Maryland
Department of
the Environment

Understanding Impacts of COVID-19 on Transportation
Analysis from the Transportation and Climate Initiative
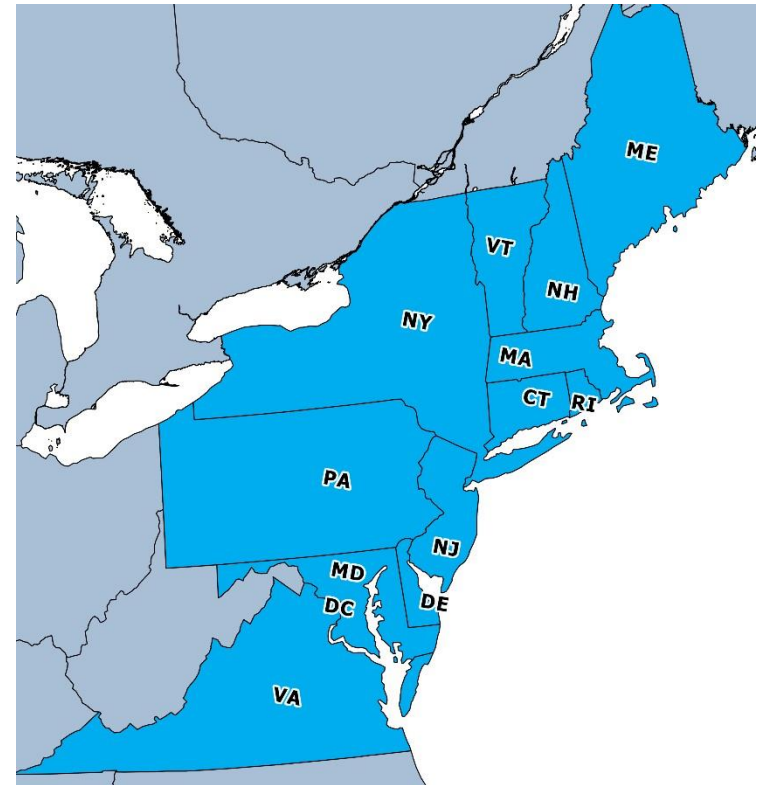
PJM Roundtable

November 18, 202

OVERVIEW OF TCI & BENEFITS MODELING

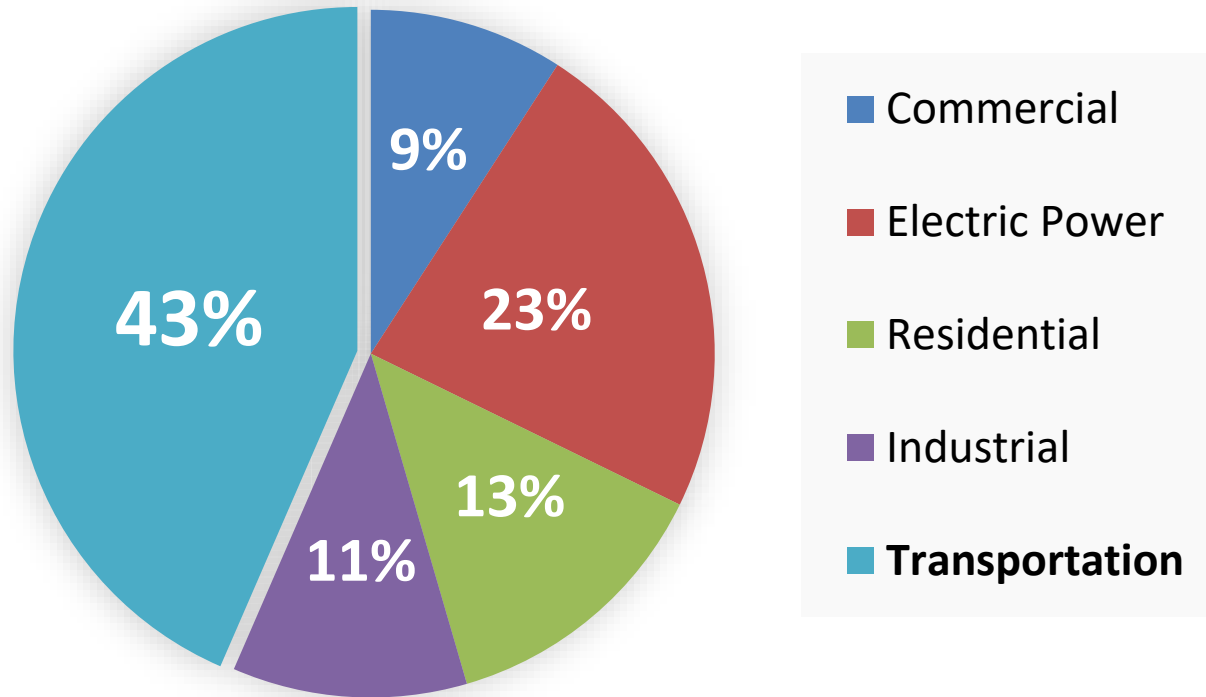# The Transportation and Climate Initiative

- Collaboration among 12 jurisdictions.

- Developing potential regional clean transportation policy

- Modeled on successful Regional Greenhouse Gas Initiative (RGGI)
  - "Cap-and-Invest"

