



Interim Results

# Rhode Island Carbon Pricing Study

Cadmus Group & Synapse Energy Economics, Inc.  
Friday, September 18<sup>th</sup>, 2020

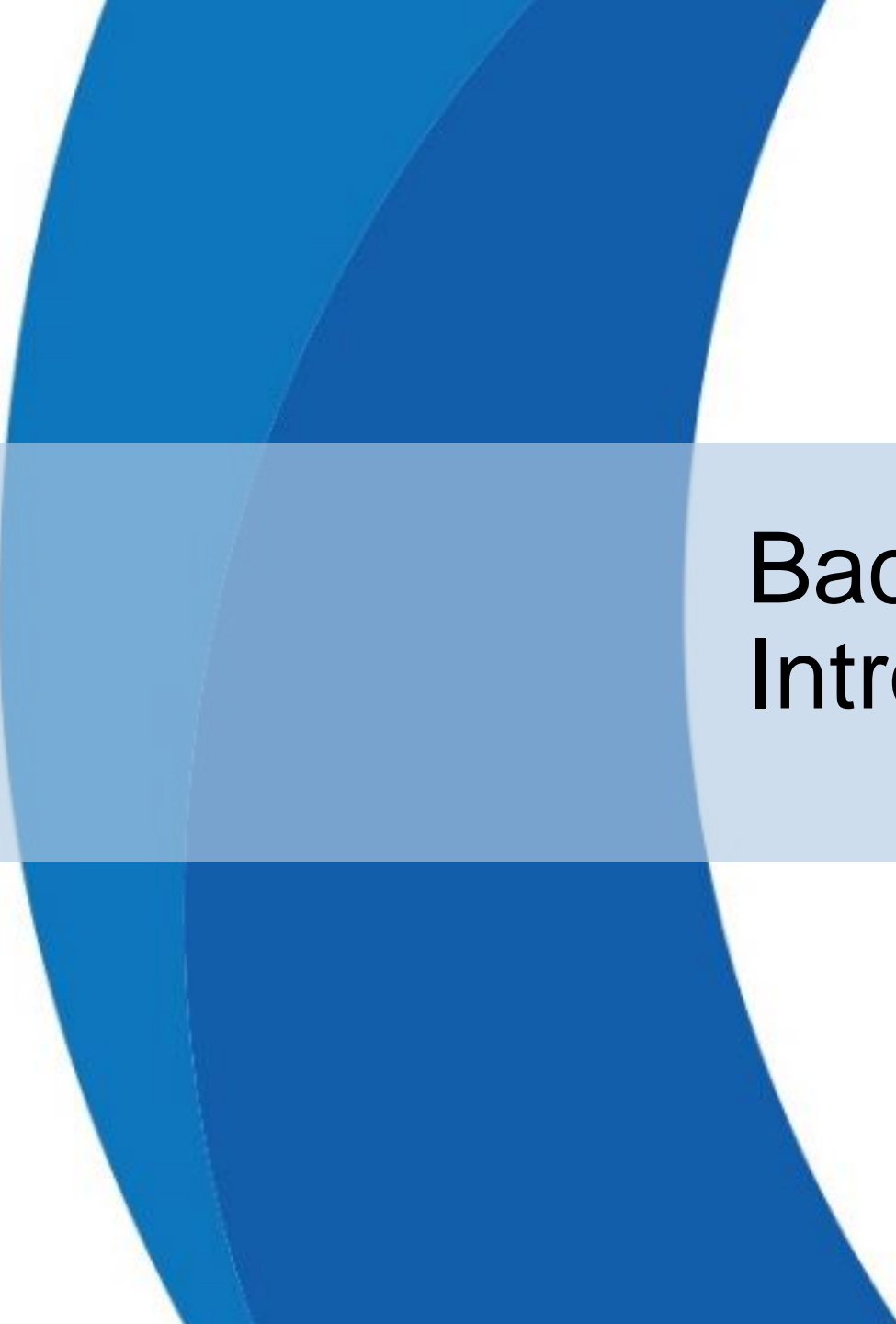


Synapse  
Energy Economics, Inc.

CADMUS

# Agenda

- Welcome, Background & Introductions
- Overview of Carbon Pricing Scenarios
- Initial Modeling Results
- Initial Policy Analysis and Stakeholder Engagement Findings
- Questions and Feedback



# Background & Introductions

# Project Overview

The purpose of this study is to provide an impartial assessment of potential state and regional carbon pricing policies. It is intended to inform (not set) policy design.

As context, the Resilient Rhode Island Act of 2014 created greenhouse gas (GHG) emissions reductions targets for at 45% below 1990 levels by 2035 and 80% below 1990 levels by 2050.

## Final Deliverables

A report and associated presentation that outline key findings from the policy analysis, modeling and stakeholder engagement.

Note that this study is conducted in the context of other related efforts in the State.

## Leading Agencies



## Consulting Support From

CADMUS



# Project Status

Tasks	Status	May	Jun	Jul	Aug	Sep	Oct	Nov
<b>Task 1. Project Management</b>	Ongoing							
<b>Task 2. Literature Review and Policy Selection</b>	Complete							
<b>Task 3. Policy Analysis</b>	In Progress							
<b>Task 4. Carbon Pricing and Economic Modeling</b>	In Progress							
<b>Task 5. Stakeholder and EC4 Engagement</b>	Ongoing							
<b>Task 6. Final Report and Public Presentations</b>	Not Yet Started							

# Today's Objectives

- Provide an update on project progress
- Share interim results
- Provide opportunity for initial feedback on findings to-date (via discussion today and comment period to follow)

# Poll: What organization do you represent?

- A. Private company or trade association
- B. Nonprofit or academic
- C. Government
- D. Individual
- E. Other

# What organization do you represent?

Poll Results (single answer required):







