SCHOOL OF PUBLIC POLICY
CENTER FOR GLOBAL SUSTAINABILITY

Maryland Department of the Environment

Updated Modeling for Maryland GHG Reduction Pathways

Mitigation Working Group
Jan 29, 2026

Agenda

- Updates from Climate Pollution Reduction Plan
- Detailed Scenario Overview
- Modeling Results
  - Comparison between 2023 and 2025 modeling of Current Policies trajectory
- Summary
- Next Steps

Summary from Climate Pollution Reduction Plan

- All scenarios in the Climate Pollution Reduction Plan assumed full implementation of all policies
  - Includes state policies where data was not yet available on compliance levels (e.g., BEPS)
  - Federal policies such as IRA were widely and quickly adopted
- Context of CPRP was general assumption of strong state-federal partnership on climate action
- CPRP scenarios were prepared in 2023, when full impacts of COVID and COVID recovery were still being evaluated in newly emerging data

	2031	2045
% reduction	*Gross*	*Net*
Current Policies	50%	65%

Note: We only address *Current Policies* here, not the additional policies used to achieve the Climate Plan goals. Updates to the *Current + Planned Policies* scenario will be available later this year.

Updates from Climate Pollution Reduction Plan

- Updated modeling tool and data
  - Switched from GCAM-USA v6 to GCAM-USA v8.2
  - Model base year updated from 2015 to 2021 (post-COVID)
  - Results calibrated to 2023 state inventory data, with AR6 GWPs
  - Electricity sector results calibrated to partially available 2025 data

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  - Electricity consumption from data centers represented explicitly in modeling
- Updated representation of state policies
  - BEPS, RPS, EmPower, and RGGI
  - Policy impact matched to real world to the extent data allows (not full implementation)

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  - BEPS, RPS, EmPower, and RGGI
  - Policy impact matched to real world to the extent data allows (not full implementation)
- Updates in federal climate policies

Changes in Emissions Relative to CPRP

- Electricity sector changes in updated modeling result in more emissions from natural gas electricity generation compared to CPRP
- Largest changes are from electricity sector and transportation sector; buildings and industry changes are notably smaller

Sector	Impact of Changes on Emission Trajectory
Electricity	↑ Base year moved forward (less RE than expected)
	↑ RPS reliance on ACPs
	↑ Explicit representation of data center demand
	↑ Off-shore wind scaled back
	↑ Brandon Shores retirement pushed back
	↓ RGGI third program review adopted
Transportation	↑ Base year moved forward (less EV adoption than expected)
	↑ ZEV bus sale targets delayed
	↓ Slower VMT growth rate than previously modeled
Buildings	↓ EmPOWER changed to GHG goal
	~ Updated BEPS exemptions and estimated compliance rates
Industry	↑ Inventory F-gas methodology revised
	↓ Updated model dynamics and recent data

Overview of 2025 Scenario Components

Both scenarios:

- **Electricity**: coal phaseout, offshore wind, potential for new nuclear, RPS, RGGI
- **Transportation**: Bus ZEV sales, nonroad emissions reductions from the Climate Pollution Reduction Plan, VMT growth from MDOT
- **Buildings**: BEPS, EmPOWER, data centers
- **Other**: cement fuel switching, HFC reductions, landfill methane regulations, marginal abatement cost curve reductions in Ag and Wastewater, fossil fuel methane regulations

Current Policies ***before*** Federal Rollbacks

- **Electricity**: full IRA incentives/tax credits, power plant regulations
- **Transportation**: ACCII, ACT, CAFE standards, BIL funding, IRA incentives
- **Buildings**: full IRA incentives
- **Other**: IRA methane fee

Current Policies ***after*** Federal Rollbacks

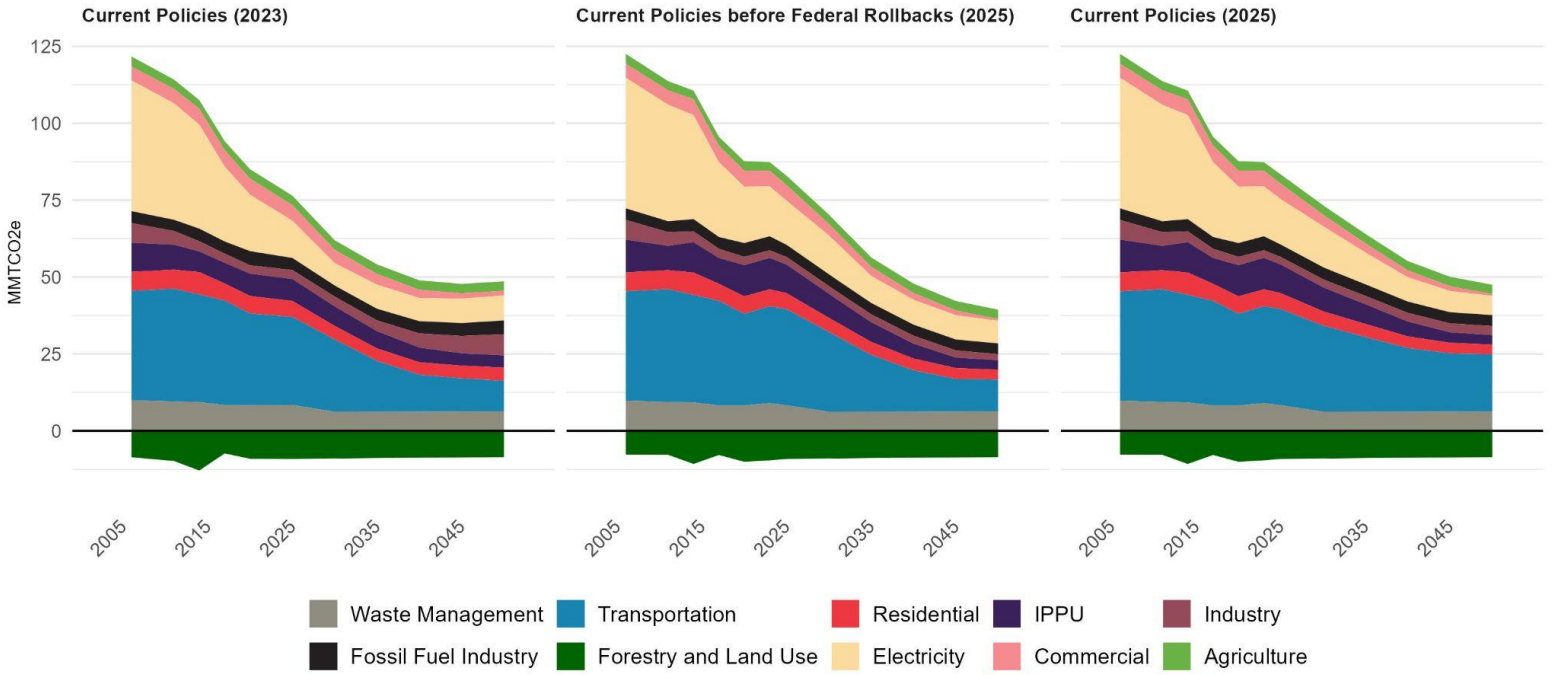
- **Electricity**: shortened IRA incentives/tax credits
- **Transportation**: shortened IRA incentives, shortened BIL funding
- **Buildings**: shortened IRA incentives
- **Other**:

Modeling Federal Rollbacks

Sector	IRA & BIL Provisions Modeled	Status, Dec. 2025
Electricity	- Production tax credit and Investment tax credit - Residential clean energy credit - PTC for existing nuclear - Energy infrastructure reinvestment financing	All except nuclear PTC rolled back
Transport	- Clean vehicle credit - Alternative refueling property credit - Commercial clean vehicle credit - Extension of incentives for biofuels - Advanced technology vehicle manufacturing	All except biofuel incentives rolled back
Buildings	- Energy efficient commercial buildings deduction - Energy efficient home & home improvement credit - Residential clean energy credit - High efficiency home rebate program	All except home rebate program rolled back
Industry	- Extension of 45Q credits for carbon capture - Production credit for clean hydrogen - Manufacturing ITC for advanced energy projects - Advanced industrial facilities deployment program - Advanced manufacturing tax credit	All except carbon capture credits and advanced manufacturing tax credit for critical minerals rolled back
Methane	- Methane fee for oil and gas producers	Regulations withdrawn
Lands	- Agricultural Conservation Easement Program - Conservation Stewardship Program - Environmental Quality Incentives Program - Regional Conservation Partnership Program - Urban and Community Forest Assistance Program	Funding rescinded

