

2022 ANNUAL REPORT



MCCC
MARYLAND COMMISSION
ON CLIMATE CHANGE

A report to Governor Larry Hogan and the Maryland General Assembly with recommendations for reducing greenhouse gas emissions and preparing for and adapting to the impacts of climate change

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Message from the Chair and Co-Chairs

Climate change offers the unique opportunity to nurture a future that minimizes worst case scenarios while designing communities that harmonize with natural systems. Forests, farms, wetlands, and streams all offer services that manage more intense rain and dampen heat while cleaning air and water.

Even though the future seems far away, it is actually beginning right now.

— Mattie Stepanek, *poet, peacemaker and philosopher*

The work of building a better future starts by recognizing that historic inequities increase vulnerability unevenly. By prioritizing equity in decision making, the Maryland Commission on Climate Change (MCCC) works to build communities that are safe, healthy, and thriving in a changing climate.

This 2022 report of the MCCC highlights a year of tremendous achievement. Maryland is a national climate leader turning ambitious ideas into transformative action. The independent Commission, in collaboration with state and federal agencies, elected leaders, stakeholders, advocates and the public, guided Maryland to exceed its 2020 goal to reduce greenhouse gas emissions 25% from 2006 levels. Maryland not only achieved this goal, but surpassed it by achieving a 30% reduction by 2020.

Moving forward, new greenhouse gas reduction goals for Maryland target a 60% reduction below 2006 levels by 2031 and net-zero emissions by 2045. The MCCC deliberated and proffered the ambitious recommendations found in this annual report. The recommendations represent a set of steps needed to achieve new emission reductions and includes rapidly accelerating

the transition to zero-emissions vehicles, reducing vehicle miles traveled, constructing more clean power generation in state, and prioritizing building decarbonization. This annual report provides a framework to support rural, urban, and suburban communities' transition to a more resilient future.

The MCCC is a venue for honest debate yielding collaborative, innovative policies while expanding Maryland's global leadership with equitable solutions to reduce greenhouse gas emissions, protect communities, and expand the state's economy for current and future generations. Each volunteer member of the MCCC has worked many hours to advance the charge to mitigate the causes of, prepare for, and adapt to the consequences of climate change. As chair and co-chairs, we are humbled to serve with exceptional colleagues on the MCCC and in its working groups.

The recommendations in this report offer a starting point to accomplish emission and resilience goals. Our overall goal is to see in a changing climate, future generations can live in thriving, equitable communities with clean air, water, and land. We can all work towards a better tomorrow.



Suzanne Dorsey, PhD
Deputy Secretary,
Maryland Department of
the Environment
Chair, Maryland
Commission on Climate
Change



Anne Lindner
Vice President for
Government and
External Affairs, PEPCO
Co-Chair, Maryland
Commission on Climate
Change



Kim Coble
Executive Director,
Maryland League of
Conservation Voters
Co-Chair, Maryland
Commission on Climate
Change



Charmaine Brown
Vice President of
Diversity, Equity, and
Inclusion at Finance of
America Companies
Co-Chair, Maryland
Commission on Climate
Change

Commission Members

LEADERSHIP

Suzanne Dorsey*

Anne Lindner

Kim Coble

Charmaine Brown

Commission Chair

Commission Co-Chair

Commission Co-Chair

Commission Co-Chair

STANDING MEMBERS

Joe Bartenfelder

Charles County Administrator Mark Belton

Town of St. Michael's Commissioner Michael Bibb

Ellington Churchill

Mohammed Choudhury

Dereck Davis

Charles Deegan

Russell Dickerson

Dr. Peter Goodwin

Jeannie Haddaway-Riccio

Beth Harber

Jesse Iliff

Gerald Jackson

Jane Kirschling

David Lapp

Robert McCord

Paul Pinsky

James Ports

Michael Powell

David Smedick

Wayne Stafford

Dana Stein

Jim Strong

Dr. Mary Beth Tung

Department of Agriculture Secretary

Maryland Association of Counties

Maryland Municipal League

Department of General Services Secretary

Superintendent of Maryland Schools

State Treasurer

Chair, Critical Area Commission

Climate Change Expert

President of UMD Ctr for Environmental Science

Department of Natural Resources Secretary

Philanthropic Organization Representative

Environmental Non-Profit Org Representative

Organized Labor Representative

Public Health Expert

Office of People's Counsel

Department of Planning Secretary

State Senator

Department of Transportation Secretary

Business Community Representative

Environmental Non-Profit Org Representative

President, Maryland Farm Bureau

Delegate

Organized Labor Representative

Maryland Energy Administration Director

* Appointed by Maryland Department of the Environment Secretary Horacio Tablada

Introduction

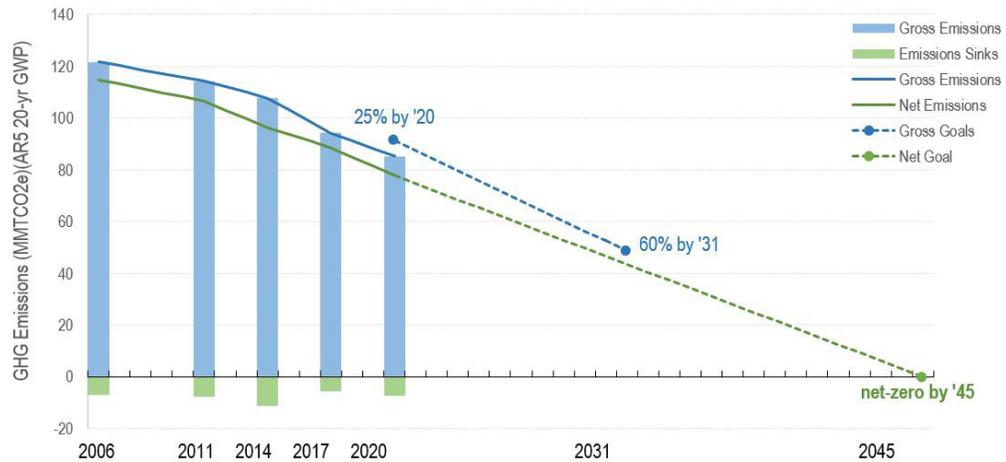
The Maryland Commission on Climate Change (MCCC or the Commission) was established to advise the Governor and the Maryland General Assembly (MGA) on strategies for reducing greenhouse gas (GHG) emissions and deliberating science-based, equitable recommendations to combat the impacts of climate change on the State. Since 2007, the Commission has played a fundamental role in Maryland's efforts to fight climate change. One of the most significant roles of the Commission is to serve in an advisory capacity to the Maryland Department of Environment (MDE) and other state entities. The Commission is comprised of a diverse set of stakeholders, policymakers, business representatives, advocates, and citizens who recommend programs and policies aimed at mitigation, adaptation, and resiliency in response to climate change. The Commission has proven that it is possible to have responsible debates and build consensus on how best to protect our natural resources, promote clean energy, and grow our economy for current and future generations. The Commission is committed to helping Maryland find bipartisan, common sense solutions to the problems facing the state. This set of recommendations is the key deliverable, produced for the Governor and the MGA, as the result of the annual meetings of the Commission process.

The Commission has proven that it is possible to have responsible debates and build consensus on how best to protect our natural resources, promote clean energy, and grow our economy for current and future generations.

