicken and egg" we were kind of –
 23 DR. HOPKINS:
 24 A. The "chicken and egg", so some sort of—now
 25 whether that takes the form of, you know,

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1 incentives, loan guarantees, other things
 2 that might bring third-party investment in
 3 or it takes the form of utility investment
 4 in some of the infrastructure or all of the
 5 infrastructure to support that charging,
 6 there's a range of different kind of options
 7 out there, but generally speaking some sort
 8 of thing that kicks you out of a state of
 9 low EVs and low EV charging into a, push
 10 towards a world where you might have high
 11 EVs and high amounts of charging.
 12 MR. O'BRIEN:
 13 Q. And would that be more beneficial than sort
 14 of looking at rates, incentive rates as a
 15 matter of kickstarting things or –
 16 DR. HOPKINS:
 17 A. I don't think, I always still think I would
 18 know a priori what's more or less
 19 beneficial. I think it's part of, you know,
 20 a number of things that would be part of an
 21 overall package approach.
 22 MR. O'BRIEN:
 23 Q. Okay.
 24 Mr. Fagan:
 25 A. You know, the federally V incentive just

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1 coming into effect. There are other things
 2 that are going to be changing the market,
 3 different vehicles that are available. I
 4 think overall being flexible and nimble,
 5 having end goals in mind and bringing
 6 different tools to bear to try to pursue
 7 those goals makes a lot of sense to me.
 8 MR. O'BRIEN:
 9 Q. And have you seen that in any other
 10 jurisdictions, that kind of package where
 11 there's a rate sort of coupled with sort of
 12 investment at the same time sort of brought
 13 out as a package?
 14 MS. WHITED:
 15 A. Absolutely, we've seen that a lot throughout
 16 the northeast, as well as California. So,
 17 for example in Massachusetts some of the new
 18 programs by the utilities include
 19 investments in both infrastructure, as well
 20 as off-peak incentive rates for EV charging.
 21 MR. O'BRIEN:
 22 Q. All at the once coming out, at the one time?
 23 MS. WHITED:
 24 A. All at once, yes.
 25 MR. O'BRIEN:

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1 Q. And in terms of the incentive rates, just
 2 sort of looking for an idea as to how that
 3 works, is it just the time of day kind of
 4 rate or is there any other complement to
 5 that?
 6 MS. WHITED:
 7 A. Yeah, primarily it's for off-peak charging,
 8 so you provide some type of incentive for
 9 off-peak charging. Most of the time that's
 10 through separately metering the charging to
 11 ensure that customers are charging off peak,
 12 but in some small municipalities without
 13 advance metering infrastructure, sometimes
 14 they offer a flat incentive of, say, \$15.00
 15 per summer for customers agreeing and, you
 16 know, proving to the utility that they have
 17 set their timers to charge off peak.
 18 MR. O'BRIEN:
 19 Q. Okay, all right. And following up with my
 20 friend's questions on heat pumps, I did want
 21 to refer to a slide you actually never
 22 referred to in your presentation, slide 29.
 23 I wonder if we could bring that up? It's
 24 just follow up on one of Mr. Young's
 25 questions and you did provide a fair bit of

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1 information here with respect to billing
 2 electrification assumptions, and it was with
 3 respect to the high scenario there where you
 4 assumed no buildings retained oil heat as
 5 backup for peak days. In this type of
 6 environment, is that something you'd
 7 realistically expect to happen, to have no
 8 backup for peak days?
 9 DR. HOPKINS:
 10 A. The purpose of that assumption was to sort
 11 of test the limits of high potential peak
 12 impact, not necessarily to say that this is,
 13 you know, we've generally said the high
 14 electrification case is more beneficial.
 15 MR. O'BRIEN:
 16 Q. Okay.
 17 DR. HOPKINS:
 18 A. This is one case where I might say combining
 19 some factors here of trying to aim, you
 20 know, trying to get a lot of electrification
 21 but managing the peak it would be more
 22 optimal. So, you know, getting that
 23 retention and coupling those systems
 24 together and the various ways that are
 25 discussed previously makes more sense to me

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1 from a system standpoint and from a customer
 2 standpoint.
 3 MR. O'BRIEN:
 4 Q. Okay. I appreciate that. And in terms of
 5 savings from heat pump adoption and you've
 6 referenced, actually in your earlier, in
 7 your initial presentation there about an
 8 error on Table 76. I wonder if we could
 9 bring that up, Table 76 of the report? And,
 10 Mr. Fagan, you had referenced that in terms
 11 of being a response to a question from
 12 Newfoundland Power as a clarification from
 13 your report. So that was the annual heat
 14 pump electricity use of 29,613 kilowatt
 15 hours and you had indicated just for the
 16 record that that figure should have been
 17 10,768, is that correct?
 18 MR. FAGAN:
 19 A. Yes, that's correct.
 20 MR. O'BRIEN:
 21 Q. And I just want to have you sort of walk me
 22 through how it's calculated. From what I
 23 can gather, it's calculated by applying the
 24 coefficient of performance for heat pump
 25 usage to that overall figure, is that right?

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1 DR. HOPKINS:
 2 A. So what 29,613 kilowatt hours corresponds to
 3 is the amount of heat to be delivered into
 4 the living space in the building and so
 5 given the seasonal average coefficient of
 6 performance you require substantially less
 7 kilowatt hours to deliver that much heat
 8 because you're simply moving the heat from
 9 outside to inside.
 10 MR. O'BRIEN:
 11 Q. So essentially you divide your 29,000 by
 12 your coefficient of performance, which I
 13 think was 2.75, is that right?
 14 DR. HOPKINS:
 15 A. 2.75.
 16 MR. O'BRIEN:
 17 Q. And you come down with your 10,000. So that
 18 sort of gives you an 18,000 and change
 19 kilowatt hour savings, is that right, is
 20 that how that works or –
 21 DR. HOPKINS:
 22 A. If the home were heated with electric
 23 resistance heat, it would in fact demand the
 24 29,613 kilowatt hours so that the savings
 25 from going from resistance to heat pump is

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1 that 18,000 or some difference.
 2 MR. O'BRIEN:
 3 Q. Yes, and that 29,000, where did you come up
 4 with that figure?
 5 DR. HOPKINS:
 6 A. So that's based on, I'm trying to remember
 7 back, but I think basically we looked at
 8 total oil use and total number of oil heated
 9 households to figure out how much oil those
 10 households are using on average, that
 11 corresponds to a certain amount of energy,
 12 as a efficiency of an oil system to deliver
 13 that heat into the space and so it's
 14 effectively equivalent to the oil use heat
 15 delivered into the space. How do I deliver
 16 just as much heat with electricity?
 17 MR. O'BRIEN:
 18 Q. Okay. And I'm going—and just in terms of
 19 comparison, I'm being told that from
 20 Newfoundland Power's records the average
 21 household would have 23,000 in total
 22 electric use and of that about 55 percent of
 23 that would actually be heat. So that
 24 figure, in comparison from electric use
 25 would be around 13,500 verses your 29,000,

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1 would that make a big difference to your
 2 analysis in that scenario?
 3 DR. HOPKINS:
 4 A. I'd have to go back through and check all
 5 the math there, but yes, generally speaking
 6 if the amount of heat demanded in a
 7 household is a substantially less than the
 8 savings from the heat pump is also that much
 9 less.
 10 MR. O'BRIEN:
 11 Q. Okay, so would you have had that information
 12 from Newfoundland Power in terms of the
 13 average heat usage for an average household?
 14 DR. HOPKINS:
 15 A. I don't remember whether we had that
 16 particular piece, given that the analysis we
 17 were doing in this case was for oil heating
 18 homes –
 19 MR. O'BRIEN:
 20 Q. For oil, yeah
 21 DR. HOPKINS:
 22 A. - your average residence that heats with
 23 electricity is not necessarily the same as
 24 your average residence that heats with oil,
 25 and so we built from the oil data, rather

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1 than from electric data.
 2 MR. O'BRIEN:
 3 Q. Okay, so the oil data would be different
 4 than someone moving from base heating to
 5 sort of a heat pump scenario?
 6 DR. HOPKINS:
 7 A. Right.
 8 MR. O'BRIEN:
 9 Q. And maybe this is a good time to take a
 10 break, Madam Chair?
 11 CHAIR:
 12 Q. Do you have any further questions?
 13 MR. O'BRIEN:
 14 Q. I have, I might have maybe five minutes of
 15 questions.
 16 CHAIR:
 17 Q. Okay, won't hold you to it, just want to
 18 make sure.
 19 MR. O'BRIEN:
 20 Q. Okay.
 21 CHAIR:
 22 Q. I just need to know who to go to, that's
 23 all.
 24 MR. O'BRIEN:
 25 Q. Okay.