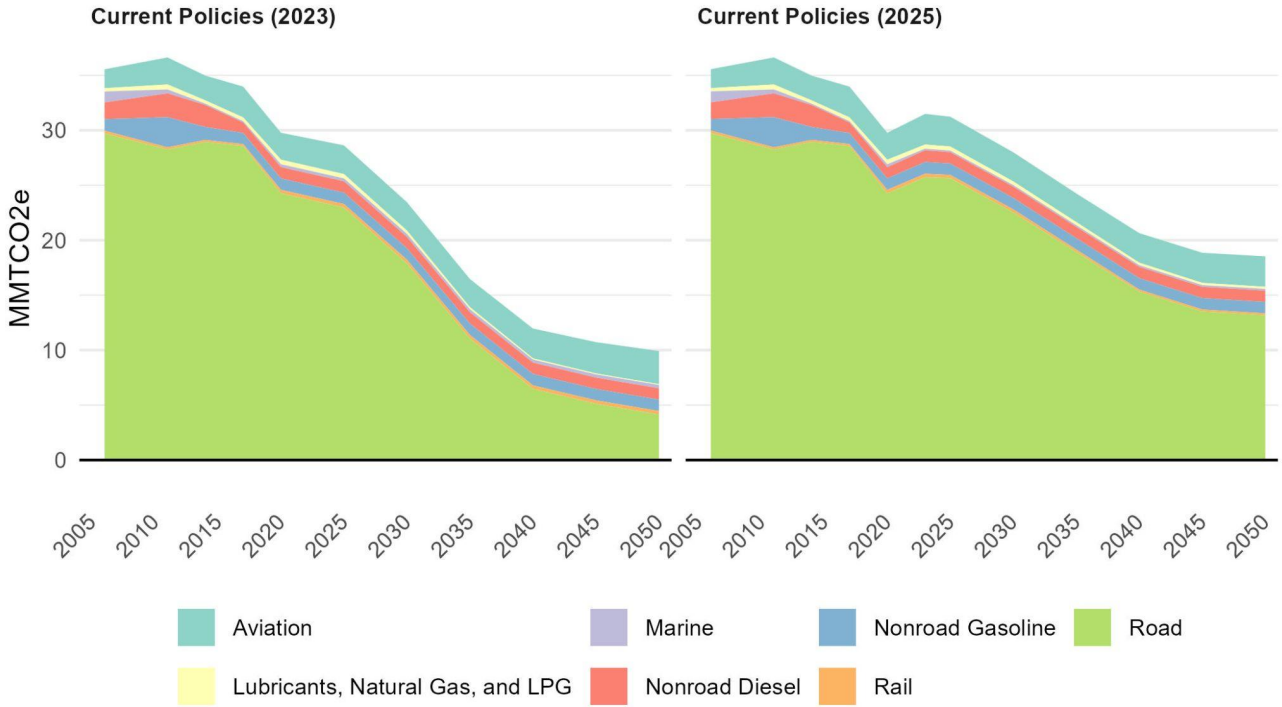
Summary of Economy-wide Results

	2031	2045
% reduction	*Gross*	*Net*
Current Policies (2023)	50%	65%
CP *before* Fed RB (2025)	45%	71%
CP *after* Fed RB (2025)	42%	64%



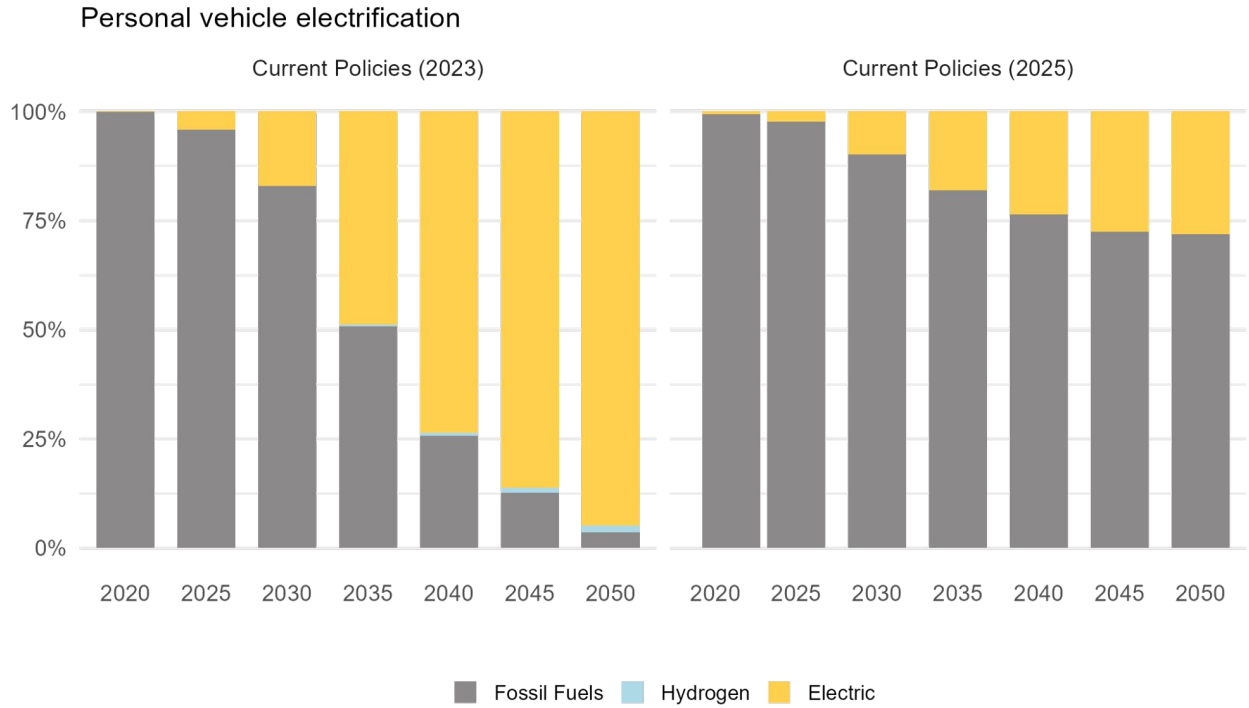
Transportation Sector Emissions

- Loss of ACCII and ACT policies leads to significant increase in emissions
- Decarbonization still expected with some electrification of on-road vehicles in updated Current Policies scenario



