

ARTICLES

A NATIONAL SECURITY THREAT WITHOUT BORDERS: CLIMATE CHANGE AND THE NEED FOR MILITARY FACILITY MODERNIZATION

by Janessa H. Brito

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SUMMARY

The U.S. military has recognized climate change as a national security threat. Over the past three decades, installations across the country have experienced infrastructure damage, personnel evacuations, and millions or billions in rebuilding or repair costs. This Article argues that most military facilities are woefully unprepared for these impacts; to expedite action, it calls for a focus on expanding Other Transaction Authority (OTA) for infrastructure-related procurement, as well as specific measures, mandates, and responses. The Article examines recent devastating weather events across Air Force installations in Florida and California. It then discusses recent laws on environmental response, with a focus on the National Defense Authorization Acts and specific provisions for infrastructure, facility, and related environmental measures, and highlights various directives, plans, and spending behavior. It concludes by proposing top-down solutions for speeding procurement and broadening use of OTAs.

Climate change is a relatively new national security threat that threatens American military operations. The U.S. Department of Defense (DOD) has dozens of military installations throughout the United States, including Hawaii and Alaska. Many of these installations have aging infrastructure, specifically buildings and related structural facilities.¹ Such facilities are growing increas-

ingly and concerningly ill-equipped to withstand climate change-related threats.² At least since 2016, DOD has implemented policy for climate adaptation and acknowledged the increasing threats from climate change.³

Nonetheless, over the past two decades, many DOD military installations have been devastated by natural disasters. Domestically, most U.S. military bases have facilities

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Disclaimer: Major Janessa H. Brito currently serves as an active-duty judge advocate general in the U.S. Air Force. The views, opinions, and recommendations expressed in this Article are only those of the author and do not necessarily represent the views or positions of the U.S. govern-

ment, the U.S. Department of Defense, the U.S. Department of the Air Force, or its components. This Article was submitted in partial satisfaction of the requirements of the degree of master of laws in environmental and government procurement law at George Washington University.

1. U.S. GOVERNMENT ACCOUNTABILITY OFFICE (GAO), GAO-22-104481, DEFENSE INFRASTRUCTURE: DOD SHOULD BETTER MANAGE RISKS POSED BY DEFERRED FACILITY MAINTENANCE (2022).
2. ANU NARAYANAN ET AL., RAND CORPORATION, RR-A523-1, GROUNDED: AN ENTERPRISE-WIDE LOOK AT DEPARTMENT OF THE AIR FORCE INSTALLATION EXPOSURE TO NATURAL HAZARDS ix (2021), https://www.rand.org/content/dam/rand/pubs/research_reports/RRA500/RRA523-1/RAND_RRA523-1.pdf.
3. DOD Directive 4715.21, Climate Change Adaptation and Resilience (Jan. 14, 2016, with Change 1 effective Aug. 31, 2018), <https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodd/471521p.pdf?ver=2018-09-25-081059-330> (providing an example of a DOD policy including climate change's application or consideration in a military context).

that have exceeded their expected life-spans.⁴ Meanwhile, DOD has historically experienced difficulty in reducing the facility maintenance backlog.⁵ Though the U.S. Government Accountability Office (GAO) found that DOD's gap in facility sustainment funding has decreased in recent years, the Department does not completely account for the cost of sustaining facilities that have exceeded their expected life-spans.⁶ Even without the threat of climate change, DOD faces hardships with upgrading and maintaining its roughly 550,000 facilities worldwide.⁷ Climate change exacerbates the threat to some of these facilities.⁸

The Congressional Budget Office (CBO) found that of 49,000 U.S. Army buildings examined in 2020, the average building age was 47 years old.⁹ Thousands of those buildings have existed for at least 75 years.¹⁰ The CBO report noted DOD previously expressed a goal of modernizing or replacing its facilities "once every 67 years."¹¹ Several facilities, including flightlines, pre-date the establishment of the U.S. Department of the Air Force (DAF) because many were used by the Army in the first half of the 20th century.¹²

In the past few decades, DAF has spent billions in post-disaster rebuilding. In 2018, Hurricane Michael caused more than \$4 billion in damages and rebuilding costs after pummeling Tyndall Air Force Base (AFB) in Florida.¹³ However, base leaders note that complete restoration and modernization of the base will not be completed until about 2026, nearly eight years after the hurricane.¹⁴ Now, DAF is calling Tyndall AFB the "Installation of the Future."¹⁵ Although unfortunate, Tyndall's rebuild should serve as a lesson to adapt existing DAF installations now rather than wait for a future natural disaster to occur.

This Article begins with a review of some of the most vulnerable DAF installations in the United States. Plagued by wildfires, droughts, flooding, and hurricanes, bases in Florida and California should be the first bases adapted for extreme weather impacts. DOD and DAF have policies in place that support modernization of their facilities, and functions to maintain continuous mission accomplishment despite environmental impacts.¹⁶ There have been projects for alternative energy, electric or hybrid vehicles, microgrids, and other "new age" technologies, but such projects are not widespread across DAF.¹⁷ Many of these technologies are subject to the time-consuming and administratively costly Federal Acquisition Regulation (FAR) government procurement processes.¹⁸ Not all acquisitions should require years for delivery or completion.

The Article then highlights some of the prominent laws, executive orders, and DOD and DAF policies that have climate implications, infrastructure and facility resiliency, and modernization. A review of key provisions from the National Defense Authorization Act (NDAA) of recent years shows how the U.S. Congress directs, appropriates, and limits military actions, including their procurement. The Article also notes the lack of DOD and DAF policy governing the use of the "other transactions authority" (OTA) as a procurement option, while decades' worth of FAR acquisitions rulemaking and conduct are well-documented and regulated.

Finally, the Article recommends top-down measures to modernize DOD facilities and installations quickly, effectively, and resiliently. First, it offers proposals for congressional implementation and expansion of existing legislation. One such proposal is the statutory expansion of the use of the OTA and creation of a separate OTA budget, to allow for faster and more efficient procurement. Other transactions (OTs) fall outside of the FAR, and many agencies appreciate the faster timelines that OTs provide, along with their other advantages.¹⁹ Then, where Congress cannot or does not act, the president, as the military's commander in chief, has several options available. DOD, DAF, and, ultimately, individual base commanders can take measures to modernize facilities as DOD races to adapt to extreme weather events.

A DOD- or DAF-wide mandate for immediate implementation is critical for both noncomplex and complex "green" projects on DAF installations. The mandate should require that installations implement plans and efforts for both installation modernization and mitigation (or show reasonable progress toward completion) by no later than

4. See GAO, *supra* note 1, at 14-16 (the expected life-spans of facilities vary by military branch).

5. *Id.* at 2.

6. *Id.*

7. See *id.*

8. The U.S. Army and U.S. Navy are the oldest U.S. military branches; thus, their installations pre-date those of the U.S. Department of the Air Force (DAF). While DAF is newer than the Army and Navy, many of its facilities are also aged. See U.S. Air Force Historical Research Agency, *The Birth of the United States Air Force*, <https://www.afhra.af.mil/About-Us/Fact-Sheets/Display/Article/433914/the-birth-of-the-united-states-air-force/> (last visited Oct. 18, 2024) (DAF was officially created in 1947 via the National Security Act of 1947).

9. Mackenzie Eaglen, *U.S. Military Bases Are Literally Falling Apart*, AM. ENTER. INST. (Dec. 2, 2022), <https://www.aei.org/op-eds/u-s-military-bases-are-literally-falling-apart/> (citing CBO, THE ARMY'S COSTS TO ELIMINATE ITS DEFERRED MAINTENANCE BACKLOG AND TO RENOVATE AND MODERNIZE ITS BUILDINGS 5 (2022)).

10. CBO, *supra* note 9, at 7.

11. *Id.* at 5. The Army, Navy, U.S. Marine Corps, and U.S. Coast Guard certainly have their own military bases and climate impact challenges; however, any reference to specific examples will be only for context. This Article will focus primarily on DAF domestic military installations.

12. 1 ROBERT MUELLER, U.S. AIR FORCE HISTORICAL RESEARCH CENTER, ACTIVE AIR FORCE BASES WITHIN THE UNITED STATES OF AMERICA ON 17 SEPTEMBER 1982 (1989), https://media.defense.gov/2010/Sep/21/2001330255/-1/-1/0/airforce_bases_us%20v1opt.pdf.

13. See NARAYANAN ET AL., *supra* note 2, at ix.

14. David Roza, *Tyndall Rises Again*, AIR & SPACE FORCES MAG. (Aug. 31, 2023), <https://www.airandspaceforces.com/article/tyndall-rises-again/>.

15. *Id.*

16. DOD's Climate Adaptation Plan and DAF's Climate Action Plan are two examples of such policies. These and other relevant policies and reports will be discussed in Parts I and II.C of this Article.

17. Some such examples will be discussed in Part I, particularly in the context of Tyndall AFB, Florida.

18. Nathaniel E. Castellano, "Other Transactions" Are Government Contracts, and Why It Matters, 48 PUB. CONT. L.J. 485, 488 (2019) (internal citations omitted).

19. 10 U.S.C. §§4021-4022 (Congress codified OTs herein).

two years of the issued mandate.²⁰ Understandably, some projects could involve complex construction requiring demolition and renovation. These projects can take several years to complete; however, the installation can have several other ongoing or completed projects during that time. Some noncomplex proposed projects could include green roofs (i.e., vegetation or “living” roofs), parking lot vertical solar panels, planting resilient trees or plants in areas suitable to the base’s climate, and purchasing or leasing electric vehicles for on-base shuttle, school bus, or taxi services.

