ALBERTA CARBON-CENTRIC ENERGY EFFICIENCY PROGRAMMING

PRESENTED AT THE 2019 ACEEE NATIONAL CONFERENCE ON ENERGY EFFICIENCY AS A RESOURCE

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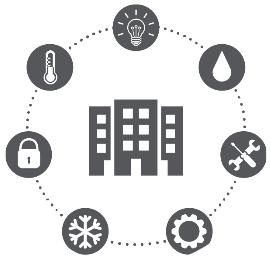
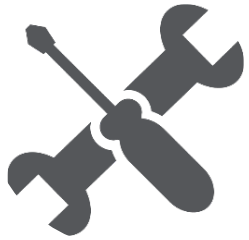
ENERGY EFFICIENCY ALBERTA

Raise awareness



Deliver programs for energy efficiency, development of micro-generation and small-scale energy systems



Develop an energy efficiency services industry

Energy Efficiency Alberta

PORTFOLIO PLANNING CHALLENGES

POLICY UNCERTAINTY

- Policy and funding uncertainty makes it difficult to plan programs and develop a stable market presence
- Pressure to balance policy and stakeholder demands with internal objectives

INFORMATION FOR DECISION-MAKING

Lack of information about baseline market conditions makes it difficult to prioritize investment, measure progress and benchmark performance

MARKET READINESS

- Consumers lack awareness of the impacts of energy use and the value of energy efficiency
- Contractors need training to effectively promote and deliver EE services

MANAGING OPERATIONS IN FAST-PACED ENVIRONMENT

Portfolio managers need adequate time to plan, contract vendors, train workforce and develop effective market entry strategies