Transportation is the Largest Source of Carbon Pollution in the TCI Region

**Sources of Carbon Dioxide Emissions
in the TCI Region**

Legend:
- Commercial — 9%
- Electric Power — 23%
- Residential — 13%
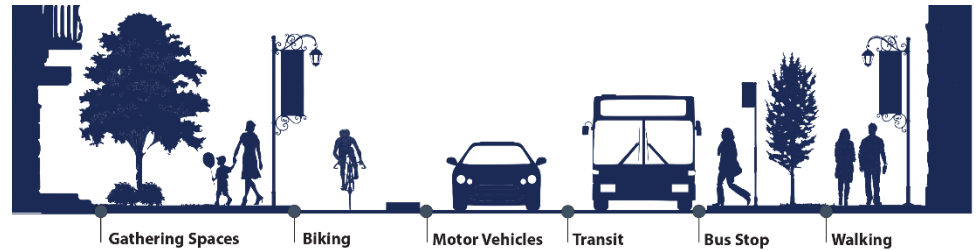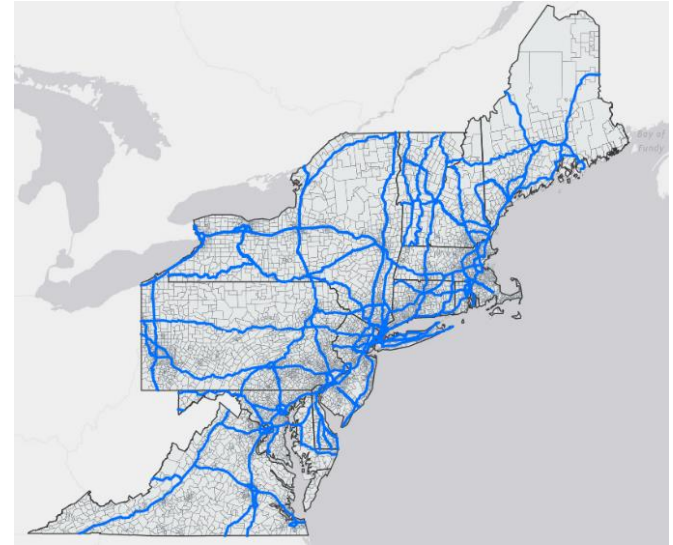- Industrial — 11%
- **Transportation** — 43%

2017 Data, U.S. Energy Information Administration

Scale of the TCI Opportunity

- 72 million people

- $5.3 trillion in GDP

- 52 million registered vehicles

- Modeled TCI cap would cover more than three times the carbon pollution covered by RGGI cap

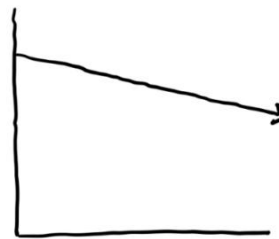Gathering Spaces | Biking | Motor Vehicles | Transit | Bus Stop | Walking

Features of Regional Cap & Invest Approach

- Guarantees Pollution Reduction

- Regional Consistency of Allowance Prices

- Offers Flexibility in Compliance

- Drives Innovation and Investments in Low Carbon Transportation Programs
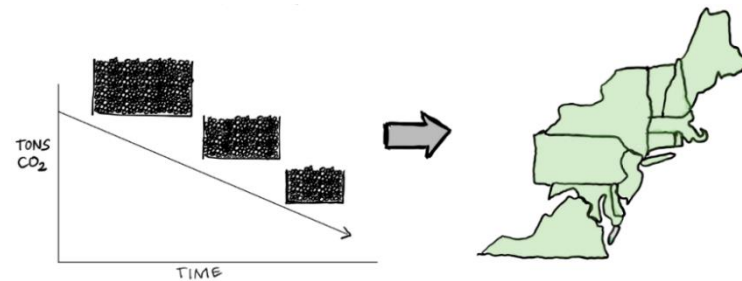
Questions for TCI Analysis

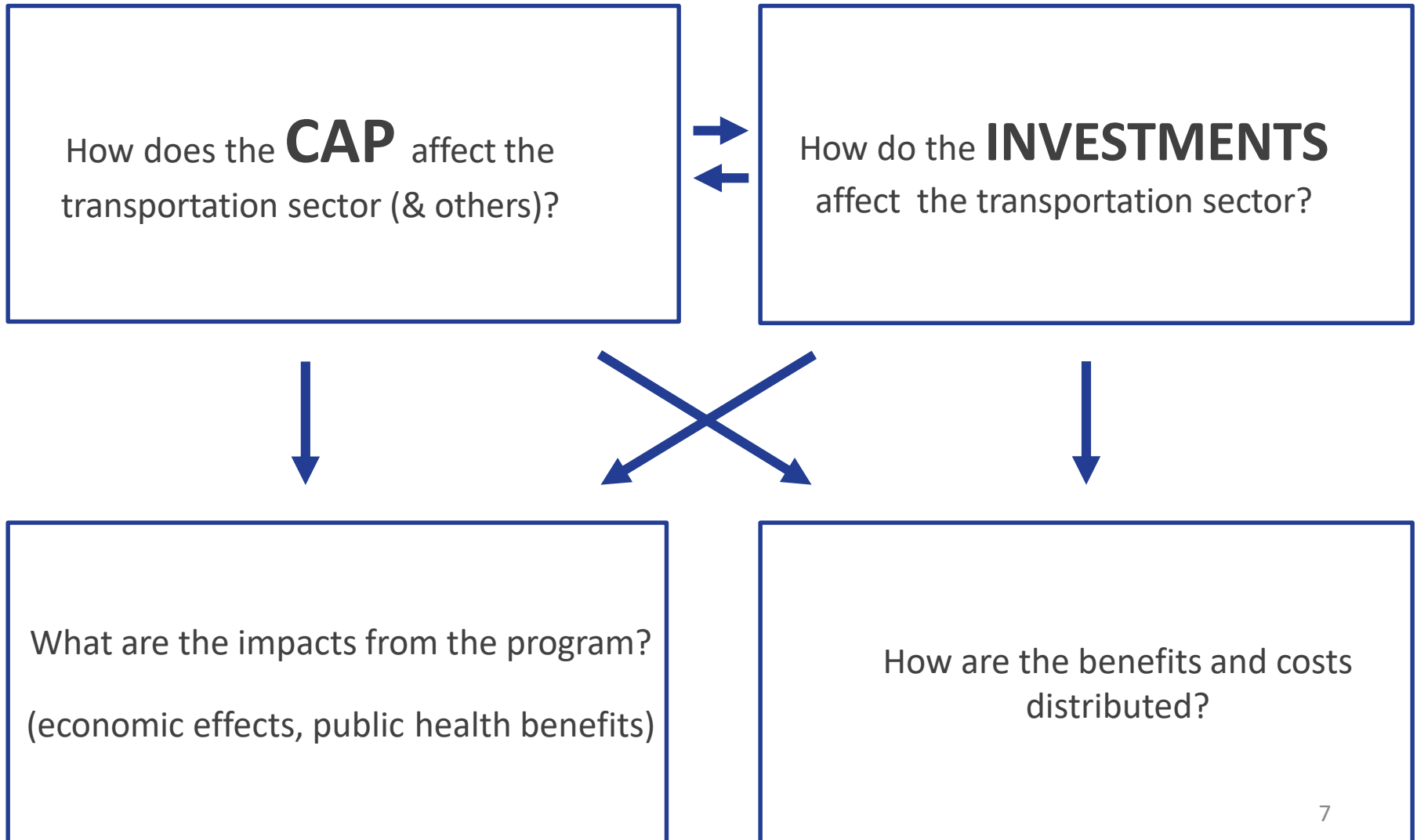How does the **CAP** affect the transportation sector (& others)?