Within the DAF mandate, installations must consider how existing facilities can be used and their vulnerability to extreme weather conditions. Such accountability could also include an assessment of necessary infrastructure mitigation. For example, most of the DAF installations in Florida are on or near coastal waters. The Article contends that scrambling to expend hundreds of millions (or billions in the case of Tyndall AFB) in rebuilding costs after every extreme weather event is unsustainable.²¹ As such events occur more frequently, this scramble will become impractical and very expensive for taxpayers. Though climate change impacts were once considered unprecedented, they must now be viewed as the baseline.

This shift in approach should demand both adaptive projects and projects to help mitigate the installations’ impacts, attempting to slow down the rate of extreme weather event occurrence. Thus, the military must shift to considering immediate and proactive, rather than reactive, steps to modernize facilities in a fiscally responsible manner. Wars are hardly won based solely on defensive tactics.²² Designated a national security threat, extreme weather conditions from climate change have been a vexing adversary. Both mitigation and adaptation are necessary for the longevity of the military’s structural assets. Rather than take defensive and reactionary measures once a devastating weather event occurs, the military must shift to proactively modernizing base facilities for climate resiliency.

DAF tests its aircraft, equipment, tactical vehicles, and uniforms to ensure they can withstand the worst conditions imaginable. With a reduction in non-mission-critical emissions from DAF facilities’ adaptation measures, the agency can help ensure that domestic stations withstand such conditions, too. Via efficient procurement methods, partnerships with local community or fellow agency partners can lead to innovative products and designs for facility modernization.

I. Imminent Need for Modernization at Select DAF Bases, and Brief Description of the OTA

To underscore the urgent need for modernization of DOD installation facilities, this part addresses DOD’s policy and measures taken to adapt to the growing issue and to mitigate its impact.²³ Additionally, it describes case studies of DAF installations in Florida and California that have experienced more frequent and/or intensive extreme weather conditions over the past several decades. One Florida installation, Homestead Air Reserve Base (ARB), was pummeled by a large hurricane in the early 1990s and was reduced in size and mission thereafter. This is significant for present purposes, because installation closures or downsizing after every major climate disaster is now unrealistic and mostly undesired. This part will highlight the compounding damage and the billions spent on rebuilding across several bases over just the past 10 years. Tyndall AFB, Florida; Vandenberg Space Force Base (SFB), California; and Beale AFB, California, illustrate these concerns.

After the installation-specific discussion, the part then describes how DOD defines “climate change,” and its classification of climate change as a national security threat. It then reviews the state of DOD’s infrastructure; specifically, the varying degrees of facilities’ and structures’ age, size, and usability, among other factors. The part closes with a discussion of government procurement with DOD- and DAF-specific uses of both FAR procurement and OTA.

A. Rise of Extreme Weather Conditions Affecting Key Florida and California DAF Installations

There have been many natural disasters impacting various DAF installations over the past several decades. That impact varies significantly from one occurrence to the next. Significant impacts on varying bases in Florida and California are addressed in this section.

1. Homestead AFB, Florida: Hurricane Andrew’s Impact in 1992

In the early 1940s, the Army Air Corps first decided an otherwise isolated airstrip near the Biscayne Bay, Florida, shore would serve as a strategic location.²⁴ From 1942 through 1945, the Homestead Army Air Field served as training grounds for thousands of carrier (C-54) transport pilots and air crew.²⁵ However, the airfield’s progress seem-

20. The justification for a two-year time frame is largely because installation commanders are in that role for about two to three years. This can vary depending on the installation and other factors.

21. See Roza, *supra* note 14.

22. Bernard Brodie & Rosalie West, *Defense, in ON WAR* 355, 357 (Michael Howard & Peter Paret eds., Princeton Univ. Press 1984), <https://doi.org/10.2307/j.ctt7svzz.17> (“Pure defense, however, would be completely contrary to the idea of war, since it would mean that only one side was waging it[.] But if we are really waging war, we must return the enemy’s blows[.]”).

23. Given the hierarchy of the federal agencies, DOD oversees DAF. Any DOD policy or directive is binding on the military services. This Article refers to varying DOD examples, data, and other information; however, it focuses on DAF installations, policies, and examples, where applicable. Much of the analysis and many proposed solutions may apply to DOD as a whole; however, applicability may vary by each military service, existing legislation, and policy, among other considerations.

24. BRITTANY T. STOKES, U.S. AIR FORCE, FACT SHEET: HISTORY OF HOMESTEAD AIR RESERVE BASE (2012), <https://www.nrc.gov/docs/ML1434/ML14342A024.pdf>.

25. *Id.*

ingly came to an abrupt halt when on September 15, 1945, a hurricane sustaining winds of up to 145 miles per hour (mph) devastated the base.²⁶ This hurricane occurred only three days after the base was officially founded.²⁷ The base endured severe damage, including the destruction of its shopping facility, enlisted barracks, and nurses' dormitory, and both the fire station and laundry facility were declared total losses.²⁸ Several aircraft were tossed around by the powerful winds.²⁹ Nearly three months after the hurricane, Homestead Air Field was completely closed on December 1, 1945.³⁰

After DAF was inaugurated in 1947, Homestead Army Air Field's strategic advantage and location garnered attention several years later.³¹ Sitting on 2,938 acres of land, the base was reactivated as Homestead AFB in 1955.³² Homestead AFB's history was forever changed by the crushing blow of Hurricane Andrew on August 24, 1992. Hurricane Andrew was a Category 5 storm, which forced a mass evacuation of military and family members from the base as well as from the surrounding area.³³

In preparation for the storm, the base's aircraft were relocated to Wright-Patterson AFB, Ohio, and remained there until April 1993.³⁴ That month, DAF temporarily relocated the 482nd Fighter Wing (essentially a fighter jet mission) from Homestead AFB to MacDill AFB, near Tampa, Florida.³⁵ In the two years that followed the hurricane, more than \$100 million was spent in initial rebuilding projects, with the infrastructure required for the flying mission taking priority.³⁶ About 97% of the facilities were severely damaged.³⁷

Shortly after Hurricane Andrew, the base was placed on the 1993 Base Realignment and Closure (BRAC) Commission's list, but after much resistance from many civilian leaders, the commission removed the base from the list for consideration.³⁸ The base was instead con-

verted to Homestead ARB in 1994.³⁹ While the base was removed from the 1993 BRAC list, it experienced much change. In its conversion to Homestead ARB, 852 acres were apportioned to the base, with the area not used by the Air Force Reserve Command distributed between mostly government agencies and a few private entities.⁴⁰ The base remains open today.

2. Tyndall AFB, Florida: Hurricane Michael (2018)

Tyndall AFB is now considered DAF's "Installation of the Future."⁴¹ However, that title was earned after the installation was effectively wiped out by Category 5 Hurricane Michael. Prior to the hurricane, Tyndall AFB had about 860 housing units on base, with about 11,000 airmen, and their families, assigned there.⁴² In 2018, one of the installation's primary missions included housing and operating the fighter aircraft F-22 Raptor. Of DAF's 187 F-22 fleet, approximately 55 were based at Tyndall AFB, more than one-quarter of the total fleet.⁴³

In early October 2018, the base's personnel were unprepared for what would be the strongest hurricane to hit Florida's panhandle.⁴⁴ Lt. Col. Daniel J. Watson, who served as the staff judge advocate (SJA) for the base's legal office at that time, recounts how quickly the storm strengthened from a tropical storm to a Category 5 hurricane.⁴⁵ The storm made landfall with sustained winds of 161 mph.⁴⁶ The hurricane caused approximately \$25.1 billion in damages and at least 74 deaths across the panhandle region.⁴⁷ An evacuation order was issued for all base personnel.⁴⁸ In the hurricane's aftermath, many airmen and base civilian personnel were temporarily displaced, experienced instability, and sustained property damage.⁴⁹

Tyndall AFB has been in rebuild mode ever since. About \$5 billion is projected for rebuild projects on the installation with an anticipated completion date nearing 2026.⁵⁰

26. *Id.*

27. *Id.*

28. *Id.*

29. *Id.*

30. *Id.*

31. *See id.*

32. *Id.*

33. *Id.*

34. *Id.*

35. *Id.*

36. *Id.*; see U.S. Inflation Calculator, *Home Page*, <https://www.usinflationcalculator.com/> (last visited Oct. 18, 2024) (According to the U.S. Inflation Calculator, when adjusted for inflation on March 19, 2024, the rebuilding cost of \$100 million in 1992 is equal to approximately \$221,187,455.45. The site uses information from the latest U.S. government's Consumer Price Index (CPI), which was most recently published on March 12, 2024, for inflation figures through February 2024.); *but see* U.S. Bureau of Labor Statistics, *CPI Inflation Calculator*, https://www.bls.gov/data/inflation_calculator.htm (last visited Oct. 18, 2024) (attempting to use the U.S. Bureau of Labor Statistics' CPI Inflation Calculator, but the site's Inflation Calculator would only generate results for values less than \$10 million).

37. U.S. Environmental Protection Agency (EPA), *Homestead Air Force Base, FL—Cleanup Activities*, <https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.cleanup&id=0404746> (last visited Oct. 18, 2024).

38. Gideon Grudo, *When Andrew Hammered Homestead*, AIR & SPACE FORCES MAG. (June 26, 2017), <https://www.airandspaceforces.com/article/when-andrew-hammered-homestead/>.