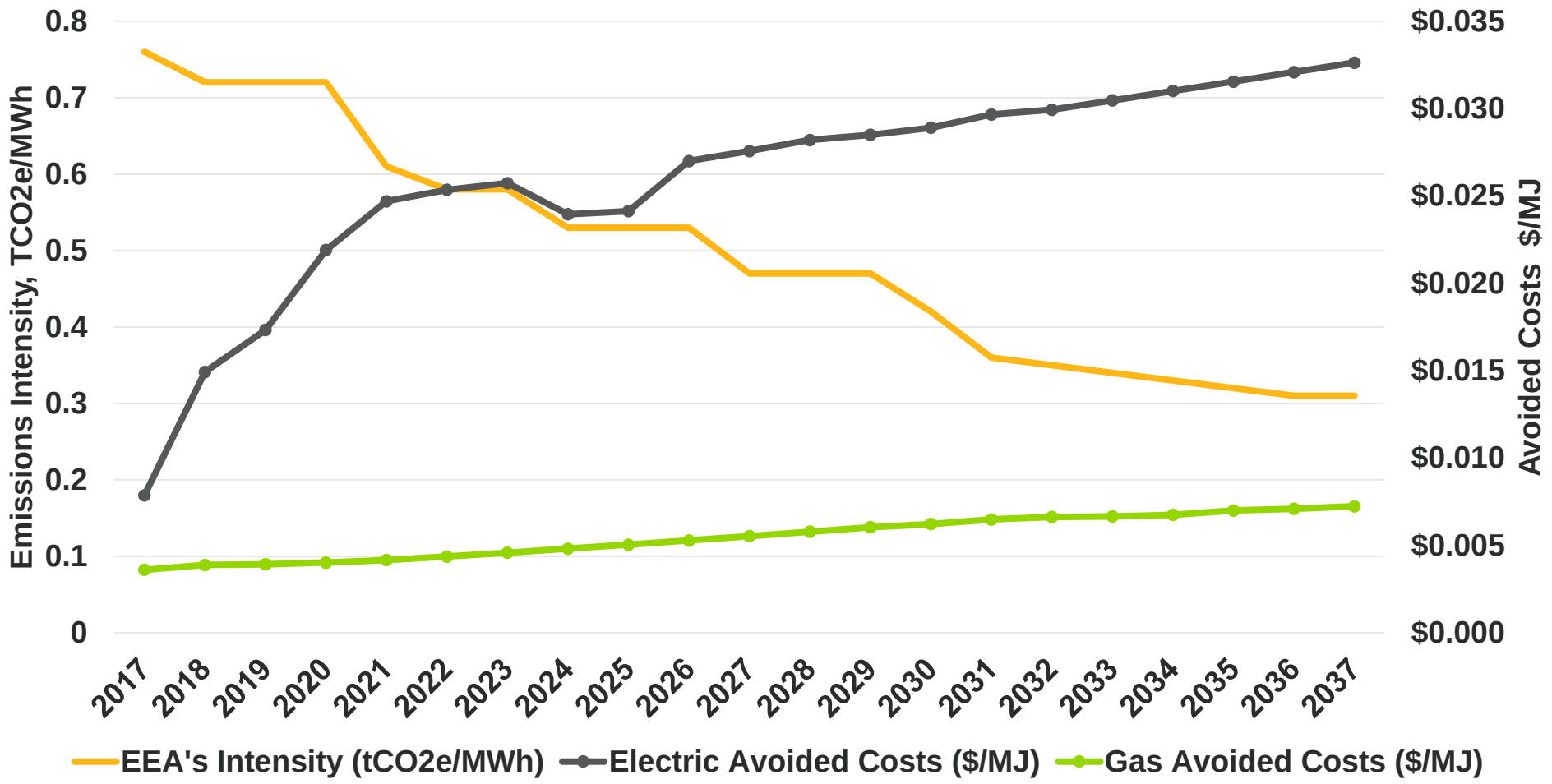
PORTFOLIO FOR CARBON REDUCTION

kWh

GJ

Program portfolio can look across electric and natural gas savings because the target is GHG emissions reductions – no individual targets for kWh and GJ savings