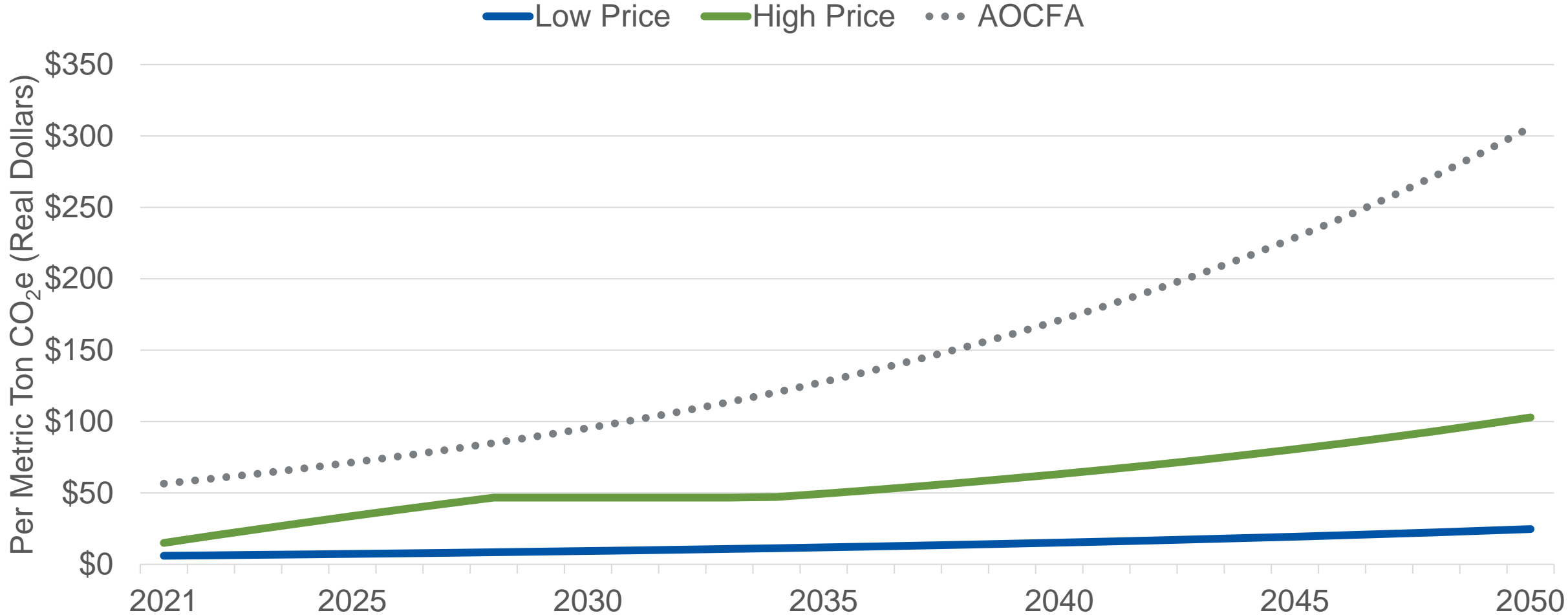
# Overview of Carbon Pricing Illustrative Cases

# Illustrative Cases Studied

- The study examines a baseline and five cases that explore several policy tradeoffs, including:
  - Level of the carbon price
  - Use of the revenue
  - Rebates

	Case	Carbon Price	Investment Focus	Rebates
1		(None/Low/High)	(Incentives / Public Services)	(Yes/No)
2				
3				
4				
5				
6				

# Illustrative Cases Studied | Price Levels



- Low price based on **Regional Greenhouse Gas Initiative (RGGI)**
- High price based on **Economic and Climate Resilience Act of 2019 (ECRA, known as Energize RI Act in previous years)**
- **American Opportunity Carbon Fee Act (AOCFA)** is a federal bill introduced by RI's Senator Whitehouse
- AOCFA was included for initial pricing-response analysis, but is not included in deeper impacts analysis

# Illustrative Cases Studied | Revenue Use

- In both price scenarios, the policy is expected to generate some amount of revenue.
- This study explores two primary uses of revenue, including:
  - **Investing the revenue in programs** that aim to reduce GHG emissions
  - **Returning the revenue in the form of rebates** to Rhode Island residents and businesses
  - **Administrative costs**
- In both the high and low pricing scenarios, the same amount of the revenue will be invested in programs that support GHG reductions.
- Rebate level will include all revenue not used for administrative cost or program investment
- Revenue use for each of the carbon pricing scenarios is outlined below:

	Low Price Scenario	High Price Scenario
Revenue Use	<ul style="list-style-type: none"><li>• Administrative costs</li><li>• Investment in programs</li></ul>	<ul style="list-style-type: none"><li>• Administrative costs</li><li>• Investment in programs</li><li>• Rebates</li></ul>

# Revenue Investment Options

		Incentives	Public Services
Transportation			
Building Thermal			

# Revenue Investment Options

		Incentives	Public Services
Transportation	Majority of Revenue	<ul style="list-style-type: none"> <li>Light duty electric vehicle incentives</li> </ul>	<ul style="list-style-type: none"> <li>Free transit fares</li> </ul>
	Remaining Revenue	<ul style="list-style-type: none"> <li>EV charger incentives</li> <li>Electric transit bus deployment</li> </ul>	<ul style="list-style-type: none"> <li>Transit bus service expansion</li> <li>Electric transit bus deployment</li> <li>Active transportation infrastructure (i.e. bike lanes)</li> </ul>
Building Thermal	Majority of Revenue	<ul style="list-style-type: none"> <li>Air- and ground-source heat pump incentives</li> </ul>	<ul style="list-style-type: none"> <li>Air- and ground-source heat pump installation and building weatherization for low-income residents and public buildings</li> </ul>
	Remaining Revenue	<ul style="list-style-type: none"> <li>Building weatherization</li> <li>Heating/cooling billpay assistance</li> </ul>	<ul style="list-style-type: none"> <li>Heating/cooling billpay assistance</li> </ul>

# Illustrative Cases Studied

	Case	Carbon Price	Investment Focus	Rebates
1	Baseline	None	N/A	No
2	Low Price Alone	Low	N/A	No
3	Low + Incentives	Low	Incentives	No
4	Low + Public Services	Low	Public Services	No
5	High + Incentives	High	Incentives	Yes
6	High + 2x Incentives	High	Double Incentives	Yes*

\*The rebate will be smaller in this scenario because investment is higher.

- Study structure designed to illustrate impacts of each change, not to develop or propose any particular policy
- Sector-specific results include emissions directly from each sector and do not include emissions associated with electric power generation