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1 (OFF RECORD – 10:58 A.M.)
 2 (RECONVENED 11:31 A.M.)
 3 CHAIR:
 4 Q. Thank you. Back to you, Mr. O’Brien.
 5 MR. O’BRIEN:
 6 Q. Thank you, Madam Chair. Just one more
 7 question, folks, on this Table 76, the heat
 8 pump loan I guess that you’ve got indicated
 9 there, the five years, am I right in
 10 assuming then that your upfront cost assumes
 11 or I guess your analysis assumes that the
 12 upfront cost of the heat pump will be paid
 13 off over a five-year term, is that right?
 14 DR. HOPKINS:
 15 A. Right.
 16 MR. O’BRIEN:
 17 Q. Okay, so the initial savings you wouldn’t
 18 see until the end of the five years, you’d
 19 see a jump in savings for customers.
 20 DR. HOPKINS:
 21 A. That figure on the slide shows that’s five
 22 years of and then it jumps up –
 23 MR. O’BRIEN:
 24 Q. And just shows that increase on the slide.
 25 DR. HOPKINS:

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1 A. - and then it jumps up when you take off the
 2 system.
 3 MR. O’BRIEN:
 4 Q. Okay. Just one last area and that’s with
 5 respect to the time of use and critical peak
 6 pricing rate design. Newfoundland Power’s—I
 7 understand Newfoundland Power’s load shape
 8 is relatively flat and when I say that, I
 9 understand it’s over sort of, there’s about
 10 14 hours of the day where it’s within 10
 11 percent of peak, would that make an effect—
 12 would you see just a movement of peak then
 13 if you looked at rate design for time of use
 14 and critical—I guess for time of use design,
 15 would that change your analysis?
 16 MS. WHITED:
 17 A. It’s definitely important to have the peak
 18 periods long enough so that you don’t simply
 19 shift the peak to a different hour.
 20 MR. O’BRIEN:
 21 Q. Right, okay. So that may have an effect as
 22 to whether or not, I guess, defeats the
 23 purpose of the time of use of looking to
 24 shift peak if it’s already kind of shifted,
 25 is that fair?

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1 MS. WHITE:
 2 A. It could if your peak hours or if your peak
 3 window is too short so that you simply shift
 4 the peak to a different hour. If you can
 5 shift it into enough of a trough, then you
 6 don’t actually create a new peak, just at a
 7 different hour.
 8 MR. O’BRIEN:
 9 Q. Okay, so that’s something for rate design to
 10 have a look at in terms of –
 11 MS. WHITE:
 12 A. Absolutely.
 13 MR. O’BRIEN:
 14 Q. And just one more question really with
 15 respect to time of use rates and critical
 16 peak pricing, did you consider that in terms
 17 of other demand responses, such as, I guess,
 18 curtailment and how that would work?
 19 MS. WHITE:
 20 A. Yes, so we assumed that demand response
 21 through, say, direct load control, would be
 22 an alternative to doing time of use rates
 23 with critical peak pricing. We expect that
 24 if you already have demand response programs
 25 to that effect in price, that there will be

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1 much less load available to shift through
 2 critical peak pricing, so it’s a bit of an
 3 “either/or” proposition.
 4 MR. O’BRIEN:
 5 Q. Okay. All right, those are all my
 6 questions, Madam Chair.
 7 CHAIR:
 8 Q. Thank you, Mr. O’Brien. Consumer Advocate?
 9 MR. FITZGERALD:
 10 Q. Thank you, Madam Chair. Good morning,
 11 panel. My name is Stephen Fitzgerald
 12 representing the Consumer Advocate. Just a
 13 couple of questions. An overall question at
 14 page 10, arises from page 10 of your
 15 September 3rd report, if you could go to
 16 that, and this is, the way it’s articulated
 17 it’s difficult, it’s a difficult issue, of
 18 course, the way you articulate and say
 19 “revenue changes”, I’m looking at the third
 20 bullet at page 10, “Revenue changes from CDM
 21 load reduction electrification. A critical
 22 tension running through our analysis from
 23 the perspective of the utility system is a
 24 net effect of increasing revenues through
 25 electrification while losing revenue due to

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1 increased conservation and efficiency.”
 2 This seems like the paradox that we’re
 3 struggling with, from a consumer’s
 4 perspective, in lay terms, is there another
 5 way to express that or what exactly is the
 6 critical tension? What are the consumers to
 7 do, electrify or conserve?
 8 MR. FAGAN:
 9 A. The short answer is both, and I don’t mean
 10 that flippantly. Electrification replaces
 11 oil end uses with more economic overall use
 12 of electricity. CDM at the same time allows
 13 you to most efficiently use the electricity
 14 for the end uses that you need; and in
 15 particular, it also helps during peak
 16 periods of time to reduce the overall peak
 17 load. So the overall aim would be for the
 18 electrification increases in load to occur
 19 more during off-peak hours than during on-
 20 peak hours, and for the CDM improvements to
 21 have a significant impact on peak load while
 22 simultaneously there will be off-peak energy
 23 savings associated with CDM and export sales
 24 will also be increased for all energy
 25 savings that arise from CDM. So the short

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1 answer is yes, both of those things should
 2 occur; different mitigation effects arise
 3 from each of them.
 4 MR. FITZGERALD:
 5 Q. Well which is so different effects but the
 6 combination provides them most effect, is
 7 that –
 8 MR. FAGAN:
 9 A. Yes.
 10 MR. FITZGERALD:
 11 Q. Okay, so but from the consumers—or are you
 12 suggesting that the Provincial Government
 13 policy should be electrification or is this
 14 a message to consumers that they should take
 15 steps now in the looming Muskrat Falls era
 16 to electrify?
 17 MR. FAGAN:
 18 A. The message of our report to the Board and
 19 to the government and to stakeholders, is
 20 that the combination of both of those things
 21 is important. The message to consumers,
 22 individual consumers, is always use
 23 electricity more efficiently if you can, and
 24 in this case you can end up with a better
 25 economic outcome for replacing oil end uses

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1 with electricity end uses in further areas
 2 that we model for the transport sector and
 3 for the heating sector.
 4 MR. FITZGERALD:
 5 Q. Okay. In your conclusions, I don’t know if
 6 this is fair to ask this or not, but do you
 7 think that there may have been a bias
 8 against oil in your promotion of
 9 electrification?
 10 MR. FAGAN:
 11 A. Sorry, could you repeat that question.
 12 MR. FITZGERALD:
 13 Q. You know, are we comfortable, can we be
 14 comfortable that in your presentation to the
 15 Board that there was no inherent bias
 16 against the oil industry, if you will, and
 17 that the electrification solution that
 18 you’re advancing is actually the most
 19 logical?
 20 MR. FAGAN:
 21 A. Oh yeah, that’s straight up economics, this
 22 just shows what’s the least expensive way to
 23 get the services that either oil provides
 24 for transport or electricity, that either
 25 oil provides for heating or electricity and