AVOIDED COSTS AND ELECTRIC EMISSIONS INTENSITY



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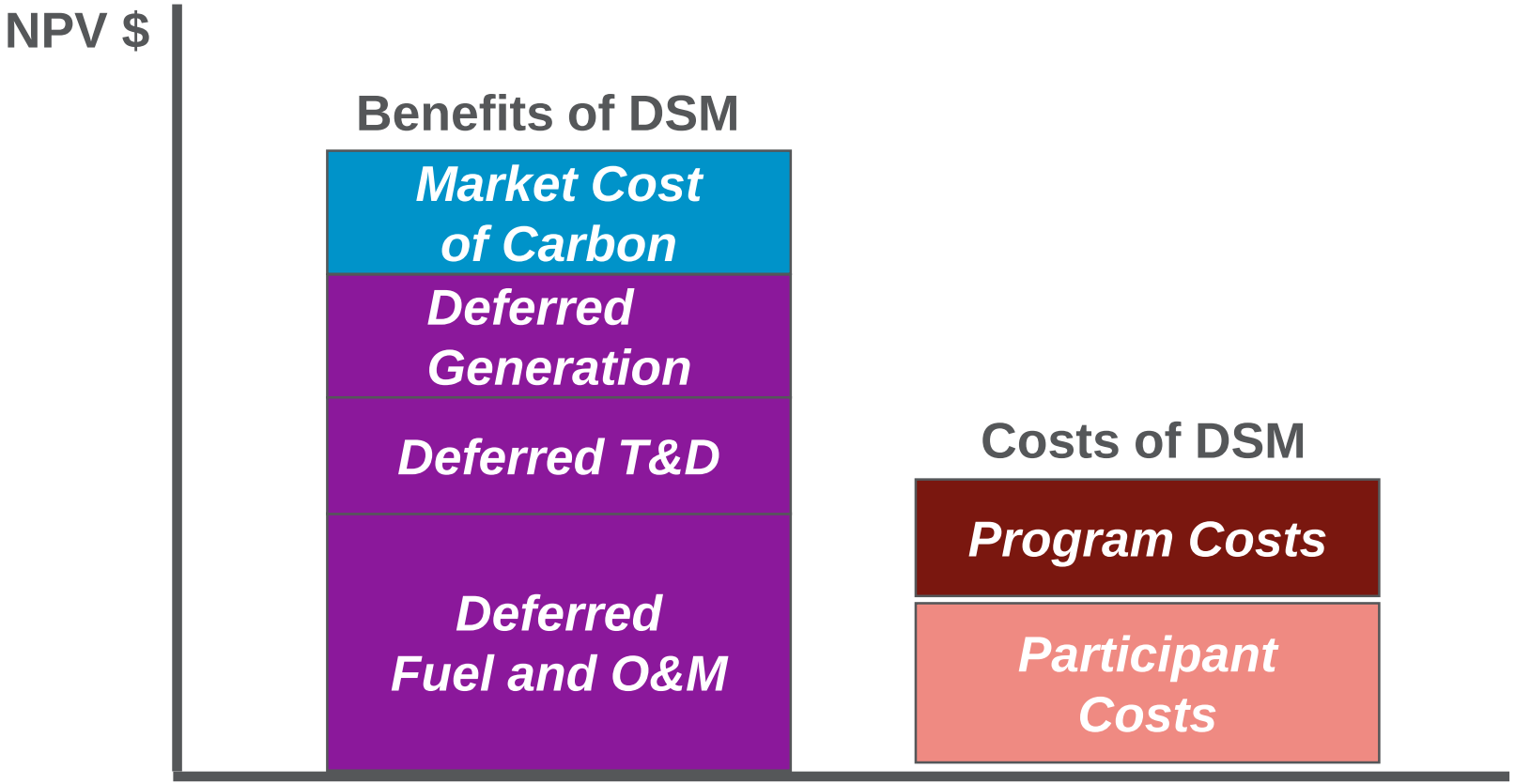
COST EFFECTIVENESS SCREENING AND REPORTING VALUES

Indicator Type	Screening			Reporting	
Description	GHG emissions	Cost	Social responsibility (societal)	EEA perspective (program)	Customer perspective (project)
Metric	Cost per tCO_2e	Modified TRC	Societal Cost Test	Program Administrator Cost Test	Participant Cost Test
Carbon price	Market Rate*	Market Rate*	Social Cost of Carbon	Market Rate*	Market Rate*
Discount rate	Societal discount rate (3%)**			7%**	5.39%**
Uses to assess performance	EEA's mandate (GHG emissions reduction)	EEA's level of investment	Global damages and managing climate change risk	EEA Corporation; Communications	Customers; Communications

* Market rate, as *originally* defined by Government plans (e.g., carbon levy). There is no longer a carbon levy in Alberta.
** All discount rates are real discount rates

TOTAL RESOURCE COST (TRC) TEST



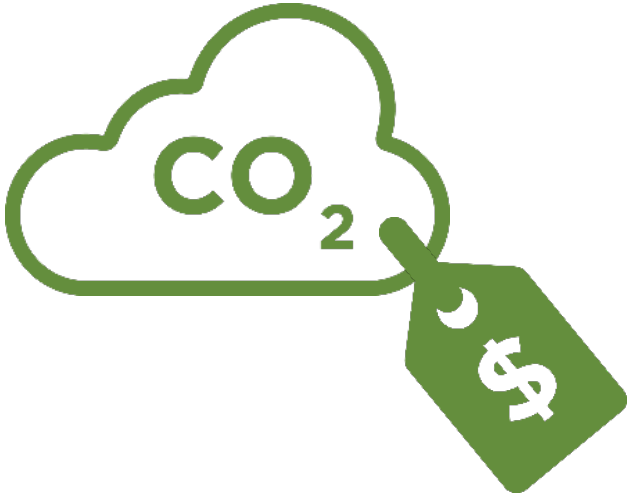
PROJECT ABATEMENT COSTS

$$\$/tCO_2e\ (project\ abatement\ cost) = \frac{PV(Technology\ Costs - Energy\ (bill)\ Cost\ Savings)}{Lifetime\ Emissions\ Reductions}$$

