Efficiency Manitoba DSM Market Potential Study

Executive Summary

August 30, 2022

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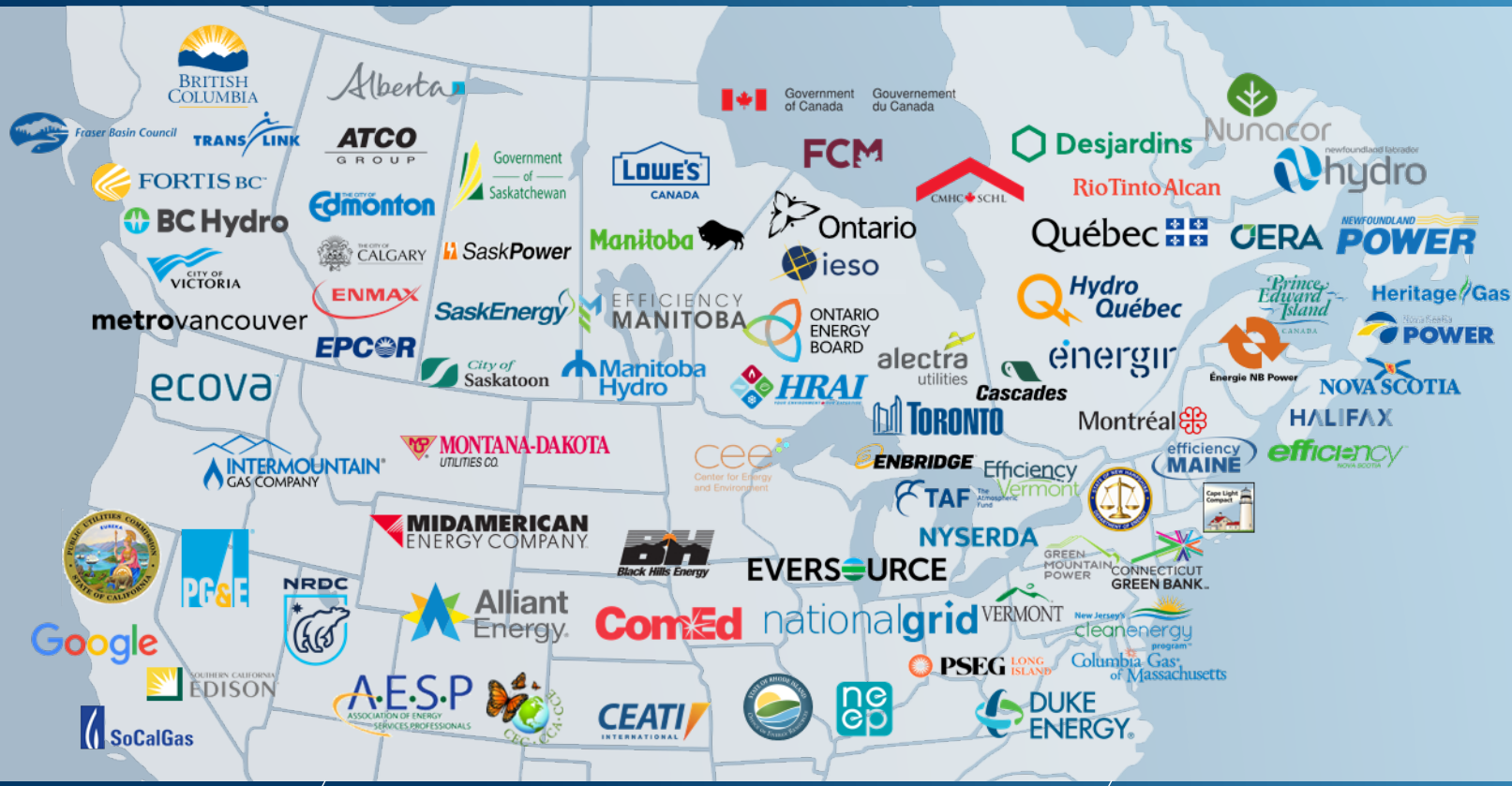

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MPS Features and Approach

By conducting over 25 potential studies in the past five years, Dunsky has developed an approach that balances comprehensiveness and accuracy and is designed to support DSM program planning in North America's leading jurisdictions.

