Maryland PATHWAYS

In-and-Out Scenarios

September 13, 2021

Energy+Environmental Economics

Charles Li, Managing Consultant
Tory Clark, Director

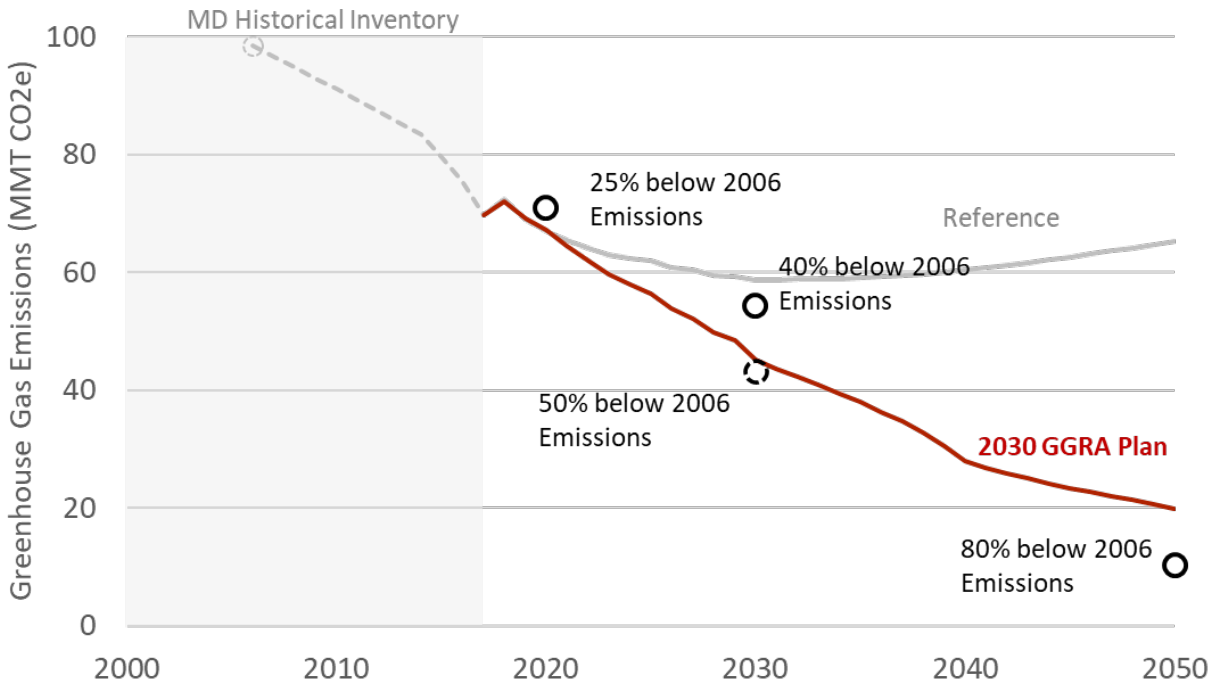
Agenda

- Background
- In-and-Out scenario narratives
- GHG results by scenario
- Summary

Background

- **In early 2021, MDE released the 2030 GGRA Plan**
  - The Plan achieves 49% reduction in statewide gross greenhouse gas emissions from 2006 levels by 2030 (54% reduction in net GHG emissions)
- **E3 previously presented two sensitivity scenarios designed by MDE to reflect different levels of potential federal actions**
- **MDE further designed five in-and-out scenarios, to evaluate the impact of key state policies and measures that will help Maryland achieve the near-term GHG reduction goal in the 2030 GGRA Plan**
- **Today's presentation focuses on E3's modeling of Maryland's GHG emissions projection under the five in-and-out scenarios using the PATHWAYS model**

MD Net GHG Emissions Results for the 2030 GGRA Plan



Notes:
- The goal of 50% reduction by 2030 is not required by the GGRA law, but it is what the state pursues in the recently released 2030 GGRA Plan.
- GGRA accounting measures reductions on a gross emissions basis. If accounting is done on a net basis (e.g. emissions measured net of land sinks) in line with the Biden Administration targets, net GHG emissions are reduced by 54%.