How do the **INVESTMENTS** affect the transportation sector?

What are the impacts from the program?

(economic effects, public health benefits)

How are the benefits and costs distributed?

Modeling Cap Reduction Scenarios

All policy scenarios assume a regional CO_2 emissions cap is applied to the fossil portion of motor gasoline and on-road diesel combusted in vehicles (e.g., light-duty cars and trucks, commercial light trucks, freight trucks, and buses).

Model Run	Projected Emissions
Reference Case (*No TCI Policy*)	19% CO_2 reductions from 2022 to 2032
Policy Cases with multiple investment portfolios	
Policy: 20% Cap Reduction	20% CO_2 reductions from 2022 to 2032
Policy: 22% Cap Reduction	22% CO_2 reductions from 2022 to 2032
Policy: 25% Cap Reduction	25% CO_2 reductions from 2022 to 2032

Illustrative Portfolios of Clean Transportation Investments

	A	B*	C	
	5%	**30%**	**54%**	Electric cars, light trucks and vans
	21%	**23%**	**27%**	Low & zero-emission buses and trucks
	35%	**18%**	**-**	Transit expansion and upkeep
	16%	**14%**	**10%**	Pedestrian and bike safety, ride sharing
	7%	**8%**	**8%**	System efficiency
	17%	**8%**	**-**	Indirect/ Other

*Scenario B is the illustrative portfolio used for most TCI cap reduction scenarios, including those used as the basis for economic and health benefit analysis.

Estimated Benefits From TCI Program *(in 2032)*

Macroeconomic

↑ GDP ~ $0.7 B to $3 B
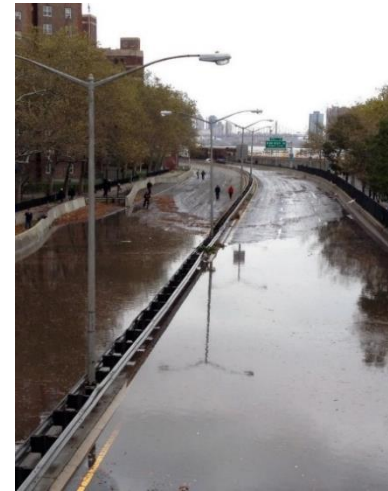
↑ Income ~ $0.5 B to $2 B

↑ Jobs ~ 2 K to 9 K

Public Health

$3 - $10 B (preliminary)

↓ Premature deaths

↓ Asthma symptoms
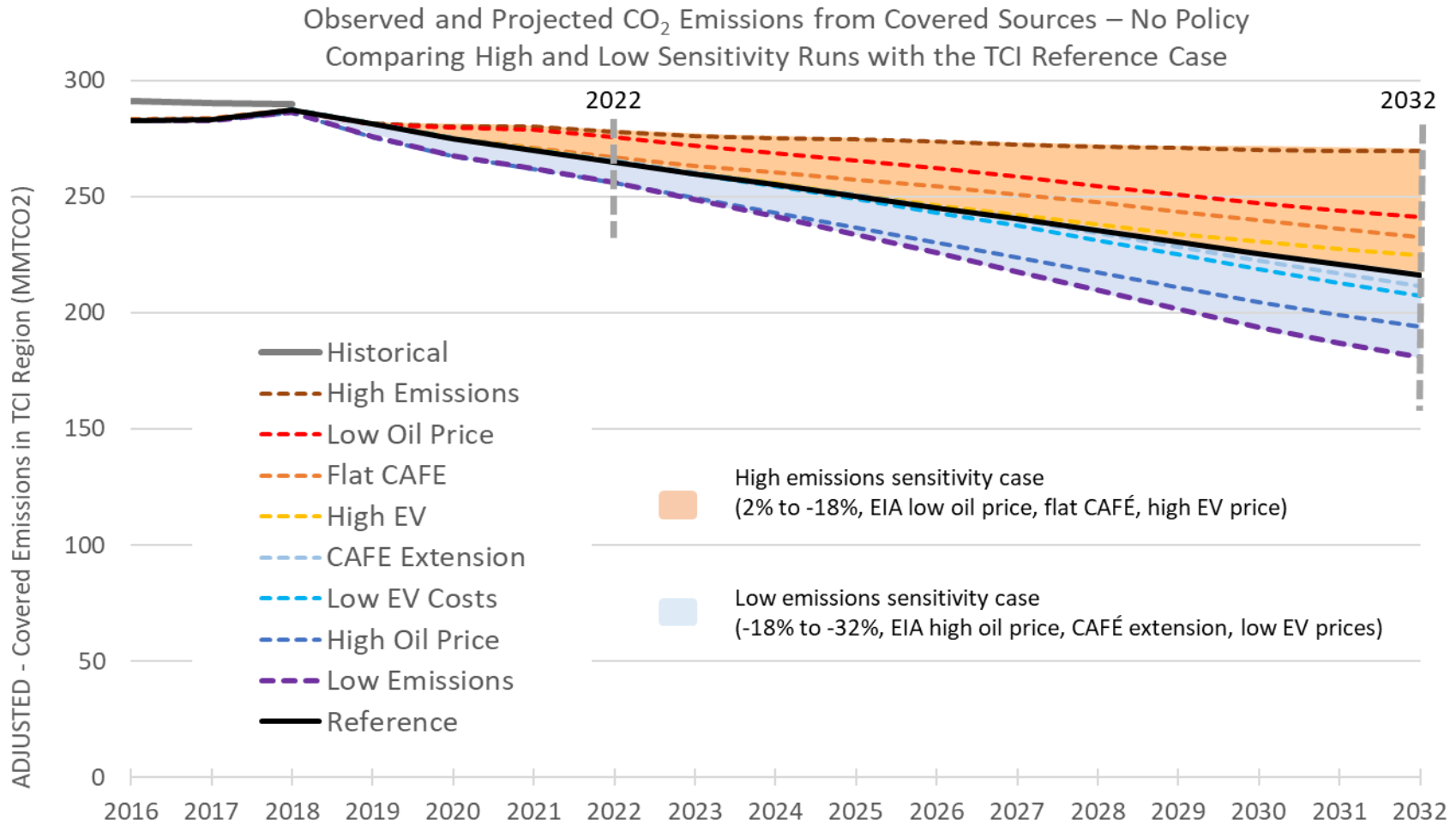
↓ Traffic-related injuries

