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"Borrowed Time: The Economic Costs of Climate Change"
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Chairman Brown, Ranking Member Toomey, and Members of the Committee, thank you for the opportunity to testify on this most important issue: The Economic Costs of Climate Change. My name is Joe Flarida and I serve as the Executive Director of Power A Clean Future Ohio. In a moment, I will share more about our work and our incredible partners in Ohio, but I want to start with two brief observations.

First, I want to recognize that climate change is not a math problem, and the impacts that we will face as human beings are far more complex than we can put into simple economic or financial terms. Those most vulnerable in communities in my home state of Ohio and around the world will experience the most harm on the shortest timeline as a result of severe climate impacts. Health consequences already impacting vulnerable populations will get worse. Access to clean air, clean water, and healthy green space will become more scarce for those who don't already have these in abundance. And despite the false narrative we hear often, stable, good-paying jobs for workers will be sacrificed if we ignore the environmental challenges in front of us. However, when it comes to complex problems, one way to wrap our heads around the challenge is to look at the numbers and understand how much it will cost us to do nothing versus how much it will cost to act. My main point today is that we cannot afford to ignore climate change. We must act now.

My second observation is that year in and year out, local governments are burdened with the most challenging public problems we face. They are the eyes that see these problems first, the voices that raise the alarm when we reach a tipping point, and the hands that are asked to implement the solutions we identify. Today, I am here to lift up those Ohio elected leaders and the tireless staff in cities and counties across Ohio that are raising the alarm on the financial costs of climate change that they see coming.

Power A Clean Future Ohio was launched in February 2020 by an incredible group of policy experts, advocates, and local government leaders, and we are fortunate to have the strong support of many voices in the Ohio business community as we work in collaboration to grow our state's clean energy economy.

We built this organization to do one thing - provide direct support to Ohio's local governments to help them identify and adopt clean energy solutions. We support them in pursuing carbon reduction goals in

big and small ways. We have learned that the right solution is the one that works for that community, be it economically, environmentally, culturally, or even, yes, politically. On this topic, any progress is good progress. We encourage local governments to plan comprehensively to account for the economic development opportunity, potential cost-savings, and the considerable environmental implications of this work in the near and long-term.

Power A Clean Future Ohio, the Ohio Environmental Council, and our technical partner Scioto Analysis recently issued a report titled: “The Bill is Coming Due: Calculating the Financial Cost of Climate Change to Ohio’s Local Governments.” This report assessed key climate impacts for local governments in Ohio. We estimated costs for the year 2050, however we know that these costs will not instantly appear in 30 years, but in most cases they are already starting to accumulate and will steadily increase until they reach the projected midcentury estimates.

For ten key climate impacts, we estimate that local governments in the state of Ohio will need to increase municipal spending **between $1.8 billion and $5.9 billion *per year*** by midcentury in order to adapt to the challenges of a worsening climate crisis. For context, a $5.9 billion increase would equate to an 82 percent increase over 2019 spending levels for environment and housing programs for local governments in Ohio.

Power A Clean Future Ohio works with 34 cities and local governments across our state of every size and in every region; and not one of these local governments knows how they will pay for the increased costs they will incur. Municipal officials are already grappling with difficult budget decisions and now they have an additional challenge to add to their strained financial resources.

By 2050, Ohio cities could see spending increases of over $2.2 billion to contend with harmful algal blooms and drinking water treatment; $1.7 billion to elevate roads that will be flooded due to changes in precipitation and severe storms; $1 billion for road repair due to damage as a result of increased freeze-thaw cycles; and, $590 million to establish and operate new cooling centers in the summer months.

Unless we see significant changes to address carbon emissions in the next few years, these impacts will only continue to worsen — and the cost to address them will continue to climb.

Our analysis provides a *conservative* estimate of the additional costs that municipalities can expect to incur due to climate change. These costs are expressed in 2021 dollars, which means that simple inflation alone will result in much higher amounts by 2050. The monetized amounts in our report represent only 10 of the 50 different impacts identified. Monetization of the other 40 impacts as well as additional climate impacts beyond these 50 would significantly increase the overall climate costs reflected in the report. In other words, the total increase in annual spending by municipal governments due to climate change is certainly higher, and likely much higher than what is reflected in the scope of this report. I want to emphasize that this report *only* covers municipal government spending and does not reflect the major cost burdens that will fall on residents – renters, homeowners – and businesses of all sizes.

