

# Priority Climate Action Plan for the Baltimore Region

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**PREPARED FOR:**

U.S. Environmental Protection Agency Region 3

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## Purpose

A partnership between jurisdictions of the Baltimore Metropolitan Council has come together with assistance from the U.S. Environmental Protection Agency's (EPA's) Climate Pollution Reduction Grant (CPRG) Planning Grant Program to create a Priority Climate Action Plan (PCAP). This plan covers Baltimore City, and the counties of Baltimore, Anne Arundel, Carroll, Harford, Howard, and Queen Anne's.

The purpose of the PCAP is to:

1. Improve our understanding of current and future greenhouse gas (GHG) emissions in the Baltimore region,
2. Identify priority strategies to reduce these emissions and to identify the potential other benefits of those strategies, and
3. Engage a variety of stakeholders in an emissions reduction planning process.

Additionally, the PCAP will inform the Comprehensive Climate Action Plan (CCAP), which is due two years from the date of the grant award made in July 2023.

The BMC, the Steering Committee, and the subgrantee - ICLEI-USA, have coordinated with the Maryland Department of Environment (MDE) to ensure methods of greenhouse gas (GHG) inventory development align to a reasonable degree with the State's approach.

## Key Definitions and Acronyms

**Priority Climate Action Plan (PCAP):** a narrative report that includes a focused list of near-term, high-priority, and implementation-ready measures to reduce GHG pollution and an analysis of GHG emissions reductions.

**Comprehensive Climate Action Plan (CCAP):** a narrative report that provides an overview of the grantees' significant GHG sources/sinks and sectors, establishes near-term and long-term GHG emission reduction goals, and provides strategies and identifies measures that address the highest priority sectors to help the grantees meet those goals.

**Greenhouse Gas (GHG) Inventory:** a list of emission sources and sinks and the associated emissions quantified using standard methods. The PCAP includes a simplified inventory. The CCAP will include a comprehensive inventory of emissions and sinks for the following sectors: industry, electricity generation/use, transportation, commercial and residential buildings, agriculture, natural and working lands, and waste and materials management.

**Low Income / Disadvantaged Communities (LIDACs):** communities with residents that have low incomes, limited access to resources, and disproportionate exposure to environmental or climate burdens. The project team is using the [Climate and Economic Justice Screening Tool](#) and the [Environmental Justice Screening and Mapping Tool](#) to identify LIDACs in the Baltimore region, as recommended by EPA. These tools identify LIDACs by assessing indicators for categories of burden: air quality, climate change, energy, environmental hazards, health, housing, legacy pollution,

transportation, water and wastewater, and workforce development. Please see the Appendix for a list of LIDAC communities in the region.

**MSA:** metropolitan statistical areas as defined by the U.S. Census 2020 MSA population.

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# 1 Introduction

## 1.1 CPRG Overview

Seven local jurisdictions of the Baltimore-Columbia-Towson Metropolitan Statistical Area and the Baltimore Metropolitan Council (BMC) have come together in an effort to develop a shared plan for moving the region forward in addressing harmful greenhouse gas emissions. This shared effort will consist of the following:

- ❖ A Priority Climate Action Plan (PCAP);
- ❖ A Comprehensive Climate Action Plan (CCAP), due approximately July 31, 2025; and,
- ❖ A Status Report, due at the close of the four-year grant period.

The Baltimore Metropolitan Council (BMC) oversaw and coordinated the development of this PCAP. This document focuses on developing a recommended set of priority greenhouse gas (GHG) reduction measures for the Baltimore region. As part of the process of developing the list of priority GHG reduction measures, the following were prepared:

- A preliminary regional greenhouse gas emissions inventory with a 2021 emissions reporting year,
- GHG emissions projections for 2030 and 2050,
- GHG reduction targets
- An initial benefits analysis for Low Income Disadvantaged Communities (LIDAC),
- A review of authority to implement, and,
- An initial workforce planning analysis.

Given the variation in climate action planning readiness across the seven jurisdictions in the MSA, the intent of the PCAP is to identify regional priorities to reduce the emissions of greenhouse gases, sequester carbon and highlight the most urgent climate mitigation and adaptation needs for climate-vulnerable communities in each county/city participating in this planning process. Current priorities outlined in existing climate action, sustainability, resilience or other related plans from jurisdictions in the MSA are reflected in this document.

BMC contracted with ICLEI-Local Governments for Sustainability USA (ICLEI) to develop a regional greenhouse gas inventory. With input from ICLEI on the potential reductions possible from various reduction measures, the Steering Committee developed a list of high impact greenhouse gas emission reduction measures, called the priority GHG reduction measures. Emission reductions from these measures, achievable by 2030 and 2050 were calculated by ICLEI, and are included in Appendix A. The CCAP, to be developed in 2024, and completed in 2025, will include a more comprehensive regional greenhouse gas emissions inventory, GHG emissions projections for 2030 and 2045, GHG reduction targets, a more comprehensive list of quantified greenhouse gas emission reduction measures, a benefits analysis including analyses for LIDAC, a review of authority to implement and intersection with other funding available, and a workforce planning analysis.

The priority measures identified in the PCAP will most likely be included in the CCAP. Additional measures to reduce GHG emissions will be identified and quantified. The additional measures will also

be evaluated for other items including LIDAC benefits. As in the PCAP, ICLEI will perform technical analyses necessary for the CCAP.

In developing the PCAP, the [State of Maryland's Climate Pollution Reduction Plan](#) and existing local climate action plans were reviewed as demonstrated in Section 2.1. Jurisdictions led a significant amount of local engagement to develop local climate action plans, which then contributed towards the Baltimore Region PCAP and its priority emission reduction measures.

## 1.2 Scope of the PCAP

The geographic scope of the PCAP covers the City of Baltimore and Anne Arundel, Baltimore, Carroll, Harford, Howard, and Queen Anne's Counties. The greenhouse gas inventory (GHGI) as well as the reductions resulting from emission reduction measures consider the entire geographic planning area above. It is our intent to look further into emissions from each individual jurisdiction in the CCAP document in 2025.

## 1.3 Approach to Developing the PCAP

The Baltimore Metropolitan Council (BMC) oversaw and coordinated the development of this Priority Climate Action Plan covering all of the jurisdictions in the Baltimore-Columbia-Towson Metropolitan Statistical Area (MSA). This PCAP includes a preliminary regional greenhouse gas emissions inventory, a list of priority greenhouse gas emission reduction measures, an initial benefits analysis for LIDAC, and a review of authority to implement.

## 2 State/MSA Context

The Baltimore-Columbia-Towson Metropolitan Statistical Area (hereafter referred to as Baltimore MSA) includes 6 counties in the State of Maryland - Anne Arundel, Baltimore, Carroll, Harford, Howard, and Queen Anne's - and the City of Baltimore. Figure 1 below depicts the geographic region.

The Baltimore Metropolitan Council is a quasi-governmental nonprofit entity in which there is a Board made up of the elected officials of the participating seven jurisdictions. BMC staff led the non-competitive planning grant for the region's PCAP, provided project management, oversaw subaward efforts, contracts with consultant(s), and will house the compiled regional greenhouse gas inventory data. Local jurisdictions in the MSA have a number of existing climate action plans, greenhouse gas inventories, and local government initiatives and ordinances that help to achieve greenhouse gas emission reductions (see below). However, more than half of the jurisdictions do not have updated community-wide GHG inventories or plans focused on reducing greenhouse gas emissions. Much effort in the past several years in the region has focused on resilience to the effects of climate change, due to the proximity of the region to the shoreline of the Chesapeake Bay. Below are just a few examples of existing plans, efforts, and goals.

