



Department of
**Environment &
Conservation**

Emission Reduction Planning Advisory Committee

Meeting #3

February 15, 2024

Meeting Agenda

Time (CT)	Agenda Item
10:00 – 10:10	Welcome & Introductions
10:10 – 10:20	Overview of the Priority Climate Action Plan
10:20 – 11:00	PCAP: Greenhouse Gas (GHG) Emissions Reduction Measures and Benefits Analyses
11:00 – 11:10	Break
11:10 – 11:30	PCAP: Other Sections
11:30 – 11:50	Implementation Grant Update
11:50 – 12:00	Timeline and Next Steps



Overview of the PCAP

PCAP Required Elements

Greenhouse Gas (GHG) Inventory

- Utilized Default Data from EPA's State Inventory Tool (SIT) Modules
- Focused on Consumption; Further Analysis of End Use Completed to Inform Measure Selection

Quantified GHG Reduction Measures (Priority Measures Only)

- Considered Measures that are **Near-Term** and **Implementable, High Impact, and Prioritized by the Public**

Benefits Analysis (Encouraged)

- For Each Measure, Analyze Co-Pollutant Reductions and/or Other Benefits Realized
- Can Include Disbenefits, if Identified

Low Income / Disadvantaged Communities Benefits Analysis

- For Each Measure, Analyze Co-Pollutant Reductions and/or Other Benefits Realized
- Can Include Disbenefits, If Identified

Review of Authority to Implement

- Identify Authority to Implement Selected Priority Measures

Intersection with Other Funding Availability

- Identify Other Funding Opportunities (Bipartisan Infrastructure Law and Inflation Reduction Act) for Implementing Measures

PCAP Timeline & Development Process

Development

- GHG Inventory
 - November 2023
- Measures & Benefits Analysis
 - January 2024
- Review of Authority to Implement
 - January 2024
- Intersection with Other Funding Availability
 - January 2024

Stakeholder Engagement

- Public Engagement
 - Fall 2023
- ERPAC
 - August 2023
 - December 2023
 - February 2024
- **New:** Sector-Based Conversations
 - January 2024

Review & Approval

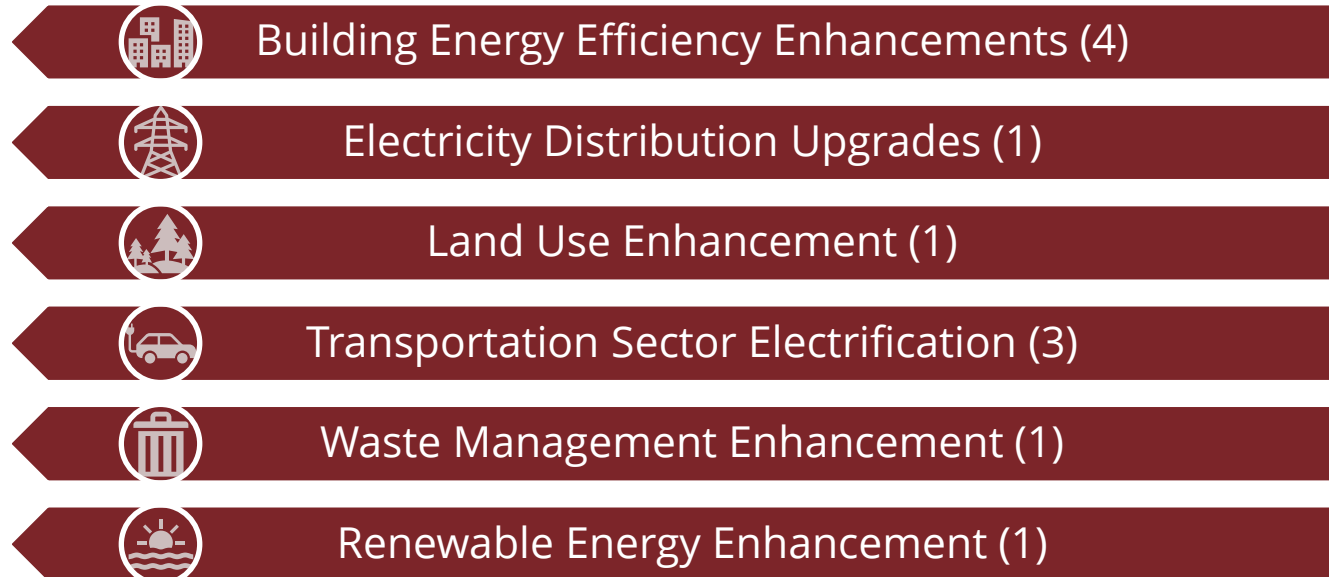
- Multiple Rounds of Internal Review and Editing
 - January / February 2024
- ERPAC Review and Feedback
 - February 2024
- Leadership Review and Approval
 - February 2024



GHG Emissions Reduction Measures

Overview

- All measures are voluntary
- All measures have state-wide applicability
- Estimated emissions reductions are not guarantees; they reflect **maximum potential**
- We have evaluated reductions for two timeframes, as per CPRG guidance:
 - 2025 to 2030
 - 2025 to 2050
- There are **11** measures across **6** groups:





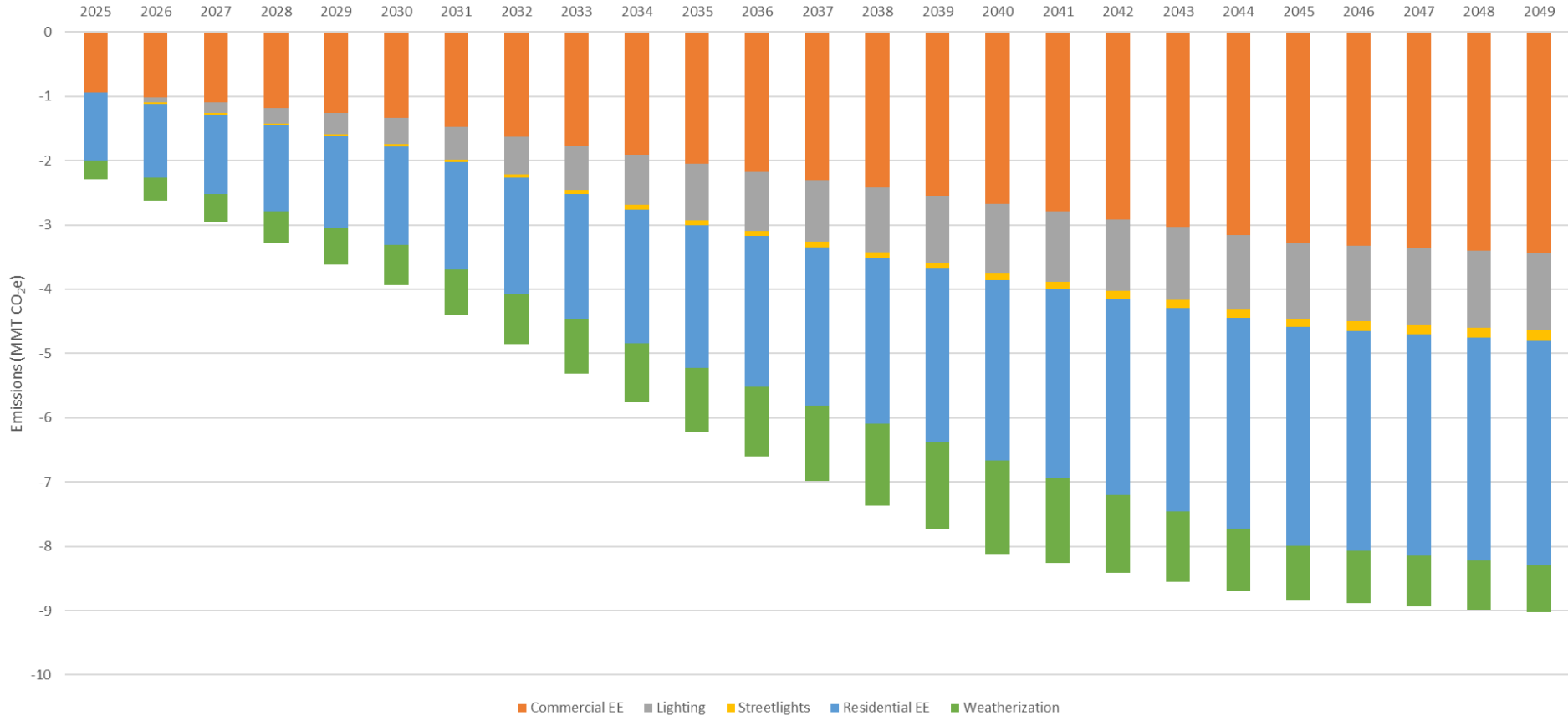
Building Energy Efficiency Enhancements

- **Measures:** Reduce GHG emissions associated with residential, commercial, and industrial buildings by:
 - Replacing existing heating/cooling, appliances, etc. with energy-efficient products
 - Installing energy-efficient lighting including streetlights
 - Weatherizing residential buildings
- **Modeling Tool:** U.S. EPA GLIMPSE (**G**lobal Change Analysis Model – **L**ong-term **I**nteractive **M**ulti-**P**ollutant **S**cenario Evaluator)
- **Emissions Reduction:**
 - 2025 to 2030 reduction: -14.7 MMT CO₂e
 - 2025 to 2050 reduction: -160.6 MMT CO₂e



Building Energy Efficiency Enhancements

Reduction Measures Annual Cumulative Greenhouse Gas Emissions





Electricity Distribution Upgrades

U.S. Energy Information Administration estimates **5% of electricity generated is lost before it reaches the consumer.**
Small improvements can translate to large savings.