This past year, the MCCC worked hard to identify policy and potential funding gaps in the state's GHG reducing programs, in addition to implementation measures that have been slow to start. The MCCC working groups provided numerous recommendations to inform and develop a strategy to implement the requirements in the Climate Solutions Now Act (CSNA) including the requirement that MDE create a plan in 2023 to reduce GHG emissions 60% by 2031.

Figure 1 (below) illustrates both our 60% by 2031 gross emissions goal and our net zero emissions goal for 2045.

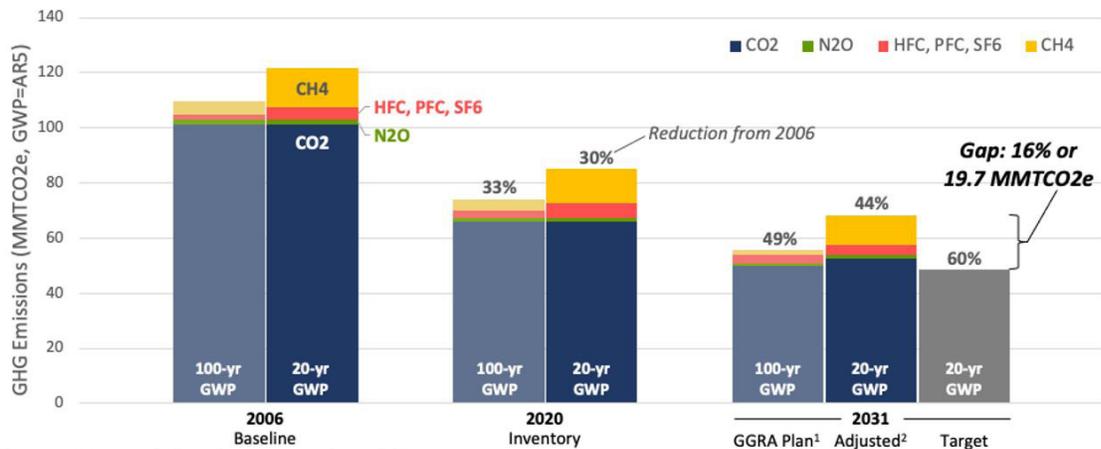
Figure 1. Maryland’s historic GHG and sinks (bars), and CSNA goals (lines)



The updated GHG reduction goals also includes a requirement that MDE use a new GHG accounting methodology, switching from the IPCC standard 100-year global warming potential (GWP) to the 20-year GWP, which accounts for the higher impact of short-lived climate pollutants like methane over shorter time periods.

Figure 2 (below) illustrates the impact of shifting from the 100-year to 20-year GWP, and the gap between projected and target GHG emission levels in 2031. If the 2030 GGRA Plan published by MDE last year were fully implemented, then the state would need to find an additional 19.7 million metric tons of carbon dioxide equivalent (MMTCO_{2e}) reduction - or an additional 16% reduction in statewide GHG emissions from 2006 levels by 2031 to meet the goal for that year.

Figure 2. Maryland’s historic emissions, projected emissions, and emissions gap



¹ 2031 emissions results from the 2030 GGRA Plan modeling

² Reflects 20-yr GWP and updated estimates for landfills, jet fuel, and ODS substitutes

The aim of the MCCC's work this year was to approach the ambitious 60% target from a new angle, one that focused on implementation of a suite of existing policies and programs that are necessary to meet the 60% target.

Over the course of 2022, the Commission's working groups undertook diverse efforts not only to develop, but also actively engage in activities to pursue the body's specific statutory charges while ensuring that environmental and climate justice considerations are integrated across its work and recommendations. The MCCC provided oversight for the [Manufacturing sector decarbonization strategies and impact in the state of Maryland study](#), which was published in October. The Commission's working groups heard from experts on topics including electrification of transportation, Electric Vehicle (EV) infrastructure, reducing vehicle miles traveled, renewable and clean energy efforts and issues, energy efficiency, and just transition. In addition, natural solutions to climate change, including carbon sequestration from forests and healthier soils; and long and short-term climate resiliency and coastal hazard mitigation were discussed. Below are brief summaries of the working groups' accomplishments:

In the Adaptation and Resiliency Working Group (ARWG), work continues on several initiatives. Progress has been made by the State Agency Saltwater Intrusion Team and through the Targeted Resilience Area project. The Maryland Department of Agriculture's Soil Health Advisory Committee approved recommendations to advance practice adoption through Maryland's Healthy Soils Program. Also, the state submitted an addendum to address additional load reductions required for Integrating Climate Change into the Phase III Watershed Implementation Plan in order to meet Total Maximum Daily Load endpoints by 2025.

The Education, Communication and Outreach Working Group (ECO) reports accomplishments this year in all focus areas: education, communication, and outreach. ECO developed a logo for the Commission (first one) as well as cover and layout for the 2022 Annual Report. ECO secured speaking opportunities for Commission leadership on state and national levels. The ECO working group also advertised and hosted three public webinars in our series: Climate Talk: The Climate Solutions Now Act, The 2021 Annual Report and Recommendations for Climate Action, and The Growth of ESG. ECO plans to produce an annual webinar for the Commission annual report henceforth every December, starting in 2022.

The Mitigation Working Group (MWG) focused its attention in 2022 on decarbonizing the transportation sector, which is the largest source of GHG emissions in Maryland (and the nation). Several of the MWG's policy

recommendations this year exemplify this focus. The MWG also ran a Biomass to Energy Subgroup, which developed recommendations for modifying the thermal renewable energy program within the state's Renewable Portfolio Standard. Later in 2022, the MWG will launch a new subgroup to further develop recommendations for accelerating the transition to light-duty zero emissions vehicles. That subgroup aims to have recommendations ready for the MWG in early 2023.

The Scientific and Technical Working Group (STWG) tracks recent scientific and engineering literature relevant to the work of MCCC. The final synthesis report of the Intergovernmental Panel on Climate Change (IPCC) 6th Assessment report (AR6) will be published at the end of the year, but STWG has tracked and provided summary reports of the IPCC working groups and special reports contributing to AR6. Relevant webinars and other literature are tracked through STWG meeting reports. Activities also include the completion of a webinar series on 'Blue Carbon' and a report on the potential for carbon sequestration in Maryland's tidal marshes (with ARWG), contributions to the update of Maryland's Ocean Acidification Plan, and technical support of the Saltwater Intrusion Plan.

The Commission is dedicated to ensuring that policy recommendations consider impacts to all people, especially those who have historically been marginalized and overburdened.

The Climate Justice team continued its efforts to ensure equity is considered in the work undertaken by the MCCC's Working Groups. As such, the team's working group liaisons represented the interest of communities that are under-resourced, overburdened, and disproportionately impacted by climate change. The Climate Justice team emphasized, where appropriate, the need for applying tools that would target resources in proportion to the need and measure and track outcomes. Finally, the Climate Justice team continues to seek opportunities for meaningful collaboration with community stakeholders and advocates to leverage their expertise as well as to identify solutions that address the financial, economic, and health burdens driven by climate and its harmful impacts.

Programs and recommendations not addressed in 2022 will be included in each working group's 2023 work plans and will be considered by the Commission in the coming year.

