RI 2025 Climate Action Strategy and CCAP

Energy Efficiency Council (EEC) Full Council Committee Meeting

May 15th, 2025

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Energy+Environmental Economics

Agenda

- Introductions
- Project Overview and Status
- Overview of Modeling Approach
- Building Sector: Current Emissions and Inputs & Assumptions
- Building Sector: Role of Efficiency in Building Decarbonization Strategies
- Discussion
- Next Steps

Introductions

Energy and Environmental Economics (E3)

Tory Clark
Project Partner

Chelsea Petrenko
Project Lead

Molly Bertolacini
Project Manager

Rawley Loken
Technical Lead

Lighthouse Consulting Group

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Kyle McElroy
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BW Research Partnership

Cai Steger
Project Manager

Mitch Schirch
Modeling Specialist

Project Overview and Status

Energy+Environmental Economics

Project Goals

The overarching goal of this project is to create the RI Comprehensive Climate Action Plan (CCAP) for the Climate Pollution Reduction Grant (CPRG) program and the RI 2025 Climate Action Strategy as part of RI's Act on Climate

+ **The RI CCAP and RI 2025 Climate Action Strategy will consist of:**
  - Robust stakeholder engagement
  - GHG reduction measures modeling and sector-specific GHG target development
  - Policy, technology and cost analyses
  - Macroeconomic, workforce, climate resilience, and benefits analysis

+ **Key elements of each plan will include:**
  - Energy efficiency in buildings and transportation
  - Transition away from fossil fuel
  - Transition to renewable electric power
  - The removal of carbon from the air through land use and forest conservation
  - A just transition for workers
  - Considerations for energy affordability
  - Benefits to environmental justice and low-income and disadvantaged communities (LIDAC)

Topic Areas for Stakeholder Engagement

How will climate mitigation efforts affect jobs, workforce and businesses? How can RI ensure a just transition as the economy decarbonizes?

Workforce*

What are the most effective strategies to ensure the communities most affected by climate change benefit from GHG reduction measures?

EJ, equitable transition*

How does decarbonization in RI affect the electric sector? What role do electric and gas utilities play in reducing emissions?

Energy

Which subsectors are the biggest contributors to RI's emissions? What strategies should be prioritized to reduce transportation emissions?

Transportation

What is the role of municipalities in decarbonizing RI's economy?

Municipalities

What pathways for reducing building related emissions should be prioritized?

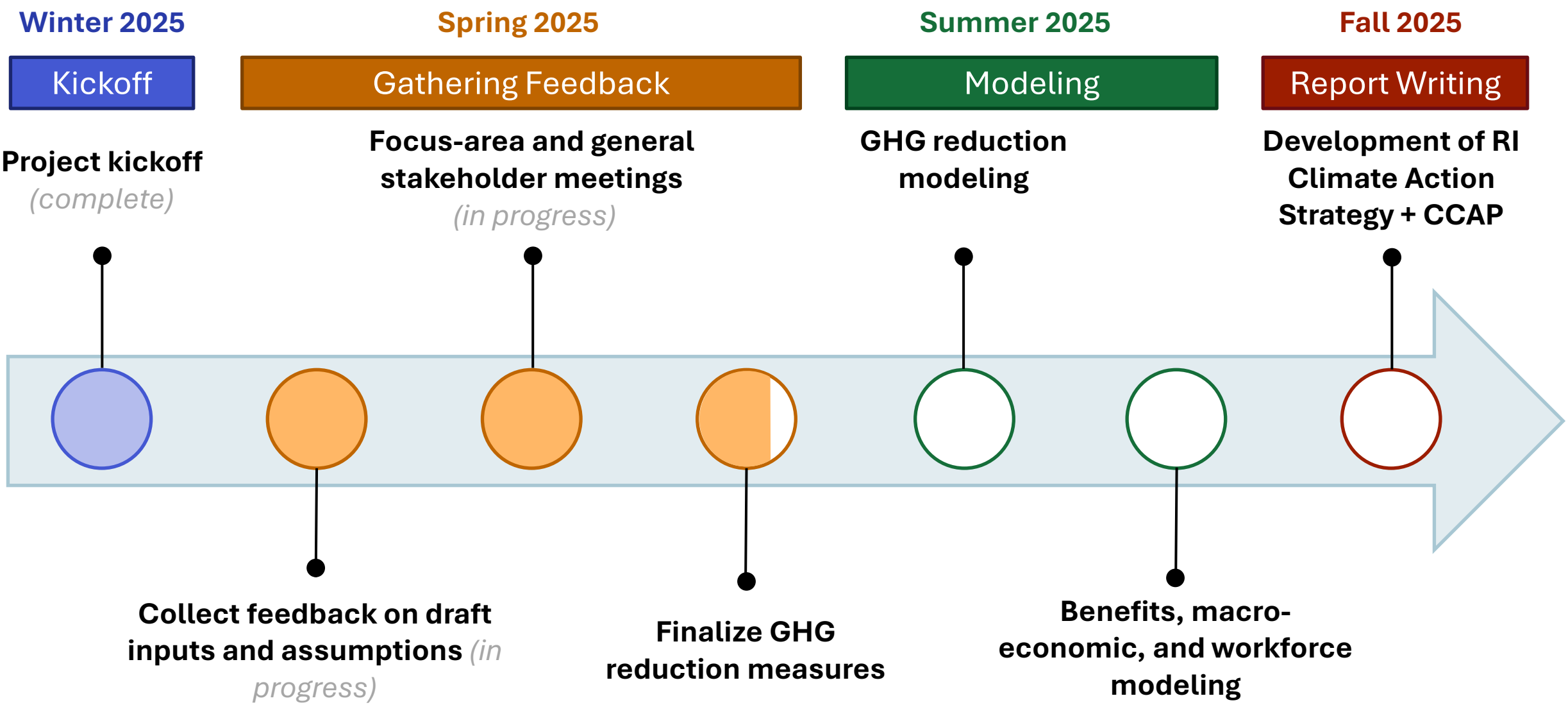
Buildings

* These topics will be infused throughout ALL conversations, but also will have their own sessions

