STATE SPENDING SERIES: CLIMATE CHANGE COSTS

APRIL 2025

As Maryland's Chief Fiscal Officer and a member of the state spending board – the Board of Public Works – the Comptroller of Maryland is supportive of cost-effective investments that grow the economy and advance economic opportunity for all Marylanders.

This report is part of a series that explains state expenses and shares lessons learned from across the United States and the world about cost drivers of critical infrastructure and other public goods that are essential to inclusive and resilient growth.

Climate change is significantly impacting people, communities, and economies worldwide through rising sea levels, prolonged heat waves, and more frequent and intense extreme weather events. The costs of inaction are severe, encompassing economic disruption, worsening health disparities, and long-term, irreversible environmental damage. Addressing the effects of climate change requires a range of smart investments, from mitigation projects that include efforts to reduce planet warming greenhouse gas emissions (GHG) to the development of resilient infrastructure capable of withstanding future climate impacts.

It is essential to measure the costs of climate change in order to inform effective policies, strategies, and budget decisions for building a sustainable future. This involves complex economic modeling, incorporating direct expenses and indirect impacts over time, such as lost productivity, damage to natural ecosystems, and the long-term benefits of avoided harm. From there, policymakers and others will be better positioned to understand and make decisions that balance these costs for the benefit of Maryland.

This report outlines the categories and types of costs associated with climate change, followed by an examination of the costs of both action and inaction on climate change and its impacts. Finally, the report explores potential funding strategies to pay for new investments to address climate change. This report serves as a precursor to a larger project to calculate actual cost estimates, which the Comptroller's Office will undertake over the next two years.

Current State of the Climate

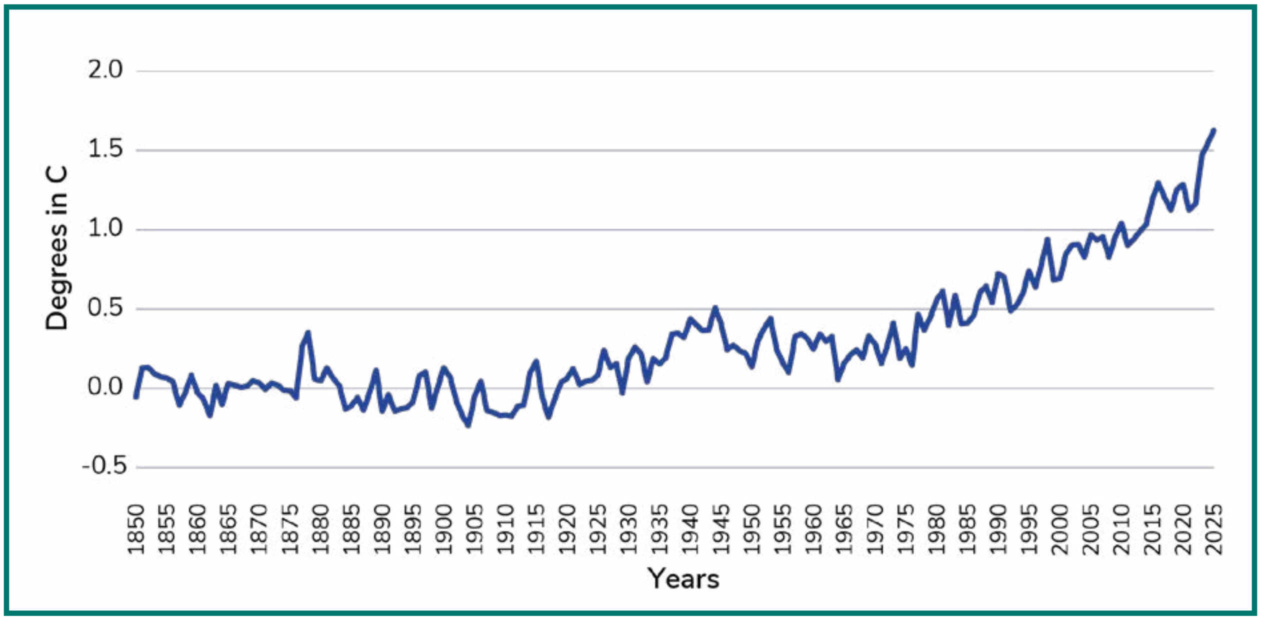
Anthropogenic climate change is caused by human activities, principally, the burning of fossil fuels. This has propelled Earth's climate system toward a critical threshold that, when crossed, can lead to abrupt and potentially irreversible changes. Immediate and decisive action is imperative. To ensure that responses are both strategic and cost-effective, it is essential to understand the costs of climate change as well as the most efficient and effective mitigation and resilience measures.