Federal actions, including funding from the Inflation Reduction Act, may help the state implement select 2030 GGRA Plan measures, but the state will need to develop and implement significantly more stringent measures over the next 8 years to achieve the 2031 goal. The Infrastructure Investment and Jobs Act will also help support Maryland’s goals when used to fund low carbon transportation options such as public transit, bike, pedestrian infrastructure, and transit-oriented development programs.

Through this report, the Commission offers a series of recommendations to the Governor and MGA to enhance the state’s efforts in climate change mitigation, adaptation, and resilience, to better incorporate environmental and climate justice into the state’s climate approach. The Commission is dedicated to ensuring that policy recommendations consider impacts to all people, especially those who have historically been marginalized and overburdened. The recommendations following will help Maryland continue to protect the economy, the environment, and the health of all of its residents.

Smith Island



Policy Recommendations

The MCCC continues to promote its recommendations from last year except where this year's recommendations supersede previous recommendations. A summary of the MCCC's recommendations from last year is included as an appendix to this report.

ADAPTATION AND RESILIENCE WORKING GROUP

1

State agencies that are represented on ARWG should collaboratively develop Maryland's Next Generation Adaptation Plan: 10 Year Roadmap to Resilience

ARWG agencies should use the resilience strategies identified in the Draft Maryland Climate Adaptation and Resilience Framework Recommendations: 2021 - 2030 to develop a Next Generation Adaptation Plan which will span a 10-year roadmap to resilience and help meet the state's GHG reduction goals.

- a. Priorities should be established to shape annual work plans and strategy implementation. Agencies will be assigned specific deliverables, in consultation with those agencies, and report progress to the Commission. Legislative priorities will be forwarded to the General Assembly and the governor for consideration.
- b. The Next Generation Adaptation Plan should develop an effective tracking system to measure progress on priorities and develop an online platform to communicate adaptation progress across the state.
- c. The Next Generation Adaptation Plan should be completed within one year.

EDUCATION, COMMUNICATION AND OUTREACH WORKING GROUP

2

To meet the tenets of inclusivity and climate justice, **the General Assembly should use short, plain (non-scientific and brief) language in bill titles, goals, and names of commissions, task forces, and working groups.**

3

Marylanders must be engaged and invested in achieving the state's goal of reducing GHG emissions and improving resilience. To educate and motivate all Marylanders, including underserved, overburdened and under-resourced communities, **the Governor and General Assembly should adequately fund and develop a statewide climate**

awareness campaign overseen by ECO, which will include an interactive website that will offer one stop shopping for state and federal resources to help local governments and Marylanders to find and utilize resources available to them to engage in climate solutions.

MITIGATION WORKING GROUP

The State must immediately take the following actions to get on track for achieving a 60% reduction in statewide greenhouse gas (GHG) emissions from 2006 levels by 2031, the most ambitious GHG reduction goal of any U.S. state. The following actions alone are likely not enough to achieve this goal but are critical parts of a comprehensive plan to reduce GHG emissions.

Rapidly accelerate the transition to zero-emissions vehicles



4

The Governor or General Assembly should set an aspirational target for 75% of newly registered light-duty vehicles in the state to be Zero-Emissions Vehicles (ZEV) and plug-in hybrids by 2030.

The State should align ZEV purchase incentives and infrastructure planning with this target. Analysis shows that on-road gasoline consumption is the largest source of GHG emissions in Maryland and rapidly transitioning to light-duty ZEVs is one of Maryland's best opportunities to make progress toward its 60x31 goal.

5

By the end of 2022, MDE should adopt the Advanced Clean Cars II (ACC II) standards

- following the lead of other Section 177 States - that accelerate ZEV sales percentages starting with model year 2026 and ramp up to achieve 100% ZEV sales share for new cars by 2035.

6

The Maryland Clean Energy Center (MCEC, a state "Green Bank") should work with public and private entities to offer low-interest, government-backed loans to assure that the average monthly cost of owning a ZEV is always lower than the average monthly cost of owning a comparable internal combustion engine vehicle (ICEV)

(for vehicles and owners that meet certain requirements). Several light-duty ZEVs already have lower monthly costs of ownership than comparable ICEVs when federal tax credits are included, so state incentives are



not needed to make some ZEVs the lowest-cost option. For other ZEV models, modest state incentives may be needed to reduce the monthly cost of ownership below that of comparable ICEVs. State incentives can be phased-out as ZEVs get closer to purchase price parity with ICEVs and achieve a lower monthly cost of ownership without state support. These “lowest cost assured” loans should be available for purchasing light-, medium-, and heavy-duty vehicles and charging equipment. For heavy-duty vehicles, substantial state incentives may be needed for ZEVs to have lower monthly cost of ownership than ICEVs, especially for fleet vehicles that are turned over every few years. MCEC should work with the General Assembly to secure an appropriate amount of funding for this comprehensive loan program, which could become the state’s primary financing mechanism for helping Marylanders reduce household and business costs while significantly improving air quality. MCEC should develop the program with equity as a core objective.

7

MDE should adopt the Advanced Clean Truck rule -

following the lead of states that have adopted or are moving to adopt this rule including CA, CT, MA, ME, NJ, NY, OR, VT, and WA to require manufacturers to increase the sale of zero-emission trucks and school buses. The state should also coordinate with the other states in the Mid-Atlantic and New England region to seek consistency in applying the regulations, conducting infrastructure planning, and incentivizing the purchase of qualifying vehicles. Maryland should offer incentives consistent with those offered by states that have adopted the ACT.

8

The General Assembly should require MDE to propose regulations for a Low Carbon Fuel Standard -

similar to the programs in CA and OR - while accommodating Maryland circumstances and contingent on assuring adequate supply to reduce the carbon intensity of

motor fuels distributed in the state. This would be an important near-term action to reduce emissions from internal combustion light-, medium-, and heavy-duty vehicles, which will be on the road for decades to come since the transition to ZEVs will take time.

9

The General Assembly should provide funding to help EV purchasers living in existing multi-dwelling unit buildings and the owners of those buildings to install charging equipment.

For new construction, the Maryland Building Codes Administration should adopt the multi-dwelling unit buildings EV charging infrastructure requirements in the draft 2024 International Energy Conservation Code as part of the statewide building performance standards.

Increase support for alternative transportation to reduce vehicle miles traveled and Metropolitan Planning Organizations' efforts to reduce on-road greenhouse gas emissions



10

The Governor should greatly increase the percentage of federal funding including from the Surface Transportation Block Grant and National Highway Performance Program to be used by state agencies and shared with cities and counties for public transit, bike, and pedestrian infrastructure, and Transit Oriented Development programs.

11

The General Assembly should make major changes to the Maryland Commuter Choice program, including incentives, with the goal of increasing the number of employers participating from 50 employers (in 2022) to at least 500 starting in 2024, including focusing on the needs of Maryland's top 32 employers that each employ over 2,500 people. Increase the percentage of employer costs and total of employee costs eligible for reimbursement for offering employees qualified community benefits programs like transit, cash in lieu of parking, telework, and more.

12

The General Assembly should provide funding and other support for local and regional micro transit services to augment rail and bus mass transit.

13

The General Assembly should require recertification of Transit-Oriented Development (TOD) areas. Recertification should be based on whether general plans, zoning, existing land use, PFA's and TOD development capacities are aligned to accommodate future population and employment projections.