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1 then it’s a straight up technical and
 2 economic analysis comparing the two fuels.
 3 MR. FITZGERALD:
 4 Q. In your analysis and in your presentation
 5 was there any consideration given to, you
 6 know, the fact that Nalcor itself, I guess,
 7 is partially an oil-based company, our
 8 economy in Newfoundland has been somewhat
 9 reliant on that industry in the recent past,
 10 was there any consideration of this, you
 11 mentioned the new money that’s saved by not
 12 burning oil, if you will, was there any sort
 13 of macroeconomic view of the best interest
 14 of the Province whether the electrification
 15 could impact on the oil industry at all?
 16 MR. FAGAN:
 17 A. We did not do a macroeconomic analysis. A
 18 macroeconomic analysis could look at that
 19 and if we were to do that, at the same time
 20 you would also want to look at the effect of
 21 the electrification in the CDM for example,
 22 and the macroeconomic effects that those
 23 things would have, coupled with whatever
 24 macroeconomic effects might occur from a
 25 reduction in the use of oil.

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1 MR. FITZGERALD:
 2 Q. Thank you. Just to move to heat pumps
 3 briefly, when you looked at the economics of
 4 the heat pump recommendation, were there
 5 other alternatives and particularly I'm
 6 thinking about convection heating, would
 7 that be a type of heating that could be
 8 implemented as well in a general sense?
 9 DR. HOPKINS:
 10 A. I'm not sure I know what you mean by
 11 convection heating.
 12 MR. FITZGERALD:
 13 Q. Convection heating, it's not a mini-split,
 14 it's not a heat pump, it's resistance—if
 15 you're not familiar with that type of
 16 product, then I'll move on, but it's a
 17 resistant type of heating mechanism, but
 18 it's not full on baseboard heating, if you
 19 will. If you're not familiar with it, then
 20 we'll move on.
 21 DR. HOPKINS:
 22 A. I'm not familiar with it. Just in general
 23 terms the amount of heat that goes into the
 24 space is determined by, and the resulting
 25 electric demand, are going to be determined

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1 roughly speaking on whether you're moving in
 2 the heat pump case or producing it through
 3 resistance and the exact mechanism by which
 4 the heat is distributed throughout the space
 5 should be a relatively minor effect relative
 6 to the question of where the heat is coming
 7 from.
 8 MR. FITZGERALD:
 9 Q. Okay, fair enough. The EV and—or the
 10 electric vehicles, was there any
 11 consideration to whether hybrid vehicles
 12 would be an alternative in the circumstance
 13 where if you go all electric and the system
 14 goes down, then you have no backup. I mean,
 15 is that a, would there be any sort of
 16 advantage to promoting hybrid vehicles as
 17 opposed to all electric?
 18 DR. HOPKINS:
 19 A. We've lumped them together, but actually the
 20 analysis is a fair split between hybrid
 21 plug-in vehicles and all electric vehicles.
 22 MR. FITZGERALD:
 23 Q. If I could take you now to page 100 of your
 24 September 3 report. This is Table 46 and
 25 47, and 46, I think in a general sense,

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1 records total export sales by way of
 2 gigawatt hours and 47 refers to it in
 3 monetary terms, correct?
 4 MR. FAGAN:
 5 A. That's correct.
 6 MR. FITZGERALD:
 7 Q. So the amounts that are expressed here in
 8 Table 46, total gigawatt hours, are these
 9 including or excluding the Nova Scotia
 10 obligations?
 11 MR. FAGAN:
 12 A. This excluded the Nova Scotia obligations
 13 associated with the block and the
 14 supplementary energy.
 15 MR. FITZGERALD:
 16 Q. Okay.
 17 MR. FAGAN:
 18 A. But they include flows of surplus power
 19 through the Nova Scotia path.
 20 MR. FITZGERALD:
 21 Q. Okay. And by our math, I guess when we
 22 looked at these two tables in combination,
 23 it appears in a general sense that they do
 24 reveal what the average kilowatt hour price
 25 is, and I think, and correct me if I'm

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1 wrong, but we've calculated it to be about
 2 3.5 cents per kilowatt hour?
 3 MR. FAGAN:
 4 A. Yeah, that sounds reasonable. The exact
 5 computations are embedded in the numbers
 6 that we have here.
 7 MR. FITZGERALD:
 8 Q. Right, right, so we have to disembed them,
 9 if that's such a word. And as we see, you
 10 know, looking at the embedded calculation,
 11 if you will, we've calculated about five, by
 12 2030. It's about five cents a kilowatt
 13 hour, does that resemble what you recall?
 14 MR. FAGAN:
 15 A. Yes, subject to check, I'd have to go
 16 through and just do the basic math.
 17 Whatever that basic math looks like putting
 18 these numbers together, that's the answer.
 19 There's no question there.
 20 MR. FITZGERALD:
 21 Q. Okay.
 22 MR. FAGAN:
 23 A. And these are in nominal terms, so you would
 24 expect that there would be an upward trend
 25 on a nominal basis.

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1 MR. FITZGERALD:
 2 Q. Okay, subject, of course, to the vagaries of
 3 forecast, as they go ten years, of course we
 4 recognize that they're probably not as
 5 accurate as our near term forecast, in a
 6 general sense.
 7 MR. FAGAN:
 8 A. Subject to the forecast price, certainly.
 9 MR. FITZGERALD:
 10 Q. So we note that one of the advantages that
 11 you've mentioned for CDM, of course, is to
 12 free up electricity for export. I believe
 13 that's one of the underpinnings of the CDM
 14 initiative?
 15 MR. FAGAN:
 16 A. Yes, I would—that's important, the CDM
 17 effect on shaving peak, it's probably more
 18 important when you look at the benefits of
 19 CDM, sizeable, a greater amount of those
 20 benefits accrue from the peak shaving value
 21 of the CDM.
 22 MR. FITZGERALD:
 23 Q. With the low price, relatively low price and
 24 I suppose that's a leading question whether
 25 it's a low price or not, but would you agree

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1 that the 3.5 percent or 3.5 cents a kilowatt
 2 hour is a relatively low cost for—or price
 3 for energy?
 4 MR. FAGAN:
 5 A. It's a relative term. 3.5 percent is
 6 relatively low compared to 10 percent and
 7 3.5 percent is relatively high compared to
 8 2.5 cents.
 9 (11:45 a.m.)
 10 MR. FITZGERALD:
 11 Q. Sure, but historically speaking, though, in
 12 your experience, the current market and you
 13 mentioned this morning I think the
 14 northeastern United States, is that
 15 generally a low price these days and has
 16 been historically?
 17 MR. FAGAN:
 18 A. Yeah, the average wholesale prices have
 19 definitely been trending down because of the
 20 effect of natural gas prices in the US.
 21 MR. FITZGERALD:
 22 Q. So I guess the question would be, then, you
 23 know, why is there a push, if you will, to
 24 sell or to export energy at such a low price
 25 when it can be purchased here?

