

**REFERENCE:** Daymark Evidence p.2, 19, 132

**PREAMBLE:**

Daymark finding no. 1 states: “Efficiency Manitoba has proposed a Plan that on average over the three years averages producing enough savings to meet the targets in the Regulations.”

On December 3, 2019, EM revised the electric codes and standards savings in PUB/EM-39R, affecting the savings forecasted by the Plan. The Plan no longer appears to meet the legislated savings targets.

In PUB/EM-28, EM advises that: “Efficiency Manitoba is confident that the flexibility of the Plan will allow for modifications to the offerings to enable the achievement of the 1.5% target.”

**REQUEST:**

- a) If any findings or conclusions in Daymark’s report require any revisions in light of the updated information provided by EM, please provide them.
- b) Provide Daymark’s view whether the Plan has the flexibility to achieve the 1.5% electric savings target, as claimed by EM. Provide any concerns or reservations Daymark has about EM meeting the 1.5% target with the proposed Plan, considering EM forecasts electric savings less than 1.5%.

**RATIONALE:**

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**RESPONSE:**

- a) Daymark reviewed Efficiency Manitoba’s revised response to PUB/EM-39R and calculated the impact on savings as a percent of load due to Efficiency Manitoba’s revised savings from codes & standards. While the overall savings as a percent of total load remains the same for 2020/21 at 1.43%, the revision lowers the savings percentage for the second and third year, as well as the three-year average. Based on this revision, savings as a percent of total load is now projected for 2021/22 to be 1.48% versus 1.55%, and for 2022/23 to be 1.45% versus 1.50%, with a corresponding reduction in the three-year average from 1.51% to 1.46%. These percentage reductions are equivalent to lower total savings over three years of 14 GWh.

The impact of Efficiency Manitoba’s revision is shown in the tables below, with the first table showing the overall target from the Act (which is unchanged):

**Three-Year Plan Electric Energy Savings Target**

Description	2020/21	2021/22	2022/23	Three-year
				average
Reference electric Load (GWh)	26,047	26,029	25,911	25,996
Target percent of load	1.50%	1.50%	1.50%	1.50%
Electric energy savings required to achieve target	391	390	389	390

The next table, below, included in Efficiency Manitoba’s Filing Table A3.1 (pdf page 249), shows savings projected under the proposed Plan, as originally filed:

**Using data originally filed by Efficiency Manitoba**

Description	2020/21	2021/22	2022/23	Three-year average
Program-Savings (GWh)	285	300	295	293
Codes & Standards Savings (GWh)	88	103	108	100
Total (GWh)	373	403	403	393
<b>Savings as percentage of total load</b>	<b>1.43%</b>	<b>1.55%</b>	<b>1.56%</b>	<b>1.51%</b>

The final table, below, is our revision of Efficiency Manitoba’s Table A3.1, and shows the revised projected savings using the lower projected savings for codes & standards Efficiency Manitoba provided in its response to PUB/EM 1-39 (revised).

**Revised based on Efficiency Manitoba’s response to PUB/EMI-39**

Description	2020/21	2021/22	2022/23	Three-year average
Program-Savings (GWh)	285	300	295	293
Codes & Standards Savings (GWh)	88	86	82	85
Total (GWh)	373	386	377	379
<b>Savings as percentage of total load</b>	<b>1.43%</b>	<b>1.48%</b>	<b>1.45%</b>	<b>1.46%</b>

- b) Daymark’s view as to whether the plan has the flexibility to achieve the 1.5% electric savings target is addressed in Daymark’s response to PUB/DAYMARK-1-2a.

Daymark’s concerns or reservations about Efficiency Manitoba meeting the 1.5% target with the proposed plan are addressed in Daymark’s response to PUB/DAYMARK-1-4a-b.

**REFERENCE:** Daymark Evidence pdf p.3, 74

**PREAMBLE:**

On page 3 of its evidence, Daymark states: “The fact that measures expire within a fifteen-year period will add to the challenges faced by Efficiency Manitoba in meeting its fifteen-year overall savings goals.” Table 17 shows electric measures with lives from one to five years deliver 42% of the savings.

**REQUEST:**

- a) Please confirm whether some measures that expire within a fifteen-year period may provide an opportunity for EM achieve renewed savings with the same measure and comment on the significance of this opportunity. Does a significant number of short-life measures (as shown in Table 17) make it easier for EM to achieve its savings targets in future efficiency plans?
- b) Since EM's annual savings target does not decline over time, please comment on the challenge EM will face in identifying and implementing measures that will achieve the target

**RESPONSE:**

- a) Daymark confirms that the opportunity for renewed savings from short-lived measures exists. Daymark interprets renewed savings to mean that when a measure reaches its end of life the participant may have an opportunity to participate in an energy efficiency program as part of replacing that measure.  
  
This may create more opportunity to reach the annual savings targets of 1.5% for electric and 0.75% for natural gas in the years after the initial measure. However, even in terms of the functionality of the initial measure, if a market transformation has occurred and the replacement measure to be chosen by the customer/participant is now the most efficient measure, there would not be an opportunity for renewed savings. Also, if codes or standards have evolved into requiring the measure then there is not an opportunity for renewed savings unless more efficient options exist.
- b) Daymark is unclear as to the interpretation of the Province’s fifteen-year savings. In the Efficiency Manitoba Act (Section 7(2)) it refers to the savings after fifteen years to be the cumulative total of 22.5% for electric and 11.25% for natural gas. If this goal is the sum of the percentages of annual savings achieved in each year then short-lived measures create more opportunity and not more challenges to meet that goal. If the after fifteen-years refers to savings in effect at the end of year fifteen then short-lived measures create extreme difficulty in meeting this interpretation of the goal without greatly increasing annual savings targets each year above the 1.5% for electric and 0.75% for natural gas. Daymark is not advocating which interpretation should be utilized by the PUB and the Province. Daymark’s observation in the Preamble was made assuming the second interpretation.

**REFERENCE:** Daymark Evidence p.21

**PREAMBLE:**

Regulation 119/2019 s.11: In addition to the factors set out in subsection 11(4) of the Act, the PUB must consider the following when reviewing an efficiency plan: (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;

**REQUEST:**

Notwithstanding the revision to the Plan savings in PUB/EM-39R, if the Board was required to undertake a review pursuant to ss.11(e), provide Daymark's views whether such a review will require a review of the cost effectiveness of all initiatives included in the Plan. If not required, how would EM and the Board determine which initiatives are the ones that cause the projected savings to exceed the savings target?

**RATIONALE:**

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**RESPONSE:**

Daymark recognizes that there is a complex set of objectives or attributes that the Province expects of the activities proposed by Efficiency Manitoba in each three-year plan. We view the major objectives put forth, which at times can create conflicting strategies, as being the following:

1. The Plan should provide programs that are accessible to all Manitobans regardless of geography, and especially to hard-to-reach customers, such as those who have lower incomes and indigenous people and businesses.
2. The Plan should provide programs that meet the annual savings target for electric and natural gas savings.
3. The Plan should propose programs that are cost effective.

The regulations described in the preamble also suggest that if Efficiency Manitoba wishes to propose programs that aggregate to savings greater than the annual target, that the programs that exceed the annual target should be cost effective.

Daymark's view is that in a comprehensive review of the plan it would most likely be necessary to review the cost effectiveness of all programs and measures if Efficiency Manitoba proposes a plan that exceeds the annual target. It may not be necessary, but still desirable, to review the economics of programs that are needed to satisfy the first of the criteria we have listed above. The economics of programs needed to achieve the accessibility, or some other non-monetary savings, objective could be skipped in the review of cost-effectiveness. It would seem to Daymark that the other programs should have their cost effectiveness reviewed.

**REFERENCE:** Daymark Evidence pdf p.36, 37; PUB/EM-27(c)

**PREAMBLE:**

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**REQUEST:**

Did Daymark compare EM's Plan to Manitoba Hydro's actual performance and not just Manitoba Hydro's DSM plan targets? If not, why not?

- a) Since EM's annual savings target does not decline over time, please comment on the challenge EM will face in identifying and implementing measures that will achieve the target
- b) How does the Plan compare to Manitoba Hydro's most current actual DSM results as shown in the 2017/18 Provincial Annual DSM Report?

**RESPONSE:**

- a) The challenge that Efficiency Manitoba will face in order to continue to attain its annual savings target will be to assure that they are getting higher than planned participation rates for those measures that offer the greatest contribution to savings per sale (or installation). For example, the Commercial HVAC Water Heater – Tank (Gas) measure offers participants a choice of tanks that provide 9 different levels of energy savings (due in part to each unit's insulation specifications). If during a mid-year review Efficiency Manitoba noticed that not as many of the higher efficiency units were being installed, they could revise their options to exclude less efficient units.

Additionally, we understand that Efficiency Manitoba has scaled incentives for this type of measure to make the customer indifferent to which level of efficient unit is installed. By dropping the less efficient units from the program, they could reallocate the budget for this measure to offer a higher incentive for the most efficient unit.

Finally, Efficiency Manitoba may have to review program measures for which they expect to have nearly saturated the market by 2023, defined as Efficiency Manitoba's estimate of Total Market in each measure spreadsheet. We noted at least one case, Commercial HVAC Boilers (Gas), where Efficiency Manitoba estimates natural conservation to be relatively strong and growing, while Efficiency Manitoba anticipates the number of incented installs to decline year over year. Efficiency Manitoba could consider reducing and redeploying incentive dollars from this program to, for example, the HVAC Water Heater – Tank measure.

Another alternative would be to accelerate development of custom programs that are expected to garner substantial savings by installing a number of high efficiency units in one location or business, such as the Energy Manager program, which anticipates annual savings of 466,000 kWh, but no program driven sales in 2020 and 1 sale in 2021 followed by 2 in 2022.

- b) Daymark attempted to compare measures included in the Efficiency Manitoba plan with those presented in the Manitoba Hydro 2018 DSM Report, which included actual results through 2016/17 and estimated savings and participation for 2017/2018. There are differences in

program design and metrics between the two plans, even for those program measures that seemed to be a continuation of the legacy Manitoba Hydro plan. For example, the definition of the total market (when provided) appeared to be different between the two plans, and the definition of a project (i.e., number of installs based on units or square footage) was not consistent. Consistency may not have been required, especially if by redesigning the program Efficiency Manitoba could anticipate more installs and greater savings, but it did hamper comparison.

We found only one measure that appeared to be directly comparable across programs: the Commercial Building Envelope (CBE) Windows and Doors insulation program. We compared three metrics for each plan:

- total market
- number of potential installs per year
- number of planned projects per year

At the end of 2017, Manitoba Hydro assumed the total market of 27,000, potential annual installs of 750 and planned 150 projects during 2017/2018. By contrast, Efficiency Manitoba defined total market as 1,750, with an estimated 182 PowerSmart program installs per year, of which 25 are due to Natural Conservation, leaving 157 incented sales. In fact, using measure level spreadsheet data, Efficiency Manitoba appears to have set a slightly higher target for itself of 169 incented sales per year, which Efficiency Manitoba acknowledges could happen due to the availability of incremental third-party financing.

Given both the difference in Total Market characteristics and sometimes even lower savings per year, as in the case of this CBE Windows program, it appears difficult to compare the Manitoba Hydro DSM program to Efficiency Manitoba's program which is designed to take advantage of more financing and innovative program design.

