

June 2023

# Paying the Price: Taxpayers Footing the Bill for Increasing Costs of Climate Change



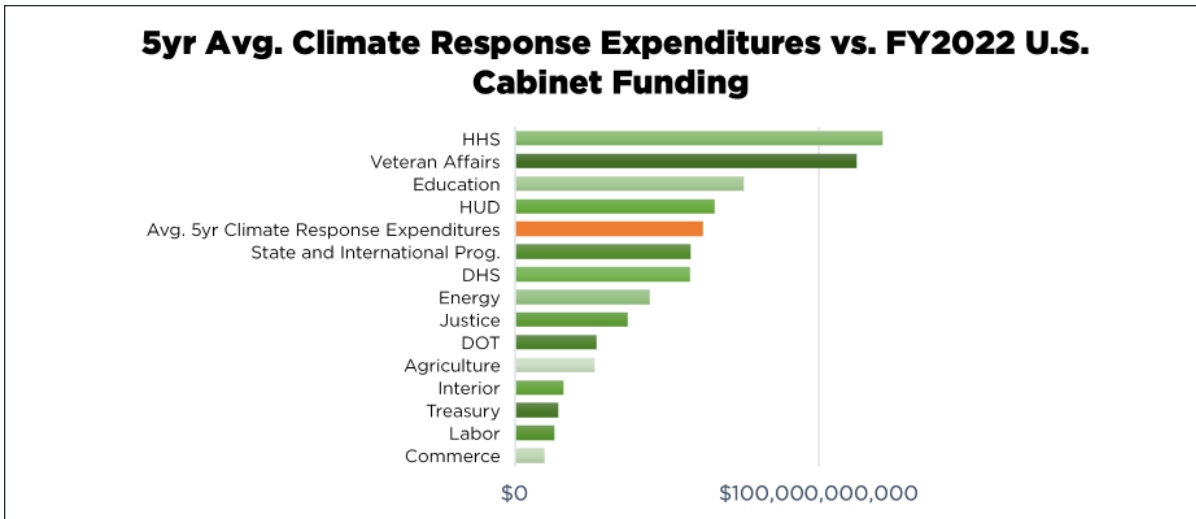
2022 Yellowstone National Park | Jim Peaco, NPS

## Executive Summary

Whether we realize it or not, we are all paying for the impacts of climate change. These costs are large and growing and have effectively become a tax on the public. While climate change did not create wildfires, hurricanes, floods, or droughts, it is making extreme weather more frequent, destructive, and costly. Presidential major disaster declarations, which trigger funding of emergency and recovery efforts led primarily by the Federal Emergency Management Agency (FEMA), tripled from 200 in the 1960s to 600 in the first decade of this century. Taxpayers spent more than \$120 billion responding to 2017 disasters.

To put the high costs of federal disaster spending into perspective, 2017 disaster spending exceeded the annual discretionary budget of every federal agency except the Pentagon that year. A federal agency funded at an amount equal to the 2017 disaster spending would have received

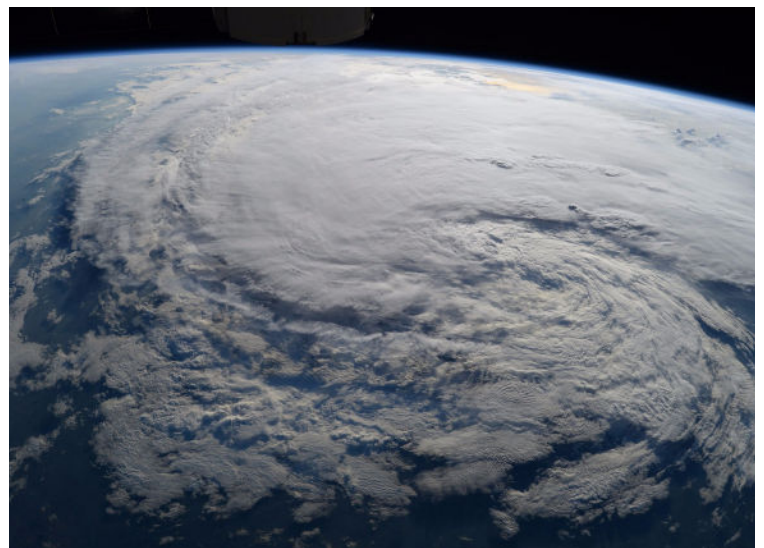
more funding than the combined fiscal year appropriations for the Departments of Commerce, Energy, Interior, Labor, Transportation, Treasury, as well as the Environmental Protection Agency and the U.S. Army Corps Engineers.



This report is intended to be an introduction to the scale and types of costs federal taxpayers have borne, and will continue to bear, in the absence of effective policy action on climate. It catalogs federal programs addressing disaster response, federal flood insurance, infrastructure, federal crop insurance and agricultural disaster aid, natural security and healthcare – all impacted by the rising taxpayer costs of climate change. Given the challenge in calculating specific costs attributed to climate change, this report is by no means a comprehensive inventory of every climate cost we pay as taxpayers each year. In fact, the data, transparency, and tools necessary to make this calculation do not yet exist.

Federal programs providing disaster assistance have become overwhelmed by the relentless increase in the scope and costs of climate-induced disasters around the country and many, if not most, federal programs are impacted in some way by climate change – in addition to those aimed at adapting to and mitigating climate change, but they are beyond the scope of this preliminary analysis and this report focuses on the largest federal programs that directly respond to the effects of climate change.

The experience of the National Flood Insurance Program (NFIP) provides a good illustration of the soaring cost to taxpayers of climate-induced disasters. NFIP provides subsidized federal flood insurance and generates roughly \$3.2 billion in premium revenue annually and the program can borrow from the U.S. Treasury when payouts exceed premiums.

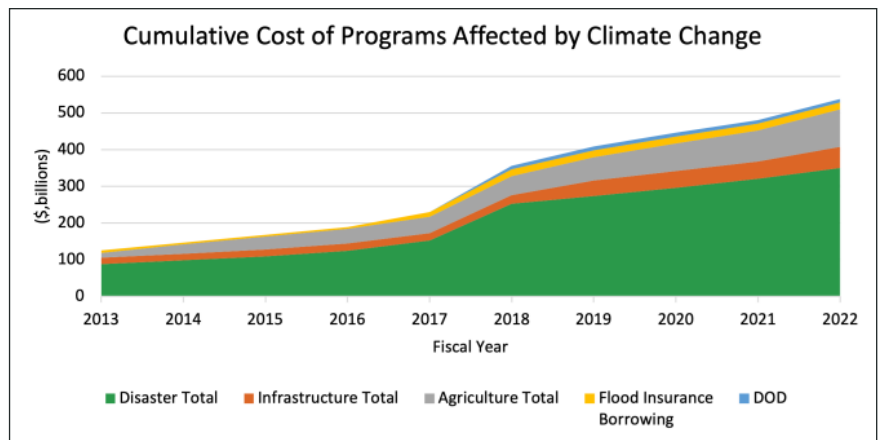


Hurricane Harvey Aug. 28, 2017 | NASA Goddard Space Flight Center, Flickr

Prior to 2005, NFIP could not borrow more than \$1.5 billion, but three storms that year, predominantly Hurricanes Katrina, Rita, and Wilma, forced the program to borrow nearly \$18 billion. Superstorm Sandy in 2012 led to \$6 billion in additional borrowing, and several large rain events in 2016 added another \$3.7 billion. This was eclipsed in 2017, after Hurricanes Harvey, Irma, and Maria forced NFIP to borrow another \$10.5 billion.

Flood insurance is far from the government’s only exposure to growing climate liabilities. Expenditures on federal crop insurance covering droughts, flooding, and other natural disasters now cost more than \$8 billion per year on average and are expected to increase by billions of dollars each year. From 2017 to 2021, federal taxpayers spent an average of \$2.9 billion per year on wildfire suppression, more than double the amount spent from 2007 to 2011. Increasingly frequent and deadly natural disasters, as well as other long-term shifts in the climate like melting permafrost and sustained high summer temperatures, are also leaving taxpayers on the hook for billions in damages to public and private infrastructure – including the \$2.6 billion taxpayers spent just last year on emergency highway repairs.

The Department of Defense (DOD) owns a real estate portfolio worth roughly \$1.2 trillion, including many coastal bases vulnerable to sea level rise. Four out of the five Navy drydocks in Norfolk, Virginia, flood from extreme high tide and storms every year, for example. In 2018, Hurricane Florence destroyed Marine Corps facilities in North Carolina leaving a \$3.6 billion price tag in its wake. In 2018, Hurricane Michael destroyed 99% of Tyndall Air Force in the Florida panhandle costing taxpayers \$4.7 billion in repairs that are still not complete. Beyond the billions of defense dollars spent responding to the physical impact of climate change, the Pentagon under multiple presidential administrations has cited climate change as a national security issue, impacting missions and operational plans as food scarcity and other climate-related humanitarian crises upset stability in regions around the world.



As a budget watchdog, we believe taxpayers should know where and how their tax dollars are being spent. While it is very difficult to track all climate-related spending, we know climate spending is not being adequately accounted for in the federal budget. Congress and the executive branch must take steps to not only document these costs more accurately, but also adequately budget for climate-related costs that continue to create enormous future liabilities for taxpayers.