39. *Id.*

40. See U.S. EPA, *supra* note 37.

41. U.S. Air Force, *Tyndall AFB Installation Facility Standards*, <https://www.tyndallafb.com/> (last visited Oct. 18, 2024).

42. Amanda Morris, "It Will Be Years" Before Life at Tyndall Air Force Base Returns to Normal, NPR (Oct. 20, 2018, 5:09 AM), <https://www.npr.org/2018/10/20/658512648/it-will-be-years-before-life-at-tyndall-air-force-base-returns-to-normal> (quoting Brig. Gen. Edward Thomas, Air Force director of public affairs).

43. *Id.*

44. Daniel J. Watson, *Hurricane Michael: Confronting a Worst Case Scenario: Tyndall AFB & Hurricane Michael*, JAG REP., Oct. 23, 2019, at 1, 4 (internal citation omitted).

45. *See id.* at 1-3.

46. *Id.* at 4 (internal citation omitted).

47. Tiffany Price, *Surviving Hurricane Michael in Building 909*, AIR FORCE INSTALLATION & MISSION SUPPORT CTR. (Mar. 9, 2022), <https://www.afimsc.af.mil/News/Article-Display/Article/2965969/surviving-hurricane-michael-in-building-909/>.

48. See Watson, *supra* note 44; see also Vincent L. DeFabo, *Civil Law: Hurricane Michael Response: Medical Legal Considerations Before, During, and After a Natural Disaster*, JAG REP., May 21, 2020, at 1.

49. See DeFabo, *supra* note 48.

50. Lucas Thompson, *After Destruction, Florida Air Force Base Rebuilds to Face Effects of Climate Change*, NBC NEWS (Sept. 24, 2022, 8:14 AM), <https://www.nbcnews.com/health/after-destruction-florida-air-force-base-rebuilds-to-face-effects-climate-change>.

Nonetheless, new F-35 Lightning II aircraft will similarly be housed at the installation.⁵¹ The first three state-of-the-art F-35s arrived at Tyndall on August 1, 2023.⁵² The base is expected to house a total of 78 F-35s.⁵³ Housing the new F-35s in addition to the devastation from the hurricane caused DOD to award its single largest construction contract valued at nearly \$532 million.⁵⁴ That firm-fixed price contract includes \$72 million in contingencies and oversight costs, and intends to deliver “11 projects that directly support flight operations for the F-35.”⁵⁵

The government is also investing millions in novel military infrastructure projects on Tyndall AFB to better adapt the base to future hurricanes and similarly devastating natural disasters. On April 1, 2021, a total small business set-aside contract was awarded for restoration of the longleaf pine ecosystem in a 60- to 80-acre area on Tyndall AFB.⁵⁶ This contract was quickly awarded for \$231,270 under the FAR’s small business set-aside provision.⁵⁷ The solicitation-to-award timeline took less than two months.⁵⁸

This contract was a collaborative effort between Tyndall AFB, the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, and the contracted small business. The project seems part adaptation and part mitigation in purpose, as the native pines have many benefits. They resist strong winds and coastal surges; increase shade, which helps reduce temperatures and also lowers base energy costs and

consumption; and provide cover from wind-tossed debris.⁵⁹ As of August 31, 2023, the collaborative effort planted 6.5 million longleaf pine seedlings, with another million projected in 2024.⁶⁰ This effort expands to line the local U.S. Highway 98 with 475,000 trees over a 700-acre area.⁶¹

Another adaptation effort is a basewide measure requiring that all new construction must withstand Category 5 hurricane winds, ranging between 165 and 186 mph winds.⁶² A firm-fixed price-negotiated procurement was awarded for the two-phase design and build of “Zone 7 F-35 Munitions Storage Facilities.”⁶³ This unrestricted FAR procurement called for new additions to four buildings and a new build.⁶⁴ The solicitation was initially published on April 2, 2021, and the contract was awarded nearly two years later on March 24, 2023, for more than \$94 million.⁶⁵

A separate two-phase construction contract solicitation was issued on November 5, 2020, and was restricted as a total small business set-aside under the FAR. The build was for the “Zone 8 Security Forces Mobility Storage.”⁶⁶ This 10,000-square-foot project will be resistant to up to 170-mph winds and will serve a variety of purposes for the base.⁶⁷ In contrast, this contract was awarded less than eight months later on July 12, 2021, for more than \$6.5 million.⁶⁸

Another interesting project recently underway at Tyndall AFB is a coastal zone restoration project using “Reefense” technology.⁶⁹ In 2021, the Defense Advanced Research Projects Agency (DARPA) released a “Broad

www.nbcnews.com/science/environment/destruction-florida-air-force-base-rebuilds-face-effects-climate-change-rcna43091.

51. See Greg Hadley & John A. Tirpak, *In Secret Solicitation, Air Force Starts Bidding for NGAD to Replace F-22*, AIR & SPACE FORCES MAG. (May 18, 2023), <https://www.airandspaceforces.com/air-force-selection-processing-ngad/> (noting that the F-22 Raptors will be retired by around year 2030 and will be replaced by the Next Generation Air Dominance (NGAD) fighter). On May 18, 2023, DAF released its classified solicitation to industry for engineering and manufacturing development of the NGAD. DAF expects to award the contract in late 2024. *Id.*
52. Tiffany Del Oso, *Long Awaited F-35 Aircraft Touch Down at Tyndall*, TYNDALL AIR FORCE BASE (Aug. 1, 2023), <https://www.tyndall.af.mil/News/Article-Display/Article/3478806/long-awaited-f-35-aircraft-touch-down-at-tyndall/>.
53. Bailey Nichols, *Tyndall Holds Arrival Ceremony for 5 More F-35s*, MY-PANHANDLE.COM NEWS (Nov. 6, 2023, 6:17 PM), <https://www.mypanhandle.com/news/military/tyndall-afb/tyndall-holds-arrival-ceremony-for-5-more-f-35s/>.
54. Scott Maucione, *Air Force Awards Largest Ever Military Construction Contract for F-35 Facilities at Tyndall*, FED. NEWS NETWORK (May 17, 2022, 3:41 PM), <https://federalnewsnetwork.com/air-force/2022/05/air-force-awards-largest-ever-military-construction-contract-for-f-35-facilities-at-tyndall/?readmore=1>.
55. See *id.*; see also DOD, *Contracts for May 10, 2022*, <https://www.defense.gov/News/Contracts/Contract/Article/3027116/> (last visited Oct. 18, 2024).
56. Julia K. Siderewicz, Solicitation No. W9128F21Q0022: Solicitation/Contract/Order for Commercial Items (Feb. 19, 2021), <https://sam.gov/opp/89aa23cb7da849cca99978e97a109e01/view> (last visited Oct. 18, 2024) (pdf available under “Attachments/Links” section of web page).
57. SAM.gov, *Awards Summary for Notice ID: W9128F21Q0022*, <https://sam.gov/opp/89aa23cb7da849cca99978e97a109e01/view> (last visited Oct. 18, 2024).
58. See SAM.gov, *Forest Support at Tyndall AFB, FL, Notice ID: W9128F21Q0022: Awards Summary*, <https://sam.gov/opp/d224e8ba48d04c40bfb1a0b-8811c31b1/view> (last visited Oct. 18, 2024) (click on “Award Notices” in the left vertical menu) (The initial solicitation was issued February 19, 2021, with an amendment made on March 1, 2021. The amendment extended the proposal due date from March 12, 2021, to March 16, 2021. The award date was on April 1, 2021.).

59. TYNDALL AFB, LANDSCAPE MASTER PLAN B04-12 (2020), https://tyndallifs.com/images/landscape_master_plan/TAFB_Final_LandscapeMasterPlan.pdf.
60. See Roza, *supra* note 14.
61. Magen M. Reeves, *Deforestation on Tyndall AFB Leads to Ecosystem Restoration*, AIR UNIV. (Jan. 16, 2020), <https://www.airuniversity.af.edu/News/Display/Article/2059018/deforestation-on-tyndall-afb-leads-to-ecosystem-restoration/>.
62. See TYNDALL AFB, *supra* note 59, at B01.2.4 Coastal.
63. U.S. ARMY CORPS OF ENGINEERS, SOLICITATION No. W9127820R0118: SPECIFICATIONS FOR TWO-PHASE DESIGN AND CONSTRUCTION OF ZONE 7 F-35 MUNITIONS STORAGE FACILITIES, TYNDALL AIR FORCE BASE, FLORIDA (2021), <https://sam.gov/api/prod/opp/v3/opportunities/resources/files/030a6bcabe0e4b199f661cf64ff71fea/download?&status=archived&token=>.
64. SAM.gov, *W9127820R0118—Zone 7, F-35 Munitions Storage Facilities, Tyndall AFB, FL*, <https://sam.gov/opp/5e1206a0d6c44c428d4734e5e6994505/view> (last visited Oct. 18, 2024) (see “Description” section of web page).
65. *Id.*
66. U.S. ARMY CORPS OF ENGINEERS, SOLICITATION No. W9127820R0046: SPECIFICATIONS FOR TWO-PHASE DESIGN AND CONSTRUCTION OF ZONE 8 SECURITY FORCES MOBILITY STORAGE, TYNDALL AIR FORCE BASE, FLORIDA (2020), <https://sam.gov/opp/ae08dd099a04476bbeb6d68efb6ef683/view> (last visited Oct. 18, 2024) (W9127820R0046 PHASE ONE SPECS.pdf available under “Attachments/Links” section of web page).
67. Tyndall AFB, *Tyndall Rebuild: Security Forces Mobility Storage*, <https://www.tyndall.af.mil/News/Art/igphoto/2003016391/> (last visited Nov. 3, 2024).
68. See SAM.gov, *Notice ID: W9127821R0046: Two-Phase Design Build of Zone 8 Security Forces Mobility Storage, Tyndall AFB, FL (Bay County, FL)—General Information*, <https://sam.gov/opp/ae08dd099a04476bbeb6d68efb6ef683/view#general> (last visited Oct. 18, 2024) (this project was awarded about eight months after the initial solicitation, with at least two amendments made to the solicitation during that time); see also SAM.gov, *Notice ID: W9127821C0027: Two-Phase Design Build of Zone 8 Security Forces Mobility Storage, Tyndall AFB, FL (Bay County, FL)*, <https://sam.gov/opp/e5d5d4ad381d49a18d20ba5d693eb83c/view> (last visited Oct. 18, 2024) (listing Related Notice: W9127821R0046).
69. See Roza, *supra* note 14.