- **Measure:** Reduces GHG by improving electricity transmission efficiency
 - Baseline GHG inventory assumes 5.1% loss
 - Best case estimate assume a 4% improvement (i.e., loss of 4.9%)
- **Modeling Tool:** GWh saved converted to MMT CO₂e with EPA **Emissions & Generation Resource Integrated Database (eGRID)** factors
- **Emissions Reduction:**
 - 2025 to 2030 reduction: - 0.4 MMT CO₂e
 - 2025 to 2050 reduction: -1.8 MMT CO₂e

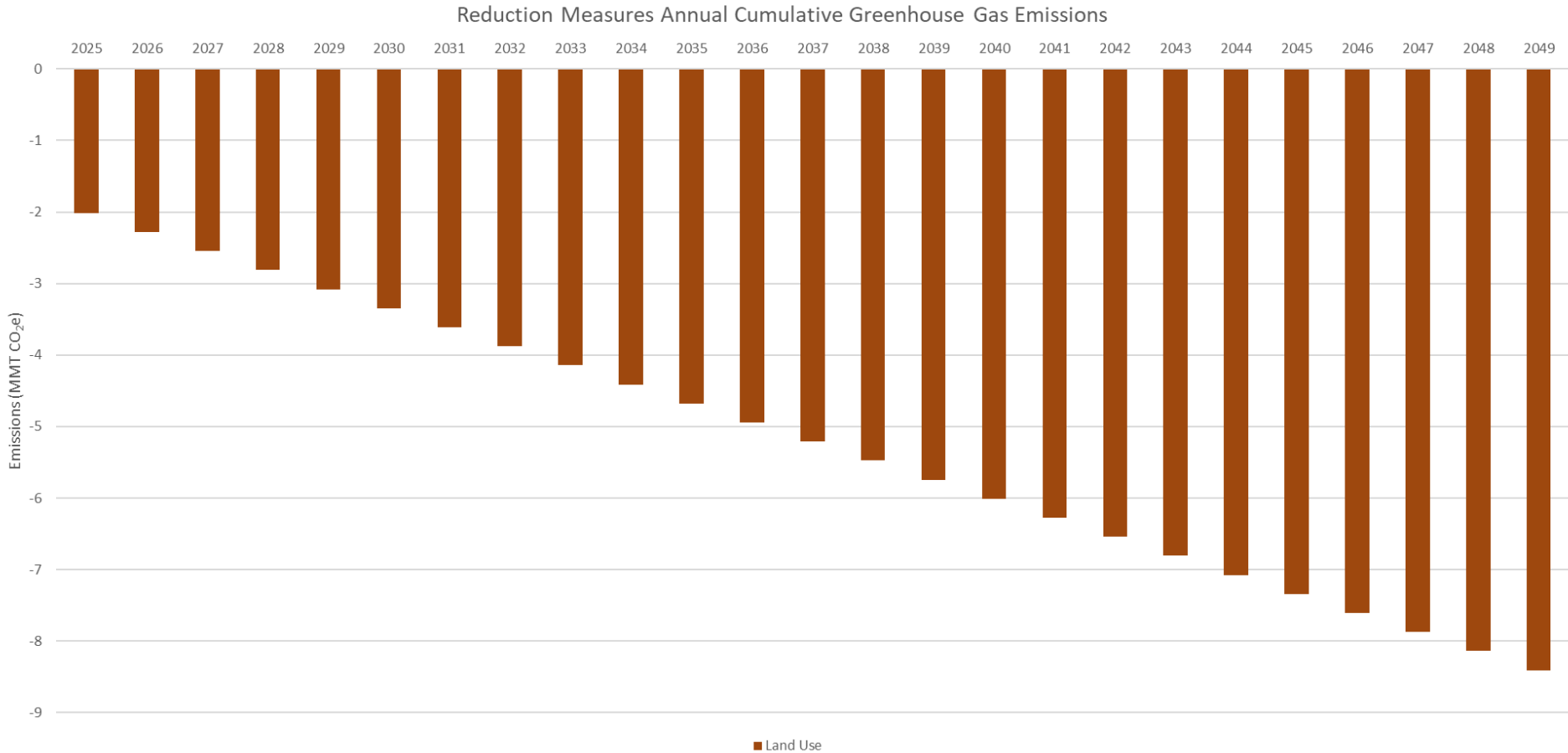


Land Use Enhancement

- **Measure:** Reduces GHG emissions by preventing:
 - Forest conversion to other land uses
 - Forest losses due to fire or other causes (e.g., pests)
- **Modeling Tool:** EPA **State Inventory Tool (SIT)**
 - Baseline was to assume 2019 forest remains intact
 - Current trends project an increasing rate of forest loss: up to 864,000 acres between 2025 and 2050
- **Emissions Reduction:**
 - 2025 to 2030 reduction: -12.7 MMT CO₂e
 - 2025 to 2050 reduction: -130.3 MMT CO₂e



Land Use Enhancement: Protect Forests





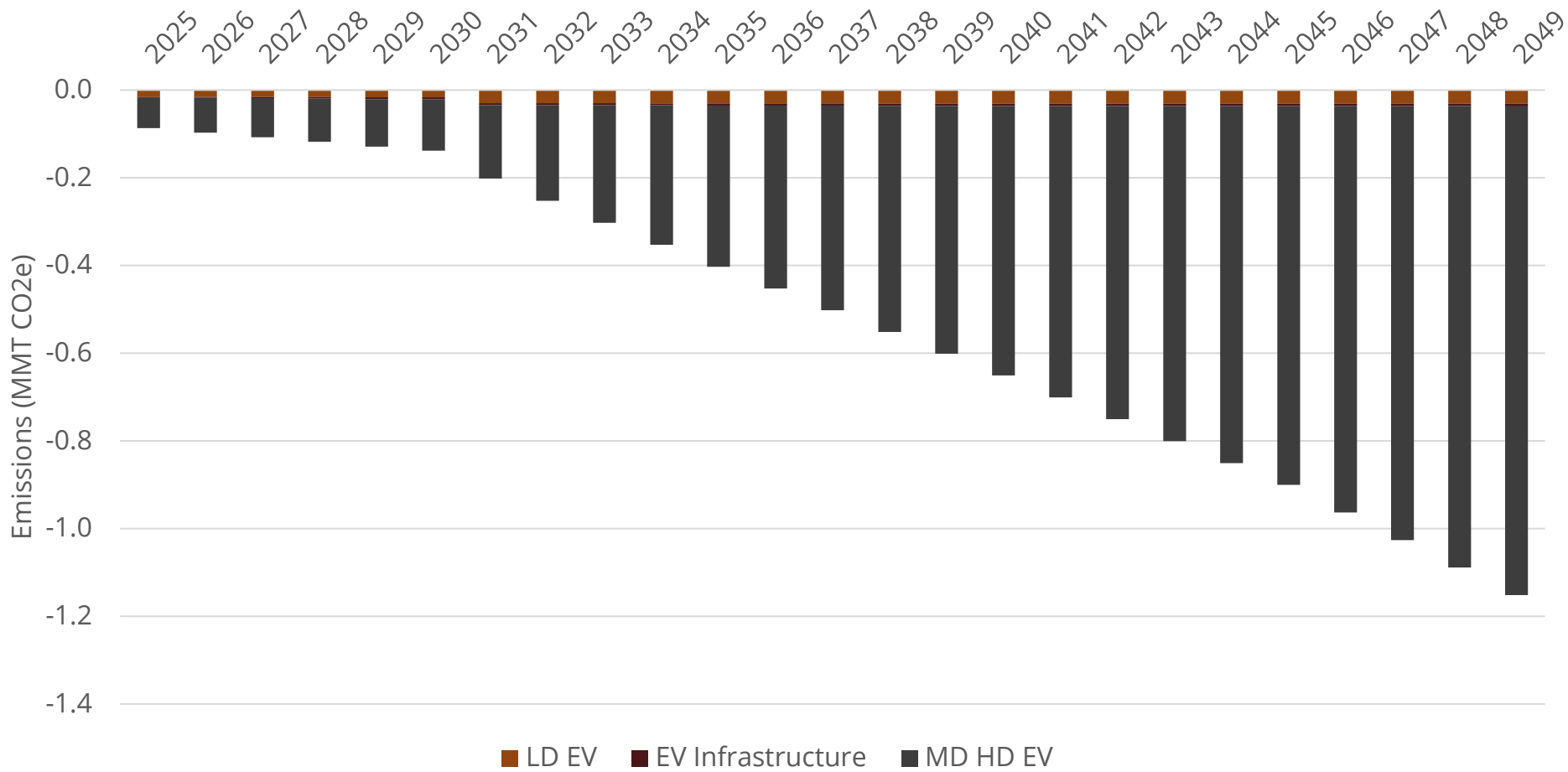
Transportation Sector Electrification

- **Measures:** Reduce vehicle exhaust by promoting the use of electric vehicles (EVs), including:
 1. State and local government light-duty cars and trucks
 2. Programs to expand community electric vehicle charging infrastructure
 3. State-wide medium- and heavy-duty vehicles, including buses
- **Modeling Tool:**
 - AVERT (**AV**oided **E**missions gene**R**ation **T**ool),
 - AFLEET (**A**lternative **F**uel **L**ife-cycle **E**nvironmental and **E**conomic **T**ransportation)
 - GLIMPSE
- **Emissions Reduction:**
 - 2025 to 2030 reduction: -0.5 MMT CO₂e
 - 2025 to 2050 reduction: -13.2 MMT CO₂e



