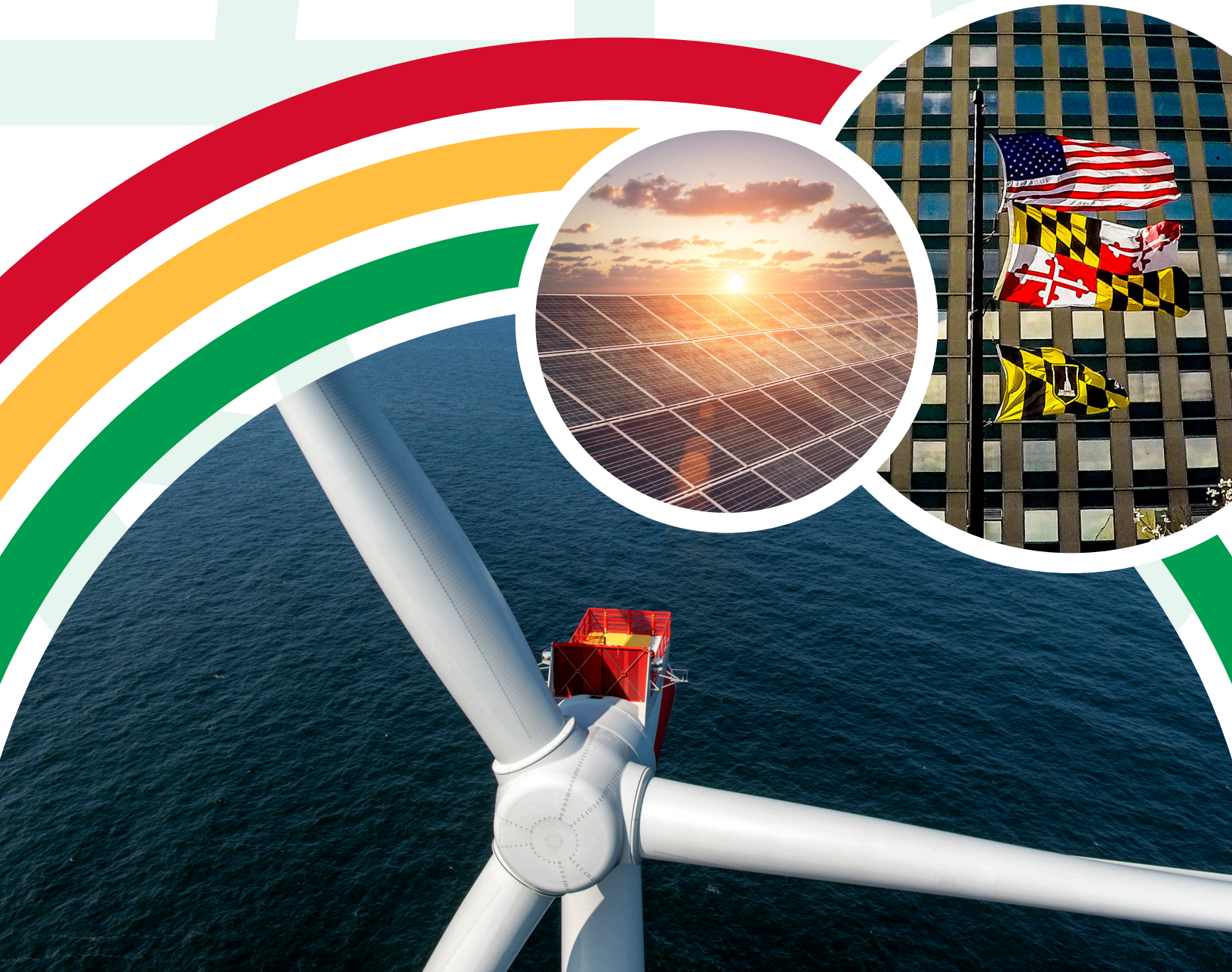
MCCC

MARYLAND COMMISSION
ON CLIMATE CHANGE

2023 ANNUAL REPORT



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MESSAGE FROM THE COMMISSION LEADERSHIP

On behalf of the members of the Maryland Commission on Climate Change (MCCC), we are honored to present the Commission's 2023 annual report of policy recommendations to Governor Moore and the General Assembly.

The climate crisis is upon us. Within just five years, global temperatures could breach the critical 1.5°C threshold, triggering catastrophic and irreversible consequences. This long-feared catastrophe is imminent - the time for meaningful climate action is now.

The commission is recommending dozens of solutions for action that form the bulk of this report. Our recommendations represent a thoughtful consensus from diverse expert members among the Scientific and Technical, Adaptation and Resilience, Greenhouse Gas Mitigation, and Education Communication and Outreach working groups. The recommendations provide targeted policy guidance, based on science, economics, and equity, to meet the state's climate goals.

While we celebrate immense progress made since the Commission's 2007 inception, we recognize the urgent need to do more as climate pollution worsens. As an independent, nonpartisan body, the Commission will continue leveraging our collective expertise in 2024 and beyond to drive meaningful change for Maryland's future.

The members' diligent work has positioned us for long-term success. We thank the dedicated commissioners, working group members, and supporting staff for their tireless efforts and commitment to civil discourse. It has been an impressive and satisfying process overall. We also thank engaged Marylanders for sharing concerns and ideas with members. These combined efforts have greatly enhanced our state's reputation as a leader among states in combating climate change.

Yes, the climate crisis is here, but so too is the chance to chart a new course - one where humanity rises to meet this challenge. The Commission is recommending sound policies and bold action and are confident Maryland will prevail.

Serena McIlwain
Chair

Kim Coble
Co-Chair

Anne Lindner
Co-Chair

Charmaine Brown
Co-Chair

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Michael Bibb
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Maryland Municipal League

INTRODUCTION

HISTORY OF THE MARYLAND COMMISSION ON CLIMATE CHANGE

The Maryland Commission on Climate Change (MCCC) is an independent, statutory body established under Executive Order in 2007 (01.01.2007.07). The MCCC was charged with developing an action plan and firm timetable for mitigating and adapting to the impacts of climate change in Maryland. As a result of the work of more than 100 stakeholders and experts, the MCCC first produced a climate action plan which was the catalyst for the Greenhouse Gas Emissions Reduction Act of 2009 (GGRA of 2009).