A look at the rise in global temperatures and sea levels explains the urgency of immediate action.

A look at the rise in global temperatures and sea levels explains the urgency of immediate action. Global temperatures are rising faster now than 2010 to 2020 which was the warmest decade on record. (See Figure 1).

Figure 1: Global Warming: Annual Temperature Anomaly 1880-2024

The difference in average land-sea surface temperature compared to the 1861-1890 mean, in degrees Celsius.



Source: Met Office Hadley Centre - HadCRUT5 (2025)

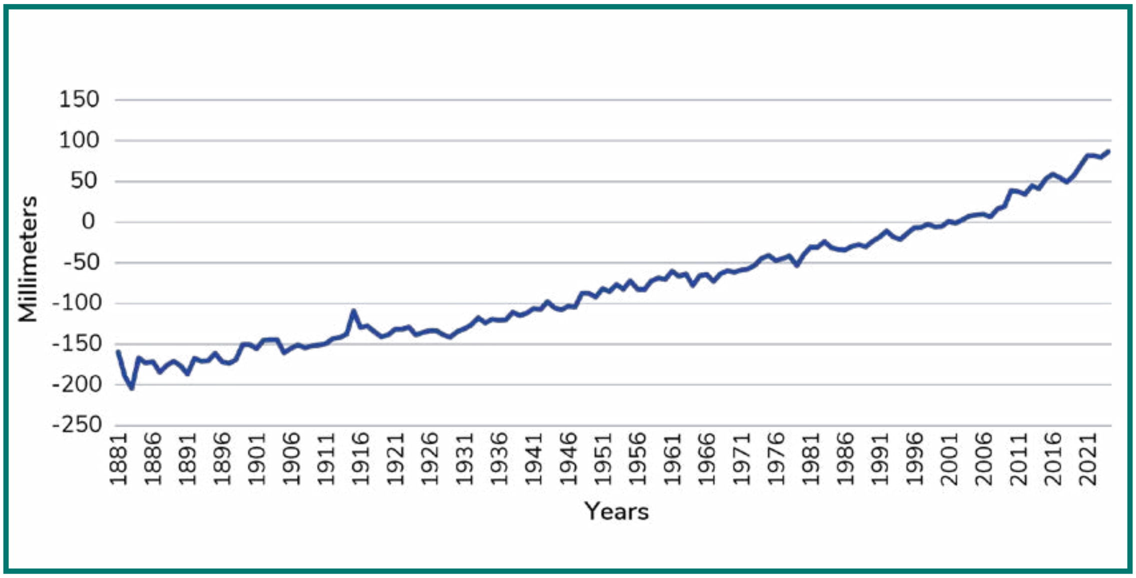
View Chart Data

The rate of global sea level rise has also accelerated since the 1990s with levels rising faster than anticipated. (See Figure 2). The primary driver is the thermal expansion of ocean water as the ocean is warming faster than expected. Maryland is seeing a long-term upward trend of sea level rise that is double the rate of global sea level rise.[1] In the Chesapeake Bay, water levels have risen over one foot during the past century and are projected to rise another 1 to 5 feet over the next 100 years.[2] The Chesapeake Bay is predicted to have a higher rate of sea level rise compared to other parts of the East Coast.

Nearly all of Maryland's 2.2 million coastal properties are vulnerable to damage.[3] Researchers with the University of Maryland's Coastal Climate Program found that Baltimore experienced 11 high-tide-flooding days in 2019 due to sea-level rise and will experience between 50-155 days of flooding by 2050. In addition, more than 100 communities in Maryland may be at risk of chronic inundation from sea-level rise and storm surges by the end of the century.[4] A conservative cost estimate of what it will take to safeguard businesses, homes, roads, and entire communities in Maryland from chronic flooding alone (not including other climate hazards) by 2040 under a moderate sea-level-rise scenario is $27.4 Billion.[5]

Figure 2: Global Sea Level Rise

Global mean sea level rise is measured relative to the 1993 - 2008 average sea level.
Church & White and University of Hawaii Sea Level Center (UHLSC)



Source: National Oceanic Atmospheric Administration, Climate.gov (2022)

View Chart Data

Sea level rise and other climate hazards create a significant financial cost to residents and governments. By making smart investments in climate mitigation and resilience projects, it is possible to reduce harm and control costs. Vulnerable communities are and will continue to bear an unprecedented financial burden to adapt and rebuild in the face of unrelenting climate impacts.