While this report seems to be full of bad news, the final point that I would like to share is that all hope is not lost. While we are very likely to incur considerable costs due to climate change, the worst of this

crisis can be averted. Local governments are leading the way in transitioning to clean energy. They are adopting carbon reduction goals and establishing bold climate action plans, but they need your support.

We are seeing local government leaders in Ohio acting swiftly in response to climate change. We are proud to support Cincinnati, Columbus, Cleveland, and Dayton who will all procure 100% of their residential power from renewable energy. Dayton's 100% renewable energy purchasing program will save residents 30%, an average of $300 per year per household. A long list of other communities in Ohio are also adopting 100% clean energy programs. This work is not reserved for just large cities either. We are working with over 20 cities and villages with less than 50,000 people, each looking to invest in and plan for a clean energy future.

Cities are adopting carbon reduction goals, establishing climate action plans, decarbonizing buildings, and purchasing electric vehicles. They are leading, and I am inspired every day to work with Ohio's elected leaders on these issues.

My recommendation to Congress is to (1) elevate this issue in every aspect of what you do and (2) invest in local governments.

There is no doubt that the costs and impacts we face are daunting, but I firmly believe that if we can do it locally, we can solve it globally.

Thank you again and I look forward to your questions.

ANALYSIS

Calculating the Financial Cost of Climate Change to Ohio's Local Governments

Our analysis provides a conservative estimate of the additional costs that municipalities can expect to incur due to climate change. Many of the costs of climate change are expressed in 2021 dollars, which means that simple inflation may drive these costs up on their own. The monetized amounts in our analysis represent only 10 of the 50 different impacts addressed. Monetization of the other 40 impacts would significantly increase the overall climate costs reflected here, but are hard to calculate on a statewide basis. In other words, the total increase in annual spending by municipal governments due to climate change is certainly higher, and likely much higher than our analysis reflects.

Annual costs of climate change for 10 major impacts on Ohio local governments expected by midcentury:

Impact	Low-End Estimate	High-End Estimate
Drinking Water Treatment	$580 million	$2.2 billion
Elevating Roads	$860 million	$1.7 billion
Road Repair	$170 million	$1 billion
Cooling Centers	$52 million	$590 million
Stormwater Management	$140 million	$150 million
Electrical Costs	$5.4 million	$79 million
Storm Recovery	$35 million	$78 million
Power Lines	$140,000	$18 million
A/C Installation	$1.4 million	$6.8 million
Cool Roofing	$0	$4.6 million
Total	**$1.8 billion**	**$5.9 billion**

Protecting Drinking Water from Harmful Algal Blooms

Harmful algal blooms, or blooms that produce toxic cyanobacteria, have increased dramatically over the past decade, particularly in the eastern United States.[1] These blooms have disrupted drinking water supplies in Ohio and elsewhere and have cost municipalities across the country millions to monitor, treat, and manage.[2]

[1]Herman, Rob, "Toxic Algae Blooms Are on the Rise," Scientific American, September 7, 2016, Available Online: https://blogs.scientificamerican.com/guest-blog/toxic-algae-blooms-are-on-the-rise/

[2] Schechinger, Anne, "The High Cost of Algae Blooms in U.S. Waters: More Than $1 Billion in 10 Years," Environmental Working Group, August 26, 2020, Available Online: https://www.ewg.org/research/high-cost-of-algae-blooms/

University of Toledo Economist Kevin Egan has found algae blooms cost the state of Ohio millions of dollars a year in lost tourism activity since tourism in the state is concentrated in its northern lakefront counties.[3]

In October 2010, the City of Celina, Ohio, estimated it had spent $13 million to install treatment controls and set up toxic algae testing due to widespread algae blooms in Grand Lake St. Marys, the largest inland lake in Ohio and drinking water supply for the City of Celina and Village of St. Marys.[4]

The statewide additional cost to protect water supplies from toxic algae blooms in Lake Erie is estimated to reach $580 million to $2.2 billion per year by midcentury. The estimated cumulative cost for water treatment in the four largest Ohio cities that abut Lake Erie is $37 million to $140 million per year.