Project Team Roles and Responsibilities

Lead organization >>	E3	BW Research	Lighthouse Consulting
Task 1: Define Model Inputs and Project Kickoff	✓		
Task 2: Public Engagement and Interagency Coordination			✓
Task 3: Deep Decarbonization Planning Analysis	✓		
Task 4: Macro-Economic, Workforce, and Benefits Analysis		✓	
Task 5 & 6: Plan development and rollout	✓		

Project Status and Timeline



Overview of Modeling Approach

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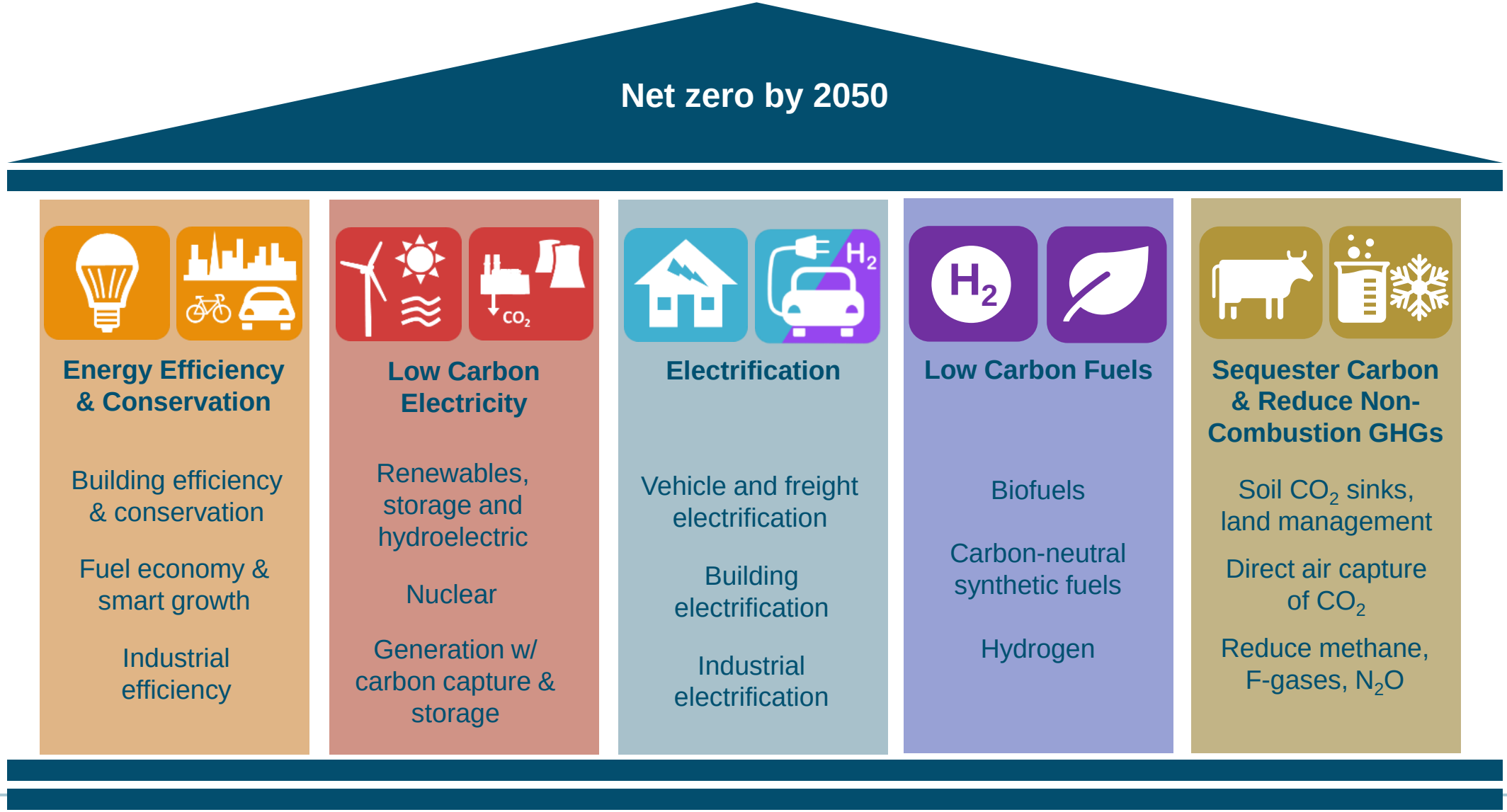
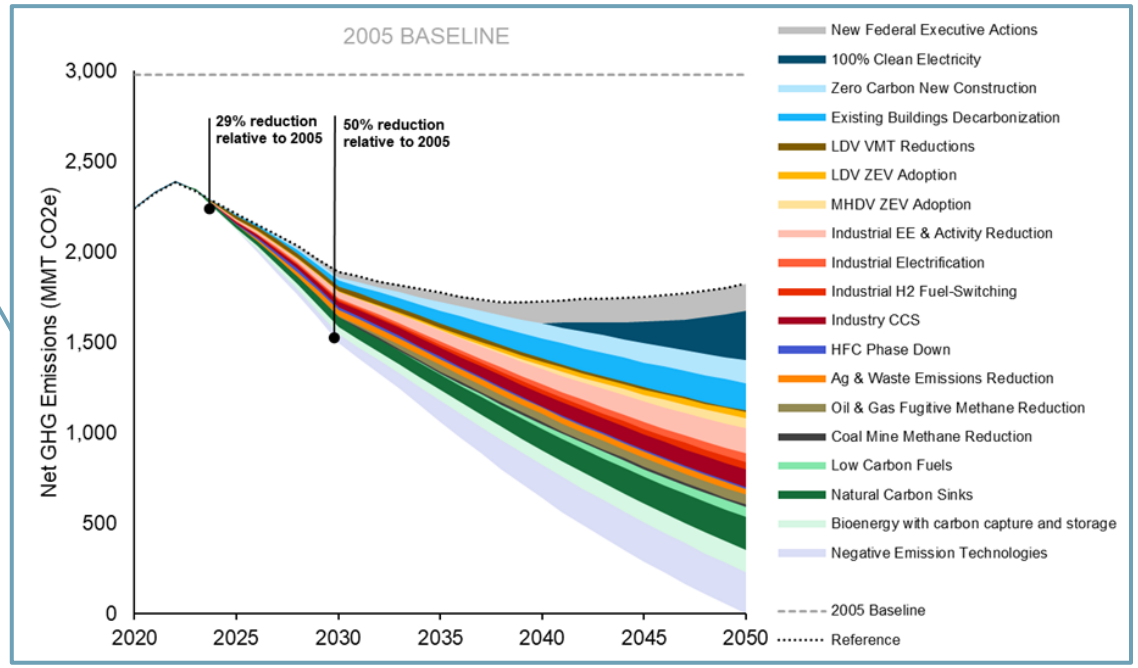
Pillars of Decarbonization Needed to Achieve Net Zero GHGs