Cost of Climate Change

One of the most noticeable aspects and costs of climate change is the escalating severity of extreme weather events. As the impacts of this severe weather intensify, it becomes increasingly important to evaluate the challenges that state and local governments and communities face. Climate change will further impact already difficult budget decisions at every level of government. Although responding to climate change requires significant upfront costs, the long-term return on investment may justify the initial costs. Accurately quantifying the impacts and costs can help state and local governments plan effectively, respond proactively, and manage these financial pressures more responsibly.

The U.S. has sustained 403 weather and climate disasters since 1980. The total cost of these events, which includes drought and flooding events, wildfires and severe storm events exceeds $2.9 trillion.[6] In 2024 alone, there were 27 confirmed weather or climate disaster events in the U.S. with losses exceeding $1 billion per event and totaling nearly $400 billion overall, with at least 568 direct or indirect fatalities.

Maryland experienced 85 extreme weather events between 1980 and 2024. According to the National Oceanic Atmospheric Administration, the total recovery costs for Maryland were between $10 billion to $20 billion dollars.[7] Some of these costs included property and infrastructure damage, crop loss, and loss of revenue to businesses. Maryland will not be immune from more disasters in the coming decades; the costs of recovery will grow in tandem.

> **Through the rapidly developing area of science called "attribution science," researchers can now estimate how much human-generated (anthropogenic) emissions from fossil fuel activity have shifted the odds of extreme weather events occurring.**

Although extreme weather events have always occurred, scientists can now quantify how much more intense and frequent they have become due to climate change. Through the rapidly developing area of science called "attribution science," researchers can now estimate how much human-generated (anthropogenic) emissions from fossil fuel activity have shifted the odds of extreme weather events occurring. This research can enable economists to calculate the share of extreme weather costs that is attributable to fossil fuels versus historically natural causes. Maryland can use this emerging science to assess the additional expenditures the state is spending due to anthropogenic climate change.

Cost of Inaction

To fully account for the true cost of climate change, it is crucial to consider not only the immediate impacts, such as disaster cleanup from extreme weather, but also the broader, compounding economic pressures it creates. Climate-related hazards drive up costs of materials, strain public health systems, deplete natural resources, inflate housing prices, and trigger insurance spikes — all of which pose significant obstacles to economic growth. Over time, the failure to invest in climate resilience and mitigation amplifies these financial burdens. While the state has yet to quantify the price of inaction, the following are key factors driving up costs as climate risks escalate.

Economy wide

Climate change places significant strain on the state's economy and budget, disrupting key sectors such as agriculture, infrastructure, tourism, and more. These disruptions lead to higher costs, reduced productivity, and widespread damage from extreme weather events. Specific economic impacts include:

- **Workforce disruptions:** Extreme heat and severe weather reduce worker productivity, especially in outdoor and labor-intensive industries.
- **Agricultural losses:** Intense heat, heavy rainfall, and stronger storms lower crop yields, reduce tillable farmland, increase water demand, and cause livestock and poultry losses. Sea level rise leads to saltwater intrusion on farmland, while rising production costs and supply challenges contribute to higher grocery prices.
- **Tourism decline:** Fewer pleasant weather days, reduced snowfall for winter sports, harmful algal blooms limiting water recreation, and the costly need for beach sand replenishment all diminish tourism revenue.
- **Supply chain disruptions and rising resource costs:** Climate impacts increase the costs of water, land, and raw materials, complicating supply chains across industries.
- **Infrastructure damage:** Flooding and severe storms damage roads, buildings, marinas, docks, waterfront businesses, and protective structures like riprap. Roads, bridges, and power lines often require costly rebuilding.

- **Loss of essential services:** Power outages, water and sewer system failures, and internet disruptions — including damage to undersea cables and coastal interconnection points — threaten basic services and economic continuity.
- **Increased financial burdens:** The growing need for state-funded disaster relief and recovery grants further strains public resources.

Health (Morbidity and Mortality)

Climate change poses direct and indirect threats to human health. The severity of these risks largely depends on the capacity of public health and safety systems to anticipate and respond to evolving dangers. Individual factors — such as behavior, age, gender, and socioeconomic status — as well as geographic location, vulnerability to health hazards, level of exposure to climate impacts, and the ability of individuals and communities to adapt, will all influence outcomes. For Maryland residents, the health impacts of climate change include:

- **Heat-related illnesses:** More frequent and intense heat waves increase risks of heat exhaustion, heat stroke, cardiac events, and even spikes in violence during extreme heat.
- **Air quality degradation:** Emissions from fossil fuel power plants and vehicles, wildfire smoke, and rising levels of pollen and mold contribute to asthma and other respiratory conditions.
- **Power outages:** Disruptions to the electrical grid jeopardize the refrigeration of medications and the operation of life-saving medical devices.
- **Critical infrastructure systems:** Temporary loss of power, water, communications, and transportation systems impact services provided by health care facilities.
- **Food and waterborne illnesses:** Shifts in weather patterns and extreme events heighten the risk of infections and zoonotic diseases.
- **Vector-borne diseases:** Warming temperatures expand the habitat of disease-carrying insects like mosquitoes and ticks, increasing the spread of illnesses.
- **Injuries from extreme weather:** Severe storms and flooding lead to a rise in nonfatal injuries and necessitate more frequent search and rescue operations.
- **Mental health impacts:** The trauma of experiencing, or the fear of, extreme weather events contribute to PTSD, anxiety, and depression.