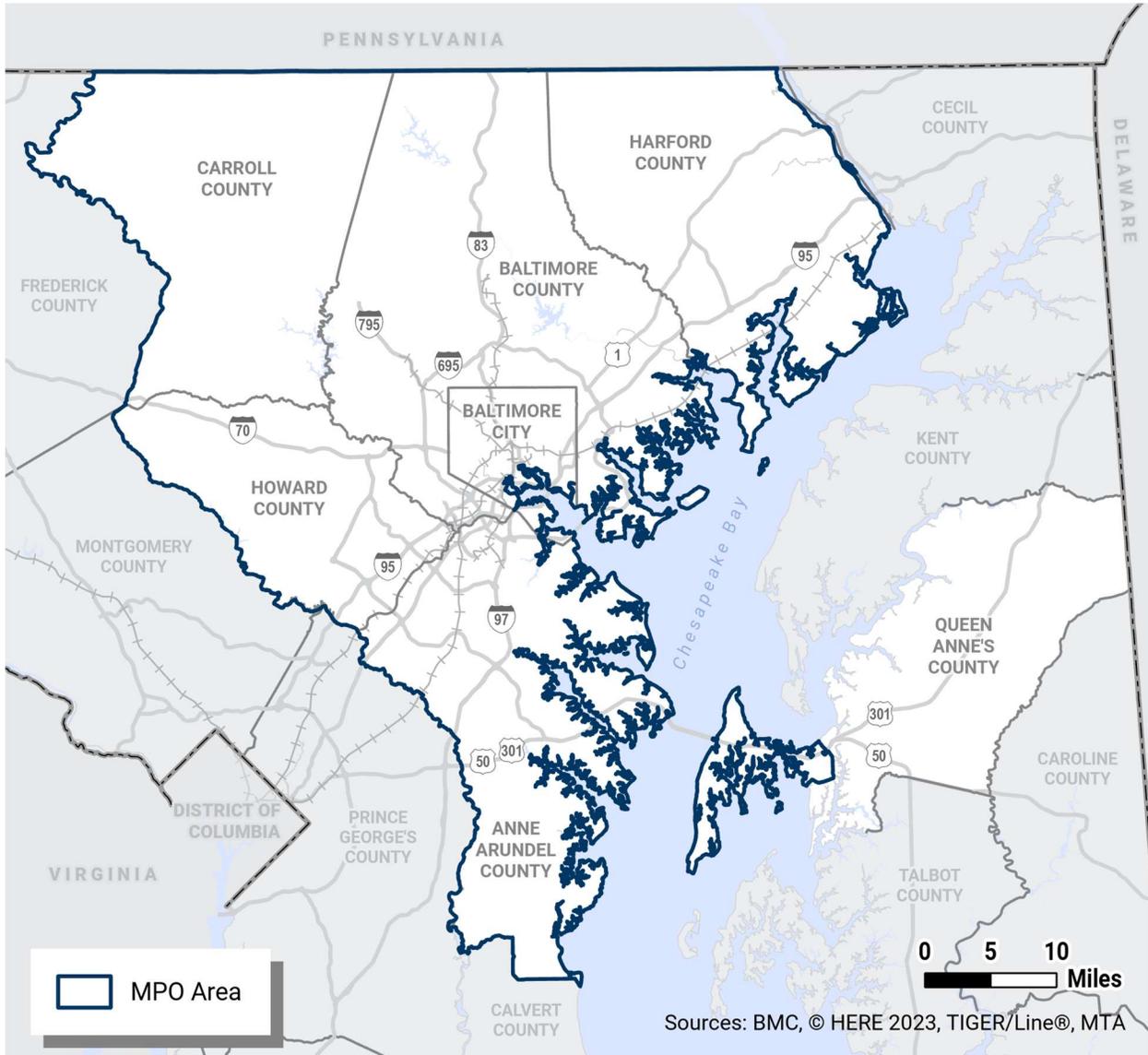


Figure 1. Geographic Planning Area for the Baltimore Region PCAP

## 2.1 Existing/In Development Climate Action or Related Plans

The following existing or in-development Climate Action Plans were taken into account when developing this PCAP:

- **Howard County Climate Forward: Climate Action and Resiliency Plan**<sup>1</sup> is a community-wide and whole-of-government work plan to achieve a 60% reduction in GHG emissions by 2030 and become net-zero by 2045. The plan includes policy context, the impacts of climate change locally, differential impacts to underserved communities, a GHG inventory, and subsequent

<sup>1</sup> <https://www.epa.gov/system/files/documents/2023-12/howard-county-climate-action-plan.pdf>

strategies, actions, and next steps that the County and community need to take to reach the goals specified in the plan.

- **Baltimore City's 2024 Climate Action Plan update**<sup>2</sup> is a guide to how Baltimore will meet its ambitious and critical goal to reduce carbon emissions by 60% by 2030. Following requirements in Baltimore City Ordinance 22-131, this CAP Update considers concerns beyond GHG reduction, including key environmental justice and community benefits such as public health. The resulting plan is a roadmap for the City in making decisions that reduce GHG emissions, address environmental injustice and compliments several citywide climate plans including the 2019 Sustainability Plan, 2023 Disaster Preparedness Planning Project or DP3, Solid Waste Management Plan and a Complete Streets Manual. These climate-focused plans in combination with CPRG funding provide a path toward a more sustainable, equitable, and resilient future.
- **Baltimore County Climate Action Plan (2021)**<sup>3</sup>
- **Queen Anne's County Climate Resilience Planning and Financing Draft Plan (2019 - )**

Additionally, several of the region's local jurisdictions have established climate-related goals, as demonstrated below:

- Queen Anne's County Climate Resolutions (2007, 2008)
- Baltimore City [Disaster Preparedness](#) and [Climate Action](#) Plans (2023/2024)
- Baltimore City carbon neutrality commitment by 2045 (2022)
- Howard County's carbon neutrality commitment by 2045 (2022)

As local jurisdictions in the region create various planning products, such as mobility plans, solid waste plans, and master plans, these may include climate pollution reducing measures and measures to mitigate the effects of climate change:

- City of Annapolis Mobility Plan
- [Anne Arundel County Green Infrastructure Master Plan](#)
- [Anne Arundel County, Plan2040 General Development Plan](#)
- [Howard County By Design \(General Plan\) 2023](#)
- Baltimore City [Complete Streets Manual](#), [10-Year Solid Waste Management](#) & [Our Baltimore - Comprehensive Plan](#)

The PCAP for the Baltimore MSA builds on strategies, actions and activities in jurisdiction-led climate plans to inform a regional implementation grant proposal.

### 3 PCAP elements

The PCAP includes the following elements below: a greenhouse gas inventory (GHGI), GHG emission projections, GHG reduction measures, LIDAC benefits analysis, a review of authority to implement, and an initial workforce analysis.

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<sup>2</sup> <https://baltimoreplanning.wixsite.com/climate>

<sup>3</sup> <https://resources.baltimorecountymd.gov/Documents/Executive/sustainability/climateactionplan.pdf>

## 3.1 Greenhouse Gas Inventory (GHGI)

### 3.1.1 GHGI Scope

This Greenhouse Gas Inventory (GHGI) covers emissions from the Baltimore MSA. This Metropolitan Statistical Area represents an estimated 2021 population of 2,837,237. The base year for the regional GHGI is 2021. The grantees have chosen this year because of federal, state, and local data availability. This year also is representative of general emissions patterns. This inventory represents emission estimates for primary GHGs (i.e., CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, HFCs, PFCs, SF<sub>6</sub>, and NF<sub>3</sub>)<sup>4</sup> for the Baltimore-region.

Version 1.2 of the U.S. Community Protocol for Accounting and Reporting GHG Emissions<sup>5</sup>, and additional activities/sources are considered in accordance with the Global Protocol for Community-Scale GHG Emissions Inventories. The Global Protocol was used as the methodological framework for the regional inventory. The scope covers sources and activities since they are the two central categorizations<sup>6</sup> of emissions.