Construct more clean power generation in-state, especially solar power



14

The State should take numerous actions to increase the pace of solar power development in Maryland including

- a. The General Assembly should require each county to designate renewable energy development to sites adequate to implement at least their projected (population-based) share of the state's legislated solar energy targets. County plans should designate sites for utility solar according to zoning. The

county should take into account soil classification with a priority on Class 3 soils or lower. County planning processes should include a stakeholder engagement process for affected parties, including agriculture.

- b. The General Assembly should direct the PSC to make the community solar program permanent and seamlessly continue it from the pilot stage without interruption while expanding capacity limits for new community solar projects in each utility territory, and ensuring that low-income household subscribers continue to benefit from significantly discounted electricity.
- c. The legislature should act to support the added cost of developing low- and moderate-income community solar projects, especially those in preferred locations (brownfields, rooftops, parking lots etc.) through improved financing incentives.

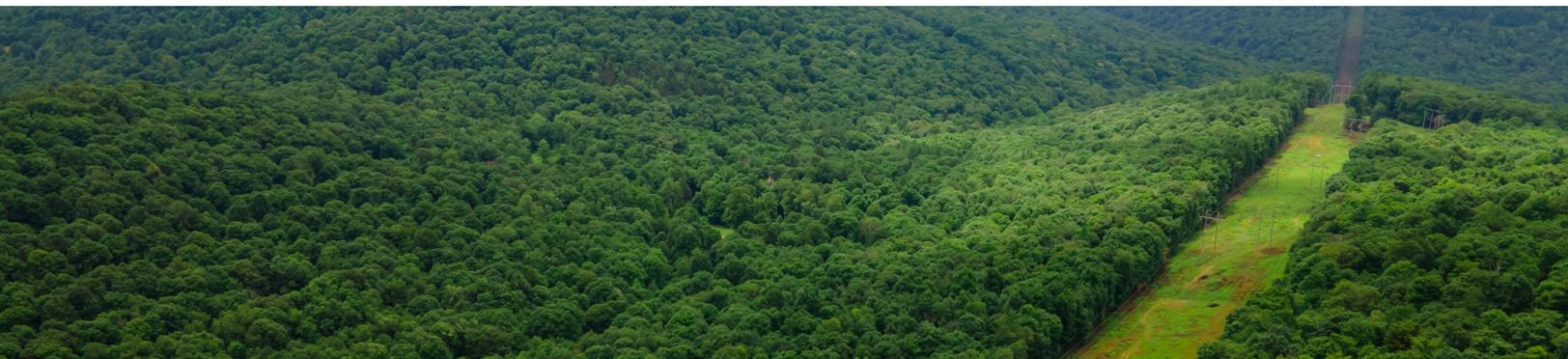


- d. Allow community solar providers to use the same “Utility Consolidated Billing with Purchase of Receivables” (UCB with POR) mechanism that all other non-utility energy providers in the state get to use.
- e. The General Assembly should provide additional incentives for solar development on “preferred sites” including residential and commercial rooftops, parking lots, abandoned sites, grayfields, and brownfields.
 - i. Substantial (e.g., 25% of project cost) refundable state tax credit for new solar arrays on these sites
 - ii. An SREC “multiplier” for preferred sites (e.g., a residential array’s output would be valued at 1.5 SREC units).
 - iii. Increasing the cost of Solar Alternate Capacity Payments beyond the low and declining levels set by 2021 SB65, to increase SREC value. There are many examples of “upfront” incentives from other states that could be drawn on.
 - iv. Increase limits on commercial net metering, virtual net metering and the size of solar facilities on commercial property with an eye toward equity and affordability.

- f. MEA should work toward developing a program/policy in coordination with the PSC and PJM to link interconnection service agreement timelines and incentives to ensure that developers can access funding in a timely manner.
- g. The State should incorporate project “readiness” or maturity into solar project siting, and permitting (similar to what PJM is doing with “first-ready, first-serve.”)
- h. The State should require long-term contracts for renewable energy to support a portion of the Standard Offer Service in the state.
- i. The Building Codes Administration should adopt solar related provisions in the draft 2024 International Energy Conservation Code.
- j. MEA should report annually in their State Agency Reports, the amount of new solar production (by project) in the previous year and report on opportunities for solar development on rooftops, parking lots, disturbed land, and less productive farmland.
- k. The General Assembly should consider revisions to the RPS to encourage more solar through SRECs and more ambitious carveouts. SRECs should incentivize projects on developed and brownfield sites and limit use for projects on sensitive lands.

15

Increase emphasis on equitable benefits – On a portfolio level, the EmPOWER Maryland program was not designed to equitably serve Maryland residents. Lower-income residential customers, in aggregate, have been estimated to pay considerably more into the program on an annual basis than they receive in program benefits. **The PSC should study these issues and establish more equitable goals for the EmPOWER portfolio** (e.g., utilizing Justice 40 principles) to guide program design and evaluation. **The General Assembly should also establish specific goals for energy programs administered by the Department of Housing and Community Development and direct the PSC to provide a commensurate amount of the EmPOWER budget and hold DHCD accountable for achieving those goals.**



Rapidly accelerate building decarbonization



16

The General Assembly should address the Public Service Commission's (PSC) recommendations in "Recommendations on the Future of EmPOWER Maryland" to adjust the EmPOWER program to work toward achieving greater GHG reductions.

The MCCC endorses the PSC's recommendations including:

- a. Amend or replace PUA § 7-211(g)(2) and adopt the PSC recommended GHG abatement goal for the Utilities;
- b. Amend or replace PUA § 7-211(g) and adopt the PSC recommended limited-income GHG abatement goal for DHCD; and
- c. Amend or replace PUA § 7-211(i)(1) and (2) and adopt the Primary Maryland Jurisdiction-Specific Test.

17

The General Assembly should provide incentives for all-electric new construction compliance pathways within the optional Net Zero new construction pathway in the 2024 International Energy Conservation Code.

18

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 and 2021);
- c. End incentives for fossil fuel appliances starting in 2023 (as recommended by the MCCC in 2021); and
- d. Provide audits that recommend steps for homes/buildings to become electric-ready, along with rebates for these investments.

19

The General Assembly should require the PSC to issue orders and regulations by no later than January 1, 2025, for managing a transition to meet the GHG reduction goals of the Climate Solutions Now Act that establishes

requirements for gas utility planning for achieving a structured and just transition to a near-zero emissions buildings sector in Maryland. Key objectives of those plans include:

Gas Transition Plans

- Appropriate gas system investments/abandonments for a shrinking customer base and reductions in gas throughput in the range of 60 to 100 percent by 2045
- Comprehensive equity strategy to enable LMI households to improve energy efficiency and electrify affordably
- Regulatory, legislative, and other policy changes needed for a managed and just transition of the gas system and infrastructure
- Operational practices to meet current customer needs and maintain safe and reliable service while minimizing infrastructure investments
- Assessment of existing gas infrastructure and options for contraction
- Alternative models for the gas utility’s long-term role, business model, ownership structure, and regulatory compact, as part of a managed transition
- Examining the feasibility of using the natural gas delivery system to carry green hydrogen.
- Examining the role of lower carbon fuels, including renewable natural gas (biogenic methane), green hydrogen, and hydrogen blending

20

Short of an all-electric construction code, or for any exceptions to an all-electric building code, **the PSC should align gas line extension policy with the goal of broader electrification of new construction and declining gas sales.**

21

The General Assembly should authorize MDE to develop a zero-emissions standard for space heating and water heating equipment with the goal of achieving a structured phaseout of non-essential emissions-producing equipment by 2030. This would be the enforcement mechanism to achieve the MCCC’s Building Energy Transition Plan recommendation for 50% of residential heating systems, cooling systems, and water heater sales to be heat pumps by 2025, reaching 95% by 2030. Standards should apply to systems installed in buildings/applications smaller than 35,000 square feet. Incentives provided through the Inflation Reduction Act, EmPOWER, and other incentive programs are expected to cover all or most of the cost of retrofitting an existing building with heat pump systems. MDE’s Building Energy Transition Implementation Task Force should evaluate what, if any, additional state support would be required to cover retrofit costs.

