Direct Testimony Presentation

PUBLIC SESSION

Demand Side Management & Energy Efficiency

PREPARED BY: DAYMARK ENERGY ADVISORS
PREPARED FOR: MANITOBA PUBLIC UTILITIES BOARD
DATE: JANUARY 13, 2020

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Agenda

1. Introduction
2. The Efficiency Manitoba Plan
3. Cost-Benefit Analysis
4. Deliverability of the Efficiency Manitoba Plan
5. Savings Targets
6. Plan for Evaluation, Measurement, and Verification

1. Introduction

Background of 2020/23 Efficiency Manitoba Plan

- Efficiency Manitoba Act (Act) establishes Efficiency Manitoba and sets targets and mandates, including requirement for a first three-year plan
- Regulation Order 119-2019 (Regulation) details how cost-effectiveness should be determined
- PUB proceedings establish scope
- Minister's letters emphasize cost savings
- PUB given the responsibility of reviewing Efficiency Manitoba's first three-year plan

Engagement as Independent Expert Consultants

PURPOSE

Daymark Energy Advisors was retained as an Independent Expert Consultant to **assist the PUB in its review of Efficiency Manitoba's Plan.**

SCOPE OF WORK

- Will targeted net savings be delivered?
- Benefits of Initiatives
- Cost-effectiveness, based on regulation and other tests
- Accessibility
- Recommendation on increasing or decreasing savings targets
- Review of savings tracking

OUT OF SCOPE:

- Derivation of marginal values and avoided costs

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Our approach

- Is the Plan complete?
- Will the Plan deliver its estimated savings?
- Are the Initiatives of the Plan cost-effective?
- Are plans for evaluation, measurement, and verification adequate?
- Review annual and long-term savings targets
- Provide overall findings

Overall conclusions

1. The Plan largely complies with the Act and Regulation, mostly passes cost-effectiveness tests, and projects relatively low rate impacts
2. Daymark has a concern that without monitoring and agility, Efficiency Manitoba may be challenged for successful deliverability in the short term.
3. The PUB faces significant questions about how Plan savings should be counted, relative to load displacement and Codes and Standards
4. The Plan may not put Efficiency Manitoba on track to meet cumulative 15-year savings goals

Findings in report Section VII by topic

REPORT SECTION	NUMBER OF FINDINGS
Compliance	3
Deliverability/Implementation Plan Review	12
Accounting for Savings from Codes & Standards	4
Cost-Benefit Analysis	11
Evaluation, Measurement, and Verification	12
Long-Term Impact	1

Organization of this presentation

2. Overview of the Efficiency Manitoba Plan *(findings, summary, completeness)*
3. Cost-Benefit Analysis *(findings, cost-benefit analysis, rate impacts)*
4. Deliverability *(findings, questions, EE in Canada, transition, hard to reach customers)*
5. Savings Targets *(findings, Codes & Standards, long-term savings, target revisions)*
6. Plan for Evaluation, Measurement, and Verification *(findings)*

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2. The Efficiency Manitoba Plan

Findings on compliance (#1 - #3)

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1. Savings that meet targets (in Plan as originally presented)
2. Programs that are highly accessible to hard-to-reach Manitobans
3. Efficiency Manitoba's cost effectiveness testing used prescribed costs and benefits

Projections relative to savings targets

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- Act 7.1 establishes annual savings targets of 1.5% for electrical energy and 0.75% for natural gas
- Efficiency Manitoba's original proposed Plan largely met these targets; however, subsequent revisions have brought projections in the electricity sector slightly below target
- On average, over the three years, Efficiency Manitoba's projections are close to established targets

Savings projections for electric, natural gas portfolios

Source: Efficiency Manitoba Plan, Section 1, p. 7

2020/23 EFFICIENCY PLAN – ELECTRIC PORTFOLIO SAVINGS

	2020/21	2021/22	2022/23	Average
Annual electric savings (GWh)	373	403	403	393
Savings as a percent of electric load	1.43%	1.55%	1.56%	1.51%
Annual capacity savings (MW)	85	93	93	90

Note: Electric energy and capacity savings determined at generation

2020/23 EFFICIENCY PLAN – NATURAL GAS PORTFOLIO SAVINGS

	2020/21	2021/22	2022/23	Average
Annual natural gas savings (million m^3)	11.7	12.8	13.2	12.6
Savings as a percent of natural gas volume	0.72%	0.79%	0.82%	0.78%
GHG savings (tonnes CO_2e)	22,200	24,200	25,200	23,900

Note: After accounting for electric programming interactive effects

Revised electric portfolio savings projections

- During the IR process, Efficiency Manitoba revised its electricity savings projections slightly, to below 1.5% each year

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
Savings as percentage of total load	**1.43%**	**1.48%**	**1.45%**	**1.46%**

Growth in energy savings

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- Efficiency Manitoba is proposing a plan with significant savings in electricity and natural gas
- The Plan provides considerable growth over prior Manitoba Hydro activities

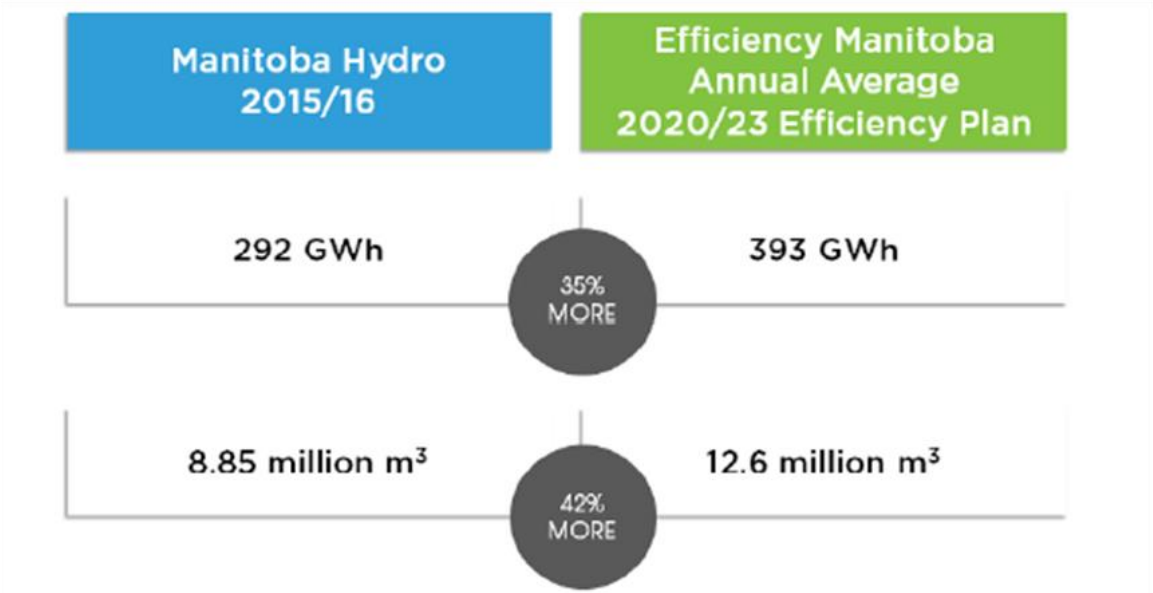

Figure 1: Comparison of Manitoba Hydro's 2015/16 Plan with Efficiency Manitoba's 2020/23 Plan

More for less cost

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- Efficiency Manitoba has taken a fresh look in establishing their organization

Manitoba Hydro 2015/16		Efficiency Manitoba Annual Average 2020/23 Efficiency Plan	
$49,329,000	INCENTIVE COSTS	$45,247,000	8% ↓
$9,927,000	PROGRAM COSTS	$13,765,000	39% ↑
$14,949,000	STAFF COSTS	$9,375,000	37% ↓
$2,190,000	OVERHEAD COSTS	$1,495,000	32% ↓
$76,396,000	**TOTAL COSTS**	**$69,881,000**	9% ↓

Figure 2: Budget Comparison by Category between Manitoba Hydro's 2015/16 Plan and EM's 2020/23 Plan

Electric portfolio impact

- The Electric programs will involve each customer sector within Manitoba
- Business customers account for 77% of the savings with 60% of the budget

Table 7: Electric Savings, Budget, and Energy Consumption by Sector in 3-Year Plan

Customer segment/category	2020-23 Average		2017/2018
	Savings (%)	Budget (%)	Energy Consumption (%)
Industrial	39%	20%	
Agricultural	3%	4%	66.10%
Commercial	35%	36%	
Residential	22%	19%	
Income Qualified	1%	3%	33.90%
Indigenous	0.50%	3%	
Enabling Strategies	-	10%	-
Overhead	-	4%	-
Total	***100%***	***100%***	***100%***

Natural gas portfolio impact

- The Natural Gas programs will involve each customer sector within Manitoba
- Business customers account for 55% of the savings with 37% of the budget

Table 8: Natural Gas Savings, Budget, and Energy Consumption by Sector in 3-Year Plan

Customer segment/category	2020-23 Average		2017/2018
	Savings (%)	Budget (%)	Energy Consumption (%)
Industrial	29%	9%	
Agricultural	1%	1%	60.50%
Commercial	25%	27%	
Residential	37%	21%	
Income Qualified	7%	30%	33.90%
Indigenous	0.30%	2%	
Enabling Strategies	-	8%	-
Overhead	-	3%	-
Total	*100%*	*100%*	*100%*

Adding new programs

- The Plan introduces 10 new programs

Table 4: Savings Attributed to New Programs in the Efficiency Manitoba 3-Year Plan

New Efficiency Manitoba Offerings - 3 Year Plan (*)		
Sector	**Bundle**	**Measure**
Residential	Direct Install	Online Home Questionnaire
Residential	Direct Install	Home Energy Check-Up
Residential	Home Renovation	Home Energy Audit
Residential	Home Renovation	Major Renovation
Residential	Emerging Tech	Solar Energy Program
Indigenous	Small Business	Product Rebates
Indigenous	Metis Inc Qual	Home EE Upgrades
Commercial	HVAC Controls	VFDs, Hotel Pumps, Sensors
Commercial	New Construction	Deep Energy Retrofits
Commercial	Custom	Strategic Energy Management Cohorts

(*) PUB/EM 1-33a-b

Compliance with Act Section 9

INCLUDED

- Description of DSM, educational, and innovation initiatives
- Analysis of cost-effectiveness
- Assessment of benefits
- Stakeholder and public input
- Loan/financing details
- Budget
- Assessment and performance measures

PARTIALLY OR NOT INCLUDED

- Plans for addressing savings shortfall (new comment)
- 15-year savings impact

Compliance with additional elements

Additional elements mandated for PUB review (1 of 2)