This table estimates additional annual costs of protecting water supplies from hazardous algae blooms by midcentury.

Area	Baseline Cost	Best-Case Additional Climate Cost	Likely Additional Climate Cost	Worst-Case Additional Climate Cost
Cleveland	$26 million	$19 million	$34 million	$71 million
Toledo	$19 million	$13 million	$24 million	$51 million
Lorain	$4.4 million	$3.2 million	$5.7 million	$12 million
Sandusky	$1.7 million	$1.2 million	$2.2 million	$4.6 million
Ohio	***$820 million***	***$580 million***	***$1 billion***	***$2.2 billion***

Additional Considerations
While hotter temperatures will likely impact harmful algal bloom growth in Ohio, increased runoff from heavy precipitation will likely also increase the presence of algal blooms. This is particularly true in Ohio due to the significant amount of farmland in the state. This means that the cost estimates in this analysis may underestimate the true cost to treat harmful algal blooms associated with climate change for Ohio municipalities if increased precipitation and runoff leads to more frequent bloom occurrences.

Elevating Roads

Climate change is expected to cause more frequent concentrated, intense storms with heavier rainfall, which will lead to increased flooding. Climate change-driven flooding can lead to traffic disruptions, construction activity delay, and weakening and washing out of soil and culverts that support roads, tunnels, and bridges.[5] Volatility of flood levels may prompt local governments to raise the height of roads and bridges to exceed the base flood elevation in order to ensure public safety in the face of these new climate-driven flooding challenges.

[3] Egan, Kevin, Invited Presentation, Ohio Association of Economists and Political Scientists Annual Conference, Tiffin, Ohio, 2017.
[4] "A compilation of cost data associated with the impacts and control of nutrient pollution." United States Environmental Protection Agency, Reports and Assessments 3 (2015): 1-25.
[5] “Climate Impacts on Transportation,” Environmental Protection Agency, January 19, 2017, Available Online: https://19january2017snapshot.epa.gov/climate-impacts/climate-impacts-transportation_.html

Ohio would need to spend between an estimated $860 million and $1.7 billion per year over 30 years to raise the state's roads above base flood elevation. The following table shows the estimated miles of roads falling below base flood elevation as well as low- and high-end annual cost estimates for raising these roads above base flood elevation in select Ohio cities and statewide.

This table estimates the additional miles of roads below base flood elevation for select Ohio cities and the annual cost to raise them above base flood elevation

Community	Est. Miles of Roads Falling Below Base Flood Elevation	Annual Cost - Low	Annual Cost - High
Dayton	65	$11 million	$23 million
Washington County	13	$2.2 million	$4.4 million
Lima	9	$1.5 million	$3 million
Youngstown	7	$1.3 million	$2.5 million
Marion	6	$1.1 million	$2.1 million
Ohio	***5,000***	***$860 million***	***$1.7 billion***

Road Repair

Roadways in the U.S. are vulnerable to a range of climate impacts. Road damage is caused not only by the wear and tear of vehicle travel, but also by weather impacts. Frequent extreme heat events, higher temperatures, more rapid freeze/thaw cycles, and increased flooding from heavy rains can significantly affect the safety and longevity of major roadways.

We estimated how future changes in temperature, precipitation and freeze-thaw cycles will affect roads in Ohio and in the following Ohio localities: Dayton, Lima, Marion, Washington County, and Youngstown. Low- and high-end repair and rehabilitation costs were estimated for the RCP 4.5[6] future climate scenario. Statewide, Ohio will be facing costs of $170 million to $1 billion per year with a likely value of $410 million per year for road repair related to climate change by midcentury.