Capture and utilize methane from waste management and CO2 from cement manufacturing

CH₂

22

The Governor should appoint a task force including Maryland's cement manufacturers, state agency staff, and technical experts to assess feasibility of constructing carbon capture and utilization/storage (CCUS) facilities and also the use of hydrogen from non-GHG emitting resources instead of carbonaceous fuels to mitigate unavoidable CO2 emissions from the cement manufacturing process and if feasible, the task force should recommend methods to secure federal funding and technical assistance for constructing CCUS facilities.

23

The General Assembly should provide matching funds to local jurisdictions to install systems that capture methane from landfills and wastewater treatment plants and, where feasible, use the captured methane for on-site power generation.



Modify the state's thermal renewable energy credit program



24

The State should develop a new climate-aligned, renewable thermal energy program to facilitate the decarbonization of the building sector.

The new program would absorb the state's existing Thermal Renewable Energy Credits (TRECs) from the Renewable Portfolio Standard (RPS) electricity program and allow for various clean heat solutions to compete for renewable energy credits, with a prioritization of clean heating solutions that are not associated with on-site emissions. Credits in this expanded program should be made available to support measures that decarbonize heating fuel supplies, reduce methane leaks from natural gas distribution systems, improve the energy efficiency of homes/buildings, install a thermal or combined heat and power system that runs on qualifying biomass fuels, replace equipment that runs on fossil fuels with equipment that runs on qualifying biomass fuels, and replace equipment that runs on fossil fuels with efficient electric alternatives such as heat pumps. Examples of this type of "Clean Heat Standard" program are under development in other states. Moving the existing TRECs to the new program would also return the state's RPS to its original intent of increasing the share of renewable energy in Maryland's electricity supply. Further, the program should prioritize the delivery of clean heating solutions, and associated climate, economic, and air quality benefits to low-income and environmental justice communities, particularly improvements to energy efficiency of homes/buildings and deployment of efficient, electric equipment such as heat pumps.

The General Assembly should also modify requirements for woody biomass-to-energy systems to qualify for TRECs during the time before the new renewable thermal energy program takes effect. Low-value woody material from a forest management action with a net positive carbon benefit should be included to support healthy and climate-adapted forest composition and sustainable urban tree management.

25

Incentivize the development of forest product industries that support sustainable forest management and maximize long-term carbon sequestration.

The Department of Commerce should build a targeted incentive package to attract and grow forest product industries, like structural wood for construction and innovative use of fiber in manufacturing, that support sustainable forest management and utilizes forest products in a way that maximizes long-term carbon sequestration. Doing so would support the Maryland Forestry Economic Adjustment Strategy and sustainable forest management practices in the state. Incentives should include up to 30% capital of manufacturing investment in new or expanded plants, capped at an amount such as \$10M per applicant.

Several conditions would need to be met first: the products manufactured would need to be carbon neutral or positive; taking into account soil carbon as well as atmospheric balance on an annual basis; at least 50% of the raw materials would be sourced from within Maryland; the energy used by the manufacturer would be from Tier 1 or renewable thermal sources, and the investments supported by the incentives would need to have zero or positive impact on the number of jobs in Maryland.

The Department of Commerce should also convene a Forest Products Council including the Department of Natural Resources, Maryland Department of the Environment, Maryland Energy Administration, Department of General Services, Maryland Department of Planning and others to inform the structure and implementation of the aforementioned incentive program and provide ongoing support and guidance to the development of an environmentally and economically beneficial forest products industry in Maryland.

SCIENTIFIC AND TECHNICAL WORKING GROUP

Build agency capacity to address Maryland's Climate Response



Background: Maryland's agencies have talented scientists, engineers and planners working to implement the requirements of CSNA and other laws and policies related to climate change. Many staff members have experience in the federal government, private sector, NGOs or state agencies. However, the additional burden on staff associated with achieving the climate goals is significant and there are substantial gaps in expertise required to implement such a comprehensive and ambitious agenda.

26

Conduct a personnel needs assessment of state agency staffing and identify the most expedient way to meet staffing needs and ensure the success of Maryland's climate agenda. Follow-up actions from this assessment could include:

- a. Prioritize and hire new agency staff that fill critical gaps in expertise and provide additional opportunities to current employees on issues related to climate and its impact on Maryland communities.
- b. Expand the current Maryland Sea Grant Science-Policy Fellows program. This program places a current or recent PhD for one year at a high level in state government to assist senior personnel. The program targets under-

represented minorities and these Fellows gain an appreciation of the pressing issues faced by state agencies whether they return to academia or join state agencies following the fellowship.

- c. Establish a dedicated funding pool to retain experts from the private sector, NGOs or academia to support agency staff on specific short-term climate priorities.
- d. Conduct a review of the current monitoring data available and identify any critical gaps that would improve the predictive capability of models and our understanding of air quality, GHG emissions and formation of heat islands - prioritizing monitoring in overburdened and underserved communities.
- e. Increase the number of enforcement staff across agencies for air and water quality prioritizing overburdened and underserved communities

Create a Climate Change Response Accelerator



Background: There needs to be significant investment from the state to catalyze the public-private partnerships, state-federal-local government collaborations, and university and innovation company research to implement actions at scale to accelerate the most promising emerging technologies and scientific research that will help Maryland achieve the 2031 and 2045 goals. This investment should be established with clear performance metrics linked to CSNA and other relevant legislation that specifically focuses on mitigation and climate justice.

27

The General Assembly and Governor's office should create a targeted Climate and Equity Innovation Fund managed by the existing Maryland Energy Innovation Institute (MEI2)/Maryland Clean Energy Center (MCEC) program that will directly provide funding to create scientific and engineering innovation to address climate change. This fund should be commensurate with the magnitude of the challenge (for example, a 10-year program with an initial allocation of \$30m for the first year) with the express purpose of innovation that positions Maryland as a national leader in energy and climate technology by:

- a. Funding in whole or in part, partnerships between industry and other entities in the private sector, NGOs, governmental entities and academia.

- b. Establishing seed grants to advance proof-of-concepts that have the potential to scale and leverage related programs where appropriate. For example: the MEI2, MCEC, and the Maryland Energy Innovation Accelerator previously created by the Maryland legislation.
- c. Creating a program to develop a diverse workforce. This program will leverage the existing efforts of the STEM pipeline and DEI initiatives that focus on the leadership and expertise needed to address Maryland’s climate challenges. This could be achieved through paid internships and other programs that specifically lead to career opportunities.