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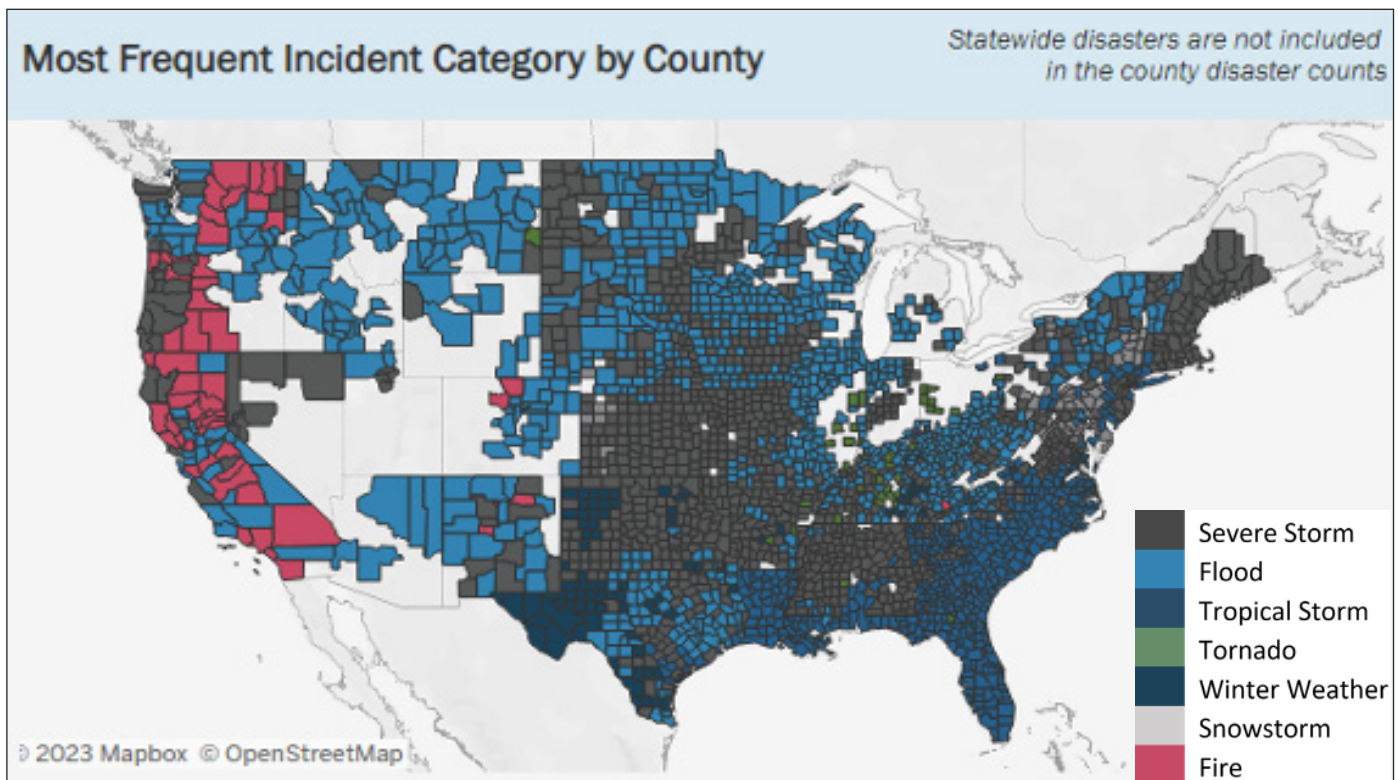
## Weather-Related Disaster Response

Perhaps the most easily recognizable hallmark of climate change is the increased intensity and frequency of natural disasters. While disasters have affected this country since the beginning of the republic, the federal government has taken a more central role in the recovery from disasters, particularly in the last several decades. As the overall costs of more frequent billion-dollar disasters have increased, the federal government is assuming an increasing proportion of the recovery costs as municipalities and states are overwhelmed.

According to FEMA, between 2013 and 2022<sup>1</sup> there were a total of 510 climate-related major natural disaster declarations.<sup>2</sup> The National Oceanic and Atmospheric Administration (NOAA) reports these disasters are increasing

in number and are becoming more costly, with a record number of billion-dollar weather-related disasters occurring in 2020.<sup>3</sup> As the number and severity of disasters increase, states, communities, and individuals increasingly rely on federal assistance to manage the costs of recovery.

The federal government's disaster response is primarily managed by five agencies: FEMA, Department of Housing and Urban Development (HUD) through Community Development Block Grants – Disaster Recovery (CDBG-DR), the Small Business Administration (SBA) through Disaster Loans, and the Department of the Interior (DOI) and United States Forest Service (USFS) which manage wildfire response.



Incidents exclude non-climate-related disasters like chemicals spill and explosions. | FEMA Disaster Declaration for States and Counties by incident category, 2013-2022

## Federal Emergency Management Agency

FEMA is the federal agency which receives the largest amount of federal funds for weather-related disaster response, the majority of which is provided through the Disaster Relief Fund (DRF). FEMA describes the DRF as “an appropriation against which FEMA can direct, coordinate, manage, and fund eligible response and recovery efforts associated with domestic major disasters and emergencies that overwhelm State resources pursuant to the Robert T. Stafford Disaster Relief and Emergency Assistance Act.”<sup>4</sup> The DRF is activated when a state governor requests a major disaster declaration and the president declares a disaster, which makes state, tribal, territorial, and local governments eligible for a variety of assistance programs funded under the DRF.<sup>5</sup>

### SUPER STORM SANDY

In late October 2012, after moving through the Caribbean as a Category 3 hurricane, a diminished but still powerful Superstorm Sandy made landfall near Atlantic City, New Jersey, as a post-tropical cyclone.<sup>6</sup> According to NOAA, 24 U.S. states were ultimately impacted by the storm causing \$65 billion in damages and taking 160 lives.<sup>7</sup> Sandy’s most significant impacts were in heavily populated areas of New Jersey, New York, and Connecticut. In the days following landfall, 17,000 federal personnel were deployed to affected areas, \$1.2 billion in housing assistance was delivered to survivors, \$800 million went towards debris removal and infrastructure restoration, and \$4.4 billion in flood insurance payments were paid to policy holders. Additionally, FEMA provided 20 million liters of water, 16 million meals, and 1.7 million blankets, among other essentials.<sup>8</sup>

The frequency of billion-dollar disasters is increasing. Between 1980 and 2007, only one year (1998) saw the occurrence of more than seven separate weather-related disasters with a price tag over \$1 billion. Since 2007, there has only been one year where there were fewer than seven such events, including a record 22 billion-dollar disasters in 2020 alone.<sup>9</sup> There are immediate costs of recovering from a weather event, and each of these disasters creates long-term obligations for taxpayers, as FEMA and other agencies assist months or even years after the event. In FY21, for example, FEMA obligated \$12.6 billion of DRF funding to past disasters.<sup>10</sup>

These long-term obligations are adding up for taxpayers. Annual appropriations to the DRF have increased from just over \$7 billion in FY13 to almost \$19 billion in FY22, totaling \$109 billion during that decade.<sup>11</sup> In addition to an increase in annual appropriations, Congress has had to appropriate supplemental funds to refill DRF coffers. After adjusting for COVID-19 emergency spending, these supplemental appropriations totaled more than \$48 billion over the past decade.<sup>12</sup> The DRF is expected to exhaust its currently available balance by August 2023, absent additional supplemental appropriations from Congress.<sup>13</sup>



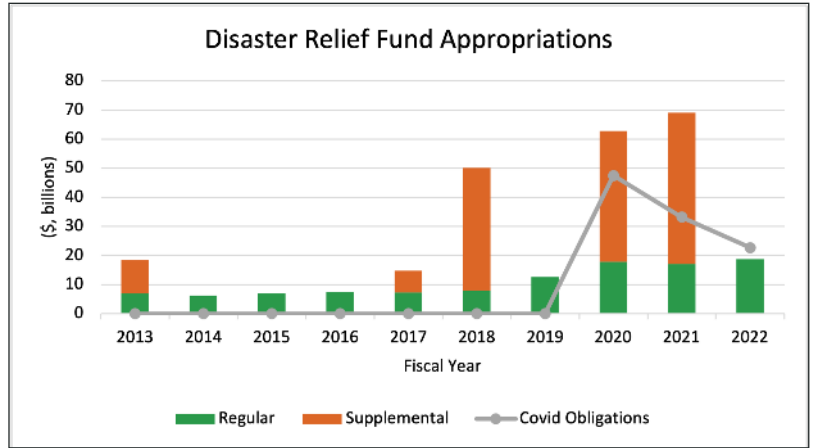
Rockaway, NY | Jocelyn Augustino, FEMA

**Mitigation**

While federal spending to mitigate the worst impacts of climate change could save taxpayers money in the long run, these expenditures increase costs for Americans taxpayers due to climate change. And even as Congress appropriates increasing amounts to these programs, they are being overwhelmed.

Between FY97 and FY19, FEMA received \$1.8 billion for what became known as Pre-Disaster Mitigation (PDM) grants.<sup>14</sup> This continued until the Disaster Recovery Reform Act of 2018, which allowed the President to set aside 6% of appropriations to the DRF each year for a new mitigation program called Building Resilient Infrastructure and Communities (BRIC).

BRIC provides grants (with a 75% federal cost share) and non-financial technical assistance for hazard mitigation and disaster resilience projects. According to the Congressional Research Service (CRS), BRIC received \$500 million in FY20, \$1 billion in FY21, and \$2.3 billion in FY22.<sup>15</sup> However, the program received \$3.6 billion worth of requests in FY20, \$4.2 billion in FY21, and \$4.6 billion in FY22.<sup>16</sup> In addition to funding BRIC, taxpayers spent \$387 million on pre-disaster mitigation congressionally directed spending in FY22 and FY23.<sup>17,18</sup>

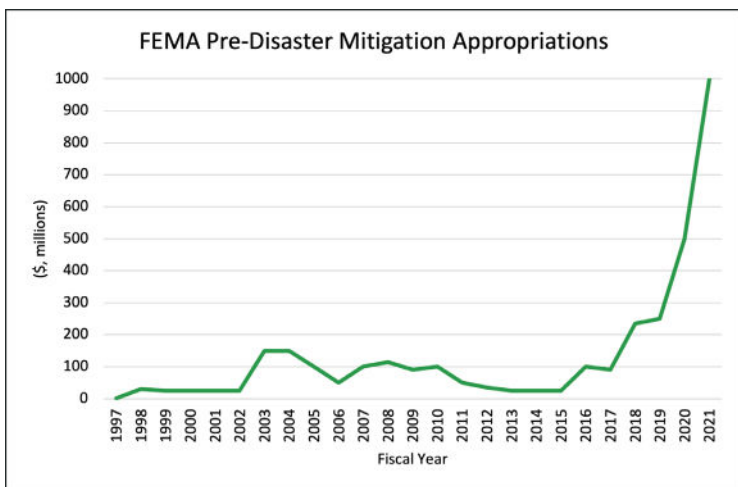


DRF appropriations include funds available for COVID-19 response. Spending on COVID-19 is the grey line.

**Department of Housing and Urban Development**

HUD manages the CDBG-DR program, which provides funding to states, local governments, and certain nonprofits for disaster recovery and resilience projects. CDBG-DR is not a permanently authorized program; it is authorized through various post-disaster supplemental appropriations.<sup>19</sup> This is an important distinction from the longstanding regular CDBG, which primarily assists with housing, infrastructure, and community development needs without special deference to issues arising from natural disasters. CDBG-DR funding is often used for long-term rebuilding efforts, rather than short-term relief costs covered by FEMA and SBA.<sup>20</sup> Lacking statutory authorization, CDBG-DR is affected by the whims of each Congress’s authorizing language and the then-current Administration’s implementing Federal Register notices.