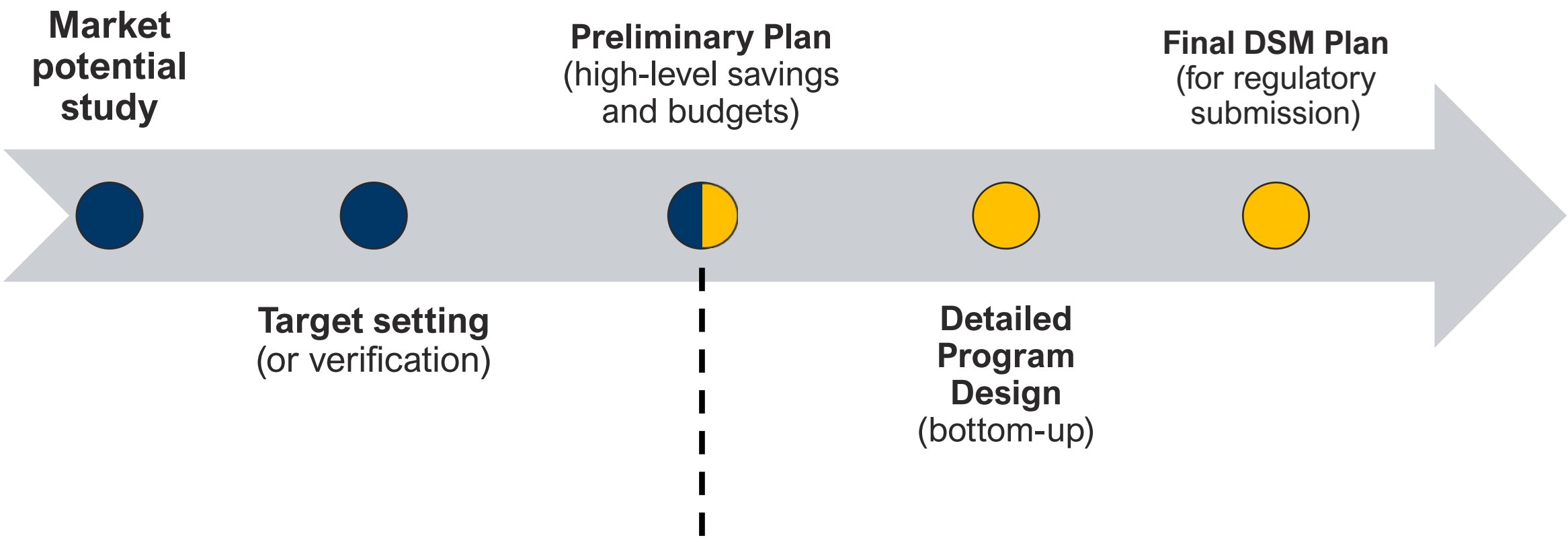
MPS Features

- ***Detailed assessment of potential*** *by market sector, segment, and key technologies*
- ***Captures market evolution*** *due to replacement schedules, market transformation, and changing standards*
- ***Assesses impact of program strategies*** *including incentive levels and enabling strategies*

Key Considerations

- ***Accuracy is strongest in initial years*** *(program planning). As results extend in time, potential estimates become more uncertain further into the study period.*
- ***To balance accuracy and comprehensiveness,*** *a bottom-up modeling approach captures the measure-groups with the most impact (>95%) and fills remaining gaps with custom measures*
- ***Industrial and agricultural*** *sectors are modeled via a top-down approach*

From the MPS to the DSM plan



Introduction

The following slide deck summary provides high-level results and key takeaways of the 2023/38 Efficiency Manitoba Demand Side Management (DSM) Market Potential Study (MPS) conducted by Dunsky Energy + Climate Advisors ("Dunsky") and its subcontractors.

In addition to the MPS, Dunsky assessed the market potential for electric demand response (DR) programs and electric vehicles (EV) on behalf of and funded by Manitoba Hydro. These analyses leveraged common inputs and assumptions developed for the DSM MPS.