In-and-Out Scenario Narratives

- The five in-and-out scenarios evaluate the impact of **state policies and measures** on GHG emissions from key sectors
- To model these five scenarios, we **revert key policies and measures to the Reference assumptions** as shown in the table below

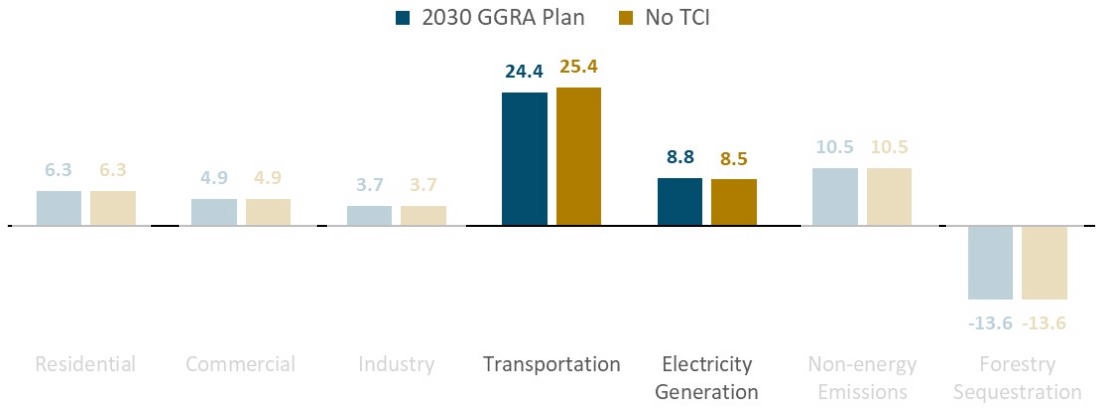
Scenario	Narrative
No TCI	What if the Transportation and Climate Initiative (TCI) proceeds are not available to increase electric vehicle sales and reduce vehicle miles traveled or vehicle fuel consumptions
No EMPOWER	What if the EMPOWER building efficiency program is discontinued after 2023 and there is no other energy efficiency measures for buildings and industry from the 2030 GGRA Plan
No Building Decarbonization	What if levels of building electrification and building shell improvement revert to Reference levels
No MHDV Electrification	What if there is no electrification of medium-and-heavy-duty vehicles
No CARES	What if CARES does not take effect and electric sector policy reverts to 50% RPS goal by 2030 from Reference Scenario

