## NEWFOUNDLAND AND LABRADOR BOARD OF COMMISSIONERS OF PUBLIC UTILITIES

120 Torbay Road, P.O. Box 21040, St. John's, Newfoundland and Labrador, Canada, A1A 5B2

# 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

## Parties:

<u>Nalcor Energy /</u> <u>Newfoundland and Labrador Hydro</u> David Eaton, Q.C., Counsel – Nalcor Geoff Young, Q.C., Counsel – NL Hydro

## **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

## **Board Counsel / Staff**

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

#### **Newfoundland Power**

Kelly Hopkins, Counsel Liam O'Brien, Counsel

	Page 1		Page 3
1	(9:00 a.m.)	1	Hopkins. I'm also a Vice-President at
2	CHAIR:	2	Synapse Energy Economics. I've been at
$\begin{vmatrix} \overline{3} \end{vmatrix}$	Q. Good morning, everybody. Happy Monday. I	3	Synapse for almost three years. My training
4	understand there's no preliminary matters,	4	is as a physicist. I have worked in energy
5	so I guess we'll go straight to you, Ms.	5	efficiency for the US Federal Government at
6	Greene, and you can introduce the first	6	the US Department of Energy, and I ran
7	presentation for today.	7	what's called the State Energy Office,
8	GREENE, Q.C.:	8	equivalent to some portion of the Ministry
9	Q. Thank you, and good morning, Chair and	9	here for the US State of Vermont for five
10	Commissioners. I'd like to first begin by	10	years or so, including developing energy
11	introducing the panel. Start with Bob	10	policy across energy supply, energy
12	Fagan. Mr. Fagan, could you please	12	efficiency, electrification, and overall
12	introduce yourself and give a very brief	12	decarbonisation efforts for the state,
13		13 14	
14	outline of your background and experience as it relates to the work you did for the Board	14	including crafting its comprehensive energy
	for this reference.	15 16	plan. Since moving to Synapse, I have worked on electrification and
16	MR. FAGAN:	10	
17		17	decarbonisation projects and energy
18 19	A. Good morning, everyone. My name is Bob	18 19	efficiency in a number of different states.
	Fagan. I'm a Vice-President at Synapse		I've testified as an expert witness in Vermont and in Quebec, as well as now here
20 21	Energy Economics. I've been at Synapse for about fifteen years. I have a Mechanical	20 21	
$21 \\ 22$	Engineering Degree and I've been an Engineer	21	today. GREENE, Q.C.:
22	and an Energy Analyst for onward of thirty	22	
23	years now working in this field. As it	23 24	Q. Thank you, and Ms. Whited. MS. WHITED:
24	pertains to this reference, my primary	24 25	A. Good morning. My name is Melissa Whited.
25		25	
	Page 2	1	Page 4
	qualifications have to do with modelling of	1	I'm a Principal Associate at Synapse Energy
$\begin{vmatrix} 2 \\ 2 \end{vmatrix}$	the economic aspects of electric power	2	Economics. I've been at Synapse for ten
	systems, and I also have an extensive	3 4	years. I work extensively on electricity
4 5	background in energy efficiency or conservation and demand management, and the	4 5	regulation topics, as well as rate design, and I've testified before seven state
	general nature of wholesale market	5 6	commissions and the Federal Energy
6 7	constructs throughout the United States, and	7	Regulatory Commission. I've also worked on
8	6	8	rate design issues in Nova Scotia, Prince
9	extensive experience working in the Maritime area, primarily resource planning in Nova	0 9	
10	Scotia and Prince Edward Island	10	Edward Island, and Quebec, in Canada, and now also in Newfoundland. I've presented on
10	jurisdictions.	10	rate design issues before the National
11	GREENE, Q.C.:	12	Association of Regulatory Utility
12	Q. And have you presented as an expert witness	12	Commissioners in the United States, and I
13	in other proceedings?	13 14	have a Masters of Arts in Agricultural and
14	MR. FAGAN:	14 15	Applied Economics, as well as a Masters of
15	A. Yes, I've been an expert witness roughly	15 16	Science in Environment and Resources.
17	nineteen states at the Federal Energy	10	GREENE, Q.C.:
18	Regulatory Commission and in five provinces	17	Q. Thank you. Before we begin your
19	– I think six provinces including this	10	presentation, I understand, Mr. Fagan, that
20	province.	20	there are two corrections you'd like to make
20	GREENE, Q.C.:	20	to your report.
$21 \\ 22$	Q. Thank you. Dr. Hopkins, could you similarly	21	MR. FAGAN:
$\begin{vmatrix} 22\\23 \end{vmatrix}$	give a brief outline of your background?	22	A. That's correct.
23	DR. HOPKINS:	23	GREENE, Q.C.:
1 47			
25	A. Sure. Good morning. My name is Asa	25	Q. The first I'd like to bring up is page 60 of

	er 7, 2019		Muskrat Falls Rate Mitigation Hearing
	Page 5		Page 7
1	your report.	1	higher in the province. The second question
2	MR. FAGAN:	2	had to do with the energy and the capacity
3	A. Yes.	3	balances from Muskrat Falls Project required
4	GREENE, Q.C.:	4	to meet load and what would be remaining for
5	Q. And could you please outline the correction	5	surplus energy and capacity. We directly
6	you would like to make?	6	compute in our modelling processes what
7	MR. FÁGAN:	7	remains for export from Muskrat Falls after
8	A. Yes, the correction is in the heading for	8	accounting for the Island and Labrador load
9	Figure 24. Instead of the word	9	requirements, and the overall resource
10	"residential", that should be "commercial".	10	capabilities in the province. The third
11	GREENE, Q.C.:	11	question asked about the potential
12	Q. The second correction I understand is on	12	electricity rate impacts associated with the
13	page 149 of your report in Table 76, is that	12	options in question one, and we compute
13	correct?	14	these impacts from all of our scenarios
15	MR. FAGAN:	15	relative to a base case where no
16	A. Yes, that's correct, Table 76, and this	16	electrification or no CDM measures are
17	pertains to the second row, the value listed	10	taken. Because of the material effect on
18	there for annual heat pump electricity use.	17	consumption associated with electrification
		18 19	or CDM, we also looked at the corollary
19	Instead of 29,613, that value should be		
20	10,768. We made this correction in response	20	effect of a reduced oil and gasoline use in
21	to an informal inquiry by Newfoundland	21	the electrification cases, and the bill
22	Power, their first informal inquiry response	22	impact effect, average customer bills across
23	question, and I just neglected to get this	23	all of our scenarios.
24	changed for the September 25th revision to	24	GREENE, Q.C.:
25	the report.	25	Q. If we could move then to a summary of your
<u> </u>	-	20	
	Page 6		Page 8
1	Page 6 GREENE, Q.C.:	1	Page 8 overall findings with respect first to your
1 2	Page 6 GREENE, Q.C.: Q. Thank you. If we go now to your	1 2	Page 8 overall findings with respect first to your work that you did on growing revenue
1 2 3	Page 6 GREENE, Q.C.: Q. Thank you. If we go now to your presentation, as you just mentioned, your	1 2 3	Page 8 overall findings with respect first to your work that you did on growing revenue opportunities?
1 2 3 4	Page 6 GREENE, Q.C.: Q. Thank you. If we go now to your presentation, as you just mentioned, your report was revised on September 25th of this	1 2 3 4	Page 8 overall findings with respect first to your work that you did on growing revenue opportunities? MR. FAGAN:
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	Page 9	_	Page 11
1	would benefit from electrification. We also	1	GREENE, Q.C.:
2	find that CDM and demand response in	2	Q. You've already outlined that you looked at
3	multiple forms is particularly important,	3	the potential for export sales, and your
4	given the concerns about possible capacity	4	finding is that it is better to increase
5	expansion costs in the province. CDM will	5	electrification in the province because
6	reduce peak consumption and it will also	6	revenue is higher from internal sales. I
7	reduce the peak megawatts, so it avoids	7	was hoping to expand and explain your
8	those potential expansion costs and it also	8	findings on expert sales?
9	has the effect of increasing export sales.	9	MR. FAGAN:
10	It can exacerbate the rate increases, but it	10	A. Yes, that's correct, essentially you can
11	can result in lower bills. Essentially,	11	obtain increased revenues if you sell more
12	customers pay bills. If the rates are	12	energy, more electricity, internal than
13	higher, but their overall consumption is	13	selling on the export market primarily
14	lower, their net bills can be lower.	14	because the export market prices are
15	GREENE, Q.C.:	15	relatively low, they don't represent firm
16	Q. Can we carry on to the next –	16	capacity and energy transfers. It's mostly
17	MR. FAGAN:	17	more of a non-firm short term energy market.
18	A. Continuing, rate design and existing	18	We did look at whether or not it's better if
19	policies and the Muskrat Falls Projects	19	export market prices are particularly
$\begin{vmatrix} 1 \\ 20 \end{vmatrix}$	surplus, we did find that rate design could	20	higher. Things do look much better if export
$20 \\ 21$	be a potentially powerful tool to shape	20	market prices are higher, but we don't have
$\begin{vmatrix} 21\\22 \end{vmatrix}$	consumption patterns and improve the	21	any particular basis to think that the
$\begin{vmatrix} 22\\23 \end{vmatrix}$	outcomes for customers. We did find that	22	export markets are - prices for export
24	the lower cost and the simpler	23	markets are going to be from the medium
25	implementation of smart electric vehicle	24	level that we model in our analysis. We do
25	Page 10	23	Page 12
1	charges in lieu of a full scale automatic	1	note that when you do maximize export sales
$\begin{vmatrix} 1\\2 \end{vmatrix}$	metering infrastructure to monitor hourly	2	if you were to do electrification, the total
$\begin{vmatrix} 2\\ 3 \end{vmatrix}$	loads would be least regrets, but it is	3	amount of export sales, you know, could rise
4	possible that a broader application of Time-	4	to more than 200 million dollars a year by
5	of-Use rates using a set of automated	5	the end of the decade, and that includes the
6	metering infrastructure to measure on an	6	effects of both the Muskrat Falls and recall
	hourly basis could potentially be economic,	7	energy export sales. Those export sales are
1 '	depending upon some of the details of		
8	1 0 1	8	much lower, but you electrify rising to 141
9	exactly how much it costs and how those benefits accrue across the different rate	9 10	million by the end of the decade, but what's
10			coupled with the minimal revenues from
11	classes. We critically note the importance	11	export sales is much higher revenues from actual electrification of revenue streams
12	of both the federal and the provincial	12	
13	policies to help. The policies, as we	13	within the province. Our modelling takes
14	outline in the report, specifically address	14	into account the combination of both CDM and
15	fuel switching, energy efficiency, and	15	electrification effects, and the overall
16	rebates for electric vehicles, all of which	16	volume and the overall pattern of sales will
17	will directly impact the electrification and	17	vary depending upon which combinations of
18	the CDM costs and effects that you see in	18	electrification, CDM, and rate design we
19	our report. We do note that the overall	19	see. As I just noted, we do show
	surplus from Muskrat Falls Project is of	20	sensitivity on market prices that you can
20	1 0	<b>~</b> 1	
21	sufficient quantity to fully support the	21	see increases export revenues on the order
21 22	sufficient quantity to fully support the higher level electrification efforts that we	22	of 75 million dollars higher by 2030
21 22 23	sufficient quantity to fully support the higher level electrification efforts that we model in our analysis. We note on Reference	22 23	of 75 million dollars higher by 2030 relative to our base case on export sales if
21 22 23 24	sufficient quantity to fully support the higher level electrification efforts that we model in our analysis. We note on Reference Question 3, that we do show rate and bill	22 23 24	of 75 million dollars higher by 2030 relative to our base case on export sales if prices were to be higher, but also note that
21 22 23	sufficient quantity to fully support the higher level electrification efforts that we model in our analysis. We note on Reference	22 23	of 75 million dollars higher by 2030 relative to our base case on export sales if

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1	Page 13	1	Page 15
	market prices were lower, you would see a	1	GREENE, Q.C.:
2	reduction in the revenues received relative	2	Q. Okay, you've already mentioned that you not
3	to our base case.	3	only looked at the impact on rates of
4	GREENE, Q.C.:	4	increased electrification, and CDM, and
5	Q. How did you determine the appropriate	5	export markets, you also looked at the
6	forecast of the export pricing to use in	6	impact on customer bills, and can you
7	your modelling?	7	explain why you did that and what it showed?
8	MR. FAGAN:	8	MR. FAGAN:
9	A. We received confidential data from Nalcor on	9	A. Yes. Essentially, with increasing levels of
10	a forecast of export market prices. Those	10	CDM, either promoted by a programmatic
11	export market prices are forecast for	11	expansion or prompted by customers doing
12	essentially the New England and Nova Scotia	12	their own actions now in the anticipation of
13	markets through export paths by way of	13	higher prices, that has a significant effect
14	Quebec, and export paths by way of Nova	14	on the average annual consumption for a
15	Scotia. Those export market prices are	15	given customer. Certainly anyone who
16	generally pegged to the price of electricity	16	electrifies, be it at the residential or at
17	in the North Eastern US, especially in New	17	the commercial institutional level will see
18	England, and those prices tend to be tied to	18	significant increases in the consumption at
19	the effect of natural gas prices on	19	their facilities. Those two effects means
20	electricity prices in that region. The	20	that it's critically important to also look
21	numbers that they provided are not	21	at the quantity consumed, in addition to the
22	unreasonable. If anything, electricity	22	price that applies for a given customer.
23	prices in the North Eastern US are likely to	23	That's why we looked at bills, and in the
24	be lower than what we may see right now	24	case of electrification scenarios, it's also
25	because there continues to be downward	25	important that it serves an additional well
	Page 14		Page 16
1	pressure on those prices due to the	1	of savings available from reduced
2	availability of less expensive natural gas	2	expenditures on oil and gasoline. Though
3	and due to the increasing level of both	3	the reference questions clearly say rate
4	solar and wind resources in the North	4	mitigation, technically and economically
5	Eastern United States, all of which put a	5	it's critically important to also look at
6	damper on the market prices seen in that	6	the bill effect associated with changes in
7	region.	7	consumption, not just the rate effects.
8	(9:15 a.m.)	8	GREENE, Q.C.:
9	GREENE, Q.C.:	9	Q. In your slide here with respect to summary
10	Q. So as I understand your answer, you're	10	findings for rates, you reference a Synapse
11	starting point were the forecast provided by	11	based case. Can you just briefly explain
12	Nalcor, but you applied your own judgement	12	what that is?
13	and analysis to determine if they were	13	MR. FAGAN:
14	reasonable and representative of the market,	14	A. Sure. Our portion of responding to the
15			
	is that correct?	15	reference questions had to do with looking
16	MR. FAGAN:	16	at changes on the demand side, increased
17	MR. FAGAN: A. Yes, we do think that they are reasonable.	16 17	at changes on the demand side, increased sales through electrification, or increased
17 18	<ul><li>MR. FAGAN:</li><li>A. Yes, we do think that they are reasonable. We did look at fundamentals from the US</li></ul>	16 17 18	at changes on the demand side, increased sales through electrification, or increased export sales in part through CDM to make the
17 18 19	<ul><li>MR. FAGAN:</li><li>A. Yes, we do think that they are reasonable. We did look at fundamentals from the US Energy Information Administration, annual</li></ul>	16 17 18 19	at changes on the demand side, increased sales through electrification, or increased export sales in part through CDM to make the increased energy available for export. So
17 18 19 20	<ul> <li>MR. FAGAN:</li> <li>A. Yes, we do think that they are reasonable. We did look at fundamentals from the US Energy Information Administration, annual energy outlook, which forecasts both short</li> </ul>	16 17 18 19 20	at changes on the demand side, increased sales through electrification, or increased export sales in part through CDM to make the increased energy available for export. So everything that we do is relative to a
17 18 19 20 21	<ul> <li>MR. FAGAN:</li> <li>A. Yes, we do think that they are reasonable. We did look at fundamentals from the US Energy Information Administration, annual energy outlook, which forecasts both short and long term prices, and the numbers which</li> </ul>	16 17 18 19 20 21	at changes on the demand side, increased sales through electrification, or increased export sales in part through CDM to make the increased energy available for export. So everything that we do is relative to a reference case, a reference load forecast,
17 18 19 20 21 22	<ul> <li>MR. FAGAN:</li> <li>A. Yes, we do think that they are reasonable. We did look at fundamentals from the US Energy Information Administration, annual energy outlook, which forecasts both short and long term prices, and the numbers which are more detailed from Nalcor do represent,</li> </ul>	16 17 18 19 20 21 22	at changes on the demand side, increased sales through electrification, or increased export sales in part through CDM to make the increased energy available for export. So everything that we do is relative to a reference case, a reference load forecast, and a reference level of export sales, and a
17 18 19 20 21 22 23	<ul> <li>MR. FAGAN:</li> <li>A. Yes, we do think that they are reasonable. We did look at fundamentals from the US Energy Information Administration, annual energy outlook, which forecasts both short and long term prices, and the numbers which are more detailed from Nalcor do represent, in our opinion, a reasonable indication of</li> </ul>	16 17 18 19 20 21 22 23	at changes on the demand side, increased sales through electrification, or increased export sales in part through CDM to make the increased energy available for export. So everything that we do is relative to a reference case, a reference load forecast, and a reference level of export sales, and a reference level of electrification. So all
17 18 19 20 21 22	<ul> <li>MR. FAGAN:</li> <li>A. Yes, we do think that they are reasonable. We did look at fundamentals from the US Energy Information Administration, annual energy outlook, which forecasts both short and long term prices, and the numbers which are more detailed from Nalcor do represent,</li> </ul>	16 17 18 19 20 21 22	at changes on the demand side, increased sales through electrification, or increased export sales in part through CDM to make the increased energy available for export. So everything that we do is relative to a reference case, a reference load forecast, and a reference level of export sales, and a