RI Climate Action Strategy Analysis Components

- **List of strategies, programs, and actions to meet RI's economywide emissions reduction targets across all sectors, sources, and sinks**
- **Estimated GHG reductions from specific strategies**
- **Short-term and long-term emissions reduction projections and sectoral targets for at least two scenarios:**
  - Current policy scenario
  - Plan implementation scenario
- **Analysis of decarbonization benefits, including benefits for low-income and disadvantaged communities (LIDAC), such as improved air quality and job creation**
- **Analysis of authority to implement to determine the process and authority to implement the various GHG reduction strategies**
- **Analysis of available funding to explore existing funding available to support GHG reduction strategies**

Example Emissions Reduction Projection by Strategy*

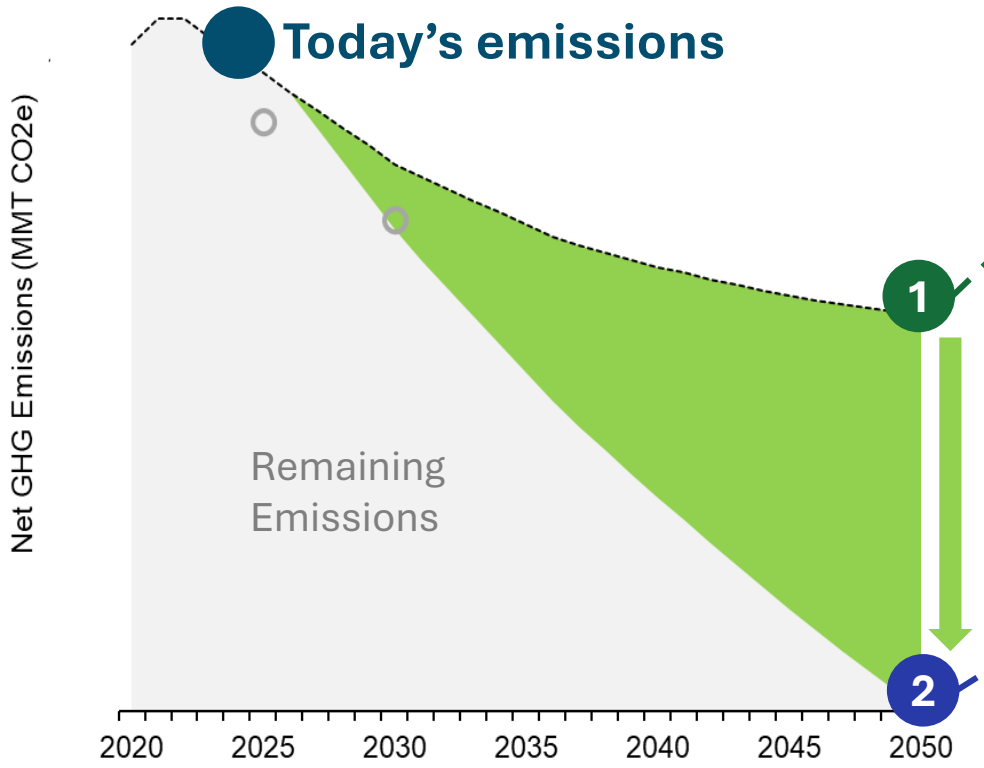


* GHG reduction strategies refer to discrete actions that reduce emissions, such as electric vehicle adoption, building electrification, etc.

Source: U.S. Climate Alliance, 2023 Annual Report, page 84

GHG Emissions Reduction Scenarios in the RI Climate Action Strategy

Illustrative Decarbonization Pathway



1. Current Policy Scenario

Near-term and long-term projections of GHG emissions in the absence of RI Climate Action Strategy/CCAP strategies.

2. Plan Implementation Scenario

Near-term and long-term projections of GHG emissions in a scenario where the CCAP is fully implemented. This scenario includes the proposed GHG reduction strategies.

