

MANITOBA PUBLIC UTILITIES BOARD

EFFICIENCY MANITOBA'S

2020/23 EFFICIENCY PLAN SUBMISSION

EVIDENCE PREPARED BY

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ON BEHALF OF

**CONSUMERS' ASSOCIATION OF CANADA (MANITOBA)
&
WINNIPEG HARVEST**

(THE CONSUMERS COALITION)

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1.0 INTRODUCTION

On October 25, 2019 Efficiency Manitoba filed its 2020/23 Efficiency Plan (the “Plan”) submission with the Public Utilities Board (the “PUB”). This represents Efficiency Manitoba’s first such submission to the PUB. Efficiency Manitoba was created as a result of findings and recommendations made by the PUB following its Needs For and Alternatives To (“NFAT”) review of Manitoba Hydro’s Preferred Development Plan. The following introduction provides a summary of the PUB’s findings and recommendations as they relate to Manitoba Hydro’s treatment of DSM in its Preferred Development Plan and the creation of Efficiency Manitoba. This background with respect to the creation of Efficiency Manitoba and the issues its creation was meant to address provides a necessary context for the review of the Plan.

On January 13, 2011, the Government of Manitoba advised Manitoba Hydro of its intention to carry out a public Needs For and Alternatives To review and assessment of the Manitoba Hydro’s proposed Preferred Development Plan (“PDP”) for major new hydro-electric generation and Canada-USA interconnection facilities using an independent body. By way of an Order in Council, on April 17, 2013, the Government of Manitoba asked a Panel of the PUB to conduct a review into the Needs For and Alternatives To Review of Manitoba Hydro’s Preferred Development Plan, and issue a Report to the Minister responsible for the administration of The Public Utilities Board Act by June 20, 2014. The Terms of Reference issued for the NFAT Review required the Panel’s report to address the need for Manitoba Hydro’s Preferred Development Plan and to provide an overall assessment as to whether or not the Plan is in the best long-term interest of the Province of Manitoba when compared to other options and alternatives.

The PUB issued its Final Report on June 20, 2014 wherein it made findings and subsequent recommendations to the Government of Manitoba regarding Manitoba Hydro’s PDP and related matters. Amongst these were a number dealing with

Manitoba Hydro's approach to developing the PDP and, in particular, its treatment of Demand Side Management¹ in the planning process. Specifically the PUB noted that:

- Integrated resource planning is a regular practice in many jurisdictions. The purpose of an integrated resource plan is to determine analytically what resource is in the best interest of consumers by examining a full spectrum of possible supply-side and demand-side options and measuring them against a collective set of objectives and criteria. This contrasts with traditional methods of utility resource planning, which emphasize supply-side options such as building new generation, transmission, and distribution facilities. Integrated resource planning also tends to be more transparent than traditional resource planning. The Panel heard evidence that the best practices for integrated resource planning involve placing every conceivable resource option on an equal footing².
- The NFAT Review demonstrated that DSM measures were not equally weighted with other energy options. It was only in the course of the NFAT hearing that it became clear that significantly higher levels of DSM than originally proposed by Manitoba Hydro were both achievable and economic. The Panel agreed with the Consumers' Association of Canada (Manitoba) that Manitoba Hydro did not treat DSM as a stand-alone resource option competitive with other generation options in its resource planning and analyses. In its resource planning, Manitoba Hydro added DSM to each alternative plan it examined. By doing this, Manitoba Hydro effectively screened out DSM as an independent resource to be evaluated against other generation resources. Had Manitoba Hydro undertaken a best-practices integrated resource planning effort, DSM would have been incorporated in the NFAT analysis from the beginning³.
- There is an inherent conflict of interest when a utility acts as both a seller of electricity and a purveyor of energy efficiency measures. Therefore, the Panel

¹ In the Glossary of Terms included in the PUB's Final Report Demand Side Management (DSM) is defined as "A targeted reduction in the demand for electricity through energy efficiency measures and updated codes and standards. DSM can reduce the requirement for new electricity generation and serve as a source of meeting demand in the same manner as new generation. Manitoba Hydro administers DSM through its Power Smart plan".

² Final Report, page 91

³ Final Report, pages 91-92

concluded that the planning and provision of DSM services should be divested from Manitoba Hydro⁴.

- The Panel was concerned that the full potential for Demand Side Management will not be realized if the responsibility for Demand Side Management remained within Manitoba Hydro. Commitment, independent action and external monitoring of performance are the demonstrated and proven ingredients of successful DSM programs⁵.

These findings led the PUB to make the following recommendations⁶:

- The Panel recommends that the Government of Manitoba divest Manitoba Hydro of its responsibilities for Demand Side Management.
- The Panel recommends that the Government of Manitoba mandate incremental annual Demand Side Management targets in the order of 1.5% of forecast domestic load (including codes and standards) over the long term.
- The Panel recommends that the Government of Manitoba establish a regulated, independent arm's-length entity that would be responsible for developing and implementing a plan to meet the mandated Demand Side Management targets.
- The Panel recommends that the Demand Side Management savings reported by the independent arm's-length entity be independently audited on an annual basis.
- The Panel recommends that integrated resource planning become a cornerstone of a new clean energy strategy for the Province of Manitoba.

On January 17, 2018 the Manitoba Government proclaimed The Efficiency Manitoba Act (Bill 19) which established Efficiency Manitoba as a Corporation. The Act⁷ also set out Efficiency Manitoba Hydro's mandate to:

- (a) implement and support demand-side management initiatives⁸ to meet the savings targets and achieve any resulting reductions in greenhouse gas emissions in Manitoba;

⁴ Final Report, page 93

⁵ Final Report, page 251

⁶ Final Report, pages 251-253

⁷ Section 4

- (b) achieve additional reductions in the consumption of electrical energy or natural gas — including resulting reductions in the demand for electrical power — if the reductions can be achieved in a cost-effective manner;
- (c) mitigate the impact of rate increases and delay the point at which capital investments in major new generation and transmission projects will be required by Manitoba Hydro to serve the needs of Manitobans;
- (d) if any of the following are prescribed as being subject to demand-side management under this Act, carry out the prescribed duties in respect of them:
 - (i) demand for electrical power in Manitoba,
 - (ii) potable water consumed in Manitoba,
 - (iii) fossil fuels consumed in the transportation sector in Manitoba; and
- (e) promote and encourage the involvement of the private sector and other non-governmental entities in the delivery of its demand-side management initiatives.

The *Act* also:

- Set out initial savings targets for the next 15 years⁹. For electrical energy, these were annual net savings that are at least equal to 1.5% of the consumption of electrical energy in the preceding year. For natural gas, these were annual net savings that are at least equal to 0.75% of the consumption of natural gas in the preceding year.
- Required¹⁰ that Efficiency Manitoba must prepare an efficiency plan for the three-year period following the commencement date and for each three-year period after that and specified the information to be included in the “Efficiency Plan”.

⁸ The *Act* (Section 2) defines demand-side management initiatives as “a measure or action taken, or a program, service or rate designed to reduce the consumption of electrical energy or natural gas, including a resulting reduction in the demand for electrical power, in Manitoba, but does not include (a) a measure, action, program, service or rate that encourages or results in a switch from the use of one kind of fuel source to another if the switch increases greenhouse gas emissions in Manitoba; or (b) a prescribed measure, action, program, service or rate”.

⁹ Section 7.1

¹⁰ Section 9

- Required¹¹ that the Efficiency Plans be submitted to the PUB and that PUB must review the plan and make a report, with recommendations, to the minister as to whether the plan should be: (a) approved; (b) approved with suggested amendments; or (c) rejected.
- Required¹² that, in reviewing an efficiency plan and making recommendations to the minister, the PUB must consider:
 - (a) the net savings required to meet the savings targets and the plans to address any existing shortfall;*
 - (b) the benefits and cost-effectiveness of the initiatives proposed in the plan;*
 - (c) whether Efficiency Manitoba is reasonably achieving the aim of providing initiatives that are accessible to all Manitobans; and*
 - (d) any additional factors prescribed by the regulations.*

Subsequent Regulations¹³ enacted by the Province set out the following additional factors which the PUB must consider when reviewing an Efficiency Plan:

- (a) the appropriateness of the methodologies used by Efficiency Manitoba to select or reject demand-side management initiatives;*
- (b) whether the plan adequately considers the interests of residential, commercial and industrial customers;*
- (c) whether, if it is practical to do so, at least 5% of Efficiency Manitoba's budget for demand-side management initiatives is allocated to initiatives targeting low-income or hard-to-reach customers;*
- (d) whether the portfolio of demand-side management initiatives required to achieve the savings targets is cost-effective;*
- (e) if the plan includes demand-side management initiatives in excess of those required to achieve the savings targets, whether those initiatives are cost-effective;*

¹¹ Sections 10 and 11(1)

¹² Section 11(4)

¹³ Regulation 119/2019

- (f) whether Efficiency Manitoba's administration budget is reasonable when compared to similar organizations;*
- (g) the impact of the efficiency plan on rates and average customer bill amounts;*
- (h) the reasonableness of the projected savings and Efficiency Manitoba's ability to meet the annual savings targets and the 15-year cumulative savings targets;*
- (i) Efficiency Manitoba's use of private-sector enterprises and non-governmental organizations to deliver demand-side management initiatives;*
- (j) whether the efficiency plan adequately considers new and emerging technologies that may be included in a future efficiency plan;*
- (k) for any efficiency plan after the first one, the reasonableness of Efficiency Manitoba's internal retrospective performance assessment;*
- (l) whether Efficiency Manitoba has reasonably attempted to comply with the directions of the minister.*

On October 25, 2019 Efficiency Manitoba filed its 2020/2023 Efficiency Plan with the Manitoba Public Utilities Board.

2.0 PURPOSE OF REPORT

PUB Order 162-19 granted intervenor status to the Consumers Coalition¹⁴ (the “Coalition”). To assist with its participation in the review of Efficiency Manitoba’s 2020/2023 Efficiency Plan, the Coalition retained Mr. William Harper (an independent consultant).

Mr. Harper has over 40 years’ experience in the electricity industry gained through positions held with the Ontario Ministry of Energy, Ontario Hydro (and one of its successor companies Hydro One Networks) and Econalysis Consulting Services, where he has provided support to intervenors in energy proceedings in British Columbia, Manitoba, Ontario and Quebec on rates, revenue requirements, industry restructuring and resource planning.

¹⁴ Consisting of the Consumers’ Association of Canada (Manitoba) Inc. and Winnipeg Harvest

With specific regards to resource planning, Mr. Harper has appeared as an expert witness before the Québec Régie de l'énergie, the Manitoba Clean Environment Commission with respect to its Needs For and Alternatives Review of Manitoba Hydro's proposed Wuskwatim Project and the Manitoba Public Utilities Board with respect to its Needs for and Alternatives To Review of Manitoba Hydro's 2013 Preferred Development Plan. Mr. Harper has also assisted clients in British Columbia and Ontario with respect to public reviews of integrated resource plans. More specifically with respect to Demand-Side Management plans, Mr. Harper has assisted clients in British Columbia with their participation in public reviews undertaken by the BCUC of DSM Expenditure Applications filed by BC Hydro and FortisBC Inc.

Following discussions with other intervenors and considering the scope of the evidence to be prepared by other consultants retained by the Coalition, it was agreed that Mr. Harper would prepare evidence addressing on the following issues:

- The overall approach taken by Efficiency Manitoba in developing its proposed Efficiency Plan (the "Plan") with focus on the general approach used and parallels with integrated resource planning.
- The inputs and methodology for calculating the cost effectiveness metrics (i.e. Program Administrator Test, Rate Impact and Customer Bill Impacts) used to assess Efficiency Manitoba's proposed Plan, including the use of the marginal value to Manitoba Hydro in the determination of the benefits from DSM savings.
- The allocation methodology proposed by Efficiency Manitoba for assigning its administration and/or overhead budget to natural gas versus electricity customers.

3.0 EFFICIENCY PLAN DEVELOPMENT PROCESS

There are strong parallels between Efficiency Manitoba's undertaking to develop an Efficiency Plan and Manitoba Hydro's undertaking to develop a Power Resource Plan. In both cases:

- The Plans are based on needs that are defined by Manitoba Hydro's load forecast,
- While the Plans' primary focus is with respect to costs there are other considerations that need to be taken into account when establishing a preferred Plan,

- There are a number of different options that could be incorporated in the Plan, each of which has different attributes, and
- The preferred Plan will typically consist of a combination of options.

The fact these similarities exist should come as no surprise since DSM is one of the options that will be considered by Manitoba Hydro in the development of a Power Resource Plan and, in Manitoba Hydro's case, the DSM alternatives it will consider will, in all likelihood, be largely if not entirely based on input from Efficiency Manitoba. Indeed, Efficiency Manitoba's development of an Efficiency Plan can be viewed as micro version of a Resource Plan that is focused just on DSM options/alternatives.

Given this similarity, the PUB's findings¹⁵ following the NFAT Review and the PUB's stated view¹⁶ that "integrated resource planning become a cornerstone of a new clean energy strategy for the Province of Manitoba", a key consideration for the PUB in its review of Efficiency Manitoba's current Plan should be the extent to which Efficiency Manitoba's approach to developing its proposed conforms with the principles of integrated resource planning.

Integrated Resource Planning

Integrated resource planning (IRP) is essentially a planning process that provides for the identification and evaluation of all available resources on an equal basis with a view to the selection of the mix of resources which yields the preferred outcome over the long run. In order to accomplish this IRP includes certain basic components which provide the framework for the decision making process. These "components" typically include:

- Identification of the Objectives of the Plan: This includes objectives both in terms of the timing and amount of "new" resources required and in terms of other considerations that need to be taken into account when developing the plan. In the case of Efficiency Manitoba this involves establishing annual targets in accordance with the requirement of the Efficiency Manitoba Act and associated Regulations. Other considerations typically include economic, environmental and social objectives as well as government regulations and stated policy. In the case of Efficiency

¹⁵ See the Introduction above

¹⁶ PUB's Final Report, page 253

Manitoba, the Act and associated Regulations set out the considerations the PUB must take into account when reviewing the Plan. Once the objectives/considerations have been identified, measures are ascribed to each. In some cases, such as cost considerations, these measures will lend themselves to quantification. In other cases a qualitative approach will be required.