# Clarifying Questions

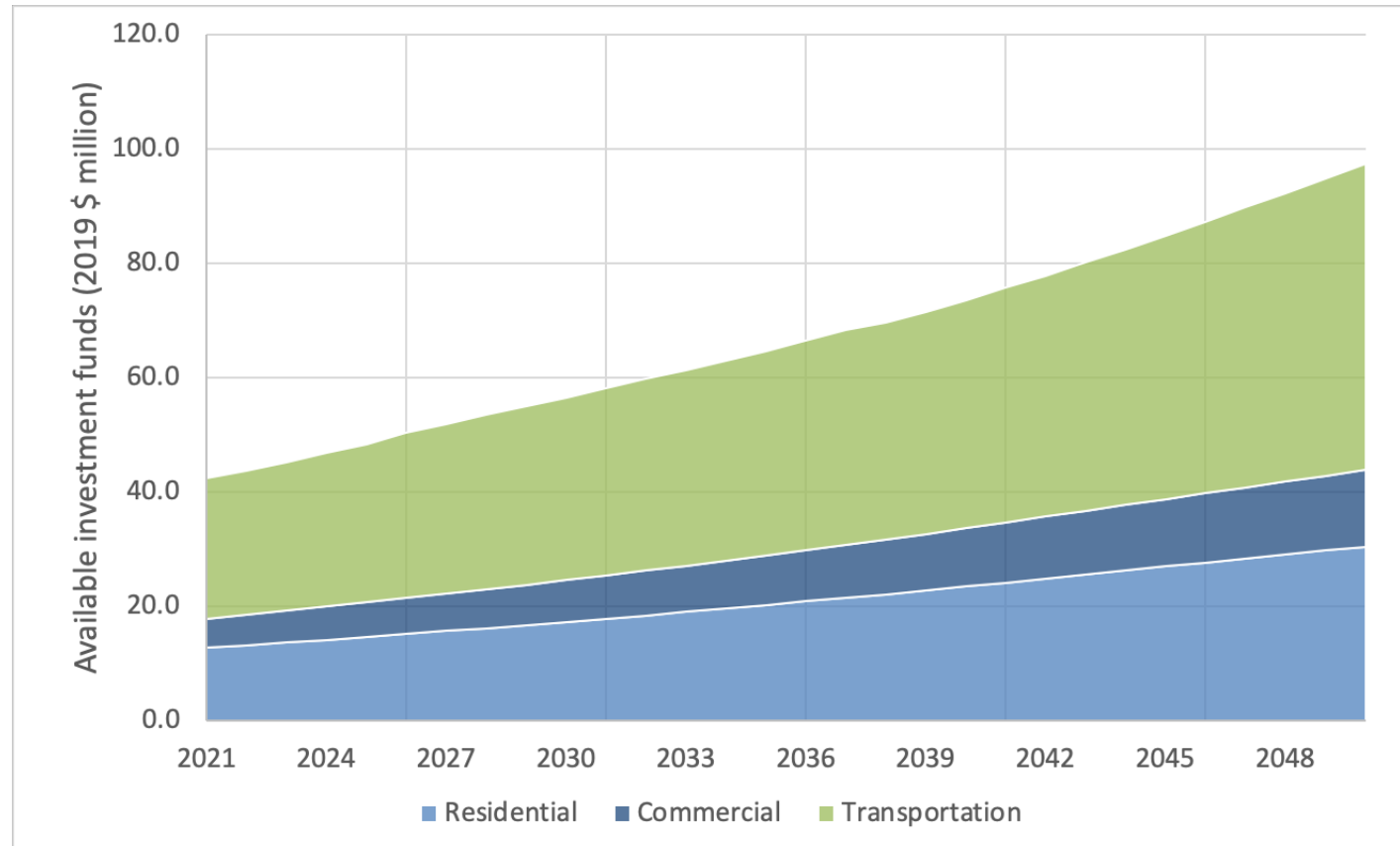




# Early Modeling Results

# Revenues from Low Carbon Price

- Used to fund investments, allocated by sector according to their contributions



# Evaluating an Alternate High Carbon Price

- In addition to the ECRA-2019-based high price we adopted for further modeling, we also looked briefly at a case based on the American Opportunity Carbon Fee Act (Federal legislation), *without* coupled investments
  - AOCFA price starts at \$52/ton and rises 6%/year above inflation
- This table shows results based on consumer price elasticities in addition to sustained policies:

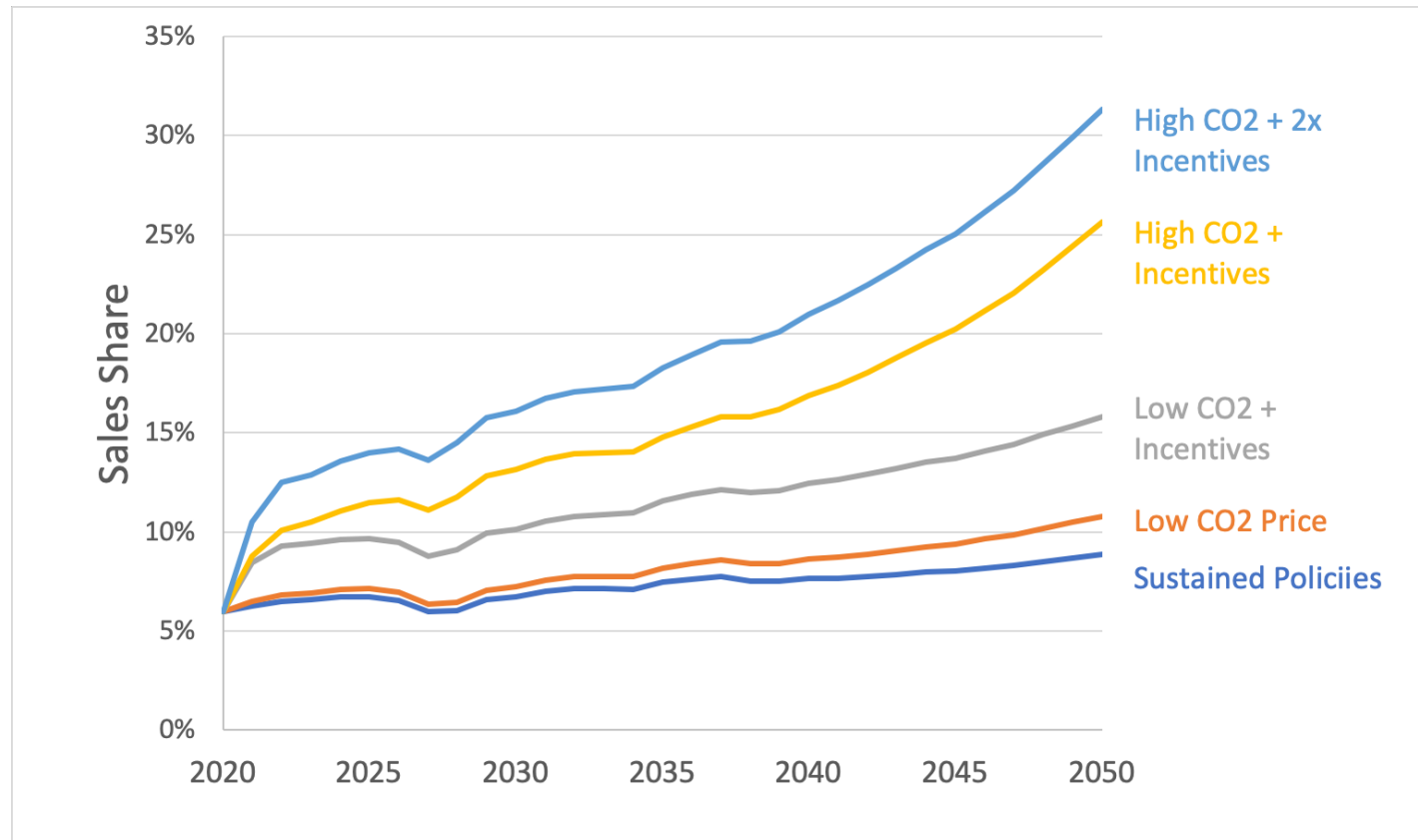
Year	Price trajectory	Price (2019 \$/metric ton)	Emissions (MMTCO <sub>2</sub> )	Emissions reductions below 1990 levels
2030	Low	\$9	6.6	45%
	ECRA 2019	\$50	6.2	48%
	AOCFA	\$88	5.9	51%
2050	Low	\$25	5.2	57%
	ECRA 2019	\$103	4.7	61%
	AOCFA	\$282	3.5	71%