Building Sector: Current Emissions and Inputs & Assumptions

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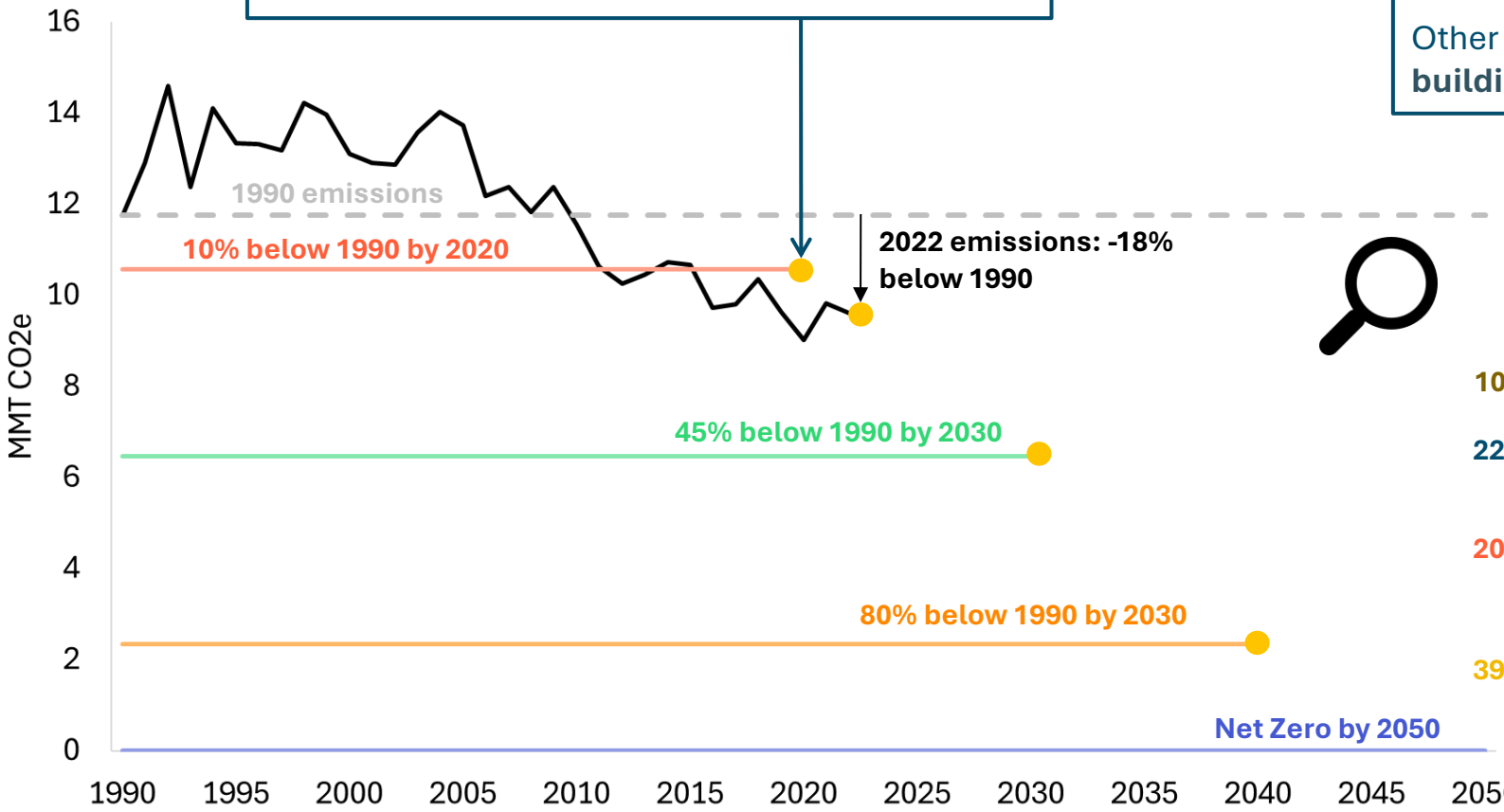
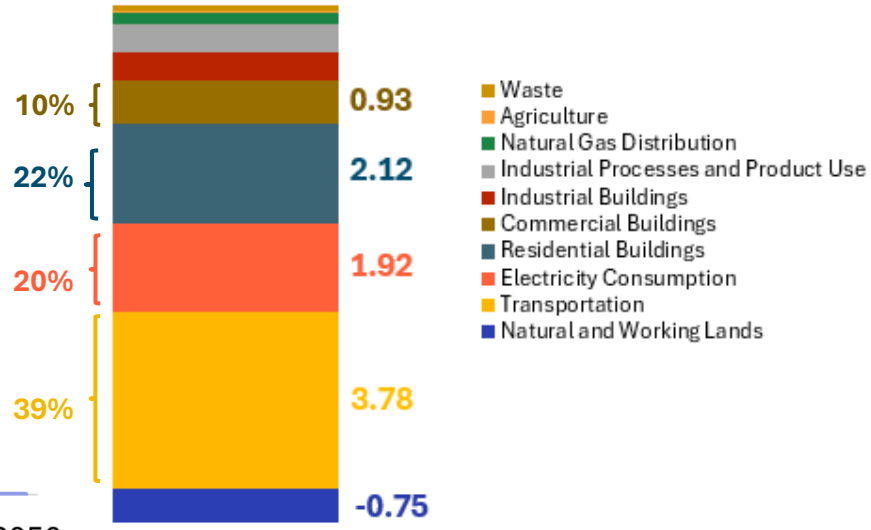
Current Greenhouse Gas Emissions in RI

Rhode Island has made significant progress in reducing in-state GHG emissions, and has met its 2020 mandate of 10% reduction from 1990 emissions levels



As of 2022, **transportation** is the largest source of Rhode Island's GHG emissions (nearly 40%) with the majority caused by driving passenger vehicles.