1What we're able to show clearly, for1customers.2example, is in the high electrification2GREENE, Q.C.:3scenario rates would be 1 cent per kilowatt3Q.One of the reference questions also asked4hour lower by 2030, but what we don't show4the Board to review the amount of capacity5or we don't take on the task, is what is the5and energy that would be available for6absolute rate in 2030 because that will6internal use and export use, and your next7depend on what the total eventual revenue7slide addresses that question. Can you8requirement is, and there's a number of8please review your findings in that area?9things that both Liberty has looked at, and9MR. FAGAN:10that still undergoing analysis suggests what10A.Yes. The modelling tool that we used, which		ci /, 2019		Wuskiat Fails Kate Witigation Hearing
2       example, is in the high electrification       2       GREENE, Q.C.:         3       g.       One of the reference questions also asked         4       hour lower by 2030, but what we don't show       4         6       absoluter ate in 2030 because that will       6         7       depend on what the total eventual revenue       7         8       requirement is, and there's an umber of       6         9       things that both Liberty has looked at, and       10         10       that stil undergoing analysis suggests what       10         11       that revenue requirement void be. So our       11         12       focus way just to tease out the effect of       6         13       the CDM, the effect of electrification, the       12         14       effect of rate design, and how it influences       13       generation, the consumption, and the fluences         15       the pattern of consumption, the pattern of       15       in an economically and technically correct         18       consumption or sales.       17       just at Muskrat Falls, you coret the         20       Q.       Is there anything else you'd like to say for       20       on the order of 1.7 to on the order of 2.1         21       your summary findings on rates and billis in       22		Page 17		Page 19
3         scenario rates would be 1 cent per kilowatt hour lower by 2030, but what we don't show or we don't take on the task, is what is the absolute rate in 2030 because that will depend on what the total eventual revenue requirement is, and there's a number of things that both Liberty has looked at, and that still undergoing analysis suggests what that still undergoing analysis suggests what that still undergoing analysis suggests what that revenue requirement would be. So our focus was just to tease out the effect of the CDM, the effect of lectrification, the effect of rate design, and how it influences the pattern of consumption, the pattern of consumption or sales.         A.         Yes. The modelling tool that we used, which is the same tool that Hydro used, the PLEXOS production Cost Modelling Tool, is           10         that still undergoing analysis suggests what the reflect of rate design, and how it influences the pattern of consumption, the pattern of consumption or sales.         10         A.         Yes. The modelling tool that We used, which is the same tool that Hydro used, the PLEXOS Production Cost Modelling Tool, is           19         GREENE, Q.C.:         10         In erder of 1.1 to on the order of 2.1 your summary findings on rates and bills in Slide 8?         11         terawatt hours, so the order of 2.1 to on the order of 2.1 torawatt hours, so that the growing with surplus cencry availability that ranges           2         decarification, but at the same time the pask load exposure that the province the order of 2 terawatt hours, so the solid endor, so analy the regort sales flows from Hydro's Marginal and Generation to solid will see. We do indenate management measures, the total revenues, the total will see. We do indenat management measures, the total revenue		•		
4       hour lower by 2030, but what we don't show or we don't take on the task, is what is the aboluter ate in 2030 because that will depend on what the total eventual revenue trings that both Liberry has looked at, and that still undergoing analysis suggests what that still undergoing analysis suggests what that still undergoing analysis suggests what the that vervue requirement would be. So our that still undergoing analysis suggests what the the two the requirement would be. So our that still undergoing analysis suggests what the two the requirement would be. So our the consumption, the pattern of the attach to those different patterns of consumption or sales.       10       A. Tes. The modelling tool that Hydro used, the PLEXOS the pattern of consumption, the pattern of the attach to those different patterns of consumption or sales.       11       is the attach to those different patterns of consumption or sales.       12       Production Cost Modelling Tool, is an an economically and technically correct the used which the task was the beam took and the flows in an economically and technically correct the submit of scenarios that maximize         20       Q. Is there anything else you'd like to say for your summary findings on rates and bills in the flow from Tables thing, we do indicate that it's the the combination of scenarios that maximize       12       Terwatt hours, and that's what the the associate that the province the will see. We do make a core assumption that flows from Hydro's Marginal and Generation to cost Study, that basically there is always value to reducing the peak load cosposure that the province the maximize CDM effects, in particular reducing the peak load exposure that the province the do and directly look at reliability and the flow sform Hydro's Marginal and Generation flow triang efforts, be they directly from the constrain and demand		1		
5or we don't fake on the task, is what is the absolute rate in 2030 because that will5and energy that would be available for internal use and export use, and you next6absolute rate in 2030 because that will6internal use and export use, and you next7side addresses that question. Can you8requirement is, and there's a number of that still undergoing analysis suggests what7NR. FAGAN:10that still undergoing analysis suggests what10A.Yes. The modelling fool that Hydro used, the PLEXOS11that requirement would be. So our focus was just to tease out the effect of rate design, and how it influences13essentially a way to keep track of the generation, the consumption, and the flows15the pattern of consumption, the pattern of consumption or sales.15in an economically and technically correct to an accontergy availability in tarages20Q.Is there anything else you'd like to say for 2119with surplus correct availability in tarages23MR. FAGAN:21trawatt hours, and that's what the 2224A.The last thing, we do indicate that it's the 2520on the order of 2.123the abscled where is always24are on the order of 2 terawatt hours, so a attualts waitable for export sales25the last thing, we do indicate that it's the 2513are on the order of 2 terawatt hours, so a are time, Max, and that's what the 2626electrification, but at the same time province. On the margin, filthy it and the province. On the margin, filthy				
6       absolute rate in 2030 because that will       6       internal use and export use, and your next         7       depend on what the total eventual revenue       8       iside addresses that question. Can you         8       requirement is, and ther's an unber of       9       slide addresses that question. Can you         9       things that both Liberty has looked at, and       10       that still undergoing analysis suggests what         11       that revenue requirement would be. So out       11       is the same tool that Hydro used, the PLEXOS         12       focus was just to tease out the effect of       12       Production Cost Modelling Tool, is         13       the CDM, the effect of effect of       13       essentially and technically correct         16       export sales, and the resulting revenues       16       manner. So what we find is that fy ou look yo use the prequirements on the island, that you end up         17       that attach to those different patterns of       17       just at Muskrat Falls, you cover the         18       requirement is, and that's what the       20       0       the travatt hours, and that's what the         20       Q.       Is there anything else you'd like to say for       12       12       terawatt hours, and that's what the         21       edepending the absoled province       18       requirement		•		
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8       requirement is, and there's a number of       9       please review your findings in that area?         9       things that both Liberty has looked at, and       MR. FAGAN:         10       that still undergoing analysis suggests what       In         11       that requirement would be. So out       File         12       focus was just to tease out the effect of       File         13       the CDM, the effect of electrification, the       reduction Cost Modelling Tool, is         14       effect of rate design, and how it influences       in an economically and the flows         15       the pattern of consumption, rule pattern or sales.       in an economically and the flows         16       export sales, and the resulting revenues       in an economically and technically correct         17       that atach to those different patterns of       in an economically and the flows         18       requirements on the island, that you end up with surplus centry availability that ranges       po on the order of 1.7 to on the order of 2.1         18       semimation of scenarios that maximize       20       on the order of 2.1         21       your summary findings on rates and bills in       21       terawatt hours, and that's what the         22       beciming portion of	6			1
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10that still undergoing analysis suggests what that revenue requirement would be. So our 1210A.Yes. The modelling tool that we used, which is the same tool that Hydro used, the PLEXOS Production Cost Modelling Tool, is essentially a way to keep track of the generation, the consumption, and the flows in an economically and technically correct manner. So what we find is that if you look just at Muskrat Falls, you cover the requirements on the island, that you end up with surplus energy availability that ranges on the order of 1.7 to on the order of 2.1 terawatt hours, and that's what the 22 2020Q.Is there anything else you'd like to say for 101821Slide 8? 2320on the order of 1.7 to on the order of 2.1 to on the order of 1.7 to on the order of 2.1 terawatt hours, and that's what the 24 2521Slide 8? 2322on the order of 2 terawatt hours, so the combination of scenarios that maximize 2424A.The last thing, we do indicate that it's the combination of scenarios that maximize125S terawatt hours, recall energy quantities 24Page 18 are on the order of 2 terawatt hours, so depending upon how you do the basic energy balances, the total revenues, the total quantities available for export sales actually ranges up 0 3.5 terawatt hours is or not you count both recall and Muskrat falls, or you try to look just at Muskrat<	8	requirement is, and there's a number of		please review your findings in that area?
11that revenue requirement would be. So our11is the same tool that Hydro used, the PLEXOS12focus was just to tease out the effect ofis the same tool that Hydro used, the PLEXOS13the CDM, the effect of felectification, theis the same tool that Hydro used, the PLEXOS14effect of rate design, and how it influencesis the pattern of15the pattern of consumption, the pattern ofin an economically and technically correct16export sales, and the resulting revenuesin an economically and technically correct17that attach to those different patterns ofin an economically and technically correct18consumption or sales.in a economically and technically correct20Q.Is there anything else you'd like to say foryour summary findings on rates and bills in21your summary findings on rates and bills in2122by our summary findings on rates and bills in2223MR. FAGAN:2324A.The last thing, we do indicate that it's the25combination of scenarios that maximize2526fows from Hydro's Marginal and Generationfalls is on the order of 2 terawatt hours, if2maximize CDM effects, in particular reducingare on the order of 2 terawatt hours if3the you take both recall and Muskratfalls is ust and the range of4will see. We do make a core assumption thatsestillad muskrat5flows from Hydro's Marginal and Generation56you take both recall and Muskrat <td>9</td> <td></td> <td></td> <td>MR. FAGAN:</td>	9			MR. FAGAN:
12focus was just to tease out the effect of 1312Production Cost Modelling Tool, is essentially a way to keep track of the generation, the consumption, and the flows in an economically and technically correct in an economically and technically correct with surplus energy availability that ranges on the order of 1.7 to on the order of 2.1 terawatt hours, and that's what the ecombination of scenarios that maximize 25Page 18 S terawatt hours, recall energy quantities12electrification, but at the same time termest to reducing the peak load exposure that the province a depending upon how you do the basic energy balances, the total revenues, the total quantities available for export sales a coust study that basically three is always for maximize CDM effects, in particular reducing the pak load exposure that the province a depending upon how you do the	10	that still undergoing analysis suggests what	10	A. Yes. The modelling tool that we used, which
13the CDM, the effect of electrification, the effect of rate design, and how it influences 1513essentially a way to keep track of the generation, the consumption, and the flows in an economically and technically correct manner. So what we find is that if you look in an economically and technically correct manner. So what we find is that if you look in an economically and technically correct manner. So what we find is that if you look up or summary findings on rates and bills in 2213essentially a way to keep track of the generation, the consumption, and the flows in an economically and technically correct manner. So what we find is that if you look up out summary findings on rates and bills in 2214If way to keep track of the generation, the consumption, and the flows in an economically and technically correct manner. So what we find is that if you look with surplus energy availability that ranges 0 on the order of 1.1 to on the order of 2.1 to return thours, and that's what the beginning portion of this slide shows, which comes from Table 41 of the report. At the same time, Muskrat Falls is on the order of 5 terawatt hours, so depending upon how you do the basic energy balances, the total revenues, the total quantities available for export sales actually ranges up to 3.5 terawatt hours if you take both recall and Muskrat Falls into account, and that's essentially what this table for export sales depends on whether or not you count both recall and Muskrat Falls. Generation the arzin, there's both a generation the arzin, there's both a generation the arzin there's both a generation the arzin ther's both a generation and demand margement measures, 15 shaving actions come with a value of the marging and Generation Cost Study, and ther decuring lindings shart is the 	11	that revenue requirement would be. So our	11	is the same tool that Hydro used, the PLEXOS
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23to support our findings that it's the combination of both electrification and CDM23 24potential in two sectors; buildings and transport. What this slide shows is that by		•	22	A. Yes. We focused on the electrification
24 combination of both electrification and CDM 24 transport. What this slide shows is that by	23		23	potential in two sectors; buildings and
	24		24	•
	25	that provides the best benefit for	25	

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	Page 21	1	Page 23
	basically penetration of electric vehicles	1	situation where you potentially have a
2	and conversion of electric resistance	2	capacity problem on the island, thus any
3	heating – I'm sorry, conversion of oil	3	demand side resource that can contribute to
4	heating to either heat pump, or in some	4	mitigating that capacity problem has value.
5	cases electric resistance heating, could add	5	Now it also saves energy and it saves energy
6	up to 600 gigawatt hours per year, and	6	primarily during winter hours, and depending
7	that's on a provincial basis of on the order	7	upon how the programs have done, and whether
8	of 9,000 gigawatt hours per year. The	8	or not you use rate design, the energy
9	savings that you see from this essentially	9	savings you see from CDM can free up energy
10	stem from oil savings, which ramps up to on	10	for export sales during some of the higher
11	the order of 244 million dollars per year by	11	priced hours in the winter. Most of the
12	2030. The direct contribution to revenues	12	export market prices are higher during
13	associated with this electrification, taking	13	winter hours, and generally higher during
14	into account the costs of incentives for	14	peak winter hours rather than off-peak
15	heat pumps and the cost for electric vehicle	15	winter hours. So that's why CDM and demand
16	charges, for example, ranges from in the	16	response become particularly important as
17	early years to 67 million dollars up to on	17	you move into an era where you have plenty
18	the order of 134 million by 2030 for the	18	of energy, but you have some concerns about
19	high electrification case. I'm sorry, that	19	capacity.
20	was the direct contribution to revenues as	20	GREENE, Q.C.:
21	the slide indicates. The net mitigation is	21	Q. And could you just show your findings?
22	on the order of 10's of millions of dollars	22	MR. FAGAN:
23	from the high electrification scenarios,	23	A. Sure. This slide just shows that the peak
24	reaching upwards of 50 million dollars net	24	savings that we find stem from both
25	by 2030 for the high scenario. This slide	25	conservation demand management, as
	Page 22		Page 24
1	represents the peak load additions	1	conventionally known in the Province, and
2	associated with electrification. I'll note	2	also from demand response, and this would be
3	that these are the additions you see on	3	demand response separate from the
4	peak. These totals are not necessarily	4	interruptible curtailment capacity that
5	coincident with the island's winter peak.	5	currently exists in the Province, and then a
6	That coincident is a little bit lower than	6	significant portion of this is potentially
7	the 147 you see here. It's more on the	7	available from the effects of heat pumps
8	order of 100 megawatts. This just shows the	8	displacing or supplementing the use of
9	variation in the addition to peak seen	9	electric resistance heating. As we show on
10	across the different types of	10	
	across the different types of	10	later slides, the heat pump technologically
11	electrification by transport or by building	10 11	later slides, the heat pump technologically is a superior way of getting heat from use
	• 1		
11	electrification by transport or by building	11	is a superior way of getting heat from use
11 12	electrification by transport or by building sector.	11 12	is a superior way of getting heat from use of electricity.
11 12 13	electrification by transport or by building sector. GREENE, Q.C.:	11 12 13	is a superior way of getting heat from use of electricity. GREENE, Q.C.: Q. And of course, these – if you do focus on
11 12 13 14	electrification by transport or by building sector. GREENE, Q.C.: Q. You've already mentioned that you also	11 12 13 14	is a superior way of getting heat from use of electricity. GREENE, Q.C.:
11 12 13 14 15	<ul> <li>electrification by transport or by building sector.</li> <li>GREENE, Q.C.:</li> <li>Q. You've already mentioned that you also studied Conservation Demand Management, and can you explain why that was important here</li> </ul>	11 12 13 14 15	<ul> <li>is a superior way of getting heat from use of electricity.</li> <li>GREENE, Q.C.:</li> <li>Q. And of course, these – if you do focus on CDM and demand management response, these</li> </ul>
11 12 13 14 15 16	electrification by transport or by building sector. GREENE, Q.C.: Q. You've already mentioned that you also studied Conservation Demand Management, and	11 12 13 14 15 16	<ul> <li>is a superior way of getting heat from use of electricity.</li> <li>GREENE, Q.C.:</li> <li>Q. And of course, these – if you do focus on CDM and demand management response, these types of programs add additional cost for</li> </ul>
11 12 13 14 15 16 17	<ul> <li>electrification by transport or by building sector.</li> <li>GREENE, Q.C.:</li> <li>Q. You've already mentioned that you also studied Conservation Demand Management, and can you explain why that was important here because again it seems almost counterintuitive if we need to grow revenue,</li> </ul>	11 12 13 14 15 16 17	<ul> <li>is a superior way of getting heat from use of electricity.</li> <li>GREENE, Q.C.:</li> <li>Q. And of course, these – if you do focus on CDM and demand management response, these types of programs add additional cost for the customer and for the utilities. Did you</li> </ul>
11 12 13 14 15 16 17 18	<ul> <li>electrification by transport or by building sector.</li> <li>GREENE, Q.C.:</li> <li>Q. You've already mentioned that you also studied Conservation Demand Management, and can you explain why that was important here because again it seems almost counterintuitive if we need to grow revenue, why do you focus on reducing demand? So can</li> </ul>	11 12 13 14 15 16 17 18	<ul> <li>is a superior way of getting heat from use of electricity.</li> <li>GREENE, Q.C.:</li> <li>Q. And of course, these – if you do focus on CDM and demand management response, these types of programs add additional cost for the customer and for the utilities. Did you consider costs in your analysis?</li> <li>MR. FAGAN:</li> </ul>
11 12 13 14 15 16 17 18 19	<ul> <li>electrification by transport or by building sector.</li> <li>GREENE, Q.C.:</li> <li>Q. You've already mentioned that you also studied Conservation Demand Management, and can you explain why that was important here because again it seems almost counterintuitive if we need to grow revenue,</li> </ul>	11 12 13 14 15 16 17 18 19	<ul> <li>is a superior way of getting heat from use of electricity.</li> <li>GREENE, Q.C.:</li> <li>Q. And of course, these – if you do focus on CDM and demand management response, these types of programs add additional cost for the customer and for the utilities. Did you consider costs in your analysis?</li> <li>MR. FAGAN:</li> <li>A. We did. Essentially on the island, because</li> </ul>
11 12 13 14 15 16 17 18 19 20	<ul> <li>electrification by transport or by building sector.</li> <li>GREENE, Q.C.:</li> <li>Q. You've already mentioned that you also studied Conservation Demand Management, and can you explain why that was important here because again it seems almost counterintuitive if we need to grow revenue, why do you focus on reducing demand? So can you just briefly explain that and what you</li> </ul>	11 12 13 14 15 16 17 18 19 20	<ul> <li>is a superior way of getting heat from use of electricity.</li> <li>GREENE, Q.C.:</li> <li>Q. And of course, these – if you do focus on CDM and demand management response, these types of programs add additional cost for the customer and for the utilities. Did you consider costs in your analysis?</li> <li>MR. FAGAN:</li> <li>A. We did. Essentially on the island, because of the capacity value associated with peak</li> </ul>
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11 12 13 14 15 16 17 18 19 20 21 22	<ul> <li>electrification by transport or by building sector.</li> <li>GREENE, Q.C.:</li> <li>Q. You've already mentioned that you also studied Conservation Demand Management, and can you explain why that was important here because again it seems almost counterintuitive if we need to grow revenue, why do you focus on reducing demand? So can you just briefly explain that and what you found?</li> <li>MR. FAGAN:</li> </ul>	11 12 13 14 15 16 17 18 19 20 21 22 23	<ul> <li>is a superior way of getting heat from use of electricity.</li> <li>GREENE, Q.C.:</li> <li>Q. And of course, these – if you do focus on CDM and demand management response, these types of programs add additional cost for the customer and for the utilities. Did you consider costs in your analysis?</li> <li>MR. FAGAN:</li> <li>A. We did. Essentially on the island, because of the capacity value associated with peak shaving, that peak shaving coming from</li> </ul>