GHG Results by Scenario

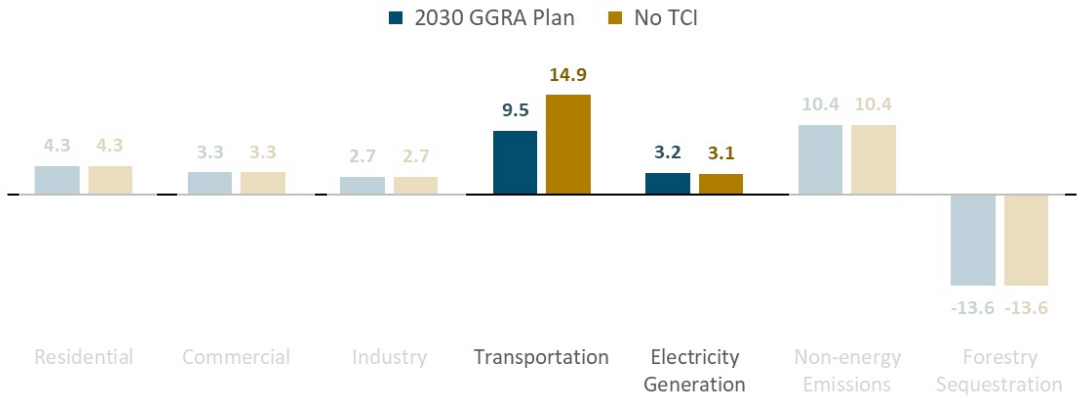
Energy+Environmental Economics

TCI In-and-Out Results

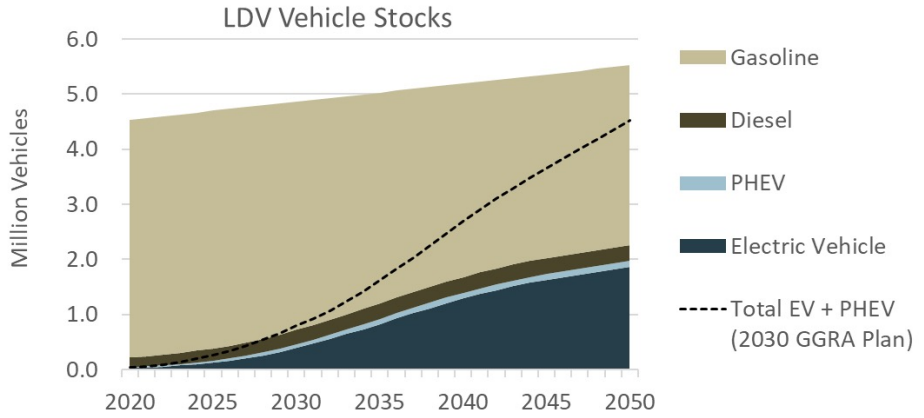
2030 GHG Emissions (MMT CO2e)



2050 GHG Emissions (MMT CO2e)



+ Without investments of TCI proceeds, **more vehicle miles traveled**, **higher vehicle fuel consumption** and **fewer electric light-duty vehicles** all increase GHG emissions, especially in the long term

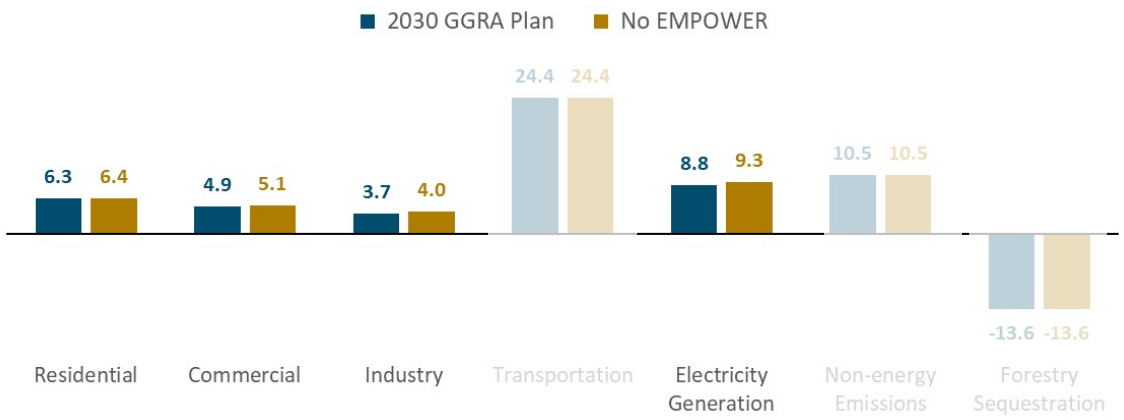


Total Net GHG Emissions (MMT CO2e)

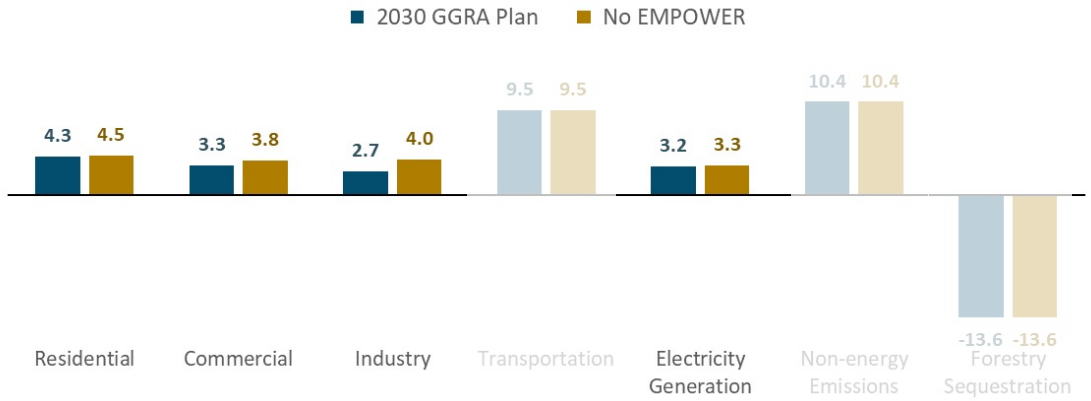
	2030 GGRA Plan	No TCI	Difference relative to GGRA
2030	45.1	45.7	+0.6
2050	19.9	25.2	+5.3