Buildings

# Price and Incentive Impacts on Market Adoption of Heat Pumps

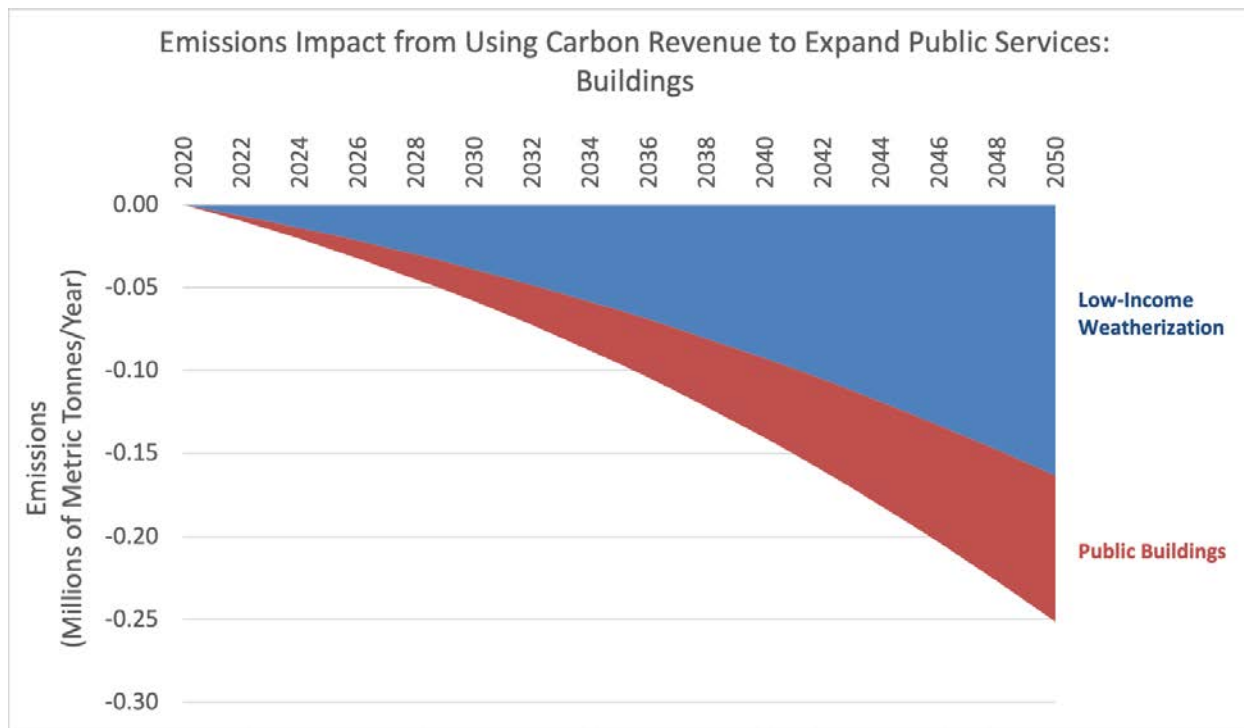
- Illustrative results for residential heat pump adoption in homes with forced air heat and access to natural gas:



- Also modeled for homes with boilers and using delivered fuels
- Also modeled for residential water heaters and commercial space and water heating

# Public Services Investments

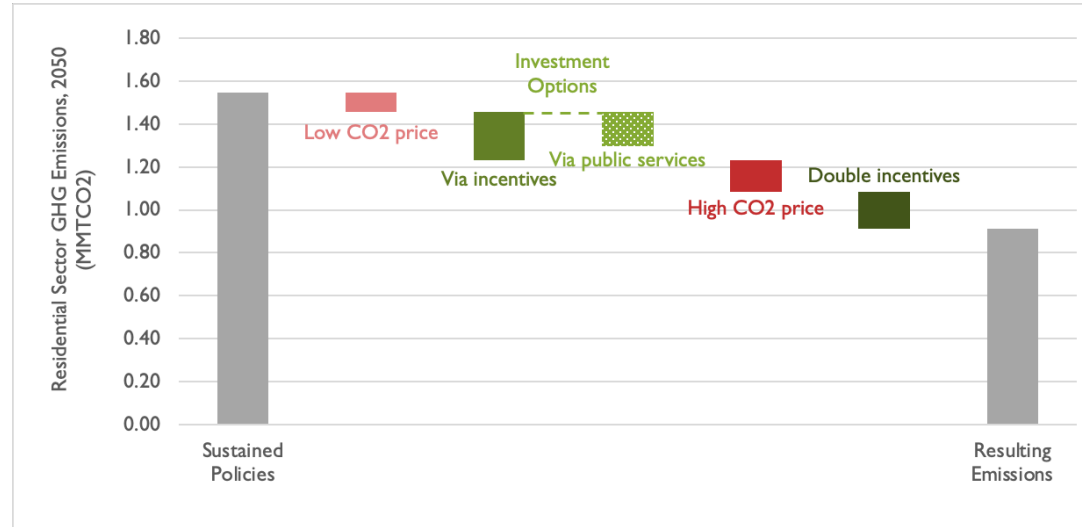
- 75% of revenues used for weatherization and heat pump installations
- Residential portion: Low-income weatherization w/ no-cost HP installation
- Commercial portion: Public buildings weatherization and HPs (schools, municipal buildings, state buildings, etc.)