Transportation Sector Electrification

Reduction Measures Annual Cumulative Greenhouse Gas Emissions



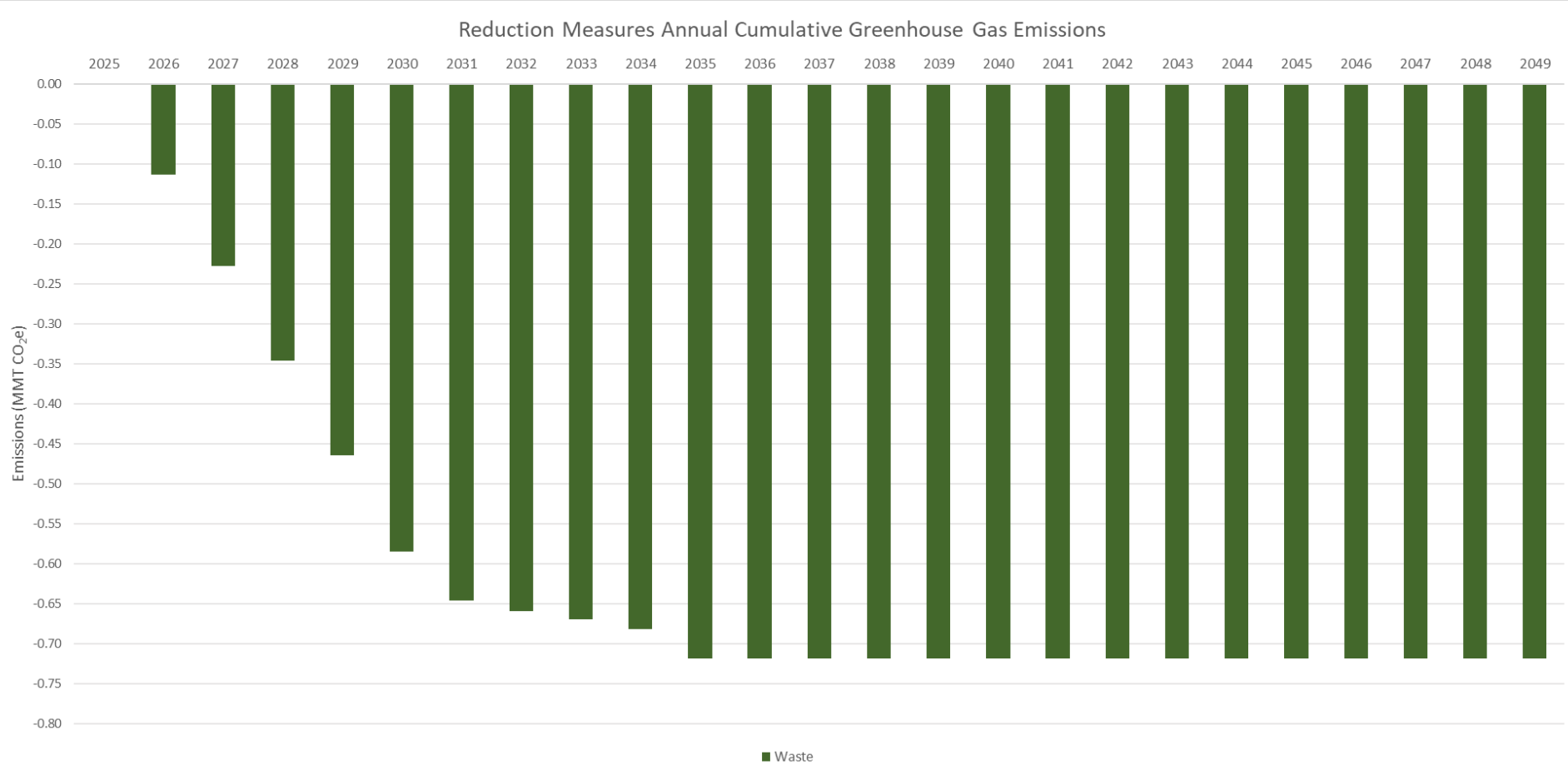


Waste Management Enhancement

- **Measure:** Reduces GHG by reducing the volume of food waste sent to landfills through:
 - Increased composting
 - Anaerobic digestion
 - Food diversion
- **Modeling Tool:** EPA's **WA**ste **R**eduction **M**odel (WARM)
- **Emissions Reduction:**
 - 2025 to 2030 reduction: -1.2 MMT CO₂e
 - 2025 to 2050 reduction: -15.2 MMT CO₂e