- Identification of all Feasible Options/Alternatives: The important consideration at this stage is that all options that are expected to be available within the timeframe of the plan be identified for consideration. In the case of Efficiency Manitoba, the focus would be on all potential DSM initiatives. However, this component may also involve a high level screening of the options to eliminate those that are viewed as infeasible either for technical, cost or public policy reasons. At this stage the key attributes, reflective of the objectives identified for the plan are documented.
- Identify a Preferred Plan: This typically involves developing multiple resource portfolios (i.e., candidate plans) based on the feasible options; assessing each of the candidate plans based on its attributes and how they align with the objectives and then identifying a preferred plan. This is frequently referred to as multi-criteria or multi-attribute analyses. In the case of Efficiency Manitoba the candidate plans would reflect different combinations of DSM initiatives.

A key principle throughout the IRP process is that all feasible options be identified and evaluated on systematic and balanced basis.

The following sections of the evidence look at the approach Efficiency Manitoba has used in the development of its proposed Plan in terms of how it aligns with the components and principles of an integrated resource planning process as outlined above.

3.1 EFFICIENCY MANITOBA'S DSM TARGETS

As noted in the preceding section the first step in an integrated planning process is to establish the objectives of the plan in terms of the “resources” required. In Efficiency Manitoba’s case, “resources” or amount of net energy savings required are set out in Act in the form of target percentages which are to be used for establishing both the requirements of the Efficiency Plans submitted to the PUB and measuring the actual

performance of Efficiency Manitoba. The following sections look at Efficiency Manitoba's approach in both regards.

3.1.1 Planning Targets

The Efficiency Manitoba Act sets out the annual savings targets that Efficiency Manitoba is responsible for meeting as follows¹⁷:

Subject to the regulations, the annual savings targets that Efficiency Manitoba is responsible for meeting in the 15-year period following the commencement date are as follows:

Electrical Energy

In the initial year following the commencement date, net savings that are at least equal to 1.5% of the consumption of electrical energy in the preceding year. In each of the following years, incremental net savings that are at least equal to 1.5% of the consumption of electrical energy in the immediately preceding year.

Natural Gas

In the initial year following the commencement date, net savings that are at least equal to 0.75% of the consumption of natural gas in the preceding year. In each of the following years, incremental net savings that are at least equal to 0.75% of the consumption of natural gas in the immediately preceding year.

In its proposed Plan, Efficiency Manitoba has calculated the values for the electricity targets for 2020/21, 2021/22 and 2022/23 as follows¹⁸:

- Start with the forecast values for electric use at point of generation from Manitoba Hydro's 2018 Load Forecast;
- Adjust for DSM savings not accounted for in the Load Forecast; and
- Multiply by the 1.5% savings target

¹⁷ Section 7.1

¹⁸ Section A2, page 20 and PUB/EM I-45 a)

The following Table sets out the derivation of the required savings in each year based on the 1.5% savings target.

Table 1 – Derivation of Electric Target Values

Electric forecast year	2019/20	2020/21	2021/22
2018 Electric Load Forecast (GWh)	26,237	26,528	26,759
Add: Cumulative 2018 Codes and Standards (GWh)	160	224	278
Less: 2019/20 DSM Plan (GWh)	350	350	350
Less: Cumulative Plan savings (GWh)	-	373	776
Reference electric load (GWh)	26,047	26,029	25,911
Table A2.1	2020/21	2021/22	2022/23
Reference electric load (GWh)	26,047	26,029	25,911
Target percent of load	1.5%	1.5%	1.5%
Electric energy savings required to achieve target (GWh)	391	390	389

Note: Total may not add up exactly due to rounding. Reference electric load and energy savings values are at generation.

In the Plan the values for the natural gas targets for 2020/21, 2021/22 and 2022/23 have been calculated as follows:

- Start with the 2017/18 actual natural gas volume consumption per Manitoba Hydro's 2017/18 Annual Report;
- Adjust this value consistent with the definition of "consumption" as contained in the Efficiency Manitoba Act;
- Adjust for natural gas savings attributable to the Plan; and
- Multiply by the 0.75% savings target.

The following Table sets out the derivation of the required savings in each year¹⁹.

¹⁹ Appendix A, Section A2, pages 21-22 and PUB/EM I-45 a)

Table #2 – Derivation of Natural Gas Target Values

Natural Gas Forecast Year	2019/20	2020/21	2021/22
2017/18 actual natural gas consumption (million m ³)	2,048	2,048	2,048
Less: Adjustment from Section 2 of the EM Act			
2017/18 adjusted natural gas consumption (million m ³)			
Less: 2019/20 DSM Plan (million m ³)	8.0	8.0	8.0
Less: Cumulative EM Plan savings (million m ³)	-	11.7	24.5
2017/18 reference natural gas volume (million m ³)	1,632	1,621	1,608
Table A2.2	2020/21	2021/22	2022/23
2017/18 reference natural gas volume (million m ³)	1,632	1,621	1,608
Target percent of load	0.75%	0.75%	0.75%
Natural gas savings required to achieve target (million m ³)	12.2	12.2	12.1

Note: Total may not add up exactly due to rounding.

Comments

With respect to the electric target calculation, the Act specifies that net savings are to be equal to at least “1.5% of the consumption of electrical energy in the preceding year”. For purposes of the 2020/21-2022/23 Plan this would be the years 2019/20 to 2021/22 respectively. Since the actual values for these years are not yet known, Efficiency Manitoba’s approach of relying on the most recently available forecast values for electricity is reasonable. It should be noted that the forecast values are “weather normal” values as required by the Act²⁰. It is also noted that Efficiency Manitoba has indicated²¹ it will utilize weather normalized actual electricity consumption defined and provided by Manitoba Hydro to verify actual achievement of energy savings targets. However, the forecast values used are based on electricity volumes measured at the point of generation as opposed to the point of delivery to customer and, as a result include transmission and distribution losses where applicable. Furthermore, the forecast values include electricity used by Manitoba Hydro for Station Service and

²⁰ Section 2 of the Act defines consumption as being on a “weather-adjusted” basis.

²¹ PUB/EM I-42 a)

Construction Power²². In contrast, the *Act* clearly defines²³ consumption in the case of electrical energy as “*electrical energy that is metered and sold to a customer in Manitoba*”. Based on this definition the values used should not include Station Service and Construction Power as the associated electrical energy is not “sold to a customer”. Furthermore it is questionable whether the consumption values should be “measured” at point of generation or at the point of delivery (i.e., the customer’s meter). Finally, the Gross Firm Energy values include sales to customers, such as street lighting, which are not metered and therefore are not included in the definition of consumption as set out in the *Act*.

Efficiency Manitoba was asked about these inconsistencies during the interrogatory process. In the case of Station Service, Construction Power and customers’ unmetered loads Efficiency Manitoba responded that the “requested information is not within the knowledge of Efficiency Manitoba”²⁴. With respect to the use of electrical energy measured at the point of generation, Efficiency Manitoba’s explanation²⁵ was that “this is consistent with prior Manitoba Hydro Power Smart and DSM Plans which were also reported at generation”. Efficiency Manitoba has also indicated that using comparable customers’ meter values will not yield any difference to the resulting electric portfolio included in the Plan²⁶. The question as to whether the targets can be set using an approach different from that set out in the *Act* is a legal matter. However, from a process perspective what is important is that the approach to setting the target savings values be transparent and that any apparent deviations from the statutory requirements be clearly documented. In this regard, the current Plan is deficient as it did not identify and, to date, has not explained the inconsistencies between the Gross Firm Energy values it used for purposes of determining the electrical energy target values and “electrical energy that is metered and sold to a customer” as required by the *Act*.

²² Efficiency Manitoba has indicated (PUB/EM I-45 a)) that the 2018 Load Forecast values are taken from Table 7 of Manitoba Hydro’s 2018 Load Forecast. Inspection of that table demonstrates that the Gross Firm Energy values used include both Station Service and Construction Power.

²³ Section 2

²⁴ Coalition/EM I-1 c) & d)

²⁵ PUB/MH I-45 b)

²⁶ Coalition/EM I-49 b)

Manitoba Hydro's 2018 Load Forecast includes the impact of DSM programs and Codes and Standards implemented in the years 2017/18 and earlier²⁷. In the case of Codes and Standards, this also includes the impact they will have on incremental load (e.g., new buildings) occurring after 2017/18. As a result, it is necessary to adjust the forecast values for 2019/20 through 2021/22 for the impact of DSM programs that have/will be implemented in subsequent years and to also adjust for the further impacts Codes and Standards will have on customers' consumption in those years. In the case of DSM programs this would include the impact of DSM programs implemented by Manitoba Hydro in the years 2018/19 through 2019/20 plus the programs planned by Efficiency Manitoba for the years 2020/21 and 2021/22.

Efficiency Manitoba's DSM program adjustments have:

- Reduced the Load Forecast values for 2019/20 through 2021/22 to account for the savings anticipated from Manitoba Hydro's 2019/20 DSM programs²⁸.
- Reduced the Load Forecast values for 2019/20 through 2021/22 to account for the savings anticipated from Efficiency Manitoba's 2020/21 and 2021/22 programs²⁹.

There are three issues with Efficiency Manitoba's DSM program adjustments. First, Efficiency Manitoba has not made any adjustment for the impact of Manitoba Hydro's 2018/19 DSM Programs³⁰. According to Manitoba Hydro's 2018/19 DSM Plan³¹ the annual anticipated savings from these programs is 355 GWh. This adjustment also needs to be incorporated into the calculation of the target values for 2020/21 - 2022/23.

The second issue is that Efficiency Manitoba claims³² that the adjustments for prior years' DSM programs account for the loss in persistence of savings over time.

However, it is noted that, in terms of the DSM program adjustment values used, there is no decline in subsequent years from the savings attributed to either Manitoba Hydro's

²⁷ Coalition/EM I-2 c)

²⁸ The 350 GWh adjustment set out in Table #1 represents the anticipated savings in 2019/20 from Manitoba Hydro's 2019/20 DSM Plan per PUB/EM I-26 e)

²⁹ The respective adjustments of 373 GWh and 776 GWh represent the forecast Annual Electric Savings from Efficiency Manitoba's 2020/21 programs and 2020/21 plus 2021/22 programs respectively per Section 2, page 3.

³⁰ Coalition/EM I-2 d)-I

³¹ PUB/EM I-26 d), Manitoba Hydro's 2018/19 DSM Plan, page 2

³² Coalition/EM I-2 g)

2019/20 DSM Programs or Efficiency Manitoba's 2020/21 and 2021/22 programs. What is not clear is whether this is due to: a) there being no loss in persistence in the initial years after implementation or b) adjustments for persistence were not included. Further discovery would be required to clarify this issue³³.

Finally, Efficiency Manitoba has confirmed that its DSM program savings values are "annualized values" which means that they are calculated as if all programs were implemented at the start of the year they are introduced³⁴. In reality this is not what occurs as programs are taken up by customers throughout the first year they are introduced such that actual first year's savings are less than the annualized values. However, any attempt to calculate the impact³⁵ would require significant effort. For purposes of calculating the target values to be used in the development of the Plan Efficiency Manitoba's approach is reasonable. For purposes of verifying whether targets are met on an actual basis Efficiency Manitoba as indicated it will be using actual weather normalized load³⁶ and, as result, this issue will not exist.

As Efficiency Manitoba has indicated³⁷ adjustments related to Codes and Standards are also required in order to avoid double counting. The potential for double counting arises from the fact that:

- The 2018 Load Forecast which is used as the starting point includes the impact of Codes and Standards implemented in 2017/18 and earlier years.
- The adjustment for Manitoba Hydro's 2019/20 DSM Programs includes 90 GWh of savings in that year attributable to Codes and Standards³⁸.
- The adjustments for Efficiency Manitoba's 2020/21 and 2021/23 planned DSM programs include savings attributable to both Codes and Standards that were

³³ The interrogatories filed by the Coalition (Coalition/EM I-2 e) & g)) addressed this issue. However, further follow-up, which the timetable and process established by the PUB does not provide for, would be necessary to fully clarify issue.

³⁴ Coalition/MH I-2 f)

³⁵ Apart from making very simplifying assumptions such as the use of a ½ year rule would require significant effort,

³⁶ PUB/EM I-42 a)

³⁷ PUB/EM I-45 a)

³⁸ It is not readily apparent whether this represents the incremental impact of codes introduced prior to 2019/20 and/or also the impact of anticipated Manitoba Building Code amendments in 2020 (per PUB/EM I-39)

enacted in a prior year and which are impacting the consumption of a new load in those years as well as new codes coming into force in those years³⁹.

Efficiency Manitoba has provided an explanation of adjustments made for Codes and Standards⁴⁰ and the values are derived from the forecast impacts included in the 2016/17 Power Smart Plan - 15-year Supplement and calculated as the difference between the forecast impact of Codes and Standards in the reference year and the forecast impact for 2017/18⁴¹. However, it is not clear whether these adjustments appropriately address the potential for double counting. For example, the forecasts in the 2016/17 Power Smart Plan - 15-year Supplement for the years beyond 2017/18 are likely to include additional impacts attributable to new Codes and Standards anticipated to come into effect post 2017/18 on new building and appliances added in those years. These effects were not included in the 2018 Load Forecast and therefore do not need to be “added back”. Again, further discovery would be required to fully resolve these issues.

However, it is noted that for purposes of verifying whether targets are met on an actual basis Efficiency Manitoba will be using actual weather normalized load and the potential for overlap will not exist. What is important, for purposes of developing the target values to be used in future Plans, is that a standard approach be developed and followed.