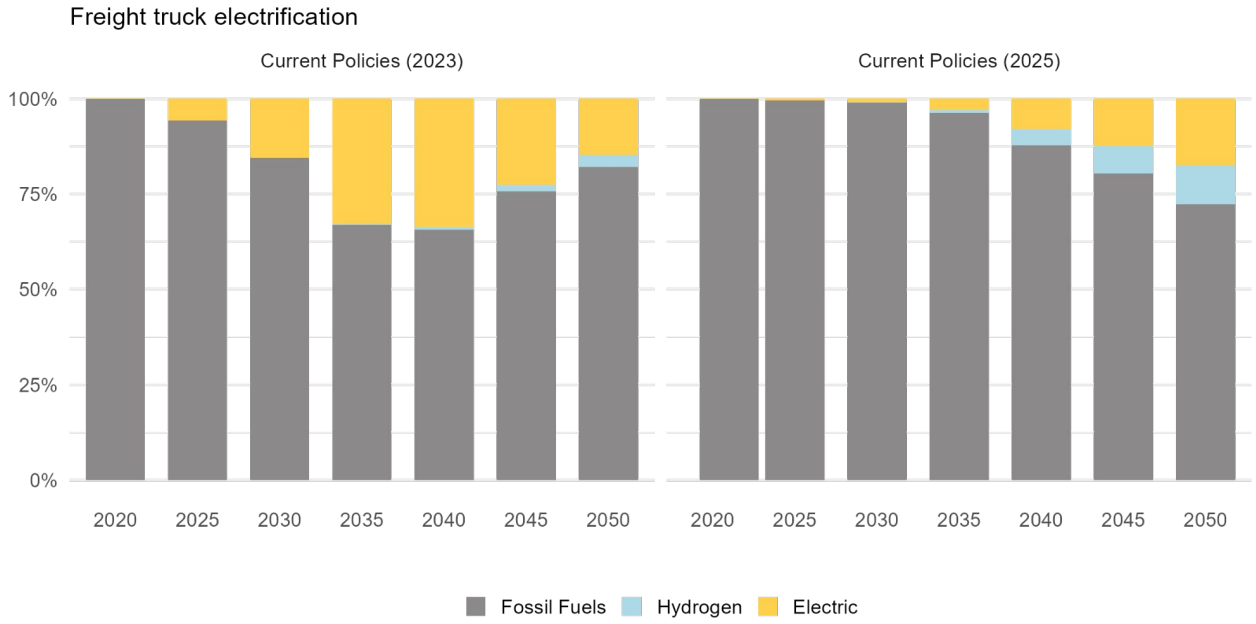
Passenger Vehicles

- Loss of ACCII, from federal govt challenging the California waiver, leads to significantly less electrification
- Without ACCII, market dynamics still drive over 25% electrification by 2045



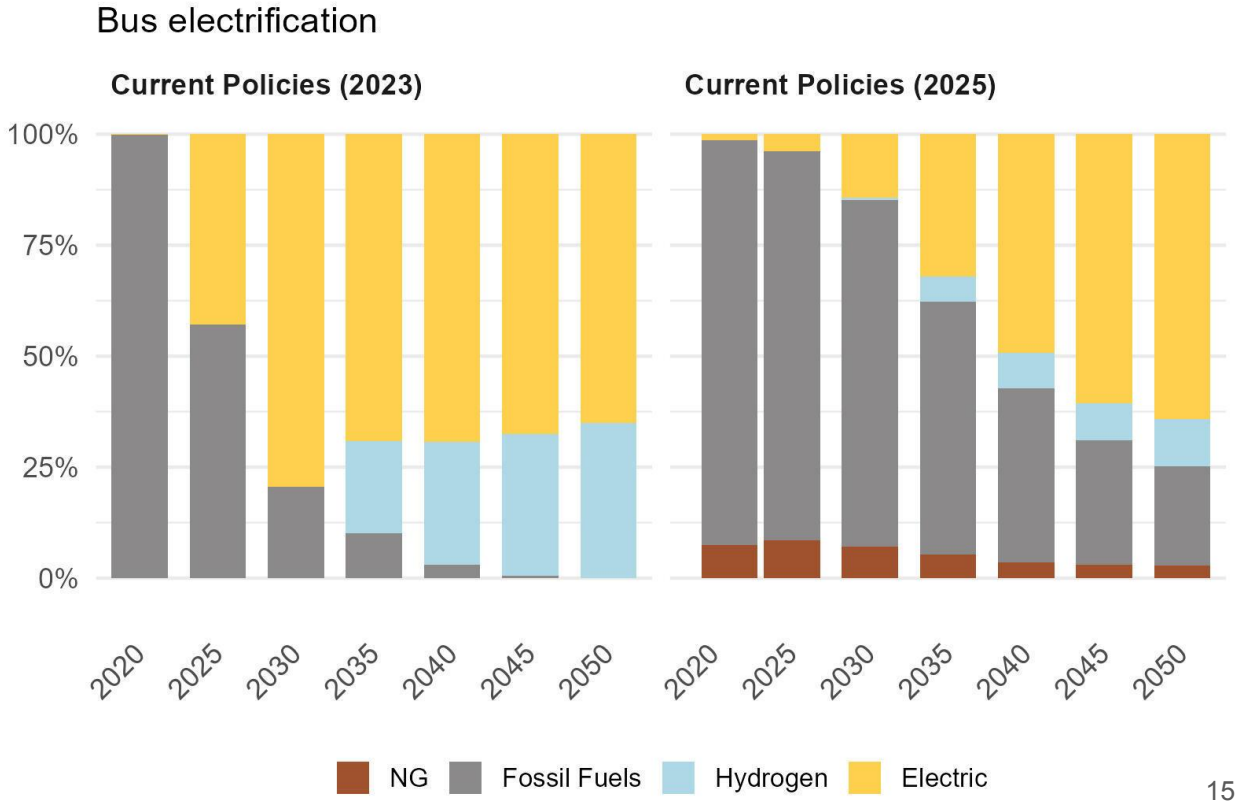
Freight Vehicles

- Loss of ACT, from federal govt challenging the California waiver, greatly impacts near-term electrification of freight trucks, but some electrification still expected in Current Policies scenario
- ACT sales requirements end with model year 2035



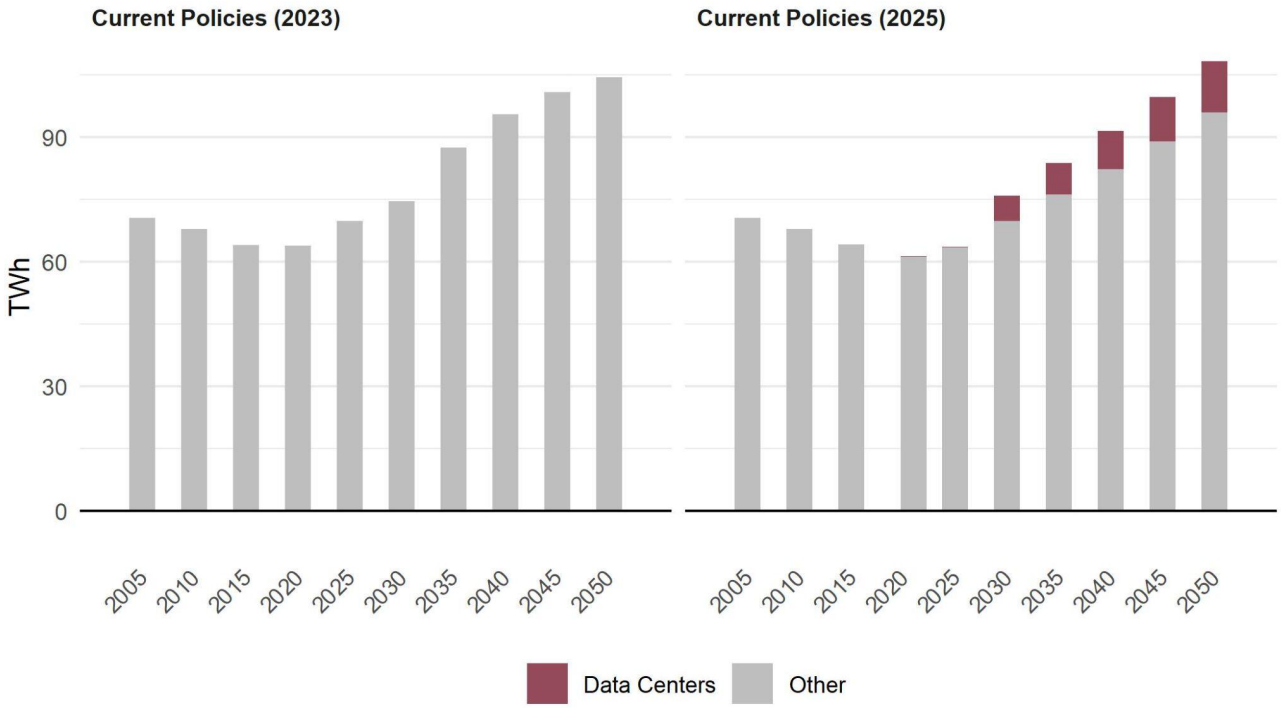
Bus Electrification

- Bus electrification is driven by state policies, so is consistent across both scenarios
- Delayed compliance is assumed, reaching 50% ZEV sales by 2030 and 100% by 2035
- Percentage of buses subject to sales requirements based on MVA registration data