INCLUDED	DAYMARK COMMENT
Providing initiatives accessible to all Manitobans	**Compliant.** See discussion in Deliverability section
Appropriateness of DSM initiative selection methodologies	Might have been enhanced by more consideration of how measure lives within the portfolios selected might or might not contribute to meeting long-term goals
Accounting for Savings from Codes & Standards	**Policy area.** See discussion in Codes and Standards section
Cost-Effectiveness	**Compliant.** See discussion in Cost-Benefit Analysis section
Evaluation, Measurement, and Verification	**Compliant.** See discussion in Evaluation, Measurement, and Verification section
Long-Term Impact	**Some concerns.** See discussion in Savings Targets section

Compliance with additional elements

Additional elements mandated for PUB review (2 of 2)

INCLUDED	DAYMARK COMMENT
Interests of residential, commercial, and industrial customers	**Compliant.** See discussion in Deliverability section
At least 5% of budget to low-income or hard-to-reach	**Compliant.** See discussion in Deliverability section
Analysis of rate impacts	**Daymark's analysis differs.** See discussion in Cost-Benefit Analysis Section.
Private sector and non-governmental involvement	**Compliant.** See discussion in Deliverability Section.
Adequate consideration of new and emerging technology	**Compliant.**
Compliance with Minister's Directives	**Compliant.**

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3. Cost-Benefit Analysis

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Summary findings (#20 - #30)

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20. Rigorous and detailed CBA process
21. Use of Program Administrator Cost Test (PACT) to match specification in the Act
22. Cost effective electric bundles and programs
23. 4% of electric savings measures C > B
24. Natural gas bundles and programs break even
25. Approx. half of NG programs not PACT cost effective
26. 30% of natural gas savings measures C > B
27. Most electric savings from short lived measures
28. Most natural gas savings long lived measures
29. LRI underestimates near term rate impacts
30. Rate impact underestimation less for natural gas

Overall savings target for 2020-2023 Plan

- The 2020/23 Plan includes savings from program-related activities and codes & standards
- Although program-related savings comprise the majority of savings, codes & standards is also sizeable
- The codes & standards savings count towards target goals but do not include any budget to fund these activities
- Daymark's cost-benefit review therefore focused on program-related activities

Table 12: Three-year Savings for Electric and Natural Gas Portfolios

Description	Electric		Natural Gas	
	Savings (GWh)	Percentage	Savings (Million cu. m.)	Percentage
Program-related savings	880.1	77%	25.7	68%
Codes and Standards Savings	256.0	23%	12.0	32%
Total Savings	***1136.1***	***100%***	***37.7***	***100%***

Daymark's approach

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- Daymark issued information requests, reviewed workpapers and consulted with Efficiency Manitoba numerous times
- Specifically, Daymark assessed:
  - Efficiency Manitoba 3-Year Plan
  - Efficiency Manitoba both portfolio-level and detailed measure-level excel workpapers
  - Information gathering via formal IR process, technical conferences, and regular correspondence with Efficiency Manitoba Staff
  - Industry reports and best practices
- Daymark approach for analysis included:
  - Developing a measure-level database from the workpapers
  - Assessing accuracy and reviewing methodologies and assumptions used by Efficiency Manitoba for Cost-Effectiveness

Cost consideration in 2020/23 Plan (#20)

- Efficiency Manitoba proposed a budget of $147 million (electric portfolio) and $63 million (natural gas portfolio) in the three-year Plan

Table 14: Proposed Annual Budget for Electric and Natural gas portfolio Plan for 2020-2023 Period

Annual Budget (Million $)	2020/21	2021/22	2022/23	Total
Electric EE Plan	44.55	51.15	50.98	146.68
Natural Gas EE Plan	18.64	21.27	23.05	62.96
Total Annual Budget	*63.19*	*72.43*	*74.03*	*209.64*

- The proposed budget for 2020/23 Efficiency Plan includes incentive costs as well as costs to support administrative activities - program design, administration, customer support, program delivery (internal & external), and corporate overhead

Energy savings determined at the measure level

- For each measure/initiative, Efficiency Manitoba used
  - Quantities of specific measure
  - Savings per unit
- In addition, Efficiency Manitoba used various participation and market data to deliver savings, such as
  - *"Natural conservation"* – use of a measure even if a program did not exist
  - *Free-rider numbers* – when a participant use of the measure would have occurred regardless without the program, but still receive incentive
  - *"Free-driver" numbers* – when a non-participant in a program use of the measure is program-driven even though no incentive is provided
  - *Persistence Factor* – accounts for product failure, early replacement, and uninstalled products by participants
- In addition, Efficiency Manitoba also considered interactive effects to account potential increase in energy consumption due to installing efficient electric savings measures

More on interactive effects

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- Efficiency Manitoba included interactive effects to capture the net impact of having more efficient electric energy technologies
  - Classic example – LED bulbs give off much less heat than conventional bulbs, resulting in an increased heating usage in winter whether from electric or natural gas
- Efficiency Manitoba adjusted the total electric and natural gas savings to account for the potential increase use in electricity and natural gas for heating for participants as a result of installing electric energy efficiency measures
- Both own-fuel and cross-fuel interactive effects were included in the analysis by Efficiency Manitoba
  - Higher electric heating kWh included in measure level analysis
  - Higher natural gas heating need considered a portfolio effect

Cost-effectiveness methodology regulations and EM (#21)

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- Efficiency Manitoba is consistent with cost-effectiveness requirement outlined in Regulation 119/2019
  - Compare cost to Efficiency Manitoba of initiatives with the marginal value to MH of the net savings of initiatives
- Program Administrator Cost Test (PACT), also called utility cost test, is a primary cost-effectiveness test

Cost-effectiveness at the portfolio level (#24)

- Electric portfolio is estimated to deliver net benefits of $345.1 million, in NPV basis, over 30-year period
- Natural gas portfolio is estimated to about break-even (negative NPV of $0.8 million) over the same period
- We discuss cost-effectiveness at detailed bundle level and measure level further

Table 13: Savings and PACT Net Benefits and Ratio at the Portfolio level

Description	Total Three-Year Energy Savings (GWh or million cu m)	PACT Net Benefits ($ Million)	PACT Ratio
2020-2023 Electric EE Plan	880.1	345.1	3.27
2020-2023 Natural Gas EE Plan	25.7	(0.8)	0.99

Considering interactive effects on natural gas

- The interactive effects caused by electric programs are netted out when showing the annual energy savings of the Plan
- However, natural gas effects are incorporated in the metrics can blur the review of the natural gas cost-effectiveness
- The overall natural gas portfolio has PACT ratio of 0.99 when the portfolio is burdened with the impact on natural gas of the electric portfolio

Table 26: Cost-effectiveness of natural gas portfolio with and without considering interactive effects

	PACT ratio	PACT NPV	PACT levelized cost (¢/m3)
Program only metrics	1.42	$22 mil.	13.03
No interactive effects metrics	1.24	$14.4 mil.	14.96
Overall portfolio metrics	0.99	($0.8 mil.)	18.69

Note: Program only metrics do not include impact of interactive effects, enabling strategies or corporate overhead. Overall portfolio metrics include these impacts. No interactive effects metrics do not include impact of interactvie effects bu do include costs associated with enabling strategies and corporate overhead

Bundle-level savings and Net PACT benefits: Electric (#22)

Table 19: Savings and PACT NPV $ by sector and bundle - Electric

Sector	DSM Bundle	Total Three-Year Savings (Kwh)	Savings %	PACT NPV	PACT NPV %
Residential	Direct Install	5,693,673	0.6%	$ 860,779	0.2%
	Product Rebates	34,696,632	3.9%	$ 7,533,261	2.0%
	Home Renovation	15,278,433	1.7%	$ 14,705,108	4.0%
	New Homes $ MR	10,612,322	1.2%	$ 16,885,441	4.6%
	Home EE Kits & Education	2,507,292	0.3%	$ 353,266	0.1%
Income Qualified Programs	Income Qualified	7,881,921	0.9%	$ 7,576,305	2.1%
Indigenous Programs	Insulation and Direct Install	791,367	0.1%	$ 613,464	0.2%
	Small Business	1,185,774	0.1%	$ (461,000)	-0.1%
	Metis Income Qualified	554,441	0.1%	$ 559,019	0.2%
	Community Geothermal	3,255,840	0.4%	$ 3,816,177	1.0%
Commercial, Industrial, & Agriculture	Small Business & Appliance	45,655,479	5.2%	$ 9,945,000	2.7%
	In Suite Efficiency	3,019,822	0.3%	$ 1,055,321	0.3%
	Renovation	309,292,587	35.1%	$ 187,956,512	50.9%
	HVAC & Controls	10,312,458	1.2%	$ 5,501,208	1.5%
	New Construction & HPB	21,915,904	2.5%	$ 9,311,153	2.5%
	Custom	70,646,282	8.0%	$ 37,133,059	10.1%
	Load Displacement	329,967,000	37.5%	$ 61,521,326	16.7%
Emerging Technology Program	Emerging Technology	6,880,972	0.8%	$ 4,156,484	1.1%
Total		***880,148,200***	***100%***	***369,021,884***	***100%***

- Three-year savings is merely the sum of the annual savings of each year of the Plan .

Bundle-level savings and Net PACT Benefits: Natural Gas

Table 20: Savings and PACT NPV $ by Sector and bundle – Natural Gas

Sector	DSM Bundle	Total Three-Year Savings (m3)	Savings %	PACT NPV*	PACT NPV %
Residential	Direct Install	499,384	1.9%	$ (165,898)	-0.8%
	Product Rebates	1,205,670	4.7%	$ (402,307)	-1.8%
	Home Renovation	2,737,423	10.6%	$ 1,481,619	6.7%
	New Homes $ MR	401,910	1.6%	$ (491,953)	-2.2%
	Home EE Kits & Education	139,893	0.5%	$ (242,659)	-1.1%
Income Qualified Programs	Income Qualified	3,237,979	12.6%	$ (8,887,742)	-40.2%
Indigenous Programs	Metis Income Qualified	157,774	0.6%	$ (519,356)	-2.4%
Commercial, Industrial, & Agriculture	Small Business & Appliance	958,599	3.7%	$ 540,611	2.4%
	In Suite Efficiency	346,736	1.3%	$ 350,568	1.6%
	Renovation	3,387,948	13.2%	$ 3,773,917	17.1%
	HVAC & Controls	2,268,681	8.8%	$ 3,772,840	17.1%
	New Construction & HPB	2,287,686	8.9%	$ (2,692,833)	-12.2%
	Custom	13,348,583	51.9%	$ 25,683,933	116.2%
Emerging Technology	Emerging Technology	332,286	1.3%	$ (103,619)	-0.5%
Interactive Effects	Interactive Effects	(5,585,543)	-21.7%		0.0%
Total		***25,725,008***	***100%***	***22,097,121***	***100%***

**Note- Bundle-level PACT values do not account for interactive effects.*

- Three-year savings is merely the sum of the annual savings of each year of the Plan .