### 3.1.2 Methodology & Data Overview

GHG emissions are quantified in two ways:

1. Measurement-based methodologies refer to the direct measurement of GHG emissions (from a monitoring system) emitted from a flue of a power plant, wastewater treatment plant, landfill, or industrial facility.
2. Calculation-based methodologies calculate emissions using activity data and emission factors. To calculate emissions accordingly, the basic equation below is used:

$$\text{Activity Data} \times \text{Emission Factor} = \text{Emissions}$$

Most emissions sources in this inventory are quantified using calculation-based methodologies. Activity data refer to the relevant measurement of energy use or other GHG-generating processes such as fuel consumption by fuel type, metered annual electricity consumption, and annual vehicle miles traveled.

Known emission factors are used to convert energy usage or other activity data into associated quantities of emissions. Emissions factors are usually expressed in terms of emissions per unit of activity (e.g. MT CO<sub>2</sub>/kWh of electricity). For this inventory, calculations were made using ICLEI's ClearPath Climate Planner tool<sup>7</sup>. **Tables 5 through 10 in Appendix B** provide an overview of data sources, methodologies and data gaps or assumptions.

### 3.1.3 GHG Emission Results

**Table 1. Summary of Emissions by Sector**, below, details the total metric tons of CO<sub>2</sub>e by sector across the Baltimore MSA. Based on a GHGI for 2021, an estimated 45.5% of regional emissions in the MSA are due to transportation and mobile sources alone. As such, the first two reduction measures focus on reducing emissions by reducing vehicle miles traveled and propelling the adoption of zero emission

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<sup>4</sup> GHGs aside from CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O are estimated from Industrial Processes and entered as CO<sub>2</sub> equivalent (CO<sub>2</sub>e)

<sup>5</sup> ICLEI. 2019. US Community Protocol for Accounting and Reporting Greenhouse Gas Emissions. Retrieved from <http://www.iclei.org/tools/ghg-protocol/community-protocol>

<sup>6</sup> 1) GHG emissions that are produced by "sources" located within the community boundary, and 2) GHG emissions produced as a consequence of community "activities."

<sup>7</sup> <https://iclei.org/clearpath/>

vehicles. Energy-related emissions contributed to 44.1% of regional MSA emissions in 2021, with residential, commercial and industrial emissions contributing 20.9%, 19.7% and 3.5%, respectively.

TABLE 1. Summary of Emissions by Sector	
Sector	Metric Tons CO <sub>2</sub> e
Transportation & Mobile Sources	14,651,004
Solid Waste	719,585
Water & Wastewater	325,157
AFOLU	231,143
Commercial Energy	6,356,377
Industrial Energy	1,140,150
Residential Energy	6,737,837
Process & Fugitive Emissions	2,036,815

The third reduction measure focuses on decarbonizing, or electrifying stationary energy sources in the residential, commercial and industrial sectors while promoting energy efficiency. Collectively these sources contribute to 44.1% of regional emissions. Measure 4 focuses on waste reduction by both reducing and diverting waste from landfilling and incineration, in addition to reducing waste-related emissions. We include both solid waste and waste water in this measure, which together equal 3.21% of the total. Measure 5 relates to the sequestration of carbon and strengthening carbon sinks through nature-based solutions.

Measures 6 and 7 are not directly related to emission reductions, but focus on enhancing the capacity of local governments to achieve climate goals and engagement targets to scale up behavior change across the region. We include these measures to highlight the inputs, outputs and activities which will feed into the aforementioned reduction targets.

**Figure 2** is a pie chart reflecting the percentage of each emission category in relation to the total. See **Table 2: Regional Greenhouse Gas Inventory** in **Appendix A** which details the findings of the regional GHGI and all sector-related emissions included.

## Metric Tons CO<sub>2</sub>e by Sector

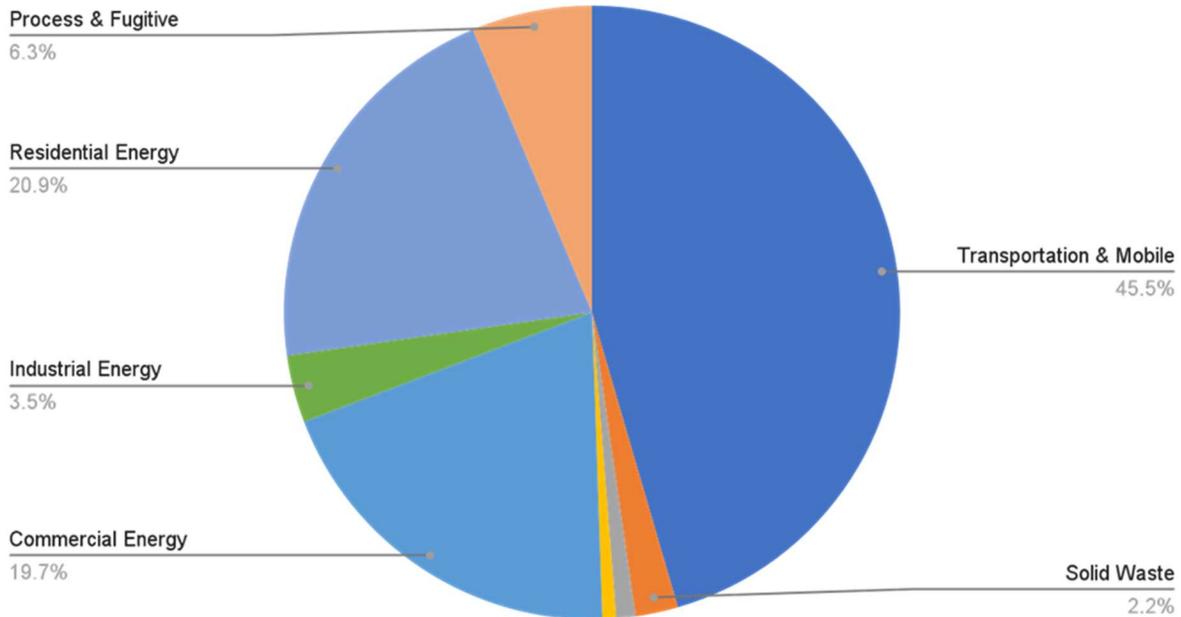


FIGURE 2. Metric Tons CO<sub>2</sub>e by Sector

## 3.2 GHG Emissions Projections

### 3.2.1 GHG Emissions Projections Overview

This Priority Climate Action Plan uses a Business as Usual projection from 2021 (base year) to 2030 and 2050. This projection was carried out for every activity/source based on various activity growth rates and carbon intensity growth rates. These growth rates are detailed in **Tables 3: BAU Emissions, Net Reductions per Action, & Remaining Emissions after Implementation (MT CO<sub>2</sub>e)** and **Table 4 GHG Reduction Projections (MT CO<sub>2</sub>e) and Percent Change from Baseline.**

Projections in **Figure 3** and **Figure 4** are Business As Usual (BAU), representing expected emissions changes based on current activities (passed legislation, growth, etc.) and does not consider any intervention such as GHG reduction strategies.