In 2014, a second Executive Order (01.01.2014.14) expanded the scope of the MCCC and its membership to include non-state government participants. In 2015, the General Assembly codified the MCCC into law. The MCCC is charged with advising the Governor and General Assembly "on ways to mitigate the causes of, prepare for, and adapt to the consequences of climate change." Serving in an advisory capacity, the MCCC is focused on climate mitigation, but, in congruence the MCCC ensures environmental and climate justice considerations are reflected in all recommendations. Fulfilling this role, the focus is to:

- Provide independent advice on setting and meeting greenhouse gas (GHG) emission reduction targets
- Review the most up-to-date climate change science and how it informs State efforts on GHG mitigation, adaptation, resiliency, economics, and policy
- Engage with a wide range of organizations and individuals to share evidence and analysis

The MCCC delivers an annual report for the governor and the Maryland General Assembly to recommend the necessary steps to fight climate change and meet the state's climate goals. The recommendations provide important support to policymakers at the Maryland Department of Environment (MDE), which develops the plan to mitigate and adapt to the impacts of climate change, as mandated by the Climate Solutions Now Act of 2022.

CLIMATE SOLUTIONS NOW ACT

Maryland has reduced climate pollution faster than almost any other state, achieving a 30% reduction in statewide GHG emissions from 2006 levels by 2020.

In 2022, the Climate Solutions Now Act (CSNA) passed into law, giving Maryland the most ambitious GHG reduction goals of any state in the nation. The law now requires Maryland to reduce statewide GHG emissions 60% from 2006 levels by 2031 and achieve net-zero GHG emissions by 2045. MDE is responsible for developing and implementing the plan to achieve the state's GHG reduction goals.

PATHWAY REPORT

The Maryland Department of the Environment (MDE) contracted the University of Maryland (UMD) Center for Global Sustainability to evaluate options for achieving the state's requirements to reduce GHG emissions and create net economic benefits for Maryland. In June 2023, the MDE and UMD released Maryland's Climate Pathway, a report showing how a package of policies would achieve the state's goals. The report found:

- Current policies would reduce emissions 51% by 2031 - current policies include Advanced Clean Cars II, Advanced Clean Trucks, Building Energy Performance Standards, EmPOWER, Renewable Portfolio Standard, etc. and federal policies such as the Inflation Reduction Act.
- New sectoral policies would reduce emissions 56% by 2031 - new sectoral policies include Advanced Clean Fleets, Clean Power Standard (100% clean power by 2035), Zero-Emission Heating Equipment Standard, etc.
- New sectoral and economywide policies would reduce emissions 60% by 2031 - new economywide policies include an expanded cap and invest program to cover additional sources of emissions.

An economic analysis found that fully implementing the policies in Maryland's Climate Pathway would create 16,700 jobs, increase personal income by $1.5 billion, and produce up to $2.4 billion in health benefits for Marylanders from now through 2031. The health benefits include 51 lives saved and 1000 fewer cases of respiratory symptoms in 2031 alone.

The MDE and UMD hosted public listening sessions from July to September 2023, where the community was invited to be a part of policy-making decisions by attending and submitting comments. Thousands of people participated in the listening sessions and submitted written comments. Their feedback was closely reviewed.

RECOMMENDATIONS

This annual report is a key deliverable of the Commission. It offers numerous well-vetted and ambitious recommendations that are urgently needed. Some build on current policies and suggest ways in which those existing policies can be strengthened or enhanced. The MCCC is dedicated to ensuring that policy recommendations consider impacts on all Marylanders, especially those who have historically been marginalized and overburdened.

Throughout the year, the MCCC discussed many topics and determined that certain policy proposals must be delayed. Those policy proposals will be included in the working groups' 2024 work plan and will be considered by the MCCC in the coming year.

These recommendations are meant to guide Maryland policymakers on decisions related to reducing GHG emissions from all sectors of Maryland's diverse economy in accordance with the State Plan and to achieve net-zero emissions by 2045. The recommendations are further meant to influence decisions related to adaptation, resiliency, and climate and environmental justice.

ADAPTATION AND RESILIENCE WORKING GROUP (ARWG)

1. State agencies should develop metrics and incorporate Next Generation Adaptation Plan Justice, Equity, Diversity, and Inclusion priorities and milestones into their annual reports on GHG reduction and impacts of climate change. This will assist the state in identifying gaps in service to vulnerable communities to ensure no Marylander is left behind.
2. Using the NextGen Adaptation Plan as a guide, the general assembly should mandate that resiliency measures be addressed as an element in local-level comprehensive plans. The ARWG will identify data to support implementing this requirement.
3. The ARWG should form an Interagency Funding Task Force as a subgroup to implement the priorities identified in the Next Generation Adaptation Plan. This task force will specifically be working to secure funding related to adaptation and resilience goals.
4. State agencies that are represented in the ARWG should prioritize funding to support the hiring of people with cultural competency to act as local-community liaisons that serve to communicate and discuss climate change impacts in low-income communities.

EDUCATION, COMMUNICATION AND OUTREACH WORKING GROUP (ECO)

1 A Well-Funded Public Awareness Campaign

The Education, Communication and Outreach Working Group (ECO) recognizes the paramount importance of the state informing, engaging, and encouraging Marylanders to take action to achieve the state's ambitious climate goals. Participation by all Marylanders is essential.

To achieve this immense task, we strongly recommend allocating a budget to the MDE to engage in a collaborative public awareness campaign designed with professional agencies. This partnership will focus on designing and executing a comprehensive educational and multi-media marketing campaign under the MDE's supervision.

The primary objective of this campaign is to ensure that every Maryland resident is well-informed about available resources and incentives for transitioning to a clean and sustainable economy and increasing resiliency to the impacts of climate change. The campaign's scope should encompass a wide range of initiatives, including an interactive website, consumer navigators, media advertisements, billboards, and more. Its core focus areas are:

- Providing easily accessible information about federal, state, and local incentives for clean energy adoption and building resilience.
- Encouraging homeowners, landlords, and residents in single and multiple dwelling buildings to explore clean energy options without imposing additional burdens on renters or those with energy-related financial hardships.
- Raising awareness about climate, resilience, energy-efficiency, and sustainability resources and programs designed to support vulnerable communities.