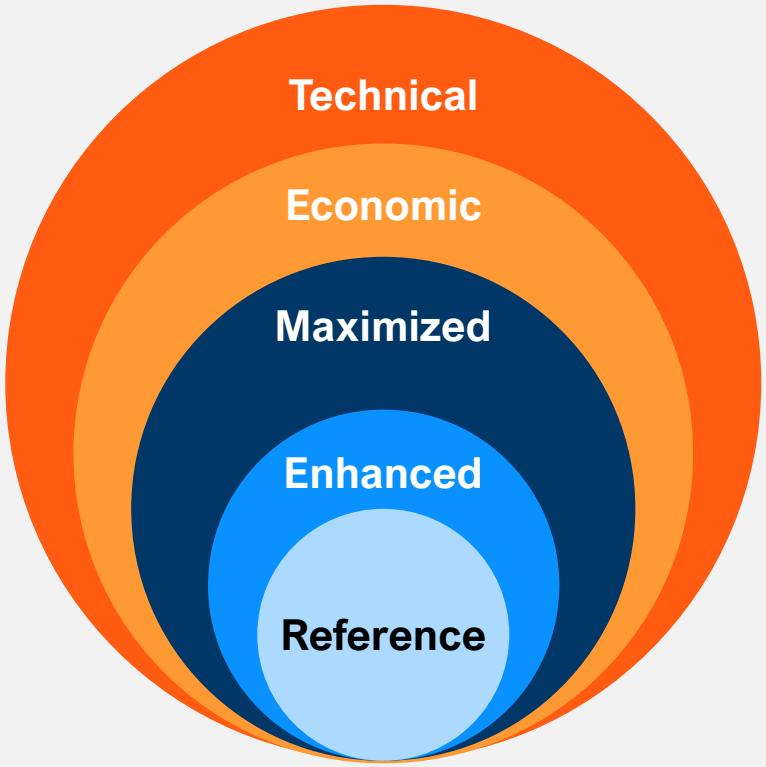
DSM MPS Parameters

Parameter	Description
Study Period	• 2023/24 (FY24) to 2037/38 (FY38) • 15-year study period
Geography	• Province-wide
Basis of savings	• Net savings at meter
Fuels	• Electricity (kWh, winter kW) • Natural gas (m^3)
Savings sources	• Energy efficiency (EE) • Fuel Switching (FS) • Distributed Generation (DG)

Note: Savings sources and included measures for the DSM MPS were defined in terms of Efficiency Manitoba's mandate. The DR and EV analyses were conducted as valued-add components as part of an integrated study.

Potential Modeling & Scenarios

For each study component, we estimate technical, economic, and achievable potential.



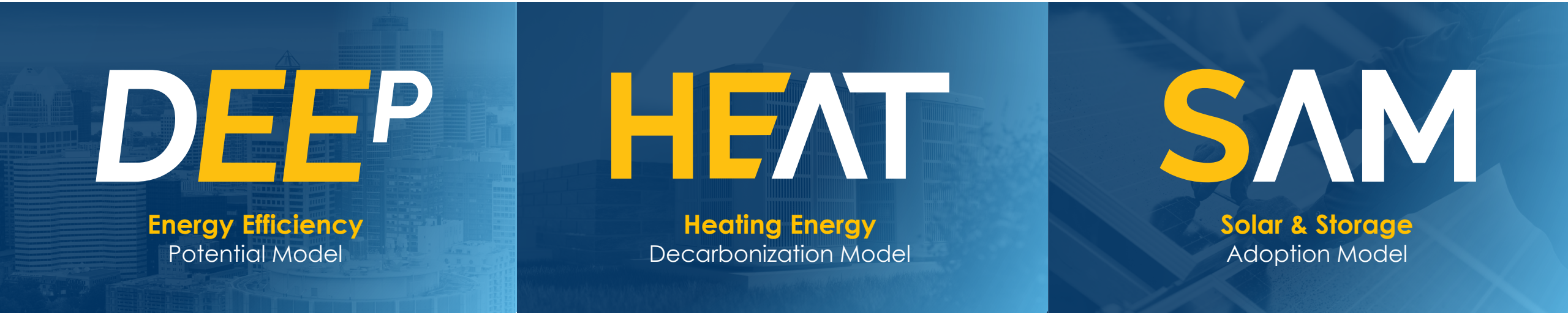
Achievable Scenario Descriptions

Reference Scenario (Ref.)	Emulates existing incentive levels and program configurations.
Enhanced Scenario (Enh.)	Increases incentive levels above and beyond Reference scenario levels.
Maximized Scenario (Max.)	Represents achievable potential under the highest reasonable incentive levels.