Insurance and Housing

Climate change-driven extreme weather events are displacing people from their homes and further straining the already critical shortage of safe, stable, and affordable housing. As sea levels rise and severe storms become more frequent, more properties face heightened risks of damage or total loss. Nationwide, disasters — from catastrophic flooding to wildfires — are also driving up insurance premiums and leading to policy cancellations in vulnerable areas. These impacts include:

- **Rising repair costs** for damaged homes and buildings.
- **Replacement costs** for personal belongings and building contents lost to disasters.
- **Home loss** due to mortgage foreclosures when insurance policies are canceled or not renewed.
- **Barriers to development** as businesses and housing projects struggle to secure necessary insurance coverage.

A new report from the Maryland Insurance Administration reveals that insurance companies are increasingly refusing to renew policies statewide, a decision that impacts homeowners, renters, and businesses.[8]

Natural Resources

Maryland is home to a rich array of natural resources — from the Chesapeake Bay and its iconic crab and oyster fisheries to expansive forests, fertile soils, and valuable minerals. However, climate change is placing these resources under severe threat, jeopardizing both ecological health and the services these ecosystems provide. Key impacts include:

- **Loss of biodiversity:** Shifting habitats and species decline reduce vital ecosystem services such as water filtration, pollination, and natural pest control.
- **Degradation of land and soil:** Saltwater intrusion from rising seas and declining soil health threaten agriculture and natural landscapes.
- **Forest decline:** Heat stress, prolonged drought, increased wildfire risk, and the spread of pests and diseases endanger Maryland's forests.
- **Wetland loss:** Rising sea levels are drowning wetlands, eroding natural buffers that protect coastlines and support biodiversity.
- **Freshwater fishery declines:** Warmer temperatures and algal blooms degrade freshwater habitats, harming fish populations.
- **Marine fishery declines:** Ocean acidification and warming seas disrupt marine ecosystems and fisheries critical to maintaining Maryland's seafood industry and economy.
- **Coastal impacts:** Sea level rise accelerates flooding and erosion, reshaping ecosystems and severely affecting agriculture, fisheries, and coastal communities.

Hidden Costs

Additional, "hidden" costs of climate change are numerous and include secondary and tertiary effects on people, places, and nature. Some examples include:

- **Essential services disruption:** Loss of service to the community when fire and police stations, hospitals and other public buildings are damaged.
- **Isolation**: Being stranded due to coastal and road and bridge flooding, isolating homes.
- **Mobility**: Damage to or temporary loss of transportation - ambulances, school buses, fire/police vehicles, and transit services.
- **Workforce disruptions**: The effects of climate-induced economic damage and rising morbidity results in lost jobs, lower labor force numbers, reduced economic production, and missing income.
- **Revenue loss**: Loss of revenue and other business interruption costs resulting from property damage.
- **Loss of life**: Due to initial loss and inability to reach those who need assistance.

Impact on underserved and overburdened communities

Under Maryland law in Environment Article 1-701, the state must ensure equal protection from environmental and public health hazards for all people regardless of race, income, culture, and social status.[9] Many low-income households and communities of color, particularly those located next to polluting industries, have been disproportionately burdened with pollution and already face increased health issues, like long term health conditions and diseases due to that pollution. Extreme weather events also disproportionately impact these vulnerable communities, which are more likely to lack the financial resources to evacuate threatened areas and recover from disasters, thereby exacerbating existing inequality leading to increased economic hardship.

Climate change also factors into the increased costs of daily household expenses like groceries, energy, and insurance. Extreme weather impacts crop yields, leading to higher food prices. An increase in hot days leads to the need for more air conditioning, raising energy bills. Climate related disasters increase the risk to property and leads to higher insurance premiums.

Cost of Action

The cost of rebuilding homes, businesses, equipment, and infrastructure after disasters is enormous — and growing. However, with smart, proactive planning, state and local governments can significantly reduce these expenses. According to the U.S. Chamber of Commerce's 2024 Climate Resiliency Report, every $1 invested in resilience and disaster preparedness returns $13 in avoided damages and recovery costs.[10]

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Climate change is already costing Maryland millions of dollars annually. Investing in resilience and mitigation now is essential to manage long-term costs for both the state and its residents. Delaying action will only make the damage — and the price tag — worse.