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	Page 25		Page 27
1	perspective of on the order of 3.0.	1	CDM to peak shave and at the same time using
2	The core inputs into this computation	2	rate design to provide incentives for
3	is what is the value of export sales that	3	consumption, preferably during off-peak
4	get freed up from CDM and what is the value	4	periods of time, results in the best
5	of capacity if you peak shave on the island.	5	customer outcomes. What we clearly show is
6	The costs shown here, basically are	6	that there more than enough surplus
7	amortized CDM program costs based on basic	7	available from Muskrat Falls to support
8	rubrics for the cost of more aggressive CGM	8	these electrification needs.
9	programs. There's sort of a wide range on	9	I will note that in all of our analysis
10	how you could actually implement more	10	we assume the LIL is in service and we
11	aggressive CDM. So the costs that are seen	11	assume the LIL is providing energy and
12	here could vary. You could certainly – you	12	capacity of the LIL. To the extent that
13	would want to maximum participating customer	13	that would not be the case then you begin to
14	contributions to any CDM measures so these	14	perturb the findings that we've seen,
15	costs could be lower.	15	although the capacity value would become
16	Alternatively, you can use CDM program	16	even more important under any situation such
17	design as a way to address the potential	17	as that.
18	inequities that can occur through folks who	18	GREENE, Q.C.:
19	are less able to have the capital to make	10	Q. You've already indicated earlier in your
	improvements in residences or commercial		
20		20 21	presentation that the impact on rates
21	businesses for CDM. But we generally find		overall with the most optimistic of your
22	that because of this capacity value, the CDM	22	scenarios of electrification and CDM would
23	and the demand response are particularly	23	not help with the rate mitigation problem.
24	important and particularly economically	24	Is it correct that by 2030 the most that
25	valuable.	25	this would produce would be about a cent a
			*
	Page 26		Page 28
1	GREENE, Q.C.:	1	Page 28 kilowatt hour off the domestic rate? Is
2	GREENE, Q.C.: Q. So, we've just reviewed at a high level the	2	Page 28 kilowatt hour off the domestic rate? Is that generally what your analysis showed?
2 3	<ul><li>GREENE, Q.C.:</li><li>Q. So, we've just reviewed at a high level the areas that you reviewed for the Board and</li></ul>	2 3	Page 28 kilowatt hour off the domestic rate? Is that generally what your analysis showed? MR. FAGAN:
2 3 4	<ul><li>GREENE, Q.C.:</li><li>Q. So, we've just reviewed at a high level the areas that you reviewed for the Board and now I'd like you, at that same high level,</li></ul>	2 3 4	Page 28 kilowatt hour off the domestic rate? Is that generally what your analysis showed? MR. FAGAN: A. That's correct. The rate impacts themselves
2 3	<ul><li>GREENE, Q.C.:</li><li>Q. So, we've just reviewed at a high level the areas that you reviewed for the Board and now I'd like you, at that same high level, to summarize your findings in terms of the</li></ul>	2 3 4 5	Page 28 kilowatt hour off the domestic rate? Is that generally what your analysis showed? MR. FAGAN: A. That's correct. The rate impacts themselves are significant, but they're not large.
2 3 4 5 6	<ul><li>GREENE, Q.C.:</li><li>Q. So, we've just reviewed at a high level the areas that you reviewed for the Board and now I'd like you, at that same high level,</li></ul>	2 3 4 5 6	Page 28 kilowatt hour off the domestic rate? Is that generally what your analysis showed? MR. FAGAN: A. That's correct. The rate impacts themselves are significant, but they're not large. GREENE, Q.C.:
2 3 4 5	<ul> <li>GREENE, Q.C.:</li> <li>Q. So, we've just reviewed at a high level the areas that you reviewed for the Board and now I'd like you, at that same high level, to summarize your findings in terms of the reference questions that you did some analysis on.</li> </ul>	2 3 4 5	Page 28 kilowatt hour off the domestic rate? Is that generally what your analysis showed? MR. FAGAN: A. That's correct. The rate impacts themselves are significant, but they're not large.
2 3 4 5 6	<ul> <li>GREENE, Q.C.:</li> <li>Q. So, we've just reviewed at a high level the areas that you reviewed for the Board and now I'd like you, at that same high level, to summarize your findings in terms of the reference questions that you did some</li> </ul>	2 3 4 5 6	Page 28 kilowatt hour off the domestic rate? Is that generally what your analysis showed? MR. FAGAN: A. That's correct. The rate impacts themselves are significant, but they're not large. GREENE, Q.C.:
2 3 4 5 6 7	<ul> <li>GREENE, Q.C.:</li> <li>Q. So, we've just reviewed at a high level the areas that you reviewed for the Board and now I'd like you, at that same high level, to summarize your findings in terms of the reference questions that you did some analysis on.</li> </ul>	2 3 4 5 6 7	Page 28 kilowatt hour off the domestic rate? Is that generally what your analysis showed? MR. FAGAN: A. That's correct. The rate impacts themselves are significant, but they're not large. GREENE, Q.C.: Q. But overall, in terms of the appropriate use
2 3 4 5 6 7 8	<ul> <li>GREENE, Q.C.:</li> <li>Q. So, we've just reviewed at a high level the areas that you reviewed for the Board and now I'd like you, at that same high level, to summarize your findings in terms of the reference questions that you did some analysis on.</li> <li>MR. FAGAN:</li> </ul>	2 3 4 5 6 7 8	Page 28 kilowatt hour off the domestic rate? Is that generally what your analysis showed? MR. FAGAN: A. That's correct. The rate impacts themselves are significant, but they're not large. GREENE, Q.C.: Q. But overall, in terms of the appropriate use of energy and maximization of the resource,
2 3 4 5 6 7 8 9	<ul> <li>GREENE, Q.C.:</li> <li>Q. So, we've just reviewed at a high level the areas that you reviewed for the Board and now I'd like you, at that same high level, to summarize your findings in terms of the reference questions that you did some analysis on.</li> <li>MR. FAGAN:</li> <li>A. Sure. In short, increasing load through</li> </ul>	2 3 4 5 6 7 8 9	Page 28 kilowatt hour off the domestic rate? Is that generally what your analysis showed? MR. FAGAN: A. That's correct. The rate impacts themselves are significant, but they're not large. GREENE, Q.C.: Q. But overall, in terms of the appropriate use of energy and maximization of the resource, this is what you believe is the path forward
2 3 4 5 6 7 8 9 10	<ul> <li>GREENE, Q.C.:</li> <li>Q. So, we've just reviewed at a high level the areas that you reviewed for the Board and now I'd like you, at that same high level, to summarize your findings in terms of the reference questions that you did some analysis on.</li> <li>MR. FAGAN:</li> <li>A. Sure. In short, increasing load through electrification, improving energy efficiency</li> </ul>	2 3 4 5 6 7 8 9 10	Page 28 kilowatt hour off the domestic rate? Is that generally what your analysis showed? MR. FAGAN: A. That's correct. The rate impacts themselves are significant, but they're not large. GREENE, Q.C.: Q. But overall, in terms of the appropriate use of energy and maximization of the resource, this is what you believe is the path forward for us here in Newfoundland?
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	Page 29		Page 31
1	are different from the patterns of energy	1	example, if the rates are – if the rates end
2	savings associated with CDM and both those	2	up being set at, for example, 17 cents in
3	patterns, in addition to underlying existing	3	2020, the effect of a high electrification
4	load patterns, can be shaped by rate design.	4	scenario would be to reduce the rate by on
5	So, in order to economically capture the	5	the order of eight-tenths of a cent per
6	variant patterns of consumption in export	6	kilowatt hour and that's shown in this
7	sales, we used a model that looked at things	7	second row, the second set of columns.
8	on an hourly level and then multiple	8	Conversely, under a high CDM only
9	scenarios just allowed us to mix and match	9	scenario where you don't do any
10	different levels of rate design and	10	electrification other than the small amounts
11	different levels of electrification or CDM.	11	that are in the base case, you would see
12	I mean, essentially there's infinite	12	increases in rates on the order of 1.4 cents
13	permeations of scenarios that we could have	13	per kilowatt hour by 2030.
14	modelled and we had to try to narrow that	14	But what's coupled with that rate
15	down. We still ended up doing scenario	15	increase, as shown in the last two columns
16	analysis on roughly 38 different	16	of this table, is generally a reduction in
17	combinations, which is quite a lot to try to	17	total energy expenditures and a reduction in
18	discern the differences.	18	the average energy expenditures on an
19	GREENE, Q.C.:	19	average customer basis. And that's what
20	Q. And if we could go to your next slide. This	20	this shows.
21	is – this slide illustrates the results of	21	So, the last two columns capture the
22	what we chose as the key illustrative	22	effect of reduced consumption and the effect
23	scenarios that you ran. So, could you	23	of increased consumption but oil savings.
24	please explain what this table shows?	24	Whereas the first column captures the effect
25	MR. FAGAN:	25	of changing export sales and also changing
	Page 30		Page 32
1	Page 30 A. Sure. The results for all the scenarios are	1	
1 2	e	1 2	Page 32
	A. Sure. The results for all the scenarios are		Page 32 internal sales associated with the level of
2	A. Sure. The results for all the scenarios are contained in the report. We do have	2	Page 32 internal sales associated with the level of CDM or electrification that's used.
2 3	A. Sure. The results for all the scenarios are contained in the report. We do have listings of the effect across all 30 some	2 3	Page 32 internal sales associated with the level of CDM or electrification that's used. GREENE, Q.C.:
2 3 4	A. Sure. The results for all the scenarios are contained in the report. We do have listings of the effect across all 30 some odd scenarios. But essentially, we just chose a handful of scenarios to show the	2 3 4	Page 32 internal sales associated with the level of CDM or electrification that's used. GREENE, Q.C.: Q. And when you looked at the average energy
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1	increasing export sales, increasing domestic	1	that scenario, there's a net increase in
2	load and get a rough idea of what that	2	peak load. So, you do have exposure to the
3	quantitative effect would look like.	3	need for additional capacity costs and
4	GREENE, Q.C.:	4	that's as you can see in the $20 - both 2025$
5	Q. So, if we could take just Scenario 12A where	5	and 2030.
6	we see the average rate mitigation by 2030,	6	So, essentially, this table breaks down
7	it's there in red, which is just over a cent	7	the components to get to the net mitigation
8	a kilowatt hour. That would show what we	8	effects of the change in utility revenues
9	just talked about. Is that correct that if	9	that you see.
10	there is increased electrification, the	10	GREENE, Q.C.:
11	Delta Utility revenues increase in 2025,	11	Q. If we could turn now to the more detail with
12	2030, and the average rate, cents a kilowatt	12	respect to your work for the load forecast.
13	hour, would go down? Is that correct?	13	Did you consider the impact on the forecast
14	MR. FAGAN:	14	load of a significant increase in price?
15	A. Yes.	15	MR. FAGAN:
16	GREENE, Q.C.:	16	A. Yes, we did. It's a tricky matter. With
17	Q. That's how we are to read that table?	17	the projected rate increase that the
18	MR. FAGAN:	18	Province is looking at, it's very difficult
19	A. Yes, that's correct.	19	to use the traditional econometric
20	GREENE, Q.C.:	20	estimating techniques, which basically look
21	Q. Okay. So, if we can go to the next table?	21	back and see how consumption has changed as
22	MR. FAGAN:	22	prices have changed. But all of that occurs
23	A. Yes. This table essentially presents the	23	within a particular band width of price
24	components of the change in utility revenues	24	increase and the band width of price
25	that we saw on the prior table and it	25	increase we're talking about now renders
	Page 34		Page 36
1	indicates that the effect on revenues comes	1	that method a lot less effective and a lot
2	from not just the increasing revenues from	2	less certain.
3	electrification or the decrease in revenues	3	So, essentially, you can think about
4	if there's improved energy efficiency, but	4	well, what options are in front of people
5	it also comes from the change in export	5	and the options that are in front of people
6	revenues that would be seen and it also	6	are switching from electricity or changing
7	comes from whatever costs might be incurred		behaviours or changing technologies to use
8	to implement the CDM or to implement the	8	less electricity. And those types of
9	electrification policies and it also takes	9	responses are reflected in Hydro's forecast,
10	into account the change in exposure to	10	what they call their low rate forecast,
11	capacity costs that the Province would see.	11	which contains a particular price elasticity
12	So, for example, if we look at that	12	that's essentially a relatively higher price
13	same 12A, scenario 12A, the export revenues	13	elasticity than you might see if you just
14			
	actually decline in scenarios where you have	14	looked at conventional econometric
15	actually decline in scenarios where you have a lot more electrification because you're	14 15	
15 16	a lot more electrification because you're		looked at conventional econometric estimating techniques. So, based primarily on that and it –
	a lot more electrification because you're using the energy internally as opposed to	15	estimating techniques. So, based primarily on that and it –
16	a lot more electrification because you're using the energy internally as opposed to exporting it. But the internal revenues	15 16	estimating techniques.
16 17 18	a lot more electrification because you're using the energy internally as opposed to exporting it. But the internal revenues increase significantly. There is a cost	15 16 17	estimating techniques. So, based primarily on that and it – based on that, the Hydro's forecast is not an unreasonable forecast. We do think that
16 17 18 19	a lot more electrification because you're using the energy internally as opposed to exporting it. But the internal revenues increase significantly. There is a cost associated with those electrification	15 16 17 18	estimating techniques. So, based primarily on that and it – based on that, the Hydro's forecast is not an unreasonable forecast. We do think that they were a little bit – that they estimated
16 17 18	a lot more electrification because you're using the energy internally as opposed to exporting it. But the internal revenues increase significantly. There is a cost associated with those electrification policies, although in our accounting, we do	15 16 17 18 19	estimating techniques. So, based primarily on that and it – based on that, the Hydro's forecast is not an unreasonable forecast. We do think that they were a little bit – that they estimated a little bit high in some of those out
16 17 18 19 20	a lot more electrification because you're using the energy internally as opposed to exporting it. But the internal revenues increase significantly. There is a cost associated with those electrification policies, although in our accounting, we do not include the \$5,000 per vehicle Federal	15 16 17 18 19 20 21	estimating techniques. So, based primarily on that and it – based on that, the Hydro's forecast is not an unreasonable forecast. We do think that they were a little bit – that they estimated a little bit high in some of those out years. Newfoundland Power, for example,
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16 17 18 19 20 21 22	a lot more electrification because you're using the energy internally as opposed to exporting it. But the internal revenues increase significantly. There is a cost associated with those electrification policies, although in our accounting, we do not include the \$5,000 per vehicle Federal rebate, for example. We do include the cost associated with heat pump incentives and	15 16 17 18 19 20 21 22	estimating techniques. So, based primarily on that and it – based on that, the Hydro's forecast is not an unreasonable forecast. We do think that they were a little bit – that they estimated a little bit high in some of those out years. Newfoundland Power, for example, estimated just a little bit lower. So, as you'll see in the subsequent slide – I'm
16 17 18 19 20 21 22 23	a lot more electrification because you're using the energy internally as opposed to exporting it. But the internal revenues increase significantly. There is a cost associated with those electrification policies, although in our accounting, we do not include the \$5,000 per vehicle Federal rebate, for example. We do include the cost	15 16 17 18 19 20 21 22 23	estimating techniques. So, based primarily on that and it – based on that, the Hydro's forecast is not an unreasonable forecast. We do think that they were a little bit – that they estimated a little bit high in some of those out years. Newfoundland Power, for example, estimated just a little bit lower. So, as

Page 371Increase if the first five years, our base21catterme low load would be that rates would3forecast, but we do think that the trend4what's happening. The consumption change is4forecast, but we do think that the trend4what's happening. The consumption change is5that has been seen in the Newfoundland Power6is. What comes with that extreme low load7secretic erritry is more predictive of what7might occur in the latter portion of the8period. So, we essentially see all to8make up part of the revenue, but you do9slightly declining energy forecast9still have - but you will see a greater rate10We did also look at some other10increase if that extreme low load scenario11We did also look at some other11were to come to pass.12trajectoris in addition to our scenarios.12GREENE, Q.C.:13For example, an extreme load trajectory,1316MR. FAGAN:14representing a price elasticity twice as15that important?15high as what Hydro used in its low rate16MR. FAGAN:14under agressive levels of CDM, the decline10the evening, and there's not much of a15under agressive levels of CDM, the decline11the the egrinming and in16mechanism that people will tak to reduce24forecast. But primarily, this is just to26ectines coming from DDM. The CDM is the		(1,201)		
2       see that for the first five years, our base       2       have to go higher, but that bills would         3       forecast, but we do think that the trend       4       actually likely go down because that's         4       forecast, but we do think that the trend       4       what's happening. The consumption change is         5       that has been seen in the Newfoundland Power       5       dramatic or more dramatic than it otherwise         6       seventaily likely go down because that's       4       actually likely go down because that's         7       might occur in the latter portion of the       7       secanario is an increase in export sales to         8       merice core to pease.       9       still have - but you will see a greater rate       10         10       trajectory.       10       showed a typical winter day peak and why is       11         11       We did also look at some other       12       GREFENE, Q.C.:       13       14       showed a typical winter day peak and why is         15       high as what Hydro used in its low rate       13       14       showed a typical winter day peak and why is         16       case, would show a decline by an additional       17       A.       This is just important to point out that         17       Lower see grease to sea grease is peak, in the moring and in	1	-	1	e e
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5     that has been seen in the Newfoundland Power service territory is more predictive of what might occur in the latter portion of the period. So, we essentially see a flat to slightly decline, energy forecast     5     dramatic or more dramatic bain, to therwise is. What comes with that extreme low load service to rome to pass.       10     We did also look at some other trajectory.     10     make up part of the reveue, but you do slightly declinine in addition to ur scenarios.       11     We did also look at some other trajectories in addition to ur scenarios.     10     CREENF, Q.C.:       12     trajectories in addition to ur scenarios.     10     RTEFNE, Q.C.       13     For example, an extreme load trajectory, the decline.     10     MR. FAGAN:       14     representing a prive elasticity twice as that important?     16     MR. FAGAN:       15     high as what Hydro used in its low rate case, would show a decline by an additional the would be a fairly steeph also shows is that 20     10     MR. FAGAN:       20     But what this graph also shows is that 21     10     But what this graph also shows is that 22     10     11       23     extent, declines coming from DDM. The CDM is the 24     27     10     11     10       24     are - they're not that different from 25     12     14     additional export sales or internally to 26       25     declines coming from DDM. The CDM is the 25     14     additional export sales or internally to		• •		
6       service territory is more predictive of what might occur in the latter portion of the secnario is an increase if the revenue, but you do slightly declining energy forecast       6       is. What comes with that extreme low load scenario is an increase if that extreme low load scenario wake up part of the revenue, but you do still have - but you will use a greater rate increase if that extreme low load scenario were to come to pass.         11       We did also look at some other trajectories in addition to our scenarios.       12       GREENE, Q.C::         13       For example, an extreme low load trajectory, that important?       30, So, if we go to slide 25, please. Here you showed a typical winter day peak and why is that important?         16       case, would show a decline by an additional there's two periods of the day when the island sees its peak, in the morning and in decline.         10       But what this graph also shows is that 21       16       A.       This is just important to point out that there's two periods of the day when the island sees its peak, in the morning and in 21       21       be at the beginning of the decade and the extent, declines coming from from free response are - they're not that differrent from 23       22       be at the beginning of the decade and the extent, day but, this just reflects our 3         2       their exposure to bills essentially.       2       2       electrification load during the periods of the day that are not peak, overnight and midday essentially.         2       their exposure to bills essentially.       2       electrification load during the				
7       might occur in the latter portion of the period. So, we essentially see a flat to 9       7       scenario is an increase in export sales to make up part of the revenue, but you do 9         8       period. So, we essentially see a flat to 9       8       make up part of the revenue, but you do 9         10       We did also look at some other 11       We did also look at some other 12       10       were to come to pass.         11       We did also look at some other 12       11       Were to come to pass.         13       For example, an extreme load trajectory, 14       7       So, if we go to slide 25, please. Here you showed a typical winter day peak and why is 15         14       representing a price elasticity twice as 15       high as what Hydro used in its low rate 16       16       MR. FAGAN:         17       Loo or so gigawatt hours by 2030, which 17       N.       This is just important to point out that 18       there's two periods of the day when the 19         10       But what this graph also shows is that 21       under agressive levels of CDM, the decline 22       ean also be fairly sizebal. So, to some 23       end of the decade, based on our reference 23       end of the decade, based on our reference 23       end of the decade, based on our reference 24       page 40         25       declines coming from CDM. The CDM is the 25       page 38       Page 40         3       Just to back up, this just reflects our 34<				
8       period. So, we essentially see a flat to       9       make up part of the revenue, but you do         9       slightly declining energy forecast       9       still have – but you will see a greater rate         11       We did also look at some other       11       were to come to pass.         12       trajectory:       13       For example, an extreme load trajectory,       13       CREENE, Q.C.:         14       representing a price elasticity twice as       14       showed a typical winter day peak and why is         15       high as what Hydro used in its low rate       15       that important?         16       case, would show a decline by an additional       16       MR. FAGAN:         17       1500 or so gigawatt hours by 2030, which       17       A. This is just important to point out that         18       would be a fairly sizepal also shows is hat       20       there's two periods of the day when the         20       But what this graph also shows is hat       21       difference between what those levels might         21       can also be fairly sizepalle. So, to some       22       be at the beginning of the decade and the         23       ecclines coming from CDM. The CDM is the       25       point out that there's nor much of a         24       mechanism that people will take to reduce       1<		• 1		
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<ul> <li>indicate that the peak will not grow quite</li> <li>as fast as Hydro forecasted them to grow out</li> <li>to 2030 in their low rate forecast case.</li> <li>GREENE, Q.C.:</li> <li>Q. So, as an indication of the impact that the</li> <li>significant price might have on customers if</li> <li>there is no rate mitigation, you model the</li> <li>extreme low load? Is that correct?</li> <li>MR. FAGAN:</li> <li>MR. FAGAN:<!--</td--><td></td><td>· ·</td><td></td><td><b>e</b> 1 1</td></li></ul>		· ·		<b>e</b> 1 1
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23MR. FAGAN:23basically a tally of the energy balance in24A.That's correct. And what you see with24basically a tally of the energy balance inthe Province, and you'll note that the heavy				
24 A. That's correct. And what you see with 24 the Province, and you'll note that the heavy				
		MK. FAGAN:		
25 extreme low load, I mean, the net effect of 25 thick line, that's at the top of the gray			<b>A 4</b>	
	24	•		

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	Page 41		Page 43
1	area, is the same pattern that we saw in the	1	increasing electrification. Is that
2	previous slide. That's the island load	2	correct?
3	pattern. But that the total supply capacity	3	DR. HOPKINS:
4	available for export market sales is greater	4	A. That's correct. So, we looked at the costs
5	than those peak needs and what you'll see is	5	that might come through various types of
6	that generally, they're able to sell a lot	6	programs. For example, the electric vehicle
7	more, as much as they can, during the on-	7	incentive, although we assumed that that
8	peak periods and sell less during the off-	8	incentive would be covered by the Federal
9	peak periods because the on-peak periods	9	Government. We also looked at heat pump
10	come with greater potential for revenue.	10	incentives and also the costs for installing
11	GREENE, Q.C.:	11	charging stations.
12	Q. So turning now to electrification, which is	12	GREENE, Q.C.:
13	the most significant opportunity to increase	13	Q. Okay. So, if we go to slide 32, we see the
14	revenue in your analysis. I want to look	14	results of your analysis. Could you just
15	just at a little bit more detail and you	15	explain them briefly, please?
16	already discussed how you looked at	16	DR. HOPKINS:
17	electrification for buildings and for in the	17	A. So, this is the high electrification
18	transportation area. So, Dr. Hopkins, could	18	scenario. The units are the total energy by
19	you just outline a little bit more about how	19	year. Different sectors are able to
20	you did that analysis?	20	electrify at different rates. So, you see
21	DR. HOPKINS:	21	Memorial University replacing one and then a
22	A. Sure. In transportation, we looked at	22	second boiler as assumed and modelled by us
23	predominantly electric vehicles, both light	23	that relatively early institutional
24	and medium duty vehicles. You see that	24	buildings, again, moving relatively earlier.
25	described as LDV and MDV. Medium duty	25	You get to see the relative scale of
	Page 42	20	Page 44
1	vehicles are things like delivery vehicles	1	residential, small and large commercial
2	and buses. We also looked at the potential	2	buildings, which are substantial but much
$\overline{3}$	for further electrification of the port here	3	smaller than the institutional load, partly
4	in St. John's, although you'll see on the	4	because there's fewer square feet that we
5	slides that that's a pretty minimal effect.	5	assumed would electrify and partly because
6	Building electrification, we looked at	6	those buildings are electrifying with heat
7	conversion of oil heating to electric	7	pumps, which use a lot less electricity per
8	heating for residential and for small and	8	amount of heat delivered.
9	large commercial buildings. We've modelled		Transportation sector has a somewhat
10	that as conversion to heat pumps. Whereas,	10	different adoption shape, as you see, with
11	for institutional use, in particular	11	the market developing much more towards the
12	Memorial University where the demand for	12	latter end of the period. This reflects the
13	very high heat is more likely, we modelled	13	increasing availability of different
14	that as conversion to electric resistance.	14	electric vehicle models as they become more
15	We developed low and high	15	available and also reductions in cost in
16	electrification scenarios within each sector	16	electric vehicles presuming to make adoption
17	and those scenarios are designed to give a	17	faster later in the period.
18	bookend sense of what the impacts on the	18	The next slide is the low scenario
19	electric system might be from lower or	19	case. The shapes are similar, but the
$\begin{vmatrix} 1 \\ 20 \end{vmatrix}$	higher electrification.	20	values are substantially lower, just for
21	GREENE, Q.C.:	20	lower rate of adoption. Only one boiler at
$\begin{vmatrix} 21\\22 \end{vmatrix}$	Q. Okay. Those were the assumptions that you	22	Memorial University and a much slower
$\begin{vmatrix} 22\\23 \end{vmatrix}$	used for each of your scenarios and did you	23	adoption of electric vehicles.
24	– when we go to slide 31, you also looked at	24	GREENE, Q.C.:
25	costs that would be associated with	25	Q. Okay. So, if we could go to slide 34 where
1			