Avoided Climate Damages

$249 M – $892 M

Exploring Uncertainty in a No-TCI future
NEMS Modeling performed by OnLocation, Inc

Observed and Projected CO_2 Emissions from Covered Sources – No Policy
Comparing High and Low Sensitivity Runs with the TCI Reference Case

Legend:
- Historical
- High Emissions
- Low Oil Price
- Flat CAFE
- High EV
- CAFE Extension
- Low EV Costs
- High Oil Price
- Low Emissions
- Reference

High emissions sensitivity case
(2% to -18%, EIA low oil price, flat CAFÉ, high EV price)

Low emissions sensitivity case
(-18% to -32%, EIA high oil price, CAFÉ extension, low EV prices)

Y-axis: ADJUSTED - Covered Emissions in TCI Region (MMTCO2)

Observations
- The oil price sensitivity cases result in the greatest change in projected "BAU" emissions
- Federal vehicle standard rollbacks are also projected to have a material impact

COVID-19 IMPACTS ANALYSIS

COVID-19 Scenario Assumptions

COVID-19 scenarios explored three main variables:

- **Economic recession.** All COVID-19 scenarios use macroeconomic inputs to reflect recession conditions in the transportation and industrial modules.

- **Oil Prices**:
  - Two of the recession scenarios use the AEO2018 low oil price scenario.
  - One of the recession scenarios uses the same oil prices as the TCI Reference Case.

- **Personal light duty vehicle (LDV) vehicle miles traveled (VMT):** Two VMT scenarios are developed to reflect a range of possible behavioral responses to the pandemic, primarily relating to changes in public transit use, telecommuting and working from home.

|	COVID High	COVID Low-1	COVID Low-2
Macroeconomic	Recession	Recession	Recession
Oil Prices	AEO 2018 Low	AEO 2018 Low	AEO 2018 Reference
Personal LDV VMT	High	Low	Low

13

COVID-19 Macroeconomic Assumptions

Personal Income Per Adult Capita
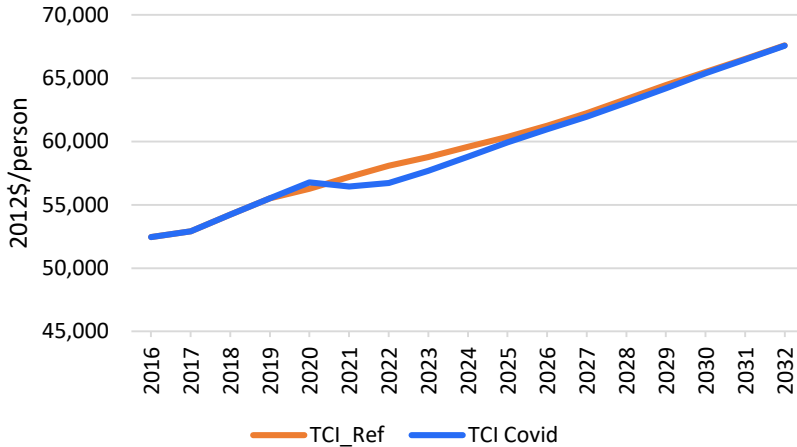
- Personal income, employment, vehicles sales (LDV and HDV), and industrial production were modified to reflect the May IHS Markit projections that include the recessionary impacts of the pandemic.

  - The IHS growth rates were applied starting in 2019 to account for slight differences between historical data used by IHS & NEMS.

Light Duty Vehicle (LDV) Sales
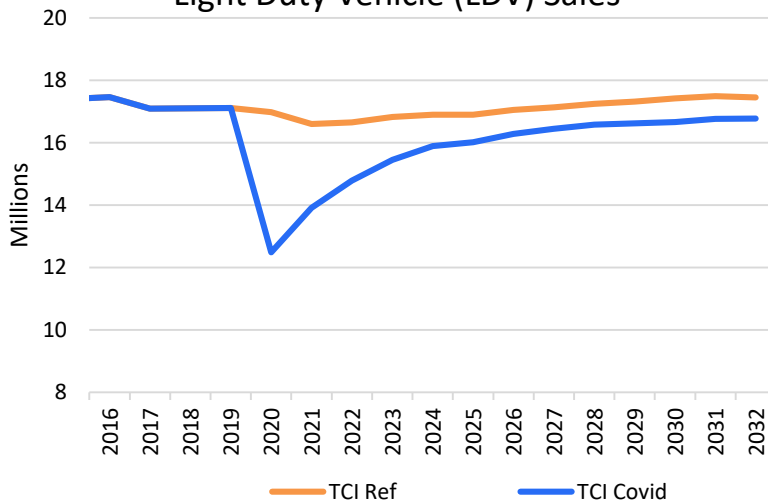
### Total Industrial Production