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**REFERENCE:** Daymark Evidence p.45 to 59

**PREAMBLE:**

EM defines hard-to-reach as "both income qualified customers and Indigenous customers as both segments face unique barriers to implementing energy efficiency opportunities." EM defines income qualified customers as those "who meet the Low Income Cut-Offs ("LICO"), as estimated by Statistics Canada, for urban centres with more than 500,000 residents. An additional 25 percent is added to the LICO qualifier (the "LICO 125 threshold")."

**REQUEST:**

For jurisdictions in which Daymark has experience, please provide, by jurisdiction, details of membership in specifically identified customer categories (that is, details of which types of customers are considered hard-to-reach) that may require specifically targeted programs.

**RESPONSE:**

Daymark has direct experience with DSM programs in two jurisdictions for which information is readily available for this response, Massachusetts and Nova Scotia, both of which have programs identified as serving hard to reach customer groups.

In Massachusetts, all utilities have filed their 2019-2021 plans including budget allocations for administration, marketing and incentives for the following hard to reach customer groups:

- A3 - Residential Hard-to-Measure
- B1 - Low-Income Whole House
- B2 - Low-Income Hard-to-Measure
- C3 - C&I Hard-to-Measure
- B1 - Income Eligible Existing Buildings
- B2 - Income Eligible Hard-to-Measure

In Nova Scotia, Efficiency One's latest DSM plan budget for 2020-2022 (M09096) will include \$4.6 million for the following enhancements for hard to reach customer groups:

"Examples of key improvements and enhancements to increase access to residential energy efficiency programs and services offered by the Preferred Plan include:

- Establishing a new First Nations program component, which was first introduced in 2018 as a pilot, to deliver comprehensive electrical energy savings to homes in First Nation communities
- Establishing a new Affordable Multi-Family Housing program component, which was first introduced as a Pilot in 2016, to provide energy audits and energy-efficient upgrades for low-income housing units. This program component has been designed to help low income renters realize the benefits of energy efficiency. Historically, this market has had low participation levels
- Additional project management support (via an Energy Advocate) for participants in the Home Energy Assessment (HEA) program component." <sup>1</sup>

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<sup>1</sup> M09096 2020-2022 Efficiency One DSM Resource Plan Application, Evidence p. 27 of 62, Appendix A, p. 14 of 95  
December 20, 2019

**REFERENCE:** Daymark Evidence p.70

**PREAMBLE:**

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**REQUEST:**

In its review of EM's free rider, free driver, and persistence factors, did Daymark identify any unusually high or low factors? If so, did Daymark investigate these with EM? If EM provided explanations, please provide. If Daymark has comments with respect to unusually high or low free rider, free driver, or persistence factors, please provide.

**RESPONSE:**

The free rider values used by Efficiency Manitoba are generally consistent within the sector and with the same types of programs elsewhere. For example, direct install measures that require an energy advisor visiting a home to install measures have low free rider values. However, product rebate measures where discounts are provided at the point-of-sale, as well as home renovation measures, have high free rider values. Some of the product rebate measures, such as dehumidifiers, bar fridges, and window air conditioners, have free rider values as high as 65%. Similarly, in the commercial, industrial, & agricultural sectors, measures associated with custom programs, renovation, and small businesses are lower (<10%), whereas measures considered for HVAC & controls have high free rider values.

The free driver values (which account for customers that do not participate in the program but are influenced by the program and adopt measures anyway) used by Efficiency Manitoba also seem to be consistent with industry approaches. The free driver values range from 0% to 30%, although a majority of measures have zero or small free driver values.

The persistence factor – expressed in terms of a percentage and accounting for any failure, early replacement, and any uninstalled products – is generally consistent with industry, based on the program type impacted, for most of the measures. For example, for low-cost measures such as lighting controls, smart plugs considered in the product rebate program have persistence factors in the range of 70% - 85% to account for the possibility of these measures not being installed after purchase, whereas measures in the same product rebate category that are high-cost and large appliances such as dishwashers and refrigerators have a persistence factor of 100%. These appliances, once purchased at point-of-sale, are likely to be installed.



**REFERENCE:** Daymark Evidence p.74; Coalition/EM I-22

**PREAMBLE:**

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**REQUEST:**

- a) Refile Table 17 removing load displacement projects.
- b) If Daymark extracted the measure lives from EM’s workpapers in the process of creating Tables 17 and 18, provide a table showing the lives of each measure as was requested in Coalition/EM I-22.

**RESPONSE:**

- a) Table 17 has been found to be incorrectly allocated. While totals remain the same, allocation among measure-life buckets needs correction. The original table in the Daymark report is shown below with strikeout.

<b>Year Range</b>	<b>Total Three-Year Savings (kWh)</b>	<b>Savings as % of Total</b>	<b>Cumulative Savings %</b>
1-5	<del>371,112,450</del>	42%	42%
6-10	<del>27,286,730</del>	3%	45%
11-15	<del>345,589,248</del>	39%	84%
16-20	<del>76,082,351</del>	9%	93%
21-25	<del>42,615,692</del>	5%	98%
26-30	<del>12,264,138</del>	1%	99%
31+	<del>5,767,240</del>	1%	100%
<b>Total</b>	<b>880,717,849</b>		

The following table is the corrected version of Table 17 which is included in the revised Report:

Year Range	Total Three-Year Savings (kWh)	Savings as % of Total	Cumulative Savings %
1-5	348,505,184	40%	40%
6-10	65,873,774	7%	47%
11-15	400,879,233	46%	93%
16-20	21,957,879	2%	95%
21-25	24,329,811	3%	98%
26-30	13,404,729	2%	99%
31+	5,767,240	1%	100%
<b>Total</b>	<b>880,717,849</b>		

The following table is the requested version of Table 17 (see EM/DAYMARK I-1) with all Load Displacement Program projects removed, which relies on the corrected Table above:

Year Range	Total Three-Year Savings (kWh)	Savings as % of Total	Cumulative Savings %
1-5	51,505,184	9%	9%
6-10	65,873,774	12%	21%
11-15	367,912,233	67%	88%
16-20	21,957,879	4%	92%
21-25	24,329,811	4%	97%
26-30	13,404,729	2%	99%
31+	5,767,240	1%	91%
<b>Total</b>	<b>550,750,849</b>		

b) Below is the table summarizing the average measure-life of each bundle, having been weighted by kWh or cubic meter savings as appropriate.

The weighted average measure life was estimated by using the following mathematical formula for each bundle in electric and natural gas portfolios:

$$\text{Weighted average measure life} = \frac{\sum_i^N (\text{measure life})_i * (\text{Savings})_i}{\sum_i^N (\text{Savings})_i}$$

where *i* is the measure and N is the total number of measures considered in each bundle of electric and natural gas portfolios separately.

	<b>Electric</b>	<b>Weighted Measure Life (Years)</b>	<b>Natural Gas</b>	<b>Weighted Measure Life (Years)</b>
<b>Agricultural</b>	Emerging Technology	20		
	Custom	25	Custom	25
<b>Commercial</b>	Emerging Technology	22	Emerging Technology	20
	HVAC & Controls	19	HVAC & Controls	21
	In Suite Efficiency	6	In Suite Efficiency	12
	New Construction & HPB	6	New Construction & HPB	11
	Renovation	12	Renovation	25
	Small Business & Appliance	9	Small Business & Appliance	9
<b>Income Qualified</b>	Income Qualified	41	Income Qualified	28
<b>Indigenous</b>	Community Geothermal	20		
	Insulation and Direct Install	26	Metis Income Qualified	24
	Metis Income Qualified	24		
	Small Business	10		
<b>Industrial</b>	Custom	14	Custom	19
	Load Displacement	2		
<b>Residential</b>	Direct Install	8	Direct Install	9
	Emerging Technology	25	Home EE Kits & Education	9
	Home EE Kits & Education	9	Home Renovation	27
	Home Renovation	21	New Homes & MR	34
	New Homes & MR	37	Product Rebates	9
	Product Rebates	9		

Tables showing individual measures and associated measure lives for the electric and natural gas portfolios are included in PUB/Daymark I-7b CSI Attachment filed with this response.

<b>Electric</b>	
Agricultural	
Commercial	
Custom	
Custom Measures	
Emerging Technology	
Emerging Technology	
<b>Industrial</b>	
Commercial	
Custom	
Custom Measures	
Emerging Technology	
Emerging Technology	
<b>Residential</b>	
Commercial	
Custom	
Custom Measures	
Emerging Technology	
Emerging Technology	
<b>Small Business</b>	
Commercial	
Custom	
Custom Measures	
Emerging Technology	
Emerging Technology	
<b>Specialty</b>	
Commercial	
Custom	
Custom Measures	
Emerging Technology	
Emerging Technology	