CDBG-DR was first created in response to Hurricane Andrew and other disasters in 1992.<sup>21</sup> As climate change makes more populated areas susceptible to various forms of natural disasters, this program may be employed more often than it has in the past. Between FY13 and FY22, this program received supplemental resources in seven of the ten years. Combined,



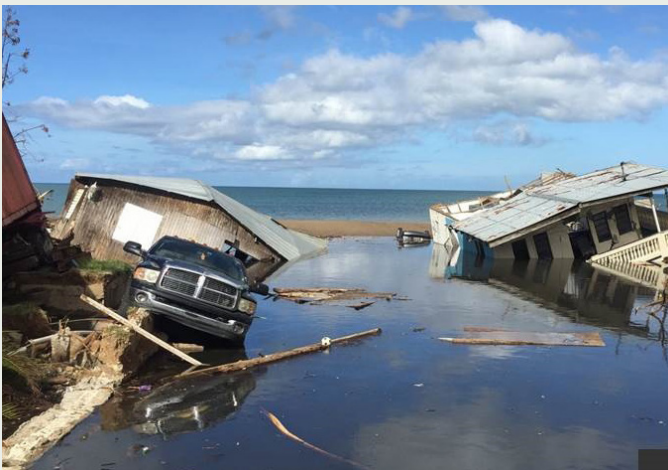
these appropriations have totaled approximately \$65.5 billion over the last decade.

HUD also offers pre-disaster mitigation assistance through Community Development Block Grant Mitigation (CDBG-MIT) grants, which are only available to CDBG-DR grantees. The funds, included within the CDBG-DR total appropriations highlighted above, are also directed through supplemental appropriations and have only been issued twice: in FY18 and FY19. In these years, a combined sum of \$12 billion was appropriated for mitigation, with the Secretary given discretionary use of leftover CDBG-DR supplemental appropriations – later determined to be \$4.1 billion – for additional mitigation grants.

## Small Business Administration

The primary way SBA responds to weather-related disasters is the Disaster Loan Program, which provides low-interest loans to affected businesses, homeowners, and renters. The loans can be used to repair or replace damaged or destroyed property, as well as to cover working capital needs and other expenses related to the disaster.<sup>24</sup> There are four main types of disaster loans made available by SBA: Personal Property Disaster Loans, Real Property Disaster Loans, Business Physical Disaster Loans, and Economic Injury Disaster Loans.

The SBA Disaster Loan Program receives funding from both annual and supplemental appropriations. Over the last decade, SBA disaster

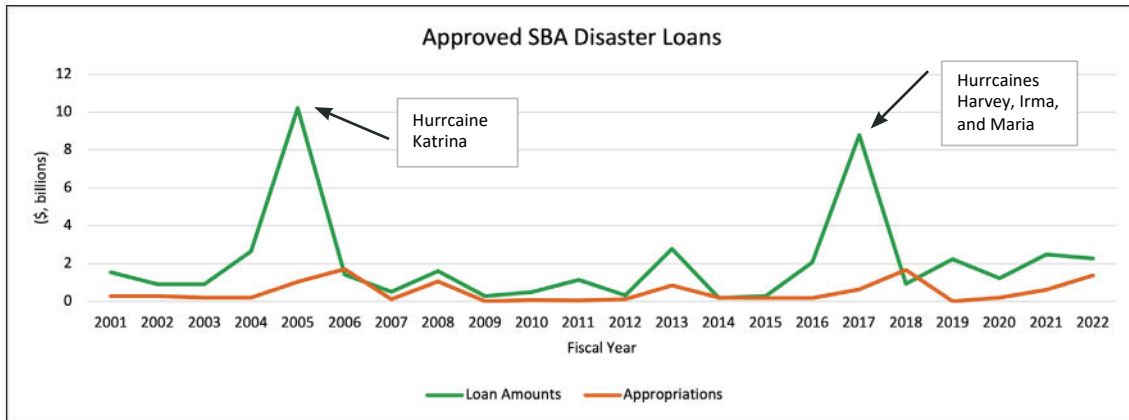


L: Puerto Rico Sept 20, 2017 | National Oceanic and Atmospheric Administration, WikiMedia  
R: Coast Guard Delivers FEMA Food, Water to Jayuya, Puerto Rico | Coast Guard News, Flickr

## AFTERMATH OF 2017 HURRICANE SEASON IN PUERTO RICO

In 2017, Puerto Rico was hit by Category 5 hurricane Irma on September 7, and then again two weeks later by Category 4 hurricane Maria. The quick succession of major storms crippled the island's infrastructure, with its electrical grid, water treatment system, and telephone infrastructure all rendered inoperable.<sup>22</sup> FEMA delivered aid on a scale which was made uniquely difficult by Puerto Rico's island geography and distance from the U.S. mainland. Once more immediate needs were met, Congress appropriated and HUD awarded a block grant through the CDBG-DR worth more than \$20 billion to the government to rebuild housing and other critical needs.<sup>23</sup>





Appropriations include regular and supplemental. The chart does not reflect the \$105.6 million in supplemental appropriations specifically allocated for COVID-19 through P.L. 116-136, P.L. 116-139, P.L. 116-260, and P.L. 117-2.

assistance received \$1.5 billion in regular appropriations and an additional \$4.6 billion through supplemental appropriations for natural disaster related loans. (Congress also provided \$105.6 billion to SBA for COVID-19 related loans.)

This program, like other federal disaster relief programs, has seen a dramatic increase in demand, and it will certainly be tapped in the future to respond to the growing costs and frequency of extreme weather events. And while these are loans and not grants (they are meant to be repaid), these are generally high-risk loans made at highly subsidized rates, extending the full cost of these disasters out over years.

### Wildfire Suppression

Like other natural disasters, climate change has increased the number and intensity of wildfires in the United States. DOI and USFS manage Wildfire Management Accounts responsible for wildfire suppression. Unlike a hurricane, wildfires can be actively mitigated by human actions through firefighting and other preventative measures. Because of this, suppression has consumed most of the USFS budget for most of its history. For more information on the history of these programs, please see Taxpayers for Common Sense’s recent report *Clearing the Smoke*.<sup>25</sup>

The frequency and intensity of wildfires continue to grow. According to NOAA, the number of billion-dollar wildfire events has doubled from an average of 0.4 per year in the 1990s, with an annual cost of \$1.3 billion, to 0.8 per year over the last 10 years, with an annual cost of \$9.7 billion.<sup>26</sup> According to TCS’s previous reporting, wildfire suppression currently sits at approximately half of the USFS budget, at \$4.7 billion. DOI also receives wildfire management funding, although at a smaller scale; FY23 appropriations totaled \$1.8 billion. Additionally, wildfire-related programs received \$20 billion in the Infrastructure Investment and Jobs Act and \$10.2 billion in the Inflation Reduction Act, although much of this is for mitigation activities.<sup>27</sup>

### Flood Insurance

The federal share of disaster relief costs has steadily risen, thanks in part to the NFIP. According to FEMA, flooding is “the most common and the most expensive natural disaster in the United States.”<sup>28</sup> NFIP provides federally backed insurance for homeowners living in areas prone to flooding. In 2021, FEMA estimated NFIP provided nearly \$1.3 trillion of flood coverage for over five million policyholders.<sup>29</sup> This understates the number of homeowners and businesses vulnerable to flooding, as flooding data indicate more property owners should have flood



Cedar Rapids, IA | U.S. Geological Society, Flickr

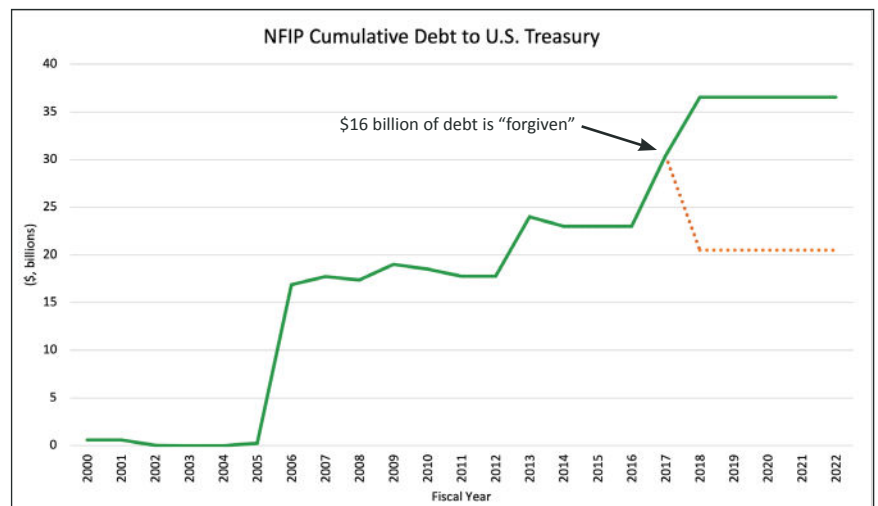
insurance through NFIP.<sup>30</sup> The program — and its taxpayer costs — are especially vulnerable to climate risks given the increase in major flooding events due to hurricanes, snowstorms, and excessive rainfall.

As the Government Accountability Office (GAO) explained in its 2023 report:<sup>31</sup>

“NFIP has experienced significant challenges because FEMA [the Federal Emergency Management Agency] is tasked with two competing goals—keeping flood insurance affordable and keeping the program fiscally solvent. Emphasizing affordability has led to premium rates that do not reflect the full risk of loss. These rates also produce insufficient premiums to pay for claims. In turn, *this has transferred some of the financial burden of flood risk from individual property owners to taxpayers.* Specifically, NFIP has had to borrow from the Department of the Treasury to pay claims from major natural disasters.”<sup>32</sup> *Emphasis added.*

NFIP loses money because flood insurance claims far outstrip revenue from premiums. As flooding worsens, the program goes deeper into the red. In 2005, after Hurricanes Katrina, Rita, and Wilma, NFIP had to “borrow” nearly \$18 billion from taxpayers to pay out claims. Superstorm Sandy in 2012 led to \$6 billion in additional borrowing, and Hurricane Matthew and several large rain events in 2016 led to another \$7.4 billion. This trend continued after the 2017 storm events of Harvey, Irma, and Maria, which led NFIP to borrow another \$6.1 billion. At that point the program was poised to owe \$36 billion in outstanding debt owed to the U.S. Treasury – in excess of the program’s roughly \$30.5 billion borrowing limit. Instead of increasing the borrowing limit and adopting reforms to improve the program’s financial situation, Congress simply forgave \$16 billion of debt.<sup>33</sup>

GAO includes NFIP on its list of “High-Risk” federal programs, most recently in 2023.<sup>34</sup> According to GAO, “As of September 2022, FEMA’s debt was \$20.5 billion despite Congress having canceled \$16 billion in debt in October 2017. Without reforms, NFIP’s financial condition will likely continue to worsen.”<sup>35</sup> In 2021, FEMA introduced some rate-setting reforms in NFIP reforms, but more is necessary to reduce risks to taxpayers, homeowners, and communities.