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1 MR. FAGAN:
 2 A. Well, as our report indicates, we think the
 3 best outcomes are to electrify up here and
 4 use the energy internally, absolutely. You
 5 can get greater average revenue by doing
 6 that up here, but what's left over should be
 7 sold. You can't store it, the facilities
 8 are just about built, so you have no choice
 9 but to export it.
 10 MR. FITZGERALD:
 11 Q. Sure, of course. At page 129 of your
 12 report, September 3rd, just the advanced
 13 metering infrastructure reference there in
 14 paragraph 7. And here you stated that the
 15 broad use of AMI to more fully implement
 16 marginal cost based pricing across all
 17 customers does not appear as economically
 18 attractive. Why is that? What were your
 19 findings there?
 20 MS. WHITED:
 21 A. Simply that the cost of implementing
 22 advanced metering infrastructure is still
 23 fairly high. We estimated approximately
 24 \$300.00 all in per meter and the benefits in
 25 jurisdictions that typically implement AMI

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1 often include large meter reading savings.
 2 We understand that Newfoundland has recently
 3 implemented automated meter reading, AMR,
 4 and so there are fewer benefits on that end.
 5 So that's something that needs to be taken
 6 into effect, whether the other benefits that
 7 AMI might provide and in the absence of
 8 those meter reading savings, may make it
 9 less economically attractive than in other
 10 jurisdictions where those are available.
 11 MR. FITZGERALD:
 12 Q. Okay. Alternatives to AMI, had Synapse
 13 considered the implementation or the
 14 recommendation for seasonal rates, would
 15 that be a method of achieving rate
 16 mitigation?
 17 MS. WHITED:
 18 A. Seasonal rates with, for example, higher
 19 prices in the winter verses lower prices in
 20 the summer are possible, but there's not
 21 much shifting of load that you can do from
 22 the winter to the summer, and so, for that
 23 reason, you know, the average rate is not
 24 going to change, it's not going to provide
 25 much mitigation benefit.

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1 MR. FITZGERALD:
 2 Q. So not something you would recommend?
 3 MS. WHITED:
 4 A. No.
 5 MR. FITZGERALD:
 6 Q. Would AMI in a more sort of isolated or
 7 particularized application be effective?
 8 For example, if you recommended that they
 9 were used for Industrial Customers or
 10 General Service 2.3, could it be
 11 cherry-picked that way to give an advantage?
 12 MS. WHITED:
 13 A. I would recommend that it be studied. It
 14 really depends on the type of system and
 15 whether you can reduce the backend costs
 16 enough to make it worth your while.
 17 Oftentimes those backend costs are
 18 relatively fixed, despite how many meters
 19 you have to install; however, I understand
 20 that industry is developing rapidly, coming
 21 up with new solutions, new types of
 22 software, that might be more modular in
 23 nature, so I would recommend that that be
 24 studied.
 25 MR. FITZGERALD:

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1 Q. Okay, thank you. And does Synapse have an
 2 opinion on the effectiveness of demand
 3 charges built into rates?
 4 MS. WHITED:
 5 A. Demand charges for large C&I customers have
 6 been widely used and those types of
 7 customers frequently have some type of
 8 energy management system where they can
 9 relatively easily respond to those types of
 10 charges. What we have seen on the
 11 Residential side is that demand charges are
 12 not well understood and they often result in
 13 a lot of customer confusion and
 14 dissatisfaction. So I would recommend first
 15 moving to something that's a little bit more
 16 understandable, like time of use rates with
 17 critical peak pricing, demand charges for
 18 the Residential cost could be studied, but
 19 another factor that cautions against using
 20 demand charges for the Residential class is
 21 that their demand is most relevant on a
 22 quinstant peak basis, rather than a non-
 23 quinstant peak basis and so you want to make
 24 sure that the demand charges are reflecting
 25 the quinstant peaks and not just non-

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1 quinstant peaks.
 2 MR. FITZGERALD:
 3 Q. We understand that Newfoundland Power
 4 charges its general service 2.3 and 2.4
 5 customers monthly demand charges based on
 6 each of their rate payers maximum use in the
 7 month. Is that practice a useful element in
 8 rate design?
 9 MR. FAGAN:
 10 A. I'll let Melissa answer it, but I just want
 11 to emphasize that our analysis and our
 12 charge from the reference questions was not
 13 to dive down into these types of detailed
 14 rate design questions, but with that caveat.
 15 MR. FITZGERALD:
 16 Q. Okay.
 17 MS. WHITED:
 18 A. For larger customers who are accustomed to
 19 these types of charges, they can be useful.
 20 I think what you just referenced is a non-
 21 quinstant peak demand charge based on the
 22 customer's highest usage in the month and
 23 any hour, as opposed to during the hour of
 24 the month or the window of each day where
 25 the peak is likely to occur. So, it depends

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1 on what types of costs you're trying to
 2 reduce. If you're trying to reduce the
 3 overall system peak, then you want to make
 4 sure that your demand charges are set at
 5 least partially based on Quinstant peaks as
 6 opposed to only non-Quinstant peak demand
 7 charges. So, in short, it depends on the
 8 details of how that's designed.
 9 MR. FITZGERALD:
 10 Q. Okay, fair enough. Thank you, Madame Chair.
 11 Those are our questions. Thank you very
 12 much.
 13 CHAIR:
 14 Q. Thank you, Mr. Fitzgerald. Mr. Coxworthy.
 15 MR. COXWORTHY:
 16 Q. Yes, thank you, Madame Chair, Commissioners.
 17 Good morning.
 18 MR. FAGAN:
 19 A. Good morning.
 20 MR. COXWORTHY:
 21 Q. My name is Paul Coxworthy. I'm counsel for
 22 the Island Industrial Customer Group. At
 23 the outset of your evidence, you outlined
 24 your experience as being in 19 US states and
 25 six Canadian provinces. With reference to

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1 it, perhaps we could turn to it, Figure 53
 2 of your report. I think it's about page
 3 119. Page number may have changed with the
 4 revision.
 5 Am I right in saying that you are
 6 advocating for directionally the options
 7 that are at the right end of that table or
 8 that figure?
 9 MR. FAGAN:
 10 A. Advocate is a strong word. We do recommend
 11 that the Province look at the combinations
 12 of CDM and electrification because we think
 13 those hold the biggest benefit. That Figure
 14 53 is one representation of putting all of
 15 this together and seeing where things lie.
 16 So, I guess the short answer is yes, it's
 17 our strong opinion that both of these
 18 components are important and both of them
 19 are required in some form in order to lead
 20 to the best outcome for rate payer.
 21 MR. COXWORTHY:
 22 Q. And again, is it fair to say, looking at
 23 this figure, that at least part of the
 24 reason why you're strongly recommending the
 25 directional solutions, I'll call them, at

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1 that end is that they relatively maximize
 2 utility revenue and relatively minimize, in
 3 fact absolutely minimize, energy
 4 expenditures?
 5 MR. FAGAN:
 6 A. In short, it certainly indicates best
 7 customer outcomes on the right-hand side of
 8 this graph. It's not quite the maximum
 9 utility revenues, but it's close.
 10 MR. COXWORTHY:
 11 Q. That's right. It gets you closer than some
 12 of the other results, closer to maximizing
 13 your utility revenues.
 14 MR. FAGAN:
 15 A. Well, I mean, you can see from this, the
 16 pure maximization of – well, I should be
 17 careful here. The maximization of utility
 18 revenues comes with the electrification only
 19 scenarios.
 20 MR. COXWORTHY:
 21 Q. And -
 22 MR. FAGAN:
 23 A. The maximization of customer benefit comes
 24 from the combination.
 25 MR. COXWORTHY:

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1 Q. And in short, why is it important to, if not
 2 have an absolute maximization of utility
 3 revenues, to keep them relatively high? Why
 4 was that part of your analysis?
 5 MR. FAGAN:
 6 A. It's important from a mitigation
 7 perspective. From a rate mitigation
 8 perspective that's important. From a bill
 9 mitigation perspective, the combination is
 10 important.
 11 MR. COXWORTHY:
 12 Q. So, it's important for both, for bill
 13 mitigation to have relatively high utility
 14 revenues? That's an important goal as well,
 15 as much as reducing energy requirement,
 16 absolute energy requirement?
 17 MR. FAGAN:
 18 A. Well, it's both of those things. You know,
 19 reducing consumption and for those areas
 20 where electrification can occur, displacing
 21 oil with more efficient use of electricity
 22 for the end-use service needed, that's what
 23 gives customers the best outcome.
 24 MR. COXWORTHY:
 25 Q. With reference, I started off by addressing