[6] RCP 4.5 climate scenario is explained in detail in the general methodology section on page 13 of this testimony and more details on this climate scenario and the models for each climate impact can be found in the full report. https://www.poweracleanfuture.org/s/OH-MunicipalCostsOfClimateChange.pdf

This table shows the estimated annual costs expected to incur by midcentury for road repair and rehabilitation associated with future changes in temperature, precipitation, and freeze–thaw cycles.

Area	Low-Cost	Expected Cost	High-Cost
Dayton	$1.1 million	$2.6 million	$6.5 million
Youngstown	$710,000	$1.7 million	$4.2 million
Washington County	$220,000	$530,000	$1.3 million
Lima	$97,000	$230,000	$570,000
Marion	$86,000	$210,000	$510,000
Ohio	***$170 million***	***$410 million***	***$1 billion***

Cooling Centers in Cities

Cooling centers are air-conditioned public buildings designated as safe locations during times of extreme heat.[7] Cooling centers may be government buildings like libraries or schools, public-oriented buildings like community centers, religious centers, or recreation centers, or even private businesses like coffee shops, malls, and movie theaters. Cooling centers are used as part of a larger heat health warning system, designed to reduce deaths from heat exposure. They are considered a best practice for reducing heat-related deaths.[8,9]

A literature review conducted by the Centers for Disease Control and Prevention (CDC) found that even a few hours spent in a cool environment reduces the risk of vulnerable populations to heat exposure-related illness.[10] Socially vulnerable populations such as the elderly or unemployed are more likely to utilize the services provided by cooling centers.

As temperatures in Ohio continue to rise as a result of climate change, Ohio cities will incur additional costs to support and expand new and existing cooling center capacity during times of extreme heat. Such costs could include staff capacity, supplies such as bottled water, utilities, and implementation of systems for tracking high-risk individuals.[11]

We used a 2015 study by researchers at Carnegie Mellon University of cooling centers in Pittsburgh to estimate current cooling center coverage and project the need for new cooling centers in Ohio cities. In the Carnegie Mellon University study, researchers found the city was operating 19 cooling centers at the time of publication.[12] The study found that Pittsburgh would need 127 cooling centers to provide maximum coverage to Pittsburgh residents, about a 600 percent increase in cooling center coverage.

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[7] Widerynski, Stasia et al, "The Use of Cooling Centers to Prevent Heat-Related Illness: Summary of Evidence and Strategies for Implementation," Climate and Health Technical Report Series, Climate and Health Program, Centers for Disease Control and Prevention, Available Online: https://www.cdc.gov/climateandhealth/docs/UseOfCoolingCenters.pdf
[8] "Heat Alert and Response Systems to Protect Health: Best Practices Guidebook," Government of Canada, Available Online: https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/climate-change-health/heat-alert-response-systems-protect-health-best-practices-guidebook.html#a351
[9] Widerynski, Stasia et al, "The Use of Cooling Centers to Prevent Heat-Related Illness."
[10] Widerynski, Stasia et al, "The Use of Cooling Centers to Prevent Heat-Related Illness."
[11] Berisha, Vjollca et al, "Assessing adaptation strategies for extreme heat: a public health evaluation of cooling centers in Maricopa County, Arizona." Weather, climate, and society 9, no. 1 (2017): 71-80.
[12] Bradford, Kathryn et al, "A heat vulnerability index and adaptation solutions for Pittsburgh, Pennsylvania." Environmental science & technology 49, no. 19 (2015): 11303-11311.

Across Ohio, municipalities will need to expand the number of days that cooling centers are open by an average of 30 days per year due to rising temperature and more frequent days of extreme heat in order to keep services at current level. We estimate this will cumulatively cost Ohio municipalities an additional $52 million per year in additional operating expenses. Local governments will also need to expand the number of existing cooling centers to provide maximum coverage to residents. We estimate that the state of Ohio would need to operate an additional 5,900 cooling centers by midcentury to provide this coverage, which would cost Ohio municipalities an additional $590 million per year to operate.

This table shows the estimated annual costs of operating cooling centers expected by 2050.