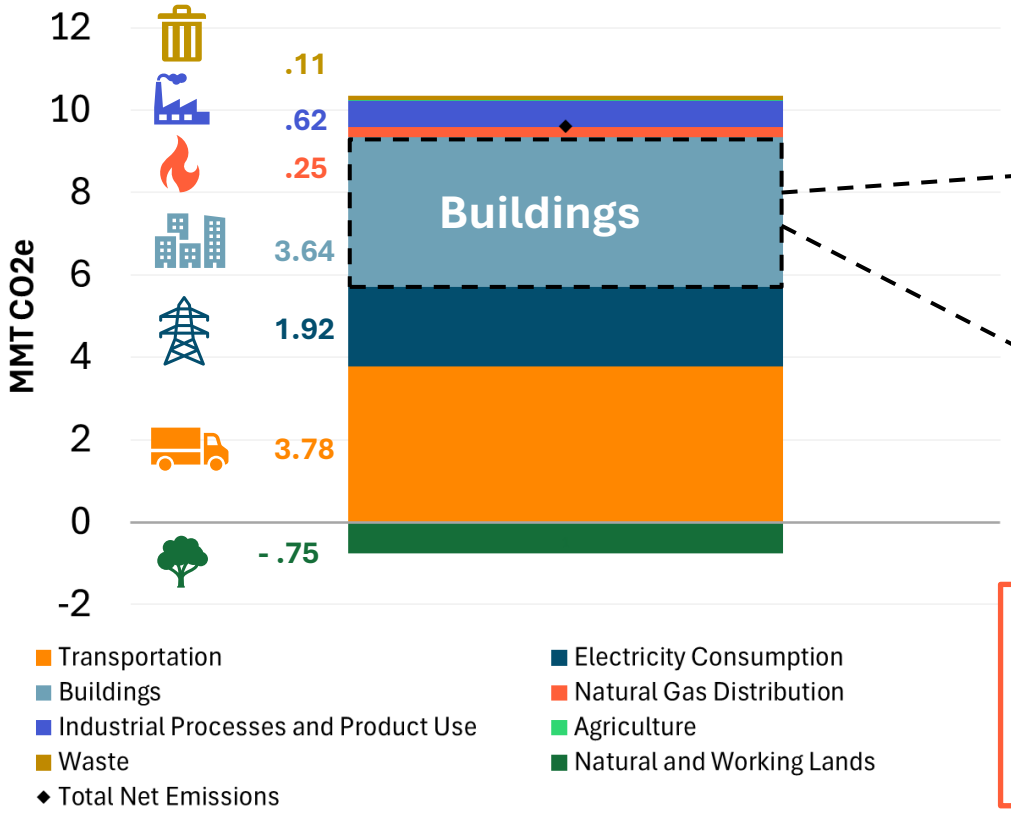
Other major contributors include **residential buildings** (22%) and **electricity consumption** (20%)



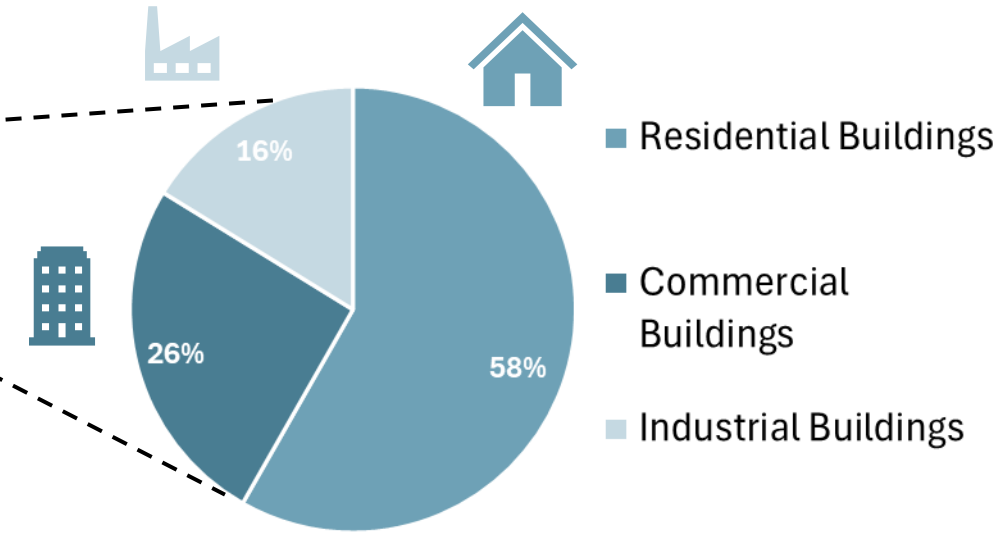
Buildings Emissions in RI

- RI emitted 10.4 MMT CO2e total greenhouse gas emissions in 2022, with the buildings sector contributing 35%
- Buildings emissions are primarily driven by fossil fuel combustion from space & water heating devices using natural gas and heating oil (84%), with the remainder coming from industrial fossil fuel combustion (16%)

RI Emissions in 2022 (MMT CO2e)



Buildings Emissions in 2022 (%)



50% of dwellings in Rhode Island are connected to the gas system for space heating, water heating, and cooking

25% of dwellings in Rhode Island use heating oil for space heating and water heating

Sources: RI 2022 Inventory

Major Greenhouse Gas (GHG) Modeling Inputs and Assumptions in the Buildings Sector*

Input	Updated Source
Housing Stock Characterization in Rhode Island	NREL ResStock Building Simulation for Rhode Island
Growth of Housing Stock in RI	RI Division of Statewide Planning
Device Costs and Efficiencies	• Clean Heat RI Program ***(for heat pump costs)*** • NREL ResStock ***(for heat pump efficiency)*** • NESCAUM 2024 HVAC market report for the Northeast and Mid-Atlantic ***(for other space heating costs)*** • Energy Information Administration (EIA) Updated Buildings Sector Appliance and Equipment Costs and Efficiency Appendix C ***(for costs and efficiencies of most devices)*** • EnergyWise Program data ***(for building shell cost and efficiency)***
Annual Energy Used per Household	EIA National Energy Modeling System (NEMS) and EIA Residential Energy Consumption Survey (RECS)
Commercial Square Footage	EIA Commercial Buildings Energy Consumption Survey (CBECS) and EIA State Energy Data System (SEDS)

* This list represents universal inputs for GHG modeling in PATHWAYS. The list does ***not*** include policy-specific inputs, such as assumptions around increased transit ridership as a result of a program/strategy

Key Takeaways from EEC Feedback via SmartComment Portal

Key Feedback and Questions	E3 Response and Next Steps
EEC and NV5 asked several questions about building device costs and efficiencies	E3 updated the model inputs spreadsheet to include direct links to source documentation, notes on which representative device from source documentation was used, and where values are direct inputs vs interpolations between years. Where applicable, values were updated to align with revised sources. For example, EEC had questions on **residential gas furnace maintenance costs**. E3 updated the model inputs spreadsheet to specify the page # from the EIA Updated Buildings Sector Appliance and Equipment Costs and Efficiency Appendix A (March 2023) where the data was found and updated the values to be consistent across all years (in real $), aligned with the typical 2022 annual maintenance costs for a gas furnace from the source documentation.
EEC and NV5 asked several questions about building shell costs	E3 collaborated with NV5 to incorporate RI-specific data on building shells, which has been added to the model. For example, the source for **residential building shell service demand changes and building shell costs** was previously Docket-22-01-NG E3 Technical Analysis Appendix B but updated to the RI EnergyWise Single Family Program and Rhode Island Energy's 2025 Energy Efficiency Plan, respectively, using data provided from NV5.