Methodology and Approach

For most customer segments, the study employs a bottom-up modeling approach that leverages a suite of Dunsky's in-house models to estimate savings for thousands of "measure-market" combinations. For large industrial customers, savings were estimated using top-down jurisdictional benchmarking approach.

The study leverages a pool of Manitoba-specific data to populate the models used to estimate DSM market potential. Where Manitoba-specific data is not available or insufficient, data from other jurisdictions is leveraged to fill gaps and produce a more robust representation of market parameters.



Achievable Electric Savings

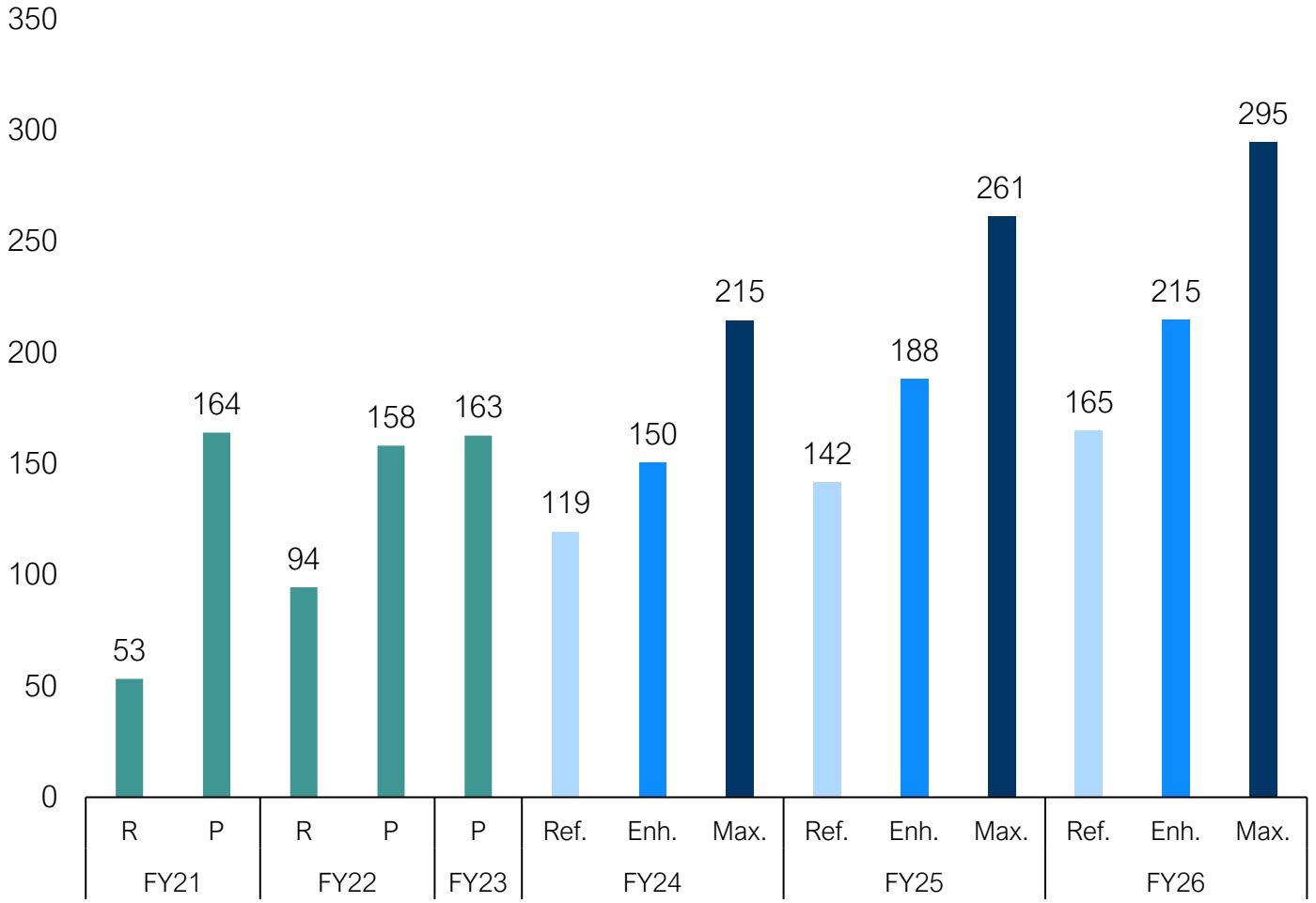
Reference scenario savings initially below levels in 2020/23 Plan.