Energy Cost Savings X **Project Lifetime** *Typically greater than* **Technology Costs**

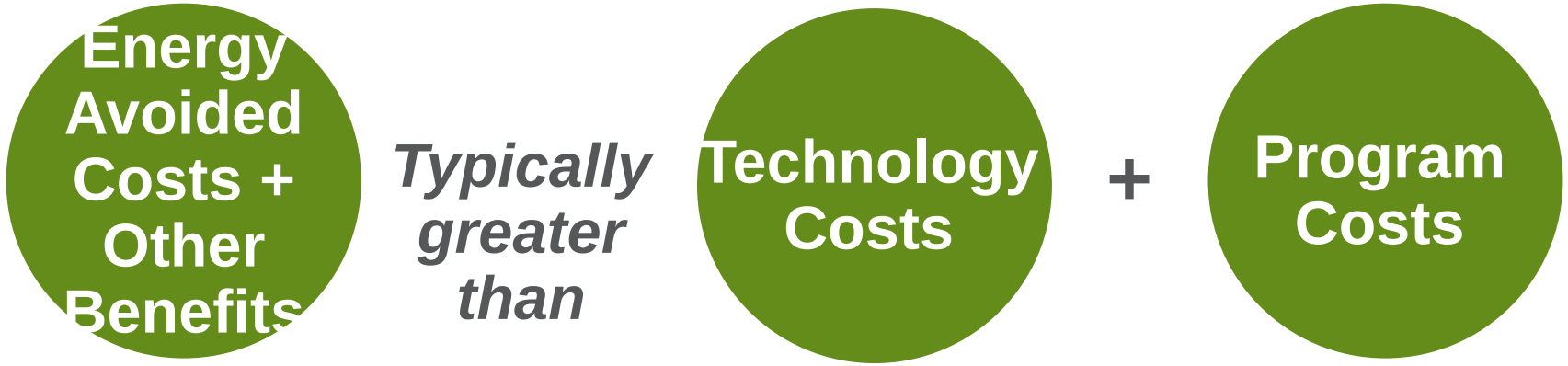
CARBON-CENTRIC PROGRAM DESIGN

Design for cost-effective lifetime emissions reductions



$$\$/tCO_2e\ (program\ abatement\ cost) = \frac{PV(Program\ Administrator\ Costs)}{Lifetime\ Emissions\ Reductions}$$

BENEFITS FOR ALBERTANS



$$\$/tCO_2e\ (societal\ abatement\ cost) = \frac{PV(Technology\ Costs + Program\ Administrator\ Costs - Avoided\ Costs*)}{Lifetime\ Emissions\ Reductions}$$

*** Only gas avoided costs includes the market price of carbon. A different mechanism is used for carbon pricing in the electricity sector.**