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	Page 45		Page 47
1	you talk about the cost impacts. Could you	1	and the rate design, which Ms. Whited will
2	please explain this slide?	2	discuss later, does make some effect from
3	DR. HOPKINS:	3	the electric vehicle owner's perspective. A
4	A. Sure. We looked at – you know, there's a	4	more favourable rate is available to them in
5	question for electrification, will people	5	terms of time of use or some sort of
6	actually do it, but does it make sense for	6	incentive rate, the more favourable the
7	customers to actually electrify their end	7	switch is.
8	uses. So, we looked at that in two	8	GREENE, Q.C.:
9	different ways. One, this slide shows the	9	Q. And you also looked at the impact for heat
10	aggregate. So, if you look at buildings,	10	pumps, is that correct?
11	for example, the figure here, in aggregate	11	DR. HOPKINS:
12	across all of the buildings are the folks	12	A. That's correct. So, this is the same
13	paying the energy bills in these buildings,	13	calculation, but for a single home heating
14	are they paying less if they electrify than	14	with a heat pump using—again financing over
15	they would if they were using – heating	15	five years, using Newfoundland Power's
16	using oil.	16	existing loan product. If oil prices are
17	So, the two high cases shown here, for	17	high, then the oil savings relative to
18	example, the high oil and high heat pump,	18	electric basically pays for the heat pump
19	shows the total spending on fuel, depending	19	over the course of the first five years and
20	on which fuel those folks were using for	20	then it's all savings from there on out.
21	their buildings and you see that the heat	21	So, you could see that this, if oil prices
22	pump case is substantially lower than the	22	are high, it would be quite economical for a
23	oil case. A general sense that in	23	household to switch to using heat pumps. If
24	aggregate, consumers in the Province would	24	oil prices are lower, it's a little bit more
25	be saving money by switching from oil to	25	break-even where there's some additional
	Page 46		Page 48
1	heat pumps.	1	costs while you're paying off the system and
2	GREENE, Q.C.:	2	some savings later, but it's a little bit
3	Q. Okay.	3	closer to $50/50$ .
4	DR. HOPKINS:	4	GREENE, Q.C.:
5	A. The other two that – the other way that we	5	Q. Moving now to CDM and Demand Response, can
6	looked at this, shown here and on the next	6	you briefly describe how you did that
7	slide. This is for electric vehicles and	7	analysis and what it showed?
8	the following one for heat pumps, looks at	8	DR. HOPKINS:
9	the individual customer economics. So, if	9	A. Yes. So, we were interested, as Mr. Fagan
10	you assume, for example, in the electric	10	described, predominately in the savings that
11			
12	vehicle that a EV owner finances a new	11	could come from lower peak load and avoided
	electric vehicle over five years and	12	capacity costs, but many kinds of CDM
12	electric vehicle over five years and depending on whether gasoline is higher	12 13	capacity costs, but many kinds of CDM measures are also result, of course, in
13 14	electric vehicle over five years and depending on whether gasoline is higher forecast or lower forecast prices, based on	12 13 14	capacity costs, but many kinds of CDM measures are also result, of course, in energy savings. So, we looked at a base
13 14 15	electric vehicle over five years and depending on whether gasoline is higher forecast or lower forecast prices, based on Canadian federal forecast data, generally	12 13 14 15	capacity costs, but many kinds of CDM measures are also result, of course, in energy savings. So, we looked at a base case, a low case and a high case. The base
13 14 15 16	electric vehicle over five years and depending on whether gasoline is higher forecast or lower forecast prices, based on Canadian federal forecast data, generally speaking that folks who would get an EV	12 13 14 15 16	capacity costs, but many kinds of CDM measures are also result, of course, in energy savings. So, we looked at a base case, a low case and a high case. The base case is basically a continuation of current
13 14 15 16 17	electric vehicle over five years and depending on whether gasoline is higher forecast or lower forecast prices, based on Canadian federal forecast data, generally speaking that folks who would get an EV would pay a little bit more, negative	12 13 14 15 16 17	capacity costs, but many kinds of CDM measures are also result, of course, in energy savings. So, we looked at a base case, a low case and a high case. The base case is basically a continuation of current levels of programs, minimal adoption of heat
13 14 15 16 17 18	electric vehicle over five years and depending on whether gasoline is higher forecast or lower forecast prices, based on Canadian federal forecast data, generally speaking that folks who would get an EV would pay a little bit more, negative savings, increase in cost, while they're	12 13 14 15 16 17 18	capacity costs, but many kinds of CDM measures are also result, of course, in energy savings. So, we looked at a base case, a low case and a high case. The base case is basically a continuation of current levels of programs, minimal adoption of heat pumps and the savings that embedded
13 14 15 16 17	electric vehicle over five years and depending on whether gasoline is higher forecast or lower forecast prices, based on Canadian federal forecast data, generally speaking that folks who would get an EV would pay a little bit more, negative	12 13 14 15 16 17	capacity costs, but many kinds of CDM measures are also result, of course, in energy savings. So, we looked at a base case, a low case and a high case. The base case is basically a continuation of current levels of programs, minimal adoption of heat
13 14 15 16 17 18	electric vehicle over five years and depending on whether gasoline is higher forecast or lower forecast prices, based on Canadian federal forecast data, generally speaking that folks who would get an EV would pay a little bit more, negative savings, increase in cost, while they're	12 13 14 15 16 17 18	capacity costs, but many kinds of CDM measures are also result, of course, in energy savings. So, we looked at a base case, a low case and a high case. The base case is basically a continuation of current levels of programs, minimal adoption of heat pumps and the savings that embedded
13 14 15 16 17 18 19 20 21	electric vehicle over five years and depending on whether gasoline is higher forecast or lower forecast prices, based on Canadian federal forecast data, generally speaking that folks who would get an EV would pay a little bit more, negative savings, increase in cost, while they're paying off the vehicle. But then for the	12 13 14 15 16 17 18 19 20 21	capacity costs, but many kinds of CDM measures are also result, of course, in energy savings. So, we looked at a base case, a low case and a high case. The base case is basically a continuation of current levels of programs, minimal adoption of heat pumps and the savings that embedded essentially in the elasticity response that
13 14 15 16 17 18 19 20	electric vehicle over five years and depending on whether gasoline is higher forecast or lower forecast prices, based on Canadian federal forecast data, generally speaking that folks who would get an EV would pay a little bit more, negative savings, increase in cost, while they're paying off the vehicle. But then for the balance of the life of the vehicle, they	12 13 14 15 16 17 18 19 20	capacity costs, but many kinds of CDM measures are also result, of course, in energy savings. So, we looked at a base case, a low case and a high case. The base case is basically a continuation of current levels of programs, minimal adoption of heat pumps and the savings that embedded essentially in the elasticity response that Mr. Fagan described before. And then, the
13 14 15 16 17 18 19 20 21	electric vehicle over five years and depending on whether gasoline is higher forecast or lower forecast prices, based on Canadian federal forecast data, generally speaking that folks who would get an EV would pay a little bit more, negative savings, increase in cost, while they're paying off the vehicle. But then for the balance of the life of the vehicle, they would see substantial savings from charging	12 13 14 15 16 17 18 19 20 21	capacity costs, but many kinds of CDM measures are also result, of course, in energy savings. So, we looked at a base case, a low case and a high case. The base case is basically a continuation of current levels of programs, minimal adoption of heat pumps and the savings that embedded essentially in the elasticity response that Mr. Fagan described before. And then, the low and high cases reflect incremental
13 14 15 16 17 18 19 20 21 22 23 24	electric vehicle over five years and depending on whether gasoline is higher forecast or lower forecast prices, based on Canadian federal forecast data, generally speaking that folks who would get an EV would pay a little bit more, negative savings, increase in cost, while they're paying off the vehicle. But then for the balance of the life of the vehicle, they would see substantial savings from charging their vehicle with electricity rather than	12 13 14 15 16 17 18 19 20 21 22	capacity costs, but many kinds of CDM measures are also result, of course, in energy savings. So, we looked at a base case, a low case and a high case. The base case is basically a continuation of current levels of programs, minimal adoption of heat pumps and the savings that embedded essentially in the elasticity response that Mr. Fagan described before. And then, the low and high cases reflect incremental additional CDM and heat pump installation.
13 14 15 16 17 18 19 20 21 22 23	electric vehicle over five years and depending on whether gasoline is higher forecast or lower forecast prices, based on Canadian federal forecast data, generally speaking that folks who would get an EV would pay a little bit more, negative savings, increase in cost, while they're paying off the vehicle. But then for the balance of the life of the vehicle, they would see substantial savings from charging their vehicle with electricity rather than driving on gasoline. It's obviously more	12 13 14 15 16 17 18 19 20 21 22 23	capacity costs, but many kinds of CDM measures are also result, of course, in energy savings. So, we looked at a base case, a low case and a high case. The base case is basically a continuation of current levels of programs, minimal adoption of heat pumps and the savings that embedded essentially in the elasticity response that Mr. Fagan described before. And then, the low and high cases reflect incremental additional CDM and heat pump installation. We did, also did a low and a high case for

	<b>D</b> 40		
1	Page 49	1	Page 51
1	savings and adoption rates in heating,	1	discount the potential savings that could—
2	lighting, hot water, refrigeration, et	2	that technical data would imply and assumed
3	cetera, and amortized the costs of the	3	that folks would, in fact, fall back on
4	resulting CDM Programs over seven years as	4	electric resistance heat perhaps more than
5	is the current practice here and calculated	5	they need to. Then the technical data would
6	out the benefit cost values that Mr. Fagan	6	imply in order to be conservative about just
7	described already in the summary.	7	how much savings might be achievable. So,
8	GREENE, Q.C.:	8	you can see the discount in the table at the
9	Q. So, if we go to slide 39, that just outlines	9	bottom between the full savings and the
10	the assumptions that you used for adoption	10	average savings reflects that correction for
11	rates for your various scenarios, is that	11	a conservatism.
12	correct?	12	GREENE, Q.C.:
12	DR. HOPKINS:	12	Q. Okay. And the next slide shows the summary
13	A. That's correct, yeah. The adoption rates	13	of savings?
14	· · · · · · · · · · · · · · · · · · ·	14	DR. HOPKINS:
	are generally higher in the residential		
16	sector as they have been historically and	16	A. Yes, so this is those three cases, the base
17	higher in Newfoundland than in Labrador.	17	case, low case and high case total amount of
18	I'll just mention that this lower figure	18	achieved savings. Base case continuing
19	here is the same one that was corrected in	19	programs would save on the order of 400
20	the report.	20	gigawatt hours by 2030, whereas the low case
21	GREENE, Q.C.:	21	adds about 130 gigawatt hours on top of
22	Q. Right.	22	that. And the high case is about 300
23	DR. HOPKINS:	23	gigawatt hours above that and that's the
24	A. The figure here is—that chart corresponds to	24	sort of the classic CDM portfolio separate
25	the commercial case rather than to the	25	from the heat pumps. And heat pumps are
	Page 50		
1	Page 50 residential case.		Page 52
1	residential case.	1	Page 52 shown in the lower chart where the low-end
2	residential case. GREENE, Q.C.:	1 2	Page 52 shown in the lower chart where the low-end base case assumptions for a CDM used a low
$\begin{vmatrix} 2\\ 3 \end{vmatrix}$	residential case. GREENE, Q.C.: Q. Okay. On slide 40, you then have a slide	1 2 3	Page 52 shown in the lower chart where the low-end base case assumptions for a CDM used a low penetration assumption for heat pumps, where
$\begin{vmatrix} 2\\ 3\\ 4 \end{vmatrix}$	residential case. GREENE, Q.C.: Q. Okay. On slide 40, you then have a slide that shows a heat pump performance and	1 2 3 4	Page 52 shown in the lower chart where the low-end base case assumptions for a CDM used a low penetration assumption for heat pumps, where heat pumps save, I mean, somewhat over 150
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Page 33Page 351Essentially, you need a sizable portion of2Muskrat Falls across the link to meet the3requirements on the Island on the peak4winter days. And that's what this slide5essentially shows, that on the order of 6006megawatis is required across the link from7Muskrat Falls in order to meet the8requirements which leaves a few hundred8requirements which leaves a few hundred9megawatis available for export. Essentially10the capacity for export, either by way of11the Island path towards Nova Scotia and New12England or by way of the Quebee path,13depending upon the total of capacity that's14flowing and the prices through those two15paths. The second slide which represents16including recall, essentially makes, if you17make the presumption that the recall18available after meeting Labrador19requirements under a base forecast for21capacity from the combination of recall and22capacity from the combination of recall and additional hundred megawatts available23an additional hundred megawatts available24order of 200 megawatts. So, these slides25capacity from the combination of26capacity and Muskraf Falls and27the case hore so for tool addition the order of the day, we are analyge on the additional represents25capacity dowasts. So, these slides <th></th> <th></th> <th></th> <th>Muskrat Fails Rate Mitigation Hearing</th>				Muskrat Fails Rate Mitigation Hearing
2       Muskraf Falls across the link to meet the requirements on the Island on the peak winter days. And that's what this slide       2       exports sales volumes ring to 4.5, to an extreme level, as much as 5 terawait hours in an extreme low load case. The revenues that are tide to those volumes essentially         6       megawatts is required across the link from megawatts available for export. Essentially       6       follow the same pattern as the volumes that are tide to those volumes essentially         7       Muskraf Falls in order to meet the megawatts available for export. Essentially       7       the capacity for export, either by way of the capacity for export, either by way of the total of capacity that's         10       the land path lowards Nova Scotta and New 12       follow the same pattern as the volumes the same pattern as the volumes         11       the land path lowards Nova Scotta and New 12       follow the same pattern as the volumes the capacity for export, either by way of 10         12       England or by way of the Quebec path, 13       follow the same capacity that's 13       14         14       flowing and the prices through those two 14       follow follow the same capacity that's 14       16         16       path addr, there is additional remaining 21       capacity for export. So, the net amount of export 23       16       Q.         21       A       So, there are several things that rates do. 22       17       NS. WHITED: 23       24         22       for		Page 53		Page 55
3       requirements on the Island on the peak       3       extreme level, as much as 5 terawait hours         4       winter days. And that's what this slide       4       in an extreme low load case. The revenues         5       essentially shows, that on the order of 600       5       that are tied to those volumes essentially         6       megawatts is required across the link from       6       follow the same pattern as the volumes         7       Muskrat Falls in order to meet the       7       follow the same pattern as the volumes         9       megawatts available for export. Essentially       9       receiving from export saltes on the order of 0         10       the capacity for export. Essentially       9       receiving from export saltes on the order of 0         11       the Island on by way of th Quebee path.       13       conversely, in the high Clectrification         13       depending upon the total of capacity that's       14       end of the decade.         14       flowing and the prices through those two       14       end of the decade.         15       paths. The second slide which represents       16       Q. Okay. So, turning now to rate design, Ms.         18       available after meeting Labrador       18       available after meeting Labrador       18         21       capacity from the combination of re				
4       winter days. And that's what this slide       4       in an extreme low load case. The revenues         5       essentially shows, that on the order of 600       5       that are tied to those volumes essentially         6       megawatts is required across the link from       7       Muskart Falls in order to meet the       7         7       Muskart Falls in order to meet the       7       themselves. So, in the high electrification         9       requirements which leaves af ewh undred       9       receiving from export sales on the order of         10       the capacity for export, either by way of       10       14d million by the end of the decade, and         11       the lsland path towards Nova Scotia and New       12       example, the export revenues in total rise         13       depending upon the total of capacity that's       13       to on the order 200 million dollars by the         14       flowing and the prices through those two       14       GREENE, Q.C.:       15       GREENE, Q.C.:         18       available after meeting Labrador       18       consider rate design when we're talking         20       Labrador, there is additional remaining       20       NS. WHITED:         21       A. So, there are several things that rate do.       21       A. So, there are several things that rate do.         2				
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16 electrical vehicles to encourage the 16 pricing with advanced-metering	cenario.
	al-peak
17 adaption of these technologies. The shorts 17 infrastructure has a reasonably no	
18 on this slide show some stylized examples of 18 impact, but we recommend doing	
19 time-of-use rates and critical-peak pricing. 19 more analysis to dig into the actu	al cost of
20 And what happens is that the critical-peak 20 that advanced-metering infrastruc	
21 pricing actually gets layered on top of the 21 assumed a 300-dollar-per-meter a	all-in cost
22 time-of-use rate. The time-of-use rate that 22 based on recent experience across	
23 we used was a two-period-time-of-use-rate 23 Canadian Provinces and a little b	
24 model with the peak hours between 6:00 a.m. 24 United States. That could be test	•
25and 11:00 a.m. and then again from 4:00 p.m.25issuing an RFP and getting more	accurate
Page 58	Page 60
1 to 9:00 p.m. The critical-peak-pricing 1 pricing. And then, looking at how	
2 rate, that would only be called a few times 2 load actually would respond in the	
3 per year and it would have a much higher 3 through doing some pilots. We lo	
4 price during those hours. So, moving on to 4 examples from Quebec and from Q	
5 slide 51, we looked at the effects of time- 5 from the Northwest United States	
6 of-use pricing on electric vehicles in other 6 how customers might respond und	
7 jurisdictions. In particular, we looked at 7 use rates with critical-peak pricing	
8 this example from Detroit Edison as to how 8 there's been very little overall ana	
9 electric vehicles respond to time-of-use 9 winter-peaking territories. So, it v	
10 rates. And because electric vehicles are a 10 very advantageous to gather some	
11 large load and they can be relatively easily 11 ground here in Newfoundland just	to verify
12 programed to automatically charge off-peak 12 those assumptions.	
13     hours, and most driving actually does not     13     GREENE, Q.C.:	Ŧ
14 occur during off-peak hours, it's a fairly 14 Q. So, just to summarize on rate desi	-
15 easy load to shift and it has quite a large 15 understand that you did not come	-
16 impact. So, this slide here just shows the 16 specific rates that you are recomm	
17 flat rate in the light blue. A lot of 17 but your analysis was more in terr	a rata
18 people on a flat rate have no incentive to 18 directional as opposed to a specifi	c rate
18people on a flat rate have no incentive to18directional as opposed to a specifi19charge off-peak, so they simply plug in when19design. Is that correct?	c Tale
18people on a flat rate have no incentive to18directional as opposed to a specifi19charge off-peak, so they simply plug in when19design. Is that correct?20they get home from work. If you implement a20MS. WHITED:	
18people on a flat rate have no incentive to charge off-peak, so they simply plug in when 2018directional as opposed to a specifi design. Is that correct?20they get home from work. If you implement a 2120MS. WHITED: 2121time-of-use rate, then that's the darker21A.	specific
18people on a flat rate have no incentive to 1918directional as opposed to a specifi19charge off-peak, so they simply plug in when 2019design. Is that correct?20they get home from work. If you implement a 2120MS. WHITED:21time-of-use rate, then that's the darker 	specific mpact
18people on a flat rate have no incentive to 1918directional as opposed to a specifi design. Is that correct?19charge off-peak, so they simply plug in when 2019design. Is that correct?20they get home from work. If you implement a 	specific mpact not
18people on a flat rate have no incentive to 1918directional as opposed to a specifi19charge off-peak, so they simply plug in when 2019design. Is that correct?20they get home from work. If you implement a 2120MS. WHITED:21time-of-use rate, then that's the darker blue line. You can see there that most of21A.22blue line. You can see there that most of22rates just to understand what the in	specific mpact not e, EV

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1	results in the report, but overall the	1	of it and then you also are able to sell
2	results were based on assumptions regarding	2	more energy externally when you've
3	shifting of load from overall results in	3	implemented the CDM. So, while
4	other jurisdictions, not on specific rates.	4	electrification is best, I'm not trying to
5	GREENE, Q.C.:	5	minimize the importance of maximizing the
6	Q. Okay. Turning now to your overall	6	export sales. As Melissa indicated, the
7	observations from the work that you did.	7	time-of-use rates using smart charging for
8	Mr. Fagan, what are the take-aways that we	8	electric vehicles seems to make the most
9	should take from your analysis?	9	sense initially, but a little bit more
10	MR. FAGAN:	10	careful analysis, you know, could reveal
11	A. I think the points listed on this slide have	11	that broader use of AMI could make sense for
12	generally been covered in the presentation	12	the province. And then, lastly, but
13	this morning, but at the highest level,	13	certainly not least, the government—federal
14	policy supported electrification and	14	and provincial policies have a significant
15	enhanced CDM including the main response	15	effect on reducing the costs for energy
16	makes the most sense for customer outcomes.	16	efficiency and for electrification.
17	Electrification clearly has the highest	17	GREENE, Q.C.:
18	mitigation value because of its increasing	18	Q. If your findings are generally accepted,
19	load to contribute to paying for fixed	19	what would you recommend be the next steps
20	costs. The CDM is critically important	20	to do further analysis?
21	because of its ability to help avoid future	21	MR. FAGAN:
22	expenditures in capacity needs, and at the	22	A. Well, essentially as you would expect, based
23	same time, it does allow increased levels of	23	on the information and we've provided, the
24	export sales and it helps to reduce bills at	24	specific policies around electrification
25	individual facility levels because of	25	would need to be developed. Certainly, the
			1 2/
	Page 62		· · ·
1	Page 62 reduced consumption. As Melissa had	1	Page 64
	Page 62 reduced consumption. As Melissa had indicated, rate design guided by the high-	1 2	· · ·
$ \begin{array}{c} 1\\ 2\\ 3 \end{array} $	reduced consumption. As Melissa had		Page 64 form of incentives that might be used for equipment such as heat pumps would be
2	reduced consumption. As Melissa had indicated, rate design guided by the high-	2	Page 64 form of incentives that might be used for
2 3	reduced consumption. As Melissa had indicated, rate design guided by the high- level analysis we show here can lead to the most efficient price signalling. The	2 3	Page 64 form of incentives that might be used for equipment such as heat pumps would be important. I mean, for example, a policy discussion could revolve around how much of
2 3 4 5	reduced consumption. As Melissa had indicated, rate design guided by the high- level analysis we show here can lead to the most efficient price signalling. The analysis we did captures that, in large	2 3 4 5	Page 64 form of incentives that might be used for equipment such as heat pumps would be important. I mean, for example, a policy discussion could revolve around how much of an incentive are you providing for heat
2 3 4	reduced consumption. As Melissa had indicated, rate design guided by the high- level analysis we show here can lead to the most efficient price signalling. The analysis we did captures that, in large part, but by capturing what the effective	2 3 4	Page 64 form of incentives that might be used for equipment such as heat pumps would be important. I mean, for example, a policy discussion could revolve around how much of an incentive are you providing for heat pumps and are there minimum standards for
2 3 4 5 6 7	reduced consumption. As Melissa had indicated, rate design guided by the high- level analysis we show here can lead to the most efficient price signalling. The analysis we did captures that, in large part, but by capturing what the effective export sales look like when you have	2 3 4 5 6 7	Page 64 form of incentives that might be used for equipment such as heat pumps would be important. I mean, for example, a policy discussion could revolve around how much of an incentive are you providing for heat pumps and are there minimum standards for those heap pumps that you're looking at? Do
2 3 4 5 6 7 8	reduced consumption. As Melissa had indicated, rate design guided by the high- level analysis we show here can lead to the most efficient price signalling. The analysis we did captures that, in large part, but by capturing what the effective export sales look like when you have different levels of rate design and you	2 3 4 5 6	Page 64 form of incentives that might be used for equipment such as heat pumps would be important. I mean, for example, a policy discussion could revolve around how much of an incentive are you providing for heat pumps and are there minimum standards for those heap pumps that you're looking at? Do you couple provision of heat-pump rebates
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2 3 4 5 6 7 8	reduced consumption. As Melissa had indicated, rate design guided by the high- level analysis we show here can lead to the most efficient price signalling. The analysis we did captures that, in large part, but by capturing what the effective export sales look like when you have different levels of rate design and you shift the buckets of consumption internally to allow for greater levels of the export	2 3 4 5 6 7 8	Page 64 form of incentives that might be used for equipment such as heat pumps would be important. I mean, for example, a policy discussion could revolve around how much of an incentive are you providing for heat pumps and are there minimum standards for those heap pumps that you're looking at? Do you couple provision of heat-pump rebates with, you know, a requirement to, you know, to try to improve building shelves at the
2 3 4 5 6 7 8 9 10 11	reduced consumption. As Melissa had indicated, rate design guided by the high- level analysis we show here can lead to the most efficient price signalling. The analysis we did captures that, in large part, but by capturing what the effective export sales look like when you have different levels of rate design and you shift the buckets of consumption internally to allow for greater levels of the export sales. We do note existing levels of	2 3 4 5 6 7 8 9 10	Page 64 form of incentives that might be used for equipment such as heat pumps would be important. I mean, for example, a policy discussion could revolve around how much of an incentive are you providing for heat pumps and are there minimum standards for those heap pumps that you're looking at? Do you couple provision of heat-pump rebates with, you know, a requirement to, you know, to try to improve building shelves at the same time? EV charges. Figuring out where
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2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	reduced consumption. As Melissa had indicated, rate design guided by the high- level analysis we show here can lead to the most efficient price signalling. The analysis we did captures that, in large part, but by capturing what the effective export sales look like when you have different levels of rate design and you shift the buckets of consumption internally to allow for greater levels of the export sales. We do note existing levels of industrial curtailment and potentially increased levels of that for demand response is critically important. That's a winter- peak capacity or peak-load shaving measure that doesn't necessarily involve a reduction in energy consumption and that's particularly important given the concerns about capacity needs in the future. You know, we note that it is better to do electrification as opposed to just maximize the exports sales, but at the same time,	2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	Page 64 form of incentives that might be used for equipment such as heat pumps would be important. I mean, for example, a policy discussion could revolve around how much of an incentive are you providing for heat pumps and are there minimum standards for those heap pumps that you're looking at? Do you couple provision of heat-pump rebates with, you know, a requirement to, you know, to try to improve building shelves at the same time? EV charges. Figuring out where and how many. We have a general sense of the total number of charges you would need, but exactly where they end up going in, and as I note below, the rate structures that would apply to those would be important. So, developing the CDM Programs themselves, what we have seen is that the enchantment of CDM Programs would be significantly—it's a significant bump up in your CDM activity is what we would be recommending. The development of those programs, it's full of
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# Muskrat Falls Rate Mitigation Hearing