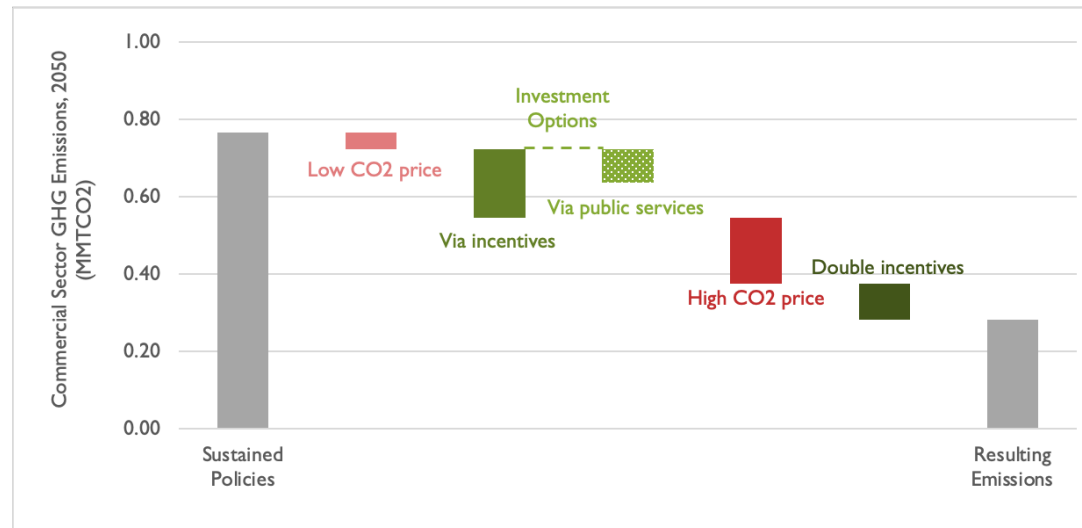
*For context: Total building emissions today are about 3 million MT/year, so by 2050 this is about a 10-15% reduction from the baseline.*

# 2050 Building Emissions Waterfalls

Residential:



Commercial:



# Buildings-Sector Insights from Modeling

- Commercial sector is more sensitive to fuel prices as the carbon prices get higher, while residential is (relatively) more responsive to upfront costs
- Investment in low-income weatherization and public buildings can reduce emissions about half as much as incentives
  - All participants in public-service programs assumed to be additional, whereas in the incentive case there are some free riders
  - Assumed economies of scale from coordinated programs