To ensure the campaign's effectiveness, we propose initiating it with public opinion surveys and research to determine the most effective messaging, materials, and delivery methods. Furthermore, we emphasize the importance of making all information available in multiple languages and with accessibility to individuals with disabilities. We recommend that polling be conducted at intervals to measure the campaign's effectiveness and adjust for maximum impact. This will be particularly important in communities that have high rates of poverty and substandard housing, high unemployment rates, and health disparities.

The MDE will collaborate with other agencies, county governments, businesses and community groups serving low-income households and the elderly to inform residents on the state's 2031 Greenhouse Gas Reduction Plan, and available incentives and ways they can advance climate solutions. In addition, the state will provide resources on how Marylanders can apply for federal and state incentives related to zero-emission vehicles (ZEVs), plug-in chargers, community solar, electric retrofitting of homes and any program that is geared toward energy efficiency and climate pollution reduction.

2 **Declaring "Climate Education Week"**

The ECO recommends that the Maryland General Assembly proclaims the first week of April, coinciding with Earth Month, as "Climate Education Week." This annual declaration would provide an unique opportunity for state agencies, county and municipal governments, and private organizations to come together in celebration and education.

During Climate Education Week, schools, colleges, universities, and various institutions can host exceptional events, workshops, and activities that focus on climate education and action. The ECO is fully committed to providing abundant resources to assist all Marylanders who wish to participate in and celebrate this week, fostering a culture of climate consciousness throughout our state.

By implementing these recommendations, our state will make significant strides toward enhancing public awareness, education, and engagement in climate action, ultimately contributing to our shared goals of reducing GHG emissions and building a more equitable, sustainable, and resilient future for all Marylanders.

MITIGATION WORKING GROUP (MWG)

1 Create the following incentives to help Marylanders buy new and used electric vehicles (EVs)

		New EV	Used EV
Federal Clean Vehicle Credit Existing (included here for reference)	Incentive	**Up to $7,500** (can be a point-of-sale rebate starting in 2024)	**Up to $4,000** (can be a point-of-sale rebate starting in 2024)
	Eligibility	Individuals, businesses, and tax-exempt organizations	Individuals
	Income Limits	$300,000 for married filing jointly; $225,000 for heads of households; $150,000 for all other filers	$150,000 for married filing jointly; $112,500 for heads of households; $75,000 for all other filers
	EV Price Limits	$80,000 for a van, SUV, or pickup; $55,000 for other light-duty vehicles	$25,000 for any light-duty vehicle
Maryland Clean Vehicle Rebate *Proposed* Budget: $300M in FY25 and FY26, $365M in FY27[1]	Incentive	**$2,500** point-of-sale rebate[1] **(up to $10,000 federal + state)**	**$1,000** point-of-sale rebate[1] **(up to $5,000 federal + state)**
	Eligibility/Limits	Same as federal but all EVs under the price caps qualify (i.e. new EVs do not need to meet manufacturing requirements)	
	Implementation	The income qualification forms used for the federal incentive would also be accepted for the state incentive. The state would refund the dealer.	
Low-to-Moderate Income Bonus *Proposed* Budget: $155M per year for four years, which provides 31,000 to 51,000 incentives per year to LMI households, aligned with ACC II sales projections	Incentive	**$5,000** point-of-sale bonus rebate **(up to $15,000 fed + state + bonus)**	**$3,000** point-of-sale bonus rebate **(up to $8,000 fed + state + bonus)**
	Eligibility	Individuals only	
	Income Limits	Up to 80% of Area Median Income ($0-$90k/year for a 4-person household)	
	EV Price Limits	Same as federal	
	Implementation	The state would mail instant rebate coupons to qualified households based on the previous year's tax returns. Dealers would accept a coupon if the address printed on the coupon matches the address on the buyer's driver's license. The state would refund the dealer.	

[1] If this program cannot be fully funded, then the General Assembly should reduce the rebate levels in order to offer lower rebates to all qualified consumers.

		New EV	Used EV
Superuser Bonus *Proposed* **Budget: Pilot it with $5M in the FY25 budget and allow some funding to be used for program administration and evaluation**	**Incentive**	**$5,000** point-of-sale bonus rebate **(up to $15,000 fed + state + bonus)**	**$3,000** point-of-sale bonus rebate **(up to $8,000 fed + state + bonus)**
	Eligibility/Limits	Same as federal (if you qualify for federal, then you qualify for state)	
	Implementation	An applicant would demonstrate with a CARFAX report that they use at least 800 gallons of fuel per year based on the average miles driven over their ownership of the trade-in vehicle multiplied by the fuel efficiency (miles per gallon) of the trade-in vehicle. The state would scrap trade-in vehicles that get less than 30 miles per gallon. The state would provide trade-in vehicles that get at least 30 miles per gallon and pass Maryland vehicle safety inspection with no/minor repair work to low-income families in need.	

2 Create a Fleet Electrification Technical Assistance Program

The state should provide grants of up to $20,000 to the owners of small fleets (10-199 vehicles) to support the transition to EV fleets. Grants would be scaled based on the size and complexity of the fleet. Grants would cover up to 100% of the cost of assessing the current fleet, recommending EVs and charging solutions to fit the needs of the fleet, developing an electrification and financing plan with the fleet manager, writing applications for grant and financing solutions, and offering other support needed for implementing the plan.

The state should provide $2M in the FY25 budget for this program. The program administrator should allocate grants in each geographic region of the state, give preference to small businesses based in Maryland, and promote the Superuser Bonus to high-mileage fleets.

3 Develop EV and V2G readiness standards

The state currently requires new single-family detached homes, duplexes, and townhouses to be constructed with EV-ready (wired) or EVSE-installed (wired with charger) parking spaces. The state should require new multifamily and commercial buildings to be constructed to meet at least EV-ready standards upon completion of a study by the MEA on this topic. The state should further require and provide support for existing multifamily buildings to install EV chargers that are accessible to building tenants.

When setting standards, the state should require that the wiring installed for EV chargers be of a sufficient gauge to be ready for vehicle-to-grid (V2G) bidirectional charging. The current practice of installing 8 gauge wire for one-directional charging limits the ability of EVs with bidirectional charging to backflow power to the home/building/grid. Wire gauge standards should also be included in the requirements for projects that would be eligible to receive state funding for the EVSE installations. Installing the right gauge wire now could prevent expensive rewiring projects in the future.

4 Implement the Advanced Clean Trucks rule

The state should ensure the adoption and implementation of the Advanced Clean Trucks Rule, which requires manufacturers to increase the sale of zero-emissions trucks and school buses in Model Years 2027 through 2035.