	Page 65		Page 67
1	the CDM Programs exist because of the market	1	today where I think, as we work through this
2	barriers that in place for people doing	2	over the next, certainly the next decade,
$\begin{vmatrix} \overline{3} \end{vmatrix}$	energy efficiency on their own. Otherwise	$\frac{2}{3}$	the area that you've looked at more closely,
4	all of this stuff would just be done. So,	4	we're going to need to understand better.
5	you know, in a way, you look carefully at	5	Those three, electric vehicles, the dynamics
	how those programs can help to transform the	6	-
$\begin{vmatrix} 6 \\ 7 \end{vmatrix}$	1 0 1		around the heat pump phenomenon that we're
7	market, and at the same time provide, in	7	seeing and how important that's going to be,
8	particular for customers who have less	8	and also some rate design implications of
9	access to capital, addressing inequities	9	CDM. If I could start with electric
10	that might otherwise—that have already begun	10	vehicles, Ms. Sheppard, if you could perhaps
11	to show up because most likely the heat pump	11	turn to page 45 of your September 30 report?
12	installations that have already occurred are	12	And there's a table there, Table 14. And
13	not occurring at the level of the lowest	13	what I see there is the amount of stock in
14	income customers, for example, in the	14	the low scenario and the high scenario that
15	province. And then, certainly looking	15	you expect to occur for electric vehicles by
16	carefully at rate design approaches is going	16	2030 and there's a fair bit of variability
17	to continue to make a lot of sense.	17	there, one and a half percent and seven and
18	Certainly, an initial form of TOU pricing	18	a half percent. And I wonder if I can next
19	for EV load is sort of the easiest rate	19	take you to page 41? And there's a footnote
20	design policy to implement on a quicker	20	at the bottom of the page 43, and if you can
21	timeframe. And then, continuing to give	21	just scroll up, just a little, so we can see
22	careful attention to the monies that are	22	where the reference is through the footnote?
23	available federally and the provincial	23	Thank you. It says, "Synapse use
24	policies that support electrification and	23	Newfoundland's historical pre-29 electrical
25	increase energy efficiency would be	25	vehicle adoption rate to develop the early
25	mercase energy enherency would be	25	veniele adoption rate to develop the early
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1	Page 66	1	Page 68
1	critically important. So, those are the	1	portion of the technology curve." The
2	critically important. So, those are the four broad groupings of next steps that we	2	portion of the technology curve." The footnote is to an article which is
2 3	critically important. So, those are the four broad groupings of next steps that we see.	2 3	portion of the technology curve." The footnote is to an article which is interestingly called, "Looking For a Place
$\begin{vmatrix} 2\\ 3\\ 4 \end{vmatrix}$	critically important. So, those are the four broad groupings of next steps that we see. GREENE, Q.C.:	2 3 4	portion of the technology curve." The footnote is to an article which is interestingly called, "Looking For a Place to Plug In". The reference in the article,
2 3 4 5	critically important. So, those are the four broad groupings of next steps that we see. GREENE, Q.C.: Q. Okay. Thank you, Panel. That concludes my	2 3 4 5	portion of the technology curve." The footnote is to an article which is interestingly called, "Looking For a Place to Plug In". The reference in the article, the article is about 18 months old, and it's
2 3 4 5 6	critically important. So, those are the four broad groupings of next steps that we see. GREENE, Q.C.: Q. Okay. Thank you, Panel. That concludes my questions, Chair.	2 3 4 5 6	portion of the technology curve." The footnote is to an article which is interestingly called, "Looking For a Place to Plug In". The reference in the article, the article is about 18 months old, and it's about the number of electric vehicles in the
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	ber 7, 20			Muskrat Fails Rate Mitigation Hearing
1		Page 69		Page 71
1		said it just a moment ago that you have an	1	you mentioned, it is generally thought that
2		idea as to how many electric chargers we	2	seeing electric vehicle charging stations
3		might need to have installed, but you	3	around and knowing that the chargers are
4		haven't really looked into exactly where	4	available and that there's one near your
5		they would be. What's your sense of that?	5	work or there's one near where you shop is
6		What's the numbers?	6	an important psychological effect to get
7	DR. I	HOPKINS:	7	folks to be willing to accept the idea that
8	A.	If you could go to page 53 of the report,	8	they're going to be able to drive their EV.
9		Table 15, the number of chargers are shown	9	YOUNG, Q.C.:
10		here on this chart. So there's level 1	10	Q. I wonder if we can pull up slide 35 from
11		chargers and fast chargers and we see that	11	this morning's presentation? Thank you.
12		they have relatively low case adoption for	12	The third bullet there, it says, "Electric
13		the province would need relatively fewer	13	grate design or incentive rates have
14		chargers, but to avoid setting barriers for	14	moderate impact on customer economics." I'm
15		the high case, you would need substantially	15	going to make an assumption and ask you to
16		more chargers. The other fast chargers	16	respond to it, that the economic advantage
17		might be, you know, stretching here, from	17	of having an electric vehicle verses other
17		here west, you know, it's a stretch across	17	fuel sources is sufficient that you don't
1		•	18 19	
19		the island, for example; whereas, the level		need to incent it too much to happen, so the
20		two chargers might be more scattered around	20	time of use considerations you're bringing
21		in workplaces, retail establishments, et	21	to the table are really about shaping the
22	VOU	cetera.	22	load to avoid the peak, is that right?
23		NG, Q.C.:	23	DR. HOPKINS:
24	Q.	And as I mentioned, we're kind of late	24	A. I would say there's two effects, definitely
25		coming to the table here, so I imagine	25	the shaping the load piece is essential to
		Page 70		Page 72
1		there's a fair bit of research we can look	1	get maximal system benefit, but also getting
2		to or at least just observations we can look	2	to the psychological piece, even if the
3		to from other jurisdictions as to their		
4		•	3	effects on rural customer economics are
		experiences in this regard.	4	relatively minor, the simple existence of a
5		experiences in this regard. IOPKINS:	4 5	relatively minor, the simple existence of a rate targeted towards electric vehicles that
6	DR. H A.	experiences in this regard. IOPKINS: Yeah, a number of places that have higher EV	4 5 6	relatively minor, the simple existence of a
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6		experiences in this regard. IOPKINS: Yeah, a number of places that have higher EV	4 5 6	relatively minor, the simple existence of a rate targeted towards electric vehicles that can be marketed as such may, implies a
6 7		experiences in this regard. IOPKINS: Yeah, a number of places that have higher EV adoption in Newfoundland and, you know,	4 5 6 7	relatively minor, the simple existence of a rate targeted towards electric vehicles that can be marketed as such may, implies a certain level of acceptiveness and blessing
6 7 8		experiences in this regard. IOPKINS: Yeah, a number of places that have higher EV adoption in Newfoundland and, you know, including much more advanced markets and the	4 5 6 7 8	relatively minor, the simple existence of a rate targeted towards electric vehicles that can be marketed as such may, implies a certain level of acceptiveness and blessing for electric vehicles, that the utility
6 7 8 9		experiences in this regard. IOPKINS: Yeah, a number of places that have higher EV adoption in Newfoundland and, you know, including much more advanced markets and the models that we used to develop these numbers	4 5 6 7 8 9	relatively minor, the simple existence of a rate targeted towards electric vehicles that can be marketed as such may, implies a certain level of acceptiveness and blessing for electric vehicles, that the utility supports them, that the policy is in support
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12       A.       I might ask Ms. Whited who has looked at last electric vehicle rates in California to answer that one.       12       not without our cold snaps from time to lime. Five years ago we had a doory which you can Google or you can talk to Liberty about it, they'll tell you, but what I see         15       MS. WHITED:       15       about it, they'll tell you, but what I see         16       A.       I don't think that we've been able to tease       16         17       that out, but it is, you know, California 18       has taken approach that they want to ensure 19       18       the coefficient, the advantage of the technology over resistance heat is quite 20         20       weihel gaoline and so, for that reason, you 23       know, they have really pursued lower rates 24       OR. HOPKINS: 22       A.       Right. 22         24       for electric vehicles than you might 25       otherwise see.       26       at minus—it looks like minus 27 or 30       because I can se how nicely it works to 4       avoid suppertime peak, as you've just 5       5       DR. HOPKINS: 20       10       Voulke at number, like minus 27 or 30       5       DR. HOPKINS: 4       20       Page 74         7       think, or certainly look at it for that 5       described a few minutes ago. So, if for no 4       5       DR. HOPKINS: 5       5       DR. HOPKINS: 4       5         8       reason. 4       acould ado one additional point is that the				
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14       answer that one.       14       you can Google or you can talk to Liberty         15       MS. WHITED:       15       about it, they'l Itel you, but what I see         16       A. I don't think that we've been able to tease       16       here is, as you've remarked, around the zero         17       that out, but it is, you know, California       17       mark and even down to minus 10, fairly flat,         18       has taken approach that they want to ensure       18       the coefficient, the advantage of the         19       that rates are available that make electric       17       mark and even down to minus 10, fairly flat,         20       vehicle fueling as cost effective or the       20       solid, it's two and a half times.         21       same costs are lower relative to fueling       21       DR. HOPKINS:         23       know, they have really pursued lower rates       23       YOUNG, Q.C.:         24       Q. Thank you. I just make that observation       2       further and went down, just say if you         3       because I can see how nicely it works to       3       looked at a number, like minus 23 or         5       described a few minutes ago. So, if for no       5       DR. HOPKINS:         6       other reason.       6       A       I haven't seen actual measured data. If it <td></td> <td>6</td> <td></td> <td></td>		6		
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#### Muskrat Falls Rate Mitigation Hearing

Page 77Page 771that that cost over point is only12experienced for two or three hours and if13your heating system can't quite keep up for34two or three hours, so the temperature in45your space falls by a degree or two and then56you recover and that's fine, but generally67speaking there's a lot of different kinds of78things pulling in different directions at89the low end of that range. My understanding99st beso-called design temperature here in1011St. John's is in the range of minus 20 or so1112and that's a temperature at which the heat1213pumps are still performing quite well.1314YOUNG, Q.C.:1415Q.I would suggest to you it's more true of St.16John's than other parts of the island and1617certainly the Province as your research in1718Labrador shows.1819DR. HOPKINS:1920A.Yes, that's true.21YOUNG, Q.C.:2123And there's a figure 28 on that page. So we23And there's a figure 28 on that page. So we23And there's a figure 28 on that page. So we23And there's a figure 28 on that page. So we23I would sig set to yould see page 66, please?23I woulder if we could see page 66, please?24<
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25 I believe this is Newfoundland Power's 25 peak use is high. I'm going to suggest to
Page 78 Page 80
1 customers and so by 2018, 18 percent of 1 you and ask you respond to it because I know
2 electric heat customers had heat pumps and 2 you've looked at this fairly closely, with
3 the point you raised about the two different 3 respect to heat pumps and not driving the
4 types of heating systems is what I want to 4 peak, would the kind of scenario I talked
5 understand a little bit better. As you've 5 about just now, where people are moving away
6 pointed out in your report, the vast 6 from oil so that they call electric
7 majority and it's clear from this, the vast 7 customers first, with a heat pump, are you
8 majority of heat pumps that people have 8 concerned about how you can manipulate the
9 installed here are the mini-split types, the 9 peak with that scenario?
10 ones that sort we see fairly commonly hung 10 (10:30 a.m.)
11 on the walls here in homes. At the bottom 11 DR. HOPKINS:
12 of the page there's a comment there, you 12 A. The electrification heat pump adoption
13say, I'm going to put words in your mouth, I13discussion is looking at that type of
14know it's dangerous, last week someone got14situation in particular and in our
15accused of treason for doing that, but you15electrification high case we imagine the
16say essentially that to understand the16folks not keeping their oil systems so that
17 effect of heat pumps you have to understand 17 the case that's comparable to what you've
18 how they're used and I suggest to you that 18 just described, including the lower average
18how they're used and I suggest to you that 1918just described, including the lower average coefficient of performance that comes at
18how they're used and I suggest to you that18just described, including the lower average19makes sense. I don't know if you've19coefficient of performance that comes at20researched this particular—I'm going to give20that coldest times. We didn't model in
18how they're used and I suggest to you that 1918just described, including the lower average coefficient of performance that comes at that coldest times. We didn't model in particular those folks switching over18is just described, including the lower average coefficient of performance that comes at that coldest times. We didn't model in particular those folks switching over
18how they're used and I suggest to you that 1918just described, including the lower average coefficient of performance that comes at 2020researched this particular—I'm going to give 2120that coldest times. We didn't model in 2122people, which I'm curious, I'll ask you to22entirely to electric resistance backup, I
18how they're used and I suggest to you that 1918just described, including the lower average coefficient of performance that comes at 2019makes sense. I don't know if you've 2019coefficient of performance that comes at 2020researched this particular—I'm going to give 2120that coldest times. We didn't model in 2122people, which I'm curious, I'll ask you to 2322entirely to electric resistance backup, I 2323respond to, there are people who had oil23would say that one of the things that might
18how they're used and I suggest to you that 1918just described, including the lower average coefficient of performance that comes at 2020researched this particular—I'm going to give 2120that coldest times. We didn't model in 2122people, which I'm curious, I'll ask you to22entirely to electric resistance backup, I