With respect to the calculation of natural gas target values for 2020/21 through 2022/23, the Act⁴² specifies that net savings are to be equal to at least “0.75% of the consumption of natural gas in the preceding year”. Again, for purposes of the 2020/21-2022/23 Plan this would be the years 2019/20 to 2021/22 respectively. However, in this case, since the forecast sales volumes for natural gas are considered confidential, Efficiency Manitoba’s approach is to use the actual natural gas volume consumption per

³⁹ Coalition/EM I-7 c). It is noted that the relevant Codes and Standards listed in PUB/EM I-39 include a number that were in effect in 2017/18.

⁴⁰ Coalition/EM I-2 d) and PUB/EM I-45 a)

⁴¹ For example, the 160 GWh adjustment for 2019/20 is derived as the difference between the C&S value of 322 GWh reported for 2019/20 and the 161 GWh value reported for 2017/18 (difference likely due to rounding)

⁴² Section 7.1

Manitoba Hydro's 2017/18 Annual Report, the most recently available Annual Report at time the Plan was being prepared is reasonable.

In the case of natural gas, the Act defines consumption as natural gas that *“(i) is metered and sold to a customer in Manitoba, and (ii) is not used as a feedstock or ingredient in the manufacture of a product.”* As a result, Efficiency Manitoba's removal of natural gas consumption used as an input to industrial production and natural gas used to generate electric power⁴³ is appropriate.

The derivation of the natural gas target values for 2020/21 through 2022/23 also includes adjustments for the impact of Manitoba Hydro's 2019/20 DSM programs and Efficiency Manitoba's 2020/21 and 2021/22 planned DSM programs. In this case, the need for such adjustments is open to debate. In the case of the electric targets the starting point was a forecast for the “preceding year” assuming no additional DSM savings beyond that incorporated in the most recent actual consumption values. However, in the case of natural gas the starting point is not a forecast for the preceding year but rather the actual sales in a much earlier year. It would be equally reasonable for Efficiency Manitoba to assume that the 2017/18 actual natural gas volumes are a reasonable proxy for the natural consumption in the preceding year including the impact of any DSM program. Based on this assumption, no adjustments would be required for DSM.

However, if adjustments for DSM are to be included in the derivation of the target values for natural gas, then at least one further adjustment is required. Since the starting point is the actual 2017/18 volumes it would be necessary to include in the adjustments the impact of Manitoba Hydro's (Centra Gas') 2018/19 DSM programs⁴⁴.

It is noted that the inclusion of DSM program adjustments has a minimal effect on the target values for natural gas⁴⁵. As result, for purposes of simplicity it would be reasonable to exclude the DSM adjustments from the calculation for the target values to be used in developing the Plan. Again, it is noted that for purposes of verifying whether

⁴³ The removal of natural gas used to generate electricity aligns with the requirement to removed natural gas used in the manufacture of a product.

⁴⁴ The savings in the 2018/19 DSM Plan, after allowing for interactive effects, are 8.5 million cubic metres per PUB/EM I-26 d)

⁴⁵ Increases them by roughly 1%-2.5%.

targets are met on an actual basis Efficiency Manitoba will be using actual weather normalized volumes and this issue does not exist.

In reviewing the planning targets for electricity savings, while the use of forecast values as the starting point is reasonable, there are distinct differences between the definition consumption as set out in the Act and how it has been determined by Efficiency Manitoba that the PUB should consider. Also, the PUB will need to consider if the DSM adjustments made by Efficiency Manitoba are appropriate.

In reviewing the planning targets for natural gas, while the use of historical use as the starting point is reasonable, the PUB will need to similarly consider whether the DSM adjustments made by Efficiency Manitoba are appropriate or even required.

3.1.2 Attribution to Targets

Section 16 of the Efficiency Manitoba Act requires that:

Efficiency Manitoba must appoint an independent assessor to assess the following and prepare a report on the assessment:

(a) the results obtained by Efficiency Manitoba under an approved efficiency plan;

(b) the cost-effectiveness of obtaining those results;

(c) any other matter prescribed by regulation.

As noted earlier, in terms of measuring the results: “New in-year savings in the first year are determined by the annualized first year savings assuming that the measures were all adopted at the start of the year.”⁴⁶ Efficiency Manitoba has also noted⁴⁷ that “increases in natural gas usage due to interactive effects from electricity DSM programs are treated as a reduction in natural gas saving for purposes of net savings and percent of target achieved”. Finally, with respect to Codes and Standards, the energy savings reported in each year will be the impact of codes and standards due to codes and standards that are in effect in that year. This will include both the incremental impact

⁴⁶ Coalition/EM I-4 d)

⁴⁷ Coalition /EM I-6 a)

from a code that was enacted in a prior year (i.e., that is impacting the consumption of a newly constructed building) or a new code coming into force in that year⁴⁸.

Comments

Attributing savings to DSM programs as if they were all adopted at the start of the year is a reasonable approach. The “annualized” value reflect the savings that the program will contribute (subject persistence) in subsequent years. It is also noted that this approach is consistent with that used by Ontario’s Independent System Operator when reporting savings from Conservation and Demand Management (CDM) programs.

The interactive effects⁴⁹ between electric DSM programs and natural gas consumption need to be accounted in the overall reporting of DSM savings as they are a direct result of the proposed Efficiency Plan⁵⁰. Efficiency Manitoba’s treatment of increased gas used due to Electric DSM initiatives as a reduction in DSM natural gas savings leads to an understatement of the savings due to natural gas portfolio and the associated program administrator cost test (PACT) results. However, it does align with the requirements of the Efficiency Manitoba Act’s definition⁵¹ of net savings:

"net savings" means, in respect of a change in the consumption of electrical energy or natural gas in Manitoba, the savings that occur after taking into account any other adjustments in consumption that are attributable to, or influenced by, the change.

It is noted that neither the natural gas savings attributed to the individual natural gas program bundles nor their PACT reported results include interactive effects⁵². The natural gas portfolio results reported in the Application for both savings and the PACT results do include interactive effects. In its responses to the information requests, Efficiency Manitoba has indicated the PACT results for the natural gas portfolio if the interactive effects are excluded and the value increases from 0.99 to 1.24⁵³. In making

⁴⁸ Coalition/EN I-7 c) and Coalition/EM I-71 a) & b)

⁴⁹ Interactive effects between natural gas and electricity can arise when electric DSM initiatives increase or decrease the use of natural gas.

⁵⁰ PUB/EM I-40 and Daymark I-40

⁵¹ Section 2

⁵² Attachment 3 and Appendix A, Section A3, page 19

⁵³ Coalition/EM I-6 d)

its recommendation as to whether the Plan should be approved the PUB should consider the natural gas portfolio results both with and without interactive effects.

Efficiency Manitoba's plans to include the incremental savings attributable to Codes and Standards implemented prior to its creation and the launch of its 2020/21 programs as contributing towards the achievement of its prescribed targets⁵⁴. The Efficiency Manitoba Regulation does permit such savings to be included:

DETERMINATION OF SAVINGS

When savings may be counted

8(1) Net savings in the consumption of electrical energy or natural gas count towards the respective savings target established in section 7 of the Act if the net savings are reasonably attributable to

...

(c) a code, standard or regulation to which Efficiency Manitoba or Manitoba Hydro has made a material contribution.

Efficiency Manitoba has indicated that it will rely on its third-party evaluator to provide expertise on assessing Efficiency Manitoba's material contribution towards savings from Codes and Standards, including the question of whether it would have to demonstrate that it increased compliance with such Codes and Standards⁵⁵. The outcome of this issue will have to await the first report of the third-party evaluator. However, it would seem unreasonable for Efficiency Manitoba to include savings that contribute targets it is required to meet unless Efficiency Manitoba itself has been involved in the achievement of those savings.

3.1.3 Target Achievement

As noted earlier, for purposes of verifying actual achievement of the targets, Efficiency Manitoba will use the weather normalized actual energy consumption defined and provided by Manitoba Hydro for both natural gas and electricity consumption⁵⁶. The determination of whether or not each year's individual target has been achieved will

⁵⁴ Coalition/EM I-71 b) and PUB/EM I-39

⁵⁵ Coalition/EM I-71 c) and Daymark I-88 a) & b)

⁵⁶ PUB/EM I-42 a)

then be calculated by comparing the actual DSM savings achieved to the actual weather normalized use in the preceding year⁵⁷.

Further, since the achievement of the targets in each year is calculated using a different “base value”, cumulative progress toward achieving the 15 year targets for electricity and natural gas (22.5% and 11.25% respectively) will be calculated by summing the percentage actually achieved in each year⁵⁸.

Comments

Overall, Efficiency Manitoba approach to calculating annual target achievements and cumulative progress towards the achievement of its 15 year target is reasonable.

3.2 EVALUATION CRITERIA (Added December 13, 2019)

As well as the resources required, an integrated planning process requires an identification of any other objectives that need to be considered in the development of the plan and the choice of “resources” to be included. These “objectives” typically reflect the types of favourable impacts stakeholders would expect the choice of resources to yield from an economic, environmental or social perspective. As such they form the basis for the evaluation criteria to be used in determining the appropriate portfolio of options to meet the established resource targets. This section looks at Efficiency Manitoba’s choice of evaluation criteria.

Efficiency Manitoba uses various evaluation criteria at different stages in the development of its Plan⁵⁹. At the initial stage of the Plan’s development, potential options are subject to a high level screen in order to decide whether they should be formally considered for inclusion in the Plan. At this stage the screening (evaluation) criteria include considerations as to whether⁶⁰:

- the technology was not yet approved for use in Canada;
- the technology would not meet municipal permitting requirements;

⁵⁷ Daymark I-83 a) & b)

⁵⁸ Daymark I-83 c)

⁵⁹ The actual plan development process is described and discussed in more detail in Section 3.4

⁶⁰ PUB/EM I-1 a)

- the potential market for the technology was too small to warrant a dedicated program rather than simply applying for a custom incentive;
- the measure would result in high free ridership;
- the program/technology's energy savings claims were not yet proven or are negligible;
- the program required a long lead time for implementation;
- based on the current rate structure, the technology provided little to no benefit;
- although the technology was technically available, no local supplier was willing to stock the product;
- the technology saved energy in warm or mild climates but was not meant for use in Manitoba's climate;
- the technology would not effectively operate in Manitoba's climate; and
- the technology was in its early stages and would need more refining before Efficiency Manitoba would recommend it.

For the balance of the plan development process, the key evaluation criteria used to determine the DSM initiatives (i.e., the specific measures/technologies) to include in the portfolios are the level of energy savings, the program costs, and program cost effectiveness (as per the PACT). To clarify this point, Coalition/EM I-14 b) specifically asked – “What factors were used in determining the individual programs/measures/technologies and the resulting program bundles that were included in the proposed portfolios and what factors were assessed after the portfolios were established?” Efficiency Manitoba's response was:

“Specifically, the quantitative analysis determined program bundle annual incremental energy savings resulting from new participation; annual incremental program costs; and the results of the program administrator cost-effectiveness tests (PACT) including the PACT Ratio, PACT net present value and levelized cost. All other factors and non-energy benefits were calculated after the portfolio was developed”.

Comments

There are an extensive number of DSM initiatives that could be considered for inclusion in Efficiency Manitoba's Plan. IRP principles required that all DSM initiatives been given equal consideration for inclusion in the Plan. However, high level screens such as the one used by Efficiency Manitoba are a practical way of ensuring the options to be considered are realistic without unduly limiting the options to be more formally considered. Efficiency Manitoba also used the provisions of the Act and its associated Regulation⁶¹ to exclude certain initiatives from consideration for inclusion in the Plan. Overall, the high-level screening criteria used by Efficiency Manitoba are reasonable.

For purposes of the subsequent development of the proposed Plan, the Efficiency Manitoba Act and associated Regulation set out both what information is to be included in the Energy Plan and the factors that the PUB is to consider in its review of Efficiency Manitoba's Plan. A number of these could be characterized as objectives including:

- From Section 9 of the Act the requirement that the Efficiency Plan is to include:
 - an assessment of the benefits to be attained if the initiatives proposed under clauses (a) to (d) are implemented during the three-year period, including the benefits to be experienced by
 - (i) those who participate in any of the proposed initiatives,
 - (ii) Manitoba Hydro, and
 - (iii) Manitobans generally, including any environmental benefits, economic development opportunities and enhancements to energy security.
- From Section 11.4 of the Act the requirement that the PUB, in reviewing the Plan, is to consider:
 - (a) the net savings required to meet the savings targets and the plans to address any existing shortfall ;
 - (b) the benefits and cost-effectiveness of the initiatives proposed in the plan; and
 - (c) whether Efficiency Manitoba is reasonably achieving the aim of providing initiatives that are accessible to all Manitobans

⁶¹ Section 2, page 22

- From the Section 11 of the Regulation the requirement that the PUB, in reviewing the Plan, is to consider:
 - o whether the plan adequately considers the interests of residential, commercial and industrial customers;
 - o whether, if it is practical to do so, at least 5% of Efficiency Manitoba's budget for demand-side management initiatives is allocated to initiatives targeting low-income or hard-to-reach customers;
 - o whether the portfolio of demand-side management initiatives required to achieve the savings targets is cost-effective;
 - o whether Efficiency Manitoba's administration budget is reasonable when compared to similar organizations;
 - o the impact of the efficiency plan on rates and average customer bill amounts;
 - o Efficiency Manitoba's use of private-sector enterprises and non-governmental organizations to deliver demand-side management initiatives; and
 - o whether the efficiency plan adequately considers new and emerging technologies that may be included in a future efficiency plan.

The three criteria used by Efficiency Manitoba can be found in the above list. However, there are also a wide range of other factors that could have been included as evaluation criteria.