1c and 2b

<b>Natural Gas</b>	
<b>Commercial</b>	
Custom	
Custom Measures	
Emerging Technology	
HVAC & Controls	
Boilers (Gas)	
HRVs Gas	
HVAC CO2 Sensor Gas	
IR Heaters	
NG to Geo (NG Savings)	
Unit Heaters	
Water Heaters - Tank	
Water Heaters - Tankless	
In Suite Efficiency	
In Suite HRV Control NG	
In Suite WES NG Bathroom Aerators	
In Suite WES NG Kitchen Aerators	
In Suite WES NG Pipe Wrap	
In Suite WES NG Shower Head	
Smart Thermostat Assumptions Gas	
New Construction & HPB	
EBOP Gas	
EBOP Lite Gas	
EBOP Maint Gas	
Manitoba Race to Reduce 2.0 Gas	
Manitoba Race to Reduce NG	
New Buildings 2.1	
New Buildings 3.0	
New Buildings NZE	
Renovation	
CBEP Attic Cavity - SBP	
CBEP Curtain Wall - 330 Portage Project	
CBEP Curtain Wall - NG Heat	
CBEP Doors - NG Heat	
CBEP Insulation - Air Tightness	
CBEP Insulation - Heating	
CBEP Insulation - Heating - Below Grade	
CBEP Windows - NG Heat	
Small Business & Appliance	
Bathroom Aerator NG	
Convection Ovens Gas	
Fryers Natural Gas	
Griddle Natural Gas	
Kitchen Aerator NG	
Smart Thermostat NG	
Spray Valve NG	
Steamers Natural Gas	
<b>Income Qualified</b>	
Income Qualified	
2020 LRP (AEP MURB - Air Sealing & Admin) Natural Gas CBA	
2020 LRP (AEP FRP Boiler Ind) Natural Gas CBA	
2020 LRP (AEP FRP Mid Furnace Ind & Comm) Natural Gas CBA	
2020 LRP (AEP FRP Std Furnace Ind & Comm) Natural Gas CBA	
2020 LRP (AEP Ind & Comm - AS & HEA, Admin Costs) Natural Gas CBA	
2020 LRP (AEP Ind & Comm - Insulation) Natural Gas CBA	
2020 LRP (AEP Ind & Comm - LED) Natural Gas CBA	
2020 LRP (AEP Ind & Comm - WESP) Natural Gas CBA	
2020 LRP (AEP Ind & Comm Appliances) Natural Gas CBA	
2020 LRP (AEP Ind & Comm Smart Thermostat) Natural Gas CBA	
2020 LRP (AEP MURB - LED) Natural Gas CBA	
2020 LRP (AEP MURB - WESP) Natural Gas CBA	
<b>Indigenous</b>	
Metis Income Qualified	
2020 LRP (Metis - Appliances) Natural Gas CBA	
2020 LRP (Metis - AS & HEA, Admin Costs) Natural Gas CBA	
2020 LRP (Metis - FRP Boiler) Natural Gas CBA	
2020 LRP (Metis - FRP Mid Furnace) Natural Gas CBA	
2020 LRP (Metis - FRP Std Furnace) Natural Gas CBA	
2020 LRP (Metis - Insulation) Natural Gas CBA	
2020 LRP (Metis - LED) Natural Gas CBA	
2020 LRP (Metis - Smart Thermostat) Natural Gas CBA	
2020 LRP (Metis - WESP) Natural Gas CBA	
<b>Industrial</b>	
Custom	
Energy Manager (EMI)	
Energy Manager (SEM Cohorts) yr1	
Large Projects yr2	
Large Projects yr3	
NG Optimization Program	
<b>Residential</b>	
Direct Install	
DSM (Home Check Up) CBA - Window Kits (Natural Gas)	
DSM (Home Check Up HRV Control) CBA - NG	
DSM (Home Check Up) CBA - NG BA	
DSM (Home Check Up) CBA - NG PW	
DSM (Home Check Up) CBA - NG SH	
DSM (Home Check Up) CBA - NG Timer	
DSM (Home Check Up) CBA - Weatherstripping (Natural Gas)	
DSM (Home Check Up) CBA - NG KA	
Gas Savings Assumptions	
Home Check Up - Costs	
Home Check Up   Lighting Y1 Gas IE	
Home Check Up   Lighting Y2 Gas IE	
Home Check Up   Lighting Y3 Gas IE	
Home Check Up   Lighting Y4+ Gas IE	
Home EE Kits & Education	
DSM (EVENT) CBA - NG PW	
DSM (Event) Admin Cost	
DSM (EVENT) CBA - NG BA	
DSM (EVENT) CBA - NG KA	
DSM (EVENT) CBA - NG SH	
DSM (Home Check Up) CBA - NG Timer	
DSM (School Program) CBA - NG BA	
DSM (School Program) CBA - NG KA	
DSM (School Program) CBA - NG PW	
DSM (School Program) CBA - NG SH	
DSM (School Program) CBA - NG Timer	
DSM (School Program) CBA - Window Kits (Natural Gas)	
DSM (School Program) CBA - Weatherstripping (Natural Gas)	
LED Gas Interactive Effects (IE)	
Home Renovation	
Air Sealing Gas	
Appliances-Washer&Dryers Gas	
Audits & Bundling Bonus Gas	
DWHR Gas	
Home Insulation Gas 3-yr combo	
HRV Controls Gas	
Res Reno   Appliances Combo (Natural Gas IE)	
Residential Geo Yr 1-5 Gas	
Residential Pool Pumps - Natural Gas Interactive Effects	
smart Thermostats Gas	
Windows and Doors Doors Gas	
Windows and Doors Gas Windows	
New Homes & MR	
A la Carte Gas Bungalow	
A la Carte Gas Cabover	
New Gas 20yr Tech	
New Gas 50yr Tech	
Reno Gas CBA	
Product Rebates	
Instant - Other Tech_1.5 GPM Showerheads (Natural Gas)	
Instant - Other Tech_Weatherstripping (Natural Gas)	
Instant - Other Tech_Window Kits (Natural Gas)	
Instant Admin Cost Gas	
Online - Appliance_Clothes Washers & Dryers (Natural Gas)	
Online - Appliance_Dishwashers (Natural Gas)	
Online - Smart Thermostats (Natural Gas)	
Online Admin Cost Natural Gas	

1c and 2b

**REFERENCE:** Daymark Evidence p.79 to 82; PUB/EM I-11

**PREAMBLE:**

In response to PUB/EM I-11, EM provided cost effectiveness test results at the bundle level, not the initiative (or measure) level

**REQUEST:**

- a) Provide the total resource cost ratios, levelized resource costs, PACT ratios, PACT levelized costs, simple customer paybacks, and participating customer cost ratios for each electric measure in the Plan, organized by customer segment. (For the purposes of this information request, the “measure level” is to correspond with the individual workpapers provided by EM)
- b) Provide a table of electric measures that have PACT ratios less than unity along with the 3-year average savings for each measure, ranked by PACT ratio. Include in the table the PACT ratios, total resource cost ratios, levelized resource costs, PACT levelized costs, simple customer paybacks, and participating customer cost ratios for each measure.
- c) Provide the total resource cost ratios, levelized resource costs, PACT ratios, PACT levelized costs, simple customer paybacks, and participating customer cost ratios for each gas measure in the Plan, organized by customer segment.
- d) Provide a table of gas measures that have PACT ratios less than unity along with the 3-year average savings for each measure, ranked by PACT ratio. Include in the table the PACT ratios, total resource cost ratios, levelized resource costs, PACT levelized costs, simple customer paybacks, and participating customer cost ratios for each measure.
- e) Explain the implications to the PUB’s review of the Plan in light of Act s.11(b) and the overall benefits to Manitobans of any measures which have both a PACT and TRC ratio less than unity.

**RESPONSE:**

a)-d) Please see PUB/Daymark I-8a-d CSI Attachment that includes the requested information, which was extracted from measure-level workpapers developed by Efficiency Manitoba.

e) Based on the conversation with PUB, Daymark prepared the response in light of Act s.11(4).b which states

**11(4)** 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;

The program administrator cost test (PACT) considers direct benefits and costs directly related to utility or program administrators. The Total Resource Cost (TRC) test considers direct benefits and any quantifiable non-energy benefits and the total cost necessary to implement the program.

Measures with PACT resulting lower than unity means that, on a net present value basis, the cost of implementing the measures are more than the benefits accrued for the utility or program administrator. Since PACT only considers benefits and costs associated with the program administrator or utility, the cost-effectiveness based on the TRC test could be relevant to assessing overall benefits to Manitobans. Measures with a TRC test resulting lower than unity, at the present value, have larger total costs than total benefits associated with them.

The implications for Manitobans are that the programs with benefit/cost ratios below unity increase the cost of electric or natural gas service to the Province, to the extent that all the benefits have been incorporated into the analysis. An example of benefits that are possible but not included is the contributions that the funding of these programs makes to securing more lasting savings through market transformation. However, even if there are no additional benefits, it does not mean that measures should be removed from the Plan just based on the PACT or TRC cost-effectiveness. It would make sense to consider whether these measures are driven by other reasons, such as strategic market transformation; social, energy or environmental policy; or assuring access to the broad cross section of Manitobans before making any recommendation as to whether to include or exclude them from the Plan.