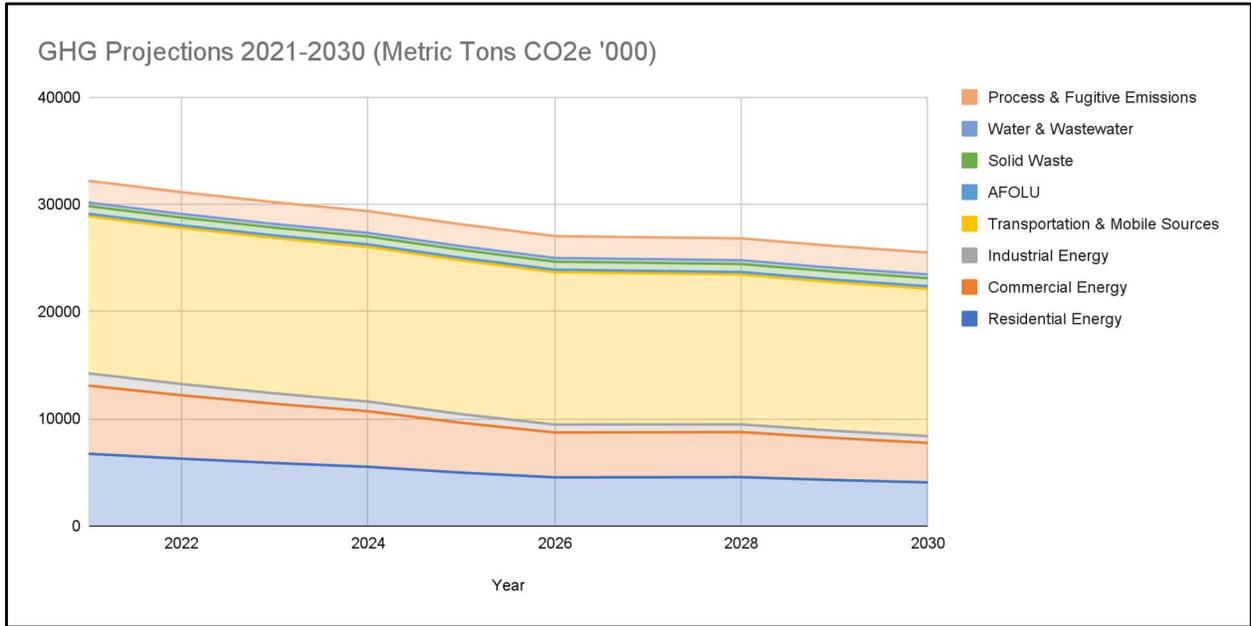


FIGURE 3. GHG Projections 2021-2030

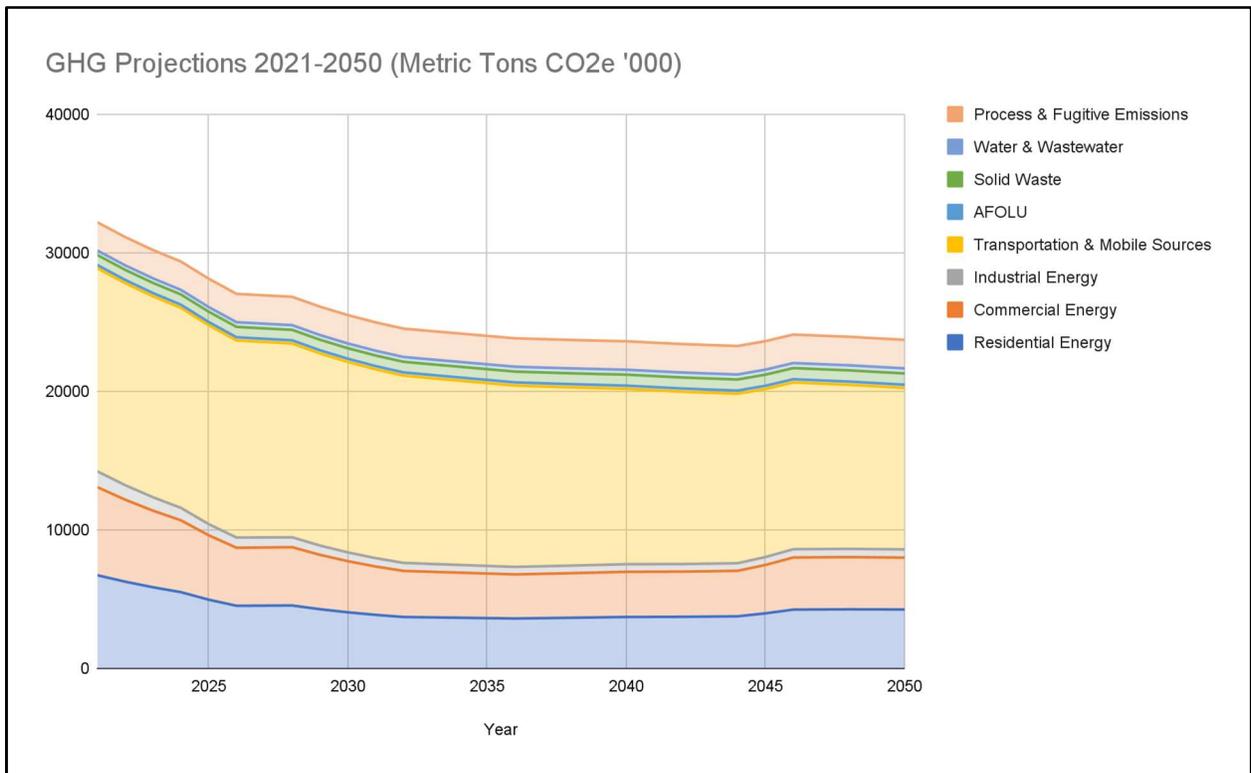


FIGURE 4. GHG Projections 2021-2050

### 3.3 GHG Reduction Targets

The Baltimore MSA has set the following priority targets in alignment with the State of Maryland's 2022 Climate Solutions Now Act:

- 60% by 2031 (compared to 2006 baselines)
- Net-Zero by 2045

The MSA has prioritized targets to maintain consistency with the state's goals and Science-Based Targets<sup>8</sup> (SBTs). While the state's baseline is 2006 and this priority GHGI is the region's first baseline inventory (2021), both goals are generally in line<sup>9</sup> with Science-Based Targets. Science-based targets (SBTs) are climate goals in line with the latest climate science. They represent a community's fair share of the ambition necessary to meet the Paris Agreement commitment to keep warming below 1.5 °C. To achieve this goal, the Intergovernmental Panel on Climate Change (IPCC) states that we must reduce global emissions by 50% by 2030 and achieve climate neutrality by 2050. Equitably reducing global emissions by 50% requires that high-emitting, wealthy nations reduce their emissions by more than 50%.

### 3.4 GHG Reduction Measures

Based upon an analysis of the GHGI, existing local and state climate action plans, and consideration of impact on LIDAC communities, and co-benefits, the following list of Priority GHG Reduction Measures was decided upon by the Baltimore MSA CPRG Steering Committee. It includes a total of seven measures that reduce GHG emissions and those that enhance carbon sinks. **Appendix C** includes several local plans with additional actions and priorities in alignment with the seven measures detailed here.

Given the significant portion of regional emissions from transportation and energy-related sources, we recommend that investments support activities that reduce emissions in these sectors.

Maryland's Climate Solutions Now Act (CSNA), adopted in 2022 by the Maryland General Assembly, makes broad changes to the State's approach to reducing statewide GHG emissions and addressing climate change. The federal Carbon Reduction Program, created by the Bipartisan Infrastructure Law (BIL), also facilitates:

- The use of public transportation facilities, pedestrian facilities, bicycle facilities, and shared or carpoled trips to reduce vehicle miles traveled by single-occupancy operated vehicles;
- The use of vehicles or modes of travel that result in lower transportation emissions; and,
- Approaches to the material use and construction of transportation assets that lower transportation emissions.