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	Page 81		Page 83
1	well and incorporated well into the other	1	a standard rate offered that you can switch
2	heating systems in their homes to mitigate	2	off of electricity when the temperature is
3	those peak effects to the extent that makes	3	below a certain level, they have an outside
4	sense, that could come in the form of	4	temperature sensor and whenever it's below,
5	incentives, rates, other things. That's	5	you know, minus ten or whatever, it switches
6	getting into details further than we went in	6	over. So we modelled that kind of case in
7	our analysis, but we did look at that	7	the low case, so I think there are a lot of
8	electrification case and the potential peak	8	different options with respect to the
9	impacts of folks not keeping their oil	9	hardware that customer keep in their homes
10	system at all.	10	and whether it's an incentive structure or
11	MR. FAGAN:	11	rate structure that would be intended to try
12	A. And let me just supplement that, it is our	12	to get the most system benefit, while also
13	understanding that Newfoundland Power is	13	making economic sense for the customers.
14	conducting load research studies. Those are	14	MR. FAGAN:
15	critically important studies. I mean, for	15	A. And as a compliment to what Dr. Hopkins has
16	example, part of what those studies will do	16	talked about, we did model the critical peak
17	is help us determine to what extent is the	17	pricing effect also which can have an effect
18	anecdote that you described common or	18	on any peak use essentially, but certainly
19	uncommon, but just getting a better handle	19	to the extent that that type of a rate
$\frac{19}{20}$	on all of that gives us a better	20	structure was in place. That goes a long
$20 \\ 21$	understanding of what type of peak	20	ways towards mitigating whatever the effects
$\begin{vmatrix} 21\\22 \end{vmatrix}$	reductions, for example, you could	21	may be, regardless of the policies you have
$\begin{vmatrix} 22\\23 \end{vmatrix}$	reasonable predict or model. So that type	23	in place around electrification and
23	of analysis is important. Lack of that data	23 24	incentives to retain oil.
24	doesn't reduce the overall effect of our	24 25	YOUNG, Q.C.:
23	doesn't reduce the overall effect of our		
	D 00	20	
	Page 82		Page 84
1	findings, the importance of these patters,	1	Page 84 Q. Can we turn to page 125 of the report
2	findings, the importance of these patters, but that will be critical to help shape the	1 2	Page 84 Q. Can we turn to page 125 of the report because I understand this one better, to
2 3	findings, the importance of these patters, but that will be critical to help shape the type of policies that you may want to have	1 2 3	Page 84 Q. Can we turn to page 125 of the report because I understand this one better, to some extent your answer addressed this, but
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2 3 4 5	findings, the importance of these patters, but that will be critical to help shape the type of policies that you may want to have in place to help minimize instances where peak load increases. You know, we do model	1 2 3 4 5	Q. Can we turn to page 125 of the report because I understand this one better, to some extent your answer addressed this, but the second bullet there on the page refers to the information from the Dunsky Report
2 3 4 5 6	findings, the importance of these patters, but that will be critical to help shape the type of policies that you may want to have in place to help minimize instances where peak load increases. You know, we do model peak load increases associated with	1 2 3 4 5 6	Q. Can we turn to page 125 of the report because I understand this one better, to some extent your answer addressed this, but the second bullet there on the page refers to the information from the Dunsky Report and it talks about the mini-split heat pump
2 3 4 5 6 7	findings, the importance of these patters, but that will be critical to help shape the type of policies that you may want to have in place to help minimize instances where peak load increases. You know, we do model peak load increases associated with electrification from an oil heated, the oil	1 2 3 4 5 6 7	Q. Can we turn to page 125 of the report because I understand this one better, to some extent your answer addressed this, but the second bullet there on the page refers to the information from the Dunsky Report and it talks about the mini-split heat pump systems complementing but not replacing oil-
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	Page 85	1	Page 87
1	economics of, example homes where they are,	1	Q. Right, thank you. Move on now to, well I'm
2	you know, how systems might integrate well,	2	calling it CDM and rate design, I'd like to
3	you know, mini-split systems tend to be good	3	explore this a little further. I wonder if
4	complements to radiator based systems and	4	we could look at the chart on page 7? It's
5	so, being able to displace some large	5	in your presentation also, but I'm more
6	fraction of oil use for when times when	6	familiar with your report, page 7 of your
7	it's, you know, cold but not as cold, or in	7	report. It's Table 1 on page 7. This chart
8	the most commonly used portions of the home,	8	is full of information, this is an excellent
9	for example, you might put a single head in	9	summary chart. If some people, if they read
10	a large open living space and you use that	10	nothing else and they read this, I think
11	to heat the home most of the time, except	11	they'd glean all from it, but there still
12	when you have guests and you turn the heat	12	might be some other important information to
13	on in the back of the house, so you know,	13	understand here. And just so that we can
14	whenever the other kind of situations might	14	understand it, if we took just the first row
15	arise. Houses are all unique; everybody's	15	across, which is No. 6, the high CDM case
16	house has its own characteristics, but I	16	which I understand was there as part of the
17	think this is getting into the details of	17	research, it's not necessarily what you're
18	the kind of program design that would be	18	proposing or suggesting, but just so we
19	reasonable to do when you're thinking about	19	understand it what we see is a fairly high
20	trying to actually figure out how to make	20	rate increase, well a cent and a half less,
21	something like this happen in practice for	21	one point four cents from that scenario and
22	customers.	22	we see a revenue drop and corresponding
23	YOUNG, Q.C.:	23	total energy's expenditures drop in the
24	Q. Thank you. So what I gather from what you	24	third last column there, correct?
25	just said and what was said a little bit	25	DR. HOPKINS:
	Page 86		Page 88
1	earlier is that you have a fairly delegate	1	A. That's right.
2	earlier is that you have a fairly delegate balance to make here, you're trying to	2	A. That's right. YOUNG, Q.C.:
2 3	earlier is that you have a fairly delegate balance to make here, you're trying to electrify, you're trying to get perhaps more	2 3	<ul><li>A. That's right.</li><li>YOUNG, Q.C.:</li><li>Q. So what we're seeing there is a fairly high</li></ul>
2 3 4	earlier is that you have a fairly delegate balance to make here, you're trying to electrify, you're trying to get perhaps more heat pumps in the system, but you are	2 3 4	<ul> <li>A. That's right.</li> <li>YOUNG, Q.C.:</li> <li>Q. So what we're seeing there is a fairly high response to CDM which drives down the total</li> </ul>
2 3 4 5	earlier is that you have a fairly delegate balance to make here, you're trying to electrify, you're trying to get perhaps more heat pumps in the system, but you are concerned about the peak because that drives	2 3 4 5	<ul> <li>A. That's right.</li> <li>YOUNG, Q.C.:</li> <li>Q. So what we're seeing there is a fairly high response to CDM which drives down the total energy which because the costs are fixed</li> </ul>
2 3 4 5 6	earlier is that you have a fairly delegate balance to make here, you're trying to electrify, you're trying to get perhaps more heat pumps in the system, but you are concerned about the peak because that drives capital costs. So it's the program design	2 3 4 5 6	<ul> <li>A. That's right.</li> <li>YOUNG, Q.C.:</li> <li>Q. So what we're seeing there is a fairly high response to CDM which drives down the total energy which because the costs are fixed largely, not much from the incremental</li> </ul>
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	Page 89		Page 91
1	higher rates if they were able to	1	we're seeing in the high CDM case, for
2	participate fully in the CDM, they might	2	example, which highlights this because it
$\begin{vmatrix} 2\\ 3 \end{vmatrix}$	actually have lower overall bills.	$\frac{2}{3}$	doesn't look at electrification, is that
4	MR. FAGAN:	4	rates do indeed go up, but the average bills
5	A. Yes, that's exactly what this shows, the	5	do indeed go down because consumption is
	· · · · · · · · · · · · · · · · · · ·		e 1
6	average customer. What this doesn't show is	6	dropping significantly so, and what a more
7	the distribution of bill effect across all	7	careful look at program design would do
8	the different customer types.	8	would begin to tease out what's fair. Who
9	YOUNG, Q.C.:	9	is going to see their consumption drop and
10	Q. Right, and that's the point I want to	10	why, and what can you do to ensure that all
11	explore a little bit because in this room	11	rate payers have access to the economic
12	all kinds of customers are represented,	12	improvements so that the benefits associated
13	different classes and even within classes	13	with this average bill decrease can be
14	you'll get differences amongst customers.	14	distributed across as much of the customer
15	So the other one that I found very	15	base as is possible. Absent the CDM
16	interesting and we talked about this already	16	programs to the extent that you have a price
17	this morning, you've talked about it, is 12A	17	response affect, those who don't have access
18	which shows a rate decrease and also lower	18	to the CDM programs are going to see the
19	average costs.	19	higher rates and no means to mitigate their
20	MR. FAGAN:	20	consumption, other than straight up customer
21	A. Yes.	21	behaviour turning the thermostat down, for
22	YOUNG, Q.C.:	22	example. But I think if it is a complex CDM
23	Q. So my question is, it's a fairly simple one,	23	program design task to look carefully at how
24	when you're pursuing the rate design that	24	the CDM programs can address the inequities
25	might work best and the, I suppose the suite	25	that otherwise are going to occur. Now you
	Page 90	-	
1			Page 92
	-	1	Page 92 talked about 12A and you talked about 6
$\begin{vmatrix} 1\\ 2 \end{vmatrix}$	of options you have, which is not just rate	1	talked about 12A and you talked about 6,
2	of options you have, which is not just rate design, it's also electrification and things	2	talked about 12A and you talked about $6$ , those are sort of the opposite ends of
2 3	of options you have, which is not just rate design, it's also electrification and things of that nature, some of which can be done	2 3	talked about 12A and you talked about 6, those are sort of the opposite ends of spectrum here. I mean, 12A excludes CDM
2 3 4	of options you have, which is not just rate design, it's also electrification and things of that nature, some of which can be done through rate design, but other programs and	2 3 4	talked about 12A and you talked about 6, those are sort of the opposite ends of spectrum here. I mean, 12A excludes CDM effects and clearly shows net benefits. 6
2 3 4 5	of options you have, which is not just rate design, it's also electrification and things of that nature, some of which can be done through rate design, but other programs and incentives can occur, would you—and I don't	2 3 4 5	talked about 12A and you talked about 6, those are sort of the opposite ends of spectrum here. I mean, 12A excludes CDM effects and clearly shows net benefits. 6 excluded any electrification and shows on
2 3 4 5 6	of options you have, which is not just rate design, it's also electrification and things of that nature, some of which can be done through rate design, but other programs and incentives can occur, would you—and I don't know if your research has gone this far,	2 3 4 5 6	talked about 12A and you talked about 6, those are sort of the opposite ends of spectrum here. I mean, 12A excludes CDM effects and clearly shows net benefits. 6 excluded any electrification and shows on average net bill benefits, but rate
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	the rate, but ultimately what they're paying	1	provided some additional information in
2	is the combination of the rate times the	2	response to Mr. Young's question. One of
3	quantities and we're talking about	3	the questions I had was with respect to the
4	significance just in quantity.	4	direct current fast charging stations.
5	(10:45 a.m.)	5	There doesn't appear and I'm assuming you
6	YONG, Q.C.:	6	will agree with me at this point any sort of
7	A. Accept that, but I guess the only question I	7	third party market for that in this Province
8	have and this is, you know, the rate design	8	and it seems to me that you would need
9	choices and considerations for our future,	9	government or utility intervention to get,
10	are whether or not you have to somehow	10	to kick start those fast charging stations
11	protect or certainly be aware of, be	11	and that sort of thing, would you agree with
12	sensitive to the customers who can't easily	12	me?
13	participate in some CDM programs because of	13	DR. HOPKINS:
14	their circumstances, you know, I'll take	14	A. I'm not as familiar with the specific market
15	what is not an uncommon demographic, in fact	15	dynamics here, but generally speaking, yeah,
16	a growing demographic in this Province, is	16	jurisdictions across the US and in Canada
17	an aging couple, empty nesters living in a	17	have found the need to do some sort of, you
18	house without a lot of cashflow and not a	18	know, priming the pump, getting yourself out
19	lot of opportunities to pursue different	19	of a catch twenty-two of charging
20	kinds of fuel switching or CDM programs,	20	infrastructure and –
21	things of that nature. I assume and as I	21	MR. O'BRIEN:
22	said a minute ago, I know you three know a	22	Q. The "chicken and egg" we were kind of –
23	lot more about this than I do, but I assume	23	DR. HOPKINS:
24	that in other places there is some means of	24	A. The "chicken and egg", so some sort of—now
25	protecting or screening the programs to	25	whether that takes the form of, you know,
	Page 94	_	Page 96
1	ensure you don't have untoward effects on	1	incentives, loan guarantees, other things
2	ensure you don't have untoward effects on that sort of demographic?	2	incentives, loan guarantees, other things that might bring third-party investment in
2 3	ensure you don't have untoward effects on that sort of demographic? MR. FAGAN:	2 3	incentives, loan guarantees, other things that might bring third-party investment in or it takes the form of utility investment
2 3 4	ensure you don't have untoward effects on that sort of demographic? MR. FAGAN: A. Yes, you've basically set the table for the	2 3 4	incentives, loan guarantees, other things that might bring third-party investment in or it takes the form of utility investment in some of the infrastructure or all of the
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	Page 97		Page 99
1	coming into effect. There are other things	1	information here with respect to billing
2	that are going to be changing the market,	2	electrification assumptions, and it was with
3	different vehicles that are available. I	3	respect to the high scenario there where you
4	think overall being flexible and nimble,	4	assumed no buildings retained oil heat as
5	having end goals in mind and bringing	5	backup for peak days. In this type of
6	different tools to bear to try to pursue	6	environment, is that something you'd
7	those goals makes a lot of sense to me.	7	realistically expect to happen, to have no
8	MR. O'BRIEN:	8	backup for peak days?
9	Q. And have you seen that in any other	9	DR. HOPKINS:
10	jurisdictions, that kind of package where	10	A. The purpose of that assumption was to sort
11	there's a rate sort of coupled with sort of	11	of test the limits of high potential peak
12	investment at the same time sort of brought	12	impact, not necessarily to say that this is,
12	out as a package?	12	you know, we've generally said the high
13	MS. WHITED:	13	electrification case is more beneficial.
14		14	MR. O'BRIEN:
	A. Absolutely, we've seen that a lot throughout		
16	the northeast, as well as California. So,	16	Q. Okay.
17	for example in Massachusetts some of the new	17	DR. HOPKINS:
18	programs by the utilities include	18	A. This is one case where I might say combining
19	investments in both infrastructure, as well	19	some factors here of trying to aim, you
20	as off-peak incentive rates for EV charging.	20	know, trying to get a lot of electrification
21	MR. O'BRIEN:	21	but managing the peak it would be more
22	Q. All at the once coming out, at the one time?	22	optimal. So, you know, getting that
23	MS. WHITED:	23	retention and coupling those systems
24	A. All at once, yes.	24	together and the various ways that are
25	MR. O'BRIEN:	25	discussed previously makes more sense to me
	Page 98		
1	Page 98 O. And in terms of the incentive rates, just	1	Page 100
1	Q. And in terms of the incentive rates, just	1	Page 100 from a system standpoint and from a customer
2	Q. And in terms of the incentive rates, just sort of looking for an idea as to how that	2	Page 100 from a system standpoint and from a customer standpoint.
2 3	Q. And in terms of the incentive rates, just sort of looking for an idea as to how that works, is it just the time of day kind of	2 3	Page 100 from a system standpoint and from a customer standpoint. MR. O'BRIEN:
2 3 4	Q. And in terms of the incentive rates, just sort of looking for an idea as to how that works, is it just the time of day kind of rate or is there any other complement to	2 3 4	Page 100 from a system standpoint and from a customer standpoint. MR. O'BRIEN: Q. Okay. I appreciate that. And in terms of
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1	Page 101	1	Page 103
	DR. HOPKINS:	1	would that make a big difference to your
$\begin{vmatrix} 2 \\ 2 \end{vmatrix}$	A. So what 29,613 kilowatt hours corresponds to	2	analysis in that scenario?
3	is the amount of heat to be delivered into	3	DR. HOPKINS:
4	the living space in the building and so	4	A. I'd have to go back through and check all
5	given the seasonal average coefficient of	5	the math there, but yes, generally speaking
6	performance you require substantially less	6	if the amount of heat demanded in a
7	kilowatt hours to deliver that much heat	7	household is a substantially less than the
8	because you're simply moving the heat from	8	savings from the heat pump is also that much
9	outside to inside.	9	less.
10	MR. O'BRIEN:	10	MR. O'BRIEN:
11	Q. So essentially you divide your 29,000 by	11	Q. Okay, so would you have had that information
12	your coefficient of performance, which I	12	from Newfoundland Power in terms of the
13	think was 2.75, is that right?	13	average heat usage for an average household?
14	DR. HOPKINS:	14	DR. HOPKINS:
15	A. 2.75.	15	A. I don't remember whether we had that
16	MR. O'BRIEN:	16	particular piece, given that the analysis we
17	Q. And you come down with your 10,000. So that	17	were doing in this case was for oil heating
18	sort of gives you an 18,000 and change	18	homes –
19	kilowatt hour savings, is that right, is	19	MR. O'BRIEN:
20	that how that works or –	20	Q. For oil, yeah
21	DR. HOPKINS:	21	DR. HOPKINS:
22	A. If the home were heated with electric	22	A your average residence that heats with
23	resistance heat, it would in fact demand the	23	electricity is not necessarily the same as
24	29,613 kilowatt hours so that the savings	24	your average residence that heats with oil,
25	from going from resistance to heat pump is	25	and so we built from the oil data, rather
	Page 102		Page 104
1	that 18,000 or some difference.	1	than from electric data.
2	MR. O'BRIEN:	2	MR. O'BRIEN:
3	Q. Yes, and that 29,000, where did you come up		Q. Okay, so the oil data would be different
4	with that figure?	4	than someone moving from base heating to
5	DR. HOPKINS:	5	sort of a heat pump scenario?
6			
1 0	A. So that's based on, I'm trying to remember	6	
	A. So that's based on, I'm trying to remember back, but I think basically we looked at	6 7	DR. HOPKINS:
7	back, but I think basically we looked at	7	DR. HOPKINS: A. Right.
7 8	back, but I think basically we looked at total oil use and total number of oil heated	7 8	DR. HOPKINS: A. Right. MR. O'BRIEN:
7 8 9	back, but I think basically we looked at total oil use and total number of oil heated households to figure out how much oil those	7 8 9	<ul><li>DR. HOPKINS:</li><li>A. Right.</li><li>MR. O'BRIEN:</li><li>Q. And maybe this is a good time to take a</li></ul>
7 8 9 10	back, but I think basically we looked at total oil use and total number of oil heated households to figure out how much oil those households are using on average, that	7 8 9 10	<ul><li>DR. HOPKINS:</li><li>A. Right.</li><li>MR. O'BRIEN:</li><li>Q. And maybe this is a good time to take a break, Madam Chair?</li></ul>
7 8 9 10 11	back, but I think basically we looked at total oil use and total number of oil heated households to figure out how much oil those households are using on average, that corresponds to a certain amount of energy,	7 8 9 10 11	<ul> <li>DR. HOPKINS:</li> <li>A. Right.</li> <li>MR. O'BRIEN:</li> <li>Q. And maybe this is a good time to take a break, Madam Chair?</li> <li>CHAIR:</li> </ul>
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	er 7, 2019		Muskrat Falls Rate Mitigation Hearing
	Page 105	_	Page 107
1	(OFF RECORD – 10:58 A.M.)	1	MS. WHITE:
2	(RECONVENED 11:31 A.M.)	2	A. It could if your peak hours or if your peak
3	CHAIR:	3	window is too short so that you simply shift
4	Q. Thank you. Back to you, Mr. O'Brien.	4	the peak to a different hour. If you can
5	MR. O'BRIEN:	5	shift it into enough of a trough, then you
6	Q. Thank you, Madam Chair. Just one more	6	don't actually create a new peak, just at a
7	question, folks, on this Table 76, the heat	7	different hour.
8	pump loan I guess that you've got indicated	8	MR. O'BRIEN:
9	there, the five years, am I right in	9	Q. Okay, so that's something for rate design to
10	assuming then that your upfront cost assumes	10	have a look at in terms of –
11	or I guess your analysis assumes that the	11	MS. WHITE:
12	upfront cost of the heat pump will be paid	12	A. Absolutely.
13	off over a five-year term, is that right?	13	MR. O'BRIEN:
14	DR. HOPKINS:	14	Q. And just one more question really with
15	A. Right.	15	respect to time of use rates and critical
16	MR. O'BRIEN:	16	peak pricing, did you consider that in terms
17	Q. Okay, so the initial savings you wouldn't	17	of other demand responses, such as, I guess,
18	see until the end of the five years, you'd	18	curtailment and how that would work?
19	see a jump in savings for customers.	19	MS. WHITE:
20	DR. HOPKINS:	20	A. Yes, so we assumed that demand response
21	A. That figure on the slide shows that's five	21	through, say, direct load control, would be
22	years of and then it jumps up –	22	an alternative to doing time of use rates
23	MR. O'BRIEN:	23	with critical peak pricing. We expect that
24	Q. And just shows that increase on the slide.	24	if you already have demand response programs
25	DR. HOPKINS:	25	to that effect in price, that there will be
	Page 106		Page 108
1	A and then it jumps up when you take off the	1	much less load available to shift through
2	system.	2	critical peak pricing, so it's a bit of an
3	MR. O'BRIEN:	2	
4		3	"either/or" proposition.
1 7	Q. Okay. Just one last area and that's with	3 4	"either/or" proposition. MR. O'BRIEN:
5	Q. Okay. Just one last area and that's with respect to the time of use and critical peak		
		4	MR. O'BRIEN:
5	respect to the time of use and critical peak	4 5	MR. O'BRIEN: Q. Okay. All right, those are all my
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1	increased conservation and efficiency."	1	with electricity end uses in further areas
2	This seems like the paradox that we're	2	that we model for the transport sector and
3	struggling with, from a consumer's	3	for the heating sector.
4	perspective, in lay terms, is there another	4	MR. FITZGERALD:
5	way to express that or what exactly is the	5	Q. Okay. In your conclusions, I don't know if
6	critical tension? What are the consumers to	6	this is fair to ask this or not, but do you
7	do, electrify or conserve?	7	think that there may have been a bias
8	MR. FAGAN:	8	against oil in your promotion of
9	A. The short answer is both, and I don't mean	9	electrification?
10	that flippantly. Electrification replaces	10	MR. FAGAN:
11	oil end uses with more economic overall use	11	A. Sorry, could you repeat that question.
12	of electricity. CDM at the same time allows	12	MR. FITZGERALD:
13	you to most efficiently use the electricity	13	Q. You know, are we comfortable, can we be
14	for the end uses that you need; and in	14	comfortable that in your presentation to the
15	particular, it also helps during peak	15	Board that there was no inherent bias
16	periods of time to reduce the overall peak	16	against the oil industry, if you will, and
17	load. So the overall aim would be for the	17	that the electrification solution that
18	electrification increases in load to occur	18	you're advancing is actually the most
19	more during off-peak hours than during on-	19	logical?
20	peak hours, and for the CDM improvements to	20	MR. FAGAN:
21	have a significant impact on peak load while	21	A. Oh yeah, that's straight up economics, this
22	simultaneously there will be off-peak energy	22	just shows what's the least expensive way to
23	savings associated with CDM and export sales	23	get the services that either oil provides
24	will also be increased for all energy	24	for transport or electricity, that either
25	savings that arise from CDM. So the short	25	oil provides for heating or electricity and
	Page 110		Page 112
1	answer is yes, both of those things should	1	then it's a straight up technical and
2	occur; different mitigation effects arise	2	economic analysis comparing the two fuels.
3	from each of them.	3	MR. FITZGERALD:
4	MR. FITZGERALD:	4	Q. In your analysis and in your presentation
5	Q. Well which is so different effects but the	5	was there any consideration given to, you
6	combination provides them most effect, is	6	know, the fact that Nalcor itself, I guess,
7	that –	7	is partially an oil-based company, our
8	MR. FAGAN:	8	economy in Newfoundland has been somewhat
9	A. Yes.	9	reliant on that industry in the recent past,
10	MR. FITZGERALD:	10	was there any consideration of this, you
11	Q. Okay, so but from the consumers—or are you	11	mentioned the new money that's saved by not
12	suggesting that the Provincial Government	12	burning oil, if you will, was there any sort
13	policy should be electrification or is this	13	of macroeconomic view of the best interest
14	a message to consumers that they should take	14	of the Province whether the electrification
15	steps now in the looming Muskrat Falls era	15	could impact on the oil industry at all?
16	to electrify?	16	MR. FAGAN:
17	MR. FAGAN:	17	A. We did not do a macroeconomic analysis. A
18	A. The message of our report to the Board and	18	macroeconomic analysis could look at that
19	to the government and to stakeholders, is	19	and if we were to do that, at the same time
20	that the combination of both of those things	20	you would also want to look at the effect of
21	is important. The message to consumers,	21	the electrification in the CDM for example,
22	individual consumers, is always use	22	and the macroeconomic effects that those
23	electricity more efficiently if you can, and	23	things would have, coupled with whatever
24	in this case you can end up with a better	24	macroeconomic effects might occur from a
1	• •		
25	economic outcome for replacing oil end uses	25	reduction in the use of oil.

	ci 7, 2019		Wiuskiat Fails Kate Witigation Heating
	Page 113		Page 115
	MR. FITZGERALD:		records total export sales by way of
2	Q. Thank you. Just to move to heat pumps	2	gigawatt hours and 47 refers to it in
3	briefly, when you looked at the economics of		monetary terms, correct?
4	the heat pump recommendation, were there	4	MR. FAGAN:
5	other alternatives and particularly I'm	5	A. That's correct.
6	thinking about convection heating, would	6	MR. FITZGERALD:
7	that be a type of heating that could be	7	Q. So the amounts that are expressed here in
8	implemented as well in a general sense?	8	Table 46, total gigawatt hours, are these
9	DR. HOPKINS:	9	including or excluding the Nova Scotia
10	A. I'm not sure I know what you mean by	10	obligations?
11	convection heating.	11	MR. FAGAN:
12	MR. FITZGERALD:	12	A. This excluded the Nova Scotia obligations
13	Q. Convection heating, it's not a mini-split,	13	associated with the block and the
14	it's not a heat pump, it's resistance—if	14	supplementary energy.
15	you're not familiar with that type of	15	MR. FITZGERALD:
16	product, then I'll move on, but it's a	16	Q. Okay.
17	resistant type of heating mechanism, but	17	MR. FAGAN:
18	it's not full on baseboard heating, if you	18	A. But they include flows of surplus power
19	will. If you're not familiar with it, then	19	through the Nova Scotia path.
20	we'll move on.	20	MR. FITZGERALD:
21	DR. HOPKINS:	21	Q. Okay. And by our math, I guess when we
22	A. I'm not familiar with it. Just in general	22	looked at these two tables in combination,
23	terms the amount of heat that goes into the	23	it appears in a general sense that they do
24	space is determined by, and the resulting	24	reveal what the average kilowatt hour price
25	electric demand, are going to be determined	25	is, and I think, and correct me if I'm
	Page 114		Page 116
1	roughly speaking on whether you're moving in		wrong, but we've calculated it to be about
2	the heat pump case or producing it through	2	3.5 cents per kilowatt hour?
3	resistance and the exact mechanism by which	3	MR. FAGAN:
4	the heat is distributed throughout the space	4	A. Yeah, that sounds reasonable. The exact
5	should be a relatively minor effect relative	5	computations are embedded in the numbers
6	to the question of where the heat is coming	6	that we have here.
7	from.	7	MR. FITZGERALD:
8	MR. FITZGERALD:	8	Q. Right, right, so we have to disembed them,
9	Q. Okay, fair enough. The EV and—or the	9	if that's such a word. And as we see, you
10	electric vehicles, was there any	10	know, looking at the embedded calculation,
11	consideration to whether hybrid vehicles	11	if you will, we've calculated about five, by
12	would be an alternative in the circumstance	12	2030. It's about five cents a kilowatt
13	where if you go all electric and the system	13	hour, does that resemble what you recall?
14	goes down, then you have no backup. I mean,	14	MR. FAGAN:
15	is that a, would there be any sort of	15	A. Yes, subject to check, I'd have to go
16	advantage to promoting hybrid vehicles as	16	through and just do the basic math.
17	opposed to all electric?	17	Whatever that basic math looks like putting
18	DR. HOPKINS:	18	these numbers together, that's the answer.
19	A. We've lumped them together, but actually the	19	There's no question there.
20	analysis is a fair split between hybrid	20	MR. FITZGERALD:
21	plug-in vehicles and all electric vehicles.	21	Q. Okay.
22	MR. FITZGERALD:	22	MR. FAGAN:
23	Q. If I could take you now to page 100 of your	23	A. And these are in nominal terms, so you would
24	September 3 report. This is Table 46 and	24	expect that there would be an upward trend
25	47, and 46, I think in a general sense,	25	on a nominal basis.
25			