Old Ellicott CityMD | Austin Kirk, Flickr

## 1-IN-100 IS MORE LIKELY THAN YOU EXPECT

The term “100-year flood” is used to describe a flood that statistically has a one percent chance of occurring in any given year – not that it will only happen once in every 100 years. Because these definitions are calculated using historic data, shifts in long term weather patterns or changes to the physical environment can alter the frequency of flooding. According to OMB, “by definition, consecutive or close in time years with 1-in-20 or 1-in-50 losses are rare, but historically, high risk years have caused the NFIP to face shortfalls.”

One example of this is Ellicott City, Maryland, which experienced two “1-in-1,000-year” rain events in just two years. In July 2016, the town received nearly 6 inches of rainfall in a 2-hour period – 5.5 inches of which fell in just 90 minutes – in a storm that was dubbed a one-in-1,000-year event by the National Weather Service.<sup>36</sup> In May 2018, another flash flood hit Ellicott City with 6.5 inches of rainfall over a 3-hour period.<sup>37</sup> According to a report by the National Academies of Sciences, Engineering, and Medicine, many residents and business owners in Ellicott City do not have flood insurance.<sup>38</sup> Since the floods, Howard County has undergone multiple flood prevention projects with local, state, and federal funding, including a \$75 million low interest federal loan from the Environmental Protection Agency.<sup>39,40</sup>

NFIP is also a climate liability for taxpayers because artificially low flood insurance premiums encourage people to stay in flood-prone areas. An Office of Management and Budget (OMB) report found increased frequency and risk of natural disasters might encourage residents to leave risk prone areas, but programs like NFIP encourage building and rebuilding in disaster-prone areas. By not accurately conveying risk, the program effectively subsidizes risk.<sup>41</sup>

FEMA has developed and is rolling out a new rating system to better reflect the true risk policyholders face to better set premiums. This is good policy because it will potentially reduce future “borrowing” from taxpayers, and helps incorporate climate costs into agency budgeting. According to agency modeling, average potential losses will be roughly \$3.3 billion per year in today’s environment. When different climate scenarios are incorporated, by 2050 these

potential losses increase to \$3.5 billion per year under a lower climate change scenario and \$3.7 billion annually under a higher climate change scenario.<sup>42</sup>

FEMA also estimates losses in the increasingly likely 1-in-20-year and 1-in-50-year flooding scenarios — where annual loss levels are larger than

95% and 98% of past loss years, respectively. Typical average annual losses are \$10.3 billion in 1-in-20-year scenarios and \$17.2 billion in 1-in-50-year scenarios, a large increase from the original baseline of \$3.3 billion, and these costs are only expected to increase due to climate change.

*“In the higher [climate change] scenario late century, the current portfolio of properties has a 1-in-50-year loss event equal to \$20 billion larger than an average annual loss—a difference which is only \$14 billion without climate change. Under the risk assumptions, by definition, consecutive or close in time years with 1-in-20 or 1-in-50 losses are rare, but historically, high risk years have caused the NFIP to face shortfalls. If these actuarially rare scenarios are to occur again with climate-change increased intensity storms, the Federal Government will face higher losses, should it need to subsidize NFIP.”*

*- Office of Management and Budget*

## Infrastructure

The effects of climate change — increasingly frequent and deadly natural disasters, among other changing weather patterns — can significantly damage infrastructure. Taxpayers pay for these damages through directed appropriations and grant programs to repair, rebuild, and fortify existing infrastructure, as well as the additional costs of building new infrastructure to be more resilient to climate change.

## Transportation

The U.S. has a vast network of transportation systems — including 4.2 million miles of roads, 137,000 miles of freight railroads, 20,000 miles of passenger railroads, 18,000 miles of public transit, 45,000 maritime vessels, and 20,000 airports — that are susceptible to damages from climate change.<sup>43</sup> Not only can extreme weather events significantly damage transportation

infrastructure, but shifting long-term weather patterns, such as temperature increases and changes in precipitation, can also undermine its structural integrity. And while not all this transportation infrastructure is federally constructed or maintained, the federal government is often a spending backstop after major disasters.

The impacts of these weather fluctuations differ across the country. Warmer temperatures in Alaska are thawing near-surface permafrost, which causes severe damages to both above- and below-ground infrastructure like roads, railroads, and pipelines.<sup>44</sup> Sea level rise makes coastal infrastructure — including 27% of major roads, 9% of rail lines, and 72% of ports built on land at or below 4 feet in elevation — more susceptible to flooding events.<sup>45</sup> And sustained temperatures above 90°F leave 5.8 million miles

of paved roads susceptible to increased rutting, cracking, and buckling, according to the U.S. Global Change Research Program, a government program to coordinate research and investments across federal agencies.

There are a variety of federal programs that address these damages from climate change. The Federal Highway Administration’s Emergency Relief Program (FHWA-ER) provides cost share grants for the repair or reconstruction of federal-aid highways and roads on federal lands that have been damaged by natural disasters or other external causes.<sup>46</sup> In addition to a permanent authorization of \$100 million per year in contract authority from the Highway Trust Fund, taxpayers have spent more than \$20 billion on the program since 1998, much of which has been directed at recovery from natural disasters.<sup>47</sup> FHWA-ER received \$2.6 billion in FY22, the second largest supplemental appropriation for the program since FY06.

Federal taxpayers also pay for the impacts of climate change on transportation infrastructure through ad-hoc disaster aid. In the past decade, the Federal Transit Administration (FTA) provided \$10.9 billion through its Public Transportation Emergency Relief Program to

protect, repair, or replace damages from declared emergencies or major disasters, most of which was in response to Superstorm Sandy.<sup>48</sup> The Federal Aviation Administration (FAA) received \$259.2 million in ad-hoc disaster assistance between FY13-FY22.<sup>49</sup>

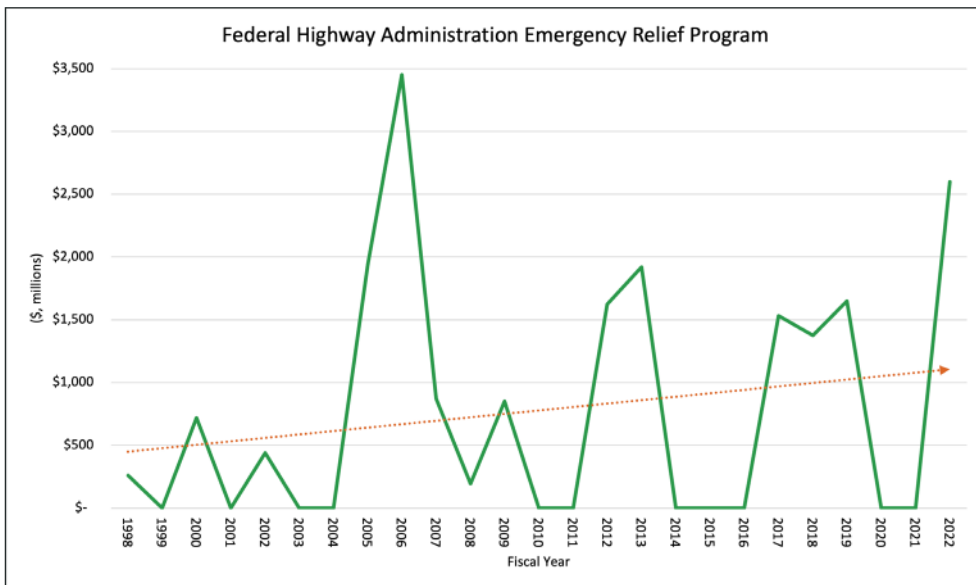
The costs of climate change to transportation infrastructure are only expected to increase. For example, projected increases in precipitation and sea level rise are anticipated to threaten between 2,500 and 4,600 bridges across the U.S. by 2050, with average annual damages of \$1.2 to \$1.4 billion each year (in 2015 dollars).<sup>50</sup> And 13 of the 47 largest airports in America are also within reach of moderate-to-high storm surges and at risk for increased damages.<sup>51</sup>

Taxpayers also spend money to mitigate future damage to federal and non-federal infrastructure. The Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation grant program was authorized in the Infrastructure, Investments, and Jobs Act (IIJA), receiving \$8.7 billion in formula funding and grants through FY26. There are also a variety of other federal programs with the goal of improving community infrastructure for climate-related reasons — like the Healthy Streets

Program – and programs that include climate resiliency as a bonus, but not a priority — like the Surface Transportation Block Grant Program.<sup>52</sup>

**Energy**

Energy infrastructure in the U.S. faces similar threats from climate change, and federal taxpayers have paid and will continue to pay those costs, both directly to support public and private energy



infrastructure and indirectly from higher energy prices and increased energy volatility. U.S. energy infrastructure is aging and, according to GAO, “changes in climate have the potential to further strain these already aging components by forcing them to operate outside of the ranges for which they were designed.”<sup>53</sup>

Climate change also poses physical risks to energy infrastructure; for example, 4,000 oil and gas platforms in the Gulf Coast, along with over 4,000 miles of fiber optic cable across the country, are at risk from sea level rise.<sup>54,55</sup> Two major wildfire events in 2000 and 2011 caused a combined \$346.7 million in damages to the Los Alamos National Laboratory, a Department of Energy (DOE) facility, not including lost productivity.<sup>56</sup> In 2008, Hurricanes Gustav and Ike caused \$22 million in damages to several Strategic Petroleum Reserve (SPR) sites in the Gulf Coast region.<sup>57</sup> SPR has received \$52 million in supplemental appropriations over the last decade for expenses related to damages caused by natural disasters.<sup>58</sup>

Taxpayers also pay for immediate response efforts to smaller, weather-related disruptions. DOE’s All-Hazards Incident Response, Regional Support, and Situational Awareness program spends millions of dollars every year to train and coordinate a group of approximately 120 volunteer responders from across DOE to fix damaged energy systems, including those damaged by extreme weather events. Similarly, DOE’s Infrastructure Security and Energy Restoration program receives millions of dollars annually to coordinate federal assistance and resources during declared disasters, among other activities.<sup>59</sup>

Changing long-term weather patterns can create unexpected costs. For example, warm water temperatures in the Tennessee River prevented

the Tennessee Valley Authority’s (TVA) Browns Ferry Nuclear Plant from safely discharging heated cooling water from the reactor leading the facility to curtail power production resulting in \$50 million in replacement energy costs.<sup>60</sup>

Congress appropriated \$10.5 billion in the IIJA for a suite of federal grant programs aimed at increasing the resilience of the electricity grid, and the FY23 omnibus supplemental spending bill included \$1 billion to improve the resilience of Puerto Rico’s electric grid. DOE also conducts research and development on tools to advance climate resilience planning through partnerships and national laboratories, such as the North American Energy Resilience Model, which received \$30 million in FY23 alone.