All funds would be distributed on a competitive basis that relies on peer-review, rigorous performance metrics and demonstration of synergies between the priorities of industry, academe, local governments, NGOs, communities and the state.

Addressing Critical Scientific and Engineering Knowledge Needs



In order to address climate mitigation, guide the response of communities and inform the recovery of Chesapeake Bay, the following emerging issues should be made a focus for 2023.

Building the modeling and assessment capacity in Maryland



Background: Maryland is making decisions that transform the infrastructure and quality of life of residents. The implications are significant across many sectors and the best-available, transparent, and replicable models are essential. These models should quantify levels of confidence and track progress in a rigorous scientific manner. These models should be open-source and accessible to MCCC and agencies with expertise housed in the agencies, private sector and universities to guide the application and future enhancements to the models.

28

A plan should be developed by the MDE, DNR, MDOT, and UMCES that defines the suite of models to be used by the state in addressing climate change mitigation and adaptation.

These models should be open source. The plan should identify key new positions needed in state agencies to oversee the models and articulate how the models will be sustained and enhanced over time through support or in partnership with Maryland’s higher education institutions, consultants, NGOs and the private sector. The goal is to create a community of

experts that drive innovation and implementation of actions that can be scaled. This plan should also include how monitoring updates to supplement existing data collection programs that support model projections and verification of progress being made.

Enacting Maryland's Ocean and Coastal Acidification Plan



Background: The 2021 MCCC Annual Report: Recommendation #42 stated 'The state should work with STWG in reviewing and supporting the Ocean Acidification Research and Monitoring Action Plan as part of the state's membership in the International Alliance to Combat Ocean Acidification.'

29

Based on work conducted in 2022, MDE and DNR, in coordination with the EPA Chesapeake Bay Program, the state of Virginia and other partners should execute a tributary and main stem carbonate system monitoring plan within the Chesapeake Bay. Monitoring the carbonate

system chemistry affected by climate change is necessary to improve scientific understanding of potential ecosystem effects, natural and anthropogenic controls, and to establish a more robust baseline for assessing future trends.

Monitoring GHG - particularly point sources of methane



Background: Methane is the second strongest driver of radiative forcing causing climate change but may be the most easily controlled. The rate of emissions is variable and the uncertainty in inventories high. The new MDE inventory is much improved, but much remains to be learned about the relative roles of major sources including natural gas wells, transport and usage, landfills, wastewater



treatment facilities, agriculture, emissions associated with coal, and natural emissions such as wetlands. Engineering solutions such as pipe replacement and soil cover on municipal waste are readily implemented.

30

Support a variety of top-down (atmospheric-observation based) methods for evaluating methane flux to identify major sources for emissions reductions and for comparison to bottom-up (activity-based) methods and to improve inventories.

Enhance public health adaptation to threats of climate change



Background: Despite mitigation efforts, communities across Maryland will continue to be exposed to increasing number of extreme weather events that will increase their risk of morbidity and mortality. There needs to be a significant investment from the state to help community prepare for these threats ahead and time and respond to them.

31

The state should consider developing 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).

32

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

33

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 the University of Maryland School of Public Health 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.

Establishing common hydrologic methodology for stormwater and flood design



Background: Direct application of the historic record to hydrologic analyses is no longer an accurate estimator of future precipitation characteristics and the changing climate must be included in future projections. There are a diverse range of methodologies currently being deployed but the methods should be standardized to ensure consistency in infrastructure design.

34

Design precipitation and flow characteristics will vary across the state but guidance should be developed on the methodology and presented in a manner that is easily implemented by local government. This methodology and updates of design criteria for stormwater management and flood risk should be subject to a 5-year review process to capture the latest scientific understanding and best engineering practice.



Science Update

FINDINGS OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC)

During 2022 the Intergovernmental Panel on Climate Change released the final two of three working group reports of its Sixth Assessment (AR6), these on [Impacts, Adaptation and Vulnerability](#) and Mitigation of Climate Change. When the first report on the Physical Science Basis was released in 2021, it was described by [UN Secretary-General António Guterres](#) as a [code red for humanity](#), an atlas of human suffering and a damning indictment of failed climate leadership.

Selected IPCC scientific findings include:

- It is unequivocal that human influence has warmed the atmosphere, ocean, and land. Widespread and rapid changes in the atmosphere, ocean, cryosphere, and biosphere have occurred.
- Continued global warming is projected to further intensify the global water cycle, including its variability, global monsoon precipitation, and the severity of wet and dry events.
- GHG emissions are continuing to increase. For a 67% chance of limiting global warming to 1.5°C, it is necessary to limit carbon emissions to 400 gigatonnes of carbon dioxide. This is 10 years of emissions at 2020 levels.
- Current National Determined Contributions that set GHG Reduction Targets will result in 2.4°C increase in global temperature by 2100. Current levels of emissions will result in a 2.7°C increase.
- 40% of the world population is highly vulnerable to the effects of climate change.
- Environmental justice issues will be exacerbated at the national, regional, and local levels.
- Technology is important, but there will be no single magic fix. For example, machines for direct carbon capture may emit a good percentage of the extracted carbon if there is no clean energy source to power the process.

- The worst effects of climate change can be avoided and global warming limited to the 1.5oC threshold if concerted and significant action is taken now.
- Low emissions technology is becoming more affordable. These findings are supported by a recent publication, economists predict that a fast transition from fossil fuels to green energy could result in global savings of \$12 trillion.

RELEVANCE OF IPCC FINDINGS TO MARYLAND

Maryland can expect continuing severe chronic and periodic impacts of climate change, including:

-  Increases in extreme precipitation in our region (very likely)
-  Expected increase in river and pluvial flooding (medium confidence)
-  Expected greater incidence of heat waves (virtually certain)^{1 2}
-  Economic impact of weather and climate related disasters will continue to escalate³. (Table 1 provides evidence of the recent costs to Maryland)
-  Exacerbated air quality and environmental justice problems due to climate change including higher temperatures
-  Exacerbated air quality and environmental justice problems due to climate change including higher temperatures

Climate change is physically changing the Chesapeake Bay ecosystem and will influence recovery efforts, potentially including the effectiveness of best management practices being implemented to reduce nutrient and sediment loading. This is the subject of assessments by Maryland's agencies and the Chesapeake Bay Program.