Agency Announcement” for a research and development (R&D) project, involving the development of “self-healing, hybrid biological, and engineered reef-mimicking structures to mitigate the coastal flooding, erosion, and storm damage that increasingly threaten civilian and DoD infrastructure and personnel.”⁷⁰ After reviewing proposals, DARPA awarded the State University of New Jersey (Rutgers) more than \$12 million in grant funds for their oyster reef research on the Gulf of Mexico coast.⁷¹ Rutgers is now working with Tyndall AFB on its plans for coastal zone restoration and refortification using “biodegradable concrete and cement as a foundation for seagrass and oysters[, with a] goal for oysters to build and repair wave-blocking reefs on their own.”⁷²

In 2021, the Air Force Civil Engineer Center (AFCEC) became DAF’s designated organizational lead for the Natural Disaster Recovery Division (NDR).⁷³ AFCEC has been heavily involved in Tyndall AFB’s repair and installation resiliency efforts. The NDR is primarily charged with responding to current and future natural disasters, while also ensuring installation resiliency for future extreme weather events.⁷⁴

3. Recent Examples of California DAF Bases Affected by Natural Disaster Exposure

Like Florida, California has DAF military installations. Similarly, California is increasingly susceptible to damaging weather conditions propelled by climate change. An increase in wildfires and longer periods of severe drought and higher temperatures are the most vexing of these threats.⁷⁵ Researchers in a comprehensive study reported that California saw a “substantial and statistically significant” historical trend in several climate factors between 1979 and 2018.⁷⁶ The report concluded that during that

time period, there was an increased weather-driven wildfire risk in the autumn, which coincided “with a strong and robust warming trend . . . , and a modest negative precipitation trend.”⁷⁷ With more than 30 major defense installations, and six DAF-led and -operated bases located in California, extreme weather has also affected DAF base infrastructure, missions, and their personnel.⁷⁸

Since 2016, several devastating wildfires have impacted California and some DAF installations located in the state.⁷⁹ From September through the first half of November 2018, the weather conditions were “very warm and dry, which produced a period of extraordinarily high wildfire potential.”⁸⁰ On November 8, 2018, the Woolsey Fire began, which ultimately consumed almost 100,000 acres of public land, and 88% of the National Park Service’s land within the Santa Monica Mountains National Recreation Area.⁸¹ This fire was reported extinguished on January 4, 2019.⁸² The county of Los Angeles estimated \$3-\$5 billion in insured losses for the county, with about \$52 million in fire suppression costs alone.⁸³

The Woolsey Fire was so close to the Channel Islands Air National Guard Station that it could be seen from the base’s flightline.⁸⁴ California’s five Air National Guard wings were activated to respond to the fires, one of which is located on Beale AFB.⁸⁵ Other than visible smoke, the DAF base infrastructure and personnel were physically unharmed.⁸⁶ Camp Fire was similarly ignited in early November 2018, about 80 miles north of Sacramento.⁸⁷ Camp Fire proved

70. BIOLOGICAL TECHNOLOGIES OFFICE, DARPA, BROAD AGENCY ANNOUNCEMENT: REEFENSE, HR001121S0012, at 4 (2021), <https://sam.gov/opp/a6a1466b3dcd4bafba274691b35607f9/view> (last visited Oct. 18, 2024) (HR001121S0012.pdf available under “Attachments/Links” section of web page).

71. Press Release, DARPA, DARPA Selects Teams to Develop Novel Hybrid Reef-Mimicking Structures (June 15, 2022), <https://www.darpa.mil/news-events/2022-06-15> (DARPA also awarded grant monies to two other research teams for their own innovative proposals). See Jennifer Chudy Simon, *Rutgers Awarded \$12.6 Million Grant to Create Oyster Habitat for Coastal Resilience*, RUTGERS TODAY (Sept. 1, 2022), <https://www.rutgers.edu/news/rutgers-awarded-126-million-grant-create-oyster-habitat-coastal-resilience>; see also SAM.gov, Notice ID: HR001121S0012-HR001122C0136: Reefense—History, <https://sam.gov/opp/c80f41ecde444951b7078922a7c37b8e/view#history> (last visited Oct. 18, 2024).

72. David Roza, *How to Protect Your Air Base From Hurricanes, Part 1: Let Nature Help*, AIR & SPACE FORCES MAG. (Aug. 9, 2023), [https://www.airandspaceforces.com/tyndall-air-force-base-hurricane-part-1/\(internal-citation-omitted\)](https://www.airandspaceforces.com/tyndall-air-force-base-hurricane-part-1/(internal-citation-omitted)).

73. Tyndall AFB, *Installation of the Future*, <https://www.tyndall.af.mil/Rebuild/> (last visited Oct. 18, 2024).

74. *Id.*

75. Michael Goss et al., *Climate Change Is Increasing the Likelihood of Extreme Autumn Wildfire Conditions Across California*, 15 ENV’T RSCH. LETTERS 094016 (2020), <https://iopscience.iop.org/article/10.1088/1748-9326/ab83a7/pdf>.

76. *Id.* at 11.

77. *Id.*

78. California Governor’s Military Council, *California Military Installations and Operational Areas*, https://militarycouncil.ca.gov/s_californiamilitarybases/ (last visited Oct. 18, 2024) (the six DAF bases are Beale AFB (northeast of Sacramento, California); Edwards AFB (northeast of Santa Clarita and Los Angeles); Los Angeles SFB (near Los Angeles International Airport); March ARB (southeast of Riverside and San Bernardino); Travis AFB (between San Francisco and Sacramento); and Vandenberg SFB (on the Pacific Coast, southwest of Santa Maria)).

79. See NARAYANAN ET AL., *supra* note 2, at 50 (citation omitted) (In 2016, Vandenberg AFB ultimately delayed a rocket launch after a wildfire blazed through the surrounding area. Although the wildfire did not cause structural damage on the base, it did “c[o]me dangerously close to two space launch pads.”).

80. See Goss et al., *supra* note 75, at 7.

81. National Park Service, *2018 Woolsey Fire*, <https://www.nps.gov/samo/learn/management/2018-woolsey-fire.htm> (last visited Oct. 18, 2024).

82. CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL, DTSC FINAL SUMMARY REPORT OF WOOLSEY FIRE 4 (2020), https://dtsc.ca.gov/wp-content/uploads/sites/31/SSFL/DTSC_Final_Summary_Report_of_Woolsey_Fire.pdf.

83. Citygate Associates, LLC, *Executive Summary, in COUNTY OF LOS ANGELES: AFTER ACTION REVIEW OF THE WOOLSEY FIRE INCIDENT 1, 4* (2019), <https://file.lacounty.gov/SDSInter/bos/supdocs/144968.pdf>.

84. Amy Hudson, *California Air National Guard Activates to Fight Massive Wildfires*, AIR & SPACE FORCES MAG. (Nov. 14, 2018), <https://www.airandspaceforces.com/california-air-national-guard-activates-to-fight-massive-wildfires/>.

85. *Id.*

86. *Id.*; see also CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL, *supra* note 82, at 19. California’s Department of Toxic Substances Control (DTSC) completed analyses of oil and ash samples testing for radiation and/or hazardous materials in specific areas after the Woolsey Fire. Based on the samples collected, the DTSC concluded none of their measurements or analyses indicated their presence. The DTSC also concluded the collected air samples were “consistent with local ambient air quality results.”

87. Richard Gonzales & Bill Chappell, *California’s Camp Fire Becomes the Deadliest Wildfire in State History*, NPR (Nov. 13, 2018, 9:00 AM), <https://>

to be the deadliest wildfire in California's history.⁸⁸ In five days, Camp Fire burned 153,000 acres, caused major property damage throughout the region, and caused about \$17 billion in total losses.⁸⁹ Additionally, the fire's smoke ultimately produced San Francisco's and the surrounding areas' worst air quality on record.⁹⁰

Wildfires are not the only extreme weather conditions affecting California bases. In 2019, Beale AFB experienced localized heavy rain, which overwhelmed the base's storm-water conveyance systems and caused flooding.⁹¹ On June 8, 2021, some base housing residents on Beale AFB and personnel were evacuated after the Intanko Fire broke out in nearby Yuba County.⁹² Though no base structures were damaged, the wildfire reached about 150 yards from the base's elementary school.⁹³

In a worsening trend, in August 2020, an evacuation of nonessential personnel was ordered for Travis AFB, as the LNU Lightning Complex Fire blazed through some areas just outside the installation's perimeter.⁹⁴ That, along with the Jones Fire in a different county, caused poor air quality for both Travis AFB and Beale AFB.⁹⁵ Then, in August 2021, 120 National Guard and Air Force Reserve members were activated for wildfire suppression and additional assistance to the already 1,000 activated California National Guard members.⁹⁶ Burning since July 14, 2021, the Dixie Fire engulfed 630,000 acres, becoming the second-largest record wildfire in California's history.⁹⁷ However, according to Chief Thom Porter, director of the California Department of Forestry and Fire Protection, the Dixie Fire was the first wildfire in his memory to burn from the west of the Sierra Nevada and crest over into the valley floor into the east of the range.⁹⁸

While wildfires have not caused structural damage to DAF infrastructure in recent years, they have grown stron-

ger, more frequent, and ever closer to several installations in the region. Gradually, more military personnel and equipment have been dedicated in recent years to managing and suppressing the fires, and also, unfortunately, in recovery efforts. Sadly, rising uncertainties in extreme weather conditions also affect the airmen, their families, and civilian personnel who work and live near the installations.