5 Implement the Advanced Clean Cars II rule

The state should ensure the adoption and implementation of the California Advanced Clean Cars II standards, which require that an increasing percentage of new vehicles sold are zero-emissions starting in Model Year 2027.

6 Transition locally operated transit systems to zero-emissions buses

The state should enact policies requiring the transition of all locally operated transit passenger bus fleets to ZEV beginning as soon as possible with a full transition no later than 2040. The state should also offer assistance to secure grants from other sources (e.g. federal IIJA programs). The same training and worker protections contained in the state legislation governing the MTA zero-emission bus transition should apply.

7 Support and enforce the 2025 electric school bus mandate

As codified in the Climate Solutions Now Act, the state should allocate funding to the MDE Zero Emission Vehicle School Bus Transition Grant Program, prioritizing schools with the greatest needs. The state should also create a multi-agency and stakeholder working group (including but not limited to utilities, Public Service Commission (PSC), OPC, parent-teacher-student organizations, worker organizations and school districts) to support and accelerate the deployment of electric school buses by providing technical assistance for securing federal funds and other financial aid mechanisms.

8 Consider a real property tax deduction or credit for decarbonization improvements

The state should consider, in conjunction with the Building Energy Transition Implementation Task Force, a real property tax deduction or credit for decarbonization expenses and exemptions from recordation and personal property taxes for decarbonization and equipment.

9 Study using increased tax revenues to support the BEPS compliance

The state should study, in conjunction with the Building Energy Transition Implementation Task Force, using increased commercial real property and recordation tax revenues to fund building level BEPS compliance.

10 Align EV infrastructure incentives with owner/tenant responsibilities

The state should align EV infrastructure incentives with multi-dwelling units to support building owner, condo association and commercial tenant responsibility to install charging infrastructure.

11 Transition to electric MARC trains

Transition the MARC Penn Line to enable all electric operations upon Amtrak completion of the Frederick Douglass Tunnel (FDT) project, which is currently projected to be completed in 2032. MTA should include a roadmap for transitioning the MARC rolling stock fleet to zero emission technology in their update to the 2019 MARC Cornerstone Plan.

12 Allow the state to regulate GHG emissions from manufacturing

The General Assembly should make the following modifications to the statute (recommended additions to the existing statute are shown in ALL CAPS):

Md Env. Code 2-1202

(h)

(1) "Manufacturing" means the process of substantially transforming, or a substantial step in the process of substantially transforming, tangible personal property into a new and different article of tangible personal property by the use of labor or machinery.

(2) "Manufacturing," when performed by companies primarily engaged in the activities described in paragraph (1) of this subsection, includes:

(i) The operation of saw mills, grain mills, or feed mills;

(ii) The operation of machinery and equipment used to extract and process minerals, metals, or earthen materials or by-products that result from the extracting or processing; and

(iii) Research and development activities.

(3) "Manufacturing" does not include:

(i) Activities that are primarily a service;

(ii) Activities that are intellectual, artistic, or clerical in nature;

(iii) Public utility services, including gas, electric, water, and steam production services; or

(iv) Any other activity that would not commonly be considered as manufacturing.

(4) FOR THE PURPOSE OF THIS TITLE, MANUFACTURING DOES NOT INCLUDE THE MANUFACTURING OF CEMENT PRODUCTS.

Md Env. Code 2-1205

(g)

(1) Unless required by federal law or regulations or existing State law, regulations adopted by State agencies to implement a final plan may not:

(i) Require greenhouse gas emissions reductions from the State's manufacturing sector BELOW THE EMISSIONS OF THAT MANUFACTURER IN CALENDAR YEAR 2023; or

(ii) Cause a significant increase in costs to the State's manufacturing sector BEYOND THE COSTS THAT WOULD BE INCURRED BY THAT MANUFACTURER IN CALENDAR YEAR 2023.

(2) Paragraph (1) of this subsection may not be construed to exempt greenhouse gas emissions sources in the State's manufacturing sector from the obligation to comply with:

(i) Greenhouse gas emissions monitoring, recordkeeping, and reporting requirements for which the Department had existing authority under § 2-301(a) of this title on or before October 1, 2009; or

(ii) Greenhouse gas emissions reductions required of the manufacturing sector as a result of the State's implementation of the Regional Greenhouse Gas Initiative.

(h) A regulation adopted by a State agency for the purpose of reducing greenhouse gas emissions in accordance with this section may not be construed to result in a significant increase in costs to the State's manufacturing sector unless the source would not incur the cost increase but for the new regulation.

(I) SUBSECTION (G) AND (H) APPLY ONLY TO PERSONS WHO ENGAGED IN MANUFACTURING IN MARYLAND DURING CALENDAR YEAR 2023.

13 **Provide funding for EV readiness projects**

The General Assembly should establish a state property tax credit for multi-dwelling unit and commercial building owners equivalent to the documented costs incurred for expanded utility-side and customer-side infrastructure required to serve EV charging equipment.

Rationale:

- As EV charging installations create increased electric load, the likelihood increases that the utility-side and/or the customer-side infrastructure serving the host building will need to be expanded.
- Under electric utility service extension tariffs these costs are often the responsibility of the property owner that makes the service request.
- Infrastructure costs will vary depending on the requirements of each site but could be considerable. For example, expenses related to Southern California Edison's Charge Ready Pilot Program reported for 75 level 2 charging sites averaged $32,702 per site for utility-side infrastructure and $101,152 per workplace charging site for the customer-side infrastructure between the grid interconnection charging equipment.

14 **Modify the Strategic Infrastructure Development and Enhancement Plan (STRIDE) to reduce ratepayer costs and facilitate electrification**

The Public Service Commission/General Assembly should make modifications to the STRIDE program to prioritize ratepayer-supported investment on the highest risk assets – pipes that are leaking and most leak-prone – and to consider less costly alternatives to replacement, such as electrification.

- Direct gas companies to develop a risk-assessment analysis for projects prior to receiving accelerated financial treatment.
- Require justification as to why replacement is necessary compared to any less-costly alternatives, such as:
  - » leak detection and repair,
  - » targeted replacement, and
  - » electrification.
- Require heightened analysis for service locations that may be retired because of electrification.
- Establish notice requirements for customer-specific STRIDE work to allow customers time to electrify, avoiding unnecessary costly investments.
- The Public Service Commission (PSC) should require utilities to submit specific analysis on climate and rate impact of their natural gas investments and proposals - including long term rate impact and impact on stranded costs in light of the Climate Solutions Now Act.