1 Refer for example to: <https://riskfactor.com/>

2 <https://firststreet.org/press/press-release-2022-heat-model-launch/>

3 <https://www.climate.gov> and NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (2022). <https://www.ncei.noaa.gov/access/billions/>, DOI: [10.25921/stkw-7w73](https://doi.org/10.25921/stkw-7w73)

Table 1. Increasing Incidence and Damages Due to Climate and Weather-Related Disasters in Maryland⁴ [CPI adjusted for 2022]

Time Period	Billion-Dollar Disasters	Events/Year	Cost	Percent of Total Cost
1980s (1980-1989)	7	0.7	\$1.0-\$2.0B	11.2%
1990s (1990-1999)	13	1.3	\$2.0-\$5.0B	17.5%
2000s (2000-2009)	10	1.0	\$2.0-\$5.0B	25.9%
2010s (2010-2019)	27	2.7	\$5.0-\$10.0B	38.9%
Last 5 Years (2017-2021)	19	3.8	\$2.0-\$5.0B	13.8%
Last 3 Years (2019-2021)	11	3.7	\$500M-\$1.0B	6.2%
Last Year (2021)	5	5.0	\$250M-\$500M	2.5%
All Years (1980-2022)*	70	1.6	\$10.0B-\$20.0B	100.0%

* Statistics valid as of October 11, 2022

SEA LEVEL RISE IN MARYLAND

Sea-level rise accelerated by climate change has been a key concern for Maryland with its thousands of miles of tidal shoreline and low lying coastal and urban areas. Under the auspices of the MCCC, projections of future sea-level rise in Maryland were developed in 2008, 2013, and 2017. Over that time, scientific understanding of sea-level rise as a global phenomenon has advanced greatly, particularly with regard to: the sources contributing to it, contributions of melting glaciers and polar ice sheets, the rate of recent acceleration, and why sea level rises at higher rates in some parts of the ocean. This emerging understanding was taken into account in the development of new projections of sea-level rise under different emissions pathways in the IPCC’s Sixth Assessment. While about half a foot of sea-level rise will occur by 2050, even if the world achieves net-zero greenhouse emissions

⁴ Ibid.

by that time, continued growth in emissions would dramatically accelerate sea-level rise later this century and beyond. Global warming in excess of 2°C greatly increases the risk of rapid loss of ice from Antarctica and Greenland, potentially raising sea level by as much as 8 feet over the next 100 years. Recent research shows that certain thresholds of sea level rise are inevitable; however, the actual sea level rise experienced depends on the actions taken in the coming decades. The University of Maryland Center for Environmental Science will update sea-level rise projections for Maryland in 2023 based on the proven [Sea Level Projection Tool](#) developed by National Aeronautics and Space Administration using the IPCC projections.



Appendix: 2021 MCCC Annual Report Recommendations

These Commission 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 2030 GGRA 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.

BUILDINGS

The full text of the following buildings recommendations can be found in the Building Energy Transition Plan (attached to this report).

1. Adopt an All-Electric Construction Code
2. Develop a Clean Heat Retrofit Program
 - A. Retrofit 100 % of low-income households by 2030
 - B. Encourage fuel-switching through EmPOWER beginning in 2024
 - C. Encourage beneficial electrification through EmPOWER beginning in 2024
 - D. Target 50% of residential heating, ventilation, and air conditioning and water heater sales to be heat pumps by 2025, 95% by 2030
 - E. Align energy plans, approvals, and funding with the objectives of this Plan
3. Create a Building Emissions Standard
4. Develop Utility Transition Plans
5. Prioritize an equitable level of benefits for all Marylanders

6. Improve interagency coordination for holistic building retrofits
7. Use federal funds for comprehensive retrofits of low-income housing
8. Sunset financial subsidies for fossil fuel appliances within EmPOWER
9. Offer incentives for net-zero energy all-electric new buildings
10. Lead by example through the electrification and decarbonization of state buildings
11. Allow local jurisdictions to set higher fines for non-compliance on building performance
12. Offer tax credits or other incentives for enhanced energy efficiency in new construction
13. Allow above-code green programs to comply with the state-adopted International Energy Conservation Code
14. Allow a portfolio approach to renewable energy generation
15. Evaluate property tax assessment processes to support decarbonization efforts
16. Identify locations that need grid upgrades to accommodate new all-electric buildings

TRANSPORTATION

17. The state should continue to provide valuable assistance with the hope of joining a strong and equitable Transportation Climate Initiative Program to reduce pollution and improve transportation options in communities throughout the mid-Atlantic region.
18. State agencies should identify regulatory and policy mechanisms that encourage the development and use of low and zero emission technologies and fuels and provide recommendations for amendments.

19. State agencies should expand financial incentives for purchase of zero emission vehicles (ZEVs) and installation of electric vehicle supply equipment (EVSE). Incentives should be structured to ensure equitable disbursement and deployment of EVSE in underserved communities and rural areas.
20. The Maryland Department of Transportation (MDOT) should continue the expansion of 'Commuter Choice Maryland' Travel Demand Management programs to reduce congestion and emissions associated with commuter travel. State agencies should seek partnerships that recognize employers and organizations for offering transportation benefits and creative program incentives to their employees.
21. State agencies should identify and install charging infrastructure at state sites to support government owned vehicle electrification as well as identify fleet vehicles eligible for conversion that will meet legislative ZEV purchase requirements.
22. The state should enact policies requiring the transition of diesel school buses to ZEV beginning as soon as possible with a full transition no later than 2040.
23. The state should enact policies requiring the transition of all locally operated transit passenger buses to ZEV beginning as soon as possible with a full transition no later than 2040.
24. As a signatory of the Medium and Heavy-Duty Truck ZEV Memorandum of Understanding (MOU), the state should work through the existing multi-state ZEV Task Force facilitated by the Northeast States for Coordinated Air Use Management (NESCAUM) to develop and implement a ZEV action plan for trucks and buses.

POWER SECTOR

25. As part of the third program review of the Regional Greenhouse Gas Initiative, MDE and the Maryland Public Service Commission should champion program improvements, including an emissions cap, which reduces CO2 emissions from regulated sources to zero by 2040 with cost controls, enhanced public health protections, particularly for environmental and climate justice communities; and ensure that the program provides significant job and economic benefits to all Marylanders.
26. The state should expand the development of offshore wind energy resources and the accompanying industry supply chain and workforce work by streamlining permitting and regulatory processes in collaboration with SMART-POWER partner states.

SHORT-LIVED CLIMATE POLLUTANTS

27. MDE should continue evaluating and drafting regulatory options to address methane emissions from the natural gas distribution system.
28. The Scientific and Technical Working Group (STWG) should support the experts at MDE and the University of Maryland (UMD) who are developing air monitoring sites at landfills to determine how field data can improve the accuracy of methane emissions monitoring at point sources.
29. MDE should consider including black carbon data in the state GHG inventory.
30. The STWG's expert subgroup on livestock and animal feed should conclude their assessment of the feasibility of additives to cattle feed to reduce animal emissions of methane.

BIOMASS-TO-ENERGY

31. The state should use waste from timber slash (i.e., woody material typically left behind after a timber harvest), thinnings for healthy and climate-adapted forest stand densities, urban tree management, the wood products industry, and untreated wood that otherwise would be recycled or landfilled for mid-sized (1-2 Megawatts) combined heat and power systems or thermal-only systems.
32. The Maryland Department of Natural Resources (DNR) should track new and existing woody biomass to energy facilities in the state along with their feedstock and report this as part of DNR's annual GGRA progress report. Through partnerships with regulatory and incentive agencies (i.e., MDE and the Maryland Energy Administration (MEA)), DNR should ensure the sourcing of wood fuels does not exceed the supply through the sources mentioned above.
33. The Mitigation Working Group (MWG) is directed to make recommendations about whether thermal renewable credits should be granted, and under what terms, when the credits would be generated from solely woody biomass to energy facilities where the woody biomass is sourced from timber slash, thinnings for healthy and climate-adapted forest stand densities, urban tree management, the wood products industry, and untreated wood that otherwise would be recycled or landfilled. Currently only facilities that co-fire with a majority of manure can qualify.

STATE GOVERNMENT OPERATIONS

34. The Maryland Department of General Services (DGS) should report annually on GHG emissions for all state government operations and oversee the development of an interagency Climate Action Plan that aims to achieve net-zero emissions by 2035 across all state operations for scope 1 & 2 emissions.
- * All state-funded operations, including the University System of Maryland should be included in the GHG report and Climate Action Plan.