Investments in resilience not only protect communities but also ensure their survival. With thoughtful planning, including coordination between public and private authorities, there is the potential to reduce the impact of climate change and improve the resilience of Maryland at a community scale. Strengthening infrastructure — from roads, bridges, and ports to dams, railways, marinas, and airports — will bolster Maryland's ability to withstand climate hazards. These steps are crucial to safeguarding the state's economy and securing its long-term sustainability.

Maryland conducted a cost benefit analysis of mitigation policies in 2023 as part of the Maryland Climate Pollution Reduction Plan.[11] The plan includes modeling to reduce statewide greenhouse gas emissions (GHG) by 60% from 2006 levels by 2031 and net zero by 2045. Implementing the necessary mitigation measures, such as transitioning to cleaner power, transportation, and buildings, calls for an increased state investment of approximately $8 billion by 2031. The modeling in the plan estimates $135 billion in global economic societal benefits by reducing emissions by 646 million tons by 2050. This figure incorporates the social cost of carbon which is a monetary estimate of economic damages to society and the economy from GHG emissions, including impacts to human health and property damage.[12] As detailed in the plan, implementing these mitigation policies in Maryland will add an estimated 27,000 jobs and grow the economy. There will also be improvements in air quality and public health outcomes especially for people living in underserved and overburdened communities.[13]

Examples of effective resilience and adaptation strategies include conserving and restoring natural ecosystems, protecting habitats, and safeguarding vital natural resources. Strengthening state and local economies involves reinforcing critical infrastructure, adopting climate-resilient construction practices, and improving the sustainability of food systems. Social resilience can be enhanced by developing and implementing comprehensive adaptation plans, establishing community resilience hubs, and expanding public education and outreach efforts. The following outlines the specific investments required to build climate resilience across these areas, organized by climate hazard.

Precipitation and Flooding

A warmer planet holds more water vapor in its atmosphere leading to heavier precipitation. This results in more rain per event, which leads to flooding. Resilience measures to consider include:

- **Flood proofing**: Relocate or elevate infrastructure (buildings, roads, bridges, transit, wastewater plants) especially in flood prone areas.
- **Reduce flood risk**: Improve drainage systems and flood control structures.
- **Restore natural flood protection:** Preserve floodplains, stream restoration, wetlands restoration, parks to absorb urban water and green stormwater.
- **Planning**: Develop and implement comprehensive flood management plans, emergency protocols, flood warning system, community education and preparedness campaigns, and safe evacuation routes.
- **Septic systems**: Divert water from septic systems and improve bermed infiltration ponds.
- **Build** Barrier walls, sea walls, flood gates, levees, and stormwater catchment systems.
- **Shore up** Ports, marinas, and public docks.

Storms

Climate change will intensify storms with heavier rainfall, stronger winds, and increased storm surges in Maryland, making storms more destructive and costly. Resilience measures to consider include:

- **Structure and infrastructure projects**:
  - Proactive defensive upgrades to roads, bridges, rail and transit systems.
  - Raising electrical components in buildings to above the base flood elevation.
  - Use of sump pumps and backflow valves.
  - Sewer systems/wastewater treatment plant upgrades.
- **Power:**
  - Protect power lines by pruning trees.
  - Update parts of the electrical grid to increase stability and resilience including supporting creation of self-sufficient microgrids.

- Bury overhead power lines or install systems that ensure failure of only small sections of power lines rather than cascading failures.
- Increase power storage capacity to enhance grid reliability.

Temperature

Global warming is most often associated with overall hotter temperatures. However, it is only one component of climate change; Maryland will experience increased likelihood and intensity of heatwaves, making them hotter, longer and more frequent. Resilience measures to consider include:

- **Electrification**: Transition to electric heat pumps that heat and cool buildings.
- **Energy Efficiency**: Increased energy efficiency in buildings with insulation, reflective surfaces, and tinted windows.
- **Cooling**: Establishing community cooling centers.
- **Trees**: Planting trees to reduce urban heat islands.
- **Drinking water**: Protecting drinking water supplies from heat induced algal growth.