Electricity Consumption

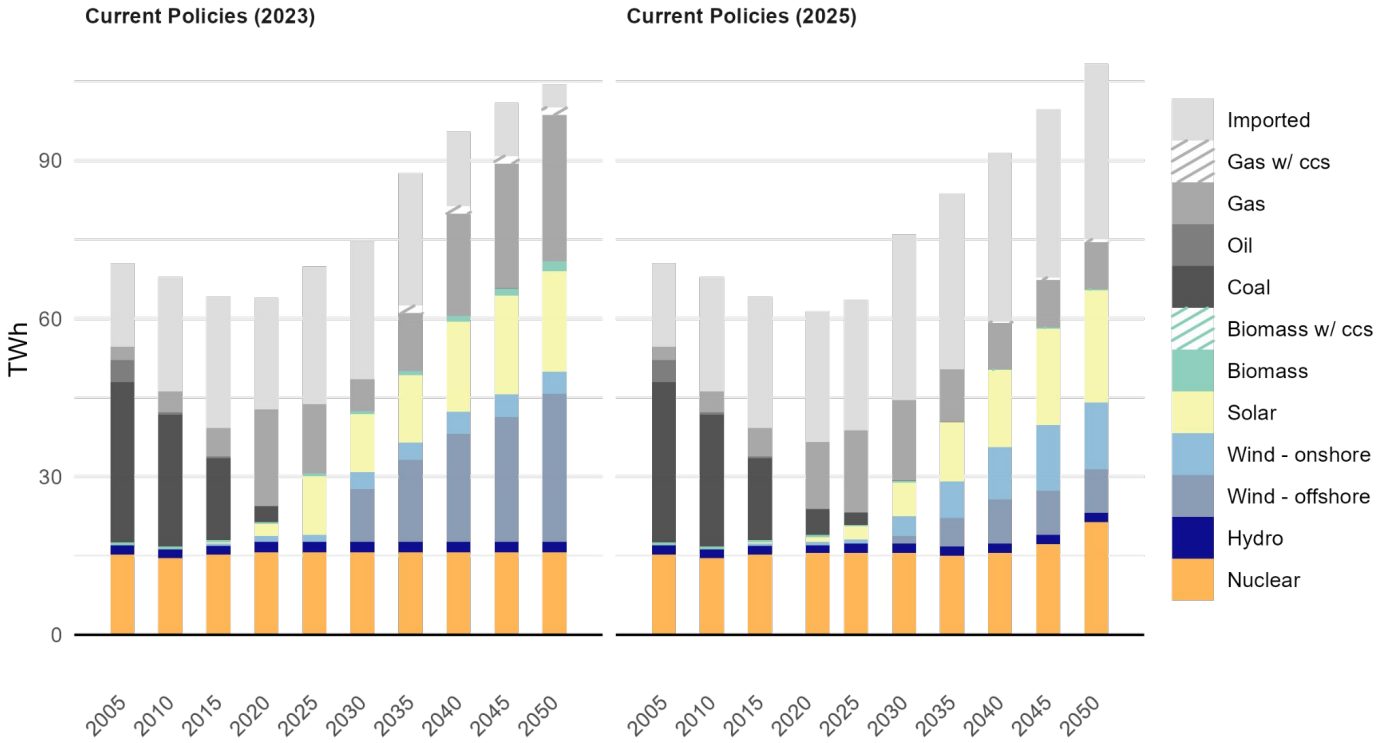
- Data Center consumption estimated using MWCOG*, EPRI, and PJM projections
  - Consumption in MD reaches 5.96 TWh by 2030 and 10.75 TWh by 2045
- Note: this graph shows annual energy consumption, not capacity



*Metropolitan Washington Council of Governments

Electricity Generation (2023 to 2025)

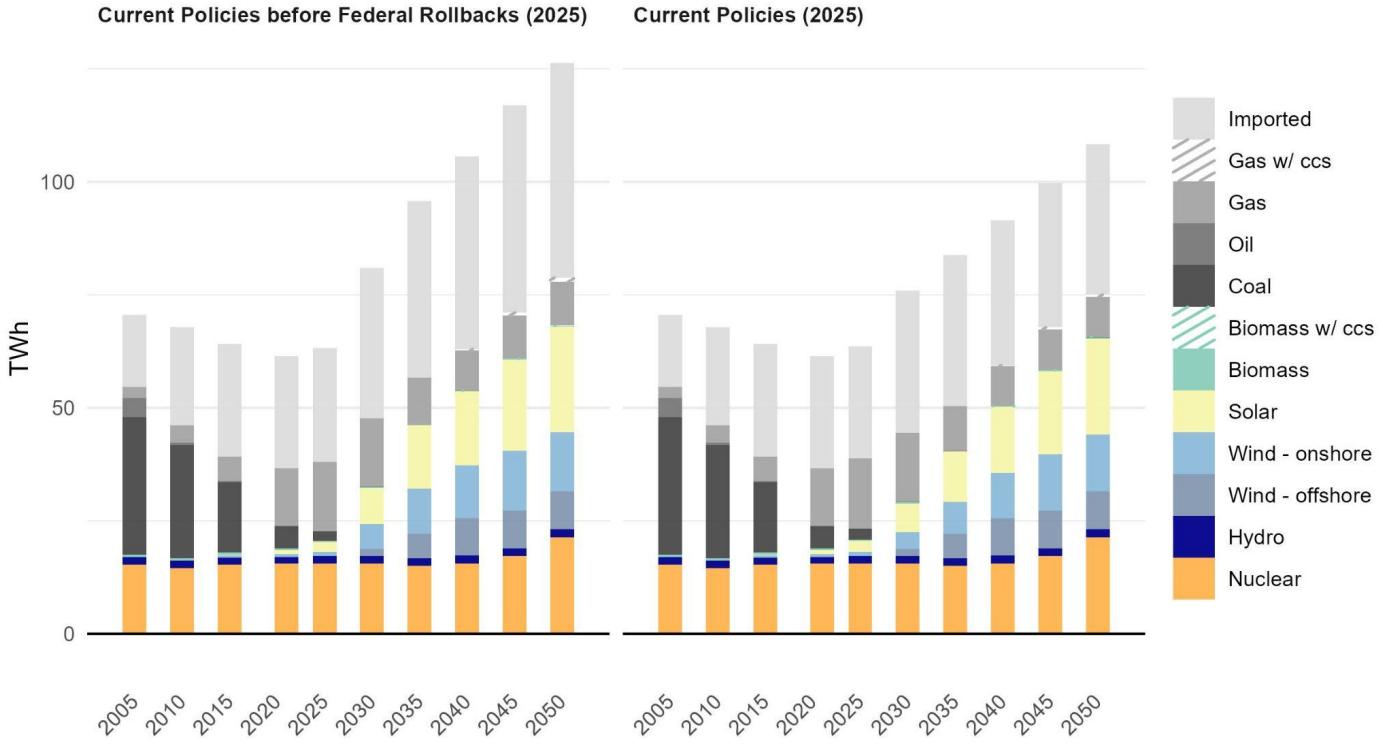
- Offshore wind generation limited to approved projects (US Wind) in nearterm
- Near-term solar deployment slows due to 2025 data
- Changed RPS representation allows more natural gas in near-term
- RGGI update reduces gas in long-term
- New nuclear allowed post-2040



Note: Solar includes grid-scale, distributed, and grid-scale paired with storage. Wind includes wind paired with storage.