15 **Align state spending with climate goals**

The Governor and General Assembly should ensure that state spending on energy projects promotes climate-aligned, zero-emission technologies and does not support or incentivize fossil fuel projects, systems, or infrastructure and is, at minimum, delivering at least 40% of funding to overburdened and underserved communities to be aligned with the Justice40 initiative. The Governor and General Assembly should act to ensure that grants, incentives, financing, and any other funding received from the Federal government are reserved for equitable, climate-aligned investment in clean and zero-emission technologies and infrastructure, not fossil fuel appliances, systems, or infrastructure. (Relevant MCCC recommendations from previous years: 2021 – MWG #7)

16 **End the Strategy Energy Investment Fund (SEIF) support for fossil fuel projects**

The Governor should direct the Maryland Energy Administration (MEA) to end any financial support for fossil fuel projects from the SEIF and reserve all SEIF funds for projects that are fossil fuel-free or supporting qualifying households with bill assistance in the case of Regional Greenhouse Gas Initiative (RGGI)-derived funds except in very limited and specific cases for circumstances:

1. Where electrification and other zero-emission technologies are technically infeasible given the current state of readily available technologies, or

2. For minor repairs to existing fossil fuel equipment (e.g., HVAC, water heating, etc.) that remedy health and safety related issues, or reduce energy usage and GHG emissions as long as the upgrades do not significantly extend the anticipated life of the equipment.

The MEA should work with appropriate stakeholders to ensure that households receiving direct bill assistance from the SEIF are prioritized for whole-home retrofits that deliver efficient, all electric energy retrofits as well as health and safety retrofits. (Relevant MCCC recommendations from previous years: 2020 – MWG #25 and #26; 2021 – MCCC Building Energy Transition Plan and recommendations; 2022 – reiterated Building Energy Transition Plan and recommendations)

17 **Sunset financial incentives for fossil fuel appliances/systems in EmPOWER**

The General Assembly should amend Public Utilities Article § 7–211 to require that EmPOWER work better for reducing GHG emissions with provisions to:

a) Include specific GHG reduction targets, to be established by MDE;

b) Encourage fuel-switching from fossil fuels to efficient electric appliances with incentives for heat pump space heating and hot water heating, high-efficiency electric clothes dryers, and induction ranges/stovetops starting in 2024 (as recommended by the MCCC in 2020, 2021, and 2022);

c) End incentives for fossil fuel appliances starting in 2024 (as recommended by the MCCC in 2021 and 2022); and

d) Provide audits that recommend steps for homes/buildings to become electric-ready, along with rebates for these investments.

18 **Remove municipal solid waste incineration as an eligible source in Renewable Portfolio Standard (RPS)**

Due to the energy source's contributions to the state's GHG emissions, the General Assembly should adopt legislation to remove municipal solid waste incineration as an eligible generating source from the RPS. (Relevant MCCC recommendations from previous years: 2020 – MWG #18; 2021 – reiterated via Appendix B of 2020 report)

SCIENCE AND TECHNICAL WORKING GROUP (STWG)

1 **Improve public health preparedness for the challenges posed by climate change.**

1.1 The state should develop a Ready-Set-Go framework for public health adaptation based on early warning systems leveraging subseasonal-to-seasonal (S2S) forecasts. Early health warnings with seasonal lead time should inform contingency planning, and personnel/volunteer training (Ready phase), while sub- seasonal lead time should inform resource allocation, and personnel/volunteer activation (Set phase). Finally, warnings with short range lead time (days) should inform the activation stage, including evacuation, opening of shelters, and distribution of aids (Go phase).

1.2 The state should issue a report on the background, status, and needs associated with the Centers for Disease Control and Prevention (CDC) funding for the Climate and Health Program. Additionally, the state should compensate for the loss of the CDC funding for the Climate and Health program within the Maryland Department of Health to enhance Maryland's public health preparedness to climate change.

1.3 The Maryland Climate and Health Profile Report, published in 2016, should be updated by the Maryland Department of Health and Mental Hygiene in collaboration with university expertise every five years to accommodate more recent scientific evidence and provide relevant future projections of health burden in Maryland, with a particular emphasis on climate justice by implementing meaningful community engagement.

2 **Establish a Climate and Equity Innovation Fund.**

While Maryland's climate goals now lead the nation in terms of carbon reduction policy, it does not match those goals with investment in the technology development necessary to achieve those goals like is done in states such as California and New York. Unlike biotech and cyber there are no energy specific programs/priorities in the Department of Commerce.

In fact, Maryland is dead last in the nation when it comes to diversity of how it spends its research funding with 85% of that going to biotech.

Biotech and cyber are now well-established contributors to the Maryland economy. Given the preeminence of Maryland's energy research, as demonstrated by its leadership in obtaining US Department of Energy research awards, it's time to create similar programs for energy from early-stage seed funding through tax incentives for established companies.

To facilitate and incentivize the translation of promising viable technologies that can be scaled, it is recommended that a Climate and Equity Innovation Fund be established. This fund should be commensurate with the magnitude of the challenge and comparable on a percentage of state GDP to other climate conscious states like California and New York. This competitive and peer-reviewed program would accelerate Maryland's research leadership to become a national leader in climate technology innovation through partnerships and supporting workforce development programs that focus on creativity, diversity, and equity. The program would be managed by existing accelerator programs, for energy and climate technology the Maryland Energy Innovation Institute (MEI2) in

partnership with Maryland Energy Innovation Accelerator (MEIA) and Maryland Clean Energy Center (MCEC) as previously established by Maryland legislation, and the Maryland Sea Grant (MDSG) for adaptation. These programs have a demonstrated history of managing such competitive programs on behalf of Maryland and moreover providing a greater than 10X return on investment in terms of bringing federal and private investment to the State of Maryland.