- This reduction is driven by a decline in non-residential lighting savings as the market continues to transform.
- Savings grow over time as custom industrial savings increase to jurisdictional benchmarks and the opportunity for electric heat pumps increases as the market grows.

Solar PV contributes a small – but growing – share of savings, while increased electric consumption from fuel switching counts against savings targets.

Increasing incentives and pursuing new measures such as home energy reports (HERs) in FY25 drive higher savings under Enhanced and Maximized scenarios.

First-year Electric Savings (GWh)



Note: "R" denotes actual results and "P" denotes planned values. Values exclude savings attributable to C&S and load displacement measures. FY21 and FY22 results impacted by the onset and continuation of the COVID-19 pandemic.

Incentive Costs – Electric Portfolio

Relative to the 2020/23 Plan budgets, estimated annual costs for the electric portfolio are similar in the first year of the study under the Reference scenario and trend higher in later years despite a lower level of savings.

- This is a result of the increasing average acquisition costs that are driven by the steady reduction in lighting savings, which are generally less expensive savings to procure, and the declining net-to-gross (NTG) factors as naturally occurring adoption of some efficiency measures increases during the study period.

Under the Enhanced and Maximized scenarios, costs increase faster than savings – resulting in higher average acquisition costs.

Electric Incentive Costs

	Incentive Costs ($ million)	Incentive $ per First-year kWh
2020/23 Plan Avg.	$28.1	$0.17
Reference		
FY24	$28.6	$0.24
FY25	$33.3	$0.24
FY26	$38.1	$0.23
Enhanced		
FY24	$50.5	$0.34
FY25	$59.4	$0.32
FY26	$67.9	$0.32
Maximized		
FY24	$153.3	$0.73
FY25	$179.4	$0.70
FY26	$210.0	$0.72

Note: 2020/23 Plan values are in nominal dollars, while estimated budget values are are stated in real 2021 dollars. Values include energy efficiency and distributed generation incentive costs, but exclude incentive costs associated with load displacement.