14
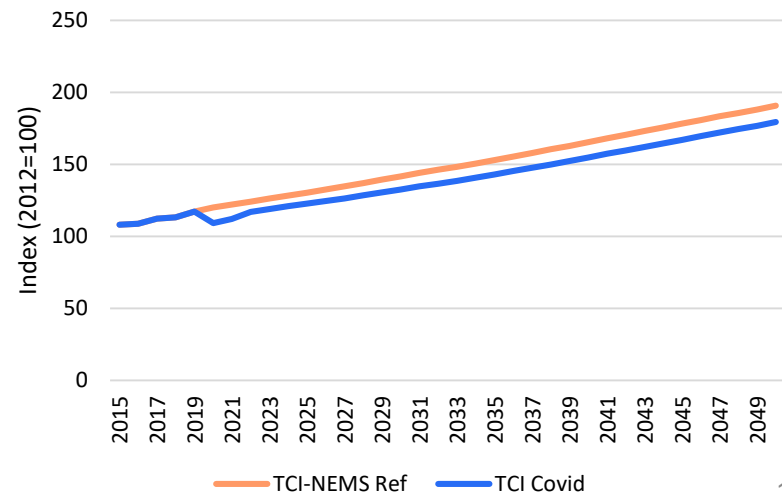
Personal LDV VMT Adjustments

- The trajectory for the personal light duty vehicle (LDV) LDV vehicle miles traveled (VMT) adjustment for the high and low COVID scenarios are below.

    - The 2020 adjustments are applied to EIA's short-term forecast for gasoline consumption

|	2020	2021	2022	2023	2024	2025	2026	2027	2028
Low	-8%	-2.7%	-2.5%	-2.2%	-1.8%	-1.5%	-1.1%	-0.8%	-0.8%
High	-8%	-2.2%	-1.2%	-0.1%	1.0%	2.2%	3.3%	4.4%	4.4%

Change in Personal LDV VMT
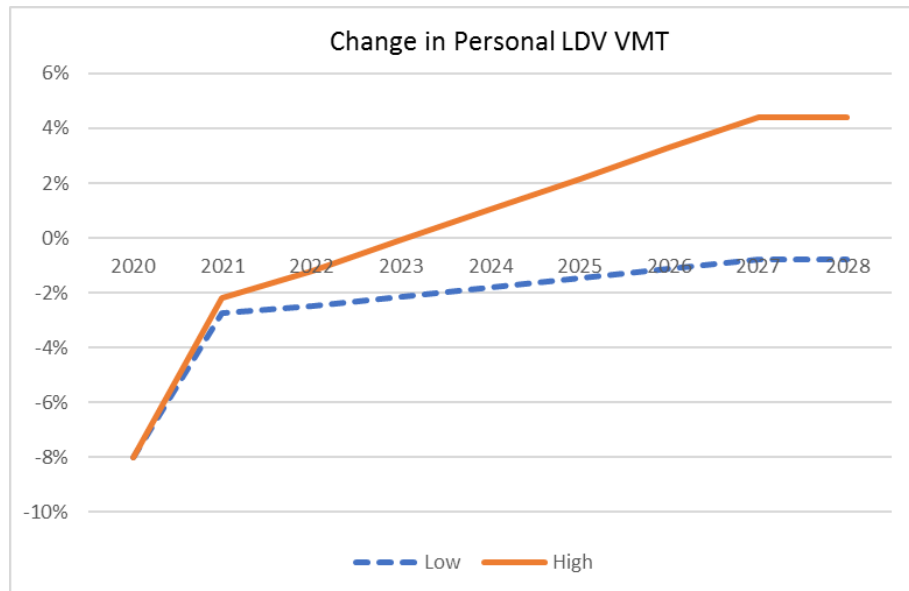
COVID-19 Sensitivity Results
Reference Case Oil Prices

- The macroeconomic effect of the COVID-19 recession and the Low VMT scenario assumptions contribute to persistent, low emissions
- Both cases include the same oil prices (AEO 2018 Reference case)

Projected CO2 Emissions from TCI Region - No Policy

NEMS modeling performed by OnLocation, Inc.
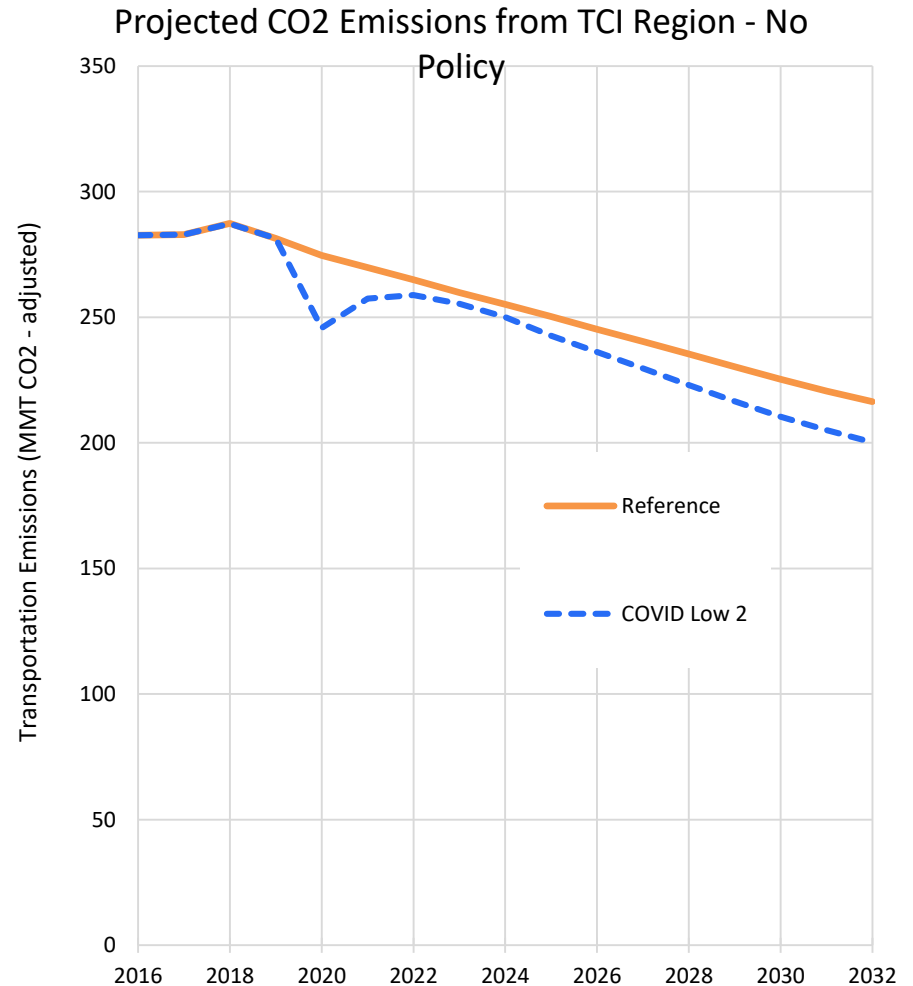
COVID-19 Sensitivity Results
Low Oil Prices