B. DOD's Climate Change Policy

In recent decades, DOD military installations in the continental United States have experienced new, dramatic weather impacts. Many of these weather conditions result collectively in billions of taxpayers' dollars being spent on rebuilding or renovating installation infrastructure. California and Florida are not the only locations experiencing severe weather events, including hurricanes, wildfires, droughts, flooding, and extreme heat. Aside from the extensive and costly property damage, extreme weather may have other impacts for DAF installations.

Evacuations due to hurricanes require military, DOD employees, and their families to leave and find shelter elsewhere.⁹⁹ Evacuations or base closures can affect access to medical care. Many base personnel and retirees in the local area often seek medical care on installations. If such installations are closed or temporarily impacted, access to health care may be difficult for some.¹⁰⁰ It is also foreseeable that military personnel may develop mental health concerns from experiencing such climate threats, as surviving, or quickly evacuating (alone or with families) while leaving most of their belongings and livelihood behind, can be a traumatic event.¹⁰¹ It is no surprise that climate change has been recognized as having significant national security implications.¹⁰²

DOD is the United States' largest consumer of energy and the world's single biggest institutional petroleum user.¹⁰³ Although still at high levels, DOD has generally

www.npr.org/2018/11/13/667315613/californias-camp-fire-becomes-the-deadliest-in-state-history.

88. Clifford F. Mass & David Ovens, *The Synoptic and Mesoscale Evolution Accompanying the 2018 Camp Fire of Northern California*, 102 BULL. AM. METEOROLOGICAL SOC'Y E168, E169 (2021) (internal citation omitted), [https://journals.ametsoc.org/configurable/content/journals\\$002fbams\\$002f102\\$002f10002fbams-D-20-0124.1.xml](https://journals.ametsoc.org/configurable/content/journals$002fbams$002f102$002f10002fbams-D-20-0124.1.xml).

89. *See id.*

90. *Id.* at E177 (citation omitted).

91. ANU NARAYANAN ET AL., RAND CORPORATION, RRA1730-1, ACCOUNTING FOR CLIMATE RESILIENCE IN INFRASTRUCTURE INVESTMENT DECISIONMAKING 32 (2023), https://www.rand.org/pubs/research_reports/RRA1730-1.html.

92. Rachel S. Cohen, *Wildfire Prompts Beale AFB to Evacuate Some Base Housing*, AIR FORCE TIMES (June 8, 2021), <https://www.airforcetimes.com/news/your-air-force/2021/06/08/wildfire-prompts-beale-afb-to-evacuate-some-base-housing/>.

93. *Id.*

94. Jennifer-Leigh Oprihory, *Travis AFB Evades Fire Damage, but Evacuation Order Remains*, AIR & SPACE FORCES MAG. (Aug. 20, 2020), <https://www.airandspaceforces.com/travis-afb-evades-fire-damage-but-evacuation-order-remains>.

95. *Id.*

96. Crystal Housman, *Cal Guard Actively Fights State's Wildfires*, U.S. ARMY (Aug. 19, 2021), https://www.army.mil/article/249548/cal_guard_actively_fights_states_wildfires.

97. *Id.*

98. *Id.*; *see also* David R. Baker, *California's Dixie Fire Burns Clear Across a Mountain Range*, BLOOMBERG (Aug. 18, 2021, 6:07 PM), <https://www.bloomberg.com/news/articles/2021-08-18/california-s-dixie-fire-burns-clear-across-a-mountain-range>.

99. *See, e.g.*, Oprihory, *supra* note 94; Cohen, *supra* note 92; DeFabo, *supra* note 48, at 1.

100. DeFabo, *supra* note 48, at 5. In 2016, Hurricane Michael also impacted access to medical care for military personnel stationed in the panhandle of Florida, like at Tyndall AFB and Eglin AFB. TRICARE, the primary health insurance for active military members, "authorized most evacuees to receive medical care from a TriCare authorized provider without a referral. This authorization lasted in some counties for one week and in more impacted counties for over three months." *Id.*

101. *See* Ju-Yeon Lee et al., *The Impact of Community Disaster Trauma: A Focus on Emerging Research of PTSD and Other Mental Health Outcomes*, 56 CHONNAM MED. J. 99 (2020), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7250671/> (These extreme weather events can prove even costlier in veterans' disabilities claims for mental health concerns from their time in service attributed to the traumatic experience of surviving such an event. It may also become increasingly difficult and expensive to move missions around to other installations and relocate airmen, their families, and other personnel.).

102. OFFICE OF THE UNDERSECRETARY FOR POLICY (STRATEGY, PLANS, CAPABILITIES), DOD, DEPARTMENT OF DEFENSE CLIMATE RISK ANALYSIS (2021), <https://media.defense.gov/2021/Oct/21/2002877353/-1/-1/0/DOD-CLIMATE-RISK-ANALYSIS-FINAL.PDF> [hereinafter DOD CLIMATE RISK ANALYSIS] (report submitted to National Security Council).

103. NETA C. CRAWFORD, BROWN UNIVERSITY, PENTAGON FUEL USE, CLIMATE CHANGE, AND THE COSTS OF WAR 4 (2019), <https://watson.brown.edu/costsofwar/files/cow/imce/papers/Pentagon%20Fuel%20Use%20>

reduced its total energy consumption since 2011.¹⁰⁴ In recent years, top U.S. military officials have increasingly viewed climate change as a national threat. They recognize the impact extreme weather conditions have had on the continental United States and overseas military installations. Leadership has been forced to recognize and adapt to factors like severity, locality, and frequency of wildfires, hurricanes, rising temperatures, flooding, and melting Arctic glaciers, among others. Aside from the billions spent on post-weather event repair and rebuild, the impact on the lives of military and DOD civilian personnel is also of growing concern.

DOD defines “climate change” as “[v]ariations in average weather conditions that persist over multiple decades or longer that encompass increases and decreases in temperature, shifts in precipitation, and changing risk of certain types of severe weather events.”¹⁰⁵ In a speech to U.S. Military Academy West Point cadets, Deputy Defense Secretary Kathleen Hicks noted the solution to climate change is not straightforward, but affirmatively stated, “Climate change is a national security issue, and for the national security community, that declaration is not controversial—it’s fact.”¹⁰⁶ Secretary of the Air Force Frank Kendall also noted, “Extreme weather and environmental conditions are already imposing high costs on [DAF] installations and operational missions, while simultaneously posing new risks to our ability to train and operate effectively.”¹⁰⁷

C. DOD Military Bases’ Infrastructure Generally, With a Focus on DAF Bases

DOD reportedly has more than 550,000 facilities on its installations based in and outside the continental United States.¹⁰⁸ In total, their estimated value is about \$1.3 trillion.¹⁰⁹ In 2022, GAO completed an analysis of DOD’s facility sustainment funding, and submitted its report to the congressional Subcommittee on Readiness and Management Support, U.S. Senate Committee on Armed Forces.¹¹⁰ GAO found, *inter alia*, that DOD does not “fully account for the costs of sustaining facilities that exceed their expected lifespans”; therefore, DOD underestimates its requested annual funding requirements sought from Congress.¹¹¹ In fiscal year (FY) 2020, 29% of the buildings in use or in caretaker status by the Army, DAF, U.S.

Navy, and U.S. Marine Corps were built more than 60 years ago.¹¹²

GAO concluded that DOD has a “growing deferred maintenance backlog of at least \$130 billion, [and] DoD faces significant risk to its objective of maintaining facilities in good working order to meet mission requirements.”¹¹³ GAO credits DOD for its effort in recent years to improve its management of the deferred maintenance backlog risk, but GAO believes such efforts can be strengthened.¹¹⁴ GAO noted that DOD would benefit from successful implementation of the Sustainment Management System (SMS), which is a tool that can help DOD manage risks presented by deferred maintenance on infrastructure.¹¹⁵ GAO found that as of October 2021, DOD’s SMS implementation was three years delayed, but DAF was the service furthest along in its implementation.¹¹⁶

DAF is a newer military branch than the Army and Navy; thus, its infrastructure on sole DAF installations may generally be newer in the aggregate. Nevertheless, there are several locations where an installation is jointly occupied by multiple services, so some infrastructure and portions of the base may be older than others. DAF reportedly predicted \$90 billion in facilities’ deferred maintenance by FY 2050, which is a 195% increase from its FY 2020 deferred backlog.¹¹⁷ Some officials told GAO such anticipated increases in deferred maintenance backlog are “a significant and growing risk to the department’s ability to support its missions,” but they also noted there exist “higher-priority program requirements.”¹¹⁸

Of the FY 2020 reported data, DAF’s deferred maintenance backlog was the highest of the sister services.¹¹⁹ Yet, for the first time since 2017, DAF received 98% in obligated funds for facility sustainment in FY 2020.¹²⁰ Some officials believed DOD-deferred maintenance backlogs “are more likely to be addressed by disposing of facilities, rather than funding the delayed sustainment activities associated with the backlogs.”¹²¹

2C%20Climate%20Change%20and%20the%20Costs%20of%20War%20Revised%20November%202019%20Crawford.pdf.