**Response to PUB 1-8 (a): CSI INFORMATION**

Measures by Sector	TBC Ratio	Levelled Resource Cost	PACT Ratio	PACT Levelled Costs	Customer Payback Ratio	Participant Cost Ratio
<b>Commercial</b>						
Air-Cooled Chillers	2				3.04	16, 26, 49
Bathroom Aerator	2				26.93	
Cases with Doors & A/C Controls	2				1.56	
Cases with Heat-Free Doors, ECM & Evaporator Controllers	2				4.26	
CEEP Curtain Wall - Cooling - NS Projects	0				0.00	
CEEP Curtain Wall - Cooling EL Projects	0				0.00	
CEEP Curtain Wall - Heating	1				4.56	
CEEP Doors - Heating	1				5.39	
CEEP Insulation - All Tightness	0				1.25	
CEEP Insulation - Attic Cavity SBP	0				14.93	
CEEP Insulation - Cooling - EL Projects	0				0.00	
CEEP Insulation - Cooling - NS Projects	0				0.00	
CEEP Insulation - Heating - Below Grade	1				5.39	
CEEP Insulation - Heating - EL Projects	1				4.28	
CEEP Windows - Cooling - EL Projects	0				0.00	
CEEP Windows - Cooling - NS Projects	0				0.00	
CEEP Windows - Heating	0				1.46	
CLP Backlit Signs - Admin	0				1.32	
CLP Controls Sensors	0				26.25	
CLP Exterior Lighting	1				1.34	
CLP Interior Fixtures	3				2.49	
CLP Security Lamps 40000h	0				40.07	
CLP TLEDs	0				0.25	
Commercial Solar Photovoltaic	27				0.77	
Conversion Chems - Electric	1				1.99	
Custom Measures	6				1.70	
Dishwasher EL	0				0.71	
Dishwashers Electric 10 yr	0				14.13	
Dishwashers Electric 15 yr	1				20.84	
Dishwashers Electric 20 yr	1				11.11	
Door Closers - Electric	0				20.59	
EBOP Elec	1				1.91	
EBOP Int Elec	0				0.71	
EBOP Mount Elec	0				0.62	
EBOP Vent Elec	0				0.62	
Electrical Permit EL	0				1.00	
Fans Electric	1				1.64	
Gaskets & Strip Curtains - Electric	0				8.00	
GEMs	4				1.45	
Griddle Electric	1				1.66	
High-Efficiency Compressor	2				4.74	
Hot Food Holding Cabinet Electric	1				1.62	
HVAC Electric	2				4.54	
HVAC EIO Sensor Elec heat building	0				2.79	
HVAC CO2 Sensor Gas Heat Elec Cooling	0				0.00	
In Suite HRV Control Electric	2				3.85	
In Suite LED bulbs Combo	0				0.00	
In Suite WSL Bathroom Anemotors	0				43.09	
In Suite WSL Kitchen Anemotors	0				49.94	
In Suite WSL Pipe Wipe	0				21.88	
In Suite WSL Shower Head	0				1.64	
Kitchen Aerator EL	0				20.16	
LED Exit Sign EL	2				1.74	
LED Screw-in DR 25K SPL EL	0				5.56	
LED Screw-in DR 25K SPL EL	0				2.72	
LED Screw-in DR 25K SPL EL	1				1.97	
LED Screw-in DR 25K SPL EL	0				3.93	
LED Screw-in DR 25K SPL EL	1				4.44	
New Buildings 2.1	8				1.40	
New Buildings 3.0	6				1.05	
New Buildings NE	1				1.69	
NG to One-Stop Load Growth	0				0.00	
Night Covers - Electric	0				2.35	
PTAC to PFAP Conversion	1				2.25	
Radiant Heating 2.0 Elec	0				2.05	
Radiant Heating 3.0	0				1.34	
Smart Thermostat ex-situ Electric	4				1.54	
Smart Thermostat EL	1				1.17	
Spray Valve EL	0				8.74	
Steamers Electric	0				1.52	
TE BR Tandem Ballast EL	4				1.79	
TE Ballast EL	6				1.21	
TE LED Linear Lamp EL	3				2.34	
VFD	2				1.68	
<b>Income Qualified</b>						
2020 IEP JAFP MB - Air Sealing & Admin Electric CBA	0				1.04	
2020 IEP JAFP Ind & Comm - Insulation Electric CBA	0				8.71	
2020 IEP JAFP Ind & Comm - LED Electric CBA	0				0.00	
2020 IEP JAFP Ind & Comm - WESP Electric CBA	0				37.43	
2020 IEP JAFP Ind & Comm Appliances Electric CBA	0				1.84	
2020 IEP JAFP Ind & Comm Smart Thermostat Electric CBA	0				1.53	
2020 IEP JAFP MB - LED Electric CBA	0				66.91	
2020 IEP JAFP MB - WESP Electric CBA	0				13.12	
<b>Indigenous</b>						
2020 IEP (FH Appliances - clothes washer) Electric CBA	0				1.29	
2020 IEP (FH DR - LED) Electric CBA	0				0.00	
2020 IEP (FH Smart Thermostat) Electric CBA	0				1.53	
2020 IEP (FH Appliances) Electric CBA	0				1.48	
2020 IEP (Insulation - Insulation) Electric CBA	0				4.82	
2020 IEP (Insulation - LED) Electric CBA	0				0.00	
2020 IEP (Insulation - Smart Thermostat) Electric CBA	0				1.53	
2020 IEP (WESP - WESP) Electric CBA	0				37.42	
Community Gas Furnace	0				23.72	
FR DI Air Sealing	0				1.00	
FR DI Bathroom Aerator	0				35.47	
FR DI Kitchen Anemotors	0				46.78	
FR DI HPV	0				17.02	
FR Direct Instal Shower Head	0				20.66	
FRBP - Bathroom Aerator EL	0				26.05	
FRBP - Dimmer EL	0				1.00	
FRBP - Electrical Permits	0				0.00	
FRBP - Kitchen Aerator EL	0				21.21	
FRBP - LED Screw-in (DI) (25K SPL) EL	0				5.48	
FRBP - LED Screw-in (DI) (25K SPL) EL	0				2.03	
FRBP - TE BR Tandem Ballast EL	0				2.08	
FRBP - TE Linear Lamp EL	0				5.51	
Indigenous Insulation Year 1	0				4.41	
Indigenous Insulation Year 2	0				4.74	
SBP - LED Exit Sign EL	0				2.03	
SBP - LED Screw-in (DI) (25K SPL) EL	0				1.38	
SBP - LED Screw-in (DI) (25K SPL) EL	0				4.21	
SBP - LED Screw-in (DI) (25K SPL) EL	0				4.73	
SBP - Smart Thermostat EL	0				1.24	
SBP - Spray Valve EL	0				8.75	
SBP - TE Ballast EL	0				1.49	
<b>Industrial</b>						
Compressed Air	5				2.08	
Energy Manager (EM) V1	8				0.46	
Energy Manager (EM) V2	1				1.51	
Energy Manager (EM Cohort) V1	1				0.98	
Fans & Pumps	3				2.26	
Heat Pads	4				2.54	
Industrial Refrigeration	1				2.71	
Industrial	7				1.71	
<b>Micro Electric</b>	11				1.13	
<b>Residential</b>						
DSM (Home Check Up) CBA - Window Kits (Electric)	0				2.51	
DSM (Home Check Up) CBA - Year 1 CBA - EL	0				0.00	
A la Carte Elec Banquet	8				1.48	
A la Carte Elec Cabinet	4				1.79	
Air Sealing Electric	275				0.96	
Appliances- Dishwashers Electric	0				0.00	
Appliances- Refrigerators Electric	441				0.41	
Appliances- Washers/Dryers Electric	5				1.29	
Audio & Building Bases Electric	0				1.87	
Bar Fridges (Electric)	15				0.77	
Coal Climate Action Heat Pump Electric	14				1.6	
Dehumidifiers (Electric)	2				1.69	
DSM (EVENT) CBA - EL BA	0				14.49	
DSM (EVENT) CBA - EL Dishwasher Elec	0				14.79	
DSM (EVENT) CBA - EL BA	0				22.50	
DSM (EVENT) CBA - EL PV	0				6.42	
DSM (EVENT) CBA - EL SH	0				1.64	
DSM (Home Check Up HRV Control) CBA - EL	2				3.85	
DSM (Home Check Up) EL - The 2 APS	0				1.16	
DSM (Home Check Up) CBA - EL BA	0				36.52	
DSM (Home Check Up) CBA - EL KA	0				89.71	
DSM (Home Check Up) CBA - EL PV	0				17.02	
DSM (Home Check Up) CBA - EL SH	0				21.24	
DSM (Home Check Up) CBA - EL Timer	0				4.14	
DSM (Home Check Up) CBA - Weatherstripping (Electric)	0				6.83	
DSM (KITCHEN) LED bulbs - In-Year - Y2 CBA - EL	0				0.00	
DSM (KITCHEN) LED bulbs - Persisting CBA - EL	0				0.00	
DSM (School Program) - In Year 1 APS	0				1.38	
DSM (School Program) CBA - EL BA	0				36.90	
DSM (School Program) CBA - EL BA	0				89.15	
DSM (School Program) CBA - EL PV	0				17.00	
DSM (School Program) CBA - EL SH	0				21.14	
DSM (School Program) CBA - EL Timer	0				2.82	
DSM (School Program) CBA - Weatherstripping (Electric)	0				6.86	
DSM (School Program) CBA - Window Kits (Electric)	0				2.51	
DSM School Program CBA - Outdoor Plug-In Timers (Electric)	0				7.68	
DSM School Program CBA - Outdoor Plug-In Timers (Electric)	0				1.90	
Home Check Up (A-line bulbs - In-Year - Y1 (Elec)	0				0.00	
Home Check Up (A-line bulbs - In-Year - Y2 (Elec)	0				0.00	
Home Check Up (A-line bulbs - In-Year - Y3 (Elec)	0				0.00	
Home Check Up (A-line bulbs - Persisting (Elec)	0				0.00	
Home Check Up Electric Savings Assumptions	5				1.62	
Home Insulation Electric 3-yr combo	1				1.18	
HRV Controls Electric	2				1.94	
Insatant - A-line bulbs - In-Year Y1 (Elec)	0				21.25	
Insatant - A-line bulbs - In-Year Y2 (Elec)	0				14.49	
Insatant - A-line bulbs - In-Year Y3 (Elec)	0				7.52	
Insatant - A-line bulbs - Persisting Y4 (Elec)	0				0.00	
Insatant - Features - In-year Y1 (Elec)	0				83.10	
Insatant - Features - In-year Y2 (Elec)	0				26.48	
Insatant - Features - In-year Y3 (Elec)	0				37.30	
Insatant - Features - Persisting Y4 (Elec)	0				0.00	
Insatant - Other Tech - 1.5 GPM Showers (Electric)	0				16.82	
Insatant - Other Tech - Dishwashers (Electric)	1				6.23	
Insatant - Other Tech - Lighting Controls (Electric)	12				0.76	
Insatant - Other Tech - Outdoor Plug-In Timers (Electric)	2				1.14	
Insatant - Other Tech - Smart Plug (Electric)	13				0.55	
Insatant - Other Tech - Ther 1.4PS (Electric)	9				0.79	
Insatant - Other Tech - Weatherstripping (Electric)	1				1.09	
Insatant - Other Tech - Window Kits (Electric)	1				1.82	
Insatant - Specialty bulbs - In-year Y1 (Elec)	0				40.32	
Insatant - Specialty bulbs - In-year Y2 (Elec)	0				24.58	
Insatant - Specialty bulbs - In-year Y3 (Elec)	0				22.64	
Insatant - Specialty bulbs - Persisting Y4 (Elec)	0				0.00	
New Electric 20yr Tech	0				2.75	
New Electric 20yr Tech	17				1.23	
New-Gas 20yr Tech	8				2.20	
Online - Appliances, Clothes Washers & Dryers (Electric)	5				1.28	
Online - Appliances, Dishwashers (Electric)	281				0.10	
Online - Appliances, Refrigerators (Electric)	0				4.38	
Online - Smart Thermostats (Electric)	5				1.65	
Refrigerators & Freezers (Electric)	4				1.65	
Rene Electric CBA	7				1.93	
Residential Gas 1-1.5 Elec Savings Electric	1				1.05	
Residential Roof Pump Electric Combo	3				1.77	
Residential Roof Pump Gas	2				2.24	
Residential Solar Photovoltaic	19				0.99	
Smart Thermostats Electric	5				1.75	
Window Air Conditioners (Electric)						



## Response to PUB 1-8 (b): CSI INFORMATION

### ELECTRIC MEASURES

Measures by Sector	PACT Ratio	TRC Ratio	Levelized Resource Cost	PACT Levelized Costs	Customer Payback Ratio	Participant Cost Ratio
<b>Commercial</b>						
LED Exit Sign EL					2	1.74
Night Covers - Electric					0	2.35
CLP Backlit Signage + Admin					6	1.32
Race to Reduce 2.0 Elec					0	2.05
CBEP Insulation - Air Tightness					0	1.62
Griddle Electric					1	1.66
T8 Ballast EL					6	1.21
In Suite WES EL Shower Head					0	1.64
Race to Reduce Elec					0	1.34
CBEP Curtain Wall - Cooling - NG Projects					0	0.00
CBEP Curtain Wall - Cooling EL Projects					0	0.00
CBEP Insulation - Cooling - EL Projects					0	0.00
CBEP Insulation - Cooling - NG Projects					0	0.00
CBEP Windows - Cooling - EL Projects					0	0.00
CBEP Windows - Cooling - NG Projects					0	0.00
Dimmer EL					0	0.71
EBOP Maint Elec					0	0.62
Electrical Permit EL					0	1.00
Gaskets & Strip Curtains - Electric					0	8.60
HVAC CO2 Sensor Gas heat Elec Cooling					0	0.00
NG to Geo Elec Load Growth					0	0.00
<b>Income Qualified</b>						
2020 LRP (AEP Ind & Comm Smart Thermostat) Electric CBA					0	1.53
2020 LRP (AEP MURB - Air Sealing & Admin) Electric CBA					0	1.04
<b>Indigenous</b>						
FNSBP - T8 8ft Tandem Ballasts EL					0	2.08
SBP - LED Exit Sign EL					0	2.03
SBP - T8 Ballasts EL					0	1.49
2020 LRP (Metis - Appliances) Electric CBA					0	1.48
2020 LRP (FN Smart Thermostat) Electric CBA					0	1.53
2020 LRP (Metis - Smart Thermostat) Electric CBA					0	1.53
2020 LRP (FN Appliances - clothes washer) Electric CBA					0	1.29
FN DI Air Sealing					0	1.00
FNSBP - Dimmer EL					0	1.00
FNSBP - Electrical Permits					0	1.00
<b>Industrial</b>						
Energy Manager (EMI) V2					0	1.31
Energy Manager (EMI) V1					8	0.46
Energy Manager (SEM Cohorts) yr1					1	0.98
<b>Residential</b>						
Instant - Fixtures - In-year Y2 (Elec)					0	58.48
Home Check Up   A-line bulbs - In-Year - Y1 (Elec)					0	0.00
Appliances-Refrigerators Electric					0	4.41
Online - Appliance_Refrigerators (Electric)					0	4.38
Instant - A-line bulbs - In-Year Y3 (Elec)					0	7.52
DSM (SCHOOL LED bulbs - In-Year - Y2) CBA - EL					0	0.00
Home Check Up   A-line bulbs - In-Year - Y2 (Elec)					0	0.00
DSM (School Program) CBA - EL Timer					0	2.82
Bar Fridges (Electric)					15	0.77
Instant - Fixtures - In-year Y3 (Elec)					0	37.30
Window Air Conditioners (Electric)					5	0.76
DSM (SCHOOL LED bulbs - In-Year - Y3) CBA - EL					0	0.00
Appliances-Dishwashers Electric					199	0.10
Online - Appliance_Dishwashers (Electric)					201	0.10
Home Check Up   A-line bulbs - In-Year - Y3 (Elec)					0	0.00
Residential Pool Pump Electric Combo					3	1.77
DSM (School Program) - EL Tier 2 APS					0	1.38
Cold Climate Air-Source Heat Pump Electric					16	0.94
DSM (Home Check Up) - EL Tier 2 APS					0	1.26
Audits & Bundling Bonus Electric					0	1.67
DSM (SCHOOL LED bulbs - Persisting) CBA - EL					0	0.00
Home Check Up   A-line bulbs - Persisting (Elec)					0	0.00
Instant - A-line bulbs - Persisting Y4+ (Elec)					0	0.00
Instant - Fixtures - Persisting Y4+(Elec)					0	0.00
Instant - Specialty bulbs - Persisting Y4+ (Elec)					0	0.00
New Electric 50yr Tech					17	1.23
New Gas 20yr elec tech					8	2.20