3 **Inclusivity of All Marylanders**

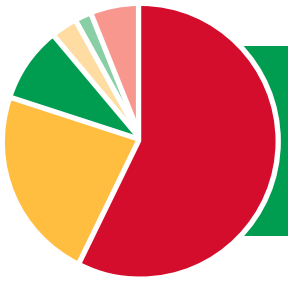
Populations that are most vulnerable to the impacts of climate change include individuals at the lower income levels, minorities, immigrants where English is their second language, and those with disabilities, among others. The reasons for these disparities vary but include the inability to financially afford adaptation strategies, the lack of access to information, and inequitable distribution and access to programs from governments, non-profits, and the private sector. Consequences of these vulnerabilities can exacerbate health disparities. Therefore, prioritization and support should be given to MDE's current effort to identify communities disproportionately affected by climate impacts and to ensure they are adequately accounted for and included in mitigation and adaptation planning. This is an integral part of the equity and underserved and overburdened community underpinnings of the 2022 Climate Solutions Now Act and the State's response to climate change.

UPDATE ON THE SCIENCE

Globally, July 2023 was the hottest month on record, sea ice was the lowest on record and for the fourth consecutive month, the global ocean surface temperature hit a record high. July was estimated to have been around 1.5°C warmer than the pre-industrial average for 1850-1900, according to the EU Copernicus Climate Change Service, operated by the European Centre for Medium Range Weather Forecasting. July was 0.33°C warmer than the previous warmest month, July 2019.

The UN World Meteorological Organization1 reiterated that there is a 66 per cent chance that the 1.5oC threshold above the pre-industrial value will be exceeded in the next five years but this is likely a "temporary" change.

According to The Fifth National Climate Assessment (NCA5), annual US greenhouse gas (GHG) emissions fell by 12% from 2005 to 2019 and this was driven by changes in electricity generation and a 40% reduction in emissions from this sector. The transportation sector is the largest GHG emitter since 2017 (Figure 1).[2]



Between 1990 and 2021, transportation greenhouse gas emissions rose by about 19%. The rise is mainly attributed to an increase in vehicle miles traveled by passenger cars and all truck types.

58% Passenger cars and light-duty trucks

23% Medium- and heavy-duty trucks

9% Aircraft

3% Ships and boats

2% Rail

6% Other

Figure 1. Greenhouse gas emissions from the US domestic transportation sector.[2] [Source Fifth National Climate Assessment]

Climate change threats to public health include air quality, extreme heat, extreme weather events, vector- and food-borne illness, food insecurity, sea level rise, and drinking water contamination.[3] The University of Maryland extension weather outlook reports a 30-day outlook for temperatures in September 2023 is 40-50% chance of above normal temperatures for the entire state, with drought conditions persisting. However, deep emissions cuts are expected to have immediate health and economic benefits and "the benefits of deep emissions cuts for current and future generations are expected to far outweigh the costs."[2]

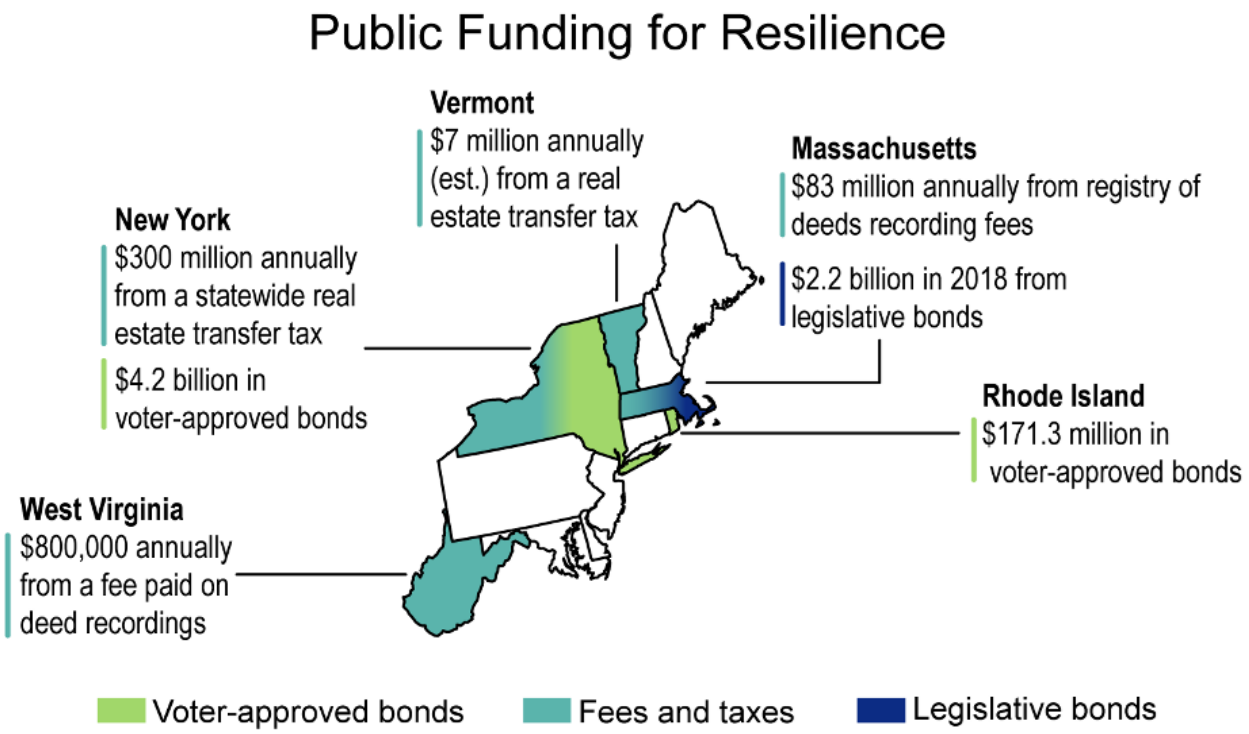


Figure 2. Examples of mechanisms from the northeastern states to fund resilience efforts.[2] [Source Fifth National Climate Assessment]

GLOBAL EMISSIONS AND PROGRESS TOWARD NATIONALLY DETERMINED CONTRIBUTIONS (NDCs)

During the 2013-22 decade, global warming reached 1.14 [0.9 to 1.4] °C and 1.26 [1.0 to 1.6] °C in 2022. This rate of warming of 0.2 °C per decade is unprecedented and is caused by a combination of greenhouse gas emissions being at an all-time high of 57.4 GtCO2e over the last decade (Figure 3), as well as reductions in the strength of aerosol cooling.4,6