Building Sector:
Role of Efficiency in Building Decarbonization Strategies

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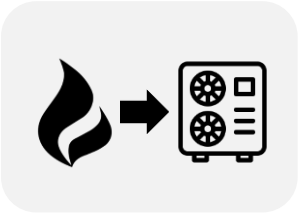
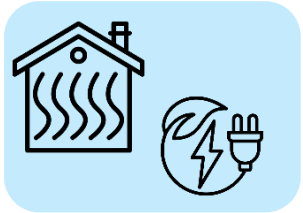
Building Decarbonization Pillars



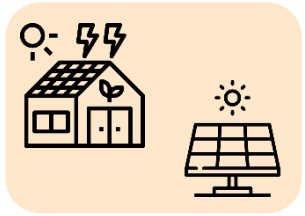
Electrify Buildings

- Replace gas and fuel oil-powered space and water heating equipment with **heat pumps**
- Replace fossil fuel – powered appliances with **all-electric appliances**
- Provide electric equipment **rebates** and incentives
- Pursue **rate design reform** to improve economics of heat pump adoption



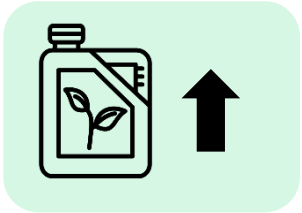
Energy Efficiency

- Improve building envelopes through **weatherization** of existing buildings
- Develop aggressive **building appliance standards**
- Develop **building performance standards** (BPS)
- Increase **grid interactivity** of appliances and equipment
- Enhance **behavioral conservation** through energy management systems



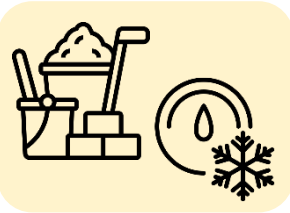
Renewable Energy in Buildings

- Install **solar PV** and/or **storage** at existing and new residential and commercial buildings
- Replace fossil fuel-powered water heating equipment with **solar hot water systems**
- Utilize **geothermal** technologies to heat and cool residential and commercial buildings



Increase the Use of Low-Carbon Fuels

- Increase the **blend of renewable fuels** in natural gas and heating oil delivered to homes and businesses
- Enforce **2021 Biofuel Heating Oil Act**, which will require 50% biofuel blend by 2030

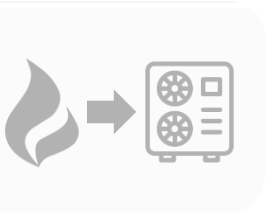


Increase the Use of Low-Carbon Materials

- Increase the use of **low-carbon building materials** when constructing new buildings, such as recycled metals and low-carbon concrete
- For cooling, switch to **refrigerants with low global warming potential** (GWP)

Example strategies

Building Decarbonization Pillars



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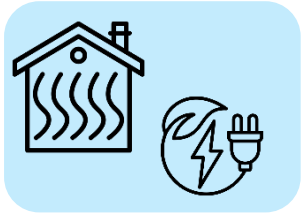

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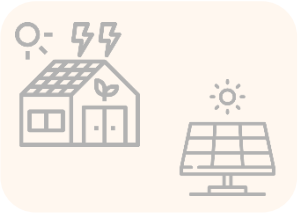

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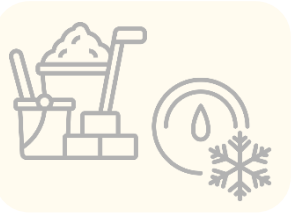

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Example strategies

RI's Recent Work in the Building Decarbonization Space

+ Future of the Regulated Gas Distribution Business

- The Future of Gas docket is led by the RI Public Utilities Commission (PUC) and **explores the future of RI's natural gas distribution system given the Act on Climate's emission reduction mandates**[1] (currently 50% of buildings in RI are connected to the natural gas system)
- Technical Analysis Report led by E3 was published in April 2024
- Policy report led by Apex Analytics and the RI PUC is forthcoming

+ Building Energy Benchmarking and Performance Standards

- On February 10th, 2025, the RI Office of Energy Resources released a report on building energy benchmarking and building performance standards (BPS)[2]
- The report outlines **approaches for implementing benchmarking and BPS in large public and private buildings**
- Governor McKee's proposed FY2026 Budget includes a new 'State Facilities Benchmarking and Performance Standards Program' (Article 3)[3]

+ RI Energy Efficiency Programs

- As of 2024, Rhode Island energy efficiency programs have saved ratepayers 18,700 GWh of electricity since 2005
- Programs such as the EnergyWise Single Family and Multifamily, Residential New Construction, and Home Energy Reports programs help Rhode Islanders track and save energy
- EEC releases annual reports to monitor and evaluate RI energy efficiency programs[6]

+ *Proposed* Building Decarbonization Act of 2025

- In early 2025, RI Bill S0091 and H5493 were introduced[4], which would **establish energy benchmarking and reporting for large buildings, BPS for municipal and state buildings, and require new construction to be electric-ready**

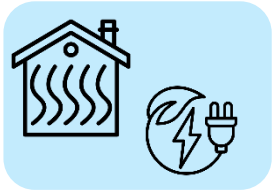
+ *Proposed* Rhode Island Clean Heat Standard Act

- In early 2025, RI Bill S0407 and H5167 were introduced[5], which would **establish the RI Clean Heat Standard Act to reduce GHG emissions in the heating sector through tradeable clean heat credits**

1 Docket 22-01-NG
2 Building Energy Report
3 Article 3
4 S0091; H5493
5 S0407; H5167
6 EEC Data and Publications

Pillar: Increase Building Efficiency

What strategies/policies can help RI meet this decarbonization pillar?