Waste Management Enhancement



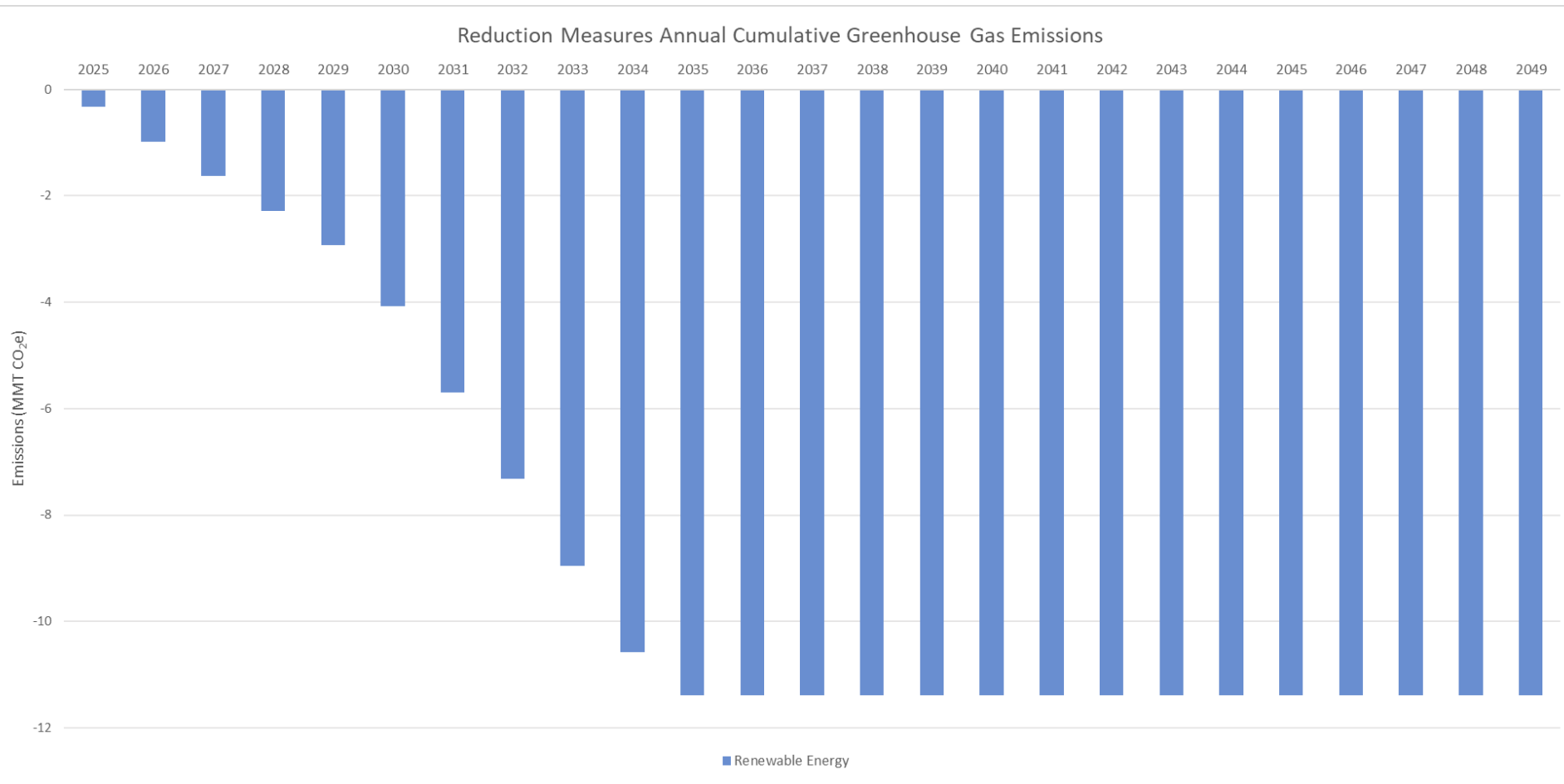


Renewable Energy Enhancement

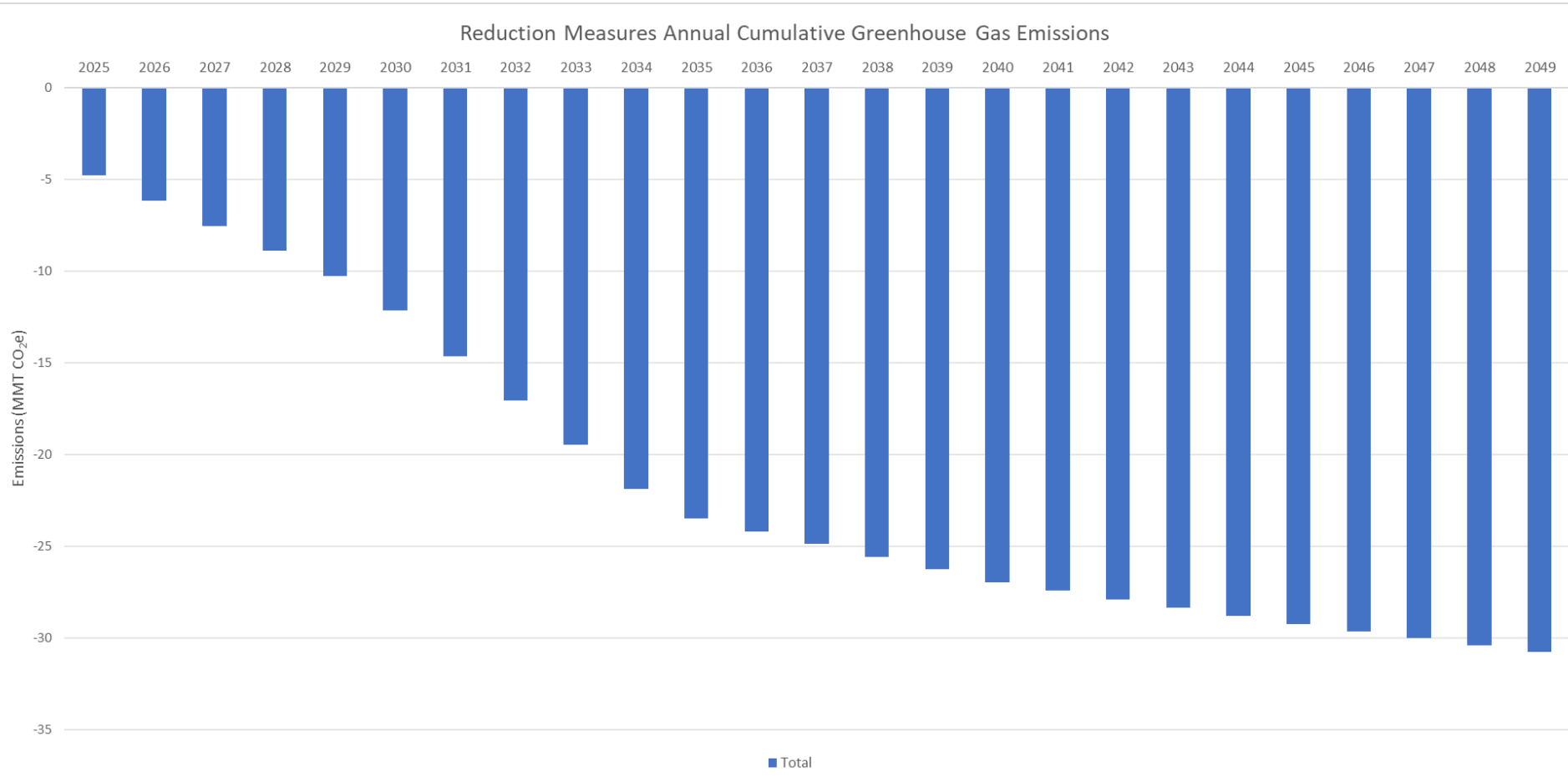
- **Measure:** Reduces GHG by increasing the use of solar energy across the state
 - Assumes existing fossil-fueled electric is offset
- **Modeling Tool:** Manual calculations were used to estimate the benefit of installing 7,000 MW of solar capacity:
 - 2,000 MW by 2030 (400 MW per year) and
 - 5,000 MW additional by 2035 (1,000 MW per year)
 - MWh solar were converted to MMT CO₂e using TN-specific fossil electric emission factors (tons CO₂/MWh)
- **Emissions Reduction:**
 - 2025 to 2030 reduction: -8.1 MMT CO₂e
 - 2025 to 2050 reduction: -215.7 MMT CO₂e



Renewable Energy Enhancement



Combined Summary GHG Reductions



The estimated 2019 statewide gross GHG emissions were
112 MMT CO₂e.



Benefits Analyses

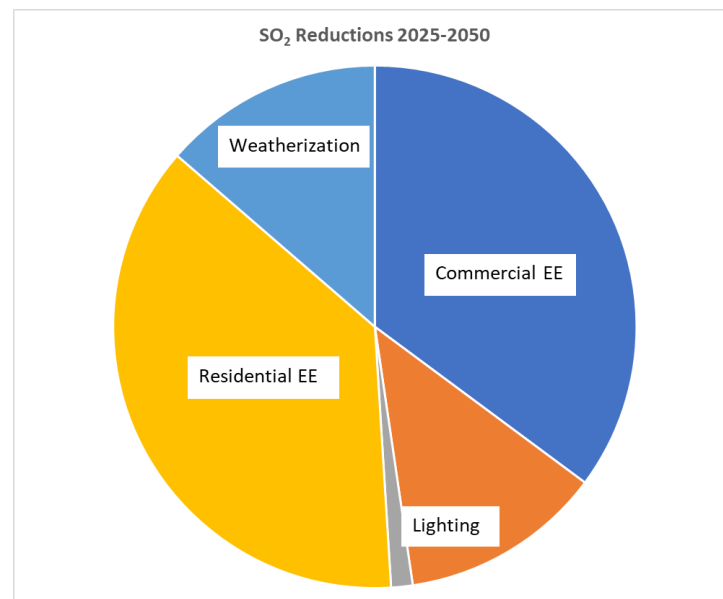
Benefits Analysis

- Co-pollutants evaluated (not all are relevant to each measure):
 - Nitrogen Oxides: NO_x
 - Particulate Matter: PM
 - Sulfur Dioxide: SO_2
 - Volatile Organic Compounds: VOCs
 - Carbon Monoxide: CO
 - Ammonia: NH_3
- 2017 NEI Inventory as baseline for comparison in PCAP
- Estimation approaches mirror GHG methods



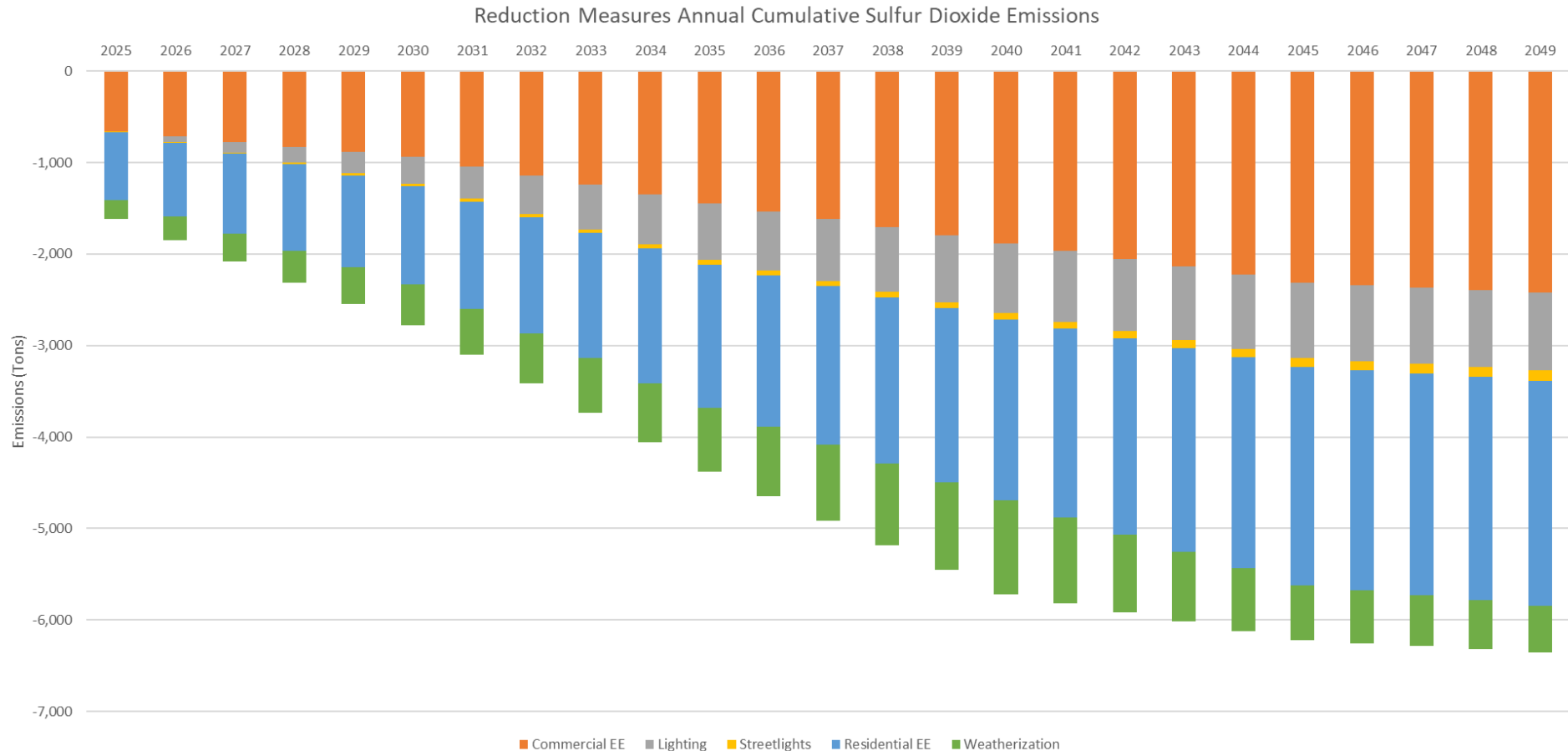
Building Energy Efficiency Enhancements

- Co-pollutant benefits:
 - SO₂ and NO_x emission reductions from avoided electricity generation were estimated using U.S. EPA eGRID factors
 - Other criteria pollutant reductions would also occur (not estimated)
 - Simplifying assumptions made about future generation mix
- SO₂:
 - 2025 to 2030 reduction: -10,389 tons
 - 2025 to 2050 reduction: -113,069 tons
- NO_x:
 - 2025 to 2030 reduction: -7,049 tons
 - 2025 to 2050 reduction: -76,712 tons





Building Energy Efficiency Enhancements (SO₂)



(NO_x emission reductions display a similar pattern reaching about -4,250 tons/year by 2050).