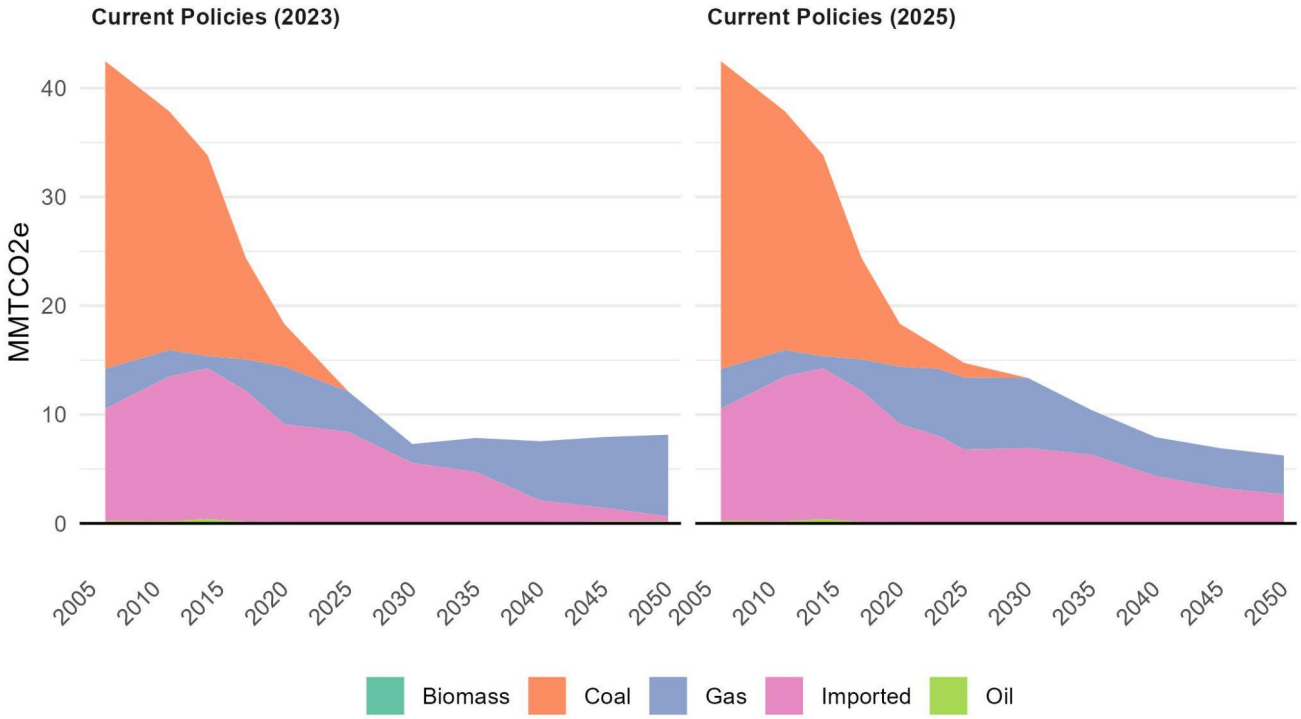
Electricity Generation (before and after rollbacks)

- More rapid growth in renewables before rollbacks due to federal incentives and higher total consumption
- More electrification before rollbacks leads to higher electricity consumption



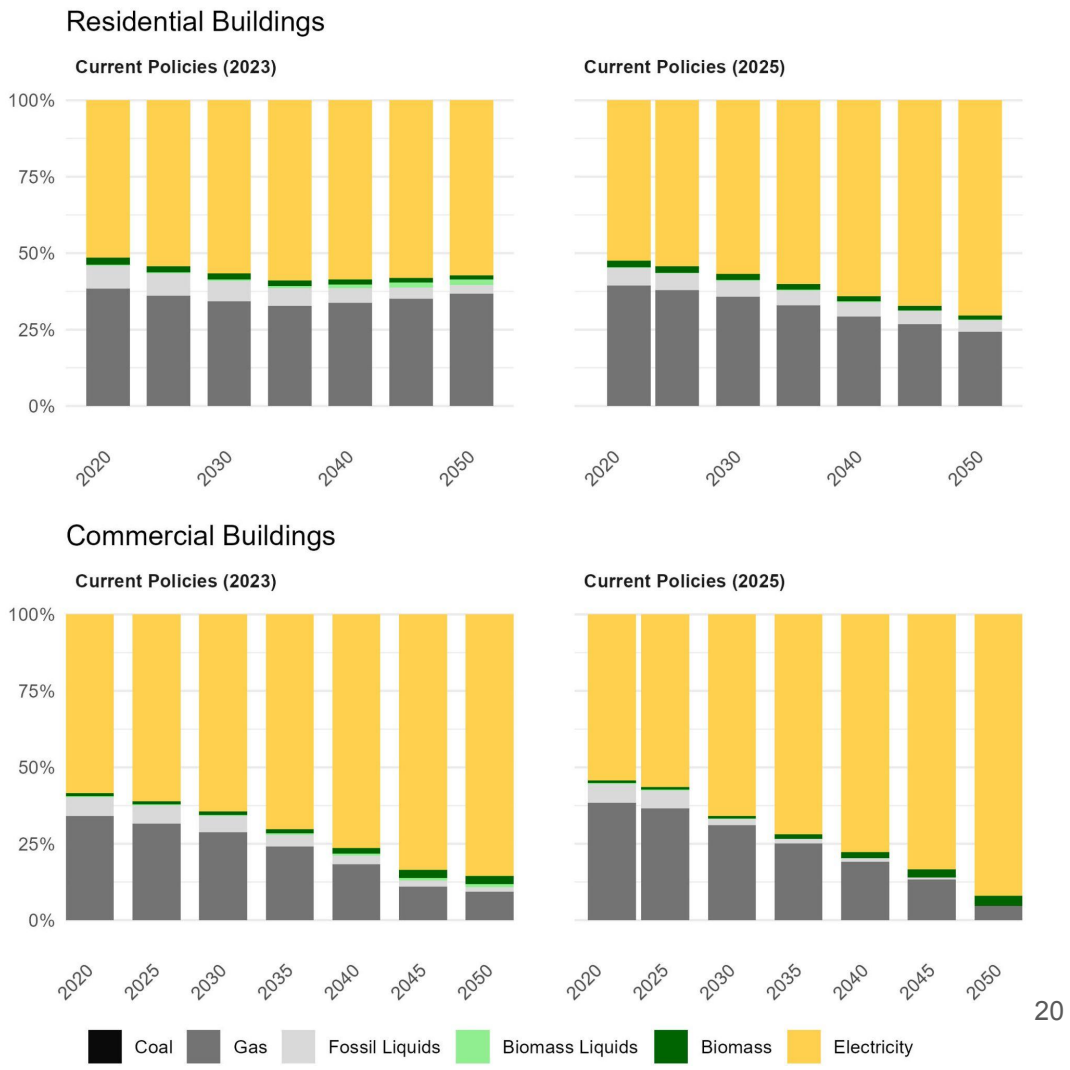
Electricity Sector Emissions

- Lower in-state natural gas emissions due to RGGI update
- Higher reliance on imports in 2025 scenario
- Coal phaseout delayed from 2025 to 2029



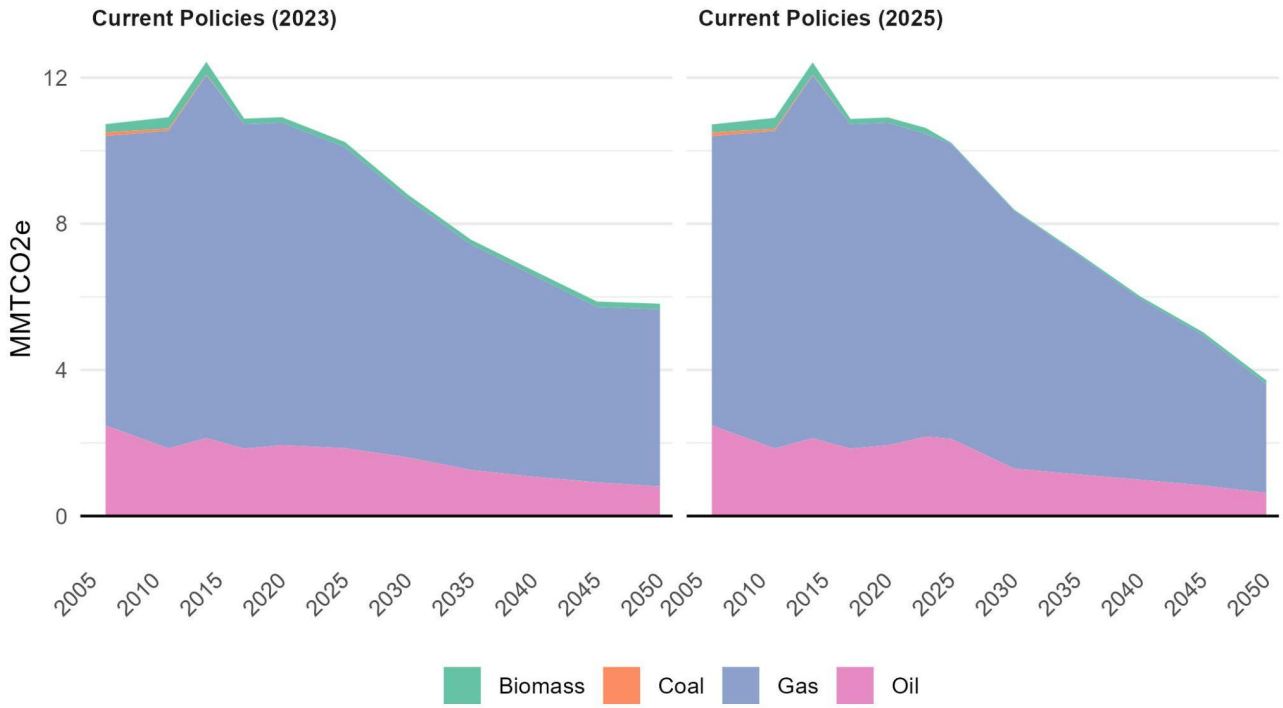
Buildings Sector Energy Use

- Empower extension drives long-term electrification in residential buildings
- BEPS achieves electrification in the commercial sector with significant reductions in fossil fuel consumption beginning in 2030 in both scenarios