There is an indication that consideration of Customer Rate Impacts and Bill Impacts were included in Efficiency Manitoba's multi-criteria analysis⁶². However, in PUB/EM I-13 c) Efficiency Manitoba was asked: "Does Efficiency Manitoba agree that cost effectiveness of the portfolio for the program administrator is just one of many factors to consider in developing the portfolio of programs? Does Efficiency Manitoba agree that it would it be reasonable to consider PACT as a determinative factor for the overall portfolio, but that Efficiency Manitoba should consider other screens when determining what programs to include in the portfolio?" In its response Efficiency Manitoba stated:

⁶² Coalition/EM I-14 g)

“Efficiency Manitoba agrees that the PACT is one of the factors to consider in developing the portfolio of programs. Efficiency Manitoba does not agree that it should consider other cost-effectiveness screens when determining what programs to include in the portfolio. The Efficiency Manitoba Regulation (Section 11d and Section 12) has prescribed the PACT as the cost-effectiveness test that should be applied at the portfolio level. In considering the mandated electric and natural gas targets, applying additional non-prescribed cost-effectiveness screens to eliminate or reduce programming to customer segments may restrict Efficiency Manitoba’s ability to satisfy the energy savings targets or to provide equitable and accessible programming”.⁶³

Based on this response, it would appear that customer rate and bill impacts are an after the fact consideration. Also, based on the question, the same presumably applies to other potential factors Efficiency Manitoba could have considered in its evaluation of the portfolios.

The response is particularly problematic from an integrated resource planning perspective and the application of multi-criteria analysis. Integrated resource planning specifically seeks to recognize that there are a number of criteria that need to be considered in the evaluation and selection of a preferred plan. The purpose of a multiple criteria analysis is to clearly set out the trade-offs that are involved when there are multiple and often conflicting objectives to be considered and demonstrate how they have been balanced in arriving at the preferred plan. Indeed, for the PUB to properly consider the various factors identified in the Act and the associated Regulation it too must understand the trade-offs involved.

Rather than ignoring these other considerations during the decision making process and simply reporting on them afterwards, it is important that all relevant considerations be included in the decision making analysis. There may well be certain criteria such as the savings targets or cost-effectiveness that must be met. However, the fact that there are a range of options available means there is likely more than one way of meeting the “mandatory” objectives. The principles of integrated resource planning require that the

⁶³ PUB/EM I-13 c)

choices involved be clearly set out and assessed against an appropriate set of evaluation criteria in a transparent and objective manner.

Admittedly the list of potential evaluation criteria is extensive. However, the criteria used should clearly extend beyond the level of budget and the mandatory considerations related to the energy savings targets and cost-effectiveness. If practical considerations required a shorter list of evaluation criteria then stakeholder processes could have (and should have) been used to identify what were considered to be the more important considerations to be used as evaluation criteria in determining the preferred plan. Overall, Efficiency Manitoba's choice of evaluation criteria is not consistent with what one would expect from an integrated resource planning process.

3.3 OPTIONS CONSIDERED (Added December 13, 2019)

Efficiency Manitoba used a variety of sources to identify potential DSM initiatives that could be included in the Plan. These included historical experience in Manitoba, input commissioned from various consultants, consultations with industry and the EEAG, information on programs from organizations that specialize in energy efficiency and information available online from utilities/DSM agencies⁶⁴. The response to Coalition/EM I-10 g) provides a listing of measures that were considered but not included in the Plan while the response to PUB/EM I-33 b) identifies all of the measures included in the Plan.

Efficiency Manitoba has budgeted to have a revised DSM Potential Study completed in order to inform opportunities to be considered in the next 3-year efficiency plan⁶⁵.

Comments

Based on the evidence, Efficiency Manitoba has canvassed a wide variety of sources in order to identify potential DSM initiatives for inclusion in the Plan. As a result, the pool of measures and technologies created is likely to be representative of those available.

However, Efficiency Manitoba has not documented the information collected in a consistent format nor is it kept in a central repository⁶⁶. Ensuring comparable

⁶⁴ Coalition/EM I-10 c) and Coalition/EM I-75 b)

⁶⁵ Coalition/EM I-10 f)

⁶⁶ Coalition/EM I-10 a) & f)

information is collected for all options to be considered is an important step in ensuring the all options are given an equal consideration. The lack of documentation and a central repository raises concerns regarding both the transparency and consistency in respect to how the options will be considered. In Efficiency Manitoba's case these concerns are compounded by the fact that the assessment of the options and development of programs was undertaken by more than one program design team⁶⁷ which makes the need for information on potential options to be collected/recorded on a consistent basis even more critical.

Another concern is the fact that, in evaluating the measures to be included in the Plan, Efficiency Manitoba did not consider different possible levels of incentives⁶⁸. Rather, for purposes of evaluating each measure a single⁶⁹ set of program design parameters (including incentive level) was developed⁷⁰ and the resulting benefits and cost associated with this design used in the evaluation of the programs and overall portfolio development. However, one of the key inputs into the PACT (i.e., the cost effectiveness test used by Efficiency Manitoba) is the level incentive that will be provided to participating customers⁷¹. The incentive assumption is also likely to have a material impact on the level of participation and hence the annual savings that can be attributed to the measure. Even if a different level of incentive results in a less cost effective program design for the measure concerned there could be beneficial effects on the overall portfolio if:

- The result is a higher level of energy savings which could reduce the need to rely on an alternative measures with even less favourable cost/benefit characteristics, or
- The results favourably align with other evaluation criteria while still producing a portfolio that is cost effective on an overall basis.

⁶⁷ Coalition/EM I-10 e)

⁶⁸ Coalition/EM I-19 a) and Coalition/EM I-20 a)

⁶⁹ The one exception to this seems to be during the refinement of the portfolio when the windows incentive level was reduced to improve cost effectiveness. See PUB/EM I-4

⁷⁰ Coalition/EM I-14 i)

⁷¹ Appendix A, Section A2, page 29

Indeed, unless options with different levels of incentives are considered the plan development process does not align with IRP principles as it does not consider all feasible options.

3.4 PREFERRED PORTFOLIO SELECTION (Added December 13, 2019)

This section of the Evidence examines the portfolio development process followed by Efficiency Manitoba and considers the extent to which it follows the principles of integrated resource planning.

Efficiency Manitoba developed its proposed natural gas and electric portfolios using a three-stage process⁷²:

- Pre-Screening Process: Identified measures/technologies that could potentially be included in either the natural gas or electric portfolio and then undertook a high level screening process to identify those that were not suitable for inclusion based on the criteria outlined in Section 3.2. As noted previously, the measures/technologies excluded at this stage are set out in the response to Coalition/EM I-10 g).
- Preliminary Portfolio Design: Programs were then designed around the remaining measures to create preliminary portfolios for natural gas and electricity⁷³.
- Final Portfolio Design: During this stage the multi-criteria decision analysis was undertaken at both the program bundle and portfolio level (using the evaluation criteria discussed in Section 3.2) and the portfolios were refined with a view to aligning the anticipated savings with the targets, reducing the budget costs and improving the cost-effectiveness of the portfolios. Changes were also made as a result of general quality control corrections. The response to PUB/EM I-4 sets out the specific refinements made to each program bundle. During this stage, two additional measures (Solar Pool Heaters & Solar Hot Water) were removed from program consideration based on their anticipated low participation rates and cost effectiveness results⁷⁴. In addition, a Metis Income Qualified program bundle was

⁷² Coalition/EM I-14 i)

⁷³ PUB/EM I-4 summarizes the savings, costs and PACT results for the program bundles included in the preliminary portfolio.

⁷⁴ PUB/EM I-4 and Coalition/EM I-17 a)

added to both the electric and natural gas portfolios based on input from stakeholders.

Comments

As discussed in Section 3.3, the process and criteria used by Efficiency Manitoba to identify and pre-screen potential measures/technologies are reasonable.

It is understood that all measures/technologies remaining after the pre-screening process were included in the preliminary portfolio⁷⁵. To do so Efficiency Manitoba designed programs that included the remaining measures in order to determine the costs (including incentives), participation rates and resulting savings⁷⁶. The resulting preliminary portfolios are set out in PUB/EM I-4.

The incentive levels assumed in the individual program designs will have a direct impact on program costs. They will also have an impact on program participation rates and the resulting energy savings. Efficiency Manitoba's responses to information requests outline its approach to establishing incentives and participation rates⁷⁷, acknowledge their interrelationship and note that different levels of incentives are considered during program design. The responses also indicate that "Efficiency Manitoba approached program design by identifying new measures that could contribute savings and considering how to get more savings from measures already part of Manitoba Hydro's DSM portfolio"⁷⁸. This would suggest that "maximizing energy savings" was the design criteria used. However, other responses indicate that the participation rates used were frequently based on historical experience⁷⁹. Overall, there is a lack of clarity regarding the objectives underpinning the development of the preliminary portfolio. Since the preliminary portfolio is effectively the "foundation" upon which the final portfolio was developed (through a series of refinements) it is important to clearly understand the principles used to establish it.

⁷⁵ Coalition/EM I-14 i) and Daymark/EM I-53

⁷⁶ Coalition/EM I-14 i)

⁷⁷ Daymark/EM I-13 d) and Daymark/EM I-77

⁷⁸ Coalition/EM I-13 a)

⁷⁹ Daymark/EM I-13 d-e), Attachment 1

In the Final Portfolio Design stage Efficiency Manitoba made a number of refinements based on the multi-criteria analyses of the individual program bundles and the overall portfolios developed in the preliminary portfolio design stage. A review of the refinements made⁸⁰ indicates that they were driven not only by considerations related directly to the criteria (i.e., budget, energy savings⁸¹ and cost-effectiveness) used in the analyses but also due to quality control improvements, input from stakeholders and the inclusion of previously overlooked costs. The result is that while PUB I-4 provides an overview of the costs, energy savings and cost-effectiveness for both the preliminary and final portfolios one cannot readily see the impact of the specific program refinements made due to the multi-criteria analysis (i.e. refinements made in response to budget, energy savings and cost effectiveness considerations). Compounding this is the fact that there were methodology changes in how the PACT was calculated for purposes of assessing the final portfolio designs⁸². Overall, there is a lack of transparency in terms of how considerations related to budget, energy savings and cost-effectiveness impact the development of the final portfolios.

One of the key components of integrated resource planning is the development of alternative portfolios in order to clearly show the differences that would arise depending upon the “weight” given to different evaluation criteria. This permits stakeholders (including the PUB) to clearly understand the trade-offs that are being made in the selection of the proposed Plan. Indeed, one of the recommendations made by EEAG members was that alternative DSM portfolio designs be included in the Plan development process. Efficiency Manitoba has indicated that this was not possible due to the time available for the Plan development⁸³.

The development of alternative DSM portfolios and their subsequent assessment using multi-criteria analysis would allow the PUB (and other interested parties) to clearly see the trade-offs associated with Efficiency Manitoba’s proposed Plan. The PUB should indicate that the development and presentation of alternative portfolios must be included

⁸⁰ PUB/EM I-4

⁸¹ The energy savings from the preliminary portfolio design stage exceeded the prescribed energy savings targets and changes were made to align the final portfolios’ savings with the targets (Coalition/EM I-21 c))

⁸² Coalition/EM I-14 – page 4

⁸³ Coalition/EM I-126

in future plans and that these portfolio alternatives need to consider a wider range of criteria than just cost, savings and cost-effectiveness. As noted earlier, these criteria should include relevant considerations regarding the economic, environmental and social impacts of a DSM plan.

4.0 EFFICIENCY MANITOBA'S COST EFFECTIVENESS AND CUSTOMER IMPACT TESTS.

This section of the Evidence looks at the appropriateness of the inputs and methodologies used by Efficiency Manitoba to calculate the cost effectiveness and customer impacts of its proposed Plan.

4.1 PROGRAM ADMINISTRATOR COST TEST

One of the mandatory considerations the PUB has to take into account in reviewing Efficiency Manitoba's Plan and making a recommendation to the Minister is "the benefits and cost-effectiveness of the initiatives proposed in the plan"⁸⁴. In addition, the Efficiency Manitoba Regulation⁸⁵ requires that the PUB consider "whether the portfolio of demand-side management initiatives required to achieve the savings targets is cost-effective". The Regulation also sets out how "cost-effectiveness" is to be determined. In the case of electricity, the Regulation requires⁸⁶ that:

The cost-effectiveness of the portfolio of electrical energy demand-side management initiatives included or under consideration to be included in an efficiency plan must be determined by comparing

(a) the levelized cost to Efficiency Manitoba of the electrical energy net savings resulting from those initiatives;

with

(b) the levelized marginal value to Manitoba Hydro of the net savings resulting from those initiatives, as determined by Manitoba Hydro based on a methodology consistent with its resource planning process, taking into account the timing and duration of the savings.

⁸⁴ Efficiency Manitoba Act, Section 11(4)(b)

⁸⁵ Section 11 (d)

⁸⁶ Section 12 (1)

In the case of natural gas, the Regulation⁸⁷ requires that:

The cost-effectiveness of the portfolio of natural gas demand-side management initiatives included or under consideration to be included in an efficiency plan must be determined by comparing

(a) the levelized cost to Efficiency Manitoba of the natural gas net savings resulting from those initiatives;

with

(b) the sum of (i) the levelized marginal value to Centra of the resulting reduction or savings in the consumption of natural gas, and (ii) the natural gas transportation costs to the Manitoba border saved by Centra as a result of the gas not being consumed.

The Regulation⁸⁸ also requires that the same approach be followed when assessing the cost-effectiveness of individual demand-side management initiatives.

The definition of cost-effectiveness, as set out in the Regulation, matches the definition of the Program Administrator Cost Test (PACT), one of the tests commonly used in the evaluation of DSM programs⁸⁹. There are a number of ways the PACT results can be expressed⁹⁰:

- As a ratio of the net present value of savings (i.e., benefits) over the net present value of costs;
- As the difference between the net present value of savings (i.e., benefits) over the net present value of costs; or
- On a dollars per unit of energy saved basis.