Electricity Distribution Upgrades

- Like Buildings Measures, co-pollutant benefits:
 - SO₂ and NO_x emission reductions from avoided electricity generation were estimated using U.S. EPA eGRID factors
 - Other criteria pollutant reductions would also occur (not estimated)
 - Simplifying assumptions made about future generation mix
 - Maximum potentials shown here
- SO₂:
 - 2025 to 2030 reduction: -335 tons
 - 2025 to 2050 reduction: -1,675 tons
- NO_x:
 - 2025 to 2030 reduction: -227 tons
 - 2025 to 2050 reduction: -1,137 tons



Land Use Enhancement

- Co-pollutants are those that would be avoided if forests are not cleared and burned, including:
 - Particulate Matter (PM), NO_x, and carbon monoxide (CO)
- Other pollutants would also be emitted (not estimated)
- PM:
 - 2025 to 2030 reduction: -7,916 tons
 - 2025 to 2050 reduction: -80,936 tons
- NO_x:
 - 2025 to 2030 reduction: -1,508 tons
 - 2025 to 2050 reduction: -15,416 tons
- CO:
 - 2025 to 2030 reduction: -53,149 tons
 - 2025 to 2050 reduction: -543,431 tons



Transportation Sector Electrification

Co-pollutant benefits:

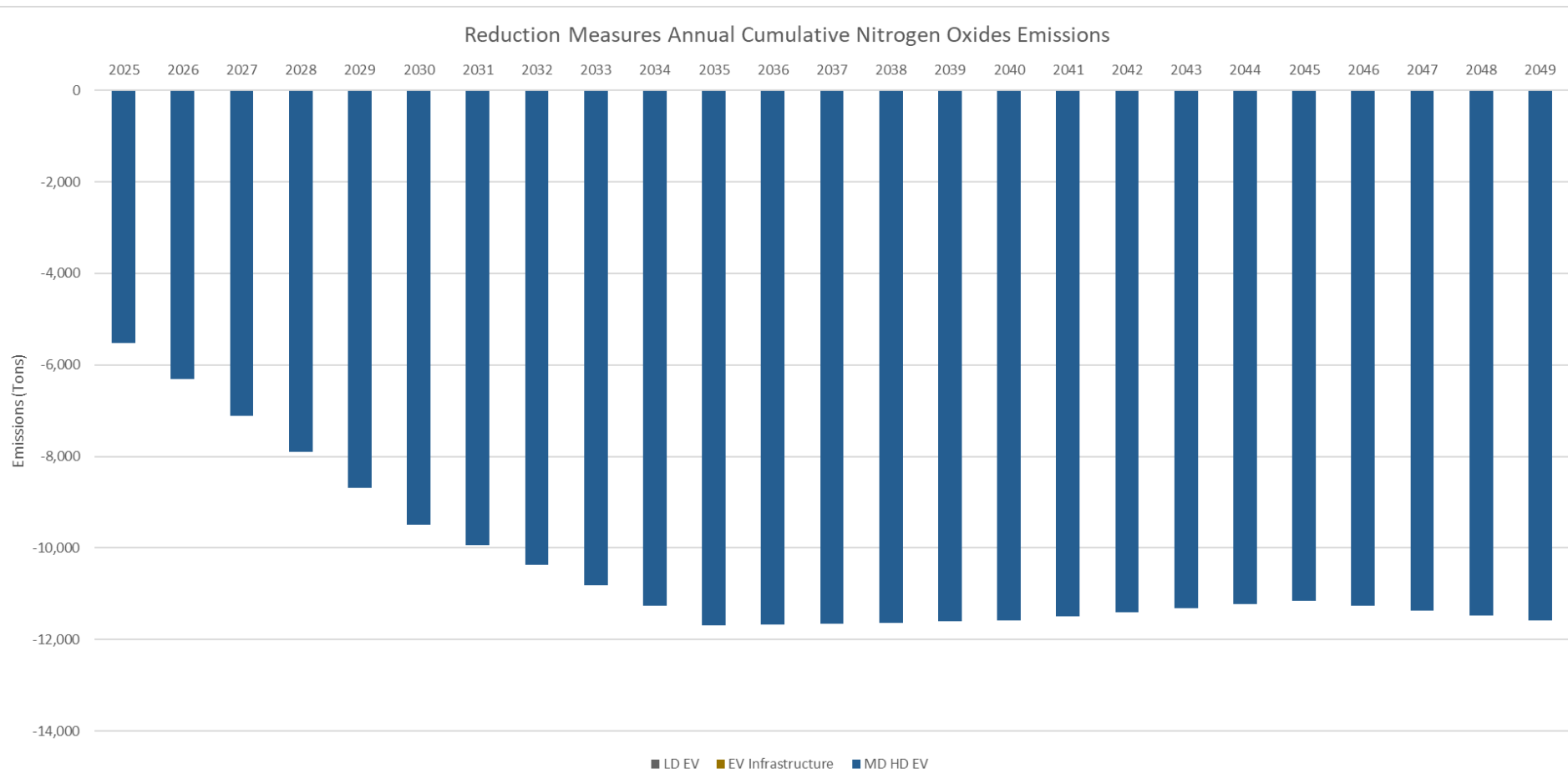
- Internal Combustion Engine Vehicle exhaust emissions are avoided by increased use of EVs
- Increased use of electricity produces emissions from fossil fuel power generation
- AVERT, AFLEET, and GLIMPSE provide co-pollutant output (not all pollutants for each measure).

Combined total reductions:

- SO₂:
 - 2025 to 2030 reduction: -16 tons
 - 2025 to 2050 reduction: -1,460 tons
- NO_x:
 - 2025 to 2030 reduction: -35,529 tons
 - 2025 to 2050 reduction: -259,535 tons
- VOCs:
 - 2025 to 2030 reduction: -2,344 tons
 - 2025 to 2050 reduction: -8,688 tons



Transportation Sector Electrification (NO_x)



Majority of co-pollutant reduction is NO_x from medium and heavy-duty vehicles.



Waste Management Enhancement

- Co-pollutant benefits result from flaring less landfill gas (methane)
- Resulting reduction in NO_x, PM, CO and others (not estimated)
- U.S. EPA emission factors used to estimate co-pollutant emissions
- PM:
 - 2025 to 2030 reduction: -8 tons
 - 2025 to 2050 reduction: -120 tons
- NO_x:
 - 2025 to 2030 reduction: -22 tons
 - 2025 to 2050 reduction: -311 tons
- CO:
 - 2025 to 2030 reduction: -25 tons
 - 2025 to 2050 reduction: -137 tons