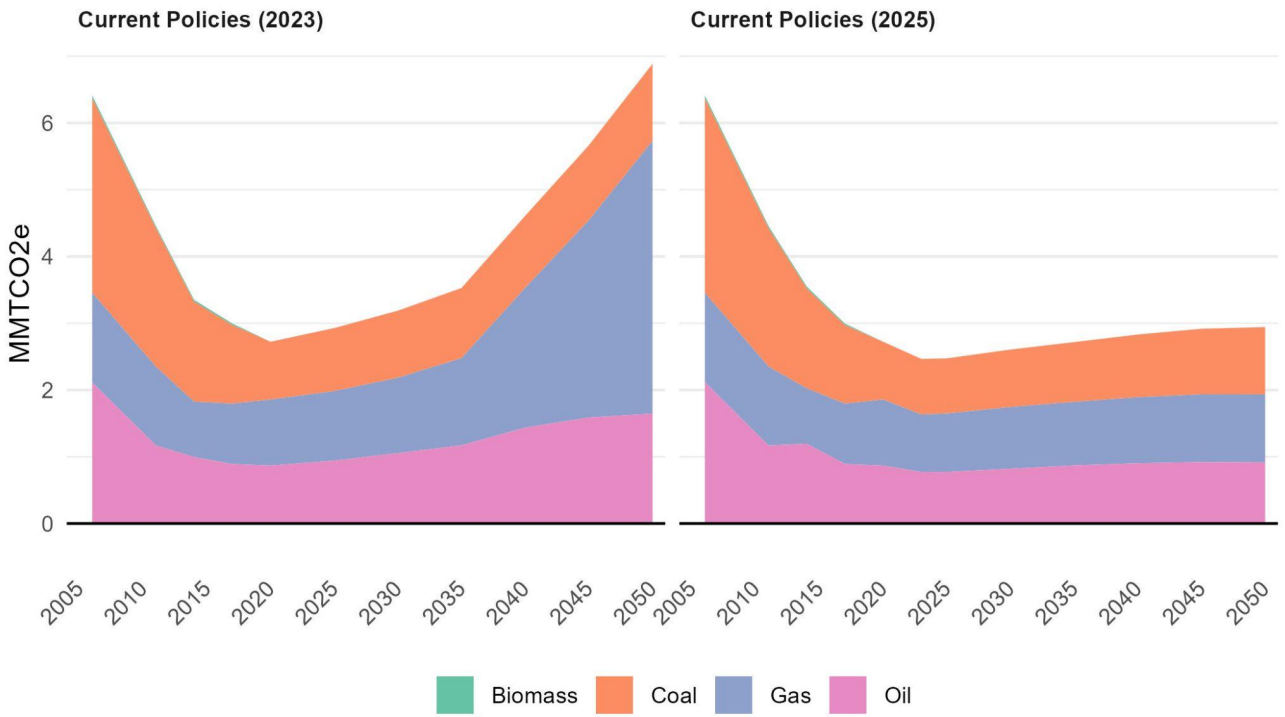
Buildings Sector Emissions

- Climate Plan scenario has small rebound in natural gas through 2050, while updated modeling shows continuous decline
- Rollback of federal policy could affect the economics of achieving full compliance with BEPS and Empower



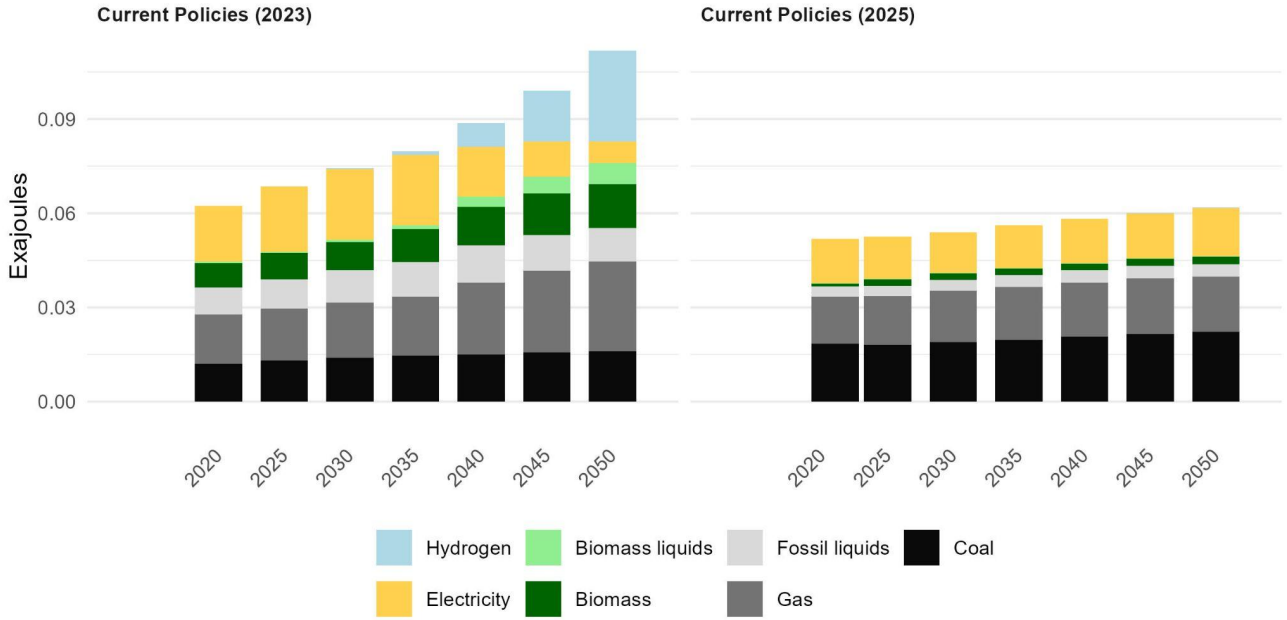
Industrial Sector Fuel Use Emissions

- New model dynamics and updated data lead to slower industrial fuel use emissions growth
- Partial cement fuel switching now included in 2025 scenario