EMPOWER In-and-Out Results

2030 GHG Emissions (MMT CO2e)

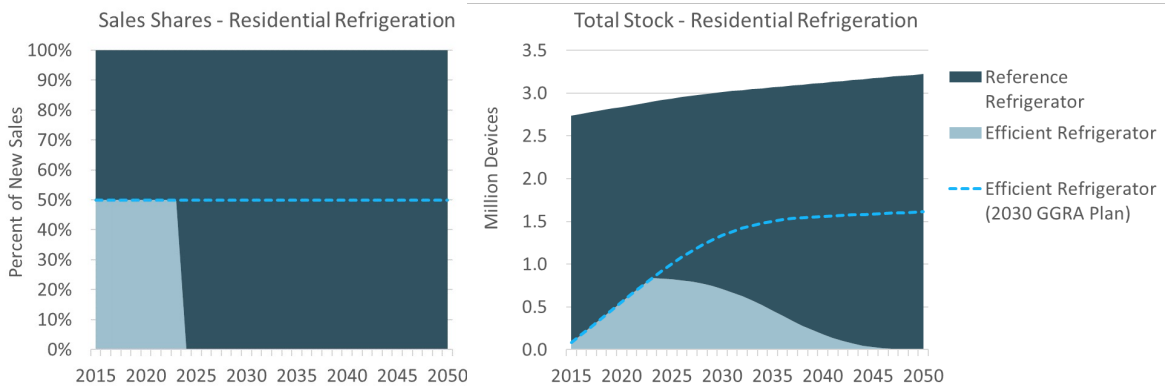


2050 GHG Emissions (MMT CO2e)



+ End of the EMPOWER building efficiency program and absence of other energy efficiency measures for buildings and industry result in **lower adoption of efficient appliances, smart devices and behavioral conservation**, and increases GHG emissions over time

Example Efficient Device Sales and Stock

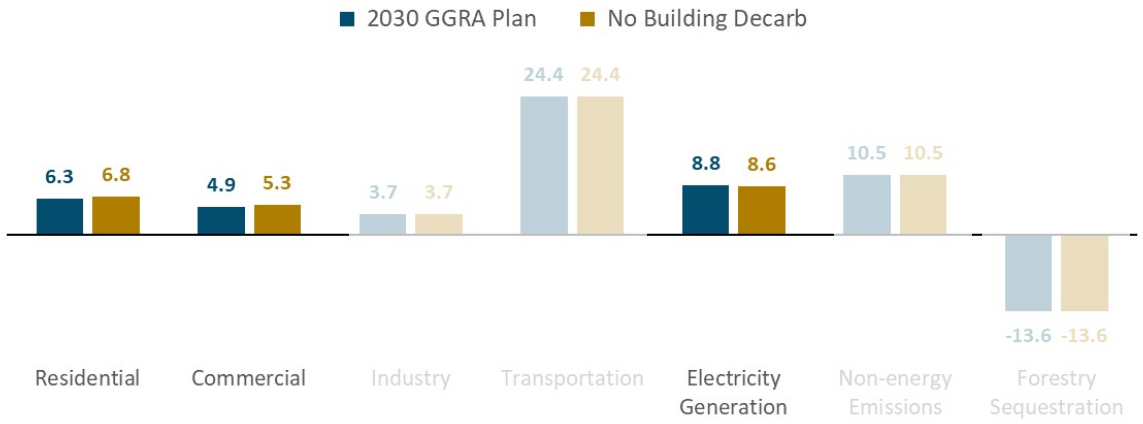


Total Net GHG Emissions (MMT CO2e)