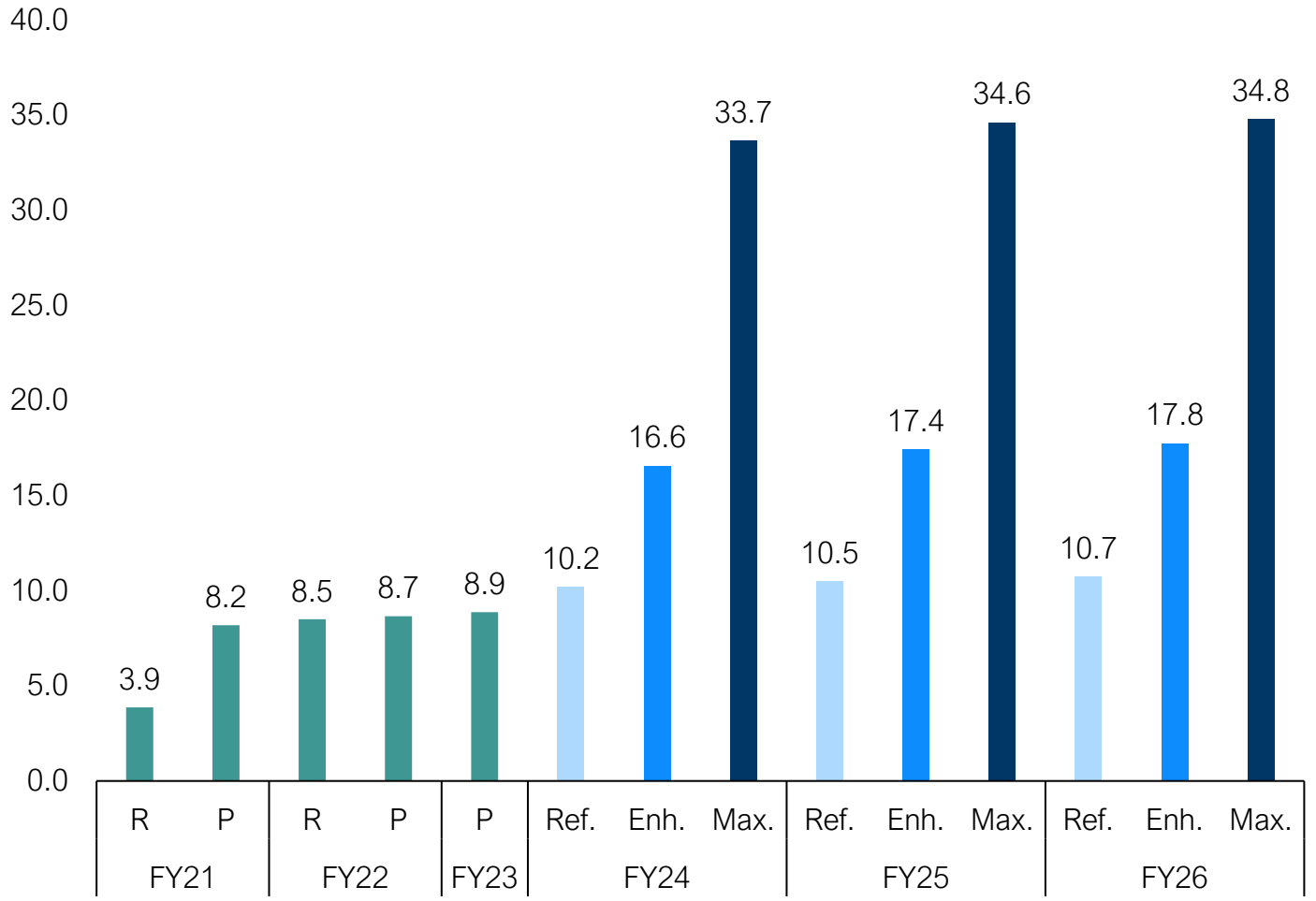
Achievable Gas Savings

Under the Reference scenario, savings are slightly above levels in the 2020/23 Plan.

- This is primarily attributable to a reduction in interactive effects from lighting measures relative to past levels.

Similar to electric savings, increasing incentives and pursuing new measures such as HERs in FY25 drive higher gas savings under Enhanced and Maximized scenarios.

First-year Gas Savings (million m³)



Note: "R" denotes actual results and "P" denotes planned values. Values include negative savings due to lighting interactive effects. Values exclude savings attributable to C&S. FY21 and FY22 results impacted by the onset and continuation of the COVID-19 pandemic.

Incentive Costs – Gas Portfolio

Estimated costs under the Reference scenario are comparable to the 2020/23 Plan, coinciding with similar savings levels.

Average acquisition costs are also similar under the Reference scenario but increase under the Enhanced and Maximized scenarios as costs increase at faster rate than savings.

For both electric and gas portfolios, program scenarios are not optimized from program design perspective.

Gas Incentive Costs

	Incentive Costs ($ million)	Incentive $ per First-year m^3
2020/23 Plan Avg.	$14.1	$1.35
Reference		
FY24	$13.3	$1.23
FY25	$13.6	$1.23
FY26	$14.0	$1.24
Enhanced		
FY24	$26.3	$1.54
FY25	$27.1	$1.51
FY26	$27.9	$1.53
Maximized		
FY24	$93.7	$2.75
FY25	$95.0	$2.71
FY26	$96.6	$2.74

Note: 2020/23 Plan values are in nominal dollars, while estimated budget values are are stated in real 2021 dollars. Values include energy efficiency and fuel switching incentive costs.

Energy Efficiency Conclusions (1/3)

Under Reference scenario incentive levels and program configurations, electric savings will vary from past programs as gas savings remain steady.

Electric savings are expected to be lower at the beginning of the study as non-residential lighting savings opportunities decline. Previously a mainstay of electric efficiency programs, the non-residential lighting market is quickly transforming in Manitoba. As the saturation of LEDs increases and more market participants naturally adopt efficient lighting measures, the ability of non-residential lighting programs to deliver savings will diminish.

- Over time, however, electric savings may increase to levels that replace the declining lighting opportunity, as large industrial custom project savings increase and the replacement of electric resistance heating with heat pumps gains momentum.

Gas savings are expected to remain at similar levels as articulated in the 2020/23 Plan as external factors and market transformation for gas measures are not expected to significantly change saving opportunities or markets in the first three years of the study. The decline in non-residential lighting savings will reduce interactive effect penalties on gas savings.