1c, 2b, 4a

**Response to PUB 1-8 (c): CSI INFORMATION**

**NATURAL GAS MEASURES**

Measures by Sector	TRC Ratio	Levelized Resource Cost	PACT Ratio	PACT Levelized Costs	Customer Payback Ratio	Participant Cost Ratio
<b>Commercial</b>						
Bathroom Aerator NG					0	10.20
Boilers (Gas)					4	3.61
CBEP Attic Cavity - SBP					0	4.57
CBEP Curtain Wall - 330 Portage Project					18	1.06
CBEP Curtain Wall - NG Heat					6	1.79
CBEP Doors - NG Heat					5	2.16
CBEP Insulation - Air Tightness					1	1.19
CBEP Insulation - Heating					3	2.58
CBEP Insulation - Heating - Below Grade					3	2.40
CBEP Windows - NG Heat					1	2.35
Convection Ovens Gas					0	41.50
Custom Measures					4	2.90
EBOP Gas					3	1.48
EBOP Lite Gas					2	2.12
EBOP Maint Gas					0	0.62
Fryers Natural Gas					3	2.23
Griddle Natural Gas					0	2.13
HRVs Gas					15	1.28
HVAC CO2 Sensor Gas					0	2.00
In Suite HRV Control NG					8	1.49
In Suite WES NG Bathroom Aerators					0	16.19
In Suite WES NG Kitchen Aerators					0	18.66
In Suite WES NG Pipe Wrap					0	5.13
In Suite WES NG Shower Head					0	5.65
IR Heaters					3	3.12
Kitchen Aerator NG					0	8.86
Manitoba Race to Reduce 2.0 Gas					0	1.38
Manitoba Race to Reduce NG					0	1.17
New Buildings 2.1					34	0.64
New Buildings 3.0					46	0.56
New Buildings NZF					79	0.68
<b>Income Qualified</b>						
NG to Geo (NG Savings)					8	2.37
Smart Thermostat Assumptions Gas					23	0.51
Smart Thermostat NG					4	1.37
Spray Valve NG					0	22.81
Steamers Natural Gas					1	3.07
Unit Heaters					7	1.18
Water Heaters - Tank					11	1.31
Water Heaters - Tankless					3	4.41
<b>Indigenous</b>						
2020 LRP (AEP MURB - Air Sealing & Admin) Natural Gas CBA					0	1.01
2020 LRP (AEP FRP Boiler Ind) Natural Gas CBA					0	2.26
2020 LRP (AEP FRP Mid Furnace Ind & Comm) Natural Gas CBA					0	1.67
2020 LRP (AEP FRP Std Furnace Ind & Comm) Natural Gas CBA					0	2.80
2020 LRP (AEP Ind & Comm - Insulation) Natural Gas CBA					0	4.24
2020 LRP (AEP Ind & Comm - LED) Natural Gas CBA					0	0.00
2020 LRP (AEP Ind & Comm - WESP) Natural Gas CBA					0	13.43
2020 LRP (AEP Ind & Comm Appliances) Natural Gas CBA					0	0.00
2020 LRP (AEP Ind & Comm Smart Thermostat) Natural Gas CBA					0	1.46
2020 LRP (AEP MURB - LED) Natural Gas CBA					0	0.00
2020 LRP (AEP MURB - WESP) Natural Gas CBA					0	5.13
<b>Industrial</b>						
Energy Manager (EMI)					0	0.00
Energy Manager (SEM Cohorts) yr1					0	0.00
Large Projects yr2					2	4.10
Large Projects yr3					5	1.90
NG Optimization Program					6	2.78
<b>Residential</b>						
DSM (EVENT) CBA - NG PW					0	2.88
DSM (Home Check Up) CBA - Window Kits (Natural Gas)					0	1.46
A la Carte Gas Bungalow					28	0.72
A la Carte Gas Cabover					28	0.78
Air Sealing Gas					0	2.07
Appliances-Washer&Dryers Gas					0	0.00
Audits & Bundling Bonus Gas					0	1.67
DSM (EVENT) CBA - NG BA					0	7.31
DSM (EVENT) CBA - NG KA					0	8.34
DSM (EVENT) CBA - NG SH					0	2.65
DSM (Home Check Up HRV Control) CBA - NG					8	1.49
DSM (Home Check Up) CBA - NG BA					0	26.73
DSM (Home Check Up) CBA - NG PW					0	6.44
DSM (Home Check Up) CBA - NG SH					0	7.88
DSM (Home Check Up) CBA - NG Timer					0	9.29
DSM (Home Check Up) CBA - Weatherstripping (Natural Gas)					0	2.78
DSM (Home Check Up) CBA - NG KA					0	30.92
DSM (School Program) CBA - NG BA					0	26.91
DSM (School Program) CBA - NG KA					0	31.12
DSM (School Program) CBA - NG PW					0	6.48
DSM (School Program) CBA - NG SH					0	7.93
DSM (School Program) CBA - NG Timer					0	2.24
DSM (School Program) CBA - Window Kits (Natural Gas)					0	1.46
DSM (School Program)p CBA - Weatherstripping (Natural Gas)					0	2.79
DWHR Gas					24	0.89
Gas Savings Assumptions					23	0.51
Home Insulation Gas 3-yr combo					10	1.59
HRV Controls Gas					1	2.38
Instant - Other Tech_1.5 GPM Showerheads (Natural Gas)					1	6.07
Instant - Other Tech_Weatherstripping (Natural Gas)					3	2.13
Instant - Other Tech_Window Kits (Natural Gas)					2	0.78
New Gas 20yr Tech					0	1.80
New Gas 50yr Tech					80	0.28
Online - Appliance_Clothes Washers & Dryers (Natural Gas)					0	0.00
Online - Appliance_Dishwashers (Natural Gas)					0	0.00
Online - Smart Thermostats (Natural Gas)					20	0.68
Reno Gas CBA					26	0.91
Residential Geo Yr 1-5 Gas					31	0.61
smart Thermostats Gas					19	0.65
Windows and Doors Doors Gas					8	1.94
Windows and Doors Gas_Windows					8	1.94

1c, 2b, 4a

**Interactive Effects and Costs extracted from Efficiency Manitoba's measure-level workpapers - included as a separate table**

Measures by Sector	TRC Ratio	Levelized Resource Cost	PACT Ratio	PACT Levelized Costs	Customer Payback Ratio	Participant Cost Ratio
<b>Residential</b>						
Home Check Up   Lighting Y1 Gas IE						
Home Check Up   Lighting Y2 Gas IE						
Home Check Up   Lighting Y3 Gas IE						
Home Check Up   Lighting Y4+ Gas IE						
LED Gas Interactive Effects (IE)						
Res Reno   Appliances Combo (Natural Gas IE)						
Residential Pool Pumps - Natural Gas Interactive Effects						
Home Check Up - Costs						
DSM (Event) Admin Cost						
Instant Admin Cost Gas						
Online Admin Cost Natural Gas						
<b>Income Qualified</b>						
2020 LRP (AEP Ind & Comm - AS & HEA, Admin Costs) Natural Gas CBA						
<b>Indigenous</b>						
2020 LRP (Metis - AS & HEA, Admin Costs) Natural Gas CBA						

1c, 2b, 4a

## Response to PUB 1-8 (d): CSI INFORMATION

### NATURAL GAS MEASURES

Measures by Sector	PACT Ratio	TRC Ratio	Levelized Resource Cost	PACT Levelized Costs	Customer Payback Ratio	Participant Cost Ratio
<b>Commercial</b>						
Griddle Natural Gas					0	2.13
EBOP Gas					3	1.48
HVAC CO2 Sensor Gas					0	2.00
Smart Thermostat NG					4	1.37
New Buildings NZE					29	0.68
New Buildings 2.1					34	0.64
New Buildings 3.0					46	0.56
Manitoba Race to Reduce 2.0 Gas					0	1.38
Unit Heaters					7	1.18
CBEP Insulation - Air Tightness					1	1.19
Manitoba Race to Reduce NG					0	1.17
EBOP Maint Gas					0	0.62
<b>Income Qualified</b>						
2020 LRP (AEP FRP Boiler Ind) Natural Gas CBA					0	2.26
2020 LRP (AEP Ind & Comm Smart Thermostat) Natural Gas CBA					0	1.46
2020 LRP (AEP FRP Std Furnace Ind & Comm) Natural Gas CBA					0	2.80
2020 LRP (AEP FRP Mid Furnace Ind & Comm) Natural Gas CBA					0	1.67
2020 LRP (AEP MURB - Air Sealing & Admin) Natural Gas CBA					0	1.01
2020 LRP (AEP Ind & Comm - LED) Natural Gas CBA					0	0.00
2020 LRP (AEP Ind & Comm Appliances) Natural Gas CBA					0	0.00
2020 LRP (AEP MURB - LED) Natural Gas CBA					0	0.00
<b>Indigenous</b>						
2020 LRP (Metis - Insulation) Natural Gas CBA					0	2.36
2020 LRP (Metis - FRP Boiler) Natural Gas CBA					0	2.26
2020 LRP (Metis - Smart Thermostat) Natural Gas CBA					0	1.46
2020 LRP (Metis - FRP Std Furnace) Natural Gas CBA					0	2.45
2020 LRP (Metis - FRP Mid Furnace) Natural Gas CBA					0	1.52
2020 LRP (Metis - Appliances) Natural Gas CBA					0	0.00
2020 LRP (Metis - LED) Natural Gas CBA					0	0.00
<b>Industrial</b>						
Energy Manager (EMI)					0	0.00
<b>Residential</b>						
Windows and Doors Doors Gas					8	1.94
Instant - Other Tech_Window Kits (Natural Gas)					2	0.78
Air Sealing Gas					0	2.07
Online - Smart Thermostats (Natural Gas)					20	0.68
A la Carte Gas Cabover					28	0.78
DSM (School Program) CBA - NG Timer					0	2.24
DSM (School Program) CBA - Window Kits (Natural Gas)					0	1.46
DSM (Home Check Up) CBA - Window Kits (Natural Gas)					0	1.46
New Gas 20yr Tech					0	1.80
Appliances-Washer&Dryers Gas					0	0.00
Audits & Bundling Bonus Gas					0	1.67
New Gas 50yr Tech					80	0.28
Online - Appliance_Clothes Washers & Dryers (Natural Gas)					0	0.00
Online - Appliance_Dishwashers (Natural Gas)					0	0.00

1c, 2b, 4a

**REFERENCE:**

Daymark Evidence p.79 to 82 ; Manitoba Hydro 2016/17 DSM Plan 15-Year Supplement p.6 of 128 (PUB/EM-26(b))

**PREAMBLE:**

Manitoba Hydro previously prepared a graph showing the levelized resource costs and levelized utility costs for each DSM measure.