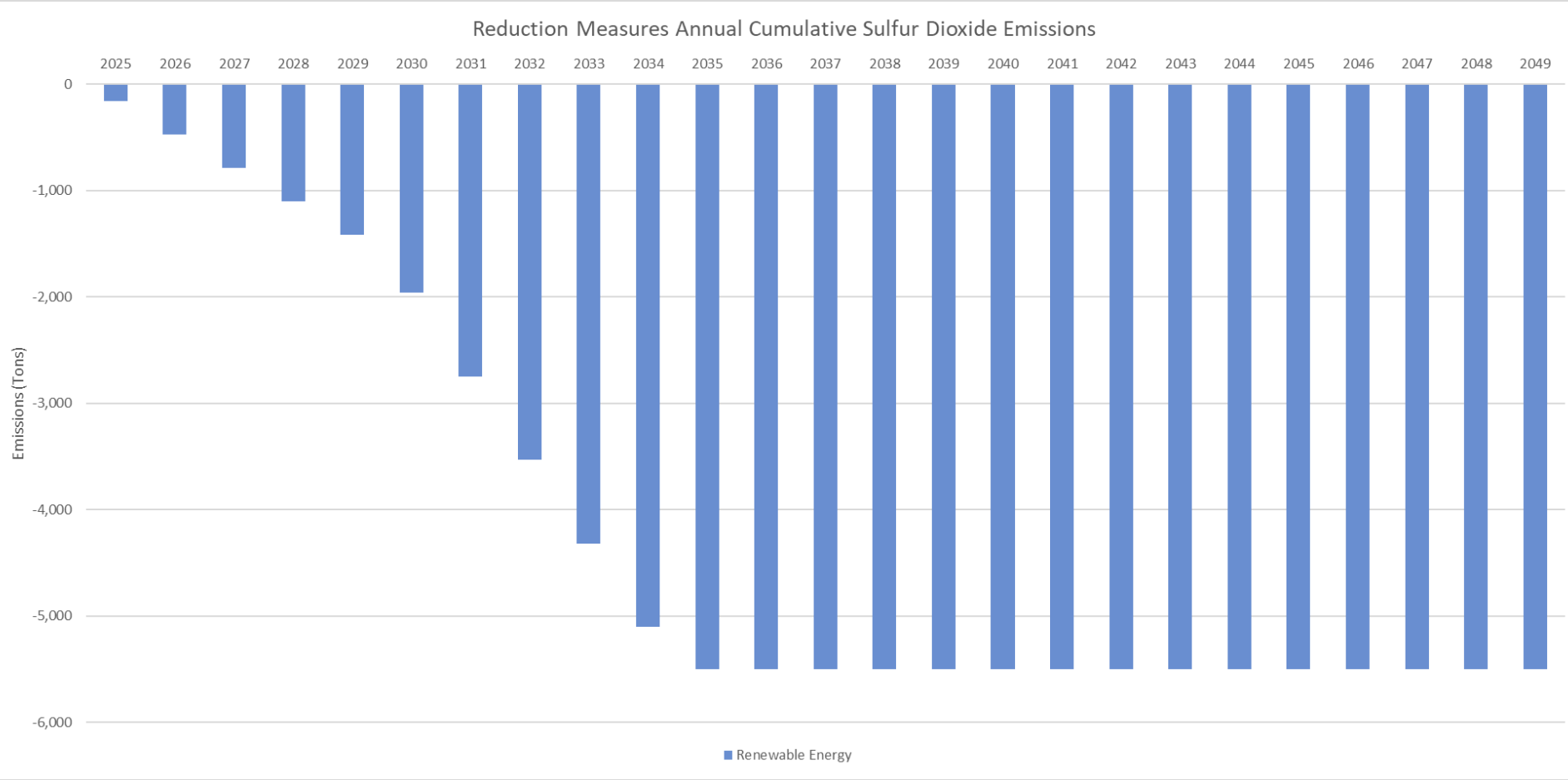


Renewable Energy Enhancement

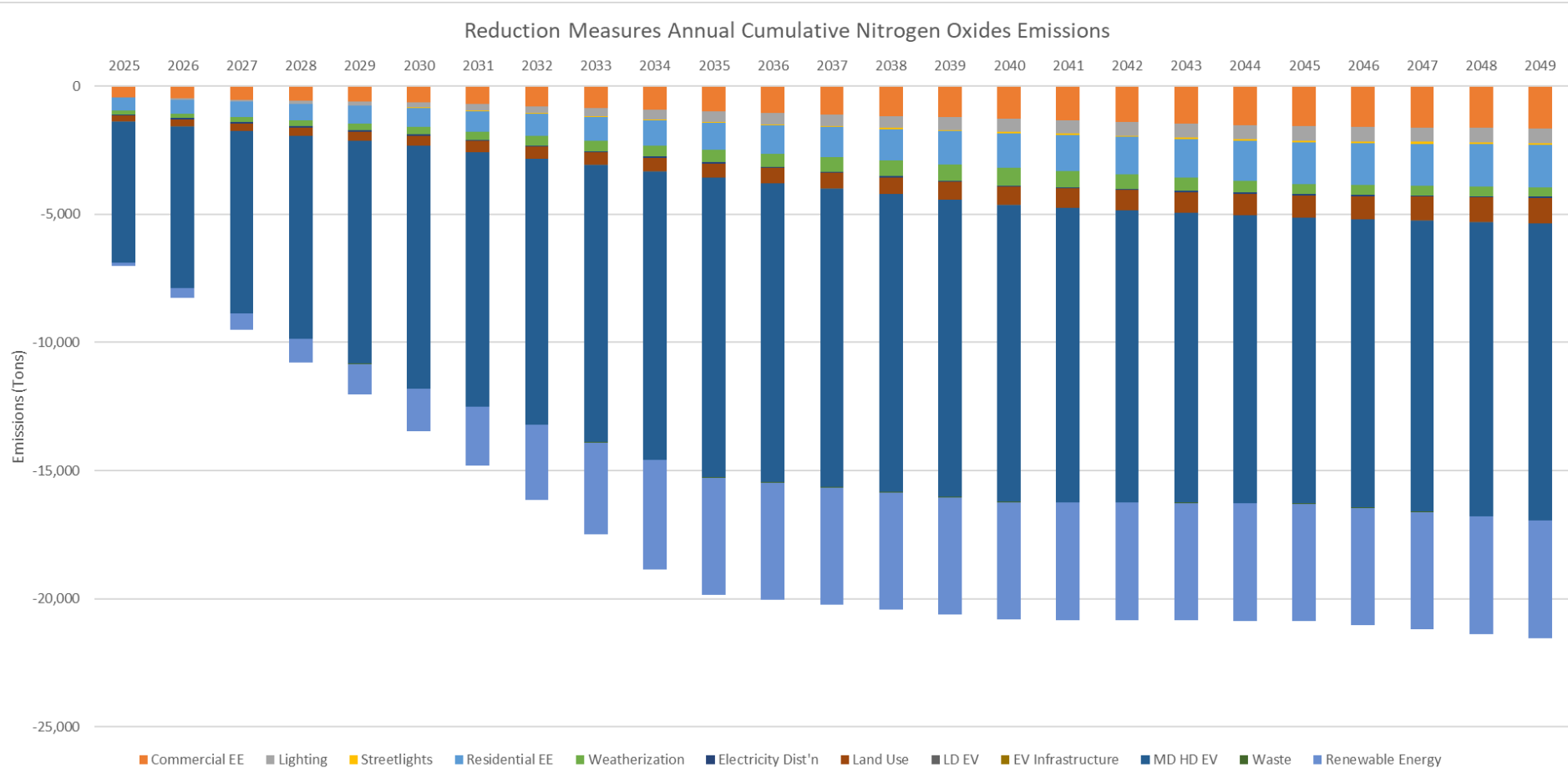
- Like Buildings and Transportation, co-pollutant benefits:
 - SO₂, NO_x, PM, VOC, and NH₃ emission reductions from avoided electricity generation were estimated using TN-specific fossil-fired electricity generation factors and AVERT modeling
 - Other criteria pollutant reductions would also occur (not estimated)
- SO₂:
 - 2025 to 2030 reduction: -3,928 tons
 - 2025 to 2050 reduction: -104,081 tons
- NO_x:
 - 2025 to 2030 reduction: -3,277 tons
 - 2025 to 2050 reduction: -86,831 tons
- PM:
 - 2025 to 2030 reduction: -809 tons
 - 2025 to 2050 reduction: -21,445 tons
- VOCs:
 - 2025 to 2030 reduction: -211 tons
 - 2025 to 2050 reduction: -5,579 tons



Renewable Energy Enhancement (SO₂)



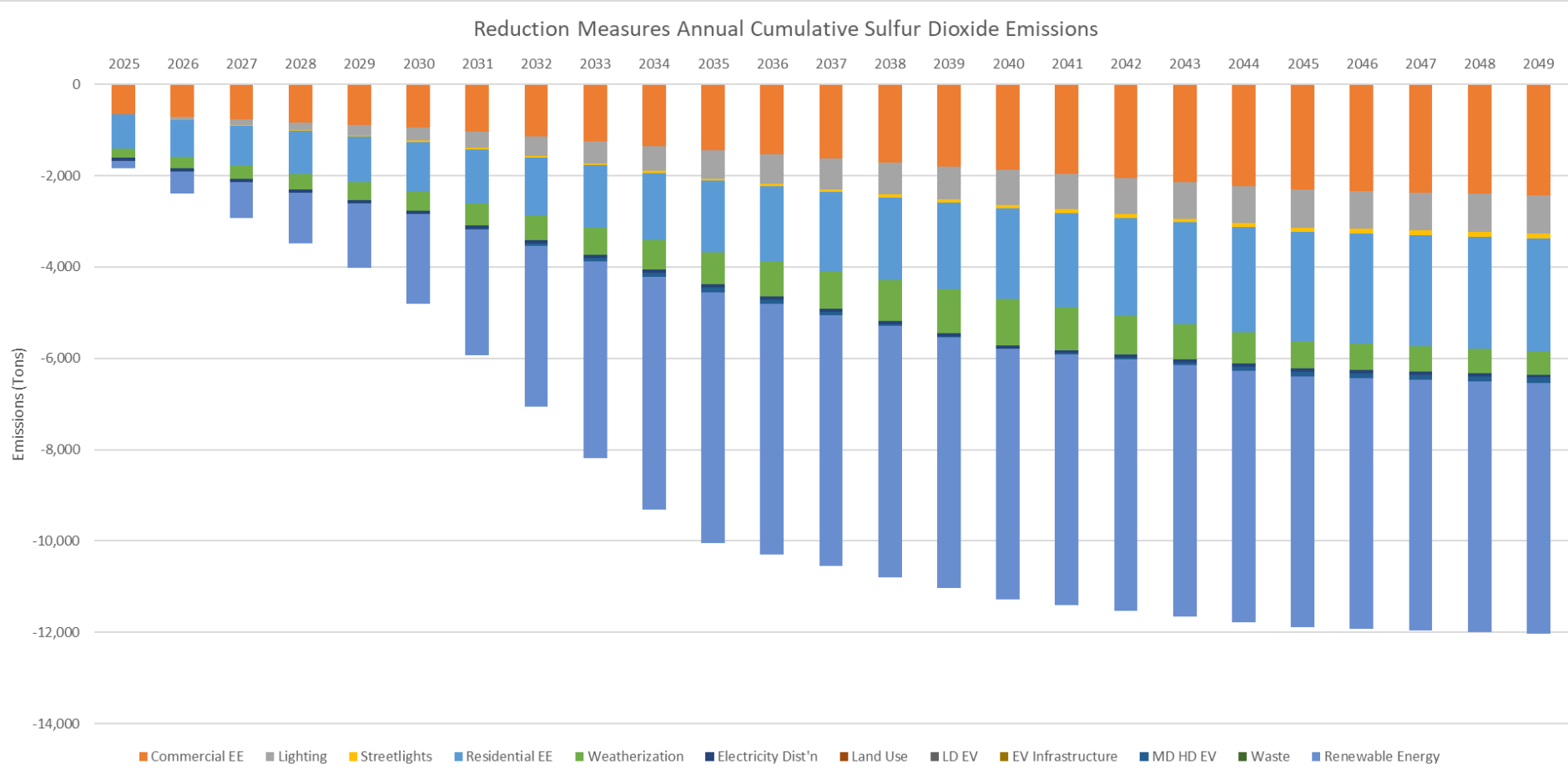
Combined Benefits Summary (NO_x)



State-wide NO_x emissions in 2017 were estimated at **219,961 tons per year.**



Combined Benefits Summary (SO₂)



State-wide SO₂ emissions in 2017 were estimated at **46,634 tons per year.**

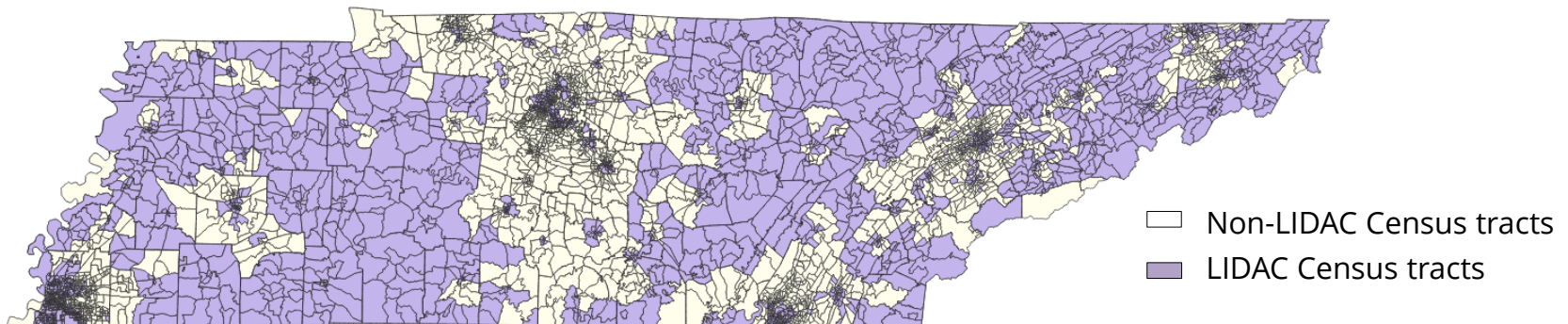




PCAP: Other Sections

LIDAC Benefits Analysis

- PCAP Requirements:
 - i. The identification of LIDACs in Tennessee, including Census Tract ID
 - ii. A description of LIDAC engagement and how community priorities were incorporated into measure selection, and
 - iii. Preliminary analysis of expected benefits to LIDACs of implementing priority measures for LIDACs.
- Identification of LIDACs
 - LIDACs represent 54% of Tennessee census tracts