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1 your experience in other jurisdictions. Are
 2 you aware of any other jurisdictions that
 3 you've worked in where this type of
 4 directional approach has been implemented?
 5 The directional approach that appears in the
 6 last five bars on Figure 53.
 7 MR. FAGAN:
 8 A. Maybe I'll let you answer that. I mean,
 9 there's many jurisdictions where both
 10 electrification and energy efficiency have
 11 been looked at together, perhaps not
 12 necessarily with this -
 13 MR. COXWORTHY:
 14 Q. I guess my first question was anywhere that
 15 it's actually been tried, not just looked
 16 at, but used, implemented for a period of
 17 time.
 18 DR. HOPKINS:
 19 A. I'll mention the US states of Vermont and
 20 Massachusetts as examples. In the Vermont
 21 case, there's a strong policy push towards
 22 electrification. They have a lot of oil
 23 heat, so the economics of heat pumps are
 24 relatively favourable. They're a ZEV state.
 25 They're signed on to the California Zero

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1 Emission Vehicle policies towards electric
 2 vehicles. They're also among the states
 3 that they have been recently ranked number
 4 three in the US on electric energy
 5 efficiency. So, they're, you know, really
 6 pushing very hard on both of those
 7 directions.
 8 Massachusetts, number one on energy
 9 efficiency in the US, has recently
 10 implemented heat pump incentives through its
 11 energy efficiency programs. Is also a ZEV
 12 state; has electric vehicle incentives, et
 13 cetera. So, they're similarly pushing on
 14 both the electrification and the energy
 15 efficiency side of the ledger.
 16 MS. WHITED:
 17 A. And I would add California as well.
 18 DR. HOPKINS:
 19 A. Oh, right.
 20 MR. FAGAN:
 21 A. Yeah, I mean, California, all three of these
 22 components are in place in California.
 23 California has traditionally been one of the
 24 leading energy efficiency states. They've
 25 had significant inroads, probably more so

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1 than any other state, on electrification for
 2 vehicles and they have been at the forefront
 3 in rate design efforts over the years to try
 4 to get the right price signalling in place.
 5 MR. COXWORTHY:
 6 Q. So, in California, is it rate design that's
 7 been coupled with electrification to achieve
 8 these results or is it CDM?
 9 MR. FAGAN:
 10 A. It's all. California looks holistically at
 11 energy efficiency policies, at
 12 electrification and electric vehicle
 13 policies and rate design across a whole
 14 plethora of proceedings in California. It's
 15 hard to keep them all straight. But they
 16 look holistically at all of these elements.
 17 MR. COXWORTHY:
 18 Q. California, in terms of the size of the
 19 market, the issues that they face, load
 20 shapes, customer class, et cetera, is it
 21 comparable to Newfoundland and Labrador?
 22 MR. FAGAN:
 23 A. It's obviously different in many respects,
 24 but at its core, electrification and energy
 25 efficiency and rate design is sort of

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1 universal across all of the jurisdictions, I
 2 think, in Canada and the United States and
 3 elsewhere in the world.
 4 MR. COXWORTHY:
 5 Q. So, one to one, you think the lessons that
 6 they're drawn from a jurisdiction like
 7 California will apply in Newfoundland and
 8 Labrador? That's a reliable measure; that
 9 the success that's been achieved in
 10 California can be expected here?
 11 MR. FAGAN:
 12 A. They don't directly apply in the sense that
 13 a lot of things are different. You know,
 14 the dominant – you know, solar is – I mean,
 15 California has a significant share of hydro
 16 also, both its own hydro and imported
 17 hydroelectricity and they also have
 18 significant amount of both wind and solar.
 19 The demographics are different. It's a
 20 summer peaking system, not a – although
 21 parts of northern California are winter
 22 peaking actually. So, there's a lot of
 23 differences. But what's more stark are the
 24 parallels and the analogs you can draw
 25 because at a fundamental level, the

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1 technologies, heat pump technologies and the
 2 electric vehicle technologies and the
 3 regulatory impacts of smart rate design can
 4 reap the benefits regardless of whether or
 5 not it's California, North Dakota, Florida
 6 or Newfoundland.
 7 (12:00 noon)
 8 MR. COXWORTHY:
 9 Q. All that you just mentioned, imported
 10 electricity. One of the factors in
 11 California is their ability to import
 12 electricity and in fact, that's probably – I
 13 think that's probably true of all of the
 14 examples you've just given, Vermont, Mass,
 15 they all have access, ready access to
 16 imported electricity from outside of their
 17 jurisdiction.
 18 MR. FAGAN:
 19 A. Yeah, California certainly imports and
 20 exports – they're net imported, but
 21 seasonally there are significant export
 22 also. Sure, all jurisdictions are -
 23 MR. COXWORTHY:
 24 Q. And how important is that, the flexibility
 25 to be able to import electricity from other

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1 jurisdictions, to achieving the types of
 2 results reliably that you're advocating for?
 3 MR. FAGAN:
 4 A. To achieve the types of results that are
 5 listed in this report, what's required is
 6 you need to have a path for exporting
 7 surplus energy.
 8 MR. COXWORTHY:
 9 Q. Just for exported? Is imported electricity
 10 important?
 11 MR. FAGAN:
 12 A. Primarily for exporting surplus energy. You
 13 also have a path to import electricity. But
 14 with this, this is demonstrating the value
 15 of exporting surplus electricity in part
 16 along with the other elements.
 17 MR. COXWORTHY:
 18 Q. Going back though to the factor of imported
 19 electricity in these other jurisdictions and
 20 the flexibility that gives if you have
 21 access to cheaper electricity from other
 22 markets. Do we have that in Newfoundland
 23 and Labrador? Will we have that in
 24 Newfoundland and Labrador, based on the
 25 information you have?

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1 MR. FAGAN:
 2 A. I think that's less a part of the equation
 3 in Newfoundland, absolutely. You know, you
 4 now have your own – or will have your own
 5 close to zero marginal cost electricity to
 6 serve all of your needs. So, you're – you
 7 won't need the imported electricity as much
 8 as some other jurisdictions that don't have
 9 the resource base that you have.
 10 MR. COXWORTHY:
 11 Q. If we could turn to Table 1 of your
 12 presentation, at page 18 I think. And this
 13 is just an example, but throughout your
 14 presentation, throughout your report, you
 15 refer to average customers, average rate
 16 mitigation, average electric bill. Are
 17 Industrial Customers included in that, those
 18 averages?
 19 MR. FAGAN:
 20 A. Yes, all customers are in that average.
 21 MR. COXWORTHY:
 22 Q. This average customer, how many Hydro
 23 customers are within the band or relatively
 24 closely within a band of average customer?
 25 Are we talking about fairly wide extremes to

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1 arrive at an average?
 2 MR. FAGAN:
 3 A. This is a system wide analysis. So, average
 4 customers means the entirety of the customer
 5 base and the variances in consumption
 6 patterns and levels of consumption vary
 7 across all of the rate classes.
 8 MR. COXWORTHY:
 9 Q. Sure.
 10 MR. FAGAN:
 11 A. And I think we've made this clear that
 12 moving forward, looking at the distribution
 13 of these effects across the rate classes is
 14 important and depends upon more than just
 15 what we've been able to analyse in this set
 16 of reference questions. But, the average
 17 customer presentation gives you a good idea
 18 of the overall direction and magnitude of
 19 mitigation impacts under different scenarios
 20 for different policies.
 21 MR. COXWORTHY:
 22 Q. I guess that's what I'm trying – why should
 23 we accept that using these average figures
 24 are actually going to give us a good
 25 indication?