City	Additional days of operation	Annual cost for additional days of cooling center operation	New centers needed for full coverage	Full coverage total annual cost
Dayton	37	$480,000	44	$5.5 million
Toledo	31	$480,000	54	$5.4 million
Akron	28	$390,000	48	$3.9 million
Youngstown	29	$180,000	21	$1.8 million
Canton	29	$120,000	14	$1.2 million
Ohio	***33***	***$52 million***	***5,900***	***$590 million***

Stormwater Management

With climate change causing heavier and more frequent precipitation, Ohio municipalities will need to make upgrades to their stormwater management systems to provide the same quality of service as in the past. This could mean adding extra culverts or installing detention or retention basins, rain gardens, infiltration trenches, and other stormwater management techniques to address more frequent and severe rainfall.

The U.S. Environmental Protection Agency (EPA) lists retention basins and other strategies as effective strategies for dealing with changes in rainwater frequency.[13] However, increased frequency and intensity of rain caused by climate change is impacting the design of retention basins all across the world.[14] In particular, a recent study found that the biggest threat for flooding comes not from the total rain during a storm, but the total rain at the heaviest point during the storm.[15] This is because detention and retention basins can adequately drain during the course of a storm but are most threatened for overflow and failure when storming is worst. More heavy rains or more intense weather events could

[13] Clar, Michael L., “Stormwater Best Management Practice Design Guide - Volume 3: Basin Best Management Practices,” National Risk Management Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Cincinnati, OH 45268, September 2004, Available Online: https://cfpub.epa.gov/si/si_public_record_Report.cfm?Lab=NRMRL&dirEntryID=99760
[14] Sanches Fernandes, Luis F. et al, "Influence of climate change on the design of retention basins in northeastern Portugal." Water 10, no. 6 (2018): 743.
[15] Elshorbagy, Amin, Kelsea Lindenas, and Hossein Azinfar. "Risk-based quantification of the impact of climate change on storm water infrastructure." Water Science 32, no. 1 (2018): 102-114.

thus require not only installation of new basins or spillways, but a combination of different stormwater management technologies.

Of the 10 technologies studied, three technologies — rain gardens, infiltration trenches, and sand filters — were effective at reducing runoff at a similar low cost across municipalities. The annual construction, maintenance, and rehabilitation costs expected by midcentury for each strategy in the selected Ohio municipalities are below. The statewide cost to implement a given stormwater management technology is estimated to reach $140 million to $150 million per year by midcentury.

These estimates assume a single technology is used to manage stormwater. Mixing and matching technologies may increase or decrease costs depending on the watershed coverage of the technology within the municipality. These numbers also assumed that construction costs were capitalized over 30 years.

This table shows the estimated annual costs for stormwater management infrastructure for select Ohio municipalities expected by midcentury.

Municipality	Rain Gardens	Infiltration Trenches	Sand Filters
Toledo	$10 million	$10 million	$11 million
Youngstown	$3 million	$3 million	$3.2 million
Lima	$1.5 million	$1.4 million	$1.5 million
Marion	$1.3 million	$1.7 million	$1.3 million
Marietta	$590,000	$570,000	$620,000
Ohio	***$140 million***	***$140 million***	***$150 million***

Increased Electricity Costs for City Operations

Once installed, air conditioning systems require recurring costs to operate and maintain. Hotter days and longer summers mean that new and existing units will be used on a more consistent basis. In addition to creating more cooling capacity, Ohio municipalities must also consider higher electricity costs associated with increased air conditioning usage for all publicly owned and operated buildings.

For example, according to the Center for Climate Integrity and Resilient Analytics's 2021 analysis, Ohio schools will have to spend an additional $56 million annually to operate and maintain new air conditioning systems, once installed.[16] In addition to schools, other public buildings will also be running their air conditioning systems more regularly.

Future utility costs related to increased air conditioning usage in public buildings were estimated for five municipalities in Ohio: Marion, Lima, Toledo, Marietta, and Youngstown.

Toledo will incur the highest increase in spending with additional cooling costs estimated between $44,000 and $670,000 per year by midcentury. Cumulatively, these cities are facing between $75,000 and $1.1 million per year in additional utility costs in order to cool public buildings. Statewide, Ohio can expect increased cooling costs to run from a total of $5.4 million to $78 million per year.