Octobe	er /, 201			Muskrat rans Rate Mitigation Hearing
1		Page 117	1	Page 119
1		TITZGERALD:	1	MR. FAGAN:
2	Q.	Okay, subject, of course, to the vagaries of	2	A. Well, as our report indicates, we think the
3		forecast, as they go ten years, of course we	3	best outcomes are to electrify up here and
4		recognize that they're probably not as	4	use the energy internally, absolutely. You
5		accurate as our near term forecast, in a	5	can get greater average revenue by doing
6		general sense.	6	that up here, but what's left over should be
7		FAGAN:	7	sold. You can't store it, the facilities
8	A.	Subject to the forecast price, certainly.	8	are just about built, so you have no choice
9		FITZGERALD:	9	but to export it.
10	Q.	So we note that one of the advantages that	10	MR. FITZGERALD:
11		you've mentioned for CDM, of course, is to	11	Q. Sure, of course. At page 129 of your
12		free up electricity for export. I believe	12	report, September 3rd, just the advanced
13		that's one of the underpinnings of the CDM	13	metering infrastructure reference there in
14		initiative?	14	paragraph 7. And here you stated that the
15		FAGAN:	15	broad use of AMI to more fully implement
16	A.	Yes, I would-that's important, the CDM	16	marginal cost based pricing across all
17		effect on shaving peak, it's probably more	17	customers does not appear as economically
18		important when you look at the benefits of	18	attractive. Why is that? What were your
19		CDM, sizeable, a greater amount of those	19	findings there?
20		benefits accrue from the peak shaving value	20	MS. WHITED:
21		of the CDM.	21	A. Simply that the cost of implementing
22		FITZGERALD:	22	advanced metering infrastructure is still
23	Q.	With the low price, relatively low price and	23	fairly high. We estimated approximately
24		I suppose that's a leading question whether	24	\$300.00 all in per meter and the benefits in
25		it's a low price or not, but would you agree	25	jurisdictions that typically implement AMI
		Page 118		Page 120
1		that the 3.5 percent or 3.5 cents a kilowatt	1	often include large meter reading savings.
2		hour is a relatively low cost for-or price	2	We understand that Newfoundland has recently
3		for energy?	3	implemented automated meter reading, AMR,
4	MR. F	AGAN:	4	and so there are fewer benefits on that end.
5	A.	It's a relative term. 3.5 percent is	5	So that's something that needs to be taken
6		relatively low compared to 10 percent and	6	into effect, whether the other benefits that
7		3.5 percent is relatively high compared to	7	AMI might provide and in the absence of
8		2.5 cents.	8	those meter reading savings, may make it
9	(11:45	a.m.)	9	less economically attractive then in other
10	MR. F	ITZGERALD:	10	jurisdictions where those are available.
11	Q.	Sure, but historically speaking, though, in	11	MR. FITZGERALD:
12		your experience, the current market and you	12	Q. Okay. Alternatives to AMI, had Synapse
13		mentioned this morning I think the	13	considered the implementation or the
14		northeastern United States, is that	14	recommendation for seasonal rates, would
15		generally a low price these days and has	15	that be a method of achieving rate
			10	that be a method of demoving face
16		been historically?	16	mitigation?
16 17	MR. F	• • •		
	MR. F A.	been historically?	16	mitigation? MS. WHITED:
17		been historically? AGAN:	16 17	mitigation? MS. WHITED:
17 18		been historically? AGAN: Yeah, the average wholesale prices have definitely been trending down because of the	16 17 18	mitigation? MS. WHITED: A. Seasonal rates with, for example, higher prices in the winter verses lower prices in
17 18 19	А.	been historically? AGAN: Yeah, the average wholesale prices have	16 17 18 19	mitigation? MS. WHITED: A. Seasonal rates with, for example, higher prices in the winter verses lower prices in the summer are possible, but there's not
17 18 19 20	A. MR. F	been historically? AGAN: Yeah, the average wholesale prices have definitely been trending down because of the effect of natural gas prices in the US. ITZGERALD:	16 17 18 19 20	mitigation? MS. WHITED: A. Seasonal rates with, for example, higher prices in the winter verses lower prices in the summer are possible, but there's not much shifting of load that you can do from
17 18 19 20 21	А.	been historically? AGAN: Yeah, the average wholesale prices have definitely been trending down because of the effect of natural gas prices in the US. ITZGERALD: So I guess the question would be, then, you	16 17 18 19 20 21	<ul> <li>mitigation?</li> <li>MS. WHITED:</li> <li>A. Seasonal rates with, for example, higher prices in the winter verses lower prices in the summer are possible, but there's not much shifting of load that you can do from the winter to the summer, and so, for that</li> </ul>
17 18 19 20 21 22	A. MR. F	been historically? AGAN: Yeah, the average wholesale prices have definitely been trending down because of the effect of natural gas prices in the US. ITZGERALD:	16 17 18 19 20 21 22	mitigation? MS. WHITED: A. Seasonal rates with, for example, higher prices in the winter verses lower prices in the summer are possible, but there's not much shifting of load that you can do from

	er 7, 2019		Muskrat Fails Rate Mitigation Hearing
	Page 121		Page 123
1	MR. FITZGERALD:	1	quinstant peaks.
2	Q. So not something you would recommend?	2	MR. FITZGERALD:
3	MS. WHITED:	3	Q. We understand that Newfoundland Power
4	A. No.	4	charges its general service 2.3 and 2.4
5	MR. FITZGERALD:	5	customers monthly demand charges based on
6	Q. Would AMI in a more sort of isolated or	6	each of their rate payers maximum use in the
7	particularized application be effective?	7	month. Is that practice a useful element in
8	For example, if you recommended that they	8	rate design?
9	were used for Industrial Customers or	9	MR. FAGAN:
10	General Service 2.3, could it be	10	A. I'll let Melissa answer it, but I just want
11	cherrypicked that way to give an advantage?	11	to emphasize that our analysis and our
12	MS. WHITED:	12	charge from the reference questions was not
13	A. I would recommend that it be studied. It	13	to dive down into these types of detailed
14	really depends on the type of system and	14	rate design questions, but with that caveat.
15	whether you can reduce the backend costs	15	MR. FITZGERALD:
16	enough to make it worth your while.	16	Q. Okay.
17	Oftentimes those backend costs are	17	MS. WHITED:
18	relatively fixed, despite how many meters	18	A. For larger customers who are accustomed to
19	you have to install; however, I understand	19	these types of charges, they can be useful.
20	that industry is developing rapidly, coming	20	I think what you just referenced is a non-
$21^{20}$	up with new solutions, new types of	20	quinstant peak demand charge based on the
22	software, that might be more modular in	22	customer's highest usage in the month and
23	nature, so I would recommend that that be	23	any hour, as opposed to during the hour of
24	studied.	24	the month or the window of each day where
25	MR. FITZGERALD:	25	the peak is likely to occur. So, it depends
25	Page 122	23	Page 124
1	Q. Okay, thank you. And does Synapse have an	1	-
1 1			
1 2		1	on what types of costs you're trying to reduce the
$\begin{vmatrix} 2\\ 3 \end{vmatrix}$	opinion on the effectiveness of demand	2	reduce. If you're trying to reduce the
3	opinion on the effectiveness of demand charges built into rates?	2 3	reduce. If you're trying to reduce the overall system peak, then you want to make
3 4	opinion on the effectiveness of demand charges built into rates? MS. WHITED:	2 3 4	reduce. If you're trying to reduce the overall system peak, then you want to make sure that your demand charges are set at
3 4 5	opinion on the effectiveness of demand charges built into rates? MS. WHITED: A. Demand charges for large C&I customers have	2 3 4 5	reduce. If you're trying to reduce the overall system peak, then you want to make sure that your demand charges are set at least partially based on Quinstant peaks as
3 4 5 6	<ul><li>opinion on the effectiveness of demand charges built into rates?</li><li>MS. WHITED:</li><li>A. Demand charges for large C&amp;I customers have been widely used and those types of</li></ul>	2 3 4 5 6	reduce. If you're trying to reduce the overall system peak, then you want to make sure that your demand charges are set at least partially based on Quinstant peaks as opposed to only non-Quinstant peak demand
3 4 5 6 7	<ul> <li>opinion on the effectiveness of demand charges built into rates?</li> <li>MS. WHITED:</li> <li>A. Demand charges for large C&amp;I customers have been widely used and those types of customers frequently have some type of</li> </ul>	2 3 4 5 6 7	reduce. If you're trying to reduce the overall system peak, then you want to make sure that your demand charges are set at least partially based on Quinstant peaks as opposed to only non-Quinstant peak demand charges. So, in short, it depends on the
3 4 5 6 7 8	<ul> <li>opinion on the effectiveness of demand charges built into rates?</li> <li>MS. WHITED:</li> <li>A. Demand charges for large C&amp;I customers have been widely used and those types of customers frequently have some type of energy management system where they can</li> </ul>	2 3 4 5 6 7 8	reduce. If you're trying to reduce the overall system peak, then you want to make sure that your demand charges are set at least partially based on Quinstant peaks as opposed to only non-Quinstant peak demand charges. So, in short, it depends on the details of how that's designed.
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3 4 5 6 7 8 9 10 11	<ul> <li>opinion on the effectiveness of demand charges built into rates?</li> <li>MS. WHITED:</li> <li>A. Demand charges for large C&amp;I customers have been widely used and those types of customers frequently have some type of energy management system where they can relatively easily respond to those types of charges. What we have seen on the Residential side is that demand charges are</li> </ul>	2 3 4 5 6 7 8 9 10 11	<ul> <li>reduce. If you're trying to reduce the overall system peak, then you want to make sure that your demand charges are set at least partially based on Quinstant peaks as opposed to only non-Quinstant peak demand charges. So, in short, it depends on the details of how that's designed.</li> <li>MR. FITZGERALD:</li> <li>Q. Okay, fair enough. Thank you, Madame Chair. Those are our questions. Thank you very</li> </ul>
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	er 7, 2019		Muskrat Falls Kate Mitigation Hearing
	Page 125		Page 127
1	it, perhaps we could turn to it, Figure 53	1	Q. And in short, why is it important to, if not
2	of your report. I think it's about page	2	have an absolute maximization of utility
3	119. Page number may have changed with the	3	revenues, to keep them relatively high? Why
4	revision.	4	was that part of your analysis?
5	Am I right in saying that you are	5	MR. FAGAN:
6	advocating for directionally the options	6	A. It's important from a mitigation
7	that are at the right end of that table or	7	perspective. From a rate mitigation
8	that figure?	8	perspective that's important. From a bill
9	MR. FAGAN:	9	mitigation perspective, the combination is
10	A. Advocate is a strong word. We do recommend	10	important.
11	that the Province look at the combinations	11	MR. COXWORTHY:
12	of CDM and electrification because we think	12	Q. So, it's important for both, for bill
13	those hold the biggest benefit. That Figure	13	mitigation to have relatively high utility
14	53 is one representation of putting all of	14	revenues? That's an important goal as well,
15	this together and seeing where things lie.	15	as much as reducing energy requirement,
16	So, I guess the short answer is yes, it's	16	absolute energy requirement?
17	our strong opinion that both of these	17	MR. FAGAN:
18	components are important and both of them	18	A. Well, it's both of those things. You know,
19	are required in some form in order to lead	19	reducing consumption and for those areas
20	to the best outcome for rate payer.	20	where electrification can occur, displacing
	MR. COXWORTHY:	20 21	
21		21 22	oil with more efficient use of electricity
22	Q. And again, is it fair to say, looking at		for the end-use service needed, that's what
23	this figure, that at least part of the	23	gives customers the best outcome.
24	reason why you're strongly recommending the	24	MR. COXWORTHY:
25	directional solutions, I'll call them, at	25	Q. With reference, I started off by addressing
	Page 126	_	Page 128
1	that end is that they relatively maximize	1	your experience in other jurisdictions. Are
2	utility revenue and relatively minimize, in	2	you aware of any other jurisdictions that
3	fact absolutely minimize, energy	3	you've worked in where this type of
4	expenditures?	4	directional approach has been implemented?
5	MR. FAGAN:	5	The directional approach that appears in the
-			
6	A. In short, it certainly indicates best	6	last five bars on Figure 53.
7	customer outcomes on the right-hand side of	6 7	last five bars on Figure 53. MR. FAGAN:
7 8	customer outcomes on the right-hand side of this graph. It's not quite the maximum	6 7 8	last five bars on Figure 53. MR. FAGAN: A. Maybe I'll let you answer that. I mean,
7 8 9	customer outcomes on the right-hand side of this graph. It's not quite the maximum utility revenues, but it's close.	6 7 8 9	<ul><li>last five bars on Figure 53.</li><li>MR. FAGAN:</li><li>A. Maybe I'll let you answer that. I mean, there's many jurisdictions where both</li></ul>
7 8 9 10	customer outcomes on the right-hand side of this graph. It's not quite the maximum utility revenues, but it's close. MR. COXWORTHY:	6 7 8 9 10	<ul><li>last five bars on Figure 53.</li><li>MR. FAGAN:</li><li>A. Maybe I'll let you answer that. I mean, there's many jurisdictions where both electrification and energy efficiency have</li></ul>
7 8 9 10 11	<ul><li>customer outcomes on the right-hand side of this graph. It's not quite the maximum utility revenues, but it's close.</li><li>MR. COXWORTHY:</li><li>Q. That's right. It gets you closer than some</li></ul>	6 7 8 9 10 11	<ul> <li>last five bars on Figure 53.</li> <li>MR. FAGAN:</li> <li>A. Maybe I'll let you answer that. I mean, there's many jurisdictions where both electrification and energy efficiency have been looked at together, perhaps not</li> </ul>
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Octob	er /, 2019		Muskrat Fails Rate Mitigation Hearing
	Page 129		Page 131
1	Emission Vehicle policies towards electric	1	universal across all of the jurisdictions, I
2	vehicles. They're also among the states	2	think, in Canada and the United States and
3	that they have been recently ranked number	3	elsewhere in the world.
4	three in the US on electric energy	4	MR. COXWORTHY:
5	efficiency. So, they're, you know, really	5	Q. So, one to one, you think the lessons that
6	pushing very hard on both of those	6	they're drawn from a jurisdiction like
7	directions.	7	California will apply in Newfoundland and
8	Massachusetts, number one on energy	8	Labrador? That's a reliable measure; that
9	efficiency in the US, has recently	9	the success that's been achieved in
10	implemented heat pump incentives through its	10	California can be expected here?
11	energy efficiency programs. Is also a ZEV	11	MR. FAGAN:
12	state; has electric vehicle incentives, et	12	A. They don't directly apply in the sense that
13	cetera. So, they're similarly pushing on	13	a lot of things are different. You know,
14	both the electrification and the energy	14	the dominant – you know, solar is – I mean,
15	efficiency side of the ledger.	15	California has a significant share of hydro
16	MS. WHITED:	16	also, both its own hydro and imported
17	A. And I would add California as well.	17	hydroelectricity and they also have
18	DR. HOPKINS:	18	significant amount of both wind and solar.
19	A. Oh, right.	19	The demographics are different. It's a
20	MR. FAGAN:	20	summer peaking system, not a – although
20	A. Yeah, I mean, California, all three of these	20	parts of northern California are winter
21		21	1
22	components are in place in California. California has traditionally been one of the	22	peaking actually. So, there's a lot of differences. But what's more stark are the
		23 24	
24	leading energy efficiency states. They've	24 25	parallels and the analogs you can draw
25	had significant inroads, probably more so	23	because at a fundamental level, the
	Page 130	_	Page 132
	than any other state, on electrification for	1	technologies, heat pump technologies and the
2	vehicles and they have been at the forefront	2	electric vehicle technologies and the
3	in rate design efforts over the years to try	3	regulatory impacts of smart rate design can
4	to get the right price signalling in place.	4	reap the benefits regardless of whether or
5	MR. COXWORTHY:	5	not it's California, North Dakota, Florida
6	Q. So, in California, is it rate design that's	6	or Newfoundland.
7	been coupled with electrification to achieve	7	(12:00 noon)
8	these results or is it CDM?	8	MR. COXWORTHY:
9	MR. FAGAN:	9	Q. All that you just mentioned, imported
10	A. It's all. California looks holistically at	10	electricity. One of the factors in
11	energy efficiency policies, at	11	California is their ability to import
12	electrification and electric vehicle	12	electricity and in fact, that's probably – I
13	policies and rate design across a whole	13	think that's probably true of all of the
14	plethora of proceedings in California. It's	14	examples you've just given, Vermont, Mass,
15	hard to keep them all straight. But they	15	they all have access, ready access to
16	look holistically at all of these elements.	16	imported electricity from outside of their
17	MR. COXWORTHY:	17	jurisdiction.
18	Q. California, in terms of the size of the	18	MR. FÅGAN:
19	market, the issues that they face, load	19	A. Yeah, California certainly imports and
20	shapes, customer class, et cetera, is it	20	exports – they're net imported, but
21	comparable to Newfoundland and Labrador?	21	seasonally there are significant export
22	MR. FAGAN:	22	also. Sure, all jurisdictions are -
23	A. It's obviously different in many respects,	23	MR. COXWORTHY:
24	but at its core, electrification and energy	24	Q. And how important is that, the flexibility
25	efficiency and rate design is sort of	25	to be able to import electricity from other