Manitoba Hydro's graph showing levelized utility costs for Manitoba Hydro's DSM programs shows the Furnace Replacement Program with a levelized cost of 140 cents/m<sup>3</sup>, including approximately 85 cents/m<sup>3</sup> related to the utility contribution over resource cost

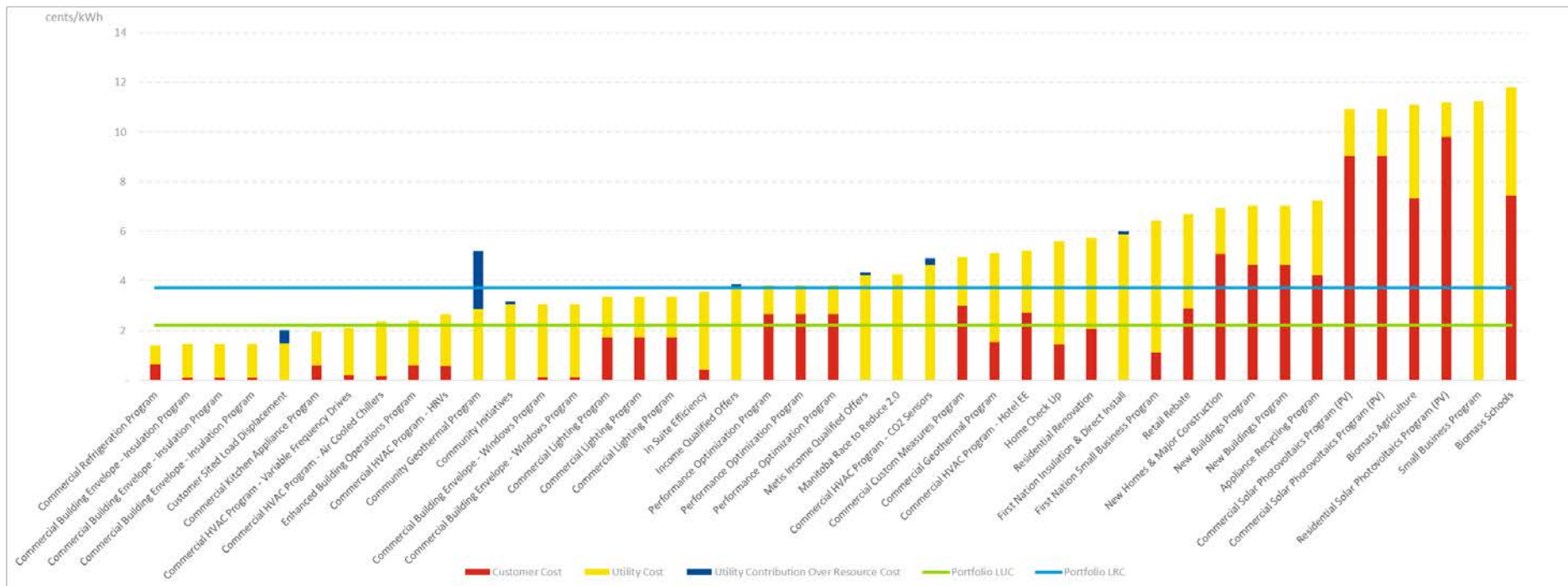
**REQUEST:**

- a) Graph the levelized resource costs and levelized program administrator costs for each measure in a similar form to the chart on Manitoba Hydro 2016/17 DSM Plan page iv (page 6 of 128 in PUB/EM-26(b)). Prepare separate graphs for electric and gas measures.
- b) Confirm whether the PACT used by EM and reported by Daymark in PUB/Daymark-8 includes the program administrator's contribution over resource cost for Income Qualified standard furnace replacements. Confirm whether the mid-efficiency furnace replacements are treated the same.
- c) If not confirmed, provide the PACT ratio, PACT NPV, and PACT levelized cost including the program administrator's contribution over the resource cost.

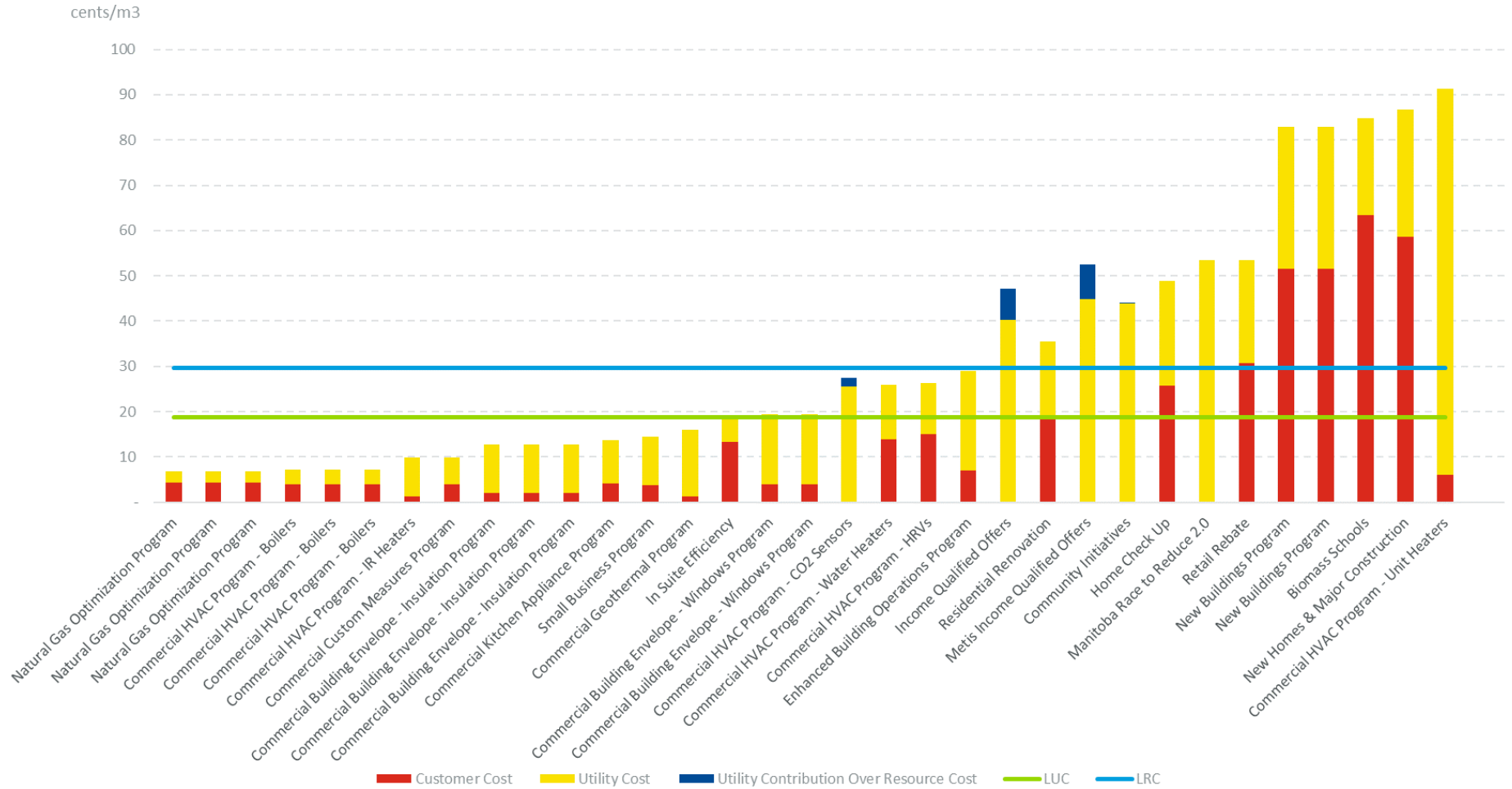
**RESPONSE:**

- a) Based on the conversation with the PUB, Daymark is providing the requested figures at the program level. The data used to create the following figures are sourced from Efficiency Manitoba's portfolio-level workpapers. Please note that the levelized values presented in the figures do not include any reported interactive effects at the program or portfolio levels.

Electric:



Natural Gas:



b) Confirmed. Income Qualified standard and mid-efficiency furnace replacement measures PACT ratios were measured using PACT Benefits in the numerator and Utility Costs in the denominator. This formula was used for all measures in all programs and portfolios. Please refer to the table below that reports various parameters for both measures extracted from Efficiency Manitoba’s measure-level workpapers.

<b>Measure Name</b>	<b>Total Resource cost (\$)</b>	<b>Utility Cost (\$)</b>	<b>PACT Benefits (\$)</b>	<b>PACT Ratio</b>	<b>Utility’s contribution over resource cost (\$)</b>
2020 LRP (AEP FRP Std Furnace Ind & Comm) Natural Gas CBA	2,638,035	5,390,055	1,327,795	0.25	2,752,020
2020 LRP (AEP FRP Mid Furnace Ind & Comm) Natural Gas CBA	600,945	855,340	100,102	0.12	254,395

c) Refer to PUB/Daymark-I-9 (b).

**REFERENCE:** Daymark Evidence p.94

**PREAMBLE:**

Table 31 shows that 7% of the electric savings and 26% of gas savings arise from measures where the costs exceed the benefits according to Daymark’s Pure Measure Value Test.

**REQUEST:**

Provide tables ranking the five electric measures and five gas measures that score the lowest on Daymark’s PMVT, along with the PMVT and three-year average savings for each of these measures.

**RESPONSE:**

Please see the tables below with the requested information. The following list is constructed using the measure-level data that Daymark extracted from the individual measure-level files provided by Efficiency Manitoba and is based on the measures that have PMVT greater than zero. We note that there is a total of 42 measures, 30 in the electric portfolio and 12 in the gas portfolio, which had neither savings nor costs provided in the workpapers. These measures are not included in the list of measures provided in the table below, since the request was for the five lowest scores.

Measure Name	Portfolio	PMVT Ratio	3-Year Savings (kWh)
Cold Climate Air-Source Heat Pump Electric	Electric	0.13	47,261
Energy Manager (EMI) V1	Electric	0.11	660,000
Appliances-Dishwashers Electric	Electric	0.04	2,442
Online - Appliance_Dishwashers (Electric)	Electric	0.04	19,391
2020 LRP (AEP MURB - Air Sealing & Admin) Electric CBA	Electric	0.01	20,266

Measure Name	Portfolio	PMVT Ratio	3-Year Savings (m3)
2020 LRP (AEP FRP Mid Furnace Ind & Comm) Natural Gas CBA	Natural Gas	0.24	68,796
Manitoba Race to Reduce NG	Natural Gas	0.23	123,372
New Buildings 3.0	Natural Gas	0.20	-
2020 LRP (Metis - FRP Mid Furnace) Natural Gas CBA	Natural Gas	0.19	3,440
2020 LRP (AEP MURB - Air Sealing & Admin) Natural Gas CBA	Natural Gas	0.01	2,027



**REFERENCE:** Daymark Evidence p.99, 100

**PREAMBLE:**

Tables 36 and 37 show PACT results for the sensitivity case of achievement of only 80% of the savings.