104. See *id.* fig. 1 (internal citations omitted).

105. See DOD CLIMATE RISK ANALYSIS, *supra* note 102, at 5 (citing DOD Directive 4715.21, *supra* note 3).

106. Jim Garamone, *Hicks Defines Need to Focus DOD on Climate Change Threats*, U.S. DEP’T DEF. (Aug. 30, 2023), <https://www.defense.gov/News/News-Stories/Article/Article/3510772/hicks-defines-need-to-focus-dod-on-climate-change-threats/>.

107. OFFICE OF THE ASSISTANT SECRETARY FOR ENERGY, INSTALLATIONS, AND ENVIRONMENT, DAF, DEPARTMENT OF THE AIR FORCE CLIMATE ACTION PLAN (2022) [hereinafter DAF CLIMATE ACTION PLAN].

108. GAO, *supra* note 1, at 6.

109. *Id.* GAO Highlights.

110. *Id.* at 1-2.

111. *Id.* GAO Highlights.

112. *Id.* at 15. The buildings noted in this statistic also exceeded their expected life-spans. GAO noted that it did not include structures or linear structures in its analysis.

113. *Id.* at 30. “Deferred maintenance backlog” incorporates regular or preventive maintenance that the base’s real property managers would like to complete but have yet to address. Such improvements would improve the property’s condition to meet the service’s standards, but “[f]ailure to perform such maintenance could accelerate the natural degradation of property and substantially increase the costs of renovations in the future.” CBO, THE NAVY’S COSTS TO ELIMINATE ITS DEFERRED MAINTENANCE BACKLOG AND TO RENOVATE AND MODERNIZE ITS BUILDINGS 1 (2023), <https://www.cbo.gov/system/files/2023-11/59381-navy.pdf>.

114. GAO, *supra* note 1.

115. See GAO, *supra* note 1, at 26.

116. *Id.* at 27 (noting that DAF’s use of the SMS helps them determine the “condition assessments [and] model scenarios of various funding levels and their impact, over time, on facility condition”).

117. *Id.* at 22.

118. *Id.*

119. *Id.* (stating that DAF reported a 12% deferred maintenance backlog, while the Army accounted for 9%, Navy reported 3%, and the Marine Corps reported 0%).

120. *Id.* at 46 fig.9 (reporting that DAF received the following amounts obligated for facility sustainment funding for each respective year: 85% in FY 2017; 81% in FY 2018; and 81% in FY 2019).

121. See *id.* at 22-23.

Aside from the overall facilities' structural concerns across DOD and DAF, research has also highlighted DAF infrastructure's vulnerability to extreme weather conditions. In 2020, the RAND Corporation completed a DAF-wide assessment of infrastructure exposure to natural disasters.¹²² The study evaluated for three natural hazards and their effects on installations: flooding, fires, and high winds.¹²³ The study concluded that more than 69% of DAF installations have less than 20% of their area in the special flood hazard area, but determined that five of the 10 bases assessed for sea-level rise exposure are in Florida, though Joint Base Langley-Eustis in Virginia also was exposed to flooding from increased sea levels.¹²⁴ Researchers acknowledged though that exposure to sea-level rise does not necessarily mean the installations are highly vulnerable.¹²⁵

Twenty DAF installations have at least some areas of the base categorized as "high" or "very high" risk of wild-fire hazard potential (WHP).¹²⁶ Of the five bases with the highest relative exposure to wildfires, two are in California (Beale AFB and Vandenburg SFB), and one in the panhandle of Florida (Eglin AFB).¹²⁷ The researchers caution that these classifications do not consider where on the base the higher relative WHP values exist, or the specific size of the base or its assets, which could all influence the exposure severity.¹²⁸ Nonetheless, wildfires are difficult to predict and are known to jump to nonadjacent areas.¹²⁹ Thus, they recommend DAF "should flag bases with even small portions with high exposure."¹³⁰

D. Assessment of Usage, Age, and Size of DOD Infrastructure

In 2016, the CBO determined DOD's military departments own or lease 27 million acres, with its buildings occupying 2.3 billion square feet.¹³¹ That year, \$25 billion was allocated to DOD's budget for base operations support (BOS), which covers base costs like utilities, housing, and maintenance.¹³² From the DOD buildings studied, the CBO found that DOD uses the most square footage for family housing (395 million square feet), maintenance and production (311 million square feet), and supply (295 million square feet).¹³³

122. See NARAYANAN ET AL., *supra* note 2, at iii (This research was completed by RAND Project AIR FORCE (PAF), which is a division of the RAND Corporation. The study was federally funded and prepared under contract FA7014-16-D-1000.).

123. *Id.* at 5.

124. *Id.* at 24, 31.

125. *Id.* at 32.

126. *Id.* at 33.

127. *Id.* at 34 (noting that the other two bases are Mountain Home AFB in Idaho, and Moody AFB in southeastern Georgia).

128. See NARAYANAN ET AL., *supra* note 2.

129. *Id.*

130. *Id.* at 33.

131. CBO, THE COST OF SUPPORTING MILITARY BASES 2 (2019) (citing DOD, BASE STRUCTURE REPORT—FISCAL YEAR 2018 BASELINE, <https://go.usa.gov/xpB6Z>).

132. *Id.* at 1.

133. *Id.* at 3 fig.1.

The older the infrastructure is, the higher the associated BOS costs may be.¹³⁴ Similarly, incidences of extreme weather, like extreme temperatures or precipitation, may affect the BOS costs for the base.¹³⁵ In fact, the CBO concluded a base's BOS costs are connected to its climate extremes, along with its size (personnel, infrastructure, and location), the operating branch of service, its hosted mission(s), and its location.¹³⁶ Of these, the strongest correlation was the base's number of employees and building space square footage.¹³⁷

The CBO published reports on the Army's and Navy's costs to eliminate their deferred maintenance backlogs and estimated costs associated with renovating or modernizing their buildings.¹³⁸ For their analyses and estimates, the CBO used reported data from the Navy current as of September 2020.¹³⁹ The Navy has more than 175,000 buildings and other structures, of which the CBO studied 20,000 across 59 bases.¹⁴⁰ The CBO found that, on average, the buildings analyzed were 48 years old, with 30% of buildings at 67 years or older.¹⁴¹ This would mean that, on average, the buildings analyzed were built in 1975, with 30% built in 1956 or later.¹⁴² While DAF is a newer branch of service than the Navy, the CBO noted DOD previously expressed a goal to "restore, modernize, or replace facilities once every 67 years."¹⁴³

E. OTs' Procurement in DOD and DAF

Each year, DOD receives hundreds of billions of congressionally authorized dollars in procurement spending. These funds are generally placed into different accounts or categories ("colors") of money for different spending purposes. This section begins with information from recent years on DOD's and, specifically, DAF's overall budgets and the appropriations related to infrastructure. Also, this section highlights budgeting allotments for climate change-related procurement in DAF. The section concludes with a discussion on what OTs are, how they are used, and how they are different from FAR-based contracts.

134. *Id.* at 7.

135. *Id.*

136. *Id.* at 1.

137. *Id.*

138. The CBO published its report on the Army's deferred maintenance backlog in November 2022, and its report on the Navy was released in November 2023. The CBO has not yet completed a similar assessment on DAF. However, the findings from its Navy report will be reviewed for two primary reasons: (1) the Navy is smaller than the Army, as is DAF; thus, some figures may be somewhat comparable, although certainly not the same nor exact; and (2) the DAF installations highlighted in this Article are coastal and/or somewhat near a large body of water, and many of the Navy's installations are similarly situated.

139. CBO, *supra* note 113, at 1.

140. *Id.*

141. *Id.* at 4.