Strategies Quantified in Current Policy Scenario

- Existing energy efficiency levels will be determined by current efficiency program implementation, such as **utility-administered efficiency programs**
- **Federal appliance efficiency standards**, such as the Federal Energy Conservation Standards for Consumer Furnaces which requires that all gas furnaces are 95% fuel efficient by 2029

PCAP* and 2022 Climate Update Priority Strategies

- Expand **existing weatherization, utility efficiency, and appliance efficiency standard programs**
- **Retrofit state buildings** and facilities
- Provide subsidies for **pre-weatherization** work
- Incentivize **demand response** for peak shaving
- Look to the OER report on **building benchmarking and performance standards** for approaches to decarbonize large buildings

*Priority Climate Action Plan

Discussion Questions

- **Please provide feedback on the existing building decarbonization/efficiency strategies under consideration**
  - I.e., the strategies from the Priority Climate Action Plan (PCAP) and priority actions from the 2022 Climate Update.
- **What strategies are missing and should be explored in the RI Climate Action Strategy?**
- **Does the EEC have any recommendations for ways or sources we can use to measure the impact of the proposed strategies?**

Next Steps

- The project team is compiling feedback from all stakeholder engagement meetings during the Action Plan Development stage of the project to finalize strategies to model
- E3 and BW will begin modeling in the next couple of weeks

Thank You

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Appendix

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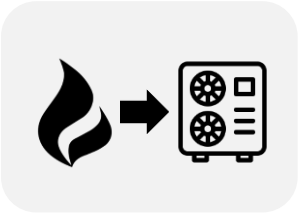
Building Decarbonization Pillars



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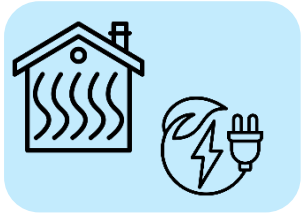

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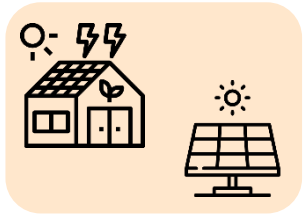

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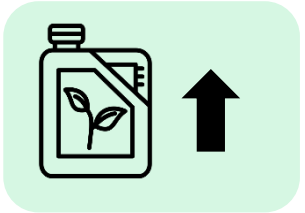

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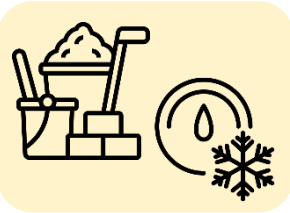

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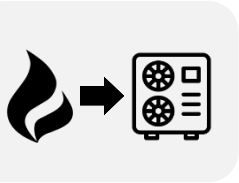
Example strategies

Pillar: Electrify Buildings

What strategies/policies can help RI meet this decarbonization pillar?



Strategies Quantified in Current Policy Scenario

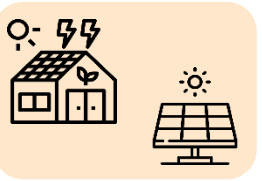
- Existing efficient equipment and heat pump adoption projections in RI are impacted by multiple existing policies, such as the:
  - Clean Heat RI
  - New England Heat Pump Accelerator initiative
  - Clean Heat Rhode Island Program
  - Inflation Reduction Act (IRA)
  - Lead by Example (LBE) Program

PCAP* and 2022 Climate Update Priority Strategies

- Hit target of **15% energy efficient electric heating by 2030**
- Increase residential and commercial heat pump adoption through **education and incentives**, such as the Clean Heat RI program
- Begin developing a **renewable thermal standard**
- Add **heat pumps to state facilities**
- Explore **non-pipe alternatives (NPA)** in RI by abandoning leak-prone gas pipes
- Look to the **Future of Gas Technical Analysis** (Docket 22-01-NG) for findings on the impact of decarbonization on the natural gas system, such as the impact of high levels of electrification
- Look to the OER report on **building benchmarking and performance standards** for approaches to decarbonize large buildings

Pillar: Renewable Energy in Buildings

What strategies/policies can help RI meet this decarbonization pillar?

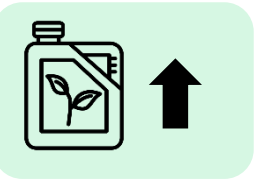


Strategies Quantified in Current Policy Scenario	PCAP* and 2022 Climate Update Priority Strategies
• N/A	• Incentivize **battery storage** for residential and commercial customers for **peak shaving** through demand response • **Incentivize solar on previously disturbed sites** and commercial facilities

*Priority Climate Action Plan

Pillar: Increase the Use of Low-Carbon Fuels

What strategies/policies can help RI meet this decarbonization pillar?



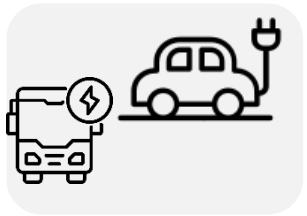
Strategies Quantified in Current Policy Scenario

- **2021 Biofuel Heating Oil Act**, which requires that heating oil must be 50% biofuel by 2030

PCAP* and 2022 Climate Update Priority Strategies

- Enforce the **2021 Biofuel Heating Oil Act**
- Look to the **Future of Gas Technical Analysis** (Docket 22-01-NG) for findings on the impact of decarbonization on the natural gas system, such as the impact of higher reliance on renewable fuels
- Look to the OER report on **building benchmarking and performance standards** for approaches to decarbonize large buildings

Transportation Decarbonization Pillars

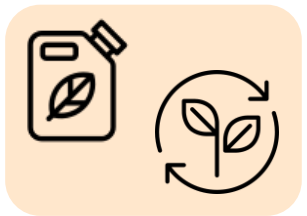


Electrify Vehicles

- Increase **annual sales for electric vehicles** by vehicle class
- Electrification of non-road gasoline and diesel demand
- Electrification of locomotive diesel
- Electrification of marine fuel