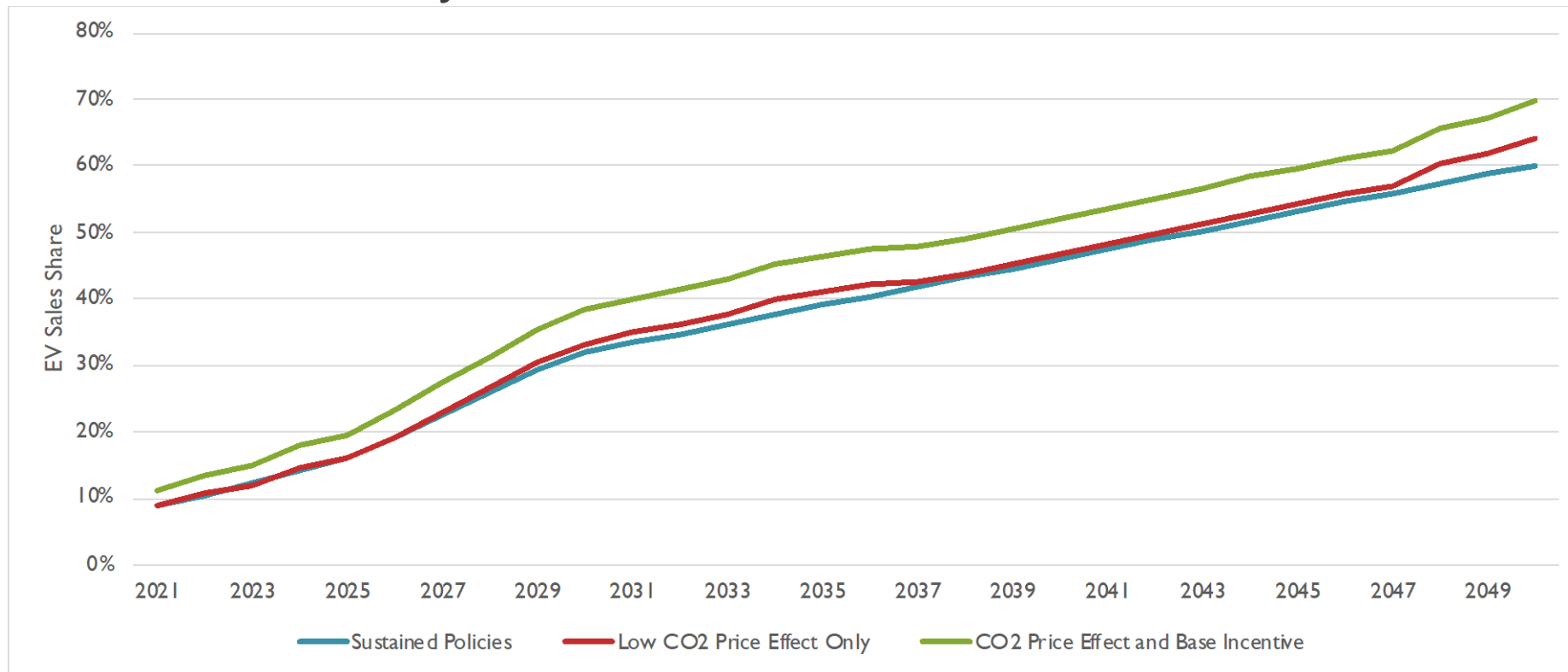




Transportation

# Price and Incentive Impacts on Market Adoption of Electric Vehicles

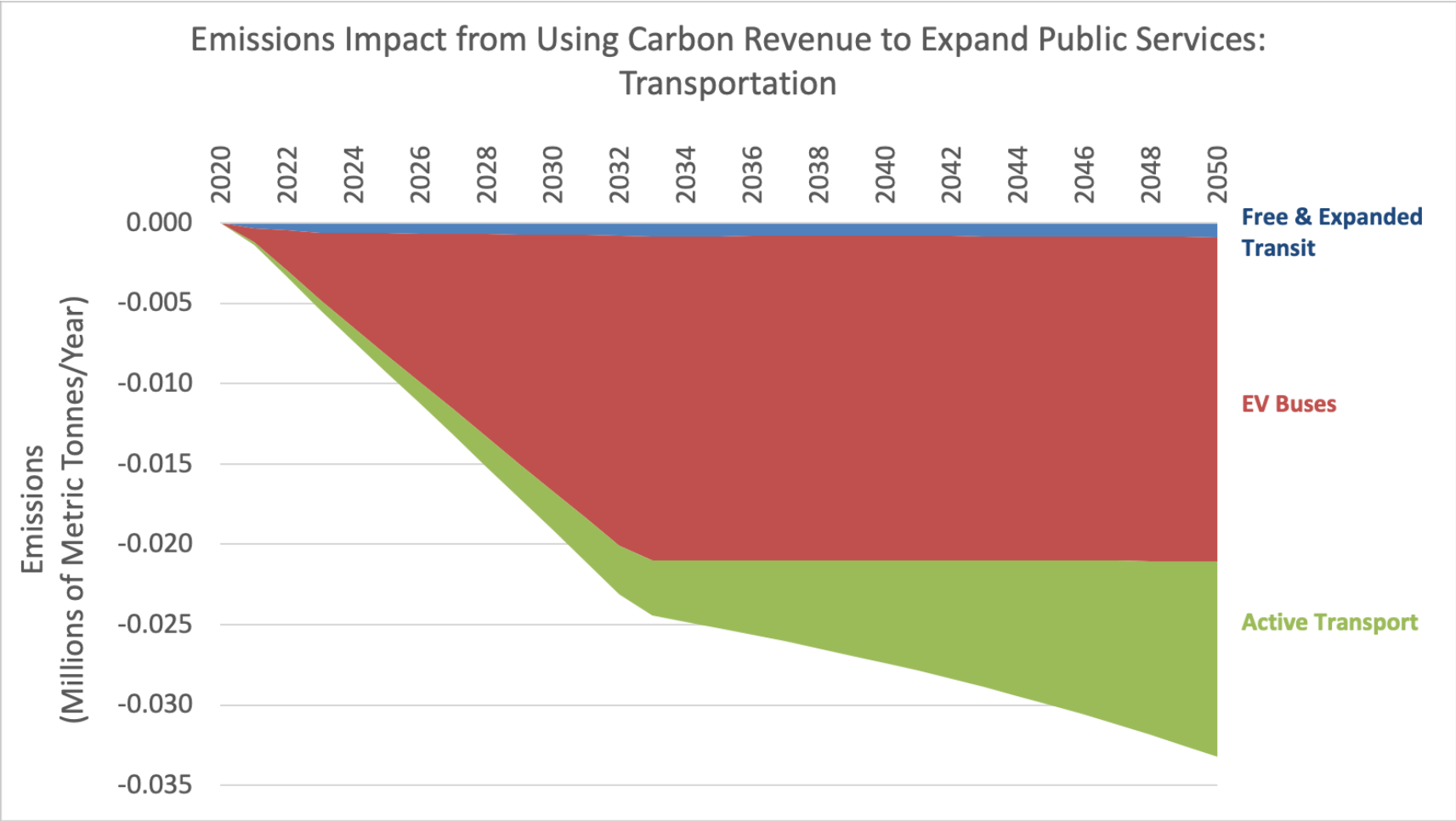
- EV incentives ~\$1300 in the baseline incentive case
- EV sales share results by case:



# Public Services Investments

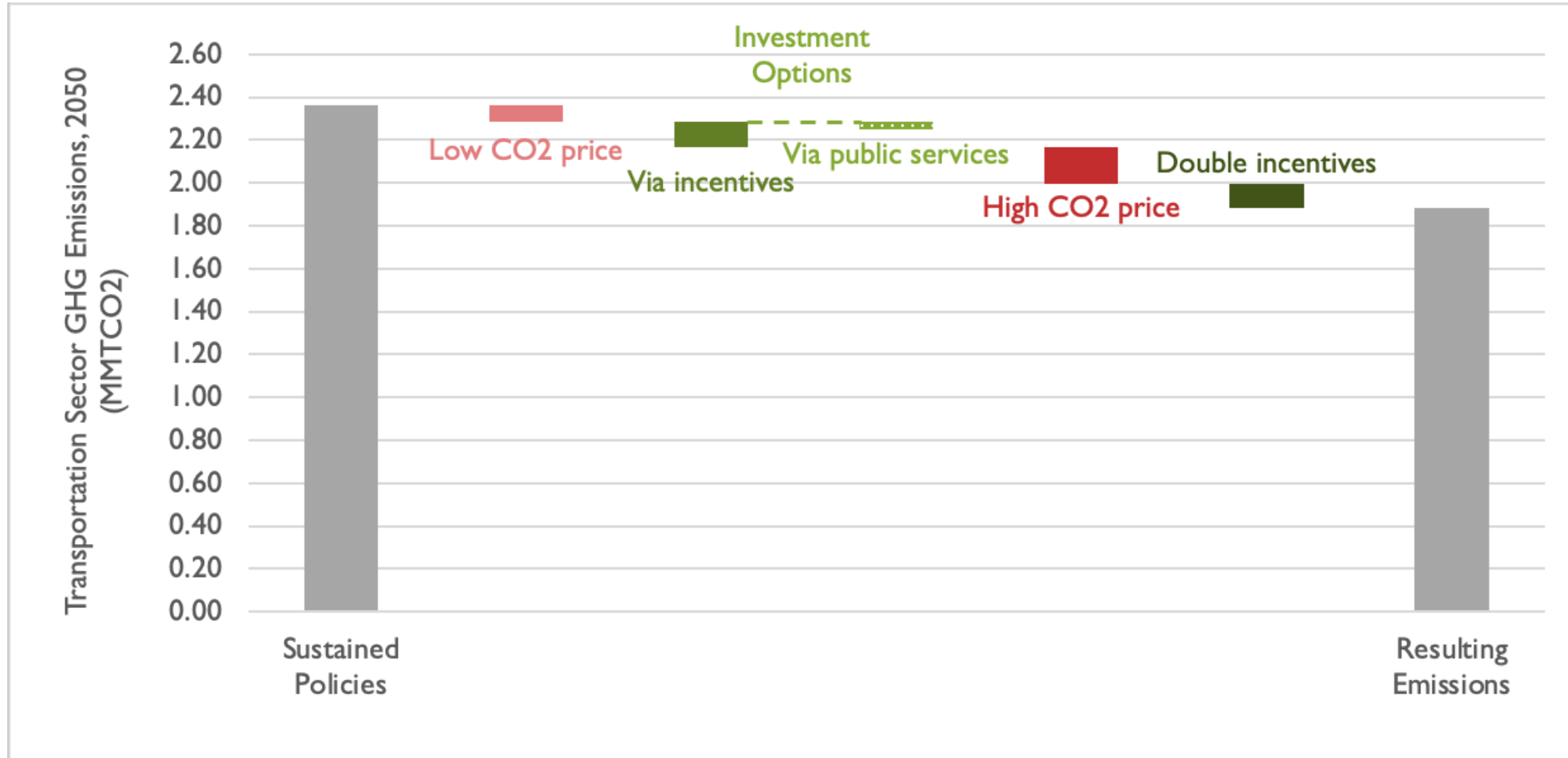
- Replace 240 buses over 12 years (20/year), plus incremental growth to meet system expansion
  - Requires about 5% of total revenues over 30 years, but higher portion in the 12 years
- Eliminate all passenger fares on RI transit (not MBTA) – about \$12 million/year
- Remainder (other than 5% for admin costs) split between expanding transit service and active transport