LIDAC Benefits Analysis

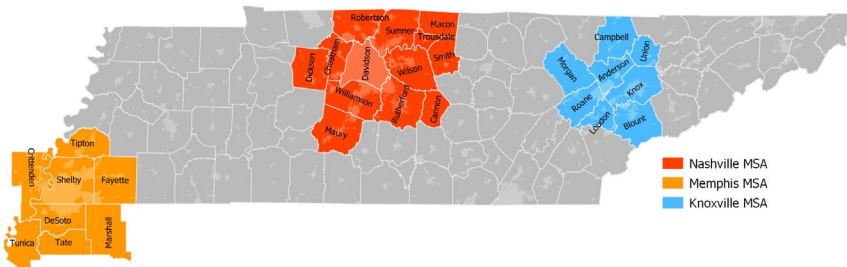
- Enhanced Engagement
 - EJScreen Community Reports for 5 MSA areas where held public meetings
 - Enhanced outreach and engagement including direct mailers, community presentations, flyers at community centers
 - Spanish translation of survey, opportunity to request interpretation services for public meetings

LIDAC Benefits Analysis

Priority measure	Potential benefit						
	Improved air quality and public health	Transportation improvement	Housing affordability	Community beautification	Community resilience	Reduced noise pollution	Workforce development
Building Energy Efficiency Enhancement							
Incentive programs for implementation of end-use energy efficiency measures in existing commercial buildings.	○	-	-	-	-	-	-
Incentive programs for the purchase of certified energy-efficient lighting in commercial and industrial buildings, as well as streetlights.	○	-	-	●	-	-	-
Incentive programs for the purchase of certified energy-efficient building products to replace inefficient products in residential buildings.	○	-	●	-	-	-	-
Weatherization programs for residential buildings.	○	-	●	-	-	-	●
Electricity Distribution Upgrades							
Upgrading electricity distribution.	○	-	●	-	●	-	●
Land Use Enhancement							
Reduce deforestation by implementing sustainable land-use practices, protecting forests.	●	-	-	●	●	○	-
Transportation Sector Electrification							
Programs to increase the share of state and local government fleets of light-duty electric vehicles.	●	●	-	-	○	●	-
Programs to expand community electric vehicle charging infrastructure.	○	●	-	-	○	○	●
Programs to increase the share of electric medium- and heavy-duty vehicles, including buses.	●	●	-	-	○	●	-
Waste Management Enhancement							
Programs and incentives to reduce or divert waste (including food and/or yard waste).	●	-	-	-	-	-	●
Renewable Energy Enhancement							
Development of renewable energy generation.	●	-	●	-	●	-	●

Interagency Coordination

- ERPAC
 - Multidisciplinary advisory committee representing stakeholder interests in CPRG process. Met 3 times during PCAP to inform and provide feedback.
- MSA Coordination
- Program Survey
 - Built an inventory of 100+ existing emission reduction measures in TN from state and local government agencies and other coordinating entities
- **NEW:** Sector Conversations
 - January 2024, met with subject matter experts in each emission sector to review GHG inventory and gather input about measures



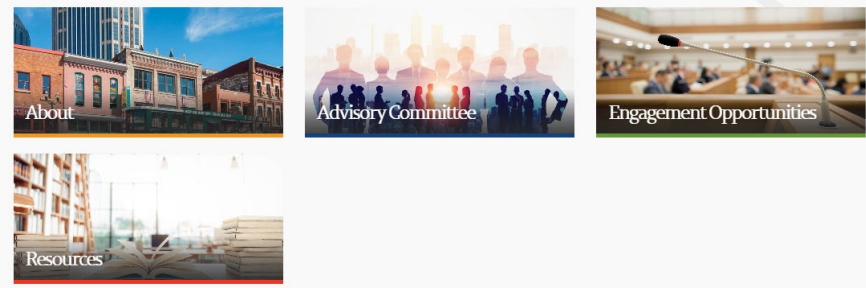
Public & Stakeholder Engagement

- Online Resources:

Tennessee Volunteer Emission Reduction Strategy

The Tennessee Volunteer Emission Reduction Strategy (TVERS) is an emission reduction plan currently being developed by the Tennessee Department of Environment and Conservation (TDEC) with support from various partners. This plan is funded through the U.S. Environmental Protection Agency's (EPA) [Climate Pollution Reduction Grant](#) (CPRG) program, which was established in the Inflation Reduction Act of 2022 (IRA). Through this program, funding is being provided to states, local governments, air pollution control agencies, tribes, and territories to develop and implement plans for reducing greenhouse gas (GHG) emissions and other harmful air pollutants. Tennessee is one of 47 states that accepted [allocated funding](#) to participate in this federally funded initiative, with TDEC as the state grant recipient. As part of this program, TDEC will work closely with the three municipalities in Tennessee who also received funding: Nashville, Memphis, and Knoxville.

More information is available in the About page below or in TDEC's approved [work plan](#) or our [informational flyer](#). See below for recent announcements and opportunities to get involved.



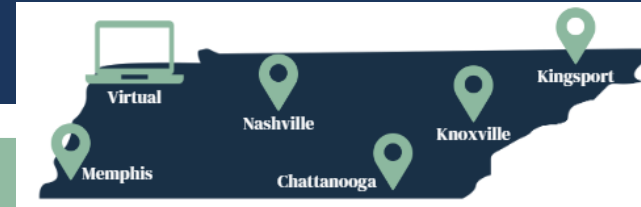
tdec.tvers@tn.gov



Signup for our listserv

- Individual Communication, Presentations, and Meetings with key stakeholders, environmental organizations, and relevant events

Public Meetings



Emission Reduction Sector Priorities



Motivations

Attendees discussed being motivated to reduce emissions out of concern for the **environment, future generations, personal and mental health, and community responsibility.**

Co-benefits

Attendees reported co-benefits including **improved air and water quality, public health, community resilience, transportation options, and green space** as most important.

Challenges

The primary challenges to reducing emissions included a **lack of government support, limited information, poor transportation infrastructure, and the high cost or inconvenience of sustainable alternatives.**

Current actions to reduce emissions

- Recycling and reducing waste
- Driving electric or hybrid vehicles
- Using alternative transportation, including transit and biking
- Using energy efficient appliances

In the community

- Energy efficiency incentives, programs and trainings
- Tree planting initiatives
- Investing in transit or greenways

Public Survey

WEST
152

MIDDLE
630

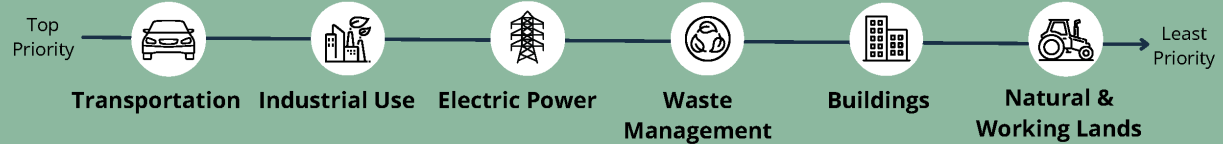
EAST
510

Home location (1,292 provided)

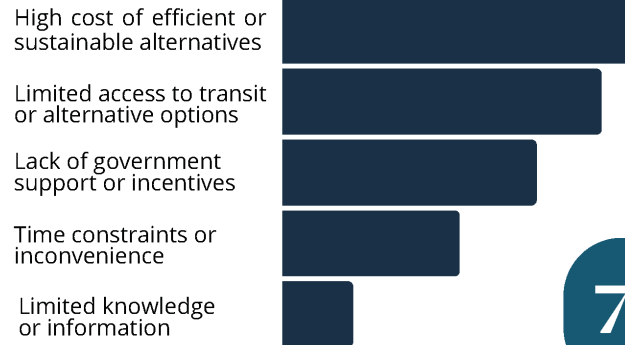
1,636 survey responses

38% of responses from low-income or disadvantaged communities

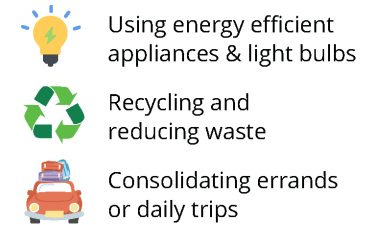
Emission Reduction Sector Priorities



Top challenges to implementing emission reduction actions



Top actions respondents take to reduce emissions



75%

of participants reported being motivated to take action out of concern for the environment and future generations

Reducing emissions can lead to additional benefits or potential costs. Survey participants reported the following as most important:

Benefits

- | | |
|----------------------------------|-------------------------------------|
| 1 Improved air and public health | 3 Community beautification |
| 2 Transportation improvements | 4 Housing and housing affordability |

Costs or Concerns

- | | |
|-------------------------------------|------------------------------------|
| 1 Increased cost of living | 3 Decrease in energy reliability |
| 2 Increased disparity or inequality | 4 Regulatory burden for businesses |

Intersection with Federal Funding

Deliverable Requirement:

- Encouraged element
- Identify other federal funding opportunities that support the implementation of PCAP measures

TDEC analyzed the following for funding opportunities:

- Bipartisan Infrastructure Law
- Inflation Reduction Act
- Tax Credits
- Other federal funding from EPA, DOE, USFA, USDA