[16] LeRoy, Sverre et al, "Hotter Days, Higher Costs."

The table reflects the annual increase in utility spending by cities in Ohio by 2050, due to additional air conditioning usage in public buildings.

City	Current Estimated Annual Utility Budget	Low-End Increase	High-End Increase
Toledo	$8.8 million	$44,000	$670,000
Youngstown	$2.8 million	$14,000	$210,000
Lima	$1.7 million	$8,000	$130,000
Marion	$940,000	$5,000	$71,000
Marietta	$220,000	$1,000	$16,000
Ohio	***$1 billion***	***$5.4 million***	***$79 million***

Storm Recovery and Adaptation to Heavy Precipitation

As climate change increases the frequency and severity of storms and heavy precipitation events, Ohioans will be forced to confront increased costs for storm recovery, clean-up, and stormwater management, as well as costs to adapt critical infrastructure to high incidence flooding events. According to the EPA, average annual precipitation in the Midwest has increased by 5 to 10 percent over the last 50 years.[17]

Particularly, the frequency and intensity of heavy precipitation events are increasing. According to the Great Lakes Integrated Sciences and Assessments team (GLISA) at the University of Michigan, total annual precipitation has grown by 14 percent in the Great Lakes region since 1951 and the amount of rain falling in the heaviest one percent of storms in the region has grown by 35 percent.[18] The team also projects average annual precipitation will grow by two to six inches by the end of the 21st century and that higher levels of water vapor in the air combined with rising temperatures will create conditions for more intense storms in the future.

Statewide costs associated with recovery and clean up from increased frequency and severity of extreme weather events are expected to reach $35 million to $78 million per year by midcentury. Below are the midcentury estimates for annual costs associated with increased frequency of four distinct extreme weather events. The range of estimates is mainly driven by the range of historical estimates of costs associated with extreme weather events.

[17] “What Climate Change Means for Ohio,” United States Environmental Protection Agency, August 2016, Available Online: https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-oh.pdf
[18] “Climate Changes in the Great Lakes region and Dayton, Ohio,” Great Lakes Integrated Sciences and Assessments: A NOAA RISA Team, University of Michigan, Available Online: https://glisa.umich.edu/wp-content/uploads/2021/03/Dayton-Climate-Summary.pdf

This table reflects the estimated statewide annual costs in Ohio by 2050 associated with an increase in severe weather events.

Event	Low	High
Drought	$21 million	$44 million
Hurricane Winds	$11 million	$28 million
Severe Storm	$1.5 million	$3.4 million
Flooding	$1.3 million	$3 million
Total	***$35 million***	***$78 million***

Protecting Power Lines with Increased Storm Severity

With increased storm severity and frequency, Ohio communities will face increased maintenance costs to protect power lines from damaged trees.

Statewide municipal power costs for pruning of trees are estimated to increase by about $140,000 per year by midcentury to adapt to increases in storms, and up to $18 million per year if municipal utilities who have not chosen to adopt full enhanced pruning programs begin the programs in response to the threat of climate change. Our analysis shows the increased annual costs of pruning trees for select municipal power companies by comparing their relative customer base to statewide customer base. It also includes cost estimates for implementing an enhanced pruning cost program, should local officials see that as an appropriate response to the increased risk of storms resulting from climate change. These cost estimates do not include the cost to consumers in investor-owned utility territory, which makes up the vast majority of electricity consumers in Ohio.

This table shows the estimated annual costs incurred by midcentury for pruning for select municipal power distributors.