Bundle-level cost-effectiveness: Electric

- It is common to look at energy efficiency cost-benefits in the form of a Benefit/Cost Ratio where ratios greater than 1.0 produce positive NPV in dollars
- The table provides bundle-level PACT ratios along with energy savings arranged from high to low PACT ratios
- Within the electric portfolio only the small business bundle has a PACT ratio of less than 1.0

Table 23: Bundle level results – Electric

DSM Bundle	Total Three-Year Electric Savings (GWh)	PACT Ratio
New Homes & MR	10.6	6.56
Custom	70.6	5.18
Renovation	309.3	4.97
Community Geothermal	3.3	4.03
Load Displacement	330.0	3.72
Emerging Technology	6.9	2.96
New Construction & HPB	21.9	2.95
Home Renovation	15.3	2.90
HVAC & Controls	10.3	2.81
Income Qualified	7.9	2.80
Metis Income Qualified	0.6	2.58
In Suite Efficiency	3.0	2.48
Small Business & Appliance	45.7	2.30
Insulation and Direct Install	0.8	1.90
Product Rebates	34.7	1.74
Home EE Kits & Education	2.5	1.61
Direct Install	5.7	1.53
Small Business	1.2	0.57
Program Support	-	-
Total	*880.1*	*3.27*

Bundle-level cost-effectiveness: Natural Gas

- The table provides natural gas bundle-level PACT ratios along with energy savings arranged from high to low PACT ratios.
- There are 8 bundles out of 14 that have PACT ratios less than 1.0
- These 8 bundles that have a PACT ratio less than 1 represent a quarter of total savings

Table 25: Portfolio level results (m^3 and PACT Ratio)

DSM Bundle	Total Three-Year Savings (m3)	PACT Ratio
Custom	13,348,583	6.51
In Suite Efficiency	346,736	3.15
HVAC & Controls	2,268,681	2.59
Small Business & Appliance	958,599	1.75
Renovation	3,387,948	1.60
Home Renovation	2,737,423	1.20
Emerging Technology	332,286	0.89
Product Rebates	1,205,670	0.79
Direct Install	499,384	0.78
New Homes & MR	401,910	0.72
New Construction & HPB	2,287,686	0.59
Income Qualified	3,237,979	0.49
Metis Income Qualified	157,774	0.44
Home EE Kits & Education	139,893	0.41
Program Support	-	-
Interactive Effects	(5,585,543)	-
Total	*25,725,008*	*0.99*

Daymark assessed cost-effectiveness of the Plan from multiple perspectives

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- Daymark was asked to assess the Plan in addition to the required cost-effectiveness perspective
- In many jurisdictions the final decision on energy efficiency is based on more than just the PACT results at the portfolio level
  - Do you include environmental benefits?
  - What level is being examined? Measure, program, bundle or portfolio?
- Total Resource Cost (TRC) is commonly used across industry
- Other tests considered are
  - Participant Cost Test (PCT)
  - Ratepayer Impact Measure (RIM)
  - Total Resource Cost Test (TRC Test)

Non-Energy Benefits (NEBs) treatment in the Plan

- In addition to direct energy savings, energy efficiency measures could result in non-energy benefits
- Efficiency Manitoba's PACT benefits does not include non-energy benefits
- However, Efficiency Manitoba's measure-level workpapers estimated couple of non-energy benefits, avoided greenhouse gas emissions and reduced water consumption, and included them in measure-level TRC analysis

Table 21: Savings by Measure Life - Electric

Portfolio	PACT Benefits ($ Million)	TRC Benefits ($ Million)	Non-energy benefits ($ Million)	NEB as % of PACT Benefits (additional)	NEB as % of TRC Benefits
Electric	497.0	517.7	20.8	4%	4%
Natural Gas	59.1	94.9	35.8	61%	38%

Total Resource Cost at the portfolio level

- As a supplement to the PACT analysis, Daymark assessed cost-effectiveness from the point of view of the Total Resource Cost test, which includes any customer costs for program participation, as well as non-energy benefits
- The Benefit/Cost Ratio for the electric portfolio while significantly lower than PACT, is still about 2.0 whereas, natural gas portfolio breaks even at 1.0

Table 27 & Table 29 of Daymark's report

Description	Total Three-Year Electric Savings (GWh)	PACT Ratio	TRC Ratio
2020-2023 Electric EE Plan	880.1	3.27	2.05

Description	Total Three-Year Natural Gas Savings (million cu m)	PACT Ratio	TRC Ratio
2020-2023 Natural Gas EE Plan	25.7	0.99	1.00

Bundle-level cost-effectiveness: Electric

Table 28: Electric Bundle level Cost-Effectiveness Results

DSM Bundle	Total Three-Year Electric Savings (GWh)	PACT Ratio	TRC Ratio
New Homes & MR	10.6	6.56	1.74
Custom	70.6	5.18	1.58
Renovation	309.3	4.97	2.52
Community Geothermal	3.3	4.03	22.26
Load Displacement	330.0	3.72	5.64
Emerging Technology	6.9	2.96	0.56
New Construction & HPB	21.9	2.95	1.19
Home Renovation	15.3	2.90	1.92
HVAC & Controls	10.3	2.81	2.24
Income Qualified	7.9	2.80	3.46
Metis Income Qualified	0.6	2.58	2.94
In Suite Efficiency	3.0	2.48	3.09
Small Business & Appliance	45.7	2.30	2.40
Insulation and Direct Install	0.8	1.90	2.07
Product Rebates	34.7	1.74	1.24
Home EE Kits & Education	2.5	1.61	3.14
Direct Install	5.7	1.53	1.99
Small Business	1.2	0.57	0.80
Program Support	-	-	-
Total	*880.1*	*3.27*	*2.05*

Bundle-level cost-effectiveness: Natural Gas

Table 30: Natural Gas Bundle-level Cost Effectiveness results

DSM Bundle	Total Three-Year Savings (m3)	PACT Ratio	TRC Ratio
Custom	13,348,583	6.51	3.62
In Suite Efficiency	346,736	3.15	4.47
HVAC & Controls	2,268,681	2.59	1.88
Small Business & Appliance	958,599	1.75	6.83
Renovation	3,387,948	1.60	1.84
Home Renovation	2,737,423	1.20	0.79
Emerging Technology	332,286	0.89	0.32
Product Rebates	1,205,670	0.79	0.49
Direct Install	499,384	0.78	1.81
New Homes & MR	401,910	0.72	0.32
New Construction & HPB	2,287,686	0.59	0.37
Income Qualified	3,237,979	0.49	0.92
Metis Income Qualified	157,774	0.44	0.84
Home EE Kits & Education	139,893	0.41	2.97
Program Support	-	-	0.00
Interactive Effects	(5,585,543)	-	-
Total	*25,725,008*	*0.99*	*100%*

Checking the cost-benefit value of a measure

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- Daymark developed a Pure Measure Value Test (PMVT) to assess the most basic question: "Is it economic for Manitoba for a measure to get installed, whether there is a program or not?"
  - *Benefits* – marginal value of energy saved, avoided GHGs, and water reduction. Same as TRC benefits.
  - *Costs* – incremental cost of the equipment to be installed
- Determines if the measure is beneficial as if no incentive program exists, similar to a Code effect
- Does not take into account residual benefits, such as market transformation

Portfolio Impact of Pure Measure Value Test (#23, #27)

- Efficiency Manitoba's plan includes measures that have PMVT ratio of less than 1
- The 4% of electric portfolio savings come from measures for which the measure cost alone is larger than the benefits
- Similarly, the natural gas portfolio gets 25% of its savings from measures for which the measure cost exceeds the benefits

Table 31: Portfolio level results after the pure measure value test

Description	Total Three-Year Energy Savings (GWh or million cu m)	PACT Ratio	TRC Ratio	Savings from measures with PMVT ratios <1
2020-2023 Electric EE Plan	880.1	3.27	2.05	4%
2020-2023 Natural Gas EE Plan	25.7	0.99	1.00	25%

The Plan includes measures that have different lives

- Measure-life varies considerably across different initiatives considered in electric and natural gas portfolios
- Majority of savings (93%) in electric portfolio have measure life of 15 years or less
- Natural gas portfolio has half of the measures with 20+ lives

Table 17: Savings by Measure Life Strata - Electric

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%
Total	***880,717,849***		

Table 18: Savings by Measure Life Strata – Natural Gas

Year Range	Total Three-Year Savings (m3)*	Savings as % of Total	Cumulative Savings %
1-5	1,112,134	4%	4%
6-10	1,070,171	3%	7%
11-15	4,785,178	15%	22%
16-20	7,843,158	25%	47%
21-25	13,344,427	43%	90%
26-30	2,864,947	9%	99%
31+	162,666	1%	100%
Total	***31,182,679***		

**Does not include program-level interactive effects.*

Impact on rates: Lifecycle Revenue Impact (LRI)

- The Plan uses the LRI to demonstrate that the electric and gas portfolios' impact on rates* will be small
- The methodology spreads all effects over 30 years
- This metric does not attempt to show the near-term rate impact

Electric Portfolio	One-Time Equivalent 30-Year Rate Increase
LRI (¢/kWh)	0.019 ¢/ kWh
LRI Percent Increase (using 6¢/kWh)	0.32%
LRI Percent Increase (using 8¢/kWh)	0.24%
LRI Percent Increase (using 10¢/kWh)	0.19%

Natural Gas Portfolio	One-Time Equivalent 30-Year Rate Increase
LRI (¢/m3)	0.23
LRI Percent Increase (using 19¢/m3)	1.22%
LRI Percent Increase (using 21¢/m3)	1.10%
LRI Percent Increase (using 23¢/m3)	1.00%

** Rate Impact is the effect of EM Costs – MH Benefits – MH Lost Revenue*

Impact on rates: Daymark LRI concerns

- The LRI Metric in the Plan does not recognize that the actual measures are in place for less than 30 years
- Daymark believes that conceptually an LRI-like calculation does illustrate the rate impacts
- The LRI for a plan is only the impact of three years of programs

Table 40: Savings by measure-life group – electric

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%
Total	***880,717,849***		

Table 41: Savings by measure-life group – natural gas

Year Range	Total Three-Year Savings (m3)*	Savings as % of Total	Cumulative Savings %
1-5	1,112,134	4%	4%
6-10	1,070,171	3%	7%
11-15	4,785,178	15%	22%
16-20	7,843,158	25%	47%
21-25	13,344,427	43%	90%
26-30	2,864,947	9%	99%
31+	162,666	1%	100%
Total	***31,182,679***		