Sea Level Rise

With nearly 3,100 miles of shoreline, Maryland is highly vulnerable to the effects of rising sea levels. Seas will rise substantially over the next several decades and continue for at least several centuries. As temperatures warm and coastal tides creep inland, communities across the country face billion-dollar price tags for basic coastal defense. Resilience measures to consider include:

- **Planning**: Updating state guidance associated with coastal development in order to keep up with rapidly changing conditions.
- **Gray infrastructure:** Includes building sea walls, flood gates, and levees; and raising roads and bridges, to prevent road flooding and protect against rising water under roadways creating sink holes.
- **Green infrastructure:** Includes creating more natural wetlands, and natural shoreline stabilization and restoration.
- **Managed retreat:** Includes moving buildings away from the coast or bay.

Drought

While Maryland has an average rainfall of 43.6 inches, the state does experience droughts and climate models suggest that Maryland will experience more heat-related stress that could contribute to drought. Resilience measures to consider include:

- **Fire:** Prevention measures like controlled burns, and removal of dead brush.
- **Water:** Efforts to ensure water security through improved water infrastructure, monitoring, catchment, and conservation.
- **Agriculture:** Protecting agricultural assets including crops and livestock, improved irrigation, increased water storage capacity, and use of drought resistant crops.

- **Ecosystems:** Protect, expand and connect existing forests to ensure healthy balanced naturally drought tolerant natural places.

While investments in mitigation, resilience, and preparedness cannot prevent all losses associated with climate-related hazards, they can significantly reduce them. Over time, these preparedness investments generate savings and have economic benefits.

Paying for Climate Change Mitigation and Resilience

Although mitigation and resilience efforts are far more cost-effective than inaction, they still require substantial investment. State and local governments are using a range of strategies to finance these efforts. A crucial first step for state and local leaders is to quantify both the current and projected impacts of climate change, along with related expenditures. State investments are often intended to increase private investments and influence behavior by businesses and individuals, and they are also often directed to public sector projects that do not always receive private investment.[14]

This section outlines how Maryland is currently funding climate action, explores additional funding opportunities, and highlights how smart planning and policy decisions can help manage and reduce long-term climate costs.

Funding Sources

Maryland primarily funds climate action through a combination of the state budget, special funds and the Rainy-Day Fund. Prior to 2025, Maryland received supplemental appropriations from Congress with the Federal Emergency Management Agency playing a key role in providing federal funding and assistance. The future of these funds is unknown due to recent claw backs of funding by the Trump Administration. Maryland uses several sources, including grants, loans, equity investments, and various forms of debt financing to fund climate action.

Maryland is taking steps to enhance resilience of a broad spectrum of natural and human-based systems to the consequences of climate change. The state is investing in resilience with various initiatives funded by local, state, and federal sources totaling more than $300 million.[15]

Currently Maryland uses the following sources to fund climate work:

- The Strategic Energy Investment Fund (SEIF) allocates proceeds from the Regional Greenhouse Gas Initiative (RGGI) and other sources to distribute revenues from new or expanded climate pollution reduction programs.[16]
- The Resilient Maryland Revolving Loan Fund provides low or no interest loans to local governments to help finance for resilience projects.[17]
- The Department of Natural Resources has a variety of grants for resilience including, but not limited to: Watershed assistance, Program Open Space, Rural Legacy, Keep Maryland Beautiful, Conservation easement, Forest Conservation and Green Space Equity programs.[18]
- The Maryland State Disaster Recovery Fund provides assistance in disaster-stricken areas.[19] Money for the fund comes from the state budget, interest on loans from the fund, and federal reimbursement.
- Green banks are mission-driven financial institutions that leverage private capital to promote clean energy projects. The mission of the state's green bank, the Maryland Clean Energy Center

is to encourage the transformation of the energy economy with programs that support local jurisdictions, regional green banks, catalyze business growth, increase related green-collar jobs, and make clean energy technologies, products, and services affordable, accessible, and easy to implement.

Maryland could consider additional funding sources to pay for climate-related work, many of which are employed by other states, including:

- Green Revenue Bonds, are a debt instrument issued to raise capital to cover the costs of climate resilience and mitigation projects and initiatives. Revenue bonds are repaid primarily from the cash flows generated by the specific projects they finance, and do not impact taxes or the state's capacity to use general obligation bonds to fund other state priorities.
- Some states and municipalities are seeking monetary damages, generally accusing fossil fuel companies of violating laws by concealing from the public for decades the fact that burning fossil fuels would lead to climate change.
- Create a State Resilience Finance Plan, as California has done and Massachusetts is pursuing, to provide Maryland with a strategic roadmap for funding critical resilience initiatives. Such a plan would identify existing and future costs, map out potential funding sources, and explore innovative financing strategies. It would also provide a statewide estimate of costs for key resilience measures, and analyze which investments offer the greatest returns.