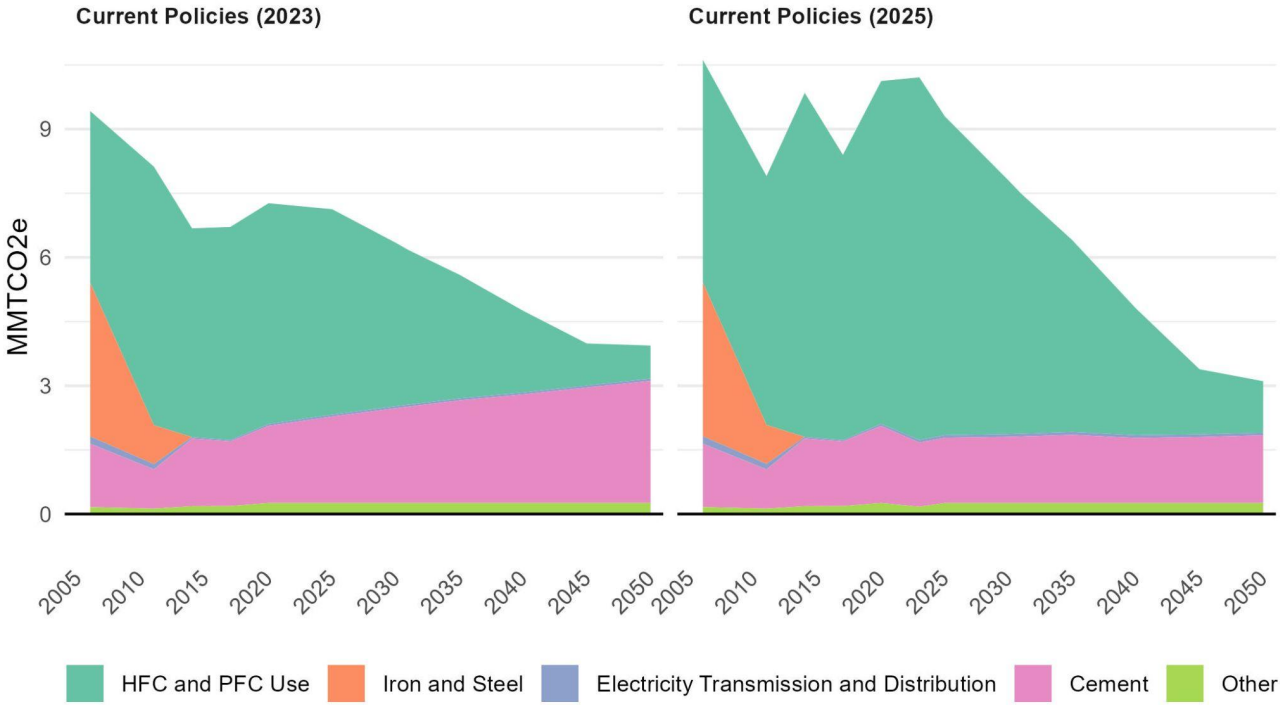
Industrial Sector Energy Use

- Overall lower energy use in industrial sector in updated modeling
- Small reduction in coal due to cement fuel switching at Hagerstown facility



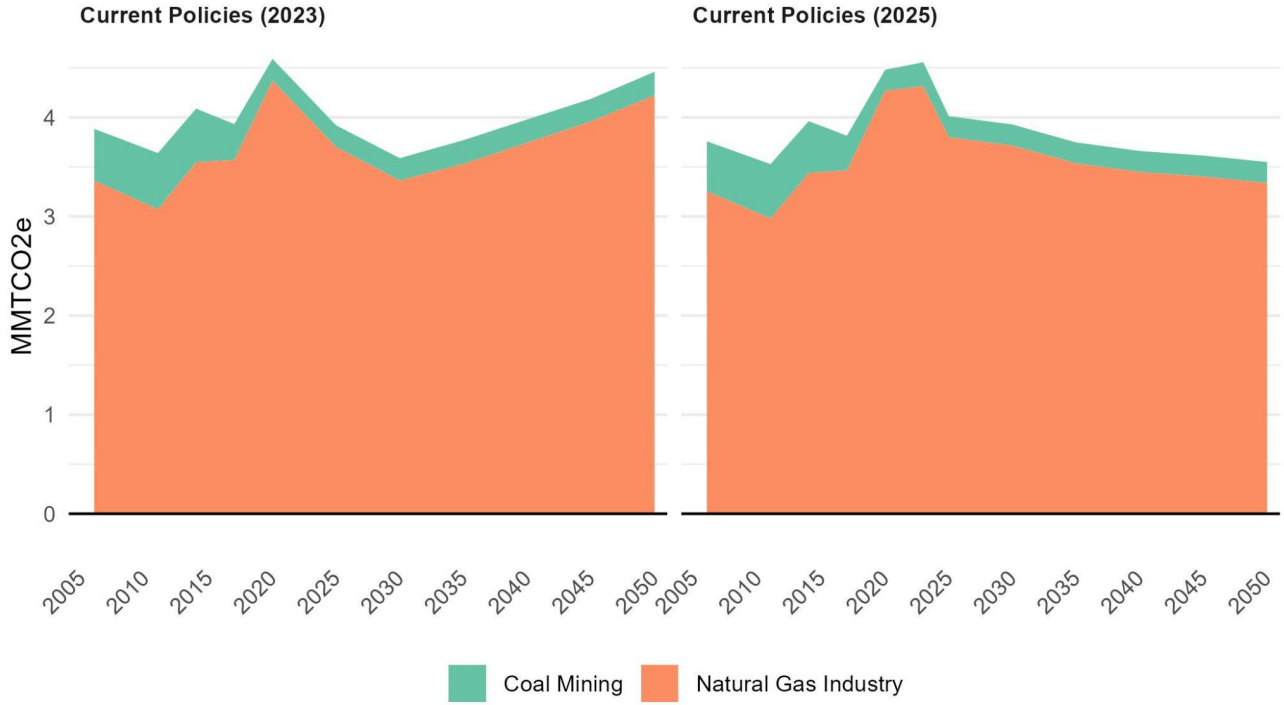
Industrial Processes and Product Use (IPPU) Emissions

- Inventory methodology updated for F-gases, primarily used as refrigerants
- Final action on AIM Act provisions still uncertain - state assumed to take action to fill any gaps created by federal policy rollbacks



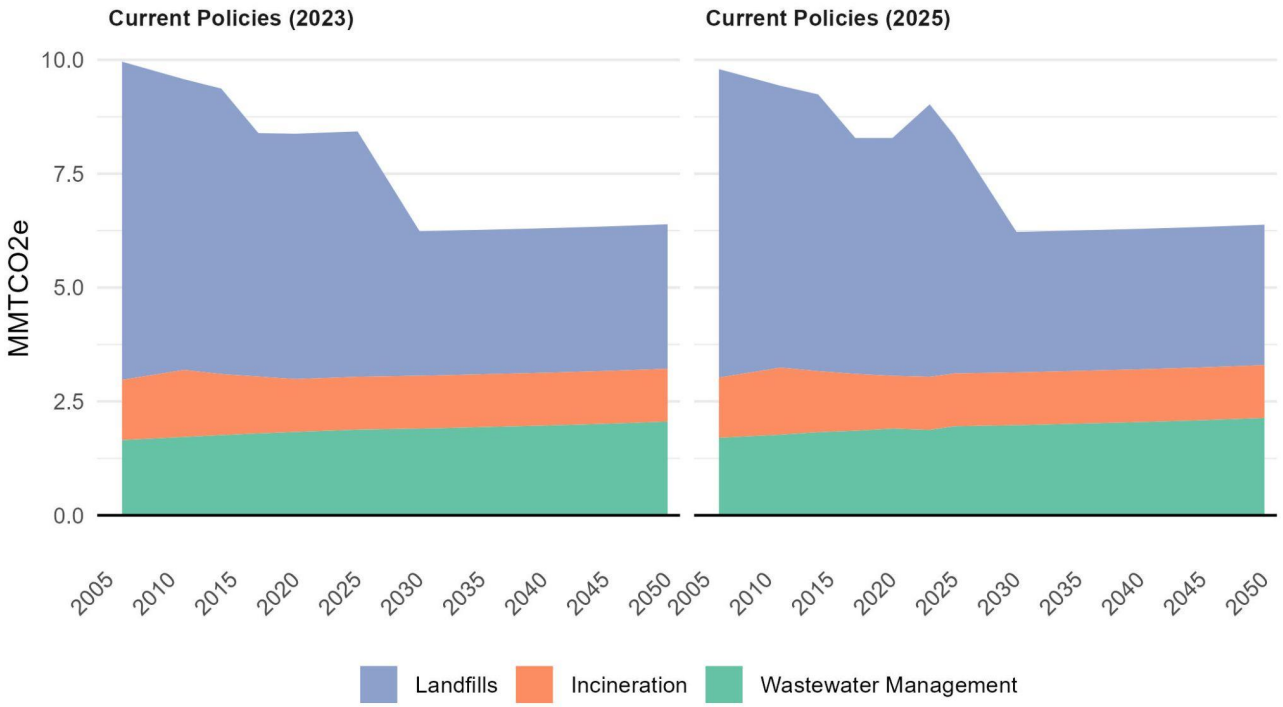
Fossil Fuel Industry Emissions

- Fossil fuel industry emissions largely driven by change in total gas consumption in the state
- IRA methane fee no longer active after rollbacks