**Does not include program-level interactive effects.*

Impact on electric rates: LRI

- Daymark used five different groups of measures according to measure-life to illustrate more closely the rate impacts in an LRI
- In the first five years the adjusted electric LRI is three times the estimated impact of the Plan LRI

Table 42: Electric portfolio – rate impact by measure life

	Efficiency Manitoba One-Time	Measure life adjusted rate increase	
	Equivalent Rate 30-year Increase	Average 1st 5-Years	Average 2nd 5 Years
LRI (¢/kWh)	0.019	0.059	0.031
LRI Percent Increase (using 6¢/kWh)	0.32%	0.99%	0.52%
LRI Percent Increase (using 8¢/kWh)	0.24%	0.74%	0.39%
LRI Percent Increase (using 10¢/kWh)	0.19%	0.59%	0.31%

Impact on natural gas rates: LRI

- Similarly the adjusted LRI for the natural gas portfolio is higher but less than 2x the Plan LRI
- This is lower than the electric portfolio analysis since the natural gas portfolio contains a considerably higher percentage of long-lived measures

Table 43: Natural gas portfolio – rate impact by measure life

	One-Time Equivalent Rate Increase	Measure Life Adjusted Rate Increase	
		Average 1st 5 Years	Average 2nd 5 Years
Lifecycle Revenue Impact (¢/m^3)	0.23	0.41	0.24
LRI Percent Increase (using 19¢/ m^3)	1.22%	2.17%	1.25%
LRI Percent Increase (using 21¢/ m^3)	1.10%	1.97%	1.13%
LRI Percent Increase (using 23¢/ m^3)	1.00%	1.79%	1.03%

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4. Deliverability of the Efficiency Manitoba Plan

Summary findings on deliverability (#4 - #9)

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4. The Plan budget substantially below MH
5. The Plan is for 30% less staff than MH
6. Staff and contract transfers from MH will help with start-up
7. The Plan's sector breakdown and incentive concentration fit with US & CA benchmarks
8. The Plan includes aggressive market participation assumptions
9. Participation estimates produce large increase in savings estimates

Summary findings on deliverability (#10 - #14)

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10. Some programs not clearly distinguished from each other
11. The Plan will not meet NG savings target in Year 1
12. Efficiency Manitoba still must ID some delivery partners
13. The Plan relies on immediate, effective collaboration with First Nations leadership
14. CRM system still under development

Deliverability assessment

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- Daymark sought to address the following questions:
  1. Has Efficiency Manitoba set targets for number of participants / projects that seem reasonable?
  2. Is the pace required to meet these targets reasonable?
  3. What market forces are assumed to drive participation, including customer as well as delivery partner incentives?
  4. Are more Manitobans being served as a result?
  5. What caveats should be raised to further clarify Efficiency Manitoba's ability to deliver savings?
- Our goal is to inform the regulators of areas needing focus and to ensure that expectations are appropriate

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- Target Savings is higher for both electric and gas compared to Manitoba Hydro plan

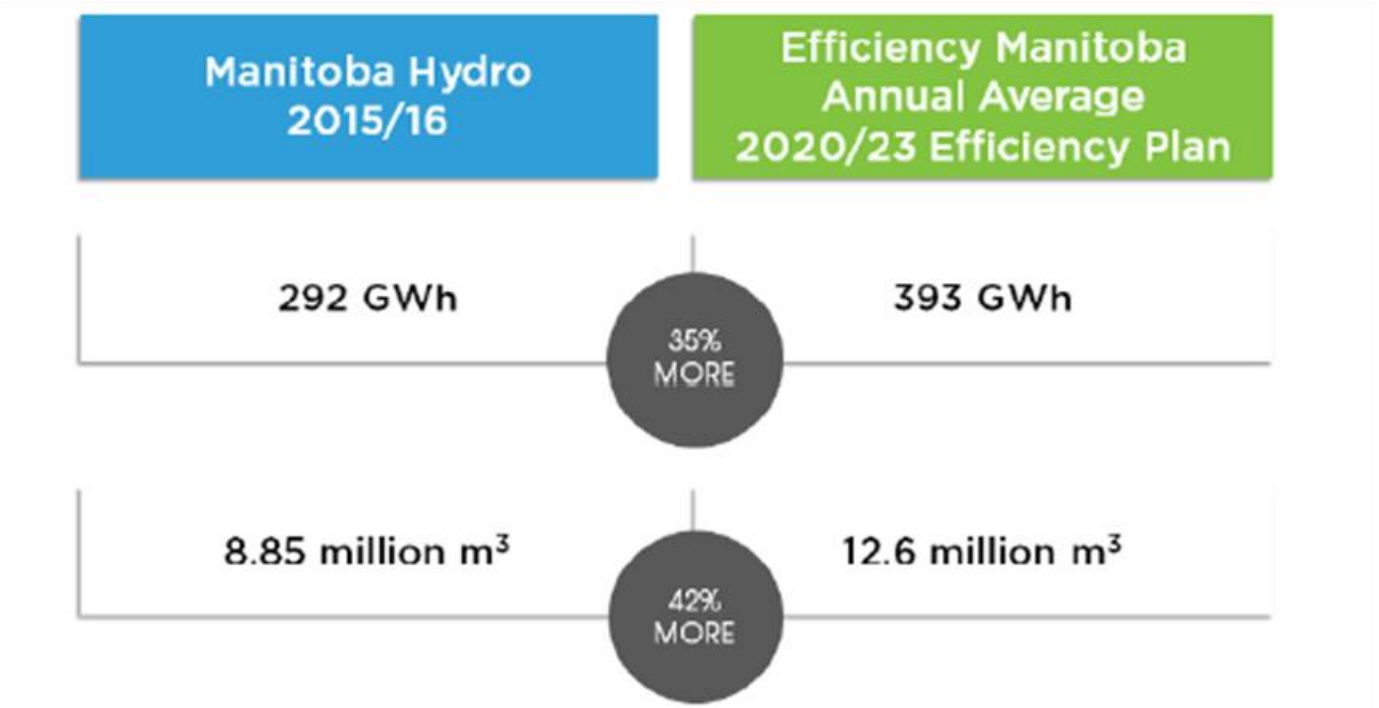

Figure 1: Comparison of Manitoba Hydro's 2015/16 Plan with Efficiency Manitoba's 2020/23 Plan

The challenge: higher savings with lower budget

Compared to MH 2015/16, Efficiency Manitoba's 2020-2023 Budget:

- Increases program costs by 39% or +$3.8 million
- But decreases all other cost categories, as shown in this chart
  - 8% reduction or $4 million in incentives
  - 37% reduction in staff (75 staff members vs 100)
  - 9% reduction or -$6.5 million in total costs.
- Efficiency Manitoba must increase savings with fewer resources and rely on delivery partners

Manitoba Hydro 2015/16		Efficiency Manitoba Annual Average 2020/23 Efficiency Plan	
$49,329,000	INCENTIVE COSTS	$45,247,000	8% ↓
$9,927,000	PROGRAM COSTS	$13,765,000	39% ↑
$14,949,000	STAFF COSTS	$9,375,000	37% ↓
$2,190,000	OVERHEAD COSTS	$1,495,000	32% ↓
$76,396,000	**TOTAL COSTS**	**$69,881,000**	9% ↓

Figure 2: Budget Comparison by Category between Manitoba Hydro's 2015/16 Plan and EM's 2020/23 Plan

National context

Performance metrics for Canada: Electric

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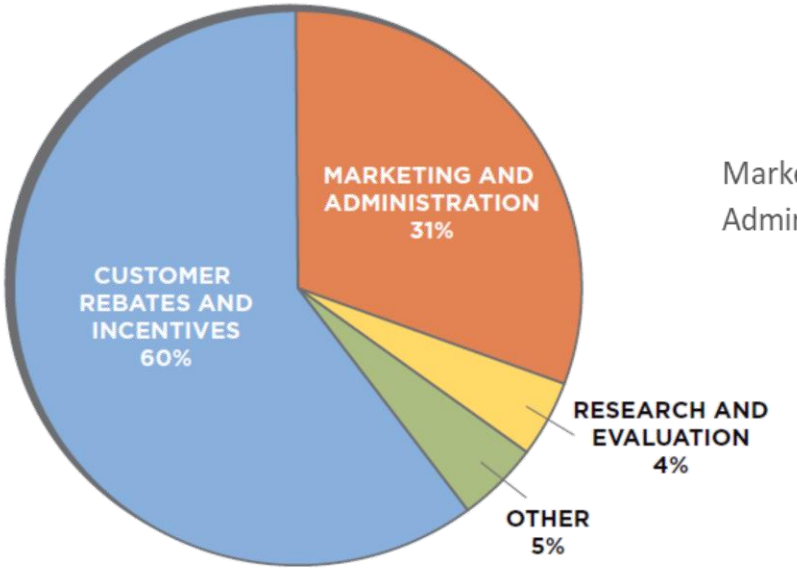
Canada budget allocation 2017



Efficiency Manitoba budgets 2020-2023

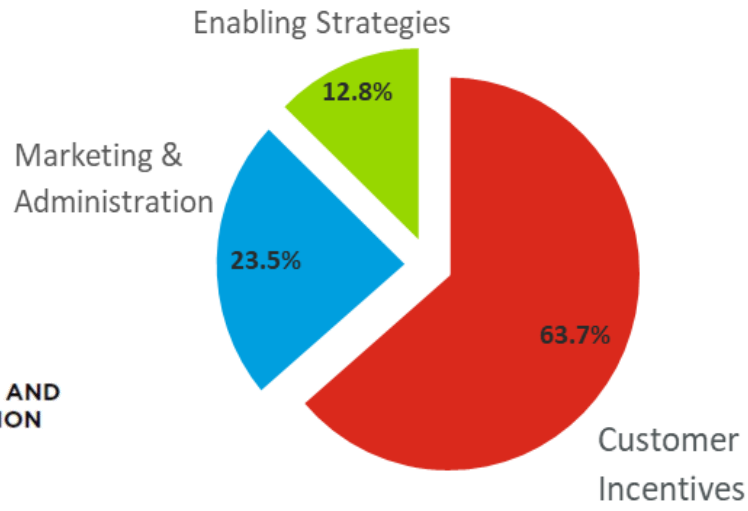


Figure 3: Cost Breakdowns Efficiency Manitoba Electric Program
Consortium for Energy Efficiency (CEE) 2018 Annual Report, May 2019, reflects data for 302 utility and nonutility program administrators operating efficiency programs in all 50 US States, the District of Columbia, and eight Canadian provinces.