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1 MR. FAGAN:
 2 A. Because of the underlying fundamentals. The
 3 underlying economic fundamentals around
 4 electrification, around CDM and around rate
 5 design impacts hold. As soon as you drill
 6 down into the rate classes, you do indeed
 7 have to be careful to minimize inequities
 8 that can otherwise arise, absolutely.
 9 There's no question about it. That's the
 10 challenge in front of you.
 11 MR. COXWORTHY:
 12 Q. But you're assuming that they'll be roughly
 13 similar take-ups of electrification, of CDM,
 14 both as amongst different customer classes,
 15 as well as within individual Industrial
 16 classes. That that's going to be possible
 17 through technological solutions or policy
 18 decisions. That's your assumption in
 19 putting forward these average projections as
 20 being indicative of the direction that this
 21 Province should go in, in terms of
 22 mitigating rates?
 23 MR. FAGAN:
 24 A. It's not an assumption per se. In order to
 25 minimize the inequities, you will have to

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1 think carefully about the CDM policies and
 2 the electrification policies and how you
 3 allocate costs across groups of customers.
 4 These are thorny questions. There's no two
 5 ways about it. But, the fact that this
 6 analysis is focused on an average customer,
 7 you know, in no way minimizes the importance
 8 of both the magnitude and the direction of
 9 the overall effects that are possible. You
 10 know, with the important caveat that, you
 11 know, your work is not done. You have to
 12 pay attention carefully to what you do on
 13 all of these fronts and they're not – you
 14 know, they're not – each of these areas,
 15 rate design, electrification and CDM, comes
 16 with its own set of challenges. Some of
 17 which are more easily handled than others.
 18 But, you know, there's no question about it
 19 that it's not a slam dunk. You have to be
 20 careful. But absent doing anything, you
 21 will have inequities unfold. If there were
 22 no policies at all on electrification or
 23 CDM, there's – but you have the rate
 24 increases that are going to be required,
 25 you're going to have movement and you're

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1 going to have some sort of a distributive
 2 effect across all of your rate classes. So,
 3 our recommendation would be to grab that
 4 bull by the horn, so to speak, and continue
 5 to think carefully and look at what you have
 6 to do to minimize inequities that could
 7 occur, absolutely.
 8 And both CDM and electrification
 9 programs in other parts of North America
 10 grapple with this and, you know, CDM in
 11 particular, there's a whole slew of CDM-like
 12 design approaches that should be considered.
 13 I mean, you're a less aggressive province
 14 with respect of, for example, the leading
 15 states and even the leading provinces, I
 16 believe. There's important lessons that you
 17 can learn. But it's not a simple
 18 undertaking.
 19 MR. COXWORTHY:
 20 Q. No, and that's understood. But is there any
 21 other jurisdiction – I know you've been
 22 pointing to California as being a good
 23 example, but is there any other jurisdiction
 24 similar to – that's facing similar issues to
 25 Newfoundland and Labrador that you can point

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1 to and say here's a model? You couldn't
 2 apply it exactly to your situation, but that
 3 could be patterned to the Newfoundland and
 4 Labrador situation? Is there any
 5 jurisdiction that you're familiar with that
 6 it would be useful to look to or do we
 7 really have to pick and choose and come up
 8 with a bespoke model here for what you're
 9 trying to achieve?
 10 MR. FAGAN:
 11 A. Well, I think it's almost a bespoke model,
 12 but the components of that model are fairly
 13 well understood, even though there – my
 14 general sense is no. There's very few
 15 jurisdictions in North America that are
 16 facing exactly what you're facing, you know,
 17 clearly. You know, a new large
 18 hydroelectric project that's over budget and
 19 there's this big rate shock. There's no two
 20 ways about it, and you're at the terminus of
 21 the system. But all those things
 22 notwithstanding, the lessons learned from
 23 the other jurisdictions still apply. The EV
 24 and the heat pump technologies are still
 25 there for your taking. The rate design

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1 approaches exist and the information is out
 2 there. So, as much as it's difficult to try
 3 to draw a parallel with any other
 4 jurisdiction, be it state, region or
 5 province, that doesn't make the lessons
 6 learned in those other regions and the broad
 7 implications of this analysis any less
 8 effective.
 9 MR. COXWORTHY:
 10 Q. You say there's a lot more work left to be
 11 done; that would need to be done to
 12 reasonably implement some of the directional
 13 solutions that you're strongly recommending.
 14 How much of the work have you been able to
 15 do? I mean, have we just scratched the
 16 surface?
 17 MR. FAGAN:
 18 A. I think we've done more than scratch the
 19 surface. I think putting your finger on the
 20 potentials involved is important. I think
 21 that, you know, the work that Dunsky has
 22 just completed is an important element of
 23 that work that the Province needs to do.
 24 Just being able to put in one place
 25 sort of a clear balancing of the energy

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1 flows overtime, given what’s going on with
 2 potential for a flatter load and given what
 3 the possibilities are for increased
 4 electrification and reduced energy from CDM,
 5 just putting that in one place is more than
 6 scratching the surface. I would say that,
 7 you know, to use that same analogy, you
 8 know, perhaps – you know, beginning of Phase
 9 1, we were – and even into the conclusion of
 10 Phase 1, we were scratching the surface.
 11 So, the putting it together, the synthesis
 12 involved in coming up with Table 1 and 2,
 13 for example, helps to shine a little bit of
 14 a more focused light on what the concerns
 15 are and what the potential remedies are.
 16 But diving down into the rate class and the
 17 thorny issues of how you implement policy to
 18 minimize inequities, that’s the next step,
 19 and that’s essentially what we laid out in
 20 the series of next steps there that the
 21 Province will need to tackle.
 22 MR. COXWORTHY:
 23 Q. Synapse has been involved in this process
 24 for the better part of a year to arrive at
 25 the point you’ve arrived at. I think it’s

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1 understood with good cooperation from Hydro,
 2 Nalcor, Newfoundland Power, that the
 3 information you’ve asked for has been
 4 provided. If you were to be tasked,
 5 similarly resourced, with similar
 6 cooperation from Nalcor and Hydro, to take
 7 this analysis to its end point, to the end
 8 point of digging down, drilling down into
 9 class effects, to drilling down to what
 10 actually is implementable, both reasonably
 11 and in terms of having some reasonable
 12 certainty, in terms of outcomes, how long
 13 would that take you? If it’s taken you the
 14 better part of a year to get to where you
 15 are now, how long would that take? Would it
 16 take another year, two years?
 17 MR. FAGAN:
 18 A. It would depend upon the specific scope,
 19 certainly less than two years to begin to
 20 put this – you know, get to the next level
 21 of focus. It’s hard for me to put a number
 22 on that. You can do a lot of work in a
 23 year.
 24 MR. COXWORTHY:
 25 Q. But you’re saying perhaps two years?

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1 MR. FAGAN:
 2 A. I mean, for example, the results of
 3 Newfoundland Power’s load research study,
 4 that would be really important to really
 5 help inform this. If you wanted to do some
 6 pilot programs to look more carefully at
 7 response to TOU, those things take time. So
 8 I think that type of data collection would
 9 be important to the accuracy of the finished
 10 product, absolutely. Not to mention just,
 11 you know, are you going to be good with the
 12 LIL over the next five years, over the next
 13 two years, over the next ten years, and what
 14 more will you know six months, eighteen
 15 months down the line, and how might that
 16 impact how important particular peak shaving
 17 things are. You know, are there any
 18 significant changes in export markets. We
 19 actually don’t think that there will be. I
 20 think it’s more about what’s happening
 21 internally and what your load research may
 22 tell you. That might be one of the more
 23 important pieces of data that would be
 24 useful to have to try to flush this out. I
 25 mean, some of the rate design stuff is

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1 somewhat academic, you can do it, but it’s
 2 all going to depend upon the type of data
 3 you have access to, to test how accurate the
 4 results actually are.
 5 MR. COXWORTHY:
 6 Q. If we could turn to page 39 of your
 7 presentation. Thank you, the table with the
 8 CDM adoption rates of technologies, low and
 9 high scenarios, and I wanted to ask some
 10 questions about the third band for the
 11 island there, which I understand to be for
 12 industrial customers.
 13 DR. HOPKINS:
 14 A. Correct.
 15 MR. COXWORTHY:
 16 Q. The IND?
 17 DR. HOPKINS:
 18 A. Yes.
 19 MR. COXWORTHY:
 20 Q. Yes, thank you, and I wanted to have your
 21 comment on how you’ve arrived at the
 22 projections of 14.5 percent for 2030 under
 23 the base case, and 25.8 percent under the
 24 low rate case, and 40.1 percent for the high
 25 case by 2030?