- The macroeconomic effect puts long-term downward pressure on emissions.

- Personal VMT assumptions affect the projected emissions either up or down, depending on the scenario.

- All three scenarios include the same, low oil prices (AEO 2018 low oil price side case)

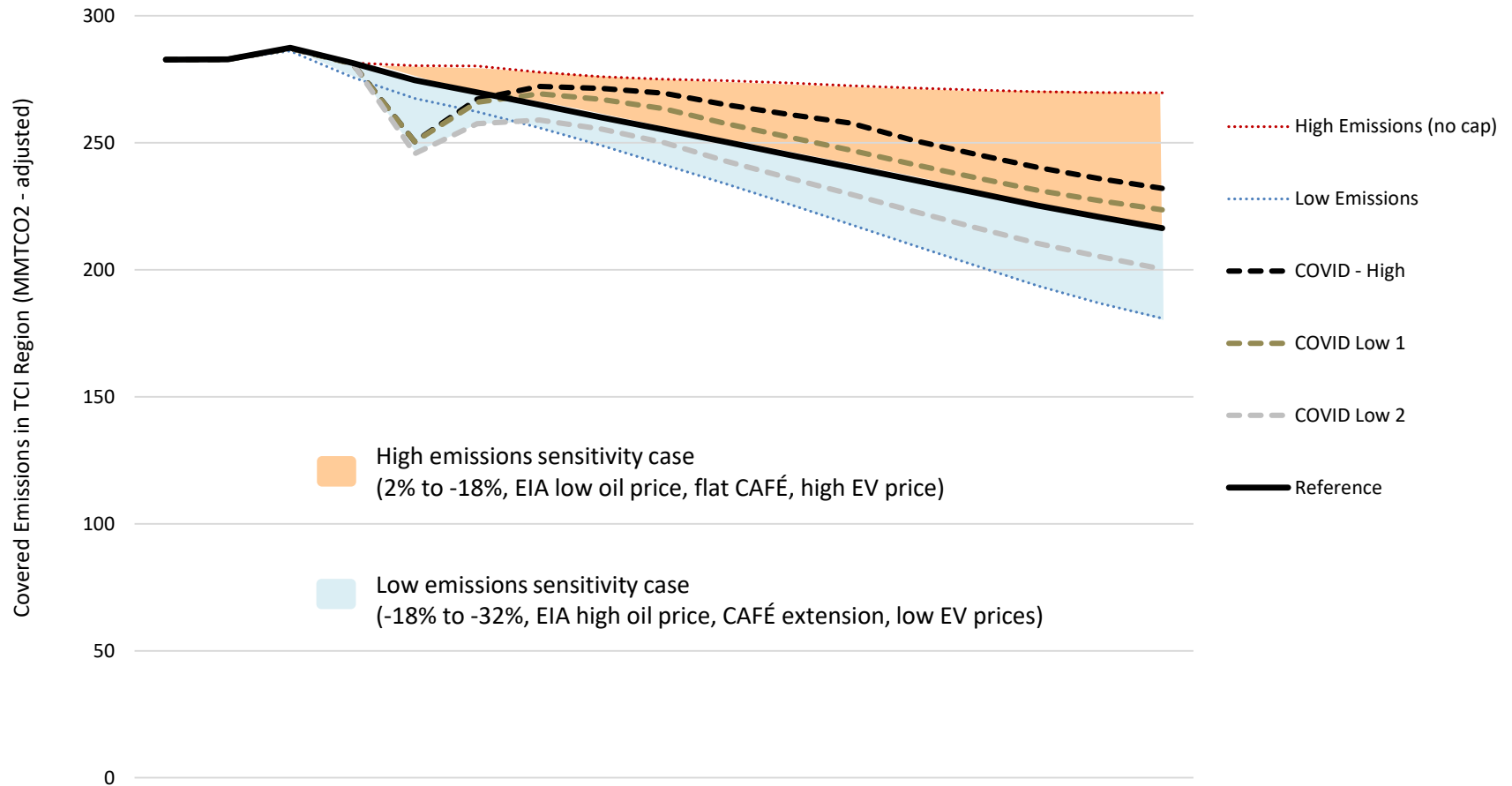Projected CO2 Emissions from TCI Region - No Policy