National context

Performance metrics for Canada: Natural gas

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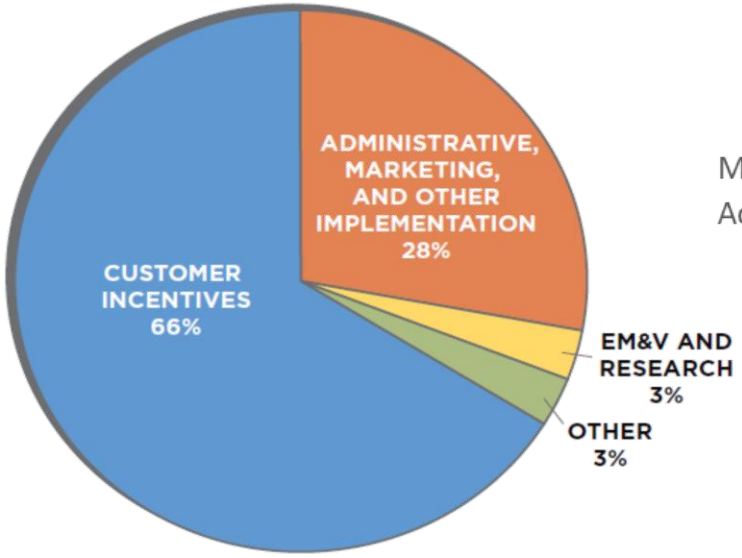
Canada budget allocation 2017



Efficiency Manitoba budgets 2020-2023

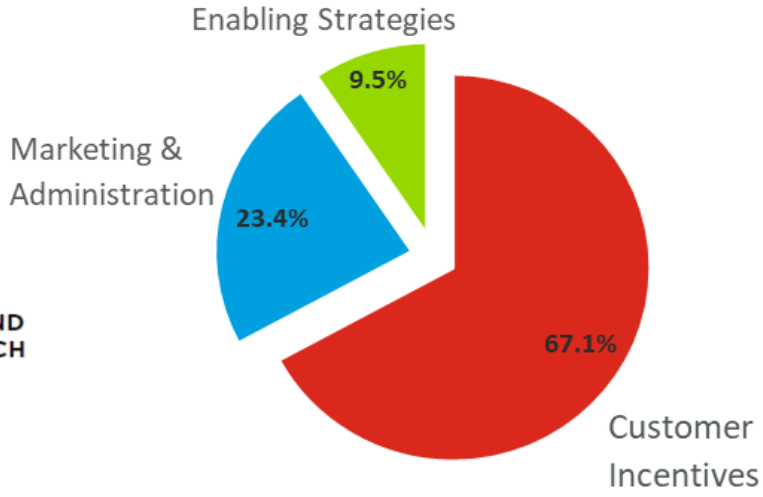


Figure 4: Comparison of Budgeted Expenditures – Natural Gas
Consortium for Energy Efficiency (CEE) 2018 Annual Report, May 2019, reflects data for 302 utility and nonutility program administrators operating efficiency programs in all 50 US States, the District of Columbia, and eight Canadian provinces.

National context: Electric

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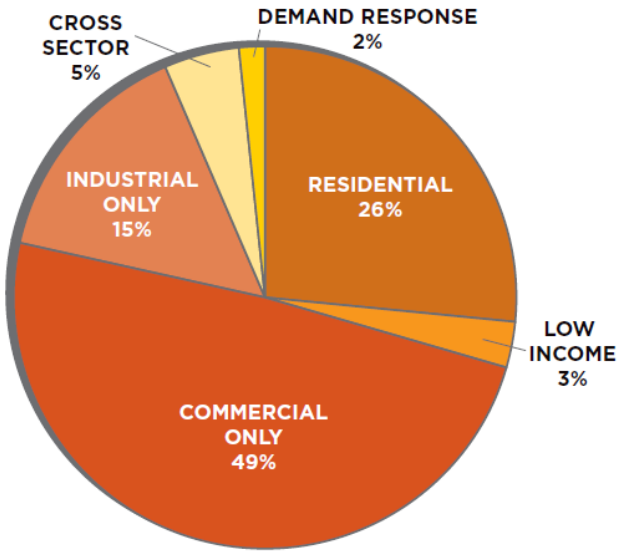
- Comparison of Budget by Sector – note difference in budget to industrial sector in Manitoba vs national

Canada budget allocation 2017



Efficiency Manitoba budgets 2020-2023

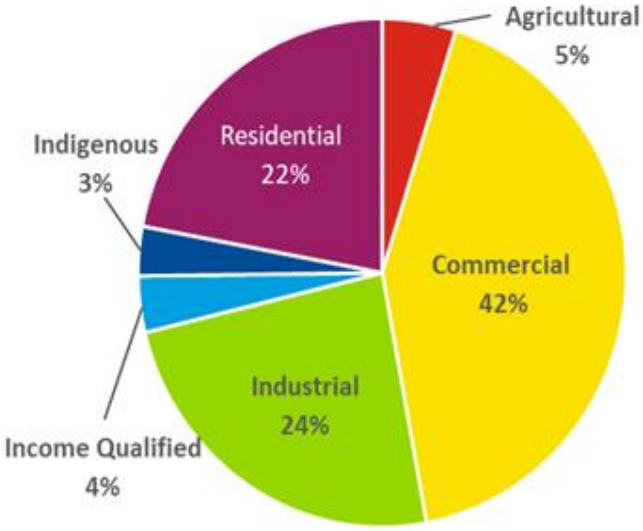


Figure 6: Comparison of Efficiency Manitoba's budget by sector to the Canadian average – electric (CEE Report)

National context: Electric

- Nationally, program design is similar to Manitoba
  - Most common electric energy efficiency programs by 2017 expenditures are:

Table 2: Most Common Canadian Electric Energy Efficiency Program Types by 2017 Expenditures (CEE Report).

CUSTOMER CLASS	PROGRAM TYPE	2017 EXPENDITURES (USD)	2017 EXPENDITURES (CAD)
COMMERCIAL	PRESCRIPTIVE—LIGHTING	$96,761,915	$125,633,222
RESIDENTIAL	CONSUMER PRODUCT REBATE FOR LIGHTING	$87,705,837	$113,875,041
COMMERCIAL	RETROCOMMISSIONING	$65,980,439	$85,667,333
INDUSTRIAL	CUSTOM INDUSTRIAL OR AGRICULTURAL PROCESSES	$54,428,047	$70,668,000
COMMERCIAL	SMALL COMMERCIAL—PRESCRIPTIVE	$37,940,791	$49,261,363

National context: Natural Gas

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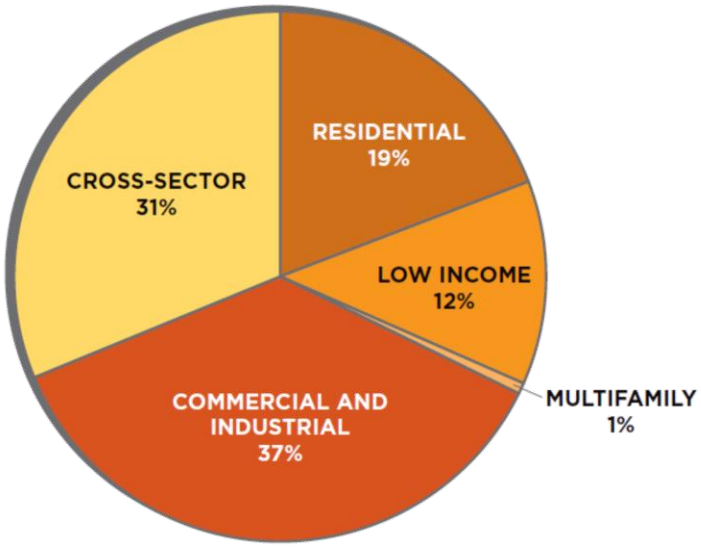
- Comparison of Budget by Sector – note difference in budget to Income Qualified sector in Manitoba vs national

Canada budget allocation 2017



Efficiency Manitoba budgets 2020-2023

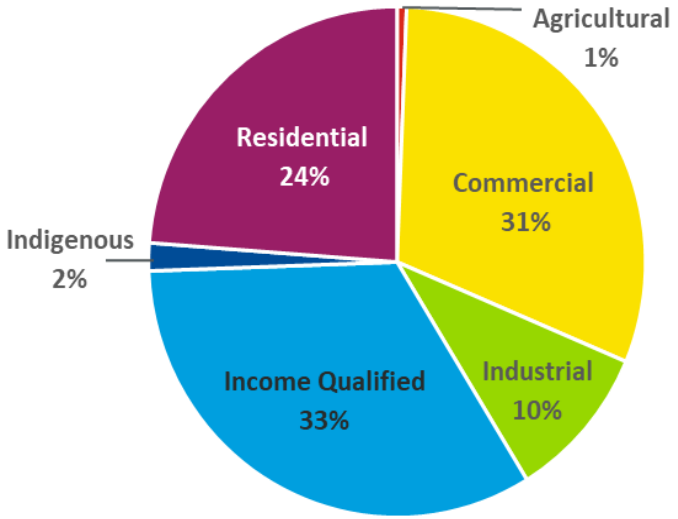


Figure 6: Comparison of Efficiency Manitoba's budget by sector to the Canadian average – natural gas (CEE Report)

Program composition

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Efficiency Manitoba's 2020-2023 plan:

- Relies on continuation of legacy programs in Manitoba Hydro's most recent plan (2018 Report)
- Has revised and enhanced some features of these legacy programs
- Includes new program offerings
- Has higher savings targets that must be met with a lower budget, which means greater participation must be obtained through program implementation and expanded stable of delivery partners

Program innovation

Efficiency Manitoba's 10 New Offerings by Sector and Bundle

New Efficiency Manitoba Offerings - 3 Year Plan (*)

Sector	Bundle	Measure
Residential	Direct Install	Online Home Questionnaire
Residential	Direct Install	Home Energy Check-Up
Residential	Home Renovation	Home Energy Audit
Residential	Home Renovation	Major Renovation
Residential	Emerging Tech	Solar Energy Program
Indigenous	Small Business	Product Rebates
Indigenous	Metis Inc Qual	Home EE Upgrades
Commercial	HVAC Controls	VFDs, Hotel Pumps, Sensors
Commercial	New Construction	Deep Energy Retrofits
Commercial	Custom	Strategic Energy Management Cohorts

(*) PUB/EM 1-33a-b

Program innovation

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- New programs consist of savings ranging between 1% and 2% of total three-year savings over 3 years:

New Efficiency Manitoba Offerings - 3 Year Plan

Three-year Combined Savings by Sector and Portfolio (*)

Sector	Energy GWh	Natural Gas Mil m^3
Commercial	8.6	0.65
Indigenous	1.5	0.16
Residential	4.3	0
Total New Offerings	14.4	0.81
Total Portfolio Energy Savings	1179	37.7
% of Total Portfolio Savings	1.2%	2.1%

(*) Est. Based on measure-level projected savings

Hard to reach customers

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- Regulation 119/2019, section 11c) requires the Plan to allocate at least 5% of initiatives low-income or hard-to-reach customers.
- Efficiency Manitoba's Plan exceeds this threshold, as shown below.