In all cases, as well as requiring the inputs set out in Regulation (i.e., the costs to Efficiency Manitoba of achieving the savings⁹¹, the annual energy savings expected to be achieved and the marginal values to Manitoba Hydro of those energy savings),

⁸⁷ Section 12 (2)

⁸⁸ Section 12 (3)

⁸⁹ For example, see the California Standard Practice Manual, per Section 2, footnote #6

⁹⁰ Appendix A, Section A2, pages 29-31

⁹¹ This would include all program incurred by Efficiency Manitoba associated with offering the energy efficiency programming plus the cost of any incentives provided to encourage energy efficient behaviours

calculation of the PACT requires inputs regarding the discount rate to be used in the net present value analysis and the time frame over which the analysis is to be performed. For purposes of PACT calculations set out in the Application Efficiency Manitoba has used a nominal discount rate of 6% and a 30-year time horizon⁹².

Details regarding Manitoba Hydro's marginal values for electricity and natural gas are considered to be commercially sensitive and have not been publically provided as part of the Application or the information request responses. However, in the case of electricity Efficiency Manitoba has indicated that⁹³:

Manitoba Hydro provides Efficiency Manitoba with a forecast of 30 years of generation, transmission and distribution marginal values. The generation marginal values for each year are broken out between marginal energy values and marginal capacity values that are then each differentiated between summer and winter seasons. Transmission marginal values are forecast on the basis of winter capacity for each of the 30 years. Distribution marginal values are also forecast on the basis of winter capacity for each of the 30 years.

Efficiency Manitoba has also indicated that it understands that the marginal values include projected capital deferral value due to winter capacity savings and value projected in the export market⁹⁴.

In the case of natural gas Efficiency Manitoba has indicated⁹⁵ that:

Manitoba Hydro provides Efficiency Manitoba with a forecast of 30 years of annual marginal values for natural gas commodity purchasing and upstream transportation costs. Efficiency Manitoba understands that Centra Gas does not include any marginal benefits associated with the deferral of transmission or distribution capacity requirements on the Centra Gas system. Efficiency Manitoba also understands that the natural gas marginal values do not include any marginal benefits associated with greenhouse gas emission reductions.

⁹² Appendix A, Section A2, page 28

⁹³ Daymark I-20 a)

⁹⁴ Section 5 page 5

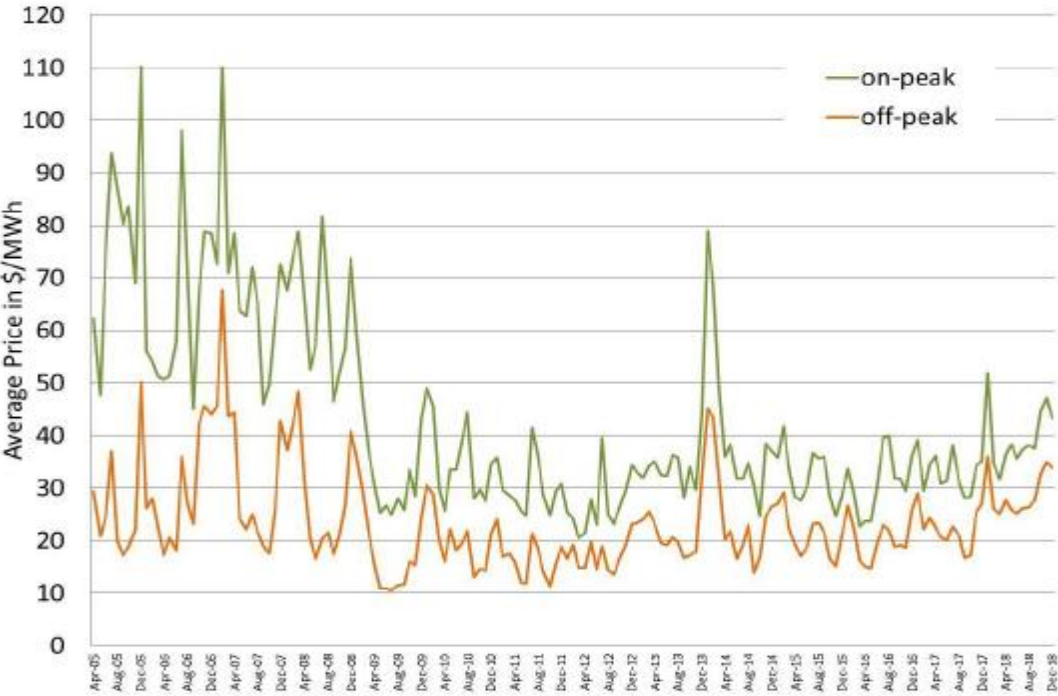
⁹⁵ Daymark/EM I-20 a)

Comments

- o Marginal Values

In the case of electricity, while the Efficiency Manitoba Regulation requires that Efficiency Manitoba use the marginal values as “determined by Manitoba Hydro based on a methodology consistent with its resource planning process”, there are a couple of concerns of note.

The first is that while the marginal values for electricity are broken down between summer and winter there is no break down between peak and off peak. As indicated in the following figure provided during Manitoba Hydro’s 2019-20 GRAs⁹⁶ there is a material and consistent difference between peak and off-peak MISO market prices. Individual electric-related DSM options will have different impacts on peak vs. off-peak consumption and improving Manitoba Hydro’s marginal electric values so that they also reflect differences in the peak vs. off-peak values of export energy is likely to change the relative PACT results for individual measures and for the electric portfolio overall.



⁹⁶ PUB/MH I-45 c)

Also, the last Power Resource Plan publically released by Manitoba Hydro was the 2016/17 Resource Planning Assumptions & Analysis Report (dated July 2016) which was filed as part of Manitoba Hydro's 2017/18 & 2018/19 GRA⁹⁷. It is not clear if Manitoba Hydro has produced more recent resources plans and updated its marginal values accordingly. As a result, a question arises as to how current the marginal values provided by Manitoba Hydro are.

In the case of natural gas, one readily apparent issue is the fact that the marginal values provided do not include marginal benefits associated with the deferral of transmission or distribution capacity requirements on the Centra Gas system. No explanation has been provided as to why this is case.

These shortcomings should be taken into consideration by the PUB in its review of the Plan.

- *Discount Rate*

When asked about the basis for the 6% discount rate used in the analysis, Efficiency Manitoba indicated that the discount rate was provided by Manitoba Hydro and accepted by Efficiency Manitoba. Efficiency Manitoba also indicated that the discount rate is consistent with Manitoba Hydro's weighted average cost of capital and, given that Manitoba Hydro is funding the Plan, it was determined that use of Manitoba Hydro's discount rate would be appropriate⁹⁸.

Based on its 2012 planning assumptions Manitoba Hydro derived a nominal discount rate of 7.05% for purposes of its NFAT application⁹⁹. The derivation of the 7.05% is set out in the following table¹⁰⁰.

⁹⁷ Appendix 7.3

⁹⁸ MIPUG/EM I-6 i)

⁹⁹ The discount rate actually used in the economic valuations was subsequently updated to 5.4% real. However, no supporting details as to its calculation are available.

¹⁰⁰ NFAT Proceeding, PUB/MH I-156 a)

Table #3 – Manitoba Hydro’s Weighted Average Cost of Capital Derivation

NFAT 2012					
Capital Source	Target Capital Structure	Nominal Rates		Real Rates	
		Rate	Weighted Rate	Rate	Weighted Rate
CDN 10 Year+Bond Yield	75%	4.65%			
10 Year+ Credit Spread		0.65%			
Provincial Guarantee Fee		1.00%			
Long-Term Debt		6.30%	4.73%	4.32%	3.24%
Long Term Debt	25%	6.30%			
Imputed Cost of Equity		3.00%			
Equity			9.30%	2.33%	7.26%
Total	100%		<u>7.05%</u>		<u>5.05%</u>

The economic forecast provided by Manitoba Hydro as part of its 2019/20 GRA indicated that the forecast for Manitoba Hydro’s cost of long term debt for the 2020/21 to 2022/23 period ranged between 5% and 5.05% (including the provincial guarantee fee)¹⁰¹. Using 5.05% in the above formula would yield a nominal weighted cost of capital of 5.8%. Overall, it appears the derivation of the 6% discount rate provided to Efficiency Manitoba by Manitoba Hydro was derived in a manner comparable to the discount rate used in the NFAT Application.

As Efficiency Manitoba has noted, Manitoba Hydro is the entity that is funding the Plan and therefore its “cost of capital” is the discount rate to use for purposes of the PACT. The issue is that Manitoba Hydro is not regulated on “rate of return” basis like privately owned electric utilities and most publicly owned electric utilities. Instead, Manitoba Hydro is regulated on what has been characterized as a “cost of service” basis. Under this approach there is no approved return on equity which can be used in the determination of an overall weighted cost of capital.

¹⁰¹ Additional Information submitted December 11, 2018. Note: Manitoba Hydro subsequently revised its interest rate forecast for 2019/20 but did not provide updated values for 2020/21 through 2022/23.

During the NFAT proceeding, Manitoba Hydro indicated that the 300 basis point premium¹⁰² for the cost of equity was based on the allowed equity returns for electric utilities regulated on a rate of return basis. However, in Manitoba Hydro's case this equity comes directly from customers and the appropriate value to use would be the discount rate that customers require in order to be neutral as between contributing (through higher rates) to the Corporation's retained earnings now as opposed to at some future point in time¹⁰³. Determination of the appropriate discount rate from the customers' perspective is difficult by virtue of the fact that Manitoba Hydro's domestic customers consist of both residential consumers as well as commercial/industrial businesses which are likely to have different views as to the time value of money (i.e., different costs for debt, different tax rates and investment opportunities). Furthermore, within each of these customer segments, individual customers will have varying views on the time value of money.

At best, the allowed return on equity for electrical utilities can be viewed as a proxy for this discount rate, since it reflects the rate of return that is viewed as being fair compensation to investors in utilities similar to Manitoba Hydro. Evidence submitted during the NFAT proceeding suggested that the 300 basis points were too low¹⁰⁴. However, in its Plan Efficiency Manitoba has provided sensitivity analyses indicating the impact on the PACT results of varying the 6% discount rate by +/- 1% and the weighted cost of capital resulting from the adjustments discussed during the NFAT proceeding would fall within the high side (i.e., +1%) of this range¹⁰⁵.

Other views on the appropriate discount rate that should be applied to customer equity suggest it should be in the order of 5%¹⁰⁶. Using this value as the cost of equity results in a lower overall weighted average cost of capital but the results would also be within the range of the sensitivity analysis undertaken by Efficiency Manitoba.

¹⁰² See Table 3 above

¹⁰³ A similar point was made by Morrison Park Associates in Evidence filed during the PUB's review of Manitoba Hydro's 2017/18 & 2018/19 GRA, page 21

¹⁰⁴ PUB NFAT Decision, page 159

¹⁰⁵ Section 5, pages 11-12

¹⁰⁶ Manitoba Hydro's 2017/18 & 2018/19 GRA, Morrison Park Associates Evidence, page 48

In considering the Plan the PUB will need to take into account the sensitivity of the cost-effectiveness of the Plan to the discount rate assumptions made in calculating the PACT results.

- *Discount Period*

Efficiency Manitoba explains that the 30-year period was chosen as it allows for the incorporation of the full benefits associated with energy efficiency measure lives that have long useful lives¹⁰⁷. It is noted that since there are no “costs” associated with the current programs beyond the first 20 years¹⁰⁸, extending the analysis further would only improve the PACT results. However, since the additional benefits included would only be those associated with measures having a life longer than 30 years and, even then, the benefits would be significantly discounted through the present value calculation the improvement in the PACT results is likely to be minimal. As can be seen from the following table¹⁰⁹, there are diminishing returns associated with extending the discount period as extending the period from ten to twenty years reduces the PAC Levelized Cost of the electric portfolio by over 20% whereas increasing the discount period from 20 to 30 years only decreases the levelized cost by a further 3%.

Table #4 – Electric PACT Sensitivity to Discount Period

	PACT ratio	PACT NPV	PAC Levelized Cost
Overall portfolio metrics (Table 5.3, using 30 years)	3.27	\$345 million	2.24¢/kWh
Overall portfolio metrics (using requested 5 years)	1.19	\$27 million	5.5¢/kWh
Overall portfolio metrics using requested 10 years)	2.37	\$201 million	2.9¢/kWh
Overall portfolio metrics (using requested 20 years)	3.16	\$328 million	2.3¢/kWh
Overall portfolio metrics (using requested 25 years)	3.24	\$339 million	2.3¢/kWh

¹⁰⁷ Daymark/EM I-36

¹⁰⁸ Efficiency Manitoba has indicated (MIPUG/EM I-1 a) & b)) that the Load Displacement Program is the only one with costs after the initial 3 year period. However the detailed Measures files provided by Efficiency Manitoba indicate that for this program costs are not incurred after Year 17.

¹⁰⁹ MIPUG/EM I-1 r)

Similar results¹¹⁰ can be seen for the natural gas portfolio as set out below.

Table #5 – Natural Gas PACT Sensitivity to Discount Period

	PACT ratio	PACT NPV	PACT Levelized Cost
Overall portfolio metrics (Table 5.4, using 30 years)	0.99	(\$0.8 million)	18.69¢/m ³
Overall portfolio metrics (using requested 5 years)	0.24	(\$45 million)	64.8¢/m ³
Overall portfolio metrics using requested 10 years)	0.51	(\$29 million)	32.7¢/m ³
Overall portfolio metrics (using requested 20 years)	0.83	(\$10 million)	21.5¢/m ³
Overall portfolio metrics (using requested 25 years)	0.95	(\$3 million)	19.3¢/m ³

Overall, the use of the 30-year period is reasonable.

- *Treatment of Codes and Standards*

The costs of Codes and Standards are included in the calculation of the PACT results at the portfolio level for the Electric and Natural Gas Program Cost-Effectiveness Metrics. However, the benefits from the savings attributed to Codes and Standard are not included¹¹¹. Including the benefits resulting from the energy savings of Codes and Standards would serve to lower the PACT levelized costs (i.e., improve the PACT ratio and PACT NPV) associated with both the electric and natural gas portfolios.