Increase Vehicle Efficiency

- **Improve fuel economy** for new vehicles



Increase the Use of Low-Carbon Fuels

- Increase the **blend of renewable and synthetic fuels** in vehicles and other transportation equipment

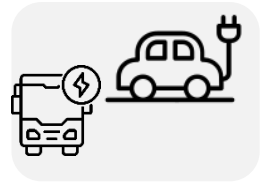
Reduce Vehicle Miles Traveled (VMT)

- **Increase transit ridership** through shared mobility programs, transit subsidies, improved bus shelters, improved rail
- **Increase active transportation** by increasing city walkability, improved bike lanes, bike and scooter share programs, and micromobility hubs
- Increase **work from home**
- Changes in **land use** policy to improve transit-oriented development
- Increase **carpooling**

Example strategies

Pillar: Electrify Vehicles

What strategies/policies can help RI meet this decarbonization pillar?



Strategies Quantified in Current Policy Scenario

- Advanced Clean Cars II (ACCII) – sets manufacturer zero-emission vehicle sales requirements for light-duty vehicles (based on CA program)
- Advanced Clean Trucks (ACT) – sets manufacturer zero-emission sales requirements for medium- and heavy-duty vehicles (based on CA program)

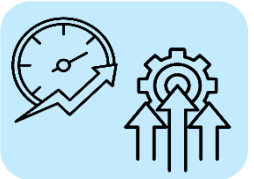
PCAP* and 2022 Climate Update Priority Strategies

- Target **10% penetration of electric vehicles by 2030**
- **DRIVE EV Rebates** (with emphasis on increasing the low-income rebate and adding a section for small commercial vans)
- **Electrify Rhode Island** (charging infrastructure – particularly at workplaces and multiunit dwellings)
- **Green the Fleet** (municipal and state vehicles)
- RIPTA's Action Plan for Electrification and Service Growth
- Department of Environmental Management (DEM)-provided **incentives for medium- and heavy-duty vehicle electrification** and charging
- Fund the replacement of gasoline-powered lawn and garden equipment with battery-operated equipment

*Priority Climate Action Plan

Pillar: Increase Vehicle Efficiency

What strategies/policies can help RI meet this decarbonization pillar?



Strategies Quantified in Current Policy Scenario	PCAP* and 2022 Climate Update Priority Strategies
• Corporate Average Fuel Economy (CAFE) standards that set minimum fuel economy requirements	• N/A

Pillar: Reduce VMT

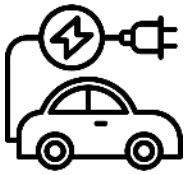
What strategies/policies can help RI meet this decarbonization pillar?

Strategies Quantified in Current Policy Scenario
• Current VMT levels in RI are impacted by multiple existing policies

PCAP* and 2022 Climate Update Priority Strategies
• Look to Transit Master Plan (TMP) and Bicycle Mobility Plan (BMP) for well-vetted strategies • Look to Metro Connector Study • Support for new Rhody Express train service (Wickford-TF Green-PVD) • Support for transit subsidies to boost ridership and encourage mode shift • Invest in bus shelter improvements to increase RIPTA ridership • Local shared mobility van service • Model climate impacts of transportation demand led by RI Department of Transportation (RIDOT) • RI Complete Streets Plan and Design Guide to develop transportation infrastructure that is safe, accessible, and sustainable • Rhode Island State Rail Plan

*Priority Climate Action Plan

Existing Municipality-Focused Decarbonization Strategies in RI



Transportation

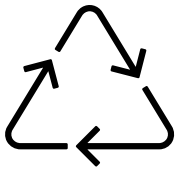
- Install carports with EV charging at municipal facilities
- Green the Fleet – adopt EVs for state and municipal fleets and install EV charging infrastructure
- RI's municipal transit plans (Transit Forward RI 2040)
- Lead by Example Program

Buildings

- Heat pumps in municipal buildings
- Energy efficiency in municipal buildings
- Energy Efficiency and Conservation Block Grant (EECBG) Program
- Heat pumps and energy management systems in schools
- Lead by Example Program

Energy

- Add solar and batteries for resilience and demand response on municipal buildings
- Install LED streetlights with controls
- Invest in municipal energy managers
- Procure renewable energy from renewable sources
- Lead by Example Program

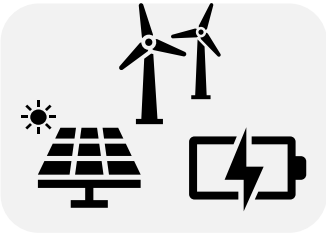


Waste and Working Lands

- Promote food waste diversion from the Central Landfill in Rhode Island municipalities – divert to anaerobic digestion and composting facilities

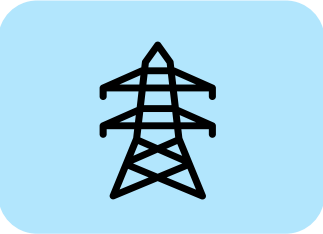
Sourced from RI's Priority Climate Action Plan, RI's 2022 Climate Update, and OER's existing initiatives

Key Considerations for a More Sustainable Energy Sector in RI



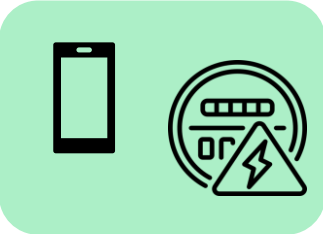
Meet Energy Demand through Renewable Energy

- Meeting RI's energy needs through 100% renewable sources by 2033 as mandated by the Renewable Energy Standard (RES)



Modernize the Electric Grid

- Modernizing transmission and distribution lines to deliver electricity efficiently and reliably
- Integrating renewable energy into the electric grid
- Upgrading monitoring and control equipment



Track Energy Use in Real Time

- Allowing consumers to track energy use in real time through the installation of smart meters