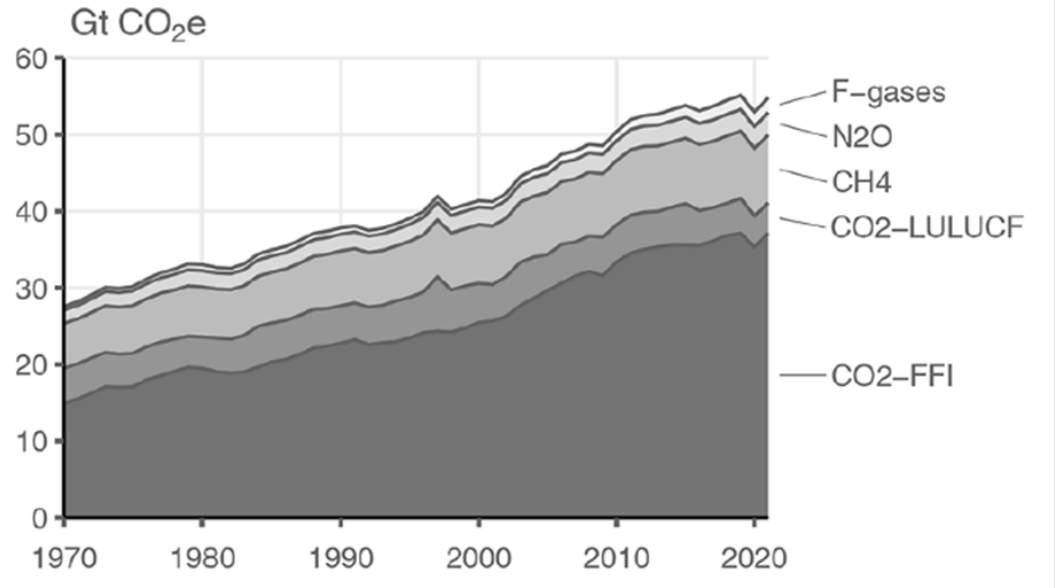


Figure 3. Global Total Greenhouse Gas Emissions. [Source: Forster et al., 2023][4]

Climate Watch monitors the progress of countries toward their Nationally Determined Contributions (NDCs) made in the 2015 Paris Climate Agreement. Climate Watch has reported that 176 countries, representing 93.9% of global emissions, have submitted new or updated NDCs and 107 countries (80.6% of global emissions) have announced total emissions reductions beyond their initial NDC.[5] According to the UN Emissions Gap Report 2023, successfully implementing all the current unconditional NDCs would put the world on track to limit temperature rise to 2.9°C so additional cuts of 14 GtCO2e are required for only 2°C of warming.[6] Although annual US GHG emissions fell 12% between 2005 and 2019, current polices in the United States will not meet the unconditional NDC GHG emissions pledge, with a gap of 19% GHG emissions.[2,6] However, every amount of warming that is avoided, reduces the risks and impacts of climate change. The first Global Stocktake will occur at COP28 and will inform the next round of NDCs.[6] There is evidence that increases in greenhouse gas emissions are slowing, and depending on societal choices, this could be the harbinger of a change in human influence on climate and highlights the importance of Maryland's leadership in climate action.

WEATHER ATTRIBUTION

2023 has witnessed a further maturing of the nascent field of weather attribution, or the science of directly linking extreme weather events as a consequence of global warming and the unabated increase in greenhouse gas emissions across the world. Attribution science has allowed researchers to determine (with uncertainty quantified) how much climate change is contributing to the severity of weather events.[7] For example, estimates show that climate change increased the rainfall from Hurricane Harvey in 2017 by 15-20%.[2] This quantification of human influence is helping communicate risks more effectively and is informing public policy related to adaptation and mitigation.

There are numerous examples relevant to Maryland. The flash flooding of Ellicott City (2016 and 2018) and New York City (September 29, 2023) are reminders of the increasing frequency and intensity of extreme rainfall events. The increasing incidence of wildfires (Figure 4) also pose threats to the forests of Maryland and to human health due to down-winding effects of smoke blown from fires in other regions.

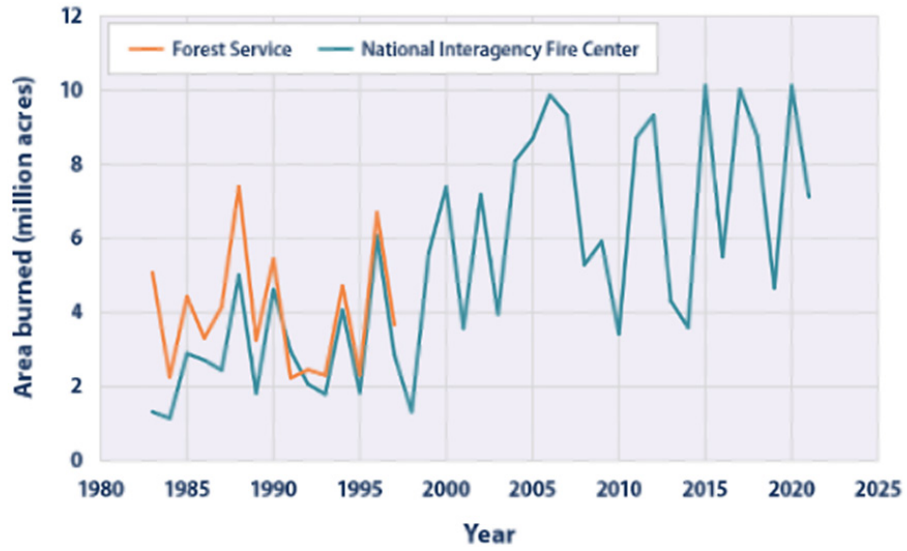


Figure 4. Wildfire Extent in the United States, 1983-2021.

Sources: NIFC (National Interagency Fire Center). 2022. Total wildland fires and acres (1983-2022) and US EPA Climate Indicators (https://www.epa.gov/climate-indicators/climate-change-indicators-wildfires).

In 2023, more than twice as many acres in Canada have burned than the previous record year. Climate change made the dangerous fire weather conditions in Quebec at least twice as likely.[8] Prevailing winds pushed the smoke plume through eastern states resulting in the National Weather Service issuing a Code RED Air Quality Alert with some school districts in Maryland and Washington DC closing on June 8-9, 2023.

Weather attribution research is refining the understanding of the types of conditions Maryland can expect to experience in coming decades. It also reinforces the critical importance of the state's progress being made to protect Marylanders and as an example to other states and countries for what is feasible economically and socially. Some recent but not comprehensive scientific findings of relevance to Maryland are maintained on the Scientific and Technical Working Group (STWG) website. In this summary we focus on heat impact to communities and the 2023 projections of sea-level rise for Maryland.