DOE also has a handful of regularly appropriated programs that help industry, as well as state, tribal, and local governments, prepare for and mitigate the impacts of extreme weather and other non-cybersecurity risks to the energy system. The Office of Cybersecurity, Energy Security, and Emergency Response, which contains many of these programs, received \$27 million in FY23.

## **Water**

The U.S. water system refers to a vast infrastructure network for drinking water, wastewater management, agricultural irrigation, flood control, and other water uses across the country. The nation’s water infrastructure already faces a variety of challenges — the Environmental Protection Agency (EPA) estimates \$744 billion is needed over the next 20 years to improve drinking water and wastewater infrastructure — that are further exacerbated by climate change.<sup>61</sup>

Like the infrastructure previously discussed, natural disasters pose direct physical threats

to public water infrastructure. For example, Superstorm Sandy in 2012 caused power outages and flooding at more than half of New York City's wastewater treatment facilities and 43% of the city's pumping stations, which resulted in the release of approximately 562 million gallons of untreated and diluted sewage into local waterways.<sup>62</sup> GAO estimates between FY11 and FY18, FEMA and CDBG-DR obligated at least \$2.3 billion and at least \$1.4 billion, respectively, for drinking water and wastewater infrastructure-related projects.<sup>63</sup>

Changes in precipitation patterns also threaten water availability and water infrastructure in many parts of the country. These projects represent massive liabilities for taxpayers. In 2022, the Association of State Dam Safety Officials estimated \$75 billion would be needed to rehabilitate the nation's non-federal dams, \$25 billion of which would be for the more than 15,000 dams deemed a "high hazard."<sup>64</sup> In February, Lake Powell, the Colorado River's second-largest reservoir by volume, fell to its lowest level since its creation in 1963.<sup>65</sup> Demand for federal funding in water infrastructure projects will only

increase as climate-driven events like the worst Southwestern megadrought in 1,200 years change our water infrastructure needs.<sup>66</sup>

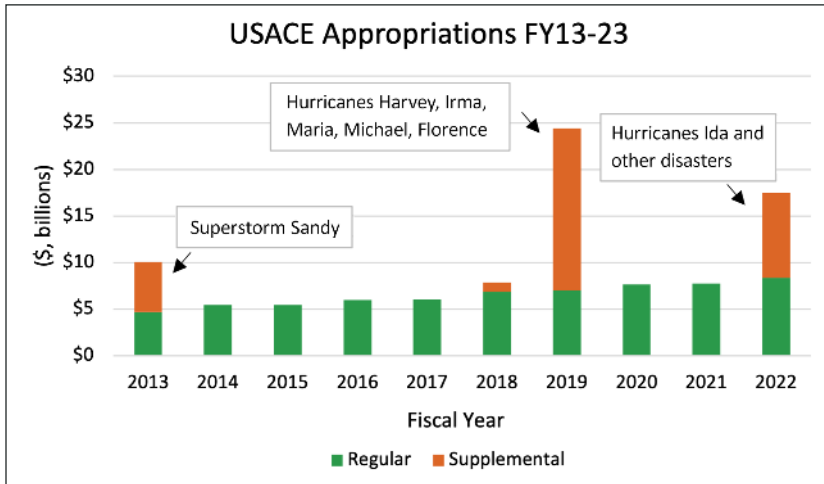
Through its Civil Works program, the U.S. Army Corps of Engineers (USACE) is the lead federal agency for navigation and flood control, performing activities related to coastal protection, dam safety, and other water infrastructure. USACE plays an important role in natural disaster prevention, mitigation, and recovery through projects such as hurricane and storm damage reduction infrastructure. For example, between FY13 and FY22, USACE has allocated \$7.7 billion in construction funding for projects relating to flood and storm damage reduction through regular appropriations.<sup>67</sup>

The federal government also appropriates supplemental funds to USACE for immediate response to natural disasters. Since Superstorm Sandy made landfall in October 2012, federal lawmakers have directed an additional \$32.3 billion in disaster appropriations to USACE, one-third of which was appropriated in the last two years. USACE supplemental appropriations

## **DROUGHT MITIGATION IN THE WESTERN U.S.**

Climate change is exacerbating the length, frequency, and severity of droughts. Since 1980, there have been 30 droughts in the United States with losses exceeding \$1 billion each. According to the U.S. Drought Monitor, the incidence of drought in the western United States during the summer of 2021 exceeded all past droughts in the region since 2000. In 2021, there were 32 weeks in which more than 20% of the western U.S. was suffering from an exceptional drought. In the 20 years prior, there had only been 5 weeks where this was recorded, all of which occurred in 2020.<sup>68</sup>

In 2022, the Inflation Reduction Act appropriated \$4 billion to the Bureau of Reclamation for activities to mitigate the impacts of drought in the West, with priority given to the Colorado River Basin. Funding may be used for: compensation for voluntary reductions in water use; voluntary projects that reduce water use/demand or provide environmental benefits in the Colorado River; and ecosystem and habitat restoration projects that address issues directly caused by drought.



increased investment and construction in the affected area, which increases the potential damages in a future disaster.

Potential future costs for projects protecting communities from damage due to flooding and hurricanes are substantial. As an example, the Water Resources Development Act of 2022 authorized construction of the Coastal Texas Protection and Restoration project, a \$34 billion project primarily designed to

are primarily composed of construction spending, which contains costs of repairing damage to existing infrastructure from natural disasters and constructing new projects, including flood and storm damage reduction. However, like other forms of disaster spending, flood and storm damage reduction projects can lead to

protect Galveston and Houston against future storm surge.<sup>69</sup> A September 2022 report from USACE, done in response to Superstorm Sandy, found the cost of seawalls, levees, and other infrastructure to protect New York City and the immediate area would have a price tag starting at \$52.6 billion.<sup>70</sup>

## Agriculture

Climate change also affects agriculture, and agricultural practices affect climate change. The Department of Agriculture (USDA) estimates there are approximately 2 million farms in the U.S. and that U.S. farmland totals more than 895 million acres.<sup>71</sup> Agricultural production is particularly sensitive to weather and climate change, and even with widespread adoption of mitigation strategies, climate change is expected

to have a net negative impact on overall crop and livestock production. Agricultural production has already been impacted by intensifying droughts and increased frequency of flooding, and warming temperatures are expected to continue to lead to crop losses, increased pest infestations, and other impacts. This leads to higher taxpayer costs for programs addressing climate-related disasters.



Orrick, Missouri | Vincent Parsons, Flickr



## Crop Insurance

The federal government subsidizes the premiums for crop insurance covering losses caused by natural disasters through the Federal Crop Insurance Corporation (FCIC). In 2022, taxpayers spent a record \$11.6 billion subsidizing premiums for insurance plans with a total liability of \$173.5 billion, with corn, soybeans, and wheat accounting for 70% of total liability.<sup>72</sup> On average, taxpayers cover approximately 60 cents of every one dollar of premiums while agricultural producers cover the other 40 cents.

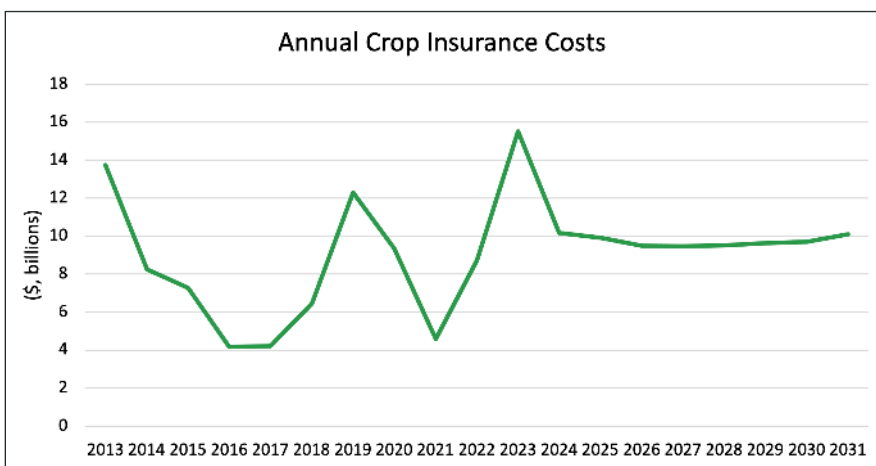
Different modeling of projected crop losses due to climate change show federal expenditures for crop insurance increasing between 3.5% and 22% annually by the end of the century.<sup>73</sup> Yields from heavily insured crops planted in the spring, such as corn and soybeans, for example, are projected to experience steeper declines in productivity due to excessive heat and dryness during summer in the Midwest.<sup>74</sup> Even the most conservative estimate of a 3.5% increase in claims represents an increase of \$330 million in annual federal spending, with the high end of the spectrum representing an increase of \$2.1 billion in annual expenditures. The Congressional Budget Office (CBO) already projects federal spending on crop insurance will total \$102.4 billion from FY23-FY32,<sup>75</sup> and costs are expected to rise further due to climate change.

## Farm Bill Disaster Programs

Taxpayers finance a generous agricultural safety net, which includes other disaster programs tailored to numerous types of agriculture, such as cattle ranchers, beekeepers, and cherry tree owners, to name just a few.<sup>76</sup> Programs like the Livestock Indemnity Program, Livestock Forage Disaster Program, and Emergency Assistance for Livestock, Honeybees, and Farm-Raised Fish Program provide economic protection from both deep, catastrophic losses as well as less severe dips in anticipated yields, prices, or incomes. Payments from most of these programs are triggered after almost any type of natural disaster. According to CBO, from FY14-FY22, farm bill-authorized disaster programs cost taxpayers an average of \$1.1 billion annually.<sup>77</sup> Combined with crop insurance, these programs cost taxpayers an average of \$8.4 billion annually from FY14-FY22.<sup>78</sup> These totals do not include other farm safety net programs such as commodity subsidies, namely Price Loss Coverage and Agriculture Risk Coverage.