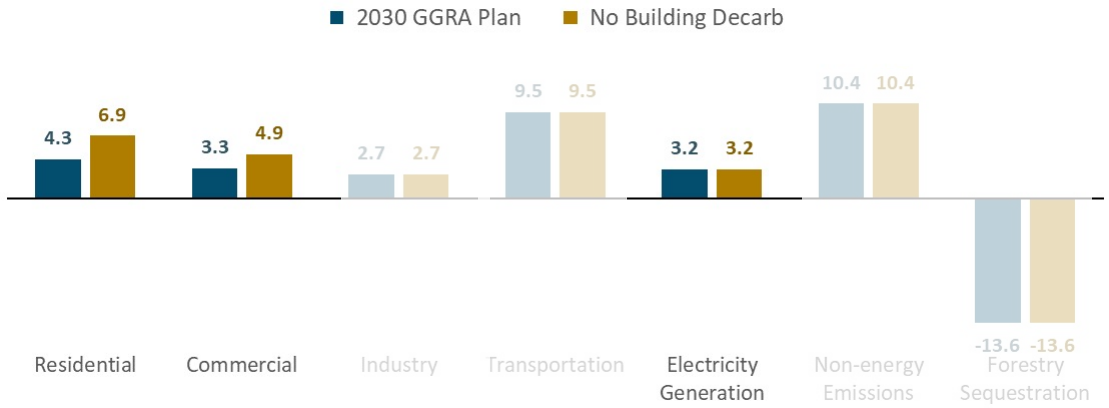
	2030 GGRA Plan	No EMPOWER	Difference relative to GGRA
2030	45.1	46.2	+1.1
2050	19.9	22.0	+2.1

Building Decarbonization In-and-Out Results

2030 GHG Emissions (MMT CO2e)

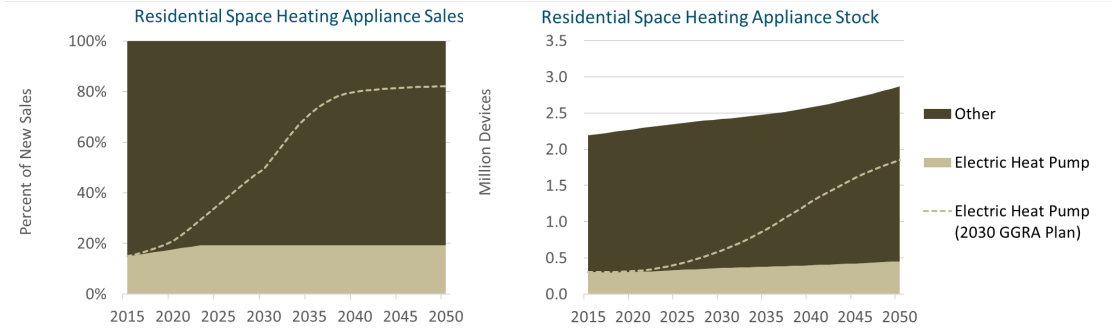


2050 GHG Emissions (MMT CO2e)



- Lower levels of building electrification and building shell improvement result in **increased fossil fuel consumptions and GHG emissions over time from Maryland buildings**
- E3 is conducting a separate study that takes building emissions to net zero by 2045, beyond what was assumed in the 2030 GGRA Plan; the study will lead to the Building Energy Transition Plan