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	Page 133		Page 135
1	jurisdictions, to achieving the types of	1	arrive at an average?
2	results reliably that you're advocating for?	2	MR. FAGAN:
3	MR. FAGAN:	3	A. This is a system wide analysis. So, average
4	A. To achieve the types of results that are	4	customers means the entirety of the customer
5	listed in this report, what's required is	5	base and the variances in consumption
6	you need to have a path for exporting	6	patterns and levels of consumption vary
	surplus energy.	7	across all of the rate classes.
	1 07		
8	MR. COXWORTHY:	8	MR. COXWORTHY:
9	Q. Just for exported? Is imported electricity	9	Q. Sure.
10	important?	10	MR. FAGAN:
11	MR. FAGAN:	11	A. And I think we've made this clear that
12	A. Primarily for exporting surplus energy. You	12	moving forward, looking at the distribution
13	also have a path to import electricity. But	13	of these effects across the rate classes is
14	with this, this is demonstrating the value	14	important and depends upon more than just
15	of exporting surplus electricity in part	15	what we've been able to analyse in this set
16	along with the other elements.	16	of reference questions. But, the average
17	MR. COXWORTHY:	17	customer presentation gives you a good idea
18	Q. Going back though to the factor of imported	18	of the overall direction and magnitude of
10	electricity in these other jurisdictions and	18	mitigation impacts under different scenarios
		19 20	
20	the flexibility that gives if you have		for different policies.
21	access to cheaper electricity from other	21	MR. COXWORTHY:
22	markets. Do we have that in Newfoundland	22	Q. I guess that's what I'm trying – why should
23	and Labrador? Will we have that in	23	we accept that using these average figures
24	Newfoundland and Labrador, based on the	24	are actually going to give us a good
25	information you have?	25	indication?
	5	-	
	Page 134		Page 136
1		1	Page 136 MR. FAGAN:
	Page 134 MR. FAGAN:	1	MR. FAGAN:
2	Page 134 MR. FAGAN: A. I think that's less a part of the equation	1 2	MR. FAGAN: A. Because of the underlying fundamentals. The
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1 1	Page 137		Page 139
1	think carefully about the CDM policies and	1	to and say here's a model? You couldn't
2	the electrification policies and how you	2	apply it exactly to your situation, but that
3	allocate costs across groups of customers.	3	could be patterned to the Newfoundland and
4	These are thorny questions. There's no two	4	Labrador situation? Is there any
5	ways about it. But, the fact that this	5	jurisdiction that you're familiar with that
6	analysis is focused on an average customer,	6	it would be useful to look to or do we
7	you know, in no way minimizes the importance	7	really have to pick and choose and come up
8	of both the magnitude and the direction of	8	with a bespoke model here for what you're
9	the overall effects that are possible. You	9	trying to achieve?
10	know, with the important caveat that, you	10	MR. FAGAN:
11	know, your work is not done. You have to	11	A. Well, I think it's almost a bespoke model,
12	pay attention carefully to what you do on	12	but the components of that model are fairly
13	all of these fronts and they're not – you	13	well understood, even though there – my
14	know, they're not – each of these areas,	14	general sense is no. There's very few
15	rate design, electrification and CDM, comes	15	jurisdictions in North America that are
16	with its own set of challenges. Some of	16	facing exactly what you're facing, you know,
17	which are more easily handled than others.	17	clearly. You know, a new large
18	But, you know, there's no question about it	18	hydroelectric project that's over budget and
19	that it's not a slam dunk. You have to be	19	there's this big rate shock. There's no two
20	careful. But absent doing anything, you	20	ways about it, and you're at the terminus of
20	will have inequities unfold. If there were	20	the system. But all those things
$21 \\ 22$	no policies at all on electrification or	22	notwithstanding, the lessons learned from
23	CDM, there's – but you have the rate	22	the other jurisdictions still apply. The EV
23	increases that are going to be required,	23 24	and the heat pump technologies are still
24		24 25	
23	you're going to have movement and you're	23	there for your taking. The rate design
	Page 138	1	Page 140
$\begin{vmatrix} 1 \\ 2 \end{vmatrix}$	going to have some sort of a distributive	1	approaches exist and the information is out there. So, as much as it's difficult to try
1 /	effect across all of your rate classes. So,		there So as much as it's difficilit to try
$\begin{vmatrix} 2 \\ 2 \end{vmatrix}$		2	•
3	our recommendation would be to grab that	3	to draw a parallel with any other
3 4	our recommendation would be to grab that bull by the horn, so to speak, and continue	3 4	to draw a parallel with any other jurisdiction, be it state, region or
3 4 5	our recommendation would be to grab that bull by the horn, so to speak, and continue to think carefully and look at what you have	3 4 5	to draw a parallel with any other jurisdiction, be it state, region or province, that doesn't make the lessons
3 4 5 6	our recommendation would be to grab that bull by the horn, so to speak, and continue to think carefully and look at what you have to do to minimize inequities that could	3 4 5 6	to draw a parallel with any other jurisdiction, be it state, region or province, that doesn't make the lessons learned in those other regions and the broad
3 4 5 6 7	our recommendation would be to grab that bull by the horn, so to speak, and continue to think carefully and look at what you have to do to minimize inequities that could occur, absolutely.	3 4 5 6 7	to draw a parallel with any other jurisdiction, be it state, region or province, that doesn't make the lessons learned in those other regions and the broad implications of this analysis any less
3 4 5 6 7 8	our recommendation would be to grab that bull by the horn, so to speak, and continue to think carefully and look at what you have to do to minimize inequities that could occur, absolutely. And both CDM and electrification	3 4 5 6 7 8	to draw a parallel with any other jurisdiction, be it state, region or province, that doesn't make the lessons learned in those other regions and the broad implications of this analysis any less effective.
3 4 5 6 7 8 9	our recommendation would be to grab that bull by the horn, so to speak, and continue to think carefully and look at what you have to do to minimize inequities that could occur, absolutely. And both CDM and electrification programs in other parts of North America	3 4 5 6 7 8 9	to draw a parallel with any other jurisdiction, be it state, region or province, that doesn't make the lessons learned in those other regions and the broad implications of this analysis any less effective. MR. COXWORTHY:
3 4 5 6 7 8 9 10	our recommendation would be to grab that bull by the horn, so to speak, and continue to think carefully and look at what you have to do to minimize inequities that could occur, absolutely. And both CDM and electrification programs in other parts of North America grabble with this and, you know, CDM in	3 4 5 6 7 8 9 10	to draw a parallel with any other jurisdiction, be it state, region or province, that doesn't make the lessons learned in those other regions and the broad implications of this analysis any less effective. MR. COXWORTHY: Q. You say there's a lot more work left to be
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3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	<ul> <li>our recommendation would be to grab that bull by the horn, so to speak, and continue to think carefully and look at what you have to do to minimize inequities that could occur, absolutely.</li> <li>And both CDM and electrification programs in other parts of North America grabble with this and, you know, CDM in particular, there's a whole slew of CDM-like design approaches that should be considered. I mean, you're a less aggressive province with respect of, for example, the leading states and even the leading provinces, I believe. There's important lessons that you can learn. But it's not a simple undertaking.</li> <li>MR. COXWORTHY:</li> <li>Q. No, and that's understood. But is there any other jurisdiction – I know you've been pointing to California as being a good</li> </ul>	3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	<ul> <li>to draw a parallel with any other jurisdiction, be it state, region or province, that doesn't make the lessons learned in those other regions and the broad implications of this analysis any less effective.</li> <li>MR. COXWORTHY:</li> <li>Q. You say there's a lot more work left to be done; that would need to be done to reasonably implement some of the directional solutions that you're strongly recommending. How much of the work have you been able to do? I mean, have we just scratched the surface?</li> <li>MR. FAGAN:</li> <li>A. I think we've done more than scratch the surface. I think putting your finger on the potentials involved is important. I think that, you know, the work that Dunsky has just completed is an important element of</li> </ul>

	Page 141	1	Page 143
	flows overtime, given what's going on with	1	MR. FAGAN:
$\begin{vmatrix} 2 \\ 2 \end{vmatrix}$	potential for a flatter load and given what	2	A. I mean, for example, the results of
3	the possibilities are for increased	3	Newfoundland Power's load research study,
4	electrification and reduced energy from CDM,	4	that would be really important to really
5	just putting that in one place is more than	5	help inform this. If you wanted to do some
6	scratching the surface. I would say that,	6	pilot programs to look more carefully at
7	you know, to use that same analogy, you	7	response to TOU, those things take time. So
8	know, perhaps – you know, beginning of Phase	8	I think that type of data collection would
9	1, we were – and even into the conclusion of	9	be important to the accuracy of the finished
10	Phase 1, we were scratching the surface.	10	product, absolutely. Not to mention just,
11	So, the putting it together, the synthesis	11	you know, are you going to be good with the
12	involved in coming up with Table 1 and 2,	12	LIL over the next five years, over the next
13	for example, helps to shine a little bit of	13	two years, over the next ten years, and what
14	a more focused light on what the concerns	14	more will you know six months, eighteen
15	are and what the potential remedies are.	15	months down the line, and how might that
16	But diving down into the rate class and the	16	impact how important particular peak shaving
17	thorny issues of how you implement policy to	17	things are. You know, are there any
18	minimize inequities, that's the next step,	18	significant changes in export markets. We
19	and that's essentially what we laid out in	19	actually don't think that there will be. I
20	the series of next steps there that the	20	think it's more about what's happening
21	Province will need to tackle.	21	internally and what your load research may
22	MR. COXWORTHY:	22	tell you. That might be one of the more
23	Q. Synapse has been involved in this process	23	important pieces of data that would be
24	for the better part of a year to arrive at	24	useful to have to try to flush this out. I
25	the point you've arrived at. I think it's	25	mean, some of the rate design stuff is
	Page 142		Page 144
1	understood with good cooperation from Hydro,	1	somewhat academic, you can do it, but it's
2	Nalcor, Newfoundland Power, that the	2	all going to depend upon the type of data
3	information you've asked for has been	3	you have access to, to test how accurate the
4	provided. If you were to be tasked,	4	results actually are.
5	similarly resourced, with similar	5	MR. COXWORTHY:
6	cooperation from Nalcor and Hydro, to take	6	Q. If we could turn to page 39 of your
7	this analysis to its end point, to the end	7	presentation. Thank you, the table with the
8	point of digging down, drilling down into	8	CDM adoption rates of technologies, low and
9	class effects, to drilling down to what	9	high scenarios, and I wanted to ask some
10	actually is implementable, both reasonably	10	questions about the third band for the
11	and in terms of having some reasonable	11	island there, which I understand to be for
12	certainty, in terms of outcomes, how long	12	industrial customers.
13	would that take you? If it's taken you the	13	DR. HOPKINS:
14	better part of a year to get to where you	14	A. Correct.
15	are now, how long would that take? Would it	15	MR. COXWORTHY:
16	take another year, two years?	16	Q. The IND?
17	MR. FAGAN:	17	DR. HOPKINS:
18	A. It would depend upon the specific scope,	18	A. Yes.
19	certainly less than two years to begin to	19	MR. COXWORTHY:
20	put this – you know, get to the next level	20	Q. Yes, thank you, and I wanted to have your
21	of focus. It's hard for me to put a number	21	comment on how you've arrived at the
22	on that. You can do a lot of work in a	22	projections of 14.5 percent for 2030 under
23	year.	23	the base case, and 25.8 percent under the
24	MR. COXWORTHY:	24	low rate case, and 40.1 percent for the high
25	Q. But you're saying perhaps two years?	25	case by 2030?

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	DR. HOPKINS:	1	suite of measures is the ones listed on the
$\begin{vmatrix} 2 \\ 2 \end{vmatrix}$	A. Just to make sure we're on the same page,	2	previous slide. Generally industrial energy
	what's showing here, this is the	3	efficiency tends to be lumpy, come in large
	accumulative adoption rates for CDM measures	4	chunks of reworking of a facility or
5	on average by those dates starting from	5	reworking of a production line, or that sort
	2019, and so in the base case, we basically	6	of thing. So this is smoothed out and also
	assumed that programs continue as they are.	7	industrial energy efficiency tends to be
8	MR. COXWORTHY:	8	outcome focused rather than – we're dealing
9	Q. Existing programs for industrial customers? DR. HOPKINS:	9 10	with, like, a large industrial facility, do
10		10	not necessarily have $a - it's$ commonly a
11	A. The existing programs, so the 1.3 is the current level of performance, as I	11	custom approach to what that particular facility needs, whatever its particular
12	understand it. So if that were to continue	12	blend of end uses are. So I think we were
13	for eleven years, that's 14.5. If	13 14	working more from a top down – sort of top
14	participation rates and adoption rates of	14	down meets bottom up, what seems like a
16	CDM measures were to increase gradually over	16	reasonable combination of what's possible in
17	time, then the cumulative of that you get	17	those measures, and recognizing that we're
18	over time is somewhat higher.	18	not actually in the particular facilities
19	MR. COXWORTHY:	19	doing site assessments ourselves.
20	Q. And are these the same existing measures, or	20	MR. FAGAN:
$\frac{20}{21}$	are you assuming there'll be new measures	20	A. But the low is not just an extrapolation of
$\begin{vmatrix} 21\\22 \end{vmatrix}$	for the low case?	22	existing programs. It's a small tweak in
23	(12:15 p.m.)	23	addition the existing programs.
24	DR. HOPKINS:	24	DR. HOPKINS:
25	A. If you go back to the previous slide,	25	A. The same measures may be being adopted as in
	Page 146		Page 148
1	there's a list of measures that we looked	1	existing programs, but at a more rapid
2	at. Industrial end uses identified here, so	2	click, recognizing perhaps somewhat larger
3	motors, compressors, pumps, fans, process,	3	incentives are the things that might be
4	energy use, HVAC, lighting and other, and so	4	necessary to make those same kinds of things
5	for each of those looked at adoption rates.	5	happen, but faster.
6	Where adoption rates are relatively high	6	MR. COXWORTHY:
7	now, the relative increase is smaller.	7	Q. You said something in the course of that
8	Where adoption rates have been relatively	8	answer, and I understood you to say, and
9	low, the relative increase is higher, but,	9	correct me if I'm wrong, that within that
10	yeah, we looked at each of those end uses	10	industrial band there, there's perhaps
11	and the potential in those areas, and what	11	included some Newfoundland Power customers.
12	plausible paths forward might be for	12	It's not what we – at least, I think of as
13	increasing uptake relative to the, sort of	13	industrial customers of Hydro. It's not
14	usual base case.	14	strictly speaking just that industrial
15	MR. COXWORTHY:	15	customer class that's included in that band?
16	Q. It's not clear to me, and perhaps it's my	16	DR. HOPKINS:
1 1 7		17	A. In terms of energy use, it's overwhelmingly
17	fault, but is the low case for 2030 based on		
18	existing = extrapolating take up of existing	18	dominated by the large customers. Whether
18 19	existing = extrapolating take up of existing CDM programs that Hydro is offering to its	18 19	dominated by the large customers. Whether on the margins $-$ I'm just forgetting at the
18 19 20	existing = extrapolating take up of existing CDM programs that Hydro is offering to its industrial customers?	18 19 20	dominated by the large customers. Whether on the margins – I'm just forgetting at the moment whether we looked at Newfoundland
18 19 20 21	existing = extrapolating take up of existing CDM programs that Hydro is offering to its industrial customers? DR. HOPKINS:	18 19 20 21	dominated by the large customers. Whether on the margins – I'm just forgetting at the moment whether we looked at Newfoundland Power customers in that piece or not.
18 19 20 21 22	existing = extrapolating take up of existing CDM programs that Hydro is offering to its industrial customers? DR. HOPKINS: A. The existing programs, I'm not sure whether	18 19 20 21 22	dominated by the large customers. Whether on the margins – I'm just forgetting at the moment whether we looked at Newfoundland Power customers in that piece or not. MR. COXWORTHY:
18 19 20 21 22 23	<ul> <li>existing = extrapolating take up of existing CDM programs that Hydro is offering to its industrial customers?</li> <li>DR. HOPKINS:</li> <li>A. The existing programs, I'm not sure whether it's limited only Hydro's in the sense that</li> </ul>	18 19 20 21 22 23	<ul> <li>dominated by the large customers. Whether on the margins – I'm just forgetting at the moment whether we looked at Newfoundland Power customers in that piece or not.</li> <li>MR. COXWORTHY:</li> <li>Q. So you don't know, or you can't tell us</li> </ul>
18 19 20 21 22	existing = extrapolating take up of existing CDM programs that Hydro is offering to its industrial customers? DR. HOPKINS: A. The existing programs, I'm not sure whether	18 19 20 21 22	dominated by the large customers. Whether on the margins – I'm just forgetting at the moment whether we looked at Newfoundland Power customers in that piece or not. MR. COXWORTHY:

	D 140		D 171
1	Page 149	1	Page 151
$\begin{vmatrix} 1 \\ 2 \end{vmatrix}$	A. I would say that the analysis is for the	1	Q. Do you know whether those studies drill down
2	island as a whole.	2	to the level of looking at particular
3	MR. COXWORTHY:	3	industrial sectors? I mean, the industrial
	Q. Yes, for energy consumption, I certainly	4	customers that we represent, an oil
5	would understand that obviously the Hydro	5	refinery, mineral ore refining, pulp and
6	industrial customers would, but in terms of	6	paper, are there differences from industrial
7	the information you're presenting here in	7	sector to industrial sector in terms of
8	terms of adoption rates and technologies, is	8	capacity to take up these types of CDM
9	this preponderantly reflecting take up of	9	opportunities?
10	that by Hydro's industrial customers?	10	DR. HOPKINS:
11	DR. HOPKINS:	11	A. Yes, there are definitely differences. We
12	A. Yes.	12	reflect those – well, for things like HVAC
13	MR. COXWORTHY:	13	and lighting, a building that's an
14	Q. And then under the high case to get the 40.1	14	industrial building is roughly comparable to
15	percent, is that extrapolating even greater	15	a building that is used for some other
16	take up of existing – what is factored into	16	purpose, but for things like motors,
17	that to get to that figure?	17	compressors, processes, et cetera, there
18	DR. HOPKINS:	18	would be differences. We based the
19	A. That's basically just that much further take	19	potential in this case on a USD assessment
20	up of those same kinds of measures, whether	20	from the mining industry to try to capture
21	they're motors, compressors, pumps. The	21	the relatively sort of heavy industry nature
22	kinds of end uses that exist in those	22	of the industrial sector here in
23	facilities are roughly the same. It's just	23	Newfoundland, but we did not break it out
24	a question of whether participation in	24	specifically, pulp and paper versus
25	programs to actually achieve those savings	25	refining. If we did that, we'd basically be
	Page 150		Page 152
1	goes just that much faster.	1	Page 152 trying to do it at a facility by facility
1 2	-	1 2	-
	goes just that much faster.		trying to do it at a facility by facility
2	goes just that much faster. MR. COXWORTHY:	2	trying to do it at a facility by facility level. Because there's so many facilities,
2 3	goes just that much faster. MR. COXWORTHY: Q. Are these percentages that are portrayed on	2 3	trying to do it at a facility by facility level. Because there's so many facilities, you would be quizzing us on where we got our
2 3 4	goes just that much faster. MR. COXWORTHY: Q. Are these percentages that are portrayed on this page, are they based on historical or statistical adoption rates from other	2 3 4	trying to do it at a facility by facility level. Because there's so many facilities, you would be quizzing us on where we got our exact data on pulp and paper from a
2 3 4 5	goes just that much faster. MR. COXWORTHY: Q. Are these percentages that are portrayed on this page, are they based on historical or	2 3 4 5	trying to do it at a facility by facility level. Because there's so many facilities, you would be quizzing us on where we got our exact data on pulp and paper from a particular facility. MR. COXWORTHY:
2 3 4 5 6	goes just that much faster. MR. COXWORTHY: Q. Are these percentages that are portrayed on this page, are they based on historical or statistical adoption rates from other jurisdictions? Have you brought the experience of other jurisdictions and	2 3 4 5 6	trying to do it at a facility by facility level. Because there's so many facilities, you would be quizzing us on where we got our exact data on pulp and paper from a particular facility. MR. COXWORTHY:
2 3 4 5 6 7	goes just that much faster. MR. COXWORTHY: Q. Are these percentages that are portrayed on this page, are they based on historical or statistical adoption rates from other jurisdictions? Have you brought the experience of other jurisdictions and industrial customers take up of these types	2 3 4 5 6 7	<ul> <li>trying to do it at a facility by facility</li> <li>level. Because there's so many facilities,</li> <li>you would be quizzing us on where we got our</li> <li>exact data on pulp and paper from a</li> <li>particular facility.</li> <li>MR. COXWORTHY:</li> <li>Q. So there's a USD category for the mining</li> </ul>
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	ber 7, 2019		Muskrat Falls Rate Mitigation Hearing
	Page 153		Page 155
1	their levels of economic production, but is	1	should be able to get there eventually?
2	it typical that they're able to tailor their	2	DR. HOPKINS:
3	operations to substantially reduce their	3	A. If 20 percent savings are there and are cost
4	electricity consumption while maintaining	4	effective, over time when you want a
5	their levels of economic production,	5	production line or a portion of the refinery
6	whatever product they're producing? Is that	6	or the pulp and paper facility is refit
7	typical?	7	sometime over the course of years, that
8	DR. HOPKINS:	8	maybe you capture that opportunity. I
9	A. There are definitely process improvements,	9	mentioned the lumpiness of industrial
10	particularly from my understanding, in motor	10	efficiency acquisition previously. So it's
11	efficiency and pump efficiency using	11	a question of being ready and capturing
12	variable speed drives and other things where	12	those savings when you can find them and
13	you're taking advantage of physics to try to	13	when they work for customers.
14	improve those pieces. There is a very	14	MR. COXWORTHY:
15	common intention, which you were	15	Q. Ms. Whited was speaking to rate design, and
16	identifying, which is the need to maintain	16	in the course of her evidence she talked
17	output. You can't shut a production line	10	about New England jurisdictions as being
18	for a month to retool it to get a 1 percent	18	example where time of use and critical peak
10	• ·	18 19	pricing has been implemented, those rates
	improvement. That doesn't make sense, and so	20	
$\begin{vmatrix} 20 \\ 21 \end{vmatrix}$	there's always those kinds of trade-offs		have been implemented and used. I think
21	which is why the achievable potential is	21	that's correct?
22	usually substantially less than the	22	MS. WHITED:
23	technical potential.	23	A. I was speaking about – well, the time of use
24	MR. COXWORTHY:	24	with critical peak pricing, they've have
25	Q. And so with that in mind, that the	25	been implemented in many different
	Page 154		Page 156
	achievable potential is usually less than	1	jurisdictions. What we used to calibrate
2	what might be technically feasible or	2	the type of response that we would see in
3	possible, again at page 39 of your	3	Newfoundland were Ontario, Quebec, and the
4		1	
1	presentation and the table there and the	4	Pacific North West, specifically Portland
5	take up rates, is that what is technically	5	Gas and Electric in Oregon.
6	take up rates, is that what is technically possible or is it your assessment of what's	5 6	Gas and Electric in Oregon. MR. COXWORTHY:
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			Widskiat I ans Kate Witigation Hearing
	Page 157		Page 159
1	designed slightly differently than the time	1	else today?
2	of use rates for residential customers.	2	GREENE, Q.C.:
3	MR. COXWORTHY:	3	Q. No, Madam Chair. We have now concluded the
4	Q. And what's the usual difference in terms of	4	part of the hearing where we present the
5	between what might be designed for retail	5	evidence that we had of experts to
6	customers, or what are some of the	6	undertake. The next witness on the schedule
7	differences in the design of those rates?	7	would be Mr. Stan Marshall, who I understand
8	MS. WHITED:	8	will be commencing tomorrow morning at 9.
9	A. It can certainly vary by jurisdiction. Some	9	CHAIR:
10	more legacy time of use rates may have	10	Q. Okay, we will adjourn and reconvene tomorrow
11	longer on peak and off peak windows as	11	morning at 9 a.m. Thank you, panel. Safe
12	opposed to shorter ones for residential	12	travels home.
12	customers. There may be higher or lower	13	(UPON CONCLUDING AT 12:32 p.m.)
13	price differentials for residential	13	
14	customers. You know, there's often a	14	
16	concern about gradually implementing the	16	
17	time of use rates, whereas when they've been	17	
18	implemented for many years for large	18	
19	customers, you don't have as much concern	19	
20	about introducing the new rate.	20	
21	MR. COXWORTHY:	21	
22	Q. And In looking at the situation in	22	
23	Newfoundland and Labrador, have you come to	23	
24	any even initial conclusions as to whether	24	
25	time of use rates, critical peak pricing,	25	
	Page 158		Page 160
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	Page 158		Page 160 CERTIFICATE
1	Page 158 would be useful in relation to the island		CERTIFICATE
1 2	Page 158 would be useful in relation to the island industrial customers?	I, Ju	CERTIFICATE dy Moss, hereby certify that the foregoing is a
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