A Maryland Carbon Reduction Strategy, developed in consultation with the metropolitan planning organizations in Maryland, outlines approaches, programs, and projects to address transportation sector emissions. The National Blueprint for Transportation Decarbonization, resulting from a joint agreement among the U.S. Department of Energy (DOE), U.S. Department of Transportation (DOT), U.S. Environmental Protection Agency (EPA), and U.S. Department of Housing and Urban Development (HUD), is a strategy for cutting all GHG emissions from the transportation sector by 2050. Locally,

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<sup>8</sup> [Science-Based Targets](#)

<sup>9</sup> 2031 target is more than 50%, which considers the MSA's fair share of global emissions reduction

Maryland Department of Transportation (MDOT) will help lead and coordinate State and local action to implement the strategy. Maryland and the Baltimore-MSA are also exploring future, expanded transit options through the revived Red Line Project led by the Maryland Transit Administration (MTA) and supported by the City's Department of Transportation. The proposed Red Line is a 14-mile transit line that would provide service between the Woodlawn area of Baltimore County and the Johns Hopkins Bayview Medical Center. When complete, the Red Line will make it easier, faster, and cheaper to travel across the greater Baltimore area. Measures for the Baltimore MSA PCAP are also in alignment with those in Maryland's Climate Pollution Reduction Plan.

**MEASURE 1: REDUCE TRANSPORTATION-RELATED EMISSIONS 25% BY 2030; 91% BY 2050**

- VMT Reduction – 25% by 2050 – Gasoline: The 2021 regional GHGI reflected gasoline-powered vehicles contribute to a total of **24 billion VMT** and make up **32.5% (10.5 MMTCO<sub>2</sub>e)** of all regional emissions. To reduce VMT, the participating jurisdictions plan the following public transportation support measures:
  - Develop pedestrian zones in communities lacking adequate pedestrian-centered design. These pedestrian zones are intended to:
    - Foster/encourage mode shift from single occupant vehicles to more active forms of transportation such as walking, biking or the use of public transit.
    - Incorporate ecologic amenities that enhance overall community-level access to climate pollution reduction resources into historically divested communities (See **Appendix C** for examples)
  - Foster safer routes for children to/from school, area bus stops or paths/trails
  - Develop new parking standards with strategically placed restrictions and approaches to remove parking minimums
  - Establish electric car-sharing infrastructure and partner with rideshares to augment paratransit and mobility Programs through the Maryland Transit Administration
  - Deploy community electric vehicle sharing programs regionally to provide low-income or no-car households access to flexible electric-powered modes of transportation
  - Distribute free transit passes to those in need and as part of targeted outreach campaigns to strategically increase ridership
  - Identify neighborhoods that would benefit from microtransit options and conduct microtransit pilot projects or implement microtransit in areas of greatest need.
  - Install bus stop cooling infrastructure
  - Support more sustainable commuting patterns through education, outreach, and incentive programs to promote telework, downsizing office space, and office share models
- VMT Reduction – 25% reduction by 2050 – Diesel: An estimated **9.7% (3.12 MMTCO<sub>2</sub>e)** of all regional emissions from the 2021 GHGI were attributed to diesel-powered vehicles. Emission reductions related to diesel-powered vehicles require legislation, but local jurisdictions have the authority to implement actions that increase the electric charging infrastructure across the region. These actions focus on those within the MSA's authority to implement and the actions we can support the State of Maryland with.
  - Decarbonize waste-related fleets such as those vehicles used for organics hauling, curbside recycling and trash pick up for residential purposes
  - Support state/local public transit bus electrification
  - Freight planning to shift from road to rail

- Planning, coordinating and maintain electric charging corridors for mid and heavy-duty vehicles

## MEASURE 2: ELECTRIFYING CARS AND TRUCKS

**17% ELECTRIC VEHICLE ADOPTION BY 2030, 99% IN 2050**

**27.5% HEAVY DUTY VEHICLE ADOPTION, 99% IN 2050**

- Advanced Clean Cars II and Clean Trucks:
  - Support the installation of EV charging infrastructure on government property for county fleets and/or for the public through cost-share and technical assistance
  - Support the installation of public EV charging infrastructure in partnership with local businesses through cost-share and technical assistance
  - Pilot new EV charging technologies

## MEASURE 3: REDUCE BUILDINGS & ENERGY RELATED EMISSIONS BY AN AVERAGE OF 48% IN 2030 AND BY AN AVERAGE OF 82% BY 2050

Combined, residential, commercial and industrial energy make up 44.1% of all estimated emissions across the region in 2021.

- Residential Energy: A total of **20.9% (6.7 MM TCO<sub>2</sub>e)** of the Baltimore MSA's emissions are from residential energy sources. Within residential energy emissions - **60% (4 MM TCO<sub>2</sub>e)** is from electricity production and, **30% (2 MM TCO<sub>2</sub>e)** from natural gas and the remaining **9% (0.7 MM TCO<sub>2</sub>e)** is due to combination of fuel sources such as wood, propane and kerosene. Reducing emissions among residential energy sources or buildings, will focus on strategies to electrify, decarbonize and enhance energy efficiency among single family homes, multi dwelling units or other public housing sites. This could include:
  - Programs to educate residents and contractors about energy saving and fuel switching technologies, their benefits, and available rebates and incentives.
  - Workforce development for HVAC technicians, electricians, salesforce, and energy auditors to expand knowledge of electrification and to develop an electrification audit program
  - Programs to help low-income oil and propane users shoulder the burden of electrification after rebates
  - Pilot program funding at least two district geothermal projects as proof of principle
  - Education, outreach, and technical and financial assistance programs to promote onsite solar, community solar, and purchases of 100% renewable energy from third party suppliers
  - Community solar projects from solar canopies installed over parking on county government property, providing discounts on electricity for low-income residents.
- Commercial Energy: A total of **19.7% (6.4 MM TCO<sub>2</sub>e)** of emissions for the region are due to commercial energy uses. Within commercial emissions - **64% (4.1 MM TCO<sub>2</sub>e)** are due to electricity, **25% (1.6 MM TCO<sub>2</sub>e)** due to burning natural gas and the remaining roughly **10% (0.6 MM TCO<sub>2</sub>e)** are from a combination of propane, kerosene and other commercial fuels. Measures to reduce emissions from commercial energy could include initiatives such as:

- Education, outreach, and partnership programs to increase business participation in energy efficiency and fuel switching incentives and promote tools such as C-PACE
- Technical and financial assistance programs to promote onsite solar and purchases of 100% renewable energy from third party suppliers
- Fund for green procurement consultants for businesses
- Pilot programs to demonstrate electrification projects, especially in underserved communities and for small businesses, including outreach and education for residents and other businesses
- Energy efficiency, fuel switching, and solar projects on county-owned property

**MEASURE 4: REDUCE MUNICIPAL SOLID WASTE EMISSIONS BY  
65% IN 2030 AND  
90% BY 2050**

- Waste diversion: Reducing solid waste related emissions entails a combination of strategies that prevent, divert or support the reuse of potential waste sources. A total of **3.21% (1.04 MM TCO<sub>2e</sub>)** of the regional emissions are due to waste and wastewater. This number does not reflect 1) emissions related to hauling waste, 2) global warming potential from organic waste that releases methane, 3) embodied carbon from materials entering municipal waste streams, 4) the immense cost municipal solid waste operations have on local governments or 5) the value of materials lost to the local economy when items are disposed of. The following activities address the aforementioned waste streams, and provide residents in the region access to organic waste diversion options:
  - Residential-level food scrap diversion through
    - i. Establishing and expanding curbside pick-up programs for organic material, including food waste
    - ii. Launching farmer's market-based food scrap drop-off programs
    - iii. Food scrap drop-off programs located at accessible community facilities
  - Climate Art for Communities made with upcycled waste materials
  - Fixit and repair clinics to reduce, divert and prevent e-waste and waste from household goods
  - Provide Household Reuse Packages as An Incentive to Recycle Right (including reusable bags, food containers, utensils, water bottles, and reusable straws for up to 4 people)
  - Establishing wood reutilization centers based on the success of Baltimore City's Camp Small initiative
  - Expand food waste diversion infrastructure in the form of a mid-to large sized compost facility
  - Support end-use markets for soil amendment or other compost products resulting from food waste diversion
  - Protect and relocate local waste collection stations as necessary to prevent flooding impacts and improve current and future access to waste collection stations.
  - Improve local government procurement to align with climate and sustainability goals

**MEASURE 5: SEQUESTER 5 MMTCO<sub>2e</sub> BY 2030 AND 50 MMTCO<sub>2e</sub> BY 2050**

- Nature-based solutions and sequestration: The 2021 regional GHGI reflects a carbon sink of roughly **1.45 MMTCO<sub>2e</sub>** or **4.5%** of the total CO<sub>2e</sub> regionally. This number can be interpreted as a 4.5% carbon sequestration, but was not modeled in the current inventory or projections.