Residential Space Heating Device Sales and Stock

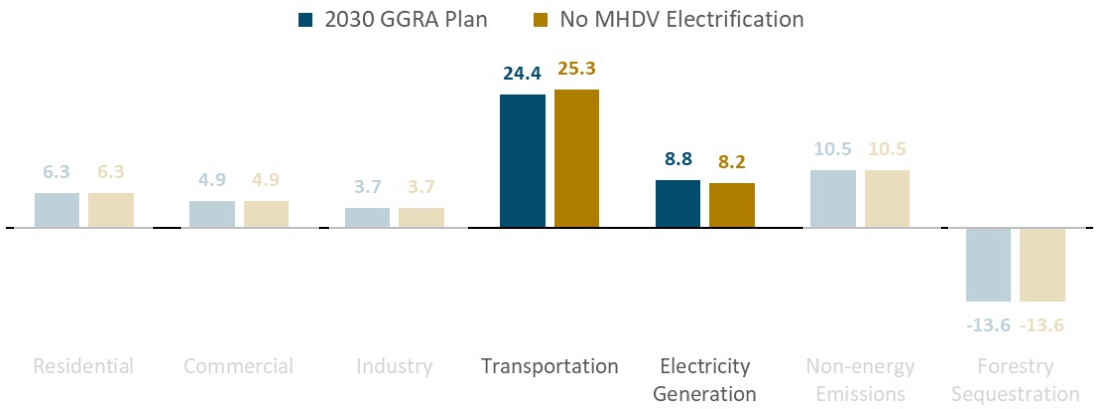


Total Net GHG Emissions (MMT CO2e)

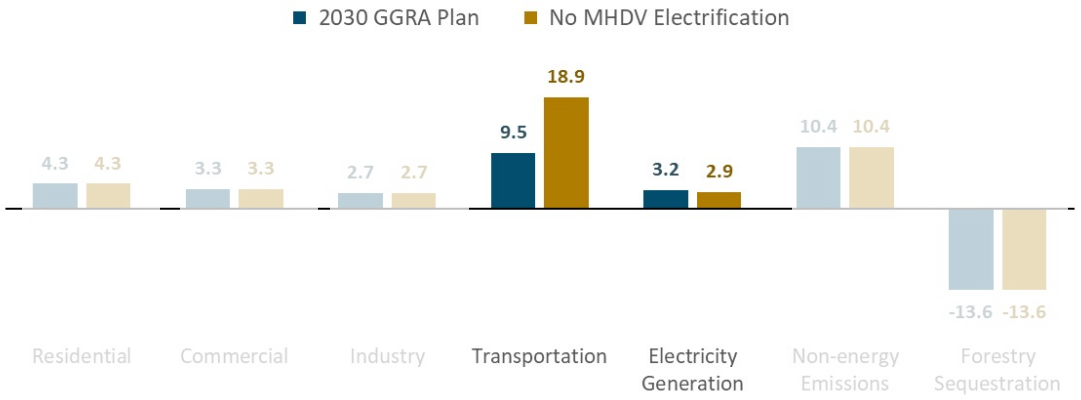
	2030 GGRA Plan	No Building Decarb	Difference relative to GGRA
2030	45.1	45.7	+0.6
2050	19.9	24.1	+4.2

MHDV Electrification In-and-Out Results

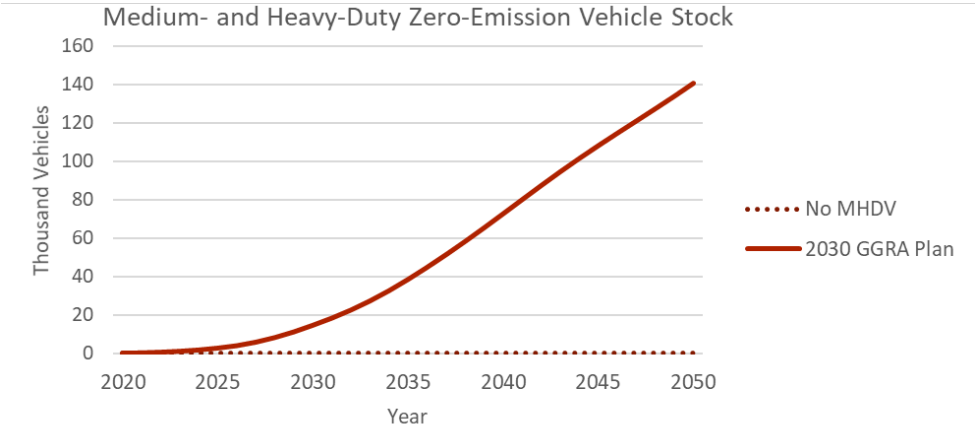
2030 GHG Emissions (MMT CO2e)