**REQUEST:**

- a) Confirm whether the benefits were reduced along with the savings in Daymark's Savings – Only 80% Achieved sensitivity case.
- b) Confirm whether 20% lower participation in EM's programs than forecasted, along with a corresponding reduction in incentives paid, would result in PACT results that fall between the Daymark Savings – Only 80% Achieved sensitivity and the baseline PACT results.

**RESPONSE:**

- a) Confirmed.
- b) While Daymark has not conducted the specific analysis requested, it stands to reason that the PACT results would fall between the 80% sensitivity tested by Daymark and the baseline as presented by Efficiency Manitoba if incentives paid decrease along with the potential 20% lower participation. Assuming all costs except customer incentive costs remain identical to the 80% savings Daymark scenario, this results in a smaller denominator in the PACT test and therefore a slightly higher PACT ratio than that of the Daymark sensitivity of only 80% savings.

**REFERENCE:** Daymark Evidence p.113

**PREAMBLE:**

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**REQUEST:**

Is the evaluation framework proposed by Econoler generally consistent with Uniform Methods Project (UMP) methods? Identify any significant deviations between Econoler's proposed framework and UMP.

**RESPONSE:**

The evaluation framework proposed by Econoler is generally consistent with the Uniform Methods Project (UMP)<sup>1</sup> methods in terms of evaluation types, timeline, cycles, and priorities of specific types of evaluation based on program needs. As discussed in Daymark's report, the framework provides a common understanding of EM&V best practices and outlines evaluation guidelines for the 2020-2023 Plan. However, the Econoler framework does not provide detailed methodologies recommended in the UMP for conducting evaluation of different program types. It is Daymark's understanding that the detailed evaluation methodologies that are consistent with UMP evaluation protocols will be developed while selecting the independent assessor to perform evaluation studies. A separate review should be performed to compare the consistency of detailed methodologies proposed for evaluation by the independent assessor selected by Efficiency Manitoba with the UMP evaluation protocols.

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<sup>1</sup> Department of Energy, Office of Energy Efficiency & Renewable Energy, Uniform Methods Project for Determining Energy Efficiency Program Savings. Online: <https://www.nrel.gov/docs/fy18osti/70472.pdf>

**REFERENCE:** Daymark Evidence p.114

**PREAMBLE:**

Daymark states: “However, it will be challenging to accurately measure C&S savings that are resulting from historical Manitoba Hydro and Efficiency Manitoba activities.”.

**REQUEST:**

- a) Clarify whether the challenge lies with verifying that Manitoba Hydro’s and EM’s historical (and future) activities were a material contribution to a code or standard, or with counting the savings due to new activity in each year related to Codes and Standards. Explain why this is the challenge.
- b) What steps can EM take now to address the challenge of verifying savings from Codes and Standards?

**RESPONSE:**

- a) There are several reasons why measuring codes and standards savings will be challenging. The first (referred to on p. 121 of our report) is the problem of determining what should count as a “material contribution” to a code and standard by Efficiency Manitoba. There is no bright-line rule about what qualifies as a material contribution, and it may not be easy to tell whether and how much a program or action undertaken by Efficiency Manitoba helped to pave the way for a new standard. However, it should be possible to assess claims in this area in terms of overall reasonableness. The second challenge has to do with establishing compliance rates. A third challenge (discussed on p. 124 of our report) is establishing what portion of savings attributed to codes and standards would have occurred even in the absence of the code and standard, as a result of actions by efficiency-minded customers (the “NOMAD” effect). For a rough and ready approximation, we adopted Efficiency Manitoba’s free rider adjustment factors. However, a more thorough analysis might require customer surveys or other quantitative analysis to determine whether NOMAD rates are well approximated by free rider rates. A fourth challenge, related to the NOMAD question (and discussed on p. 125 of our report), is how the impact of codes and standards should be considered to change as they age, as more efficient technologies gain better traction in the marketplace, and as technology develops. As a general rule, codes and standards may tend to have less ongoing impact as they age; however, the rapidity of aging might depend on the content of the code or standard and might be different for different types of technologies.
- b) In its initial filing and in its IR responses, Efficiency Manitoba proposes that a “third-party evaluator” or an “independent assessor” will address issues related to attribution of savings.<sup>1</sup> The methodology for assessment will be developed by the independent evaluator, with the intention of having this contract in place before 2021/22.<sup>2</sup> The most important step Efficiency

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<sup>1</sup> See EM Plan, A9.4.4; Coalition/EM I-71a-g; Coalition/EM I-72a-3; and Coalition/EM I70 a-b.

<sup>2</sup> PUB/EM I-36a-d.

Manitoba could take now is to ensure that the hiring of the independent evaluator stays on schedule.

The information needed to evaluate codes and standards' savings will depend on the methodology chosen by the evaluator. One area in which Efficiency Manitoba may want to consider keeping careful records for use by the evaluator has to do with documentation of involvement in the enactment of codes and standards. In California, for example, protocols established in 2006 require careful record-keeping of activities to promote new or revised codes and standards and also suggest that the impact of an agency's engagement in promoting codes and standards be evaluated through a stakeholder interview process, which would need to be conducted as soon as possible after a codes and standards change.<sup>3</sup> Keeping these records, and tracking potential stakeholder contacts, might prove to be helpful to the independent evaluator.

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<sup>3</sup> *California Energy Efficiency Evaluation Protocols* (April 2006): [www.cpuc.ca.gov/General.aspx?id=5339](http://www.cpuc.ca.gov/General.aspx?id=5339)

**REFERENCE:** Daymark Evidence pdf p.118

**PREAMBLE:**

Daymark states: “If the savings result in any projects requiring continued incentives each year, out of the then current year budget, the Efficiency Manitoba Plan assumes that the savings is counted as contributing to each year’s annual target for savings achievement. It is the equivalent of a one-year measure life that is implemented again each single year.”

**REQUEST:**

Provide a table listing all measures in the Plan that: a) have a one year measure life or b) require ongoing incentive payments for a given project or installation. For each measure in the table, identify the measure life, incremental savings, whether ongoing incentives are planned, the PACT ratio, and, where there are recurring savings counted as incremental savings in years following the initial year of the measure, the amount of those recurring savings. For customer-sited load displacement measures, provide at the individual project level.

**RESPONSE:**

a-b) Please refer to revised response MIPUG/EM-1(h) that includes the list of measures with the associated measure life.

To our knowledge, no other program is accounted for in an identical manner as the Load Displacement Project 1. The Load Displacement project has an annual savings of 99 GWh, which are credited to the electricity savings in each of the three years of the Plan. While the First Nation Community Geothermal program seems to be described similarly to the Load Displacement Project 1 in Efficiency Manitoba’s three-year report, upon review of the measure-level workpapers, cost and savings accounting was done in the traditional capital investment manner, i.e., unlike Load Displacement Project 1. Load Displacement Project 1 has a PACT ratio of 7.23.

**REFERENCE:** Daymark Evidence pdf p.118, 119

**PREAMBLE:**

Daymark states: “Daymark has analyzed the calculation for savings concerns discussed above.”  
In a previous version of its evidence, Daymark appears to have envisioned quantification of savings at risk.

**REQUEST:**

Provide a quantification of the savings at risk, either in tabular or graphical format.

**RESPONSE:**

That is a very astute observation. Daymark had hoped to be able to make that assessment, but realized that it was not possible and had neglected to take the placeholder lead-in wording out of the originally filed report.

**REFERENCE:** Daymark Evidence pdf p.118, 119

**PREAMBLE:**

Daymark states: “Daymark has analyzed the calculation for savings concerns discussed above.” In a previous version of its evidence, Daymark appears to have envisioned quantification of savings at risk.

**REQUEST:**

In Daymark’s experience in other jurisdictions that count codes and standards savings, what are the typical sunset periods (that is, how many years back can a code or standard have been enacted and still be counted?) after which savings from codes and standards can no longer be counted?

**RESPONSE:**

We are not aware of standard “sunset periods” for codes and standards savings attribution to efficiency programs used by other jurisdictions. The practice of attributing codes and standards savings to efficiency programs is still relatively uncommon, although it has been adopted by a number of US states, including California and Massachusetts. Among states that do attribute savings, many require that building codes be updated regularly (the most usual timeframe is every three years).<sup>1</sup> Arizona does not have this requirement, but it “caps” the percentage of codes and standards savings that can be attributed to energy efficiency programs.<sup>2</sup> Another variable related to codes and standards is what different states consider to be the “baseline” against which energy efficiency is measured. For some, the baseline is established by existing codes and standards. For others, however, the “baseline” is the energy used by the equipment replaced as a result of codes and standards.<sup>3</sup>

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<sup>1</sup> *California, Vermont, Oregon, Rhode Island, Washington, and Massachusetts all have such a requirement (DSIRE, <https://programs.dsireusa.org/system/program>)*

<sup>2</sup> *Savings & Evaluation Methodology for Codes and Standards Initiative. Submitted to Massachusetts Department of Energy Resources on behalf of Massachusetts Program Administrators. October 20, 2015, 19.*

<sup>3</sup> *Consortium for Energy Efficiency. State of the Efficiency Program Industry: Budgets, Expenditures, and Impacts 2018: 23. <http://www.cee1.org/annual-industryreports>, posted May 2019. © Copyright 2019 Consortium for Energy Efficiency. All rights reserved.*

**REFERENCE:** Daymark Evidence p.126, 128; PUB/EM-39R

**PREAMBLE:**

In PUB/EM-39R, EM explains that: “Local efficiency staff played a material role in the amendment of the Federal Energy Act. Local efficiency staff assisted the Federal Government by providing technical and market data regarding the heating market in Manitoba and comments to the proposed Amendment during the consultation process. Demand Side Management programs such as the Residential Loan and the High Efficiency Furnace and Boiler Rebate influenced the Manitoba market to the point that 80% of all equipment installed in 2009 was high efficiency products, thus making the Amendment acceptable to the industry and to consumers.”

**REQUEST:**

Explain why there are no gas savings shown in the chart on page 128 related to Other Residential Equipment, which includes the high efficiency furnace standard

**RESPONSE:**

Efficiency Manitoba’s workpapers showed codes and standards natural gas projected savings associated with Other Residential Equipment (specifically, high efficiency furnaces) at a projected value of 10,770 cubic meters for 2020-21, with no additional savings in this area projected for the following two years. The three-year total was too small to show up on our chart.