Energy Efficiency Conclusions (2/3)

By increasing incentives, programs can deliver substantially more savings while maintaining cost-effectiveness – albeit at higher costs. Average first-year savings over the first three years of the study under the Enhanced and Maximized scenarios:

Electric savings increase by 30% and 80% relative to the Reference scenario, respectively. This comes at an increase in incentive costs of 75% and 400%, respectively, resulting in higher average acquisition costs.

Gas savings increase by 64% and 227% relative to the Reference scenario, respectively. This comes at an increase in incentive costs of 93% and 550%, respectively, resulting in higher average acquisition costs.

Increasing savings by these orders of magnitude would also require **additional program planning and ramp up time** to achieve estimated savings levels.

The addition of **Home Energy Reports in FY25** contributes to the increase in first-year gas and electric program savings.

This behavioral measure offers an opportunity to drive significant program savings that contribute to Efficiency Manitoba's legislated targets, which are defined in terms of annual reductions in energy sales. However, the savings are relatively short-lived, and thereby offer modest lifetime savings.

Energy Efficiency Conclusions (3/3)

Raising incentives can lead to increased program savings, but for some measures and end-uses, even at the Maximized scenario incentive levels, **a substantial portion of the net economic savings remain unachieved**. These uncaptured savings represent cost-effective opportunities that are inhibited for reasons beyond customer financial benefits (e.g., limited customer awareness and knowledge, technology/intervention complexity and time requirements, etc.) as decisions to participate in energy efficiency are not solely about incentive levels. For example, under the Maximized scenario:

64% of FY26 cumulative net economic electric savings are not captured by programs.

36% of FY26 cumulative net economic gas savings are not captured by programs.

While completely eliminating all market barriers for all efficient technologies is likely not feasible, **uncaptured economic savings may represent opportunities for new or enhanced enabling program strategies, market transformation approaches, energy policy changes, and/or regulations to further reduce market barriers and increase savings**. This opportunity is particularly significant in the electric sector, where the opportunity to displace electric resistance heating with highly efficient heat pumps drives a significant portion of uncaptured economic savings.

Fuel Switching Conclusions

There is a program opportunity to incentivize hybrid electric-gas systems when air conditioning (AC) units need replacement.

- These measures prove to be especially cost-effective for customers when their AC system reaches its end-of-life as the incremental cost of the heat pump is relatively small compared to equivalent non-reversing AC equipment, and the existing gas heating system can remain in place.
- All-electric fuel switching measures do not pass cost-effectiveness screening due to the costs associated with increasing peak electric demand, which hybrid electric-gas systems avoid.

There is a program opportunity to convince those electrifying their gas water heater to adopt a heat pump water heater (HPWH).

- Many customers are already choosing to electrify their gas water heater with an electric storage water heater, even in the absence of programs. However, HPWHs are more efficient but come with an increased upfront cost, which offers a program opportunity to target incentives at customers who have already chosen to electrify their gas water heater.

No cost-effective program opportunities were identified for fuel switching to biomass.

- Customer economics are not favourable due to biomass fuel costs. Cost-effective solutions may be possible in unique and site-specific circumstances such as when low- or no-cost biomass supplies are available nearby.

Distributed Generation Conclusions

Solar PV adoption will not approach levels observed in the past pilot program in initial years of study unless lucrative incentives are provided.

- Despite continued global cost declines for solar PV systems, the pause in Manitoba's market since the end of the pilot program resulting in limited soft-cost declines coupled with significant reductions in compensation for excess generation will ultimately reduce customer demand for the next several years.
- As costs continue to decline, however, adoption will increase in the later years of the study.

The Federal Greener Homes Program has the potential to drive significant adoption of residential solar PV in the province.

- The program offers $1/W incentives up to $5,000 to participating households, which will be combinable with incentives offered by Efficiency Manitoba.

In the non-residential sector, solar PV adoption is likely to be subdued – particularly if excess generation rates remain low.

- Non-residential customers are particularly sensitive to excess generation rates, which increase the amount of time it takes for systems to create a financial return.
- If excess generation rates maintain the elevated rate as observed in FY23, non-residential adoption may be higher than estimated under the study's base case scenarios.