NEMS modeling performed by OnLocation, Inc.
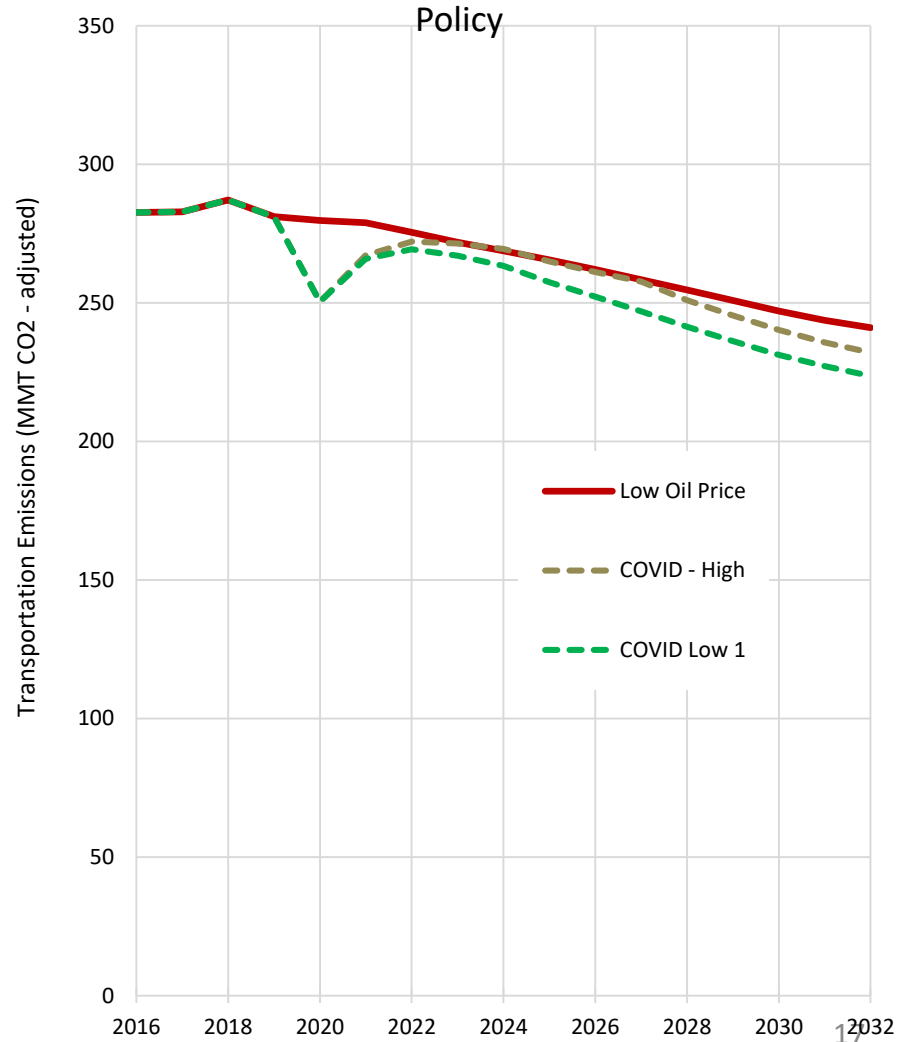
Projected Transportation CO$_2$ Emissions
Range of sensitivity analysis, with no policy

Covered Emissions in TCI Region (MMTCO2 - adjusted)

Legend:
- High Emissions (no cap)
- Low Emissions
- COVID - High
- COVID Low 1
- COVID Low 2
- Reference

High emissions sensitivity case
(2% to -18%, EIA low oil price, flat CAFÉ, high EV price)

Low emissions sensitivity case
(-18% to -32%, EIA high oil price, CAFÉ extension, low EV prices)

Observations:

- COVID recession scenarios are generally within the range of uncertainty that we had previously modeled
- In absence of new policy, pandemic could lead to range of emissions impact, depending on: pace of recovery; direction and durability of behavioral changes; and duration of gas price impacts.

ELECTRICITY SECTOR ANALYSIS

Electricity Sector Analysis

- Electrification reduces transportation emissions, but increases electricity emissions

- Our **NEMS** modeling accounts for electricity impacts, but the model's geography does not work as well for state-level analysis

- We turned to **IPM** for a second opinion, as it is better at "seeing" state borders
  - IPM is the "model of record" for RGGI

- The IPM results evaluate the electricity sector impact from the incremental electricity demand in TCI policy cases due to greater electric vehicle deployment

- Results available for:
  - TCI 22% case with no RGGI participation in Pennsylvania
  - TCI 25% case with no RGGI participation in Pennsylvania
  - TCI 25% case with RGGI participation in Pennsylvania
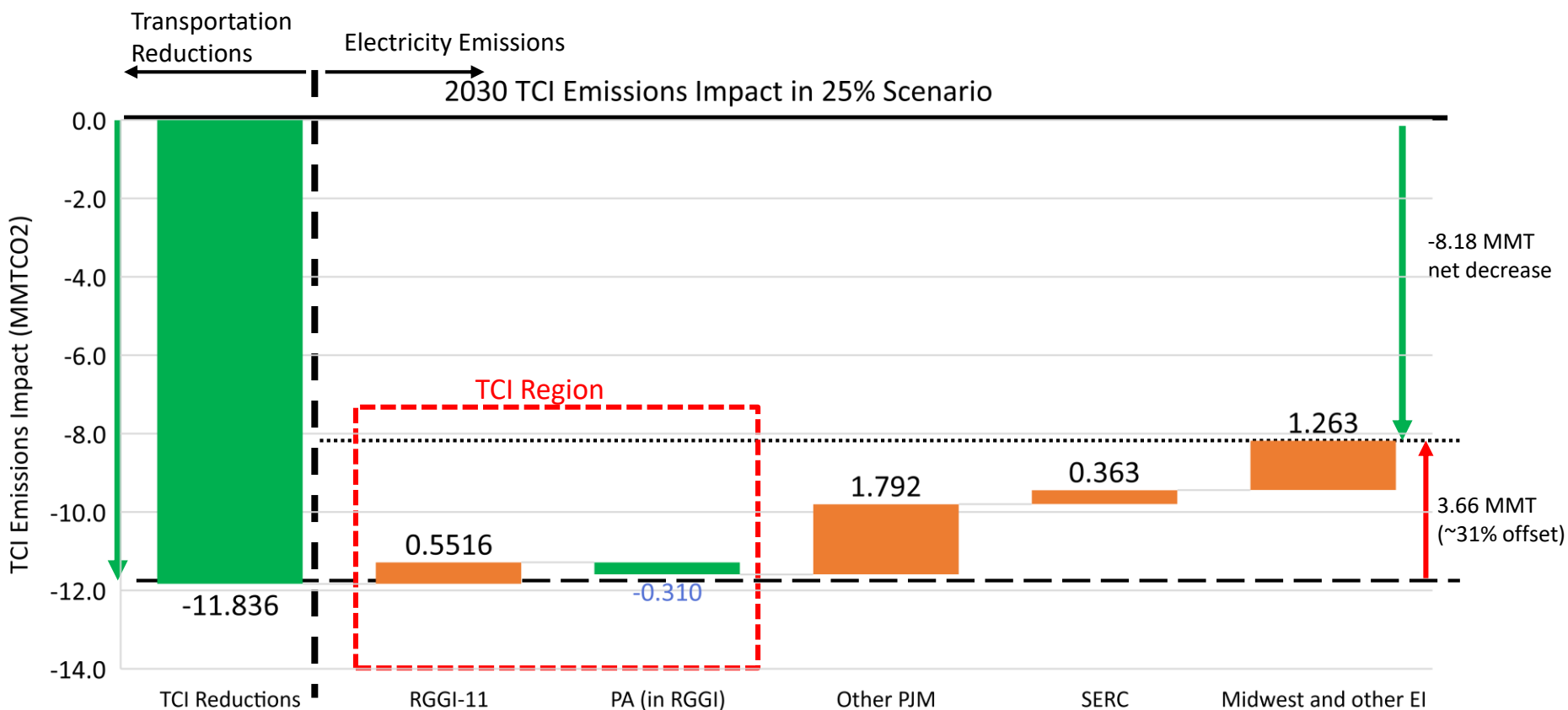
  All run under investment portfolio B