Distributor	Additional Cost	Full Enhanced Pruning Cost
Cleveland	$29,000	$3.9 million
Cuyahoga Falls	$8,700	$1.2 million
Wadsworth	$4,700	$630,000
Piqua	$3,900	$520,000
Oberlin	$1,100	$150,000
Ohio	***$140,000***	***$18 million***

Installing Air Conditioning in Ohio's Schools

The threshold at which schools typically install air conditioning is 32 school days above 80 degrees Fahrenheit, according to a 2021 analysis from the Center for Climate Integrity and Resilient Analytics, which examined engineering protocols, peer-reviewed studies on the relationship between heat and learning, and actual practice in school systems across the country.[19] The report found that by 2025, school districts across Ohio are expected to experience between 11-15 additional days above 80 degrees while still in session compared to a baseline of 25-31 days in 1970.[20]

Air conditioning installation costs were estimated for urban, high poverty school districts in Ohio, which include Akron, Cincinnati, Cleveland, Columbus, Dayton, and Toledo. We estimated the upfront cost to install new air conditioning in urban, very high poverty districts, assuming those districts lack air conditioning at the same rates as Columbus City Schools. Assuming these are paid over a 30-year window like many capital investments and that installation will begin on or before 2050, the total cost by midcentury would be $1.4 to $6.8 million per year.

This table reflects the estimated annual payments for new air conditioning system installation needed in urban, very high poverty districts by midcentury.

District	Low	High
Columbus	$12 million	$60 million
Cleveland	$7.3 million	$36 million
Cincinnati	$7.1 million	$35 million
Toledo	$6.2 million	$31 million
Akron	$4.9 million	$25 million
Dayton	$3 million	$15 million
All Urban Very High Poverty Districts	***$41 million***	***$200 million***

Cool Roof Construction for Public Sector

Cool roofs reduce the need for air conditioning, and in some cases serve as an alternative to air conditioning systems. They are designed to reduce the temperature within a building by installing material that reflects more sunlight, decreasing the need to install or run expensive air conditioning systems.[21] For example, the City of Cincinnati has already started to encourage the use of cool roofs with the 2018 Green Cincinnati Plan recommending deployment of cool roofs on new construction in the city.[22]

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[19] LeRoy, Sverre et al, "Hotter Days, Higher Costs: The Cooling Crisis in America's Classrooms," The Center for Climate Integrity, Resilient Analytics, May 2021, Available Online: https://coolingcrisis.org/uploads/media/HotterDaysHigherCosts-CCI-May2021.pdf

[20] "Ohio," Hotter Days, Higher Costs: The Cooling Crisis in America's Classrooms, Center for Climate Integrity, Available online: https://www.coolingcrisis.org/uploads/media/CCI-StateReport-Ohio.pdf

[21] "Cool Roofs," Energy Saver, Available Online: https://www.energy.gov/energysaver/cool-roofs

[22] "Heat Island Community Actions Database," United States Environmental Protection Agency, January 8, 2022, Available Online: https://www.epa.gov/heatislands/heat-island-community-actions-database

Ohio is unlikely to require all new construction to have cool roofing. But if new roofing accounts for just one percent of new public sector construction by midcentury, the additional cost to install cool roofing statewide would be roughly $4.6 million per year in 2021 dollars.

This table shows the estimated costs of cool roofing per year per city if 1 percent of new construction includes cool roofing by 2050.

City	Potential annual cost of cool roofing construction
Toledo	$110,000
Youngstown	$26,000
Marion	$14,000
Lima	$14,000
Marietta	$5,200
Ohio	***$4.6 million***

METHODOLOGY

The cost estimates in this testimony are derived using different cost models for each climate impact outlined. Please reference the full “The Bill is Coming Due” report for information on the methodology for each monetized climate impact.

Unless otherwise noted, all estimates in the report’s analysis are based on the RCP 4.5 scenario.[23] RCP stands for Representative Concentration Pathway and describes different future scenarios based on the concentration of greenhouse gas emissions in the atmosphere. Described by the International Panel on Climate Change as an “intermediate” projection,[24] the RCP 4.5 climate scenario predicts that temperature will rise between 2 to 3 degrees Celsius before 2100 assuming a range of technologies and strategies for reducing greenhouse gas emissions are employed.

[23] National Oceanic and Atmospheric Administration, “Climate Model: Temperature Change (RCP 4.5) - 2006 - 2100” https://sos.noaa.gov/catalog/datasets/climate-model-temperature-change-rcp-45-2006-2100/

[24] IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 151 pp. https://ar5-syr.ipcc.ch/topic_futurechanges.php