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1 DR. HOPKINS:
 2 A. Just to make sure we're on the same page,
 3 what's showing here, this is the
 4 accumulative adoption rates for CDM measures
 5 on average by those dates starting from
 6 2019, and so in the base case, we basically
 7 assumed that programs continue as they are.
 8 MR. COXWORTHY:
 9 Q. Existing programs for industrial customers?
 10 DR. HOPKINS:
 11 A. The existing programs, so the 1.3 is the
 12 current level of performance, as I
 13 understand it. So if that were to continue
 14 for eleven years, that's 14.5. If
 15 participation rates and adoption rates of
 16 CDM measures were to increase gradually over
 17 time, then the cumulative of that you get
 18 over time is somewhat higher.
 19 MR. COXWORTHY:
 20 Q. And are these the same existing measures, or
 21 are you assuming there'll be new measures
 22 for the low case?
 23 (12:15 p.m.)
 24 DR. HOPKINS:
 25 A. If you go back to the previous slide,

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1 there's a list of measures that we looked
 2 at. Industrial end uses identified here, so
 3 motors, compressors, pumps, fans, process,
 4 energy use, HVAC, lighting and other, and so
 5 for each of those looked at adoption rates.
 6 Where adoption rates are relatively high
 7 now, the relative increase is smaller.
 8 Where adoption rates have been relatively
 9 low, the relative increase is higher, but,
 10 yeah, we looked at each of those end uses
 11 and the potential in those areas, and what
 12 plausible paths forward might be for
 13 increasing uptake relative to the, sort of
 14 usual base case.
 15 MR. COXWORTHY:
 16 Q. It's not clear to me, and perhaps it's my
 17 fault, but is the low case for 2030 based on
 18 existing = extrapolating take up of existing
 19 CDM programs that Hydro is offering to its
 20 industrial customers?
 21 DR. HOPKINS:
 22 A. The existing programs, I'm not sure whether
 23 it's limited only Hydro's in the sense that
 24 there are some industrial customers, smaller
 25 ones, served by Newfoundland Power, but the

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1 suite of measures is the ones listed on the
 2 previous slide. Generally industrial energy
 3 efficiency tends to be lumpy, come in large
 4 chunks of reworking of a facility or
 5 reworking of a production line, or that sort
 6 of thing. So this is smoothed out and also
 7 industrial energy efficiency tends to be
 8 outcome focused rather than – we're dealing
 9 with, like, a large industrial facility, do
 10 not necessarily have a – it's commonly a
 11 custom approach to what that particular
 12 facility needs, whatever its particular
 13 blend of end uses are. So I think we were
 14 working more from a top down – sort of top
 15 down meets bottom up, what seems like a
 16 reasonable combination of what's possible in
 17 those measures, and recognizing that we're
 18 not actually in the particular facilities
 19 doing site assessments ourselves.
 20 MR. FAGAN:
 21 A. But the low is not just an extrapolation of
 22 existing programs. It's a small tweak in
 23 addition the existing programs.
 24 DR. HOPKINS:
 25 A. The same measures may be being adopted as in

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1 existing programs, but at a more rapid
 2 click, recognizing perhaps somewhat larger
 3 incentives are the things that might be
 4 necessary to make those same kinds of things
 5 happen, but faster.
 6 MR. COXWORTHY:
 7 Q. You said something in the course of that
 8 answer, and I understood you to say, and
 9 correct me if I'm wrong, that within that
 10 industrial band there, there's perhaps
 11 included some Newfoundland Power customers.
 12 It's not what we – at least, I think of as
 13 industrial customers of Hydro. It's not
 14 strictly speaking just that industrial
 15 customer class that's included in that band?
 16 DR. HOPKINS:
 17 A. In terms of energy use, it's overwhelmingly
 18 dominated by the large customers. Whether
 19 on the margins – I'm just forgetting at the
 20 moment whether we looked at Newfoundland
 21 Power customers in that piece or not.
 22 MR. COXWORTHY:
 23 Q. So you don't know, or you can't tell us
 24 right now?
 25 DR. HOPKINS:

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1 A. I would say that the analysis is for the
 2 island as a whole.
 3 MR. COXWORTHY:
 4 Q. Yes, for energy consumption, I certainly
 5 would understand that obviously the Hydro
 6 industrial customers would, but in terms of
 7 the information you're presenting here in
 8 terms of adoption rates and technologies, is
 9 this preponderantly reflecting take up of
 10 that by Hydro's industrial customers?
 11 DR. HOPKINS:
 12 A. Yes.
 13 MR. COXWORTHY:
 14 Q. And then under the high case to get the 40.1
 15 percent, is that extrapolating even greater
 16 take up of existing – what is factored into
 17 that to get to that figure?
 18 DR. HOPKINS:
 19 A. That's basically just that much further take
 20 up of those same kinds of measures, whether
 21 they're motors, compressors, pumps. The
 22 kinds of end uses that exist in those
 23 facilities are roughly the same. It's just
 24 a question of whether participation in
 25 programs to actually achieve those savings

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1 goes just that much faster.
 2 MR. COXWORTHY:
 3 Q. Are these percentages that are portrayed on
 4 this page, are they based on historical or
 5 statistical adoption rates from other
 6 jurisdictions? Have you brought the
 7 experience of other jurisdictions and
 8 industrial customers take up of these types
 9 of programs to this analysis, or is it
 10 purely based on looking at what's happened
 11 so far in Newfoundland and Labrador and
 12 extrapolating from that?
 13 MR. HOPKINS:
 14 A. It's informed based on potential studies
 15 which take into account what's achievable,
 16 and which draw upon the lessons learned from
 17 what's achievable in all different
 18 jurisdictions around the country. I don't
 19 think we have any – there's no particular
 20 model example on which it was based, but
 21 it's a question of what is an achievable
 22 level of program participation that might be
 23 achievable over time with aggressive CDM
 24 program.
 25 MR. COXWORTHY:

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1 Q. Do you know whether those studies drill down
 2 to the level of looking at particular
 3 industrial sectors? I mean, the industrial
 4 customers that we represent, an oil
 5 refinery, mineral ore refining, pulp and
 6 paper, are there differences from industrial
 7 sector to industrial sector in terms of
 8 capacity to take up these types of CDM
 9 opportunities?
 10 DR. HOPKINS:
 11 A. Yes, there are definitely differences. We
 12 reflect those – well, for things like HVAC
 13 and lighting, a building that's an
 14 industrial building is roughly comparable to
 15 a building that is used for some other
 16 purpose, but for things like motors,
 17 compressors, processes, et cetera, there
 18 would be differences. We based the
 19 potential in this case on a USD assessment
 20 from the mining industry to try to capture
 21 the relatively sort of heavy industry nature
 22 of the industrial sector here in
 23 Newfoundland, but we did not break it out
 24 specifically, pulp and paper versus
 25 refining. If we did that, we'd basically be