# Public Services Investment Impacts



*Note that the vertical scale is 10x smaller here than for public services in buildings.*

# 2050 Transportation Emissions Waterfall



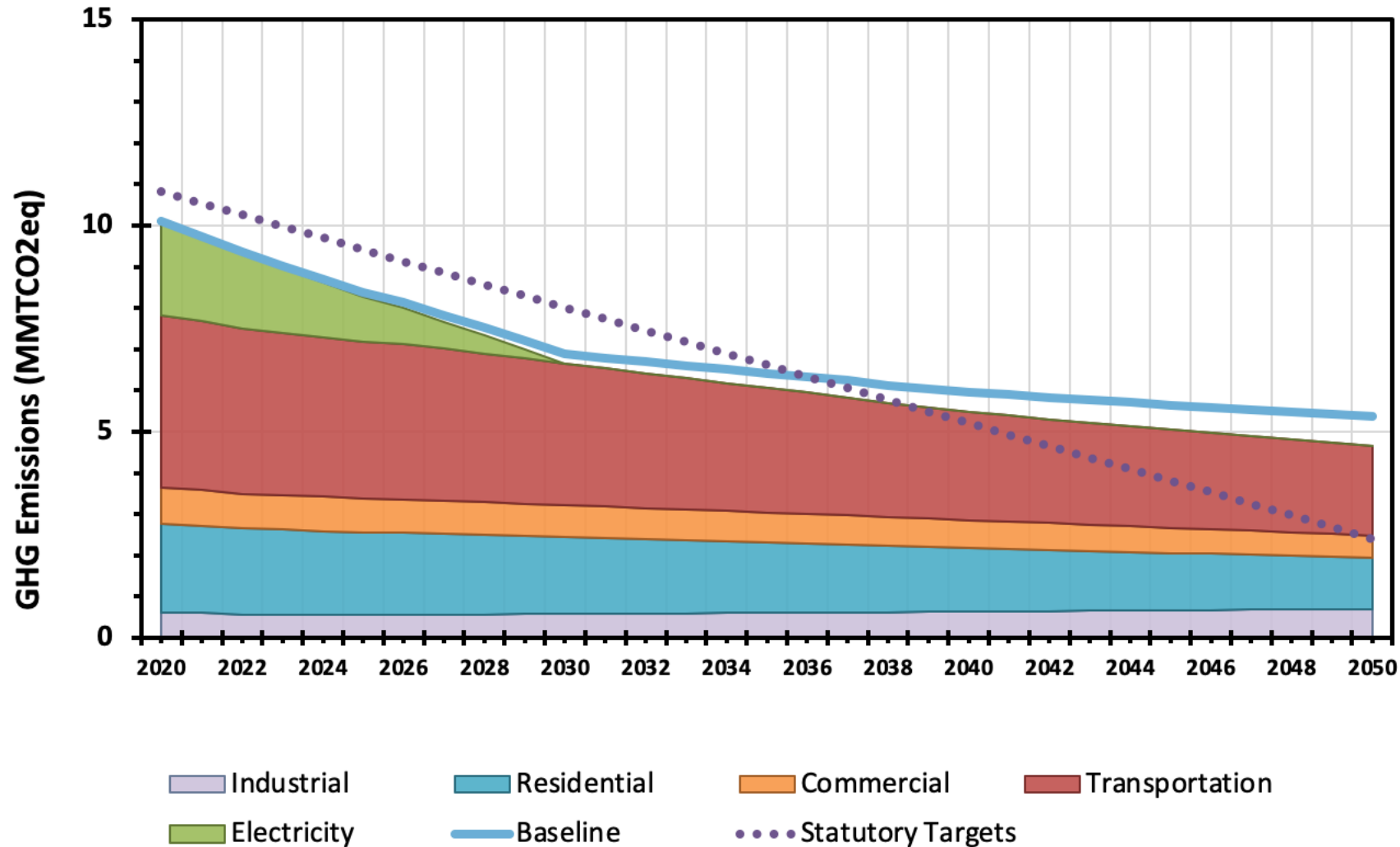
# Transportation-Sector Insights from Modeling

- EV uptake is relatively large even in the sustained policies case, driven by falling EV prices (calibrated to TCI modeling)
- Using revenue to pay for operating costs (e.g., transit fare elimination) is less impactful on cumulative emissions than using revenue to fund changes in capital stock (e.g., EV buses)