HEAT IMPACTS

July 2023 was confirmed by the NOAA, NASA and the EU Copernicus Climate Change Service as the hottest month on record and likely the highest in the past 120,000 years as well as having the highest-ever ocean surface temperatures since records began.[9]

Goodell summarized how heat-related deaths have been vastly under-counted and this hidden menace will continue to plague communities as heat waves increase in frequency, duration, and intensity as was experienced across southern Europe and regions of north America in 2023.[10]

Although Maryland did not experience the same level of extreme heat records as has been experienced in other parts of the US - the risks are clear. In 2023, 4 total heat advisories have been issued as of September 6th, which already exceeds the total of 3 in 2022. From August 29th-September 4th, 312 heat related illness complaints were reported in emergency departments in urgent care in Maryland (Figure 5).

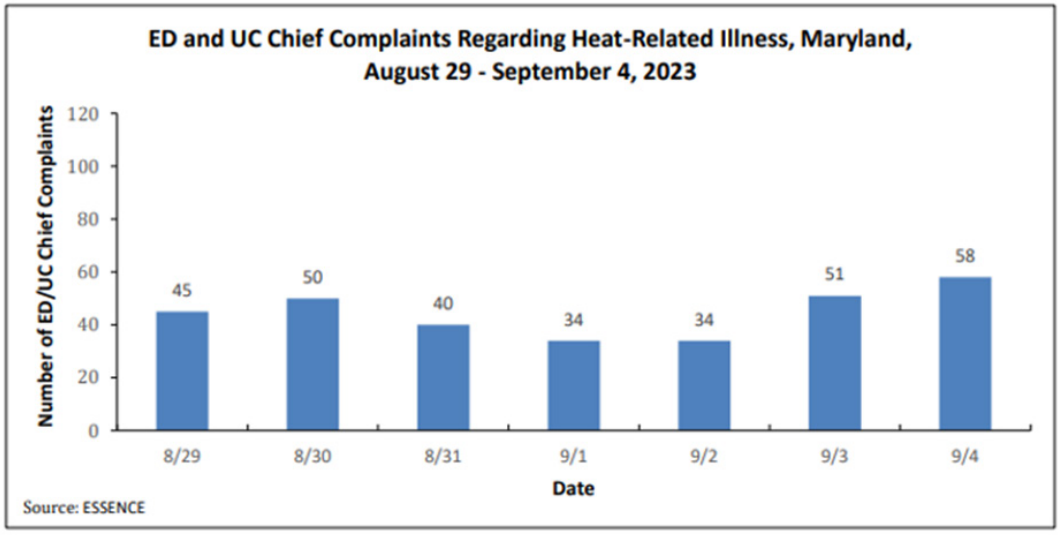


Figure 5. Reported Heat-Related Illness in Maryland During the Heatwave of August 29-September 4, 2023.

SEA-LEVEL PROJECTIONS FOR MARYLAND

As directed by the Maryland Commission on Climate Change Act, the University of Maryland Center for Environmental Science (UMCES) completed an update of the 2018 projections based on the latest scientific assessments.[11] A 14-member Sea Level Rise Expert Group oversaw the development of the report, acting under the auspices of the MCCC Scientific and Technical Working Group. Communication with the Adaptation and Resiliency Working Group was maintained throughout the process. The sea-level rise for which Maryland should plan during the latter half of the century and beyond depends on the degree to which global society limits its greenhouse gas emissions. Sea-level projections developed in the IPCC's most recent assessment that assume that only current national commitments for emission reductions would be met are recommended as the primary planning scenario for beyond the next 25 years. These projections were customized for locations in Maryland by factoring in land subsidence, ocean processes and the effects of polar ice sheet melting. For the near-term until 2050, statistical extrapolations of trends from tide gauge and satellite observations provide important guidance.

These extrapolations suggest that it is prudent to plan for mean sea-level to rise between 1 and 1.6 feet (relative to the land) from a 2005 starting point. The IPCC "current commitments" projections put the likely range at 2.0 to 3.5 feet by 2100 - two to three times the sea-level rise experienced during the 20th century. Even with unexpectedly rapid polar ice loss, sea-level is very unlikely to exceed 4.9 feet this century. The report suggests ways in which the probability distributions of these projections can be used as reference points in planning for both the natural and build environment.

MONITORING AND MODELING GHG EMISSIONS IN MARYLAND

Measurements and numerical models of GHG concentrations and emissions, supported primarily by UMD, NIST, and NOAA, have helped refine inventories and identify local hot spots in GHGs and associated short-lived pollutants – linking climate and environmental justice. These studies confirm the importance of methane in Maryland's climate impact and that traditional inventory methods underestimate methane emissions. The MDE's new methane inventories better match research grade determinations, although substantial uncertainty remains especially in emissions from the natural gas delivery system and landfills.

Recent research indicates that methane emissions from Baltimore and Washington have decreased over the past few years although the cause remains unproven. Leak rates were observed to scale with seasonal gas usage producing much higher emissions in winter than summer. The main sources in urban areas are natural gas infrastructure and landfills; on the rural eastern shore wetland emissions play a major role. Out of state sources contributing to methane in Maryland include the Marcellus gas plant and concentrated swine operations in North Carolina.

Measurements from mobile platforms continue to identify leaks and other point sources to refine inventories and suggest targets for remediation. Although replacement of the old natural gas infrastructure is a contentious issue, existing leaks are a hazard in need of immediate attention. Plans to make a Maryland landfill a testbed for methane control are underway. This will provide direct flux determination to refine models and evaluate and then implement control strategies.

The urban heat island effect, and spatially-biased emissions conspire to make many of Maryland's most vulnerable communities hot spots for not only pollution emissions but several environmental problems such as poor air and water quality and heat waves.

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ATTACHMENT

The MDE commissioned an analysis conducted by the UMD School of Public Policy to determine the total amount of State money spent on measures to reduce GHGs during the preceding fiscal year and the percentage of that funding that benefited disproportionately affected communities.
The report is available here: https://mde.maryland.gov/programs/air/ClimateChange/MCCC/Documents/2023%20MCCC%20Annual%20Report%20attachment_GHG%20Mitigation%20Spending.pdf