It is noted that, with one exception, all of the Codes and Standards that Efficiency Manitoba’s Plan counts towards savings over the three year period of its Plan were implemented prior to Plan period. Furthermore, the one potential change cited as being implemented during the 2020-2023 period, which deals with commercial space heating boilers, has been postponed numerous times since first published in August 2010 and the actually timing of the implementation is still uncertain¹¹². Given that the PACT is meant to reflect the cost-effectiveness of Efficiency Manitoba’s initiatives over the three years of the Plan and Efficiency Manitoba will eventually rely on the report of the independent evaluator as to its contribution to savings from Codes and Standards, it is a

¹¹⁰ MIPUG/EM I-1 r)

¹¹¹ MIPUG/EM I-4 i)

¹¹² PUB/EM I-39

conservative approach but reasonable to exclude the savings attributable to Codes and Standards from the determination of the PACT results for the electric and natural gas portfolios in the current Plan.

- *Furnace Replacement Program (FRP) and Affordable Energy Fund (AEF)*

The amount accumulated in the Furnace Replacement Program account as of Efficiency Manitoba's commencement date "is to be used to offset the cost of the natural gas demand-side management initiatives set out in an approved efficiency plan"¹¹³. For purposes of determining the PACT results Efficiency Manitoba includes the FRP funds used as a cost for both the relevant natural gas program bundles and the natural gas portfolio overall¹¹⁴. As the PACT is meant to measure "cost effectiveness" and these funds are covering the costs for the related programs, it is appropriate that they be included in the determination of the PACT results.

Section 14 of the Efficiency Manitoba Regulation requires that: "Efficiency Manitoba must use the Affordable Energy Fund to undertake initiatives to encourage and realize efficiency improvements and conservation in the use of home heating fuels other than electrical energy or natural gas, and not for any other purpose". Efficiency Manitoba has indicated¹¹⁵ that its proposed Plan does not specifically include any AEF funding or forecasts for conservation in the use of these other home heating fuels. As a result there is no need to address the treatment AEF funding in the calculation the current PACT results. Should AEF funding be used to support Efficiency Manitoba program initiatives then (as is the case with the FRP) it would be appropriate to include them in the determination of the PACT results.

¹¹³ Efficiency Manitoba Regulation, Section 15 (2)

¹¹⁴ Coalition/EM I-28 a)

¹¹⁵ Coalition/EM I-28 b)

4.2 LIFECYCLE REVENUE IMPACT (Added December 13, 2019)

The Efficiency Manitoba Regulation requires¹¹⁶ that the PUB must consider when reviewing the Plan:

“the impact of the efficiency plan on rates and average customer bill amounts.”

However, in this case, the Regulation does not provide any direction on how the impact on “rates” or “average customer bill amounts” is to be determined.

In the case of rate impacts, Efficiency Manitoba has used a lifecycle revenue impact (LRI) measure to indicate the equivalent one-time change in rates that is required to establish a balance between utility revenues, the marginal benefits, and the program costs required within the Plan¹¹⁷. The specific formula used for determining the LRI is:

$$\text{LRI} = \frac{\text{PV}(\text{Program Costs} + \text{Incentives}) + \text{PV}(\text{Revenue Loss}) - \text{PV}(\text{Marginal Benefits})}{\text{PV}(\text{System Energy})}$$

The benefits used in the analysis are identical to those determined for use in the PACT described above; namely, this component includes the benefits of the marginal values.

The costs for this test include both the costs incurred by Efficiency Manitoba (consistent¹¹⁸ with those used in the PACT) and the decrease in utility revenues resulting from the decrease in electricity or natural gas consumption. The system energy is either the basic electric load forecast or actual natural gas volumes. For purposes of the calculation a 30 period is used in conjunction with a 6% nominal discount rate, the same parameters as used for the PACT¹¹⁹.

Comments

- *Marginal Values and Discount Rate*

The comments made in Section 4.1 with respect to Manitoba Hydro’s marginal values for electricity and natural gas and the discount rate used are equally applicable in the context of the calculation of the LRI.

¹¹⁶ Section 11 g)

¹¹⁷ Section 5, page 12

¹¹⁸ Subject to the treatment of the FRP as discussed later in this section

¹¹⁹ Appendix A, Section A2, pages 31-32

- *Discount Period*

As noted in Section 4.1 most of the costs associated with the Plan will be incurred by Efficiency Manitoba during the three-year Plan period and all costs incurred by Efficiency Manitoba will be funded by Manitoba Hydro. In contrast the benefits will be realized by Manitoba Hydro over a longer period of time. As a result, use of a 30 year period will understate the rate adjustments required by Manitoba Hydro over the shorter term (e.g., ten years) to balance revenues, benefits and costs. Efficiency Manitoba has provided LRI values over shorter time horizons and the results are summarized below for both electricity and natural gas¹²⁰:

Table #6 - ELECTRICITY – EQUIVALENT ONE-TIME RATE INCREASE			
Discount Period	BASE RATE (\$/kWh)		
	0.06	0.08	0.10
30-Year	0.32%	0.24%	0.19%
10-Year	1.04%	0.78%	0.62%
5-Year	2.16%	1.62%	1.30%

Table #7 - NATURAL GAS – EQUIVALENT ONE-TIME RATE INCREASE			
Discount Period	BASE RATE (\$/m ³)		
	0.19	0.21	0.23
30-Year	1.22%	1.10%	1.00%
10-Year	2.36%	2.13%	1.95%
5-Year	4.04%	3.66%	3.34%

While it is not known precisely how Manitoba Hydro will recover the funds paid to Efficiency Manitoba over the three year period, Manitoba Hydro’s current practice (as

¹²⁰ Section 5, pages 14 & 16 and Coalition/EM I-33 f) & g)

directed by the PUB) is to amortize DSM costs over a 10 year period¹²¹. As a result, the PUB's consideration of rate impacts should focus on the 10-year values as well as the longer term 30-year values.

- *System Energy Values*

For electricity, the system energy values used in the present value calculation were the total forecast General Consumer Sales for 2020/21 and subsequent years per Manitoba Hydro's 2018 Load Forecast¹²².

Not all of the kilowatt hours included in General Consumer Sales are subject to the Manitoba Hydro general rate increases that will recover the costs of Efficiency Manitoba's Plan. Specifically, Manitoba Hydro's general rates increases will not apply to: i) a portion of the sales in the Diesel communities and ii) the Surplus Energy Program (SEP) sales. However, the volumes associated with these sales are small and are unlikely to have a material effect on the overall LRI calculation.

Also, in principle the system energy values used should be adjusted for the anticipated impact of post 2017/18 DSM programs. Efficiency Manitoba acknowledges that using the forecast General Consumer Sales was a simplifying assumption but contends that the results are reasonable¹²³.

Overall, the System Energy inputs used by Efficiency Manitoba in its LRI calculations are reasonable.

- *Lost Revenue Calculation*

For purposes of determining the Lost Revenue to be included in its LRI analysis Efficiency Manitoba assumed that electricity and natural gas rates would both increase at a rate of 1.92%/annum¹²⁴ over the 30 year period. Manitoba Hydro's most recent publically available Integrated Financial Forecast was prepared in the first half of

¹²¹ Manitoba Hydro's 2017/18 & 2018/19 GRA, Coalition/MH I-47 b)

¹²² Coalition/EM I-34 a)

¹²³ Coalition/EM I-31 b)

¹²⁴ Coalition/EM I-33 d)

2017¹²⁵. Based on this information future rate increases for natural gas may well be lower than the 1.92% assumed. Lower rate increases will reduce the LRI results.

However, in the case of electricity, an assumption that rate increases will match inflation, particularly over the next 5-10 years, does not appear to be reasonable given the most recent financial forecasts provided by Manitoba Hydro and the Board's recent rate increase approvals¹²⁶. Re-doing the LRI analysis using electricity rate increases in excess of inflation (e.g. 3% to 4% per annum) for the first 5 to 10 years would increase the present value of the lost revenue and, thereby, increase the LRI results.

During the interrogatory process the Coalition requested LRI values for different time periods using an alternative annual rate escalation of 3.9%¹²⁷. Following discussions with Efficiency Manitoba results were provided on December 6, 2019. However, due to miscommunications, the results provided were not the scenarios the Coalition intended and estimates as to the likely impact are not available. However, it is fair to conclude that the 5 and 10 year rate impacts would be higher than those set out in Table 6 above. The PUB's consideration of rate impacts attributable to Efficiency Manitoba's Plan should take this into account.

- *Treatment of Codes and Standards Savings*

Efficiency Manitoba does not include the revenue loss from Codes and Standards in its LRI analysis¹²⁸. The evidence also indicates that the savings from Codes and Standards are not used in the determination of the marginal benefits as the values used for the LRI analysis are defined consistently with those used for the PACT calculation¹²⁹.

This treatment is reasonable for the same reasons as set out in Section 4.1.

¹²⁵ Manitoba Hydro's 2017/18 & 2018/19 GRA, Appendices 3.1, 3.3, 3.4 and 3.6

¹²⁶ In recent Orders the Board approved an average rate increases of 3.36% in 2017 and 3.6% in 2018 along with a 2.5% increase in 2019 for most customer classes.

¹²⁷ Coalition/EM I-33 e), f) and g)

¹²⁸ Coalition/EM I-33 h)

¹²⁹ Appendix A, Section A2, page 32

- *Furnace Replacement Program (FRP) and Affordable Energy Fund (AEF)*

Efficiency Manitoba excludes the costs associated with the FRP from the LRI analysis as these costs have already been collected from customers and will not impact future rates¹³⁰. This treatment is reasonable and a similar treatment should be applied to the AEF if it is used in the future to support Efficiency Manitoba's program initiatives.

4.3 CUSTOMER BILL IMPACTS

In order to address Section 11 g) of the Regulation Efficiency Manitoba also completed an annual average customer bill impact for each program bundle and for the natural gas and electricity portfolios overall¹³¹. The Application also provides 30-year net present values for the electric and natural gas customer bill savings.

Comments

While the average annual bill impact calculations address the requirements of the Regulation they are of limited use in any assessment of the Plan. The reason for this is that they give an incomplete and misrepresentative picture of the implications for participating customers. Many of Efficiency Manitoba's programs require an upfront investment/expenditure by the participating customers¹³². Furthermore, while Efficiency Manitoba proposes to offer financial incentives to customers participating in some of its programs, in many cases these incentives do not cover the full costs that participants will incur¹³³.

The 30-year present values for the anticipated savings are also misleading. Not only do they exclude the net costs that participating customers will incur but the analysis appears to have used Manitoba Hydro's discount rate. It is important to establish the perspective that a present value analysis is meant to represent. In this case it would be the customer's perspective and the discount rate used should be one that reflects the customer's time value of money¹³⁴.

¹³⁰ Daymark/EM I-29; PUB/EM I-22 c) and Coalition/EM I-22 a)

¹³¹ Section 5, pages 17-19

¹³² Coalition/EM I-36 a)

¹³³ Daymark/EM I-13 – Attachment 1

¹³⁴ This is discussed in section 4.1 of the Evidence

In its deliberations as to whether or to approve the Plan the PUB should not attach significant weight or consideration to the results of the bill impact calculations as presented.

5.0 EFFICIENCY MANITOBA'S ALLOCATION OF SUPPORT COSTS AND CORPORATE OVERHEADS

The following table sets out the average annual electric and natural gas portfolio budgets and indicates how the various types of costs are attributed between the two.

Table #8		EFFICIENCY MANITOBA 2020/21-2022/23			
		<u>AVERAGE ANNUAL BUDGET ('000's \$)</u>			
		<u>ELECTRIC</u>	<u>NATURAL GAS</u>	<u>TOTAL</u>	<u>ATTRIBUTION</u>
PROGRAM COSTS		<u>PORTFOLIO</u>	<u>PORTFOLIO</u>		
	INCENTIVES	\$31,158	\$14,089	\$45,247	DIRECTLY ASSIGNED (COALITION/EM I-40)
	PROGRAM DESIGN	\$4,491	\$1,940	\$6,431	DIRECTLY ASSIGNED (COALITION/EM I-42)
	MODELLING, ADMIN & SUPPORT				
	ADVERTISING	\$1,151	\$710	\$1,861	DIRECTLY ASSIGNED (COALITION/EM I-43)
	DELIVERY	\$3,643	\$1,521	\$5,164	DIRECTLY ASSIGNED (COALITION/EM I-41)
	SUBTOTAL	\$40,443	\$18,260	\$58,703	
ENABLING STRATEGIES					
	PROGRAM SUPPORT & EDUCATION	\$1,319	\$350	\$1,669	MOSTLY ALLOCATED (COALITION/EM I-44)
	INNOVATION, CODES & STANDARDS AND EVALUATION	\$4,940	\$1,647	\$6,587	ALLOCATED (COALITION/EM I-44)
	SUBTOTAL	\$6,259	\$1,997	\$8,256	
	CORPORATE OVERHEADS	\$2,191	\$730	\$2,921	ALLOCATED (COALITION/EM I-46)
	TOTAL	\$48,893	\$20,987	\$69,880	
Source: Coalition/EM I-39					

As indicated in the table Efficiency Manitoba is able to directly attribute the program related costs with either the electric or natural gas portfolio. In the case of Enabling Strategies there are certain Program Support and Education activities that are predominantly electric focused and are assigned to the electric portfolio. These include¹³⁵:

- First Nations support activities as nearly all First Nations communities do not have access to natural gas.

¹³⁵ Coalition/EM I-44 i)

- Emerging Technologies supporting activities for solar photovoltaic and bioenergy.

The balance of the costs associated with Enabling Strategies as well as Corporate Overheads are allocated between the two portfolios by converting the net electricity savings and net natural gas savings forecast in the Plan to an equivalent measure (Gigajoule) and then allocating these joint costs based on each fuel's share of the total Gigajoule savings. This is the same approach that has been used by Manitoba Hydro and it results in a 75/25 allocation between the electric and natural gas portfolios¹³⁶.