However, it serves as an estimate for the potential CO<sub>2</sub>e that can be captured through nature-based solutions.

- Expand tree canopy through planting efforts and by maintaining existing forest
- Protection of public places for water access and passive recreation of natural habitat; watershed protection of forest habitat. (for example, see [Queen Anne's County Sea Level Rise and Coastal Vulnerability Assessment and Implementation Plan, March 2016](#))
- Establish outreach campaign, including demonstration projects, to raise awareness, acceptance, and appreciation of soil health, native plants, reduced mow areas, and meadows
- Protect passive recreation of natural habitat, including watersheds
- Integrate carbon sequestration elements and emphasis into private property stormwater programs and incentives
- Support farmers with incentives and technical assistance in implementing healthy soils practices to sequester carbon
- Use biochar as a soil amendment to enhance carbon sequestration potential
- Integrate other co-benefits of climate mitigation and adaptation into projects regionally to foster polysolutions
- Mitigate the health impacts of extreme heat and the urban heat island effect

**MEASURE 6: ENHANCE CLIMATE CAPACITY ACROSS LOCAL GOVERNMENTS BY 50% BY 2030**

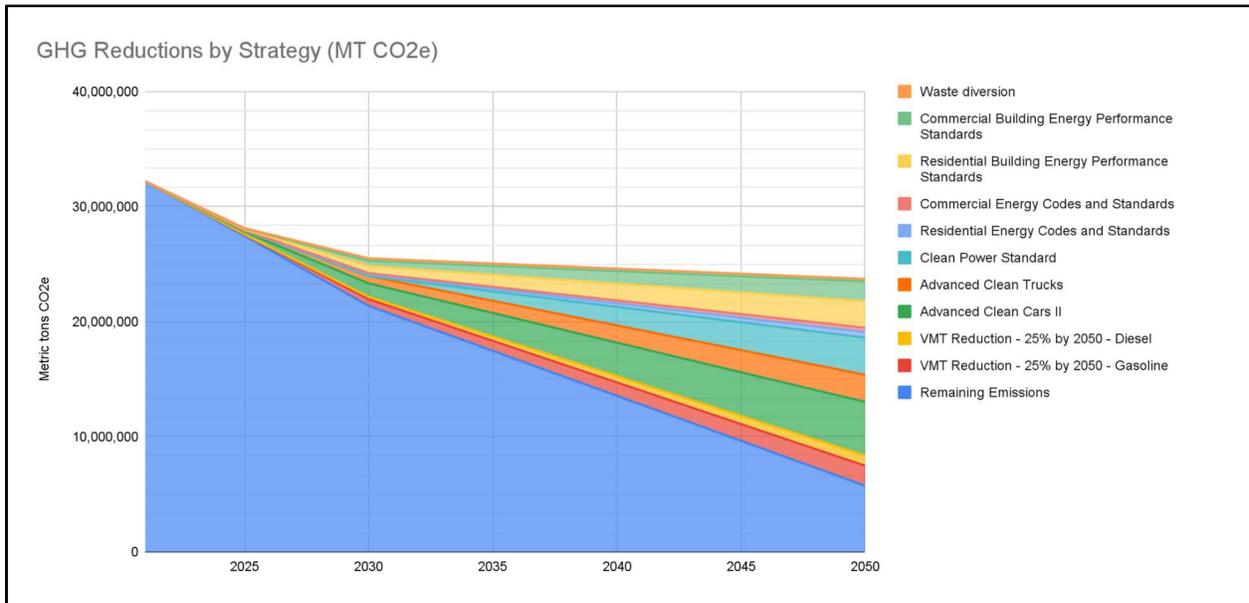
- Facilitate trainings to enhance climate literacy among local government staff to make climate connections in key roles
- Provide sector-specific professional development trainings for municipal government staff to ensure local governments workforces have the knowledge skills and education to solve complex climate challenges
- Develop a robust training program for local jurisdiction staff and/or leadership in basic climate science and methods to mitigate climate change and adapt to changes to better integrate climate goals and outcomes into many if not all of their projects and work plans.
- Foster climate career pathways for early career professions, with a focus on those from LIDAC, Black, Indigenous, or Other People of Color (BIPOC) or other underrepresented communities in the climate profession
- Hire needed climate staff to increase capacity for local governments

**MEASURE 7: ENGAGE 50% OF RESIDENTS IN THE BALTIMORE MSA BY 2030 THROUGH CPRG IMPLEMENTATION**

- Allocating CPRG funds in a manner that prioritizes authentic, meaningful engagement to connect LIDAC communities with CPRG investments while working to address environmental injustices in the region.
- Deploy culturally relevant outreach, education and engagement strategies that meet people where they are in their understanding of climate change and its impacts.

**Figure 5** below displays remaining emissions and net greenhouse gas emissions reductions per strategy through 2050. This is a modeling of priority actions only, so it does not include actions addressing smaller sectors that would be needed to reach zero emissions, or measures 6 and 7 related to capacity and engagement. In addition, while emissions data for the region is not available back to the state baseline year of 2006, electricity emissions intensity in particular has already declined significantly from 2006 to 2021. Thus the overall 2030 emissions reduction with these actions, if it were measured against

the state’s 2006 baseline, would be greater than the reduction from the region’s 2021 baseline shown in this chart.



**FIGURE 5. GHG Reductions by Strategy**

### 3.5 Low Income Disadvantaged Communities Benefits Analysis

#### Identifying LIDACs

The Inflation Reduction Act does not formally define LIDACs. However, based upon recommendations from the US EPA, the Steering Committee decided to use the [Climate and Economic Justice Screening Tool](#) and the [Environmental Justice Screening and Mapping Tool](#) to identify LIDACs located within the Baltimore region. These tools identify LIDACs by assessing indicators for categories of burden: air quality, climate change, energy, environmental hazards, health, housing, legacy pollution, transportation, water and wastewater, and workforce development. A list of LIDAC communities by census tract which could have particular benefits from each priority reduction measure was compiled by ICLEI and will be used to target areas for investment in the region’s implementation grant proposal. The map in **Figure 6** below displays the LIDAC census tracts in the Baltimore region.