Currently, taxpayers are responsible for the entirety of climate change impact costs: past, present and future. Some states are considering (or have passed) legislation to share the burden of financing these costs with oil and gas companies that are the biggest GHG emitters. In 2025, the Maryland General Assembly passed legislation to assess the cost of climate change adaptation and mitigation projects in Maryland as a result of GHG emissions. The legislation requires the state to conduct a study to assess the total cost of GHG emissions in Maryland.

The study will include a summary of various cost-driving effects of GHG emissions on the state and to residents, the costs incurred and projected to incur for each of those effects, as well as an economic analysis to determine if there would be a cost impact passed on to taxpayers should responsible parties be held accountable to cover these costs.

The Comptroller's Office will be the lead entity – in coordination with state agencies and stakeholders - in developing this study which is due for release in December 2026.

Conclusion

The costs of climate change are unavoidable, but implementing thoughtful plans, policies and mitigation, resilience and adaptation solutions now will generate savings over the long-term. Waiting to implement solutions only makes damage and solutions more costly and resource intensive. Maryland should take a preventative approach to climate action. As climate-related economic damages continue to grow, so too will their strain on the state's budget. Committing to equitable emissions reduction and climate and resilience today is an investment in reducing climate costs that can compound over time. National studies have shown that resilience, preparedness, and pre-disaster mitigation investments pay big returns. Resilience measures cannot prevent or erase the direct, post-climate hazard damage, but can reduce the harm caused, lessen the human toll and economic costs over the long term. The time to act is now.

Appendix – Data Tables for Charts

Figure 1: Global warming: annual temperature anomaly 1880-2024 in Celsius

Year	Temperature
1850	-0.05541366
1851	0.12894794
1852	0.13289867
1853	0.0919433
1854	0.07077692
1855	0.065381
1856	0.04194403
1857	-0.1049323
1858	-0.026467945
1859	0.08103258
1860	-0.027867433
1861	-0.06681519
1862	-0.17407164
1863	0.018053684
1864	-0.10316732
1865	0.029816423
1866	0.021010254
1867	0.005303625
1868	0.010470603
1869	0.0457058
1870	0.034370217
1871	-0.006265011
1872	0.03418717
1873	0.021000836
1874	-0.010953452
1875	-0.013328191

Year	Temperature
1876	-0.06181216
1877	0.2611889
1878	0.35098255
1879	0.05866343
1880	0.0464657
1881	0.13005222
1882	0.06676767
1883	0.015823338
1884	-0.13002232
1885	-0.108825825
1886	-0.058605876
1887	-0.13648802
1888	-0.017081138
1889	0.11240219
1890	-0.14456043
1891	-0.039017197
1892	-0.14526078
1893	-0.13232148
1894	-0.12146618
1895	-0.08645385
1896	0.07829047
1897	0.102497585
1898	-0.12349438
1899	0.006864104
1900	0.12780385
1901	0.06888751

Year	Temperature
1902	-0.07665878
1903	-0.17098936
1904	-0.23521331
1905	-0.045495477
1906	0.043188963
1907	-0.14177856
1908	-0.15152195
1909	-0.1733894
1910	-0.16861174
1911	-0.17678127
1912	-0.11324089
1913	-0.10471334
1914	0.09986118
1915	0.17062555
1916	-0.057725396
1917	-0.18052194
1918	-0.062066343
1919	0.037008677
1920	0.06394268
1921	0.121853404
1922	0.023284052
1923	0.04461587
1924	0.050496046
1925	0.08015577
1926	0.23974274
1927	0.13318415
1928	0.15583193
1929	-0.030145284

Year	Temperature
1930	0.18549232
1931	0.25890008
1932	0.21683604
1933	0.039953325
1934	0.1879609
1935	0.15623851
1936	0.1927768
1937	0.3430988
1938	0.350097
1939	0.32150054
1940	0.43823355
1941	0.40042704
1942	0.36370382
1943	0.36871934
1944	0.5064029
1945	0.4053861
1946	0.24348314
1947	0.27109215
1948	0.23763648
1949	0.21849552
1950	0.13567594
1951	0.3011438
1952	0.3776523
1953	0.4399285
1954	0.24554752
1955	0.1649878
1956	0.09913213
1957	0.32696283

Year	Temperature
1958	0.3446652
1959	0.31429294
1960	0.24683817
1961	0.34229797
1962	0.29825503
1963	0.32548714
1964	0.056436215
1965	0.15787727
1966	0.21340014
1967	0.24475846
1968	0.19365019
1969	0.33091152
1970	0.27723366
1971	0.1564087
1972	0.26850644
1973	0.4122479
1974	0.18977118
1975	0.25154352
1976	0.14646085
1977	0.46538624
1978	0.3675537
1979	0.45315588
1980	0.5583698
1981	0.6123098
1982	0.39656603
1983	0.5861076
1984	0.41029125
1985	0.41202748