## Emergency Disaster Spending

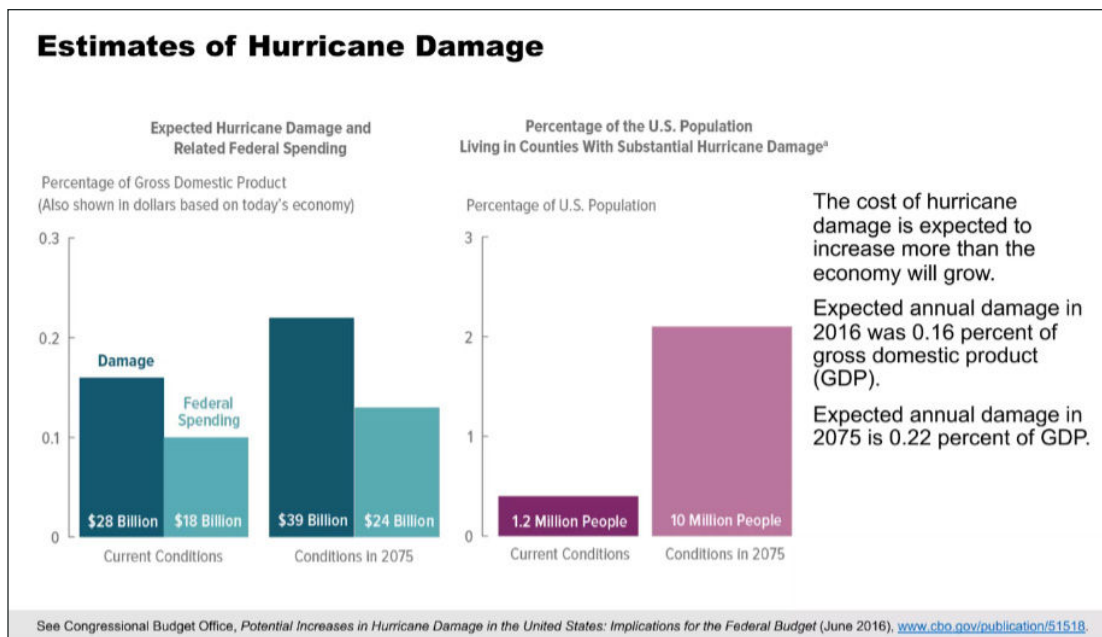
Although Congress created disaster programs within the farm bill and expanded subsidies for federal crop insurance to negate the need for unpredictable disaster spending, ad hoc disaster spending continues. After the active hurricane and wildfire seasons in 2017, “emergency” disaster-related spending for agriculture totaled \$20 billion from 2017 to 2022. Prior to 2017, the federal government had not authorized ad hoc disaster spending for agriculture in nearly a decade. The \$20 billion in ad hoc spending is in addition to spending on annual crop insurance subsidies and farm bill disaster programs. Unlike federal crop insurance, ad hoc disaster subsidies are 100% taxpayer financed.



## Costs Up, Up, Up

During years of major drought and flooding, the cost of certain federal agricultural programs increases. Crop losses due to the historic 2012 drought affected taxpayer costs in subsequent years. For example, according to CBO, federal crop insurance cost taxpayers \$13.7 billion in FY13, a record at the time.<sup>79</sup> Widespread flooding in 2019 contributed to higher crop insurance costs as well. Combined with ad hoc disaster aid authorized during this time, taxpayer costs of

agriculture disaster-related programs climbed further.<sup>80</sup> And, more recently, due to severe, persistent drought in the West and portions of the Great Plains in 2021 and 2022, the taxpayer costs of crop insurance, agricultural ad hoc disaster aid, and other programs increased in 2022. Costs of the federal crop insurance program alone are expected to reach a new record high in FY23 of \$15.5 billion, according to CBO.<sup>81</sup>



An Overview of CBO’s Role in Assessing Climate Change | Congressional Budget Office

## National Security

The effects of climate change on defense spending are more complex than in other areas of the federal budget. The most obvious examples are military installations damaged by extreme weather events. According to the Department of Defense (DOD), U.S. military bases impacted by natural disasters and extreme weather events from 2017-2021 sustained more than \$13 billion in damages. More than 1,700 military installations are in coastal areas and vulnerable to sea-level rise or extreme weather events.

Flooding, drought, and wildfire affect military installations in the same ways as civilian infrastructure, and the Pentagon has begun adopting mitigation strategies to lessen future costs. But DOD manages a global real estate portfolio with an estimated value of \$1.2 trillion spread across every conceivable climate region. This means DOD must accommodate every new challenge created by climate change, from spreading desertification to melting permafrost. And unsurprisingly, most of the existing stock of military installations were constructed long

*“There is little about what the [Defense] Department does to defend the American people that is not affected by climate change. It is a national security issue, and we must treat it as such. The Department will immediately take appropriate policy actions to prioritize climate change considerations in our activities and risk assessments, to mitigate this driver of insecurity.”*

- Defense Secretary Lloyd Austin

before the full range of threats posed by climate change were recognized or understood, adding to the challenges and costs ahead.

## **Immediate Costs**

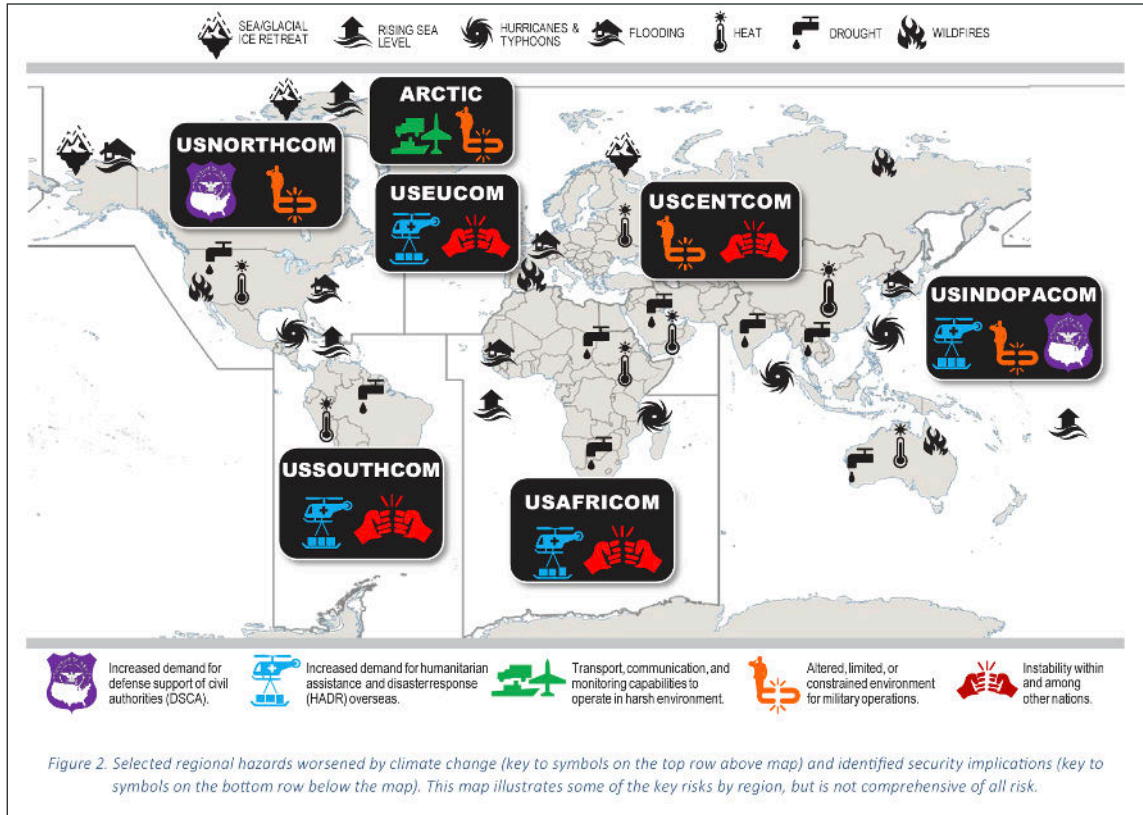
The Pentagon has initiated a wide-ranging plan of action to incorporate climate change into its departmental plans, policies, and procedures. And while DOD for several years has requested funding earmarked specifically for adapting existing facilities to mitigate the effects of climate change, it will be impossible to avoid future billion-dollar disasters. The FY23 Pentagon budget request, for example, included \$3.1 billion to mitigate logistics risks, harden critical infrastructure against climate impacts, and deploy new technologies. According to the request, “To train, fight, and win in this increasingly complex environment, the Department must consider the effects of climate change at every level of the enterprise and invest accordingly.”

This amount seems paltry given the environmental challenges the department faces. Just as the greatest climate costs for taxpayers are caused by major hurricanes striking major metropolitan areas, severe weather events have already cost the Pentagon billions in damage to installations. In 2018, in a single event, Hurricane Michael caused an estimated \$4.7 billion in damage to Florida’s Tyndall Air Force Base, which is the training center for pilots and maintenance crews of the 325th Fighter Wing. Every

single building was damaged or destroyed. U.S. Army Corps of Engineer officials who are leading the reconstruction estimate 99% of the base was destroyed. Because operations on the base were suspended for almost a month, roughly one-third of the nation’s F-22 Raptors were forced to relocate to bases with less capacity. Repairs are not estimated to be completed until 2026 or 2027.

On September 14, 2018, Hurricane Florence made landfall near Wrightsville Beach in Wilmington, North Carolina, creating a massive storm surge and dropping 36 inches of rainfall. The Marine Corps’ Base Camp Lejeune, Air Station New River, and Air Station Cherry Point all sustained significant damage, including hundreds of buildings and 60% of the nearly 6,200 homes on the facilities. An estimated 84,000 gallons of sewage spilled in Lejeune. Repair costs for the facilities exceed \$3.6 billion and are still underway.

In 2021, Winter Storm Uri caused severe damage across the southeastern United States, damaging 694 facilities and 1,366 privatized homes at Army installations in Kansas, Oklahoma, Louisiana, and Texas. DOD’s vast real estate portfolio makes it especially vulnerable to direct costs as well as indirect costs of climate change, such as disruptions to supply chains or transportation routes.