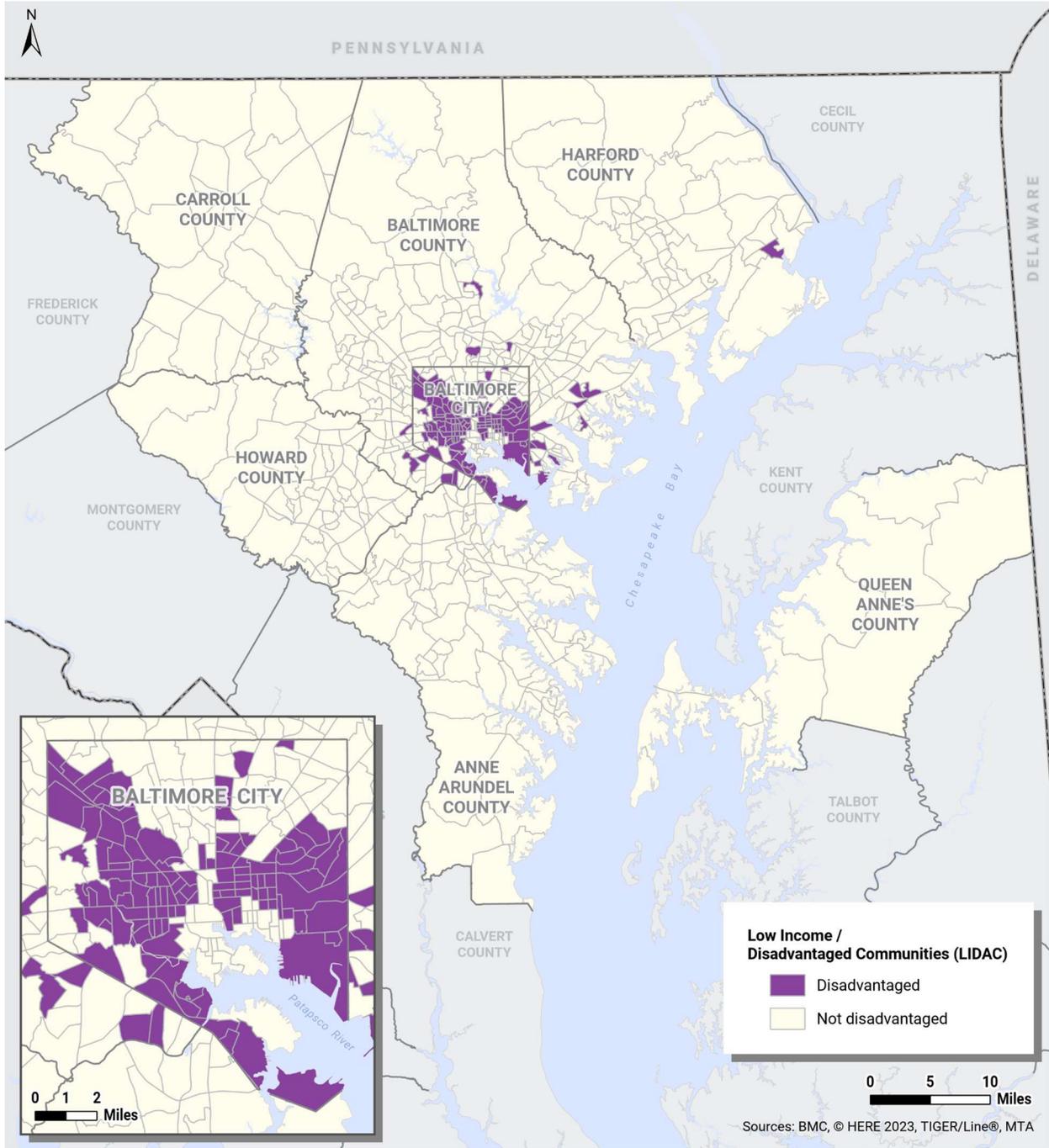


Figure 6. Low Income/Disadvantaged Communities (LIDAC) in the Baltimore Region

## Existing Climate Risks, Impacts, and Vulnerabilities among LIDACs - determined from the 2021 State Hazard Mitigation Plan<sup>10</sup>

- *Flood*
  - **Coastal hazards:** Includes tropical depression, tropical storm, hurricane, storm surge/ tide, coastal flood, and nuisance flood. All of the counties within the MSA fall within the *medium*, *medium-high*, and *high* overall ranking of coastal hazard risk, with the exception of Carroll County, which was ranked at *medium-low* risk. Flooding may lead to safety hazards. Coastal communities are subject to destruction of land and property and potential displacement of populations. Damage to infrastructure could lead to burdened electrical grids and closures of transportation routes. Coastal hazards and major changes to the coastline, including erosion, land loss, and subsidence, will drain state, county, and local resources. The economic costs related to flood mitigation and relocation measures will be high, in addition to the economic burden caused by loss of land.
  - **Severe storms and increased precipitation:** similar vulnerabilities as above, with more emphasis on those that live in floodplain or FEMA flood zones. All of the counties within the MSA fall within the *medium*, *medium-high*, and *high* overall ranking of flooding.
  - **Dam failure:** All of the counties within the MSA fall within the *medium* to *medium-high* ranking of dam failure, with the exception of Queen Anne’s County, ranked at *medium-low*. Similarly to flooding coastal hazards, inundation from dam failure could lead to safety hazards and economic burden from destruction of land and property. Flooding or damage to infrastructure could lead to closures of transportation routes or impacts to water supply.

LIDAC communities in the US are disproportionately vulnerable to flooding. In Maryland specifically, 11% of the population within the 100-year floodplain is considered in poverty. LIDAC communities face immediate and long-term human health risks from inundation and may not have access to adequate health care. They may be burdened with higher costs attributed to lack of adequate home or renters insurance coverage, may have a harder time relocating, and may not be able to afford the upfront costs of rebuilding, even with FEMA assistance (many FEMA options only offer reimbursements).

- *Severe Weather-*
  - **Extreme Heat:** Extreme temperatures events paired with high humidity are anticipated to span several days at a time, creating a *medium* to *medium-high*, and *high* risk threat to the counties in the MSA. Heat threatens public health directly, specifically children, elderly, those with preexisting health conditions, and those without access to cooling. These events also add immense burden to the electrical grid, further removing access to cooling. Additionally, low income communities without adequate home insulation or less efficient cooling systems are more vulnerable to increased costs of heating. According to the EPA, urban areas are expected to reach 1-7°F higher than surrounding areas. The highest temperature recorded in Maryland is 109°F.

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<sup>10</sup> <https://mema.maryland.gov/community/Pages/Mitigation.aspx>

- **Winter Storms:** Although temperatures are generally warming, winter storms still threaten the state. Extreme cold threatens those without sufficient access to heating. Additionally, low income communities without adequate home insulation or less efficient heating systems are more vulnerable to increased costs of heating
- **Thunderstorms, Tornado/ High Wind:** Damage to infrastructure could lead to burdened electrical grids and closures of transportation routes. Those that primarily work outside are most vulnerable.

LIDAC communities are vulnerable to severe weather. Extreme heat directly threatens communities, especially those without cooling due to costs, infrastructure, or work setting. Heat, storms, and high winds all threaten utilities, specifically the electrical grid, further preventing necessary cooling.

### **Potential Benefits (qualitative/quantitative) of GHG Emission Reduction Measures to LIDACs**

1. **Clean Power Standard - 100% Renewable Energy by 2035**
  - a. *Qualitative impacts:*
    - i. *Local economic improvements- Deployment of renewable energy could translate into local job creation.*
    - ii. *Local economic improvements- Decreased reliance on price volatile energy sources and supply disruptions.*
    - iii. *Public health- Decreased health risks from reduction of fossil fuel combustion.*
    - iv. *Increased local energy resiliency- Decentralized energy supply from renewable energy sources increases the ability to adapt to grid disruptions.*
    - v. *Cost reductions- Decreased energy costs from energy efficiency improvements and more resilient energy sources.*
    - vi. *Reduced risk to climate hazards- Emissions reductions ultimately slows climate change, therefore reducing the risk to climate hazard events induced by climate change.*
2. **Advanced Clean Cars II - 100% of new cars, light-duty trucks, and sport utility vehicles (SUVs) sold in Maryland to be ZEVs by 2035.**
  - a. *Qualitative impacts:*
    - i. *Public health- Reduced exposure to particulate emissions, ozone, and noise leads to a decrease in health risks.*
    - ii. *Local economic improvements- Increased community capacity building and job creation due to additional training and infrastructure for electric vehicles.*
    - iii. *Equity- Expansion of charging stations and public financial support lowers barriers and improves access to EV ownership.*
3. **Advanced Clean Trucks - heavy duty EVs - model based Rocky Mountain Institute data**
  - a. *Qualitative impacts:*
    - i. *Public health- Reduced exposure to diesel particulate emissions, ozone, and noise leads to a decrease in health risks.*
    - ii. *Local economic improvements- EV charging Infrastructure construction will create new or improved local jobs and build capacity through training; new jobs will be created in EV manufacturing and other technology sectors.*