2050 GHG Emissions (MMT CO2e)



+ With no electrification of medium-and-heavy-duty vehicles, **Maryland would have higher consumption of fossil fuels, mainly diesel, increases GHG emissions, especially in the long term**

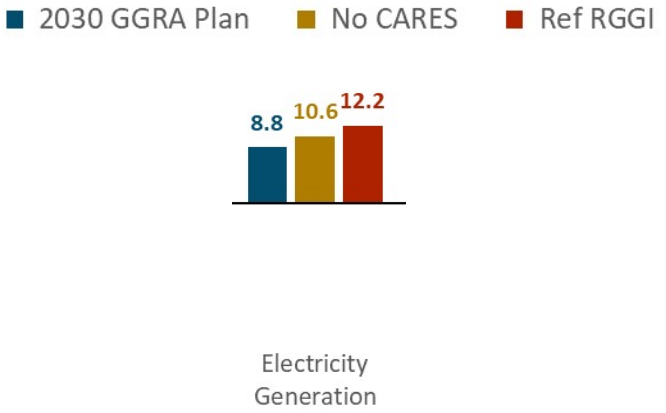


Total Net GHG Emissions (MMT CO2e)

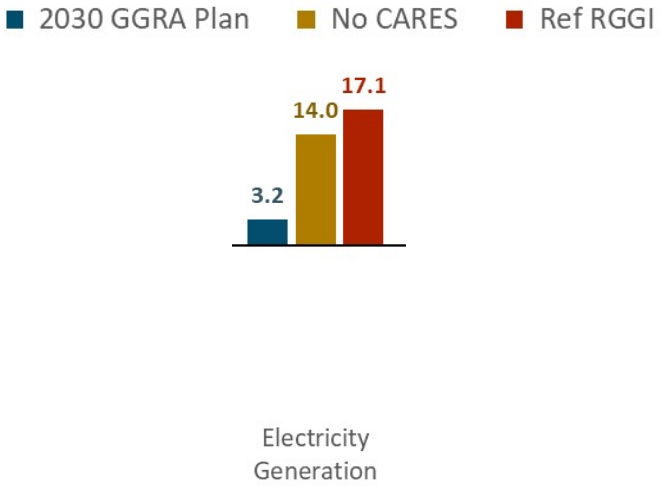
	2030 GGRA Plan	No Building Decarb	Difference relative to GGRA
2030	45.1	45.4	+0.3
2050	19.9	28.9	+9.0

CARES In-and-Out Results

2030 GHG Emissions (MMT CO2e)



2050 GHG Emissions (MMT CO2e)



+ For the CARES in-and-out analysis, we modeled **two scenarios** that allow us to **separate the impact of CARES on in-state generation vs. the impact of RGGI GHG cap on imports**
  1. **No CARES** – what if CARES does not take effect, and therefore in-state generation only meets the 50% RPS by 2030
     - To isolate the impact of CARES, other RGGI states held at zero-carbon target by 2040, as in the 2030 GGRA Plan
  2. **Ref RGGI** – what if CARES does not take effect **and** GHG cap of other RGGI states achieves only 30% reduction by 2030 relative to 2020 from the Reference scenario
+ CARES has much larger GHG impact than RGGI cap in 2050, because CARES achieves higher levels of GHG reductions in the long term for in-state generation than the 50% RPS target in Reference

Total Net GHG Emissions (MMT CO2e)

	2030 GGRA Plan	No CARES	Ref RGGI
2030	45.1	46.9	48.5
2050	19.9	30.7	33.9

Summary

- In the near term, the five measures evaluated, including TCI, EMPOWER and other efficiency measures, building decarbonization, MHDV electrification and CARES, are a critical combination as Maryland pursues 50% GHG reduction by 2030 under the 2030 GGRA Plan
- In the long term, as shown in the published 2030 GGRA Plan, Maryland needs more than these five measures to achieve 80% reductions by 2050, or beyond