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1 trying to do it at a facility by facility
 2 level. Because there's so many facilities,
 3 you would be quizzing us on where we got our
 4 exact data on pulp and paper from a
 5 particular facility.
 6 MR. COXWORTHY:
 7 Q. So there's a USD category for the mining
 8 sector?
 9 DR. HOPKINS:
 10 A. Right.
 11 MR. COXWORTHY:
 12 Q. Is there one that's pertaining to oil
 13 refineries, in particular?
 14 DR. HOPKINS:
 15 A. There may be. I don't remember exactly
 16 going back into how exactly they're broken
 17 out. There's a question of data
 18 availability of trying to find some sort of
 19 comparable historically.
 20 MR. COXWORTHY:
 21 Q. Just broadly speaking, is it typical that
 22 industrial customers, users like oil
 23 refineries, or mineral ore processors, or
 24 pulp and paper mills, that they're able to
 25 tailor their operations and still maintain

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1 their levels of economic production, but is
 2 it typical that they're able to tailor their
 3 operations to substantially reduce their
 4 electricity consumption while maintaining
 5 their levels of economic production,
 6 whatever product they're producing? Is that
 7 typical?
 8 DR. HOPKINS:
 9 A. There are definitely process improvements,
 10 particularly from my understanding, in motor
 11 efficiency and pump efficiency using
 12 variable speed drives and other things where
 13 you're taking advantage of physics to try to
 14 improve those pieces. There is a very
 15 common intention, which you were
 16 identifying, which is the need to maintain
 17 output. You can't shut a production line
 18 for a month to retool it to get a 1 percent
 19 improvement. That doesn't make sense, and so
 20 there's always those kinds of trade-offs
 21 which is why the achievable potential is
 22 usually substantially less than the
 23 technical potential.
 24 MR. COXWORTHY:
 25 Q. And so with that in mind, that the

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1 achievable potential is usually less than
 2 what might be technically feasible or
 3 possible, again at page 39 of your
 4 presentation and the table there and the
 5 take up rates, is that what is technically
 6 possible or is it your assessment of what's
 7 practically achievable?
 8 DR. HOPKINS:
 9 A. So there are assumptions on what savings are
 10 achievable by end use on Table 17 on page 59
 11 of the report. For example, for motors,
 12 compressors, pumps, fans, process, and HVAC,
 13 the potential there is 20 percent. So in
 14 the case where you have 40 percent uptake of
 15 a measure saving 20 percent, that's
 16 something like 8 percent overall saving in
 17 that end use, so we're taking what's
 18 technically possible in terms of – and
 19 achievable in this percentage savings piece
 20 and also modulating it by the fact that it
 21 takes time and an adoption may be slower or
 22 faster and thus the range of potential
 23 outcomes.
 24 MR. COXWORTHY:
 25 Q. So you're assuming you'll get there or you

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1 should be able to get there eventually?
 2 DR. HOPKINS:
 3 A. If 20 percent savings are there and are cost
 4 effective, over time when you want a
 5 production line or a portion of the refinery
 6 or the pulp and paper facility is refit
 7 sometime over the course of years, that
 8 maybe you capture that opportunity. I
 9 mentioned the lumpiness of industrial
 10 efficiency acquisition previously. So it's
 11 a question of being ready and capturing
 12 those savings when you can find them and
 13 when they work for customers.
 14 MR. COXWORTHY:
 15 Q. Ms. Whited was speaking to rate design, and
 16 in the course of her evidence she talked
 17 about New England jurisdictions as being
 18 example where time of use and critical peak
 19 pricing has been implemented, those rates
 20 have been implemented and used. I think
 21 that's correct?
 22 MS. WHITED:
 23 A. I was speaking about – well, the time of use
 24 with critical peak pricing, they've have
 25 been implemented in many different

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1 jurisdictions. What we used to calibrate
 2 the type of response that we would see in
 3 Newfoundland were Ontario, Quebec, and the
 4 Pacific North West, specifically Portland
 5 Gas and Electric in Oregon.
 6 MR. COXWORTHY:
 7 Q. And so those are examples of jurisdictions
 8 where time of use and critical peak pricing
 9 has been used – had experience in using it?
 10 MS. WHITED:
 11 A. That's correct.
 12 MR. COXWORTHY:
 13 Q. And, I guess, I'd like you to comment on the
 14 experience of industrial customers in those
 15 jurisdictions in terms of do they take up
 16 time of use, critical peak pricing, is it
 17 different from what's implemented for other
 18 customer classes?
 19 MS. WHITED:
 20 A. Certainly time of use has been much more
 21 widely implemented for large CI customers
 22 than for residential customers across all
 23 the jurisdictions that I'm familiar with,
 24 and so often those time of use programs have
 25 been in place for many years and may be

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1 designed slightly differently than the time
 2 of use rates for residential customers.
 3 MR. COXWORTHY:
 4 Q. And what's the usual difference in terms of
 5 between what might be designed for retail
 6 customers, or what are some of the
 7 differences in the design of those rates?
 8 MS. WHITED:
 9 A. It can certainly vary by jurisdiction. Some
 10 more legacy time of use rates may have
 11 longer on peak and off peak windows as
 12 opposed to shorter ones for residential
 13 customers. There may be higher or lower
 14 price differentials for residential
 15 customers. You know, there's often a
 16 concern about gradually implementing the
 17 time of use rates, whereas when they've been
 18 implemented for many years for large
 19 customers, you don't have as much concern
 20 about introducing the new rate.
 21 MR. COXWORTHY:
 22 Q. And In looking at the situation in
 23 Newfoundland and Labrador, have you come to
 24 any even initial conclusions as to whether
 25 time of use rates, critical peak pricing,

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1 would be useful in relation to the island
 2 industrial customers?
 3 MS. WHITED:
 4 A. And I understand it, there are some demand
 5 response programs in place that you'd want
 6 to consider as to whether or not you are
 7 supplementing those programs with rate
 8 design or if you are replacing those
 9 programs. So a lot of times you'll have
 10 time of use rates, but perhaps without the
 11 critical peak pricing component because you
 12 might have a demand response type of
 13 component instead.
 14 MR. COXWORTHY:
 15 Q. Thank you. I have no further questions,
 16 Madam Chair. Thank you.
 17 CHAIR:
 18 Q. Thank you, Mr. Coxworthy. Ms. Greene, do
 19 you have anything on follow up?
 20 GREENE, Q.C.:
 21 Q. No, I do not. Thank you, Chair.
 22 CHAIR:
 23 Q. And I don't have any questions, so, I guess,
 24 thank you very much for your efforts on our
 25 behalf. Ms. Greene, do we have anything

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1 else today?
 2 GREENE, Q.C.:
 3 Q. No, Madam Chair. We have now concluded the
 4 part of the hearing where we present the
 5 evidence that we had of experts to
 6 undertake. The next witness on the schedule
 7 would be Mr. Stan Marshall, who I understand
 8 will be commencing tomorrow morning at 9.
 9 CHAIR:
 10 Q. Okay, we will adjourn and reconvene tomorrow
 11 morning at 9 a.m. Thank you, panel. Safe
 12 travels home.
 13 (UPON CONCLUDING AT 12:32 p.m.)
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CERTIFICATE

I, Judy Moss, hereby certify that the foregoing is a true and correct transcript in the matter of Reference to the Board, Rate Mitigation Options and Impacts, Muskrat Falls Project, heard on the 7th day of October, 2019 before the Newfoundland and Labrador Board of Commissioners of Public Utilities, 120 Torbay Road, St. John's, Newfoundland and Labrador and was transcribed by me to the best of my ability by means of a sound apparatus.

Dated at St. John's, Newfoundland and Labrador this 7th day of October, 2019

Judy Moss

A				
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