Comments

The Enabling Strategies and Corporate Overhead costs which are subject to allocation represent costs that support the program bundles that deliver the electric and natural gas energy savings. There is no explanation provided as to why the "Equivalent Gigajoule Saving" approach was adopted by Manitoba Hydro. However, it appears to be an attempt to allocate these costs based on the relative "savings" (i.e., benefits) generated by the two portfolios. If this was the intent it is not clear why the savings/benefits are measured in terms of GJ. An alternative approach would be to allocate these costs based on the relative dollar value of the benefits created by each of the portfolios. Using this approach would result in allocating these costs between the electric and natural gas portfolios on an 89.4%/10.6% basis¹³⁷. It is noted that the use of "savings" to allocate supporting initiative costs is similar to approach the BCUC has directed that BC Hydro use in allocation supporting initiative costs to individual DSM programs¹³⁸.

Utility cost allocation studies are often undertaken in order to allocate administrative and support costs between affiliated companies or between lines of business within a single utility. In such cases, administrative and support costs are usually allocated using the principle of "cost causation" and based on cost-drivers such as Labour costs, OMA, Investment in Plant or a weighted combination of two or more. Indeed, this is the

¹³⁶Daymark/EM I-16

¹³⁷ The ratio was derived from the NPV benefit values used in the PACT calculations for the electric and natural gas portfolios as provided in PUB/EM I-11 (\$496.959 M and \$57.07 M respectively)

¹³⁸ In its Decision regarding BC Hydro's F05/06 Revenue Requirement Application Directive 61 stated that "Portfolio Level Costs should be allocated to programs, and BC Hydro is directed to use the same allocation methodology based on kWh savings as used in Exhibit B1-81."

approach currently used by Manitoba Hydro to allocate common costs between its natural gas and electricity utilities¹³⁹. Details regarding Efficiency Manitoba’s organization have yet to be determined and it is not possible to breakdown its forecast corporate overhead/staff by function. However, two reasonable bases for allocating support costs related to enabling strategies and corporate overheads would be: i) the total direct costs for the programs attributed to the natural gas and electricity portfolios and ii) the Efficiency Manitoba staff costs attributed to the natural gas and electricity portfolios. The following table sets out the allocation factors that would result from using either of these two approaches.

Table #9 – Supporting & Corporate Overhead Costs Allocation Factors				
	Total Program Costs		Program Staff Costs	
	\$M	%	\$M	%
Electricity	40.443	31.1%	4.491	30.2%
Natural Gas	18.26	68.9%	1.94	69.8%
Total	58.703	100%	6.431	100%
Sources: 1) Coalition/EM I-39 2) Section 4, Table 4.7				

In both cases, the allocation factors yield close to the same results.

It is recommended that the allocation be based on a “cost driver approach” and that, for the current Plan, an allocation split of 70/30 be used for electricity versus natural gas. This recommendation is based on the fact that the “cost driver approach” is a common utility practice for allocating support costs and corporate overheads and it is the approach used by Manitoba Hydro/Centra Gas¹⁴⁰ to assign similar costs between its natural gas and electric utilities.

¹³⁹ Centra Gas Manitoba Inc., 2019/20 General Rate Application, Appendix 5.10

¹⁴⁰ It is noted that in Order 152/19 (page 29) the Board did not reject/accept the specific methodology used but rather required Centra to provide an Integrated Cost Allocation Methodology report as a Minimum Filing Requirement for the next GRA in order to allow further understanding and testing of the methodology.

6.0 CONCLUSIONS (Added December 13, 2019)

6.1 EFFICIENCY MANITOBA'S PORTFOLIO DEVELOPMENT PROCESS

Given the PUB's conclusion in its NFAT Decision¹⁴¹ that “an integrated resource planning process is required to determine what supply and demand side resource mix is in the best interests of Manitobans”, a key consideration for the PUB in its review of Efficiency Manitoba's current Plan should be the extent to which Efficiency Manitoba's approach to developing its proposed Plan conforms with the principles and components of integrated resource planning. The Evidence examined Efficiency Manitoba's approach in terms of its alignment with the principles of integrated resource planning at each stage of integrated resources planning. Overall, there are some major shortcomings between Efficiency Manitoba's approach and an integrated resource planning process. The specific findings/conclusions are set out in the following sections which reflect the different components/stages of an integrated resource planning process.

DSM Targets

- Overall, there is lack of clarity and transparency in terms of how the target savings values have been determined and whether they have been determined appropriately.
- In reviewing the planning targets for electricity savings, while the use of forecast values as the starting point is reasonable, there are distinct differences between the definition of consumption as set out in the Act and how it has been determined by Efficiency Manitoba that the PUB should consider. Also, the PUB will need to consider if the DSM adjustments made by Efficiency Manitoba are appropriate.
- In reviewing the planning targets for natural gas, while historical use is a reasonable starting point, the PUB will need to similarly consider whether the DSM adjustments made by Efficiency Manitoba are appropriate or even required.
- In terms of actual target achievement, Efficiency Manitoba's approach to calculating annual target achievements and cumulative progress towards the achievement of its 15 year target is reasonable.

¹⁴¹ Page 253

Evaluation Criteria

- The criteria used should extend beyond the level of budget and the mandatory considerations related to the energy savings targets and cost-effectiveness. If practical considerations require a shorter list of evaluation criteria than suggested by the range of “considerations” set out in the Act/Regulation, then stakeholder processes should be used to identify what are considered to be the more important considerations to be used as evaluation criteria in determining the preferred plan. Overall, Efficiency Manitoba’s choice/range of evaluation criteria is not consistent with what one would expect from an integrated resource planning process.

Options Considered

- The “pool” of measures and technologies created is likely to be representative of those available. However, the lack of documentation and a central repository raises concerns regarding both the transparency and consistency in respect how the options will be considered.
- Assumptions regarding the level of incentives is likely to have a material impact on the level of participation and hence the annual savings that can be attributed to a measure. Efficiency Manitoba’s lack of consideration of options with different levels of incentives does not align with IRP principles as it means the portfolio development process has not considered all feasible options.

Preferred Portfolio Selection

- There is a lack of transparency in terms of the objectives underlying both i) the development of the preliminary portfolio and ii) how the considerations related to budget, energy savings and cost-effectiveness impact the development of the final portfolios.
- Efficiency Manitoba has not included alternative DSM portfolios and their subsequent assessment using multi-criteria analysis in its Plan due to time constraints. This is a standard component of an integrated resource planning process as it allows parties to clearly see the trade-offs associated with a proponent’s proposed Plan. The PUB should indicate that the development and

presentation of alternative portfolios must be included in future plans and that these portfolio alternatives need to reflect a wider range of considerations than just costs, energy savings and cost-effectiveness.

6.2 COST EFFECTIVENESS/CUSTOMER IMPACT TESTS

The Evidence looks at Efficiency Manitoba's approach to calculating cost effectiveness (i.e. the PACT) and customer impacts. In each case, there are specific issues that the PUB will need to consider when reviewing Efficiency Manitoba's proposed Plan.

Program Administrator Cost Test (PACT)

- There are short comings associated with both the electric (no peak vs. off peak differentiation) and natural gas (no local distribution/transportation values and no explanation as to why) marginal values which the PUB will need to consider.
- There is uncertainty regarding the discount rate that should be used in the analysis and which needs to be accounted for in the PUB's considerations.
- In making its recommendation as to whether the Plan should be approved the PUB should consider the natural gas portfolio PACT results both with and without interactive effects.
- However, the 30-year discount period used by Efficiency Manitoba is reasonable as is its treatment of Codes and Standards and Furnace Replacement Program costs.

Lifecycle Revenue Impact (LRI) Analysis

- The PACT conclusions with respect to the marginal values and discount rate used are equally applicable to the LRI.
- The PUB's consideration of rate impacts should focus on the 10-year values as well as the longer term 30-year values.
- The System Energy inputs used by Efficiency Manitoba in its LRI calculations are reasonable.
- The electric rate increase assumptions used by Efficiency Manitoba are understated in the short term and lead to an understatement of the LRI results.
- Efficiency Manitoba treatment of Codes and Standards and Furnace Replacement Program costs in its LRI analysis is reasonable.

Customer Bill Impacts

- The Customer Bill impact analyses gives an incomplete and misrepresentative picture of the implications for participating customers and PUB should not attach significant weight or consideration to the results as presented.

6.3 ALLOCATION OF SUPPORT COSTS AND CORPORATE OVERHEADS

- The allocation should be based on a “cost driver approach” and, for the current Plan, an allocation split of 70/30 should be used for electricity versus natural gas.

Appendix A – Statement of Qualifications and Duties

Qualifications

Mr. Harper has over 40 years' experience in the electricity industry gained through positions held with the Ontario Ministry of Energy, Ontario Hydro (and one of its successor companies Hydro One Networks) and Econalysis Consulting Services. While at Ontario Hydro, his responsibilities included Ontario Hydro's wholesale rates and Ontario Hydro's regulation of the province's municipal electric utilities; as well as the coordination of the Company's overall participation in public review processes. He has testified frequently before the OEB on rates and regulatory matters. He also testified before the Ontario Environmental Assessment Board with respect to Ontario Hydro's Demand/Supply Plan. Joining ECS in 2000, he subsequently provided support to intervenors in energy proceedings in British Columbia, Manitoba, Ontario and Quebec on rates, revenue requirements, industry restructuring and resource planning. He has testified as an expert witness before the Manitoba Public Utilities Board and the Quebec Régie de l'énergie.

With specific regards to resource planning, Mr. Harper has appeared as an expert witness before the Régie with respect to Hydro Quebec Distribution's 2001 and 2004 Supply Plans and before Manitoba Clean Environment Commission with respect to its Needs For and Alternatives Review of Manitoba Hydro's proposed Wuskwatim Project and the Manitoba Public Utilities Board with respect to its Need for and Alternatives To Review of Manitoba Hydro's 2013 Preferred Development Plan. Mr. Harper has also assisted clients in British Columbia with their participation in public reviews undertaken by the BCUC of integrated resource plans prepared by BC Hydro and FortisBC Inc. and, similarly assisted clients in Ontario with their participation in an OEB review of the Ontario Power Authority's 2007 Integrated Resource Plan for Ontario's electricity sector.

More specifically with respect to Demand-Side Management plans, Mr. Harper has assisted clients in British Columbia with their participation in public reviews undertaken by the BCUC of DSM Expenditure Applications filed by BC Hydro and FortisBC Inc.

Duties

The following duties were assigned to Mr. Bill Harper in the review of Efficiency Manitoba's 2020/23 Efficiency Plan.

The Public Interest Law Centre retained Mr. Harper to assist the Consumers Coalition with its participation in the Public Utilities Board review of the 2020/23 Efficiency Plan on issues relating to:

- The overall approach taken by Efficiency Manitoba in developing its proposed Efficiency Plan (the "Plan") with focus on the general approach used and parallels with integrated resource planning.
- The inputs and methodology for calculating the cost effectiveness metrics (i.e. Program Administrator Test, Rate Impact and Customer Bill Impacts) used to assess Efficiency Manitoba's proposed Plan, including the use of the levelized marginal value to Manitoba Hydro in the determination of the benefits from DSM savings.
- The allocation methodology proposed by Efficiency Manitoba for assigning its administration and/or overhead budget to natural gas versus electricity customers.

Mr. Harper's duties included:

- Review Efficiency Manitoba 2020/23 Efficiency Plan;
- Draft information requests;
- Review responses to information requests;
- Prepare briefing notes and attend meetings with clients and legal team, where necessary; and
- Prepare independent expert evidence relating to the issues under examination.

Mr. Harper's retainer letter includes that his duty is to provide evidence that:

- is fair, objective and non-partisan;
- is related only to matters that are within his area of expertise; and
- to provide such additional assistance as the Public Utilities Board may reasonably require to determine an issue.

Mr. Harper's retainer letter also specifies that his duty in providing assistance and giving evidence is to help the Public Utilities Board. This duty overrides any obligation to CAC Manitoba. By signing the letter of retainer, Mr. Harper confirmed that he will comply with this duty.

Appendix B – William Harper CV

Mr. Harper has over 35 years' experience in the design of rates and the regulation of electricity utilities. While employed by Ontario Hydro, he has testified as an expert witness on rates before the Ontario Energy Board from 1988 to 1995, and before the Ontario Environmental Assessment Board. He was responsible for the regulatory policy framework for Ontario municipal electric utilities and for the regulatory review of utility submissions from 1989 to 1995. Mr. Harper also coordinated the participation of Ontario Hydro (and its successor companies Ontario Hydro Services Company and Hydro One Networks) in major public reviews involving Committees of the Ontario Legislature, the Ontario Energy Board and the Macdonald Committee. He has served as a speaker on rate and regulatory issues for seminars sponsored by the APPA, MEA, EPRI, CEA, AMPCO and the Society of Management Accountants of Ontario. Since leaving Hydro One Networks, Mr. Harper has provided consulting support for client interventions on energy and telecommunications issues before the Ontario Energy Board, Manitoba Public Utilities Board, Québec's Régie de l'énergie, British Columbia Utilities Commission, Saskatchewan Rate Review Panel and CRTC. He has also appeared before the Manitoba's Public Utilities Board, the Manitoba Clean Environment Commission, the Ontario Energy Board and Quebec's Régie de l'énergie.