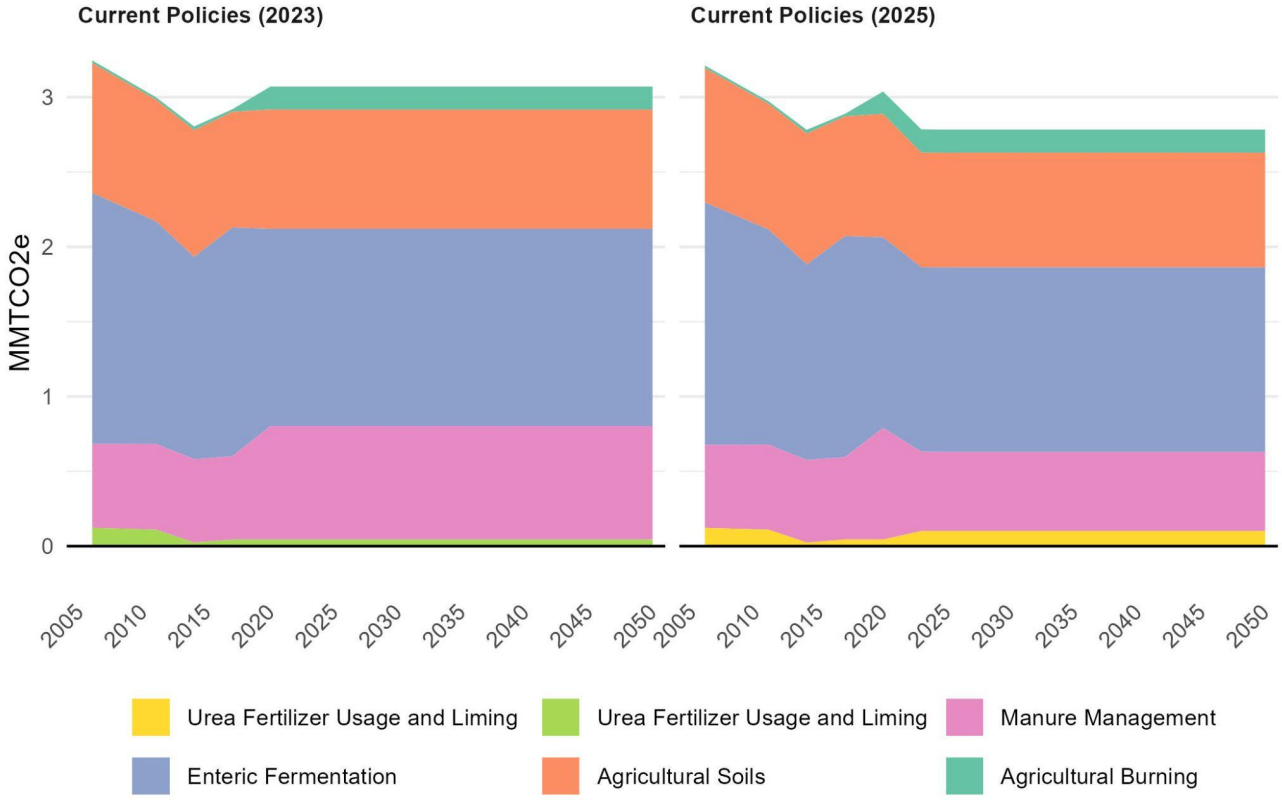
Waste Sector Emissions

- Reductions driven by state landfill regulations which seek to reduce methane emissions



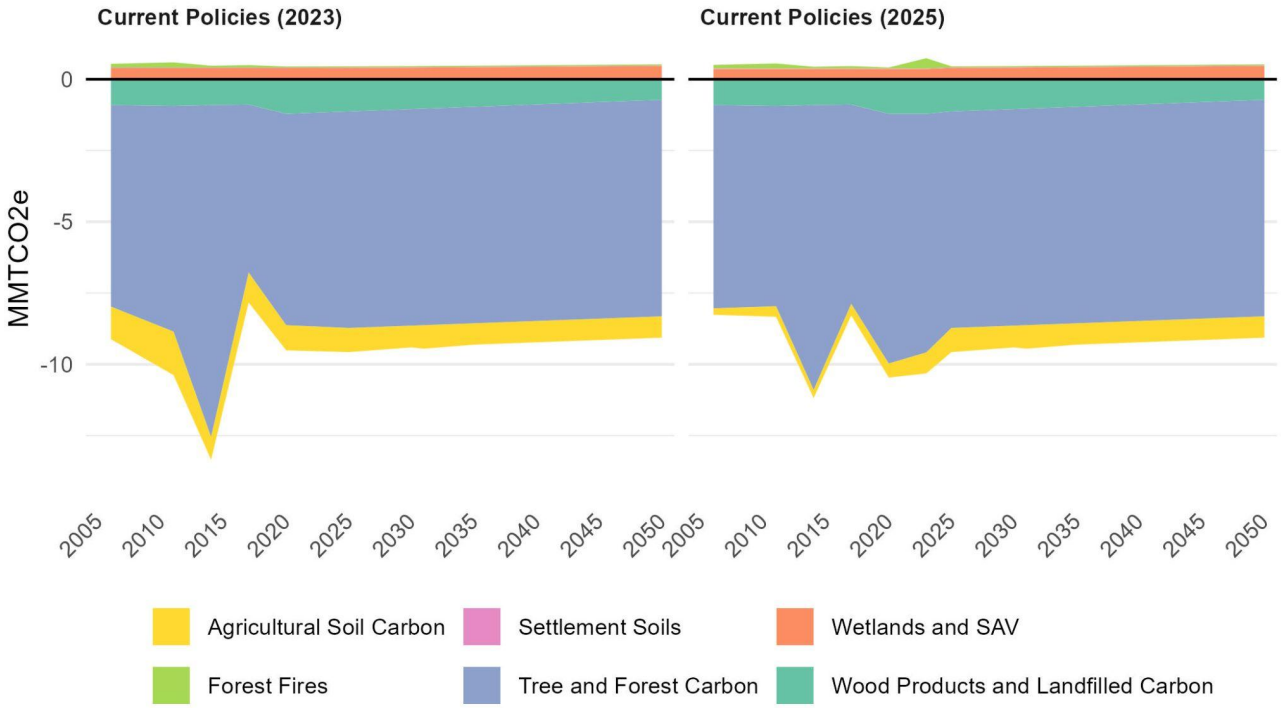
Agriculture Emissions

- Agriculture emissions held constant at 2023 levels, changed from 2020 levels in Climate Plan



Forestry and Land Use Emissions

- Retaining tree and forest carbon key to the strength of the state's natural carbon sink
- Historical inventory numbers updated
- Future projections taken from Climate Plan modeling



Summary

- Transportation sector reductions are slower without ACCII and ACT, making it harder to achieve rapid nearterm reductions
- Electricity sector decarbonizes more slowly in near-term due to a wide range of policy and broader context changes
- While many aspects of federal support have been withdrawn, Maryland can still leverage intact federal programs (NEVI, CPRG, etc) and regional partnerships (RGGI) to support emissions reductions

Percent Emissions Reductions Achieved by 2031 from 2006 Baseline		
Sector	*2023 CPRP Current Policies*	*2025 Updated Current Policies*
Economy-wide	***50%***	***42%***
Transportation	38%	23%
Electricity	83%	70%
Buildings	20%	24%
Industrial	49%	59%
IPPU	35%	29%
Fossil Fuel Industry	7%	-4%
Waste Management	37%	36%
Agriculture	5%	13%

Next Steps

- Will continue updating these scenarios as new data becomes available, incorporating additional policy updates where possible
    - Complete 2025 data for electricity generation, data centers update, addition of VA to RGGI
- Sensitivity analysis on data centers to consider impacts of more substantial development
- Currently working with MDE to develop another scenario that would incorporate updates to the “Current + Planned Policies” scenario
- Final version of all scenarios available by end of June

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Thank you!

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