Figure 12: Hard to Reach Customers by Percentage of Budget

Hard to reach customers: Indigenous customers

- Efficiency Manitoba's Indigenous Program includes the following:

Table 11: Hard to Reach Customer Programs and Measures in 3-Year Plan

Program	Measures	Status	Delivery
Insulation and Direct Install Offers	**Home Energy Efficiency Upgrades:** - Insulation - Direct Install Measures - Smart Thermostats - ENERGY STAR® certified clothes washers	Existing program with enhancements	Participating First Nations (installation)
Small Business Offers	**Product Rebates:** - Aerators and showerheads - Lighting - Smart/programmable thermostats	New offer	Contracted third-party (supply, installation)
Community Geothermal	**Geothermal heat pumps**	Existing program with enhancements	Indigenous social enterprise (coordination), First Nation (installation)
Metis Income Qualified	**Home Energy Efficiency Upgrades:** - Insulation - Direct Install Measures - Smart Thermostats - ENERGY STAR® certified clothes washers	New Offer	Contracted third-party (installation)

Hard to reach customers: Income qualified customers

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Efficiency Manitoba will continue the legacy Affordable Energy Program for Income Qualified customers by:

- Reaching beyond the single-family residential customer to achieve a similar penetration of the Multi-Unit Residential Building (MURB) cohort
- Pursuing efforts to connect with local organizations and pay for local residents to promote these programs
- Conducting further market segmentation to identify micro-communities that represent opportunities to "meet low-income customers where they live" thereby reducing the perceived barrier to entry of requiring customers to self-identify as low-income
- Offering incentive discounts for insulation and appliance upgrades

Hard to reach customers: Best practices

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The Efficiency Manitoba Plan includes several best practices for improving access for hard-to-reach customers plus contributes one of its own. These best practices focus on financial incentives and bill-payment:

- Making sure that over the full loan term on-bill financing costs are no more than the expected savings (bill-neutral) or even below (bill-positive)
- Increasing the pool of funds that can be used to offset program costs to achieve a bill-positive outcome for customers
- Offering on-bill financing and C-PACE alternatives that allow the cost obligation (and savings) to remain with the property and rental unit meter even after the owner sells the property and renters move
- Efficiency Manitoba appears to be one of the first plans to include a "De-Cluttering" or site prep service that should be especially helpful to increase participation by senior citizens and be popular with delivery partners

Limitations to assessment

- Continuity across the Manitoba Hydro DSM and Efficiency Manitoba plans is difficult to confirm due to the addition of new and enhanced programs
- Efficiency Manitoba appears to define participation and project size differently than Manitoba Hydro
- It is difficult to assess market penetration targets because an estimate of Total Market was found to be missing in the Market Analysis tab of the supporting measure-level spreadsheets
- It is important to understand whether pace of annual installations for the Manitoba Hydro program was limited by budget or an accurate reflection of customer interest. If budget limited, this suggests a faster pace of market penetration might be possible.

Key Factors for Success

- The new CRM/DSM system needs to have sufficient information for evaluation and verification of the plan.
- Timing and continuity of data maintenance in both the legacy and new systems.
- Collection of data through customer sign up for participation in bundle programs for program design is necessary. For example,
  - Commercial Building Optimization programs should be clearly distinguished from similar programs, for example both In-Suite Efficiency and Renovation include LED lighting and HRV controls
  - Overlap such as this could raise concerns about difficulty with marketing communication and training, as well as double counting of savings in the CRM system

5. Savings Targets

Summary findings (#16 - #19 and #43)

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16. Efficiency Manitoba has a very liberal and inclusive interpretation of the eligibility for all Codes & Standards savings
17. Efficiency Manitoba does not show effects of a code or standard lessening over time…likely resulting in an over-estimation of savings
18. Efficiency Manitoba does not appear to be incorporating Codes & Standards sunsetting
19. Efficiency Manitoba's savings targets rely on establishment of a few compliance coordinators to bring compliance from 50% to 85%
43. 15-year savings targets won't be met without changes

C&S are significant share of Plan savings

- Codes & Standards can be an excellent path to improve energy efficiency of the province
- It is good to have your energy efficiency program administrator not biased toward programs rather than C&S
- However, C&S savings account for ¼ of the electric savings of the Plan and ⅓ of the natural gas savings

Table 44: Electric and natural gas percent savings target achievement for codes and standards

DESCRIPTION	ELECTRIC		NATURAL GAS	
	Savings (GWh)	Percentage	Savings (Million cu. m.)	Percentage
Program-related savings	880.1	77%	25.7	68%
Codes and Standards Savings	256.0	23%	12.0	32%
Total Savings	***1136.1***	***100%***	***37.7***	***100%***

Efficiency Manitoba's approach to Codes & Standards

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- The Act standard for inclusion of Codes & Standards savings specifies those to which Efficiency Manitoba or MH have made a "material contribution." Daymark is not aware of any codes or standards EM excludes under this criterion.
- Codes & Standards savings are calculated similarly to program measure impacts
- Counted as annual, one-year incremental savings for new actions undertaken under codes & standards
- Plan does not discuss free rider/natural conservation adjustments

Composition of Codes & Standards savings: Electric

- C&S that produce electric savings initially over 60% from the Residential sector decreasing to about 40% in year three

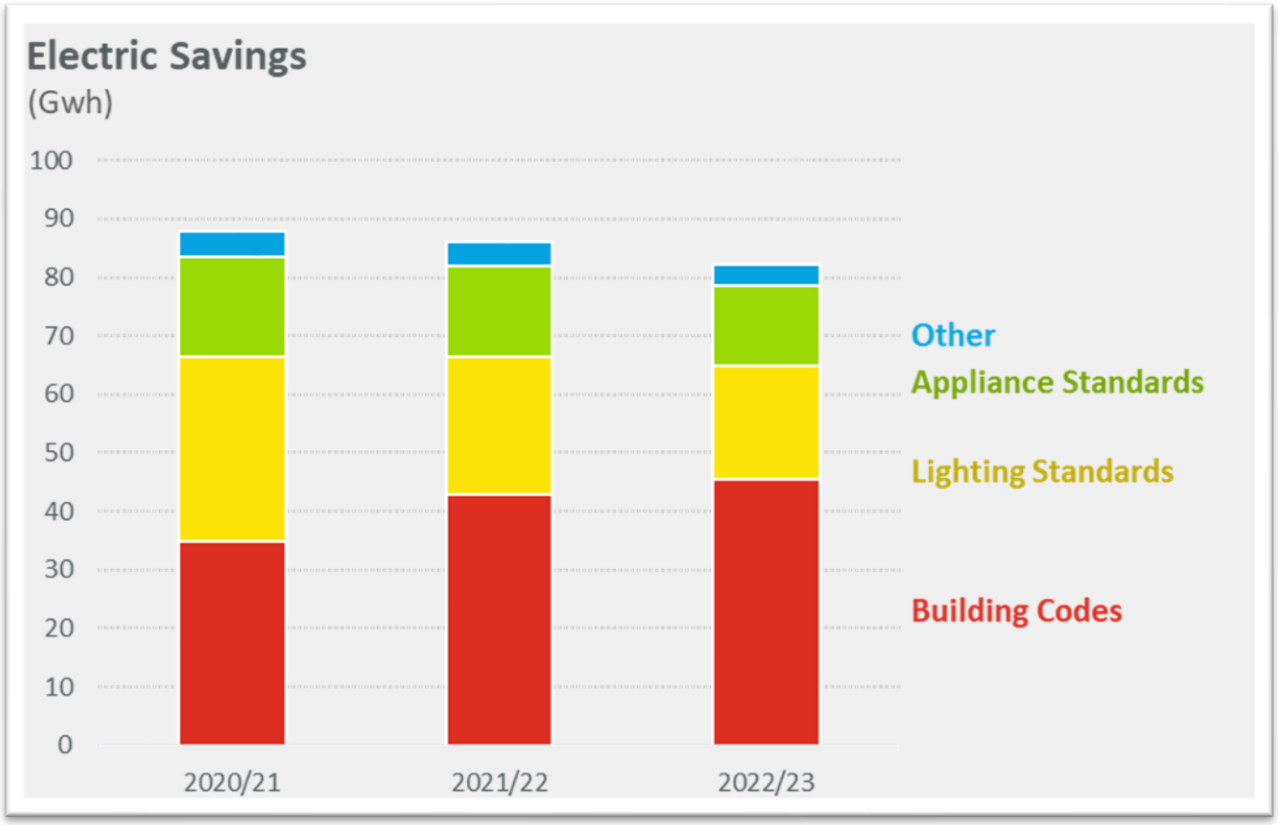

Figure 16: Electric savings in Codes & Standards

Composition of Codes & Standards savings: Natural Gas

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- C&S savings that save natural gas come predominantly from the building codes in the Residential sector