EXPERIENCE

Independent Consultant

October 2018 - Present

Econalysis Consulting Services – Associate

August 2011 – September 2018

Econalysis Consulting Services- Senior Consultant

July 2000 to July 2011

- Responsible for supporting client interventions in regulatory proceedings, including issues analyses & strategic direction, preparation of interrogatories, participation in settlement conferences, preparation of evidence and/or appearance as expert witness (where indicated by an asterix). Some of the more significant proceedings included:
 - Electricity (Ontario)
 - IMO 2000 Fees (OEB)
 - Hydro One Remote Communities Rate Application 2002-2004
 - OEB Transmission System Code Review (2003)
 - OEB Distribution Service Area Amendments (2003)
 - OEB Regulated Asset Recovery (2004)
 - OEB- 2006 Electricity Rate Handbook Proceeding*
 - 2006 Rate Applications by Various Electricity Distributors
 - OEB - 2006 Guidelines for Regulation of Prescribed Generation Assets
 - 2007 Rate Applications by Various Electricity Distributors
 - OEB - 2007 Cost of Capital and 2nd Generation Incentive Regulation Proceeding

- Hydro One Networks 2007/2008 Transmission Rate Application
 - 2008 Rate Applications by Various Electricity Distributors
 - OEB – Cost of Capital for Ontario’s Regulated Utilities (2009)
 - Hydro One Networks 2009/2010 Transmission Rate Application
 - 2009 Rate Applications by Various Electricity Distributors
 - 2010 Rate Applications by Various Electricity Distributors
 - Hydro One Networks 2011/2012 Transmission Rate Application
 - 2011 Rate Applications by Various Electricity Distributors
 - 2012 Rate Applications by Various Electricity Distributors
 - OEB – 2012 Renewed Regulatory Framework for Electricity Distributors
 - Hydro One Networks 2013/2014 Transmission Rate Application
 - 2013 Rate Applications by Various Electricity Distributors
 - 2014 Rate Applications of Various Electricity Distributors
 - OEB Residential Rate Design Policy (2014)
 - 2015 Rate Applications for Various Electricity Distributors
 - Hydro One Networks 2015/2016 Transmission Rate Application
 - 2016 Rate Applications of Various Electricity Distributors
 - OEB – 2016 Pole Attachment Rate Working Group
 - Hydro One Networks 2017&18 Transmission Rate Application
 - 2017 Rate Applications of Various Electricity Distributors
 - 2018 Rate Applications of Various Electricity Distributors
 - 2019 Rate Applications of Various Electricity Distributors
 - Hydro One Networks 2019 Transmission Rate Application
 - 2020 Rate Applications of Various Electricity Distributors
- Electricity (British Columbia)
 - BC Hydro IPP By-Pass Rates
 - BC Hydro Heritage Contract Proposals
 - BC Hydro’s 2004/05 & 2005/06; 2006/07 & 2007/08; 2008/09 & 2009/10; 2010/2011; 2011/12-2013/14 and 2016/17–2018/19 Revenue Requirement Applications
 - BC Hydro’s CFT for Vancouver Island Generation – 2004
 - BC Hydro’s 2005 Resource Expenditure and Acquisition Plan
 - BC Hydro’s 2006 Residential Time of Use Rate Experiment Application*
 - BC Hydro’s 2006 Integrated Electricity Plan
 - BC Hydro’s 2007 Rate Design Application
 - BC Hydro’s 2008 Long Term Acquisition Plan
 - BC Hydro’s 2008 Residential Inclining Block Rate Application
 - BC Hydro’s 2009 GS Rate Design Application
 - BC Hydro 2013 Residential Inclining Block Rate Re-Pricing
 - BC Hydro’s 2015 Rate Design (and Cost of Service) Application
 - BC Transmission Corporation – Open Access Transmission Tariff Application -2004
 - BCTC’s 2005/06; 2006/07, 2008/10 and 2010/2011 Revenue Requirement Applications
 - BCTC’s – 2005 Vancouver Island Transmission Reinforcement Project
 - BCTC’s – 2007 Interior-Lower Mainland Transmission Application
 - BCTC’s 2009-2018 Capital Plan
 - BCTC’s 2011 Capital Plan Update

- Fortis BC's 2005 Revenue Requirement and System Development Application
- Fortis BC's 2006; 2007; 2008; 2009; 2010; 2011; 2012 and 2013 Revenue Requirement Applications
- Fortis BC's 2007-2008 and 2009-2010 Capital Plan and System Development Plans
- FortisBC's 2007 Rate Design Application
- Fortis BC's 2009 Cost Allocation and Rate Design Application
- Fortis BC's 2011 Residential Inclining Block Rate Application
- Fortis BC's 2011 Capital Plan
- FortisBC's 2012 Integrated System Plan Review
- BC Hydro/Fortis BC 2013 Purchase Power Agreement
- FortisBC's 2014-2018 PBR Plan and Annual Reviews
- FortisBC's 2015, 2016, 2017, 2018 and 2019 Revenue Requirement Applications
- FortisBC's 2015-2016; 2017 and 2018 DSM Expenditure Applications
- FortisBC's 2016 Long Term Energy Resource Plan Application
- FortisBC's 2017 Cost of Service and Rate Design Application
- BCUC - 2012 Generic Cost of Capital Review
- BCUC – Residential Inclining Block Rate Report to Government (2017)
- BCUC – Regulation of Electric Vehicle Charging Services (2018)

- Electricity (Quebec)
 - Hydro Québec - Distribution's 2002-2011 Supply Plan*
 - Hydro Quebec - Distribution's 2002-2003 Cost of Service and Cost Allocation Methodology*
 - Hydro Québec - Distribution's 2004-2005 Tariff Application*
 - Hydro Québec - Distribution's 2005/2006 Tariff Application*
 - Hydro Québec - Distribution's 2005-2014 Supply Plan*
 - Hydro Québec - Distribution's 2006/2007 Tariff Application*
 - Hydro Québec - Transmission's 2005 Tariff Application*
 - Hydro Québec - Distribution's 2006 Interruptible Tariff Application
 - Hydro Québec - Distribution's 2006 Cost Allocation Work Group
 - Hydro-Québec - Transmission's 2007 Tariff Application
 - Hydro-Québec - Distribution's 2007/08 Tariff Application*
 - Hydro-Québec - Transmission's 2008 Tariff Application
 - Hydro-Québec - Distribution's 2008/09 Tariff Application*
 - Hydro Québec - Distribution's 2008-2017 Supply Plan
 - Hydro-Québec - Transmission's 2009 Tariff Application
 - Hydro-Québec - Distribution's 2009/10 Tariff Application*
 - Hydro Québec - Distribution's 2014-2023 Supply Plan

- Electricity (Manitoba)
 - Manitoba Hydro's Status Update Re: Acquisition of Centra Gas Manitoba Inc.*
 - Manitoba Hydro's Diesel 2003/04 Rate Application
 - Manitoba Hydro's 2004/05 and 2005/06 Rate Application*
 - Manitoba Hydro/NCN NFAAT Submission re: Wuskwatim*
 - Manitoba Hydro's 2005 Cost of Service Methodology Submission*
 - Manitoba Hydro's 2007 Rate Adjustment Application

- Manitoba Hydro's 2008 General Rate Application*
- Manitoba Hydro's 2008 Energy Intensive Industry Rate Application
- Manitoba Hydro's 2009 Rate Adjustment Application
- Manitoba Hydro's 2010-2012 General Rate Application
- Manitoba Hydro's 2010 and 2011 Diesel Community Rate Applications
- Manitoba Hydro's 2013-2014 General Rate Application
- Manitoba Hydro's 2013 NFAAT Submission re: Keeyask and Conawapa*
- Manitoba Hydro's 2015-2016 General Rate Application
- Manitoba Hydro's 2016 Interim Rate Application
- Manitoba Hydro's 2015 Cost of Service Methodology Review*
- Manitoba Hydro's 2017/18 & 2018/19 GRA*
- Manitoba Hydro's 2016 NEB Application re: MMTP
- Manitoba Hydro's 2019/20 GRA*

- Electricity (Saskatchewan)
 - Saskatchewan Power's 2008 Cost Allocation Methodology Review

- Natural Gas Distribution
 - Enbridge Consumers Gas 2001 Rates
 - BC Centra Gas Rate Design and Proposed 2003-2005 Revenue Requirement
 - Terasen Gas (Vancouver Island) LNG Storage Project (2004)
 - BCUC – 2012 Generic Cost of Capital Proceeding

- Telecommunications Sector
 - Access to In-Building Wire (CRTC)
 - Extended Area Service (CRTC)
 - Regulatory Framework for Small Telecoms (CRTC)

- Other
 - Acted as Case Manager in the preparation of Hydro One Networks' 2001-2003 Distribution Rate Application
 - Supported the implementation of OPG's Transition Rate Option program prior to Open Access in Ontario
 - Prepared Client Studies on various issues including:
 - The implications of the 2000/2001 natural gas price changes on natural gas use forecasting methodologies.
 - The separation of electricity transmission and distribution businesses in Ontario.
 - The business requirements for Ontario transmission owners/operators.
 - Various issues associated with electricity supply/distribution in remote First Nations' communities
 - Member of the OEB's 2004 Regulated Price Plan Working Group
 - Member of the OEB's 2005/06 Cost Allocation Technical Advisory Team
 - Member of the OEB's 2008 3rd Generation Incentive Regulation Working Group
 - Member of the IESO Technical Panel (April 2004 to April 2010)
 - Member of the OEB's 2011 Cost Allocation Working Group
 - Member of the OEB's 2012 Network Investment Planning Work Group

- Member of the OEB's 2012 Defining and Measuring Performance (4th Generation Incentive Regulation) Work Group
- Member of the OEB's Unmetered Load Cost Allocation Working Group (2012-2015)
- Member of the OEB's 2013 Standby Rate Working Group
- Member of the OEB's 2016 Pole Access Charge Working Group

Hydro One Networks

Manager - Regulatory Integration, Regulatory and Stakeholder Affairs (April 1999 to June 2000)

- Supervised professional and administrative staff with responsibility for:
 - providing regulatory research and advice in support of regulatory applications and business initiatives;
 - ensuring regulatory requirements and strategies are integrated into business planning and other Corporate processes;
 - providing case management services in support of specific regulatory applications.
- Acting Manager, Distribution Regulation since September 1999 with responsibility for:
 - coordinating the preparation of applications for OEB approval of changes to existing rate orders; sales of assets and the acquisition of other distribution utilities;
 - providing input to the Ontario Energy Board's emerging proposals with respect to the licences, codes and rate setting practices setting the regulatory framework for Ontario's electricity distribution utilities;
 - acting as liaison with Board staff on regulatory issues and provide regulatory input on business decisions affecting Hydro One Networks' distribution business.
- Supported the preparation and review before the OEB of Hydro One Networks' Application for 1999-2000 transmission and distribution rates.

Ontario Hydro

Team Leader, Public Hearings, Executive Services (Apr. 1995 to Apr. 1999)

- Supervised professional and admin staff responsible for managing Ontario Hydro's participation in specific public hearings and review processes.
- Directly involved in the coordination of Ontario Hydro's rate submissions to the Ontario Energy Board in 1995 and 1996, as well as Ontario Hydro's input to the Macdonald Committee on Electric Industry Restructuring and the Corporation's appearance before Committees of the Ontario Legislature dealing with Industry Restructuring and Nuclear Performance.

Manager – Rates, Energy Services and Environment (June 1993 to Apr. 95)

Manager – Rate Structures Department, Programs and Support Division (February 1989 to June 1993)

- Supervised a professional staff with responsibility for:
 - Developing Corporate rate setting policies;
 - Designing rates structures for application by retail customers of Ontario Hydro and the municipal utilities;

- Developing rates for distributors and for the sale of power to Hydro's direct industrial customers and supporting their review before the Ontario Energy Board;
- Maintaining a policy framework for the execution of Hydro's regulation of municipal electric utilities;
- Reviewing and recommending for approval, as appropriate, municipal electric utility submissions regarding rates and other financial matters;
- Collecting and reporting on the annual financial and operating results of municipal electric utilities.
- Responsible for the development and implementation of Surplus Power, Real Time Pricing, and Back Up Power pricing options for large industrial customers.
- Appeared as an expert witness on rates before the Ontario Energy Board and other regulatory tribunals.

Section Head – Rate Structures, Rates Department

November 1987 to February 1989

- With a professional staff of eight responsibilities included:
 - Developing rate setting policies and designing rate structures for application to retail customers of municipal electric utilities and Ontario Hydro;
 - Designing rates for municipal utilities and direct industrial customers and supporting their review before the Ontario Energy Board.
- Participated in the implementation of time of use rates, including the development of retail rate setting guidelines for utilities; training sessions for Hydro staff and customers presentations.
- Testified before the OEB on rate-related matters.

Superintendent – Rate Economics, Rates and Strategic Conservation Department

February 1986 to November 1987

- Supervised a Section of professional staff with responsibility for:
 - Developing rate concepts for application to Ontario Hydro's customers, including incentive and time of use rates;
 - Maintaining the Branch's Net Revenue analysis capability then used for screening marketing initiatives;
 - Providing support and guidance in the application of Hydro's existing rate structures and supporting Hydro's annual rate hearing.

Power Costing/Senior Power Costing Analyst, Financial Policy Department

April 1980 to February 1986

- Duties included:
 - Conducting studies on various cost allocation issues and preparing recommendations on revisions to cost of power policies and procedures;
 - Providing advice and guidance to Ontario Hydro personnel and external groups on the interpretation and application of cost of power policies;
 - Preparing reports for senior management and presentation to the Ontario Energy Board.

- Participated in the development of a new costing and pricing system for Ontario Hydro. Main area of work included policies for the time differentiation of rates.

Ontario Ministry of Energy

Economist, Strategic Planning and Analysis Group

April 1975 to April 1980

- Participated in the development of energy demand forecasting models for the province of Ontario, particularly industrial energy demand and Ontario Hydro's demand for primary fuels.
- Assisted in the preparation of Ministry publications and presentations on Ontario's energy supply/demand outlook.
- Acted as an economic and financial advisor in support of Ministry programs, particularly those concerning Ontario Hydro.

EDUCATION

Master of Applied Science – Management Science

- University of Waterloo, 1975
- Major in Applied Economics with a minor in Operations Research
- Ontario Graduate Scholarship, 1974

Honours Bachelor of Science

- University of Toronto, 1973
- Major in Mathematics and Economics
- Alumni Scholarship in Economics, 1972