Department of Defense, Office of the Undersecretary for Policy (Strategy, Plans, and Capabilities) 2021 | Department of Defense Climate Risk Analysis Report Submitted to National Security Council

## Ongoing Costs

Beyond individual weather events, which will continue and likely worsen, the Pentagon faces ongoing costs from the effects of climate change. In January 2019, the Office of the Under Secretary of Defense for Acquisition and Sustainment submitted a report to Congress assessing climate-related vulnerabilities and risks to installations and operations. It reported that recurring flooding, drought, and wildfires were primary concerns at 79 installations.<sup>82</sup> This is by no means an exhaustive list or description of the climate vulnerabilities of military installations worldwide (given the sensitivity of this information), but it does provide a snapshot of the kinds of climate costs DOD faces.

- **Flooding:** Recurring flooding was the most prominent threat, potentially threatening 60 of the installations studied. Among these is the Norfolk Naval Shipyard, the

largest naval base in the world, which services aircraft carriers, submarines, surface combatants, and amphibious ships. It now experiences one major flood every year, as four of its five drydocks are exposed to flooding. According to GAO, “the ground elevation at three of these drydocks is at the 10-year flood level and is subject to frequent tidal-related storm damage.”



Climate Action 2030 | Department of the Navy

Ten-year flood level means there is a ten-percent chance of flooding in any given year. GAO found that increased flooding had resulted in 2,945 lost operational days for nuclear powered aircraft carriers and submarines from FY00 through FY16.

Flooding damage extends to installations across the country. For example, in 2010, more than 14 inches of rain over two days in the Naval Support Activity Mid-South in Millington, Tennessee, resulted in a levee failure that displaced military families and extensive flood damage to base auxiliary buildings at a cost of \$154 million.<sup>83</sup> In 2018, the Air Force was forced to spend \$46.8 million to replace the 5,450 foot rock sea-wall protecting Alaska’s Cape Lisburne Long Range Radar Station’s gravel airstrip because the northwest coastline has deteriorated from tidal and storm driven wave action.<sup>84</sup> And flooding along the Missouri River and waterways in 2019 at Offutt Air Force Base in Nebraska, home to the U.S. Strategic Command, has submerged as much as one-third of the base, causing more than \$500 million in damage that would take years to repair.

- **Drought:** Drought was cited as a significant risk to 48 of the 79 installations studied in DOD’s 2019 report. Like civilian communities, particularly in already dry regions like the Southwest, military installations are impacted by water supply shortages in drought conditions. Dry conditions and drought, in turn, contribute to the growing threat of desertification, which affects training and maneuvers. By decreasing vegetation cover, desertification increases erosion and runoff, which increases the threat of flooding. Air Force bases in western states, including Kirtland, Creech, Nellis, and Hill

were identified as vulnerable to current and future desertification.

- **Wildfire:** Wildfires are a constant concern on many military installations, especially with heightened drought conditions and since routine training and testing activities are significant potential ignition sources. In March 2018, two related wildfires broke out in Colorado during infantry and helicopter training, reaching about 3,300 acres and causing the evacuation of 250 homes. In 2016, the Canyon Wildfire prompted evacuations and a rocket launch delay at Vandenberg Air Force Base (now Space Force Base), California, diverting critical resources and personnel to execute firefighting activities. The Canyon Wildfire alone cost \$17.5 million to extinguish and \$45 million to fully recover.



Wind Cave National Park | NPS Photo

Every year DOD provides support during wildfire season. More than 2,300 National Guardsmen and 350 active-duty military personnel assisted with wildfire fighting efforts during the 2018 and 2019 wildfire seasons nationwide. DOD pays approximately \$1.5 million per year for preventative fire suppression services on Fort Wainwright in Alaska, except during the 2019 fire season, when it paid an additional \$5.5 million for wildfire response.



Virgin Islands after Hurricane Maria | National Guard, Flickr

Extreme weather also creates costs for the Pentagon in the form of readiness, while responding to events also becomes a drain on resources. Testing and training are limited and impaired by extreme heat and drought, which can contribute to heat-related illnesses, including heat exhaustion and heat stroke. Flooded drydocks delay maintenance and repairs, while wildfires force evacuations and divert personnel to assist in suppression activities. Melting permafrost in the Arctic region undermines the foundations of buildings, roads, and runways, creating delays and necessitating workarounds, while excessive heat in Kuwait routinely grounds U.S. Air Force flights.<sup>85</sup> In the wake of Hurricanes Maria, Irma, and Jose in 2017, approximately 11,000 U.S. military personnel helped provide disaster response and relief efforts in Puerto Rico and the U.S. Virgin Islands, and 13,000 National Guard, active-duty service members and DOD civilians were deployed to provide direct and indirect humanitarian support as Hurricane Harvey affected 13 million people in Texas and Louisiana.<sup>86</sup>

## Long-Term Costs

The potentially more problematic effects of climate change on defense spending are the extent to which it will create and intensify instability in regions around the globe. These costs are much more difficult to estimate, but they will almost certainly be as significant as the cost of repairing and retrofitting military installations affected by extreme weather events.

The process of climate change is creating new challenges for DOD missions, plans, and installations, while simultaneously creating new demands. DOD views climate change as a threat multiplier, and in already unstable regions, it can help tip events into disaster. Syria, for example, experienced a severe drought from 2009 to 2012, which helped push that country into civil war as agriculture output declined and added to the growing unrest. Somalia and Yemen are threatened by rising sea levels, which could further displace vulnerable populations in those countries, raising the possibility of U.S. military engagement.



Arctic Sea | Daniel Foster, Flickr

### *Arctic Warming*

According to DOD's 2019 Arctic Strategy report to Congress, the changing environment in the Arctic has direct implications for U.S. national security interests. As temperatures across the Arctic region are increasing more than twice as fast as the global average, diminished sea ice coverage, declining snow cover, and melting ice sheets is reshaping the Arctic's physical environment, opening new shipping lanes and access to natural resources.<sup>87</sup> The Arctic holds over 90 billion barrels of undiscovered oil, 1,700 trillion cubic feet of natural gas, and \$1 trillion of unmined rare earth minerals,<sup>88</sup> while the Alaskan fishing industry removes more than \$4.5 billion in seafood from Arctic waters each year.

### **Other Costs**

There are several ways that climate change could negatively impact our nation's economy and gross domestic product (GDP), and thereby federal tax revenues. Although the short-term fiscal impacts of climate change can manifest in ambiguous ways — a rise in temperature may boost agricultural output in some regions but not others — researchers and economists generally agree the long-term economic effects of climate change are likely to be increasingly negative.

All of this explains why the DOD sees the Arctic as a “potential corridor for strategic competition.” Most of the resources in the region are outside the 200-mile economic exclusion zone claimed by members of the Arctic Council — Canada, Denmark (including Greenland), Finland, Iceland, Norway, Russia, Sweden, and the U.S. — making it difficult to predict who will claim ownership. A 2020 U.S. Air Force Arctic Strategy estimated one-quarter of Russia's gross domestic product is tied to the Arctic. Hoping to build new ports and other infrastructure, China has linked its 2018 Belt and Road initiative to the Arctic and has officially identified itself as a “Near Arctic State.”

Climate change will create new threats and challenges to our national security in the decades to come, perhaps best illustrated by the strategic interest in the Arctic as sea ice coverage continues to diminish, making it the newest theater in the era of “great power competition.”

Climate change, or notably the associated increase in frequency and scale of extreme weather events and overall rise in temperature, can decrease labor and agricultural land productivity, shrink labor supply, disrupt business activities, and increase production costs, all of which can negatively affect the U.S. economy and GDP.<sup>89</sup> A decrease in GDP reduces the income subject to income and payroll taxes, and thereby decreases federal revenues and increases federal deficits by hundreds of billions of dollars. A Deloitte study found that, under

a no action taken scenario resulting in a 3°C global average warming, the U.S. would suffer around \$14.5 trillion in economic losses in present value terms and a 4% GDP reduction, or \$1.5 trillion loss in the year 2070 alone.<sup>90</sup>

Federal climate related healthcare costs have not been measured by the federal government but they are likely to be substantial. Factors will include increased heat-related death and illness, exposure to air pollutants – fine particulate matter and ozone – due to wildfires, and exposure of food and water sources to certain pathogens and toxins, all of which contribute to increased mortality (premature death) and morbidity (non-fatal health issues). Another area not examined is climate change impacts on mental health. Much of these costs will be borne by private healthcare providers, but the economic impact ripples through the economy and nearly 163 million people had health coverage through federal programs in 2022.<sup>91</sup>

Among many other areas to examine federal cost and exposure to climate change is in housing.

### **Housing/mortgage risk**

Climate change can also have devastating impacts on U.S. housing. Climate-related disasters like floods, storms, and wildfires destroy properties and dislocate people from their homes. CoreLogic, a real estate data company, estimated that 35 million homes, a third of the nation’s housing stock, are at high risk of a natural disaster. The federal government as a guarantor of both mortgages and mortgage-backed securities is inevitably exposed to increased climate-related financial risk in the housing market.

The federal government has played a significant role in housing finance since the 1930s, which

expanded during the 2008 financial crisis. As of February 2023, the federal government currently supports about two thirds of the mortgage market,<sup>92</sup> through the Federal Housing Administration (FHA), Veteran Affairs’ (VA) home loans, USDA’s Rural Development programs, and the Government National Mortgage Association; as well as Government-sponsored enterprises like Federal Home Loan Mortgage Corporation and Federal National Mortgage Association. Federal exposure to climate-related housing and mortgage will only likely grow in the short to medium term due to imperfect risk perceptions of homebuyers and the lack of disincentives for risky developments.

Climate-related extreme weather events can cause physical destruction of properties which in turn leads to higher default rates. When mortgage borrowers in disaster-affected areas default, government-sponsored enterprises (GSEs) are required to purchase defaulted mortgages out of securitized pools at face value. The recoveries that can be made on the collateral may also be lower due to physical damage to the property. GSEs also face mortgage prepayment risk which can in turn lead to the loss of guarantor fees. The four largest federal single family housing guarantee programs provide around \$614 billion in primary guarantees in 2023.<sup>93</sup>

OMB estimated that on a present value basis, a one percent increase mortgage default would cost federal housing programs \$110 million, and a one percent decrease in recoveries after defaults would cost an additional \$107 million, according to the FHA, Veterans Benefits Administration, and USDA.