142. *Id.*

143. *Id.*

1. DAF's Procurement Budget and Spending Trends for Military Construction and Other Resiliency, Adaptation, and Mitigation Projects

Of DOD's \$797.7 billion in discretionary spending in FY 2023, DAF received approximately \$205.8 billion.¹⁴⁴ From that budget, \$34.2 billion was allotted for procurement, and \$75.7 billion in operations and maintenance (O&M) projects, which funds BOS contracts, among other installation services and operational needs.¹⁴⁵ DAF has 176 installations worldwide, which includes Air Force Reserve, Air National Guard, and their active-duty locations.¹⁴⁶ The FY 2023 DAF military construction (MILCON) budget totaled \$2.3 billion.¹⁴⁷ The MILCON budget funds specific critical infrastructure and can be used for building, renovating, and modernizing for resiliency.¹⁴⁸

According to the RAND Project AIR FORCE study published in 2023, because the MILCON projects are typically funded through the installation's facilities sustainment, restoration, and modernization budget, a large MILCON project can mean less funds are available to cover the base's routine maintenance costs, presenting funding "trade off" decisions.¹⁴⁹ Such trade offs could potentially further delay an installation's deferred or delayed maintenance backlog.¹⁵⁰ Nonetheless, RAND recommends that DAF prioritize infrastructure resiliency projects while providing specific examples, scenarios, and recommendations for doing so.¹⁵¹

In FY 2023, DAF's aircraft procurement budget was \$22.2 billion, while its other procurement account was allocated about \$28 billion.¹⁵² With some exceptions, annual procurement funding can be obligated within a three-year period.¹⁵³ As military housing often consumes a large geographic area of an installation, DAF's budget included a \$588 million request for housing construction and O&M funds, with \$233 million to fund future projects, among other initiatives.¹⁵⁴

In its overview report for the FY 2023 budget, DOD's comptroller noted DOD's commitment to adapt to the changing global climate by investing more than \$3 billion for hardening critical infrastructure, creating platform efficiencies, and deploying innovative technologies.¹⁵⁵ Of this \$3 billion, \$2 billion is allocated toward "installation resiliency and adaptation," which can be used for adapting military infrastructure to combat climate change, exploring technologies for alternative energy, and modernizing DOD to keep pace with private industry (e.g., the recent and quick innovations in electric transportation).¹⁵⁶ Finally, \$807 million (of the \$3 billion) was intended for science and technology investments, particularly in varying climate-related research and prototyping.¹⁵⁷

The allocated FY 2024 DOD budget is \$841.4 billion, with DAF requesting \$215.1 billion.¹⁵⁸ DOD and DAF are investing billions in modernization projects; however, contracting methods that are quicker to execute and potentially extend to other installations with similar contractual needs should be considered.

2. DOD's Authorized Use of and Recent Finance Matters for OTs

Federal government procurement is primarily governed by the FAR. The FAR regulates a variety of contracting mechanisms and provides the necessary requirements and discretionary considerations that a federal contracting officer (CO) must follow or consider when procuring a widget, service, construction, or R&D contract. Annual defense procurement using FAR-regulated contracts can easily be estimated in the hundreds of billions.

For example, in FY 2023 through September 30, 2023, DOD had \$457 billion in award obligations and 4.3 million contractual transactions.¹⁵⁹ Of that amount, DAF had more than \$92.6 billion in contract award obligations and 36,228 new awards.¹⁶⁰ Approximately \$5.6 billion was committed to DAF MILCON obligations alone, and nearly \$70 billion committed to O&M obligations.¹⁶¹ The billions available for government spending create seemingly endless opportunities for both large and small firms to participate in defense procurement. However, FAR-governed procurement often creates the perception of reg-

144. DAF Financial Management and Comptroller, *Air Force President's Budget FY23*, <https://www.saffm.hq.af.mil/FM-Resources/Budget/Air-Force-Presidents-Budget-FY23/> (last visited Oct. 18, 2024). Divided between the Air and Space Forces, DAF's FY 2023 budget was approximately \$179.7 billion, and the Space Force's was \$26.1 billion. Of the overall budget, DAF received \$52.8 billion in research, development, test, and evaluation (RDT&E) funds. Specifically, DAF received \$36.2 billion in RTD&E funds, while the Space Force received \$16.6 billion.

145. *Id.*

146. See NARAYANAN ET AL., *supra* note 91, at 10.

147. *Id.* at 12 (citing DAF, FISCAL YEAR 2023 BUDGET OVERVIEW (2022)).

148. *Id.*

149. *Id.*

150. *See id.*

151. *Id.* at vi.

152. ALEXANDRA G. NEENAN, CONGRESSIONAL RESEARCH SERVICE, IF10599, DEFENSE PRIMER: PROCUREMENT 1 tbl.1 (2024) (internal citation omitted), <https://crsreports.congress.gov/product/pdf/IF/IF10599> (DAF's Missile Procurement account was \$3 billion, and DAF's Procurement of Ammunition account was \$0.9 billion).

153. *Id.*

154. OFFICE OF THE UNDER SECRETARY OF DEFENSE (COMPTROLLER)/CHIEF FINANCIAL OFFICER, DOD, DEFENSE BUDGET OVERVIEW: UNITED STATES DEPARTMENT OF DEFENSE FISCAL YEAR 2023 BUDGET REQUEST 6-28 (2022).

155. *Id.* at 4-1.

156. *Id.* at 4-17.

157. *See id.* at 4-18 (there are many other science and technology investments for which DAF could use these funds, such as hybrid tactical vehicles, fuel cells, and advanced energy storage).

158. DAF Financial Management and Comptroller, *Air Force President's Budget FY24*, <https://www.saffm.hq.af.mil/FM-Resources/Budget/Air-Force-Presidents-Budget-FY24/> (last visited Oct. 18, 2024).

159. USAspending.gov, *Agency Profile: Department of Defense (DoD)—Award Spending*, <https://www.usaspending.gov/agency/departement-of-defense?fy=2023§ion=award-spending> (last updated Sept. 30, 2023) (this figure excludes OTs and Indefinite Delivery Vehicle award obligations).

160. *Id.* (listing specific numbers for DAF).

161. USAspending.gov, *Agency Profile: Department of Defense (DoD)—Status of Funds*, <https://www.usaspending.gov/agency/departement-of-defense?fy=2023§ion=status-of-funds> (last updated Sept. 29, 2023) (click on "Air Force" in "Department of Defense (DOD) by Sub-Component for FY 2023" table).

ulatory burden, which often repels many nontraditional defense contractors.¹⁶²

OTs are not the standard procurement method, and they are not FAR-based.¹⁶³ They are often defined by what they are not. They are not “procurement contracts, cooperative agreements, or [grants.]”¹⁶⁴ Rather, they are a transaction by which certain agencies can procure specific innovative projects.¹⁶⁵ These projects often attract nontraditional defense contractors for collaboration on new or cutting-edge projects for the military.¹⁶⁶ DOD and secretaries of the military branches are authorized to engage in prototype and follow-on production OTs.¹⁶⁷

DOD’s OTA-obligated funds rose from \$7.6 billion in FY 2019 to more than \$16 billion in FY 2020, due largely to the COVID-19 pandemic response.¹⁶⁸ About \$7.7 billion of the FY 2020 obligated funds was allocated for COVID-19 response OTA efforts. However, that number has dwindled in recent years. Of the FY 2021 OTA \$14.6 billion obligated funds, only \$3.1 billion were for COVID-19 response efforts.¹⁶⁹ Finally, in FY 2022, DOD awarded \$10.9 billion in OT obligations.¹⁷⁰ Still, given that Congress first apportioned a mere \$620 million for OTA-obligated funds to DOD in FY 2015, the funds have grown considerably since that time.¹⁷¹ DOD can allocate these OTA-obligated funds further to the military services.

DAF saw steady rises in OTA-obligated funds from FY 2015 through FY 2020; however, OTA-obligated funds for FY 2021 fell 20% from the preceding year.¹⁷² Nonetheless, from FY 2015 through FY 2020, about 46% of DAF’s total OTA obligations were spent by one DAF directorate, the

Launch Systems Enterprise Directorate.¹⁷³ The OTA-obligated funds for facilities and construction projects were a tiny fraction of the overall total.¹⁷⁴

The RAND Corporation released a report in 2020 on “prototyping Using Other Transactions,” in which it analyzed specific DAF uses of OTs on prototypes and their follow-on production.¹⁷⁵ RAND identified several existing challenges with using OTs in DAF. For example, the difficulty with establishing DAF-wide OT knowledge, while the existing DAF procurement culture is “inherently compliance-based and risk averse.”¹⁷⁶ Additionally, other challenges for practitioners include a lack of prescriptive rules for OT use, compliance with an ambiguous OT statute, lack of a “paper trail” for OT determinations, and many instances of personnel turnover.¹⁷⁷

Of the OT cases studied in that research, funding for the transaction was difficult to identify and often required senior, high-ranking officials who were interested in the project.¹⁷⁸ Through their networking circles, these officials frequently found funding, which can also come from multiple government sources and consideration of the appropriate “color of money” related to the agency’s need for the project.¹⁷⁹

II. Law, Policy, and Authorities Applicable to DOD and DAF Capabilities and Limitations When Addressing Climate Change

The military receives its funding allocations via the NDAA of the respective FY. Congress proposes the bill and presents it to the president for enactment. This legislation allows, restricts, and otherwise informs DOD where and how it can spend its allocated funds.

This part highlights some key climate change or environmentally relevant statutory provisions of the NDAs for FYs 2018-2024. A brief discussion follows on recent landmark legislation passed for civilian application: the Infrastructure Investment and Jobs Act and the Inflation Reduction Act (IRA). That discussion highlights Congress’ financial commitment to modernizing civilian infrastructure, and the significant innovation these laws hope to generate to meet the modernization goals. Civilian innovation can also be incorporated for defense modernization purposes.

However, where Congress’ controlling political party and the president’s priorities are not aligned, law making can be hostile and slow. The sitting president often decides to issue executive orders (EOs) for quicker, but limited, directives. This part will subsequently discuss the president’s

162. See Castellano, *supra* note 18, at 488.

163. OFFICE OF THE UNDER SECRETARY OF DEFENSE FOR ACQUISITION AND SUSTAINMENT, DOD, OTHER TRANSACTIONS GUIDE VERSION 2.0, at 5 (2023) [hereinafter OT GUIDE].

164. See Castellano, *supra* note 18, at 487 (internal citations omitted).

165. *Id.* at 487-88 (internal citations omitted).

166. LAUREN A. MAYER ET AL., RAND CORPORATION, RR4417, PROTOTYPING USING OTHER TRANSACTIONS 29 (2020), https://www.rand.org/content/dam/rand/pubs/research_reports/RR4400/RR4417/RAND_RR4417.pdf (This research was completed by RAND PAF, a division of the RAND Corporation, and was federally funded and prepared under contract FA7014-16-D-1000.).