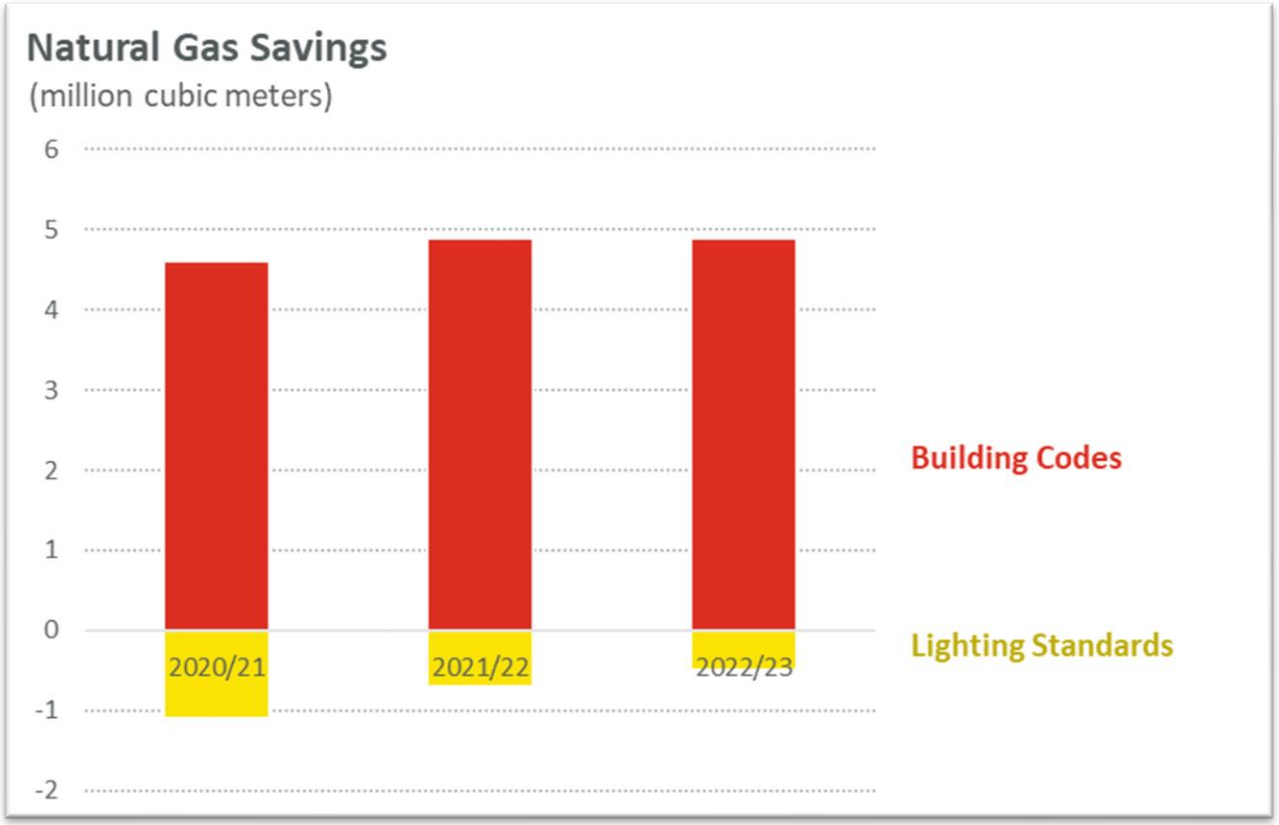

Figure 17: Natural gas savings in Codes & Standards

Codes & Standards Savings Daymark Consideration

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- The Plan does not discuss adjustments for Naturally Occurring Market Adjustment (NOMAD) implementation without code.
- The Plan also makes no adjustments for C&S aging
- Without adjustments, over time, an accumulation of overstated C&S savings may come to dominate the savings portfolio, crowding out the need for other DSM program savings

Efficiency Manitoba rebuttal on Codes & Standards

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- Daymark acknowledges that Efficiency Manitoba's rebuttal (and subsequent Committee testimony) states that adjustments for NOMAD are incorporated in the Plan projections. We have not independently evaluated these adjustments.
- Appropriate adjustments would:
  - Reflect a reasonable estimate of naturally-occurring adoption
  - Reflect likely increasing rates of naturally-occurring adoption as codes and standards age (unless they are updated)
  - Reflect an estimate of compliance rates

Illustration of potential electric C&S adjustment

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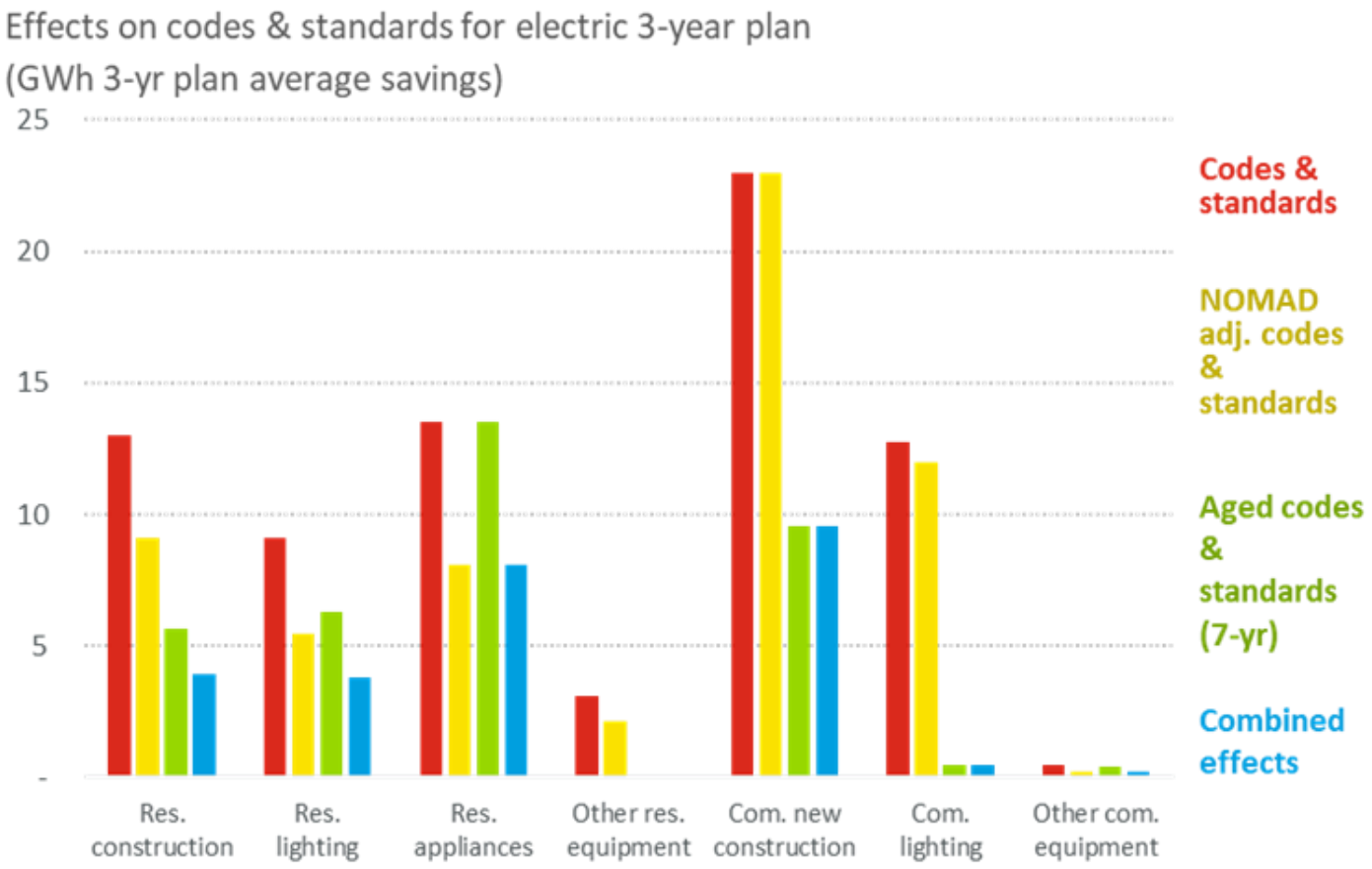

Figure 18: Effects on codes & standards for the electric 3-year plan

Illustration of potential natural gas C&S adjustment

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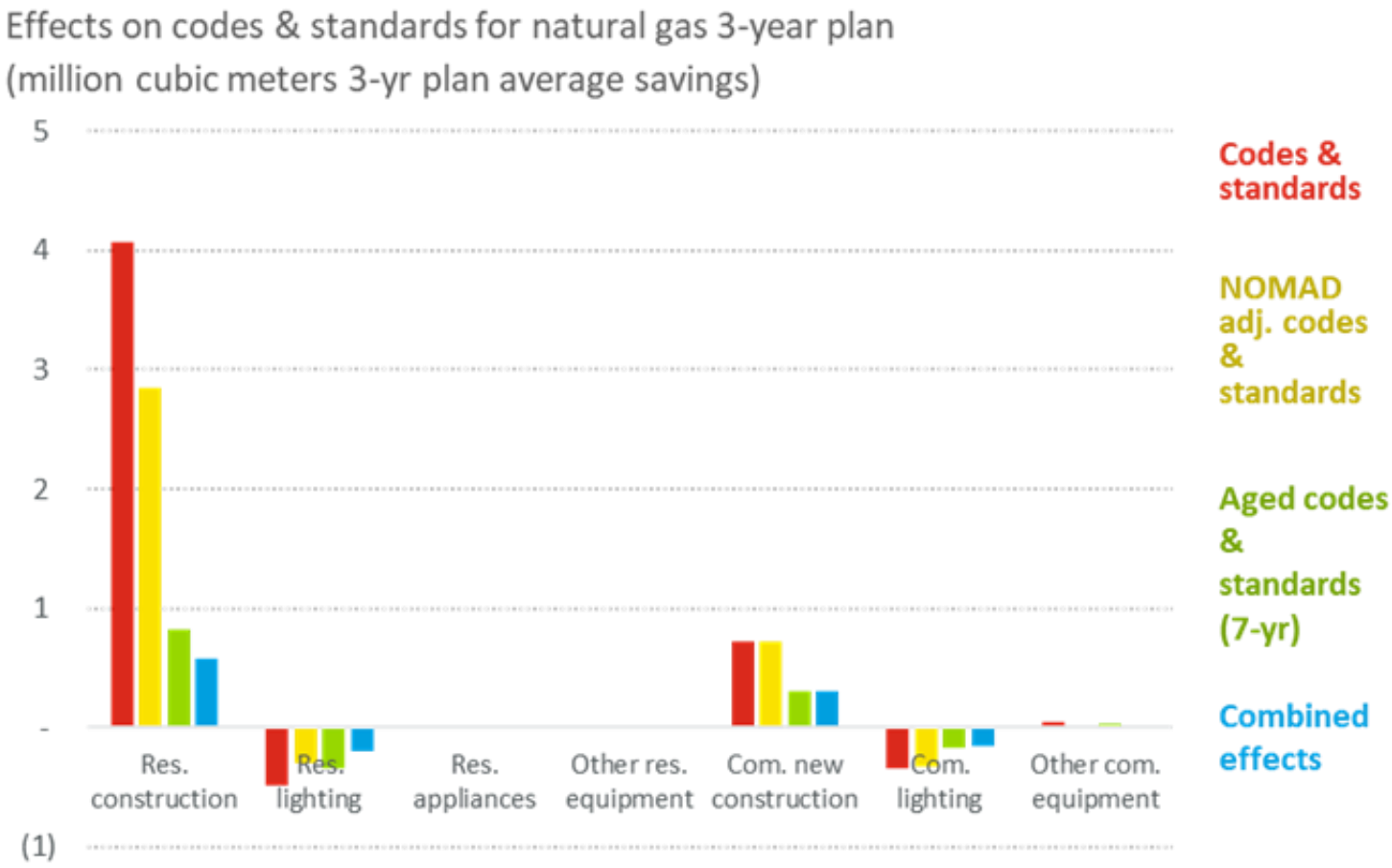

Figure 19: Effects on codes & standards for the natural gas 3-year plan

Efficiency Manitoba plans for increasing compliance

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- Efficiency Manitoba's projected codes and standards savings include plans for increasing compliance with commercial building codes due to compliance activities such as training:
  - 50% of projected commercial new construction energy savings is attributed to building codes in 2020/21
  - 75% of projected commercial new construction energy savings is attributed to building codes in 2021/22.
  - 85% of projected commercial new construction energy savings is attributed to building code in 2022/23.