4. **Maryland Transportation Plan** - 20% reduction for all on road vehicles by 2050 (assuming 2050 since this is the 2050 Transportation Plan) (this includes all fuel types included EVs)
  - a. Qualitative impacts:
    - i. *Public health- Reduced vehicle miles traveled results in local reduced exposure to particulate emissions, ozone, and noise.*
    - ii. *Reduced risk to climate hazards - Emissions reductions ultimately slows climate change, therefore reducing the risk to climate hazard events induced by climate change.*
5. **Energy Codes and Standards** - 37% savings for all new buildings and 20% savings for existing Commercial and Residential (5% of homes retrofit each year) (all data is defaults)
  - a. Qualitative impacts:
    - i. *Commercial*
      1. *Local economic improvements- Lowering operational costs for businesses could allow them to direct more funding into their workforce, leading to more employment opportunities.*
      2. *Reduced risk to climate hazards- Commercial and industrial reductions typically are at a larger scale than residential. Emissions reductions ultimately slows climate change, therefore reducing the risk to climate hazard events induced by climate change.*
    - ii. *Residential*
      1. *Cost reductions- Decreased, more stable energy costs can ease the energy burden most LIDAC communities face.*
      2. *Public health- Increases in resilience to cope with temperature extremes by incorporating and/or upgrading heating, ventilation and air conditioning systems (HVAC), installing off the grid solar energy capacity, and upgrading home building envelope (insulation).*
      3. *Public health- Increased housing quality, comfort, and safety from reduced costs, increased efficiencies, and improved indoor air quality.*
      4. *Reduced risk to climate hazards- Emissions reductions ultimately slows climate change, therefore reducing the risk to climate hazard events induced by climate change.*
6. **Building Energy Performance Standards** - 100% of commercial buildings by 2045 fully electrified (The State of Maryland Building Energy Performance target aims for buildings larger than 35,000 sq ft and ends in 2040. Since we do not have sq ft data currently, we extended this to 2045 to account for other commercial buildings). Also will apply this assumption to
  - a. Qualitative impacts:
    - i. *Public health- Electrification of all buildings in a community reduces indoor exposure to fossil fuel combustion, improving indoor air quality.*
    - ii. *Local economic improvements- Deployment of electrification could translate into local job creation targeting low-income and unemployed people and communities.*
7. **Food Residuals Diversion Law** - 2% of food reduced per year (this is an assumption)
  - a. Qualitative impacts:

- i. *Reduced risk to climate hazards- Emissions reductions ultimately slows climate change, therefore reducing the risk to climate hazard events induced by climate change.*

The following documentation specifies which census tracts are most impacted by the aforementioned strategies:

- [BaltimoreMetro\\_CEJST](#)
- [BaltimoreMetro\\_CEJST -LIDAC Analysis- Identification Methodology Affected Census Tracts.pdf](#)

\*It is important to recognize that all of the census tracts present in the data set fall into the 90th percentile or higher for any given criteria and are disproportionately impacted. For this reason and with recognition that each criteria contains disproportionately impacted community members, nearly every census tract will be impacted by the identified GHG reduction measures. Additionally, the reduction measures will result in community wide emissions reductions and will affect all census tracts indirectly, if not directly.

### 3.6 Review of Authority to Implement

The jurisdictions in the Baltimore MSA in partnership with the State of Maryland have the authority to implement all measures detailed in this PCAP, though some of that authority is primarily with the state, with local government authority being limited. **Table 11: Authority to Implement** details what authorities are with local governments, in which actions require authorities from the state.

### 3.7 Workforce Planning Analysis

A previous analysis of workforce readiness for building electrification was performed for local government in the Baltimore region. Additional workforce planning analysis will be completed ahead of the comprehensive climate action plan in 2025.

Through a previous analysis, it was assessed that the existing building workforce currently is not prepared to accommodate the anticipated steep acceleration of building electrification in Maryland. Building electrification is a comparatively recent strategy in the overall mission to decarbonize energy. As such, existing energy auditors and building contractors are often not qualified to perform electrification audits and planning. During stakeholder engagement, Howard County staff identified this as the main bottleneck in the push toward building electrification.

The existing workforce of building energy auditors has been trained to assess energy efficiency with a focus on weatherization and energy saving strategies, but not to evaluate electrification potential, capacity needs, and the need for service upgrades or workarounds, and to develop adequate strategies that incorporate recent technologies and incentives. Similarly, the existing workforce of HVAC professionals has been trained to install equipment without consideration of broader electrification strategies which households are increasingly being incentivized to pursue, and generally tends to replace equipment with the same type for ease of installation. Contractors who have been in the field for decades and their corresponding salesforce also sometimes have outdated knowledge on technologies and rebates available for switching from fossil fuel combustion equipment to electric alternatives.

Households and businesses wishing to implement electrification upgrades are left to navigate equipment options and an overwhelming array of utility, local, state, and federal incentives. Electric service limitations and the strategies they necessitate are rarely considered by a lay person when seeking equipment upgrades. The ability to perform systematic electrification audits and provide building owners with all relevant information is a crucial qualification for building professionals in light of the current push for building electrification. Past training curricula have not prepared existing professionals for this need.

The greater emphasis expected over the next decade on electrification, energy efficiency improvements, EV charging infrastructure and solar will similarly increase demand for electricians and solar installers.

## 4 Next Steps

Following the release of this PCAP, the Steering Committee and consultants will begin work on preparation of the Comprehensive Climate Action Plan (CCAP). BMC and Steering Committee members will work with a consultant on the development of the CCAP and public engagement. Emission reduction measures in the CCAP are expected to build upon and potentially expand on the list of priority action measures in this PCAP.

- **MILESTONE 1 - Determine amount of CPRG implementation funding awarded**
  - March 2024: Submit the Priority Climate Action Plan (PCAP) for the Baltimore MSA by March 1
  - April 2024: Baltimore MSA CPRG Steering Committee submit a competitive grant application for the CPRG implementation grant by April 1.
- **MILESTONE 2: Meet deliverables of the CPRG planning grant funds**
  - May 2024: While the CPRG competitive grant proposal is under review, the Baltimore MSA CPRG Steering Committee will meet monthly to proactively prepare for the implementation and continue coordinating progress on the CPRG planning grant led by the Baltimore Metropolitan Council.
  - June 2024: The Baltimore MSA CPRG Steering Committee will begin drafting an outline for the Comprehensive Climate Action Plan (CCAP)
  - July 2024: Determine if the MSA's proposal was funded, partially funded or if other funding sources need to be sought through federal, state, philanthropic or other sources.
  - August 2024: Facilitate planning meetings with the Baltimore MSA coalition partners, subawardees and other stakeholders to coordinate and plan for adjusting funding priorities based on the award notice (if awarded) and funding amount. These planning meetings will also be used to prepare for the expedient execution of necessary administrative processes for subawards, competitive procurement and other administrative needs.
- **MILESTONE 3 - Prepare for regional implementation of CPRG**
  - September 2024: Host regional coordinating meetings for the REDUCE coalition to provide direction, advice, and support to each partner in the facilitation of the CPRG and complete key pre implementation tasks
    - i. Draft language, scopes and parameters for request for proposals as necessary for competitive procurement in alignment with EPA procurements rules

- ii. Engage with targeted communities to raise awareness about the process for CPRG implementation and impacts for their respective communities.
- iii. Revisit and finalize work plan timeline as needed
- o October 2024: Depending on when funds are allocated to lead applicants, facilitate the allocation of funds to subawardees, contractors, consultants and program beneficiaries.

The Baltimore MSA Steering committee will determine additional steps needed for effective implementation as the members continue to coordinate for the CPRG implementation grant.