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MEASURE LEVEL
SOCIETAL ABATEMENT COST VS. TOTAL RESOURCE COST TEST

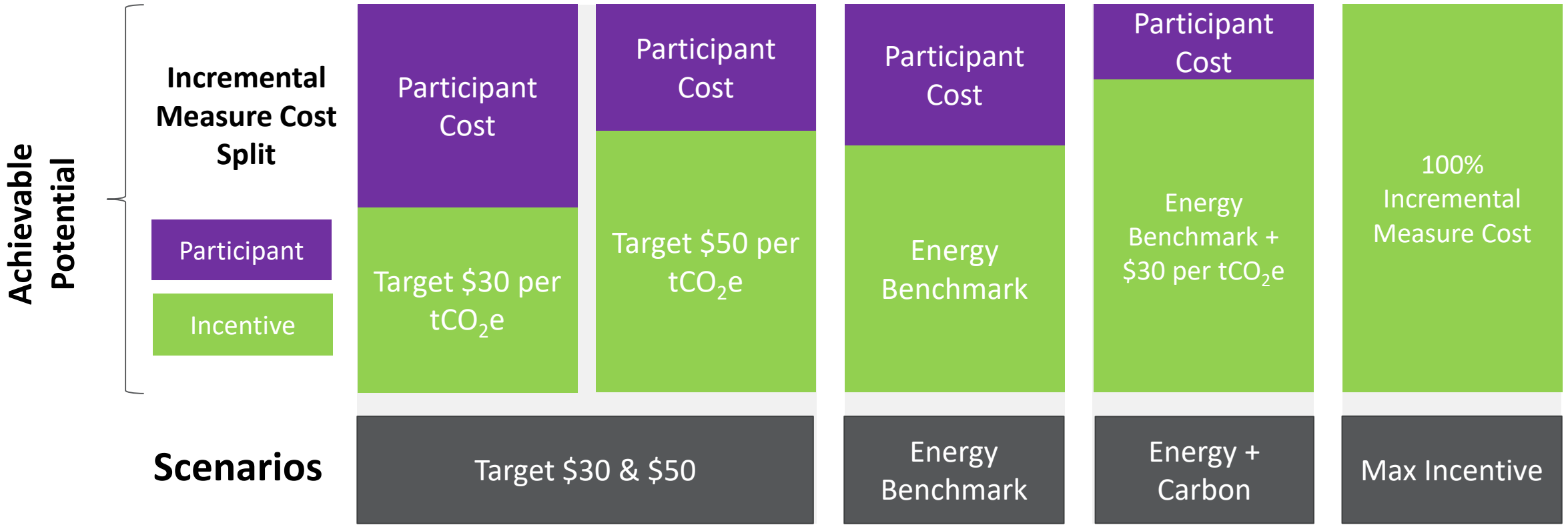
- *Economic potential included all measures that passed the TRC (0.85) or exceeded the abatement cost threshold ($/ton)*
- Societal abatement cost test passes more measures for electric, but fewer for gas
- Carbon intensity of electric grid **decreases over time**, however, carbon emissions from natural gas (i.e. emissions factor) is constant

Indicator Type	Screening	
Cost test	Societal ($/tCO$_2$e)	TRC
Carbon price	Market rate	
Discount rate	Societal discount rate	
Uses to assess performance	EEA's mandate (GHG emissions reduction)	Total investment

$$TRC = \frac{PV(Avoided\ Costs + Externalties)}{PV(Technology\ Cost)}$$

$$Societal\ [\$/tCO2e] = \frac{PV(Technology\ Costs - Avoided\ Costs)}{Lifetime\ Emissions\ Reductions}$$