****Scope 1 emissions are direct GHG emissions that occur from sources that are controlled or owned by an organization (e.g., emissions associated with fuel combustion in boilers, furnaces, vehicles). Scope 2 emissions are indirect GHG emissions associated with the purchase of electricity, steam, heat, or cooling. Although scope 2 emissions physically occur at the facility where they are generated, they are accounted for in an organization's GHG inventory because they are a result of the organization's energy use.***

TECHNOLOGY

35. The STWG has expanded its membership with experts in innovative technologies. As the impacts of climate change continue to become a threat to ecosystems and human health, a substantial number of innovative concepts are evolving. STWG will continue to compile information (articles and webinars) of potential interest to the Commissioners. Specifically, STWG will focus on feasible energy storage for renewable energy sources and advances in direct capture and storage of carbon technologies.
36. As requested by the Commission and MDE, STWG will provide scientific guidance related to setting priorities on how Maryland can achieve GHG reduction goals set by state or federal legislation. STWG members will coordinate with other working groups and respond to their requests for information. STWG will work with other working groups to identify common science and engineering priorities for planning or implementation of strategies that may arise in 2022. STWG will continue to host webinars on emerging science and technology topics as requested by the Commission, its working groups, and agencies.
37. The state should provide incentives for solar domestic hot water systems, especially in multifamily buildings.

CARBON SEQUESTRATION

38. MDE, in collaboration with the Maryland Department of Agriculture (MDA) and DNR, should include agricultural soil carbon and blue carbon within the 2023 GHG inventory based on the best available science to support a full ongoing assessment of Maryland's natural carbon sinks. Achieving this recommendation may require additional engagement with expert scientists, the U.S. Climate Alliance, or other funding partners.
39. MDE, in collaboration with MDA and DNR, should work to provide clarity on Natural and Working Lands (NWL) project eligibility for multiple forms of conservation finance, including low-interest loan financing and voluntary carbon markets, and position the state for leadership on innovative private-public partnerships for environmental restoration.
40. In support of a Maryland net-zero GHG goal, MDE, in collaboration with MDA and DNR, should complete a comprehensive assessment of potential strategic pathways for growing the state's natural carbon sinks. Such an effort should begin by leveraging the science and research on NWL currently included within the 2030 GGRA Plan and GHG Inventory. Implementing this recommendation may require additional engagement with scientists, the U.S. Climate Alliance, or other funding partners.
41. STWG will support MDE, DNR and external partners (such as COMPASS, Restore America's Estuaries) to explore the opportunities associated with blue carbon for carbon sequestration, protecting shorelines and enhancing the tidal ecosystem. Blue Carbon is defined as the carbon accumulating in vegetated, tidally influenced ecosystems such as tidal forests, tidal marshes and intertidal to subtidal seagrass meadows. Blue carbon exhibits significant potential for both mitigating and adapting to the adverse impacts of climate change. Three events are planned in late 2021 and early 2022 to cover: (a) methodology for quantifying blue carbon sequestration potential, (b) innovative models to finance blue carbon projects, and (c) highlight wetland restoration and other nature -based solutions that have been implemented in Maryland.
42. The state should work with STWG in reviewing and supporting the Ocean Acidification Research and Monitoring Action Plan as part of the state's membership in the International Alliance to Combat Ocean Acidification.

ADAPTATION AND RESILIENCY

43. Maryland Climate Adaptation and Resilience Framework (Framework): Building on its success over the past two years, with the Commission approval of the Framework, the Adaptation and Resiliency Working Group (ARWG) along with state, local and non-governmental partners will develop a 2022 work plan that outlines implementation steps for the Framework. The work plan will include specific strategies and goals for prioritization in 2022 and identify partners who will lead the implementation. ARWG will establish a subgroup to lead the implementation of Cross-Framework priorities. The priority will be to establish an effective tracking system to measure progress on the Framework as it moves into implementation and develop an online platform to house the Framework and the newly created tracking system. This will ensure accountability and transparency in the implementation of the Framework and progress on adaptation goals for the state.

44. Advance Saltwater Intrusion Plan recommendations: The state agency saltwater intrusion team will request that DNR, MDE, MDA, the Maryland Department of Planning (MDP) and the Critical Area Commission identify strategies and solutions that align opportunities to support wetland migration and inform a statewide wetland adaptation plan. The state agency saltwater intrusion team recognizes that landscape scale coastal change is occurring in parts of Maryland, and that rapid coastal change impacts local economies as land use changes with rising seas and intruding saltwater. The team recommends that existing state strategies prioritize the most vulnerable parts of Maryland's coast and support local governments, local planning and conservation tools, and local landowners seeking to protect land while possible, protect the capacity of land to transition, consider alternative transitional land uses, and/or to relocate when conditions become unsustainable. Lands most impacted will be stewarded to adapt to changing coastal conditions, improve resilience for landward properties, and maximize co-benefits like supporting wetland migration, while protecting private property rights and values.

45. Building capacity to compete for Natural Infrastructure Resiliency Funds - ARWG continues to recognize the need to prepare Maryland and its communities to take advantage of upcoming federal funding (i.e., Federal Emergency Management Agency, National Oceanic and Atmospheric Administration (NOAA), the U.S. Army Corps of Engineers) and public private partnership opportunities that promote the use of natural infrastructure to build resilience to climate impacts.

ARWG and its partners will continue to explore and expand the potential use of the Targeted Resiliency Area effort to serve as a prioritization tool for

the larger-scale funding opportunities that are emerging. DNR will lead a group of ARWG partners throughout 2022 to discuss landscape-level needs for Natural and Nature-based project identification so that Maryland and its communities are better situated to compete for future funding.

46. When requested by DNR, STWG will review recommendations on resiliency indicators at the project's website, <https://mdcoastaladaptation.net>.

ENVIRONMENTAL JUSTICE, CLIMATE JUSTICE, AND PUBLIC HEALTH

47. Like other working groups and the Commission, ARWG will work to ensure that an environmental justice lens is used in all its programming and initiatives. ARWG will look to expertise and collaboration with the Maryland Commission on Environmental Justice and Sustainable Communities (CEJSC) as well as the Commission's Climate Justice team to advise and ensure underserved communities are given the assistance needed to prepare for and adapt to the impacts of climate change. ARWG recommends that it, and all necessary partners, explore and identify an intervention to address the intersection of urban heat, climate change, vulnerabilities, and environmental justice.

48. STWG will assign a member to track and contribute to the Commission's focus on climate justice issues. STWG will embed principles of climate justice as needed into reviews and recommendations and engage additional professional experts as needed.

49. One of the most immediate impacts of climate change in Maryland is expected to be heat. Heat waves are expected to increase in frequency, daily elevated temperatures, daily high-lows, and duration. Heat waves disproportionately impact the elderly, those with co-morbidities and disadvantaged communities. STWG will help the environmental justice team and the Education, Communication, and Outreach Working Group (ECO) understand the impacts of heat waves on human health and what mitigation mechanisms are feasible within Maryland. This effort should include MDE, MEA, the Maryland Department of Health (MDH), the Maryland Department of Housing and Community Development (DHCD), and the Department of Emergency Management (MDEM).