2030 CO$_2$ Impacts in 25% TCI Cap Scenario (ICF Electricity Analysis)
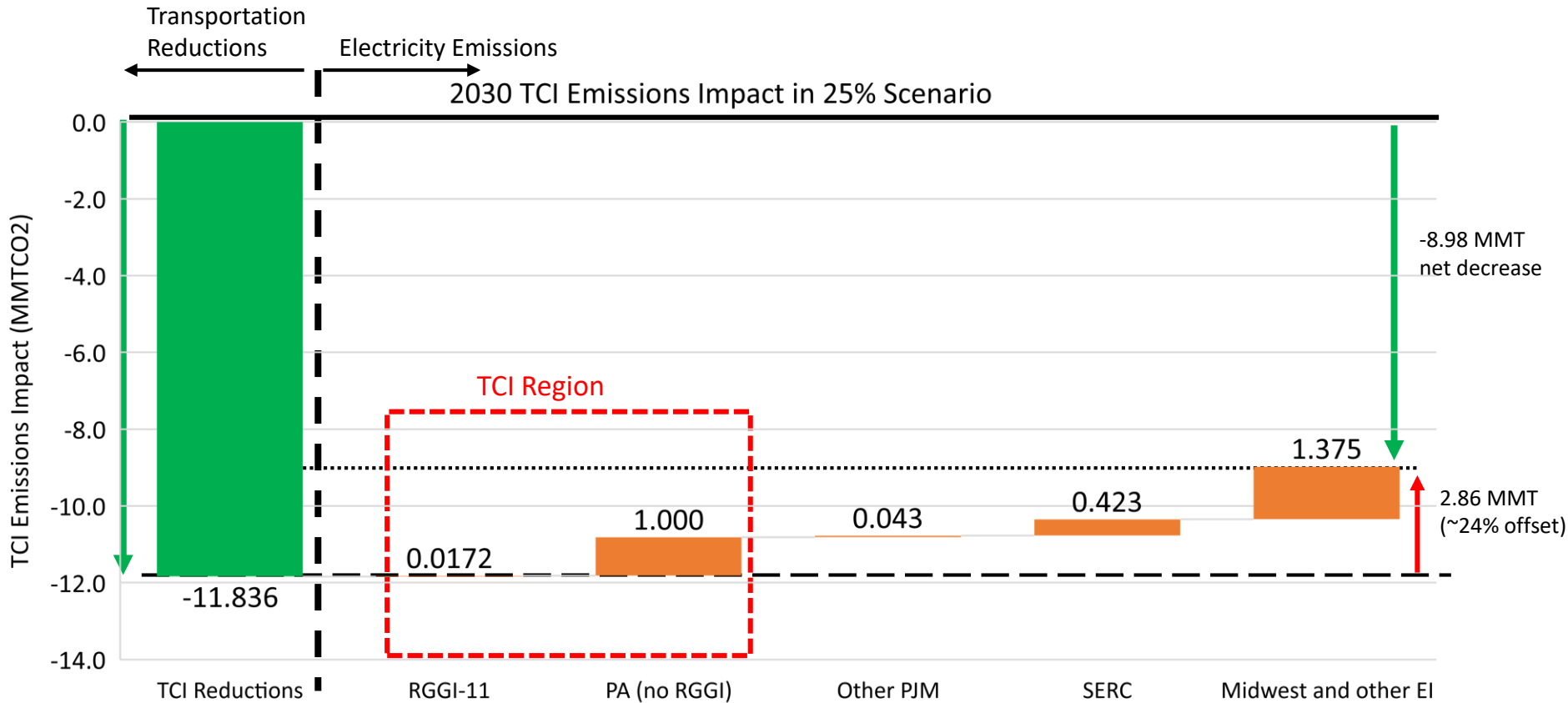
2030 CO$_2$ Impacts in 25% TCI Cap Scenario w/ PA in RGGI (ICF Electricity Analysis)

Key Takeaways from Electricity Analysis

- Electrification causes some electricity emissions increase

- Electricity CO_2 Increases are modest compared to TCI reductions
  - Extremely uncertain, depending on future market and policy drivers for electricity
  - Changes in modeling are very small, so model uncertainty is especially high

- In IPM modeling of 22 & 25% cases, electricity CO_2 increases are
  - Equal to ~7.2 to 8.6% of TCI reductions in TCI region (with no PA RGGI);
  - Equal to 2% of reductions in the TCI region with PA in RGGI
  - Equal to up to ~24 to 31% of TCI reductions across entire Eastern Interconnection (EI)
  - Most increases occur far outside of TCI and RGGI, in states without robust clean energy programs
    - ***These estimates assume no improvement in national clean energy policy or state/regional programs outside of TCI***

For More Information

To see detailed modeling results, webinar recordings, and other program materials, or to submit or view comments, visit:

transportationandclimate.org

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