SCENARIOS



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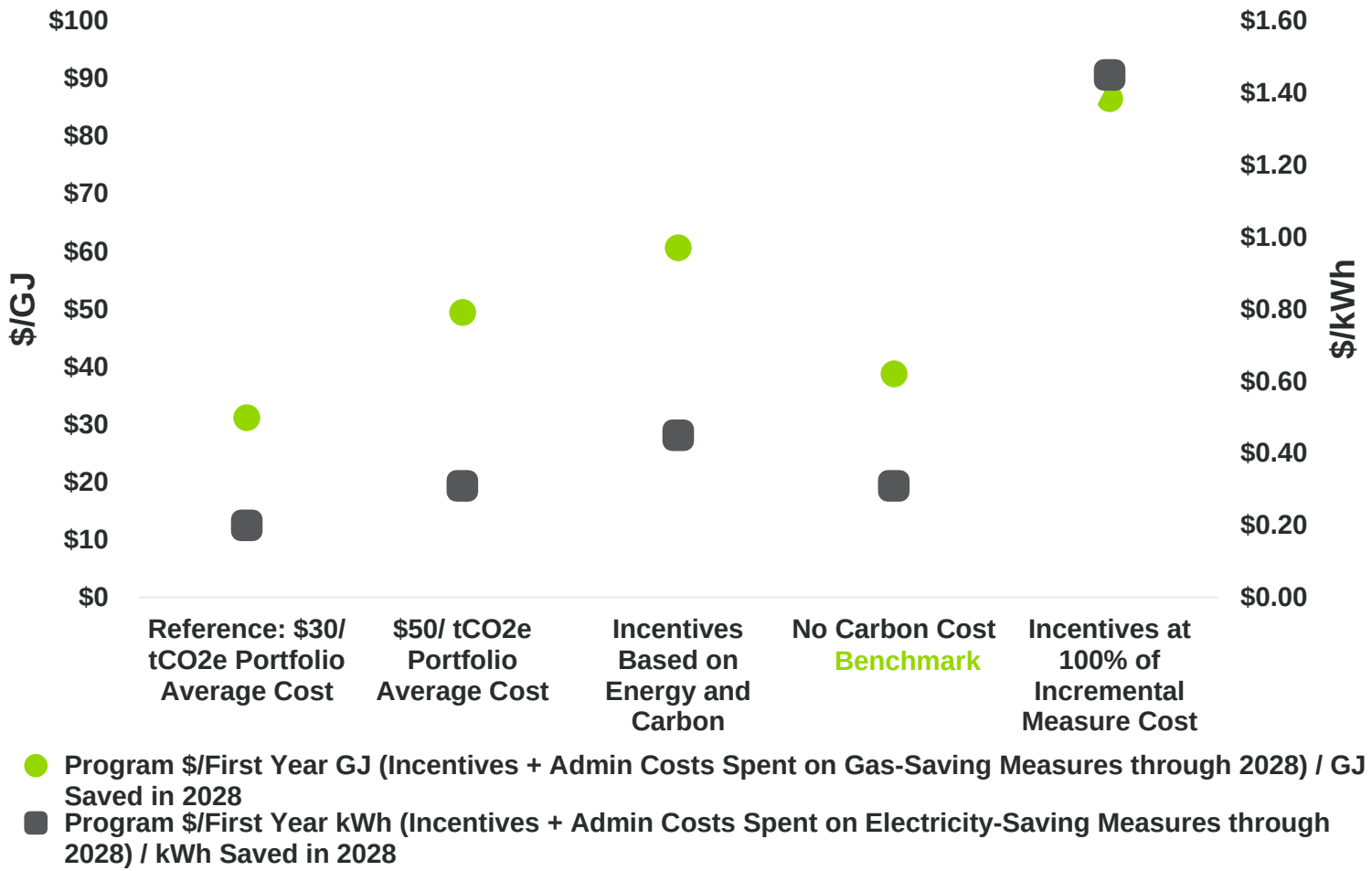
KEY FINDINGS

- Program abatement cost (carbon price floor) - $30/tCO2e
- Total cost of EE (Incremental Measure Costs + Admin Costs through 2038) / Lifetime Energy Saved
  - $30/lifetime tonne CO2e reduced
  - 2.4 ¢ / kWh (EE)
  - $3.88 / GJ (EE)
  - 5.5 ¢ / kWh (PV Solar)



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FUEL SWITCHING AND GENERATION TECHNOLOGIES

- Gas to electric fuel substitution is not cost effective with the TRC or societal abatement cost threshold
- Reasons include high electric avoided costs and lingering high carbon emissions intensity
- Potential analysis did include CHP only when it saves carbon on a lifecycle basis

LESSONS LEARNED

- Specific lessons for the Alberta Province
- Lessons beyond for Portfolio Planning and Potential Study Analysis

Choosing the Right Metric

- Sensitivities across metrics
- What is the appropriate threshold

Benchmarking

- Check that the results are meaningful
- Losing some previously cost-effective solutions

Future Proofing

- Beyond EE
  - DERs
  - Fuel Substitution
  - Other?
- GHG Abatement Goals

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