Authority to Implement

Deliverable Requirement:

- Required element
- For each measure, the grant recipient must indicate if they have statutory or regulatory authority to implement
- If authority needs to be obtained, include schedule of milestones



- TDEC is focusing on voluntary or incentive-based activities that reduce emissions
- No new regulatory authority is sought in the plan



CPRG Implementation Grant

CPRG Implementation: Grant Overview

Phase 2

EPA is awarding approximately \$4.3 billion in competitive grants to eligible applicants to implement GHG reduction programs, policies, projects, and measures identified in a PCAP

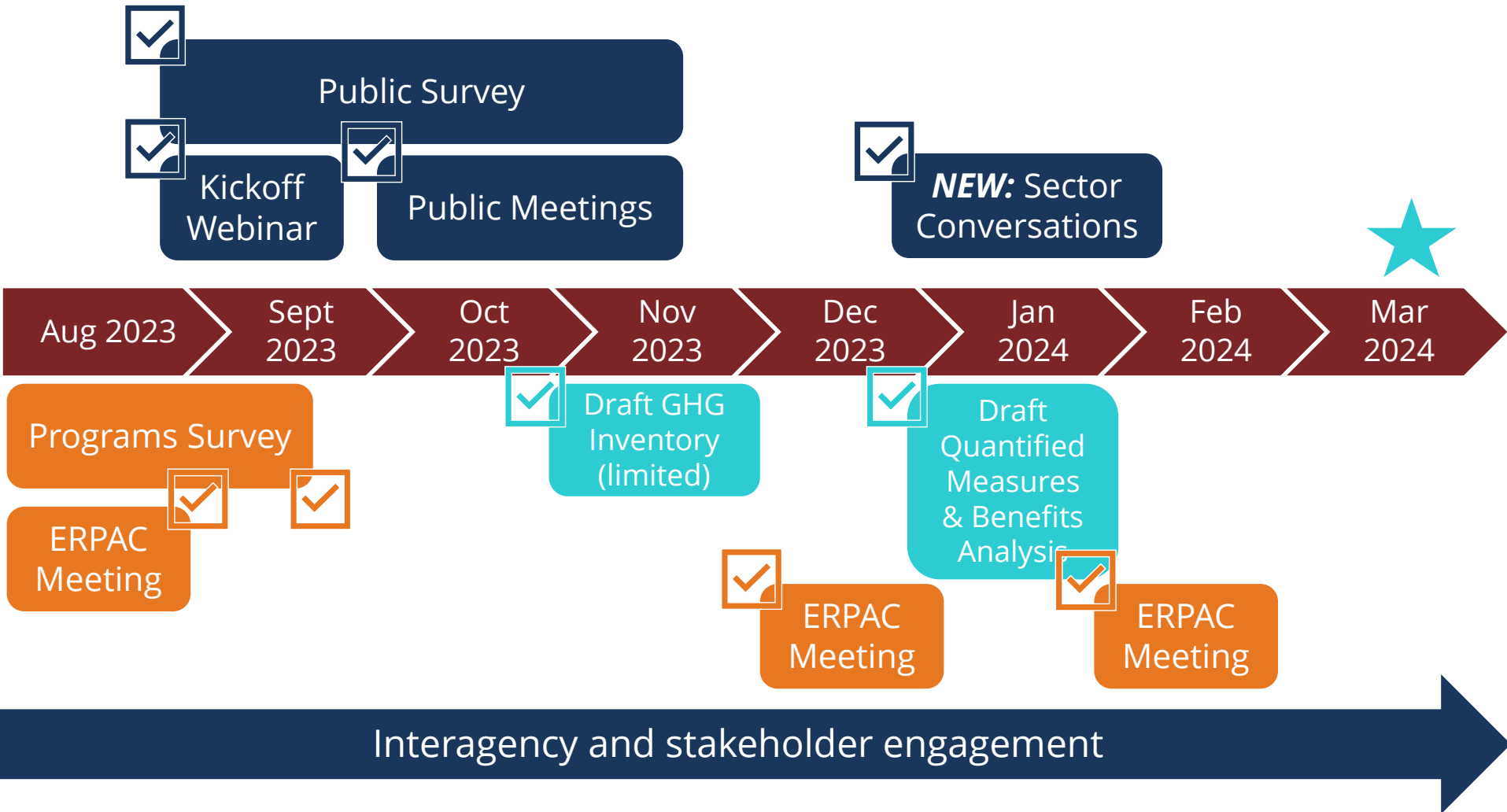
KEY DATES

September 20, 2023	NOFO: REQUEST FOR APPLICATIONS ISSUANCE
February 1, 2024	OPTIONAL NOTICE OF INTENT TO APPLY IS DUE
March 15, 2024	DEADLINE FOR SUBMITTING QUESTIONS
April 1, 2024	NOFO CLOSES – APPLICATIONS DUE BY 11:59 PM (ET)
July 2024	ANTICIPATED NOTIFICATION OF FUNDING SELECTION
October 2024	ANTICIPATED AWARD



Timeline and Next Steps

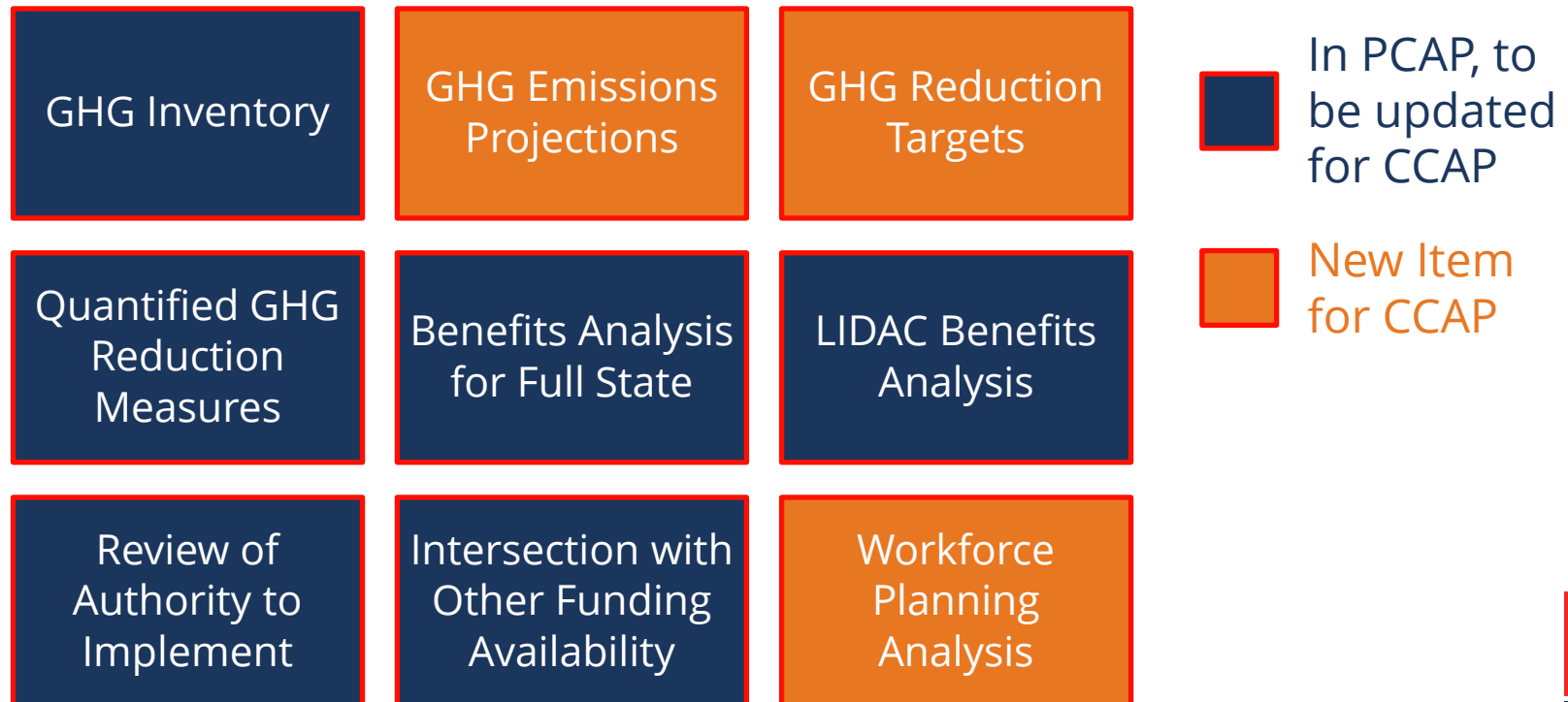
PCAP Timeline



Implementation Grant & CCAP Timeline

- April 1, 2024
 - Implementation Grant Applications Due to EPA
- June 29, 2025
 - Comprehensive Climate Action Plan (CCAP) Due to the EPA

The CCAP Must Include:

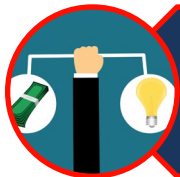


Next Steps & Action Items

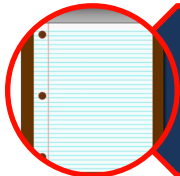
- Next ERPAC Meeting will be tentatively scheduled for September 2024
 - Moving to a bi-annual basis for the CCAP. Meetings slated for September 2024, March 2025, and September 2025.
 - We may schedule an additional meeting before our CCAP is due to the EPA (June 2025).
- Action Items and Key Dates



March 1, 2024
Priority Climate Action Plan Due



April 1, 2024
CPRG Implementation Grant Applications Due



June 29, 2025 (*tentative*)
Comprehensive Climate Action Plan Due

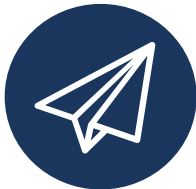
Questions?



tn.gov/environment/policy/tvers.html



tdec.tvers@tn.gov



Signup for our listserv