The federal government also faces unpriced climate risks in the housing market. For example, the U.S. housing market susceptible to flood risks is overvalued by between \$121 to \$237



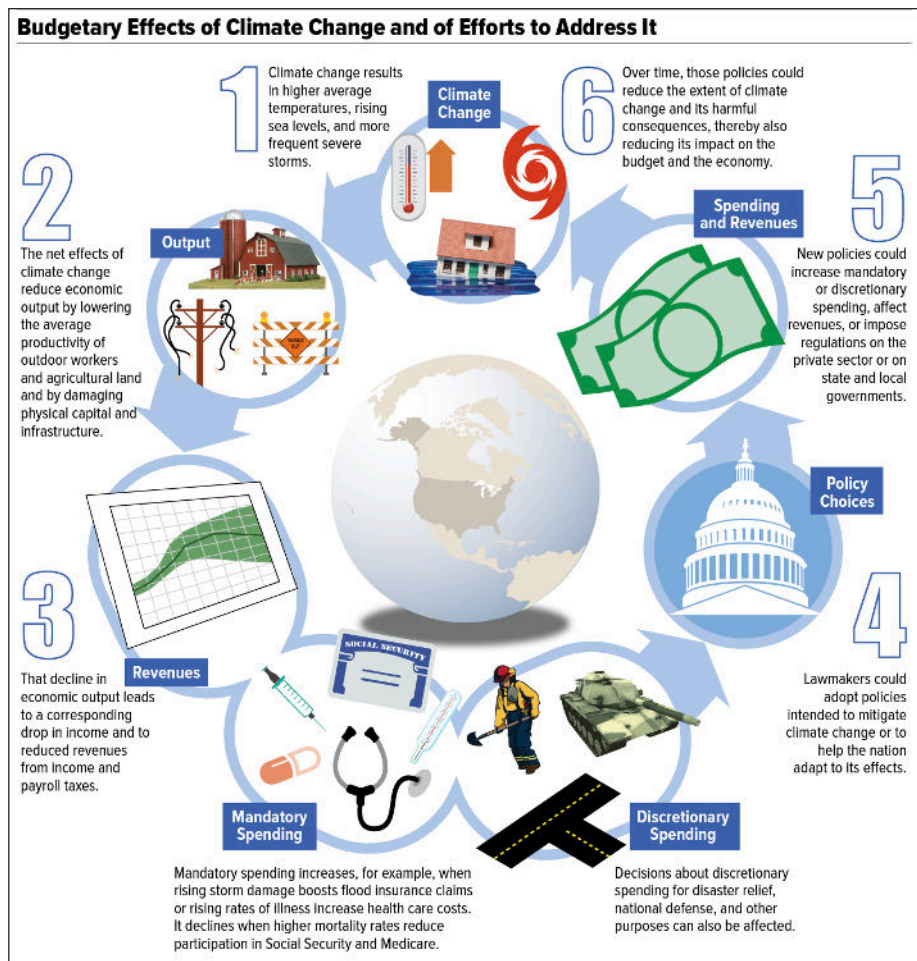
billion, with properties highly concentrated in coastal areas with no federal flood risk disclosure laws. Although some states have flood risk disclosure laws, Florida, a state with high-value and high-flood-risk real estate, does not. Both homeowners and the federal government as the guarantor of some of the underlying mortgages and mortgage-backed securities face severe price deflation risks due to this overvaluation of real estate that does not account for flood risks.

### Disaster Tax Policies

Congress has passed various disaster tax relief policies. Some tax relief policies are temporary and were passed following federally declared major disasters while others are permanently written into the nation’s tax code. Permanent disaster tax relief provisions include disaster casualty loss deductions, deferral of gain from involuntary conversions of property destroyed

by a disaster, disaster relief for owners of low-income housing tax credit properties, income exclusion for disaster relief payments to individuals, income exclusion for certain insurance living expense payments, and Internal Revenue Service administrative relief in the form of extended deadlines and waiving of certain penalties.<sup>94</sup> Temporary disaster tax relief legislation have been passed following climate-related disasters like hurricanes and wildfires.

The most recent temporary tax relief bill, the Taxpayer Certainty and Disaster Tax Relief Act of 2020, was enacted following the California wildfire season. The bill provided several temporary tax relief provisions like enhanced access to retirement funds, an employee retention tax credit, and increased limits for corporate donations to charities among other provisions. These provisions were estimated to total \$9.6 billion



in revenue loss from FY21 to FY30, according to the Joint Committee on Taxation

## Energy Costs to Government

Climate change will have a profound impact on energy costs for both individuals and the federal government. These costs will particularly affect energy consumption as costs to heat and cool buildings increase. The Department of Health and Human Services (HHS) operates the Low-Income Home Energy Assistance Program (LIHEAP) which is designed to assist low-income families with the cost of energy as well as other, related costs such as weatherization and home repair.<sup>95</sup> Currently, benefit levels vary widely between states, depending on state average temperatures and energy prices.<sup>96</sup> HHS anticipates that climate change will lead to an increase in the number of days each year where temperatures reach the threshold of extreme heat, which is defined by the Centers for Disease Control as summertime temperatures that are much hotter and/or humid than average.<sup>97,98</sup>

A report from EPA demonstrates that in the 1960s, the U.S. experienced an average of two heat waves per year, while by the 2020s, that number had increased to six per year on

## Conclusion

Taxpayer costs of climate change are growing rapidly. Costs are expected to continue to rise in the future, with major implications for the federal budget. While some federal programs impacted by rising climate costs continue on auto-pilot each year, Congress also frequently enacts ad hoc emergency spending bills to respond to disasters. This disaster spending is off-budget and contributes to our nation's growing national debt. Other federal programs

average.<sup>99</sup> According to HHS, in 2013 \$3.1 billion worth of regular block grant funding was released to LIHEAP grantees.<sup>100</sup> By 2023, that number had increased to \$3.4 billion in regular block grant funding and an additional \$1 billion in supplemental funding.<sup>101</sup> According to a report from E&E News, LIHEAP currently only funds 1 in 6 eligible households, so as demand increases, appropriations are likely to rise to meet greater need.<sup>102</sup>

In addition to demand for heating and cooling through LIHEAP, the federal government also has an obligation to heat and cool its own facilities. According to a 2018 GAO report, the federal government operated 668.6 thousand square feet of facilities in 2015.<sup>103</sup> According to a report from OMB, it currently costs approximately \$190 billion to power commercial and government buildings, but an exact figure isolating heating and cooling costs in federal buildings is likely impossible to determine.<sup>104</sup> With greater demand for electricity to heat and cool these buildings, the burden for paying these costs will fall to taxpayers.

impacted by rising taxpayer costs of climate change range from federal flood and crop insurance to infrastructure, national security, and healthcare. This report catalogs past spending on federal programs designed to respond to increasingly more frequent and intense natural disasters. Future taxpayer costs of these programs are only expected to rise in the future, to the tune of tens of billions of dollars - each year.

## Appendix

<sup>1</sup> Accurate as of May 11, 2023

<sup>2</sup> “Declared Disasters.” FEMA.gov. Accessed May 11, 2023. [https://www.fema.gov/disaster/declarations?-field\\_year\\_value%5B%5D=2022&field\\_year\\_value%5B%5D=2021&field\\_year\\_value%5B%5D=2020&-field\\_year\\_value%5B%5D=2019&field\\_year\\_value%5B%5D=2018&field\\_year\\_value%5B%5D=2017&field\\_year\\_value%5B%5D=2016&field\\_year\\_value%5B%5D=2015&field\\_year\\_value%5B%5D=2014&field\\_year\\_value%5B%5D=2013&field\\_dv2\\_declaration\\_type\\_value=DR&field\\_dv2\\_incident\\_type\\_target\\_id\\_selective=49142](https://www.fema.gov/disaster/declarations?-field_year_value%5B%5D=2022&field_year_value%5B%5D=2021&field_year_value%5B%5D=2020&-field_year_value%5B%5D=2019&field_year_value%5B%5D=2018&field_year_value%5B%5D=2017&field_year_value%5B%5D=2016&field_year_value%5B%5D=2015&field_year_value%5B%5D=2014&field_year_value%5B%5D=2013&field_dv2_declaration_type_value=DR&field_dv2_incident_type_target_id_selective=49142), excluding disasters like chemical spills, volcanic explosion, etc.

<sup>3</sup> NOAA calculates the overall costs of disaster in the U.S. “in terms of dollars that would not have been incurred had the event not taken place.” This calculation reflects more than just the federal portion of disaster costs. Direct costs NOAA incorporates in its calculations include physical damage to residential, commercial, and municipal buildings; material assets within buildings; vehicles; public assets, like transportation infrastructure; electrical infrastructure and offshore energy platforms; and agricultural. Costs also include time element losses, such as business interruption or loss of living quarters, and wildfire suppression costs, among others. NOAA disaster costs do not account for natural capital or environmental degradation; mental or physical healthcare related costs, the value of a statistical life (VSL); or supply chain, contingent business interruption costs. Source: NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (2023). <https://www.ncei.noaa.gov/access/billions/>, DOI: 10.25921/stkw-7w73

<sup>4</sup> “Disaster Relief Fund: Monthly Reports.” FEMA.gov. Accessed May 1, 2023. <https://www.fema.gov/about/reports-and-data/disaster-relief-fund-monthly-reports>.

<sup>5</sup> “The Disaster Relief Fund: Overview and Issues .” Congressional Research Service, January 20, 2022. <https://crsreports.congress.gov/product/pdf/R/R45484/28>.

<sup>6</sup> US Department of Commerce, NOAA. “Hurricane Sandy.” National Weather Service. NOAA’s National Weather Service, March 3, 2021. <https://www.weather.gov/okx/HurricaneSandy5Year#:~:text=Hurricane%20Sandy%20was%20the%2018th,eastern%20Cuba%20and%20the%20Bahamas>.

<sup>7</sup> “Costliest U.S. Tropical Cyclones Tables Updated.” National Hurricane Center. National Oceanic and Atmospheric Administration, January 26, 2018. <https://www.nhc.noaa.gov/news/UpdatedCostliest.pdf>.

<sup>8</sup> “Remembering Hurricane Sandy 10 Years Later.” FEMA.gov, October 27, 2022. <https://www.fema.gov/blog/remembering-hurricane-sandy-10-years-later>.

<sup>9</sup> “The Disaster Relief Fund: Overview and Issues .” Congressional Research Service, January 20, 2022. <https://crsreports.congress.gov/product/details?prodcode=R45484>

<sup>10</sup> *ibid*

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