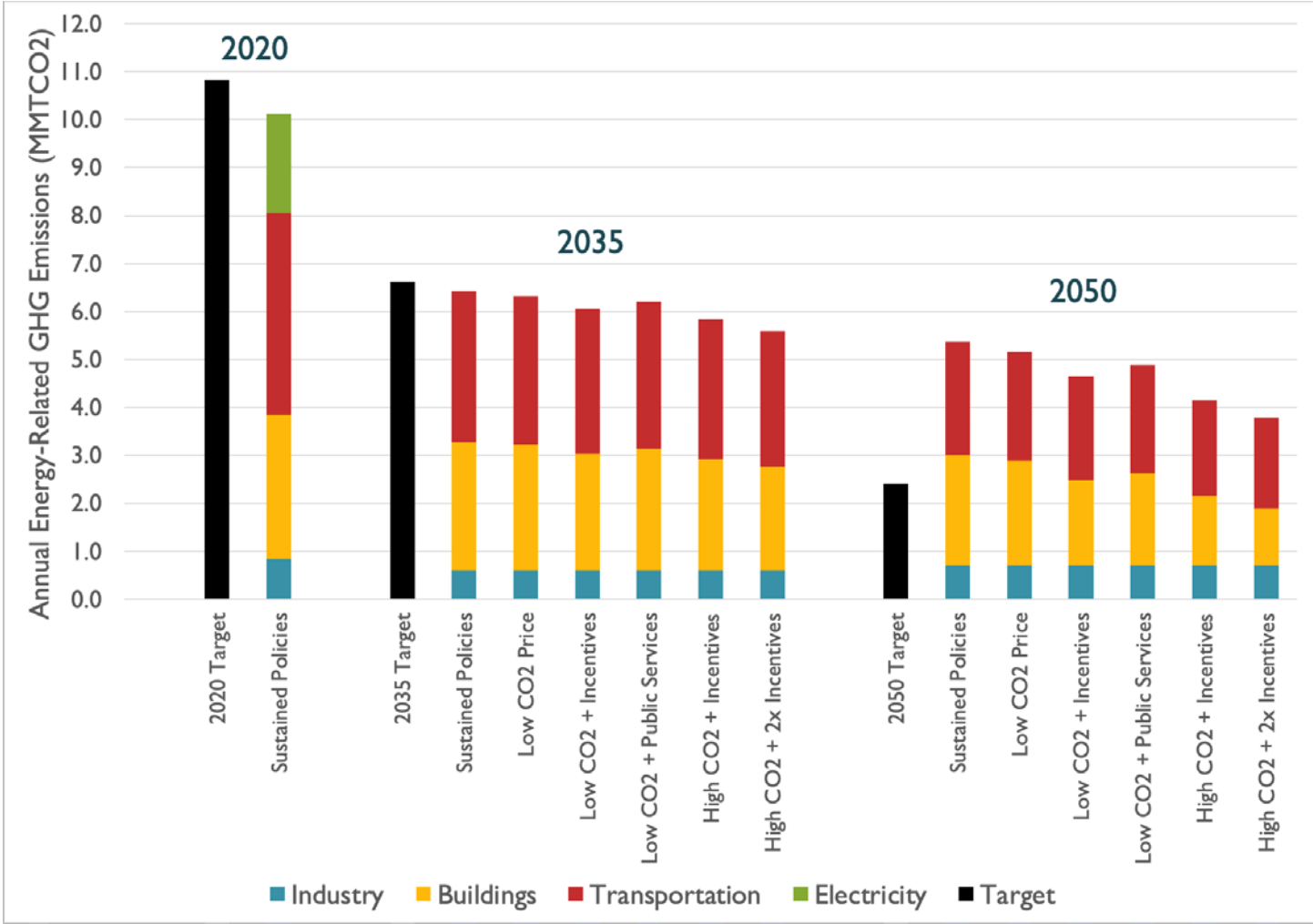
# Aggregate Emissions Results

# Illustrative Annual Results: Low Carbon Price with Incentive Investments





# Emissions in Milestone Years



# Insights from Modeling (Cross-Sector)

- 2050 GHG target would likely require substantial additional complementary policies, even in a high carbon price case
- Electric RPS to 100 percent has a transformative effect on achieving the 2035 GHG target
- Transportation is much less elastic with respect to fuel price than buildings
  - Historical \$1/gallon changes in gasoline price have not driven large changes in behavior
- Stock-turnover dynamics mean that changes in market share take time to turn into changes in emissions
  - Policies that favor near-term changes in market share for low-carbon technologies are likely to have a larger emissions impact in 2035 or 2050, all other things being equal

# Next Steps in Modeling

- We are still refining our energy modeling (for example we do not yet capture charging station impacts on EV adoption)
- Economic impacts
  - Aggregate and household-level impacts
  - Note: we expect aggregate effects to be small in all cases
- Health impacts



# Clarifying Questions



# Stakeholder Engagement- Initial Findings

# Stakeholder Engagement | Overview

- To inform the policy analysis and ensure the final report reflects stakeholder perspective, Cadmus conducted several stakeholder engagement efforts, including:
  - **Equity Interviews** with four representative stakeholders identified with input from the RI Team
  - **Sector-Specific Focus Groups** with key representatives of the Rhode Island building thermal and transportation sectors
- The final report will integrate results from the policy analysis and stakeholder engagement with the modeling

# A Carbon Price Would Complement Existing Initiatives

- There are several **existing policies, programs, and initiatives** in both the transportation and building thermal sectors that are seeking to **reduce GHG emissions** (see table for some examples)
- Prices would build on the success of RGGI

Transportation	Building Thermal
Transportation and Climate Initiative	Heating Sector Transformation Study
ZEV Mandate	RI Weatherization Assistance Program
VW Settlement Investment	National Grid Energy Efficiency Programs
Advanced Clean Trucks Rule	Efficient Buildings Fund
	PACE Financing
	Weatherization Assistance Program

# Complementary Actions Are Necessary

- Carbon pricing **alone is not adequate** to achieve decarbonization goals
- **Additional** actions will be needed to complement carbon pricing
- The same is true of **investments**
- **Education and outreach** is key to ensuring the success of programs
  - Decarbonization relies on end use **customer choices**



# Wider Geographic Scope Would Lead to Greater Success

- Operating at a regional scale helps make it more **politically palatable**
- RGGI program has **wide geographic scope** and has been **successful**
  - New states still joining
- Emission reductions can occur at **lower cost**
- Administrative costs can be **shared**
- **Prevents** leakage

# Equity Needs to be a Conscious Design Choice

- Carbon prices are inherently **regressive**, unless intentional policy design choices are made such as careful revenue reinvestment
- Low income households spend a **higher portion** of their income on energy
  - They will be disproportionately impacted
- Equitability of a program depends on the **use of the revenue**
- Low income households could see a **net gain** in income with a rebate
- **Programs** can be used to improve equitability

# Spectrum of Views on Carbon Pricing and Political Context

- Some groups **have been consistently opposed** to carbon pricing policies in RI
- Certain industries need to balance environmental priorities with **practicality** (e.g. trucking)
- Challenges of pursuing a carbon price in **political** arena
- **Costs** are more **transparent** than other policies
- Some stakeholders voiced reservations about **whether the funds will be used in an equitable and targeted fashion**
- Some stakeholders view a carbon price as a non-essential approach **that could reduce focus on** from important work of deeply transforming energy system
- Some stakeholders are concerned about potential for emitters to **pass on costs** to consumers

# How the Revenue Could Best Support Frontline Communities

- Most interviewees saw value in returning revenue to communities in the form of a rebate and/or through programmatic offerings, with a slight **preference for rebates**.
- When discussing revenue use, most interviewees emphasized several key takeaways, including:
  - The revenue should be used in a way that will **benefit local communities** and economies
  - **Communities should be involved** in the process of determining how the revenue is used
  - The revenue should be used in ways that connect to **supporting existing needs**



# Clarifying Questions



# Next Steps

# Next Steps

- Receive stakeholder comments through October 1st (via email as on next slide)
- Carry out next steps in modeling (refining modeling, conducting economic and health impact analysis)
- Based on final model inputs, and stakeholder feedback and research, complete synthesizing policy analysis and complete report by early November

# We Welcome Your Input

Please send your feedback to:

- **Chris Kearns**, *of the Rhode Island Office of Energy Resources*  
([christopher.kearns@energy.ri.gov](mailto:christopher.kearns@energy.ri.gov));

Please submit your feedback and questions by **Thursday, October 1st.**

Thanks!





# Questions?

CADMUS

# Thank You

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