Year	Temperature
1986	0.45798472
1987	0.60532415
1988	0.6444495
1989	0.5415481
1990	0.7228801
1991	0.7011943
1992	0.48719457
1993	0.52800494
1994	0.59584755
1995	0.7391639
1996	0.6389871
1997	0.7846063
1998	0.93963945
1999	0.6867827
2000	0.6933825
2001	0.8515781
2002	0.9057643
2003	0.9064679
2004	0.82966846
2005	0.96916026
2006	0.93485045
2007	0.9539991
2008	0.8279476
2009	0.9590794
2010	1.0426692
2011	0.8999955
2012	0.9399048
2013	0.9858731

Year	Temperature
2014	1.0351694
2015	1.1874121
2016	1.2952248
2017	1.207472
2018	1.1249518
2019	1.2533703
2020	1.2852182
2021	1.1242033
2022	1.1636031
2023	1.4626105
2024	1.5430979
2025	1.6256422

Source: Met Office Hadley Centre - HadCRUT5 (2025) – processed by Our World in Data

View Chart

Figure 2: Global sea level rise

Year	Global Sea Level
1881	-159.68073
1882	-189.48073
1883	-204.38072
1884	-166.61406
1885	-173.3474
1886	-171.11406
1887	-184.18073
1888	-175.88072
1889	-171.08073
1890	-176.5474
1891	-186.48073
1892	-167.5474
1893	-170.81406
1894	-170.08073
1895	-161.11406
1896	-171.4474
1897	-173.38072
1898	-169.24739
1899	-150.58073
1900	-150.31406
1901	-155.4474
1902	-145.58073
1903	-144.81406
1904	-144.78073
1905	-160.5474
1906	-154.9474
1907	-151.1474

Year	Global Sea Level
1908	-154.48073
1909	-152.31406
1910	-150.8474
1911	-149.1474
1912	-142.9474
1913	-142.0474
1914	-137.5474
1915	-108.7474
1916	-129.58073
1917	-127.78073
1918	-134.41406
1919	-141.0474
1920	-138.31406
1921	-131.91406
1922	-131.9474
1923	-128.58073
1924	-138.71407
1925	-135.61406
1926	-133.21407
1927	-133.5474
1928	-138.51407
1929	-141.3474
1930	-134.6474
1931	-130.8474
1932	-126.714066
1933	-117.54739

Year	Global Sea Level
1934	-123.8474
1935	-119.3474
1936	-120.51406
1937	-119.714066
1938	-110.91406
1939	-114.58073
1940	-111.91406
1941	-106.01406
1942	-107.2474
1943	-97.88073
1944	-105.2474
1945	-107.64739
1946	-103.54739
1947	-104.28073
1948	-87.3474
1949	-87.314064
1950	-92.28073
1951	-82.01406
1952	-85.08073
1953	-76.8474
1954	-82.18073
1955	-72.38073
1956	-82.38073
1957	-83.01406
1958	-72.2474
1959	-68.714066
1960	-70.38073
1961	-60.247395

Year	Global Sea Level
1962	-66.68073
1963	-63.88073
1964	-77.947395
1965	-66.18073
1966	-64.28073
1967	-72.91406
1968	-63.48073
1969	-59.71406
1970	-61.239754
1971	-59.363434
1972	-57.45813
1973	-53.006943
1974	-44.539375
1975	-41.241356
1976	-47.445915
1977	-44.83496
1978	-41.263718
1979	-53.21401
1980	-39.625687
1981	-30.473028
1982	-30.790474
1983	-24.037432
1984	-31.579437
1985	-33.6156
1986	-34.12176
1987	-29.50557
1988	-27.977766
1989	-29.964073

Year	Global Sea Level
1990	-23.400215
1991	-18.155539
1992	-11.176675
1993	-18.138348
1994	-21.28105
1995	-13.530466
1996	-7.0586605
1997	-6.436465
1998	-2.1894345
1999	-5.997317
2000	-5.175822
2001	0.737351
2002	-1.0583739
2003	3.2469401
2004	7.560922
2005	9.023991
2006	9.364914
2007	6.524319
2008	16.568615
2009	18.866402
2010	38.776936
2011	37.34795
2012	34.20025
2013	44.80457
2014	41.268642
2015	53.264576
2016	58.723286
2017	54.96168
2018	49.370857
2019	56.607487
2020	68.81163
2021	81.6
2022	81.74
2023	80.05
2024	86.62

Source: Source: NOAA Climate.gov (2022) – processed by Our World in Data

View Chart

Endnotes

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