Long-term impact of the Efficiency Manitoba Plan

DESCRIPTION	ELECTRIC		NATURAL GAS	
	Savings (GWh)	Percentage	Savings (Million cu. m.)	Percentage
Program-related savings	880.1	77%	25.7	68%
Codes and Standards Savings	256.0	23%	12.0	32%
Total Savings	***1136.1***	***100%***	***37.7***	***100%***

- Annual Savings Goals
  - Electric- program savings represent 1.13% out of 1.5% target
  - Natural Gas – program savings represent 0.51% out of 0.75% target
- Regulations and the Act discuss 15-year savings that will be achieved as 15 x 1.5% = 22.5% electric, and similarly 11.25% for natural gas.
- Questions on interpretation

Long-term impact of measure life

- Measuring long-term
  - Cumulative versus sum of annual target?
  - Annual reduction after year 15?
- How it is measured might not recognize that the actual measures are in place for less than 30 years
- Only 7 percent of electric savings comes from measures with more than 15-year lives, while 88% of natural gas savings

Table 40: Savings by measure-life group – electric

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%
Total	***880,717,849***		

Table 41: Savings by measure-life group – natural gas

Year Range	Total Three-Year Savings (m3)*	Savings as % of Total	Cumulative Savings %
1-5	1,112,134	4%	4%
6-10	1,070,171	3%	7%
11-15	4,785,178	15%	22%
16-20	7,843,158	25%	47%
21-25	13,344,427	43%	90%
26-30	2,864,947	9%	99%
31+	162,666	1%	100%
Total	***31,182,679***		

**Does not include program-level interactive effects.*

Projecting 15-year electric savings

1
2
3
4
5
Findings
Codes & Standards
Long-term
Potential revisions
6

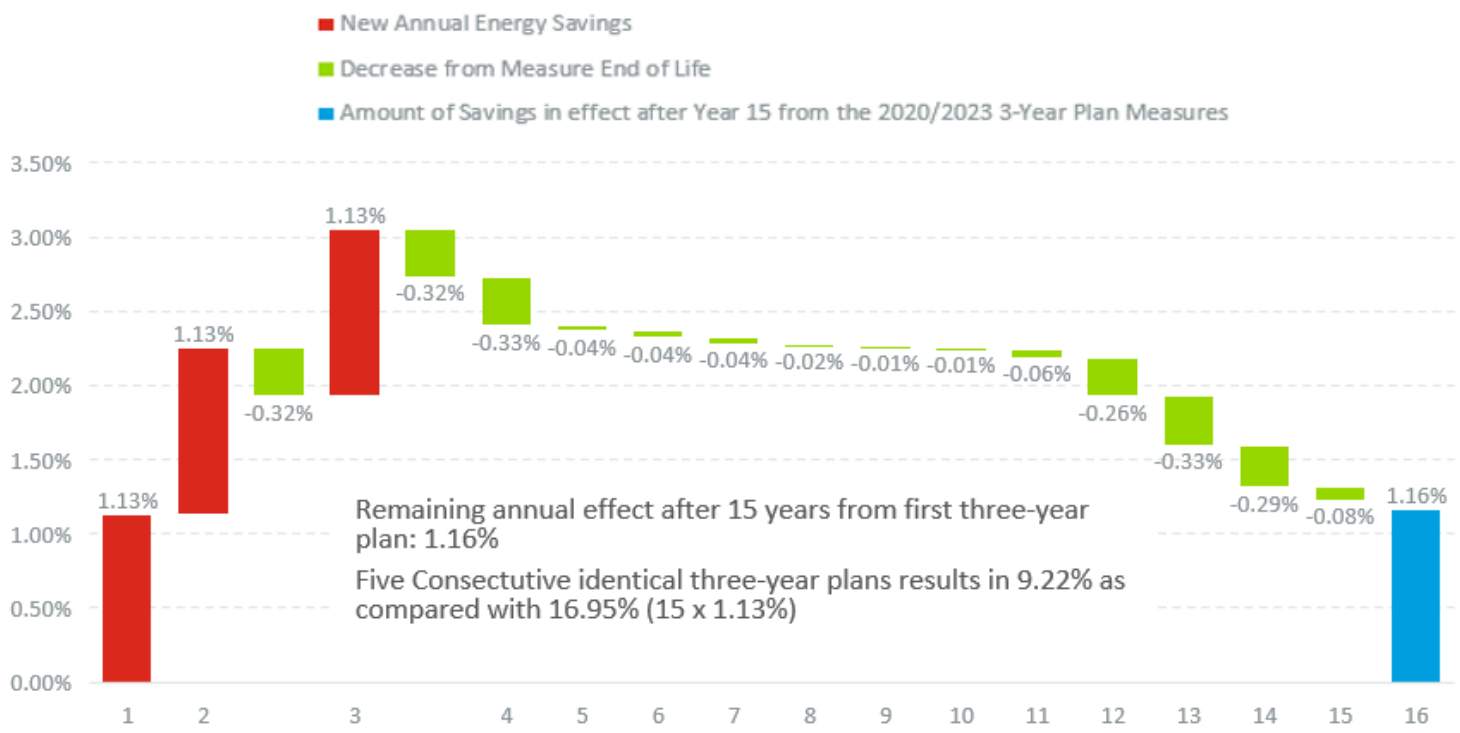

Figure 20: Savings in effect after year 15 from electric 2020/23 Plan measures

Projecting 15-year natural gas savings

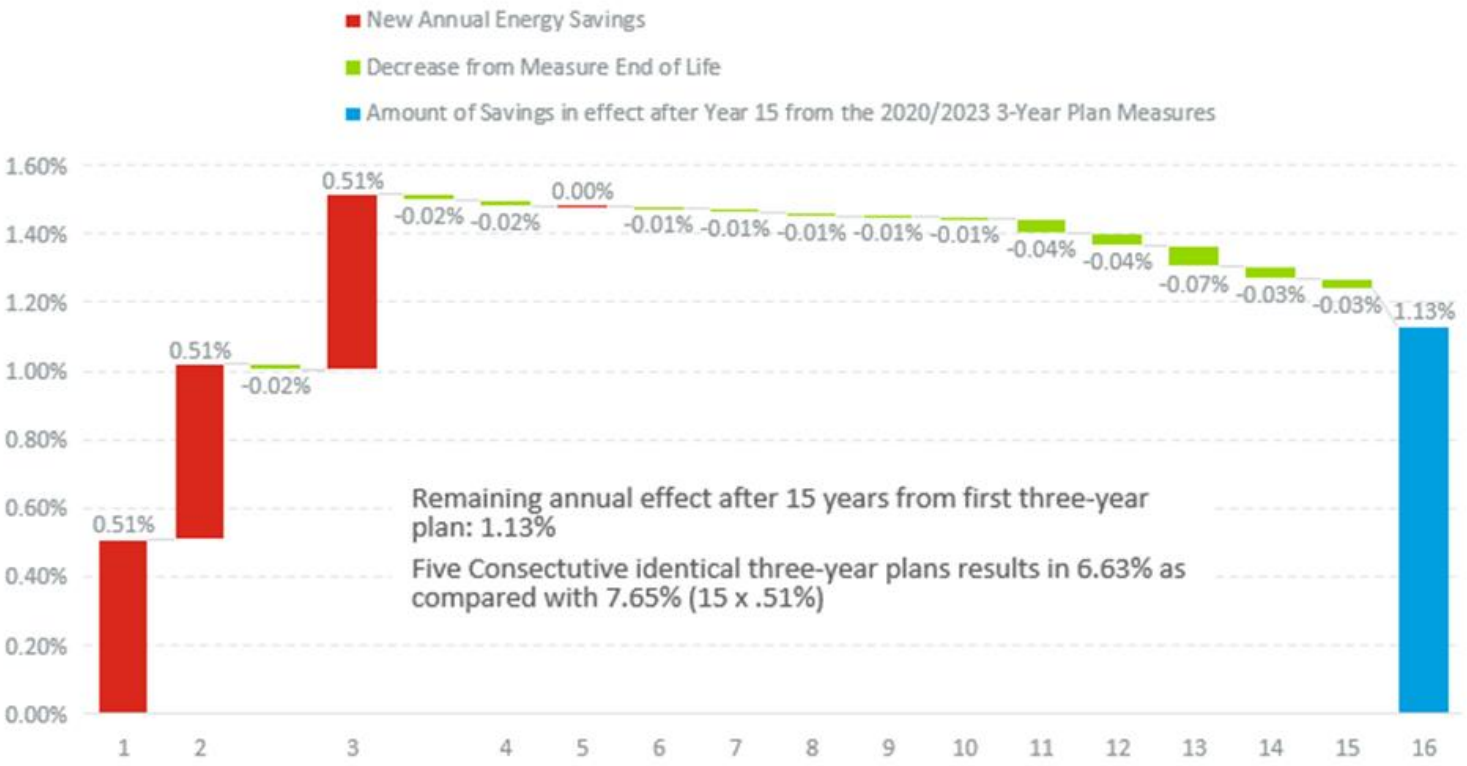

Figure 21: Savings in effect after year 15 from natural gas 2020/23 Plan measures

Potential revisions in savings targets

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Findings
Codes & Standards
Long-term
Potential revisions
6

- **Savings Targets should not be increased**
  - challenges ahead for Efficiency Manitoba to deliver the planned amount of program activity
  - since the proposed Plan already includes some bundles, programs and measures that are not cost-effective
- **Savings Targets should not be decreased**
  - Only a limited amount savings is from electric (4%) and Natural Gas (25%) measures with poor economics
  - There are other policy aspects such as accessibility to all Manitobans that can justify inclusion of these measures

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6. Plan for Evaluation, Measurement & Verification

Summary findings (#31 - #42)

31. CRM to monitor and track savings and budget
32. CRM procurement ongoing
33-34. DSM Scorecard benchmarking
35. Some qualitative metrics may be hard to score
36. Planned use of independent assessors
37. Evaluation Framework and Plan included in filing
38. Evaluations done Year 3 can't inform next Plan
39. Evaluation methodologies not yet fully developed
40. EEAG to help in assessor selection
41. EM should monitor early program rollout
42. EM must ensure it tracks data, pre-CRM

End of Presentation

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