**REFERENCE:** Daymark Evidence p.130, 131

**PREAMBLE:**

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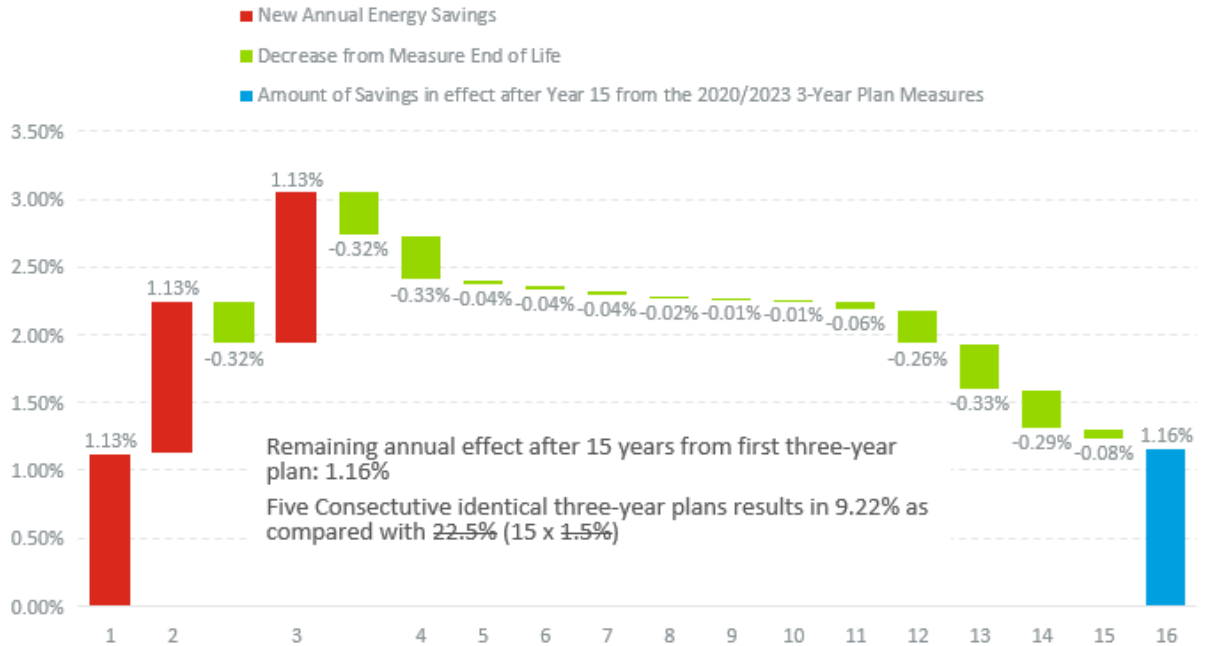
**REQUEST:**

- a) Explain how Daymark treated Load Displacement projects (and other measures) with one year measure lives in Figure 20.
- b) To be an “apples-to-apples” comparison, should the 9.22% forecasted persisting savings in Figure 20 be compared with 16.95% expected savings mentioned in the text before Figure 20 (instead of 22.5% savings)? Likewise for Figure 21, should 6.63% be compared with 7.65%?

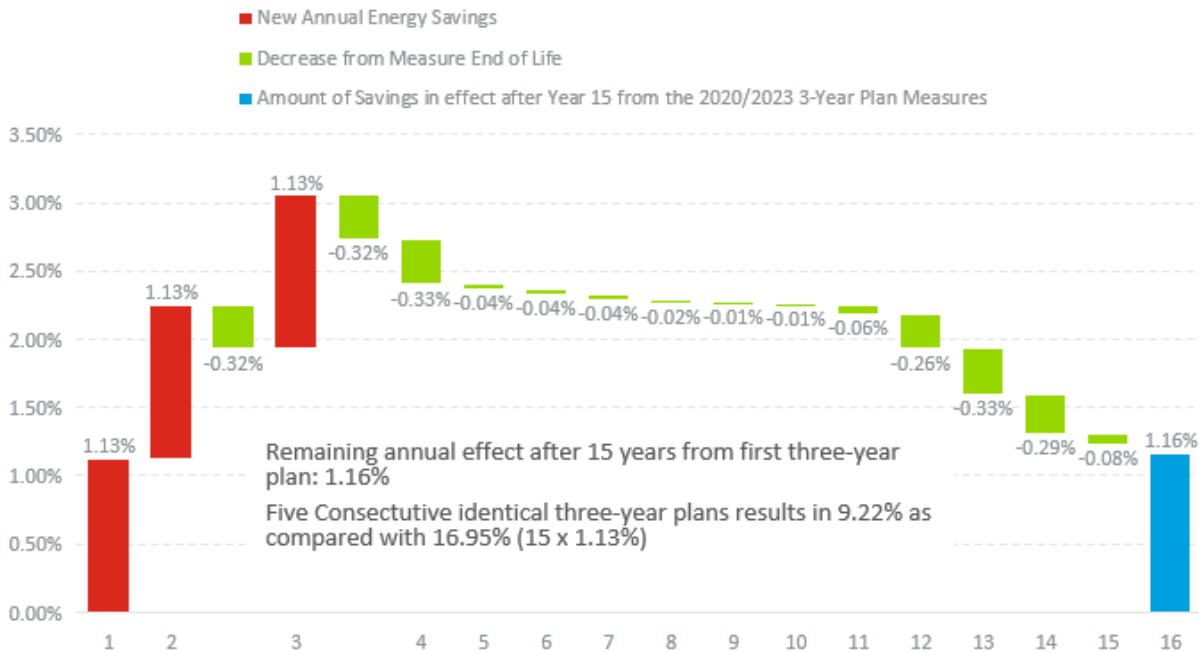
**RESPONSE:**

- a) While most measures with a one-year measure life were treated as “non-renewed,” one load displacement project was counted again in years two and three as “New Annual Energy Savings” per our discussions with Efficiency Manitoba. That is, a large portion of the “Decrease from Measure End of Life” bars in each of years two, three, and four are attributed to the “ending” of year one of the load displacement project and an equal portion of the “New Annual Energy Savings” bars in years two and three are attributable to the renewal of incentives to the same project.
- b) That is correct. Corrected versions of Figures 20 and 21 are below:

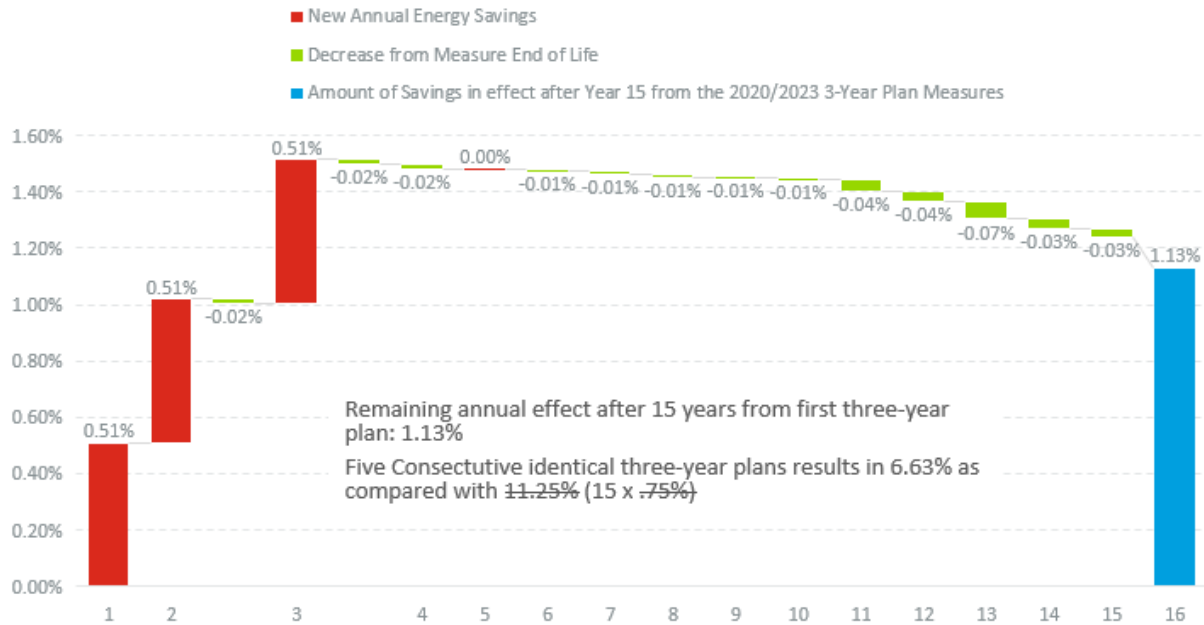
Electric Original:



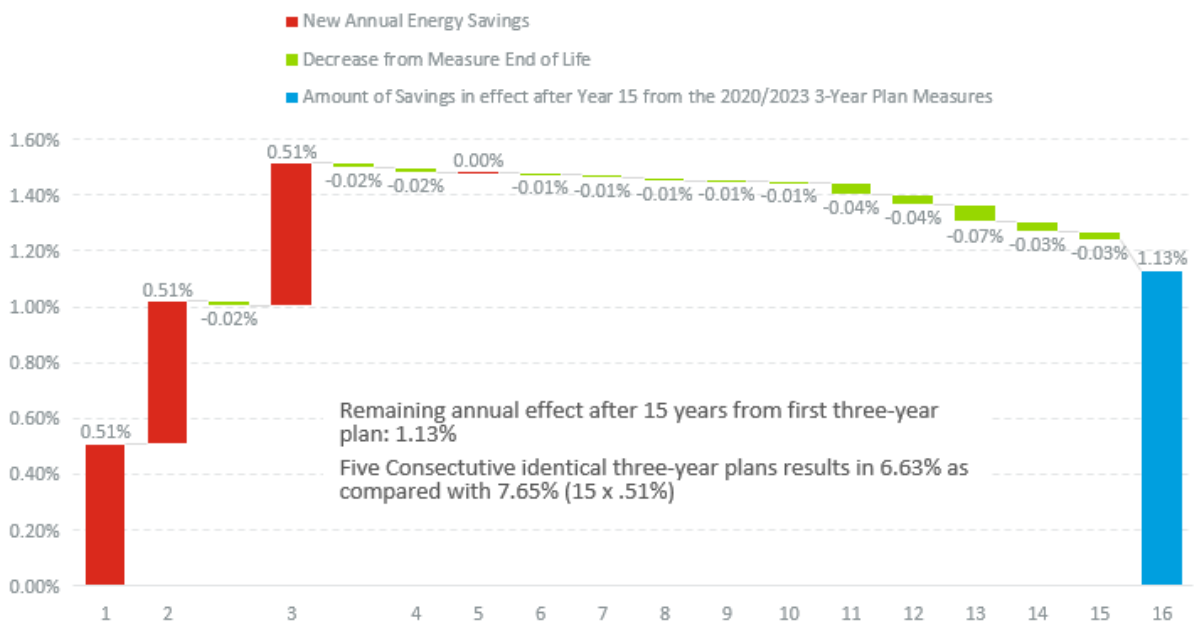
Electric Corrected:



Natural Gas Original:



Natural Gas Corrected:



**REFERENCE:** Daymark Evidence p.134

**PREAMBLE:**

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**QUESTION:**

Clarify whether finding No. 30 intends to say “underestimates” instead of “overestimates”. If “overestimates” is correct, explain with reference to finding No. 29.

**RATIONALE:**

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**RESPONSE:**

Yes, the finding should say “underestimates,” not “overestimates.”

The original finding, from p. 134 of our report, is below, with appropriate strike outs:

“30) The Efficiency Manitoba LRI metric methodology ~~for overestimates~~ the rate impact of the natural gas portfolio but to a lesser extent than the electric portfolio”

The corrected finding is as follows:

“30) The Efficiency Manitoba LRI metric methodology underestimates the rate impact of the natural gas portfolio, but to a lesser extent than the electric portfolio.”