167. 10 U.S.C. §4022 (2018).

168. RHYS MCCORMICK & GREGORY SANDERS, CENTER FOR STRATEGIC AND INTERNATIONAL STUDIES DEFENSE-INDUSTRIAL INITIATIVES GROUP, TRENDS IN DEPARTMENT OF DEFENSE OTHER TRANSACTION AUTHORITY USAGE 48 (2022), https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/220525_McCormick_Trends_OTAs.pdf?VersionId=JrTKXLxEFSrSGQh.CaObBZnbZAJkWZ.i.

169. OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE (ACQUISITION), DOD, DEFENSE PRICING AND CONTRACTING: YEAR IN REVIEW REPORT 2021, at 5 (2021), https://www.acq.osd.mil/asda/dpc/docs/2021_DPC_Year_in_Review_Report.pdf.

170. OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE (ACQUISITION), DOD, DEFENSE PRICING AND CONTRACTING: YEAR IN REVIEW REPORT 2022, at 8 (2022), https://www.acq.osd.mil/asda/dpc/docs/2022_DPC_Year_in_Review_Report.pdf [hereinafter YEAR IN REVIEW REPORT 2022].

171. OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE (ACQUISITION), DOD, DEFENSE PRICING AND CONTRACTING: YEAR IN REVIEW REPORT 2020, at 3 (2020), https://www.acq.osd.mil/asda/dpc/docs/2020_DPC_Year_in_Review_Report.pdf.

172. See MCCORMICK & SANDERS, *supra* note 168, at 29 (noting that in FY 2020, DAF received \$1.7 billion in OTA-obligated funds, and \$1.3 billion in FY 2021).

173. *Id.* at 33.

174. *Id.* at 33 fig.4-5.

175. *Id.* at 50.

176. *Id.* at x.

177. *Id.* at 21.

178. See MAYER ET AL., *supra* note 166, at 27.

179. *Id.*

EO power and limitations applicable to federal agencies. The part concludes with relevant DOD- and DAF-specific policy regarding climate change and procurement.

A. Relevant Recent Legislation Involving the Government's and Military's Responses to Climate Change

This section highlights some key climate change or environmentally relevant statutory provisions of the NDAs for FYs 2018-2024. Since 2018, Congress consistently included specific climate-related directives for DOD to develop, follow, monitor, or mandate for military installations. For the first time in several years, however, the NDAA for FY 2024 showed some regression.

1. NDAs for FYs 2018-2019 and Expansion of the Readiness and Environmental Protection Integration Program

The NDAA for FY 2018 passed notwithstanding the political differences between the controlling majorities in Congress and the then-sitting president, Donald J. Trump. That law required the Secretary of DOD to provide Congress with a report on the “vulnerabilities to military installations and combatant commander requirements resulting from climate change over the next 20 years.”¹⁸⁰ Similarly, the NDAA required DOD to consider opportunities to enhance energy resilience and incorporate those along with other energy concerns into a master plan.¹⁸¹

The following year's defense spending had far more pronounced climate-related provisions, particularly for installation construction projects. The NDAA for FY 2019 mandated that DOD change its controlling facilities' regulation to require any new facilities' construction consideration and incorporation of climate and land use projections made by the National Academies of Sciences, U.S. Geological Survey, U.S. Global Change Research Office, and National Climate Assessment.¹⁸² Congress mandated that DOD swiftly make this change in regulation within 30 days of the NDAA's enactment.¹⁸³ Congress further required that proposed MILCON projects requiring congressional notification or approval must include a disclosure of whether the construction “will be sited within or

partially within a 100-year floodplain,” and if so, the project proposal must include a risk mitigation plan.¹⁸⁴

Seemingly in a nod to the future of domestic military strength, Congress also required DOD to submit a “force structure plan” for each military branch, which incorporates an assessment of the probable national security threats, and the “end-strength levels and major military force units” authorized in the NDAA for FY 2018, along with a model of installation real property and overall infrastructure required to carry out such plans.¹⁸⁵ Then, DOD was expected to assess the requirements to successfully meet its developed force structure plans and models in relation to existing infrastructure, real property, and facilities' capabilities.¹⁸⁶ It must also identify any deficit or surplus capabilities in the identified infrastructure and real property for each military branch and their respective domestic locations (including U.S. territories).¹⁸⁷

Additionally, the NDAA for FY 2019 expanded the scope of an existing law on interagency cooperative agreement for limiting encroachment.¹⁸⁸ This statutory amendment extends interagency cooperation to those projects that will “protect the environment, military installation resilience, and military readiness.”¹⁸⁹ In practice, the Readiness and Environmental Protection Integration (REPI) Program allows military installations to enter into cost-sharing agreements with federal agencies and surrounding local and state governments to fund installation resiliency projects on base and in the base's vicinity.¹⁹⁰ Congress further specified the funding mechanism for REPI, which can be leveraged by interagency or other partner expenditures for the critical infrastructure project.¹⁹¹ Congressionally authorized funds for the REPI Program have generally increased since 2006.¹⁹²

2. NDAs for FYs 2020-2022

The NDAs for FYs 2020-2022 saw similar climate and extreme weather considerations and mandates. The NDAA for FY 2020 conditionally made up to 25% of authorized funds available to DOD for planning and design accounts for MILCON projects promoting installation energy, climate, and cyber resiliency.¹⁹³ This law extended its FY 2019 predecessor's scope to any MILCON projects requiring congressional notification or approval. Any such major or minor construction project required consideration of

180. Mark Nevitt, *Climate Change and the Law of National Security Adaptation*, 118 Nw. U. L. Rev. COLLOQUY 126, 143 (2023) (citing NDAA for FY 2018, Pub. L. No. 115-91, §335, 131 Stat. 1283, 1358 (2017)) (direct quote from the cited NDAA for FY 2018).

181. NDAA for FY 2018, Pub. L. No. 115-91, §312, 131 Stat. 1283, 1348 (2017) (amending 10 U.S.C. §2911(c)).

182. See John S. McCain NDAA for FY 2019, Pub. L. No. 115-232, §2805(c)(1), 132 Stat. 1636, 2262-63 (2018) (adding 10 U.S.C. §2864 note); see also Nevitt, *supra* note 180, at 144 (the referenced DOD regulation is the Unified Facilities Criteria (UFC) 2-100-01, and UFC 2-100-02 (and any similar successor regulations), specifically requiring amendment to §3-5.6.2.3, thereof).

183. Pub. L. No. 115-232, §2805(c)(1), 132 Stat. 1636, 2262-63 (2018).

184. *Id.* §2805(a), 132 Stat. at 2262 (adding 10 U.S.C. §2802 note).

185. *Id.* §2821(a), 132 Stat. at 2267.

186. *Id.* §2821(c), 132 Stat. at 2268.

187. *Id.* §2821(c)(2), 132 Stat. at 2268.

188. *Id.* §312(i), 132 Stat. at 1711 (amending 10 U.S.C. §2684a(a)(2)(B)).

189. 10 U.S.C. §2684a(h).

190. OFFICE OF THE SECRETARY OF DEFENSE FOR ENERGY, INSTALLATIONS, AND ENVIRONMENT, DOD, FY 2022 METRICS REPORT ON REPI PROGRAM OUTCOMES AND BENEFITS TO MILITARY MISSION CAPABILITIES 1 (2023), https://www.repi.mil/Portals/44/2022_Metrics_Report_FINAL_1.pdf.

191. *Id.* at 4 (e.g., in FY 2022, DOD expended \$800 million for REPI projects, which were leveraged by more than \$1.13 billion in partner spending).

192. *Id.* at 10 fig.4.

193. NDAA for FY 2020, Pub. L. No. 116-92, §2804(b), 133 Stat. 1198, 1882 (2019).

“potential adverse consequences of long-term changes in environmental conditions” that could affect that base’s resilience, and consideration of the building requirements for the respective project’s locality and industry best practices developed to withstand extreme weather events.¹⁹⁴

Congress also established a pilot R&D program called the “Direct Air Capture and Blue Carbon Removal Technology Program,” for removing carbon from both the air and the sea (known as “blue carbon”).¹⁹⁵ It also passed the Ports Improvement Act, which authorized funds to state and local governments to improve their ports.¹⁹⁶ Congress further required DOD to report on Russian and Chinese foreign activities in the warming Arctic region, as well as prepare for disasters, among other directives.¹⁹⁷ Notably, the NDAA for FY 2020 mandated that DOD develop installation “master plans,” which plan for and assess facilities’ risks to extreme weather events and the impacts thereof.¹⁹⁸

For the following NDAA for FY 2021, Congress required DOD to submit an update of its 2014 Adaptation Roadmap.¹⁹⁹ DOD had until February 1, 2022, to provide an update to address “the current and foreseeable effects of extreme weather and sea level fluctuations” on DOD’s mission.²⁰⁰ Congress listed increased frequency of extreme weather events, training and testing conditions, increased demand for humanitarian relief operations, and geopolitical instability caused by climate change as matters of congressional concern for update.²⁰¹

This legislation also created the National Academies Climate Security Roundtable (Roundtable), led via joint agreement by the director of national intelligence and Under Secretary of Defense.²⁰² Congress designated several different Roundtable participants and identified its purpose to (1) support the National Security Advisory Council previously created; (2) establish best practices for the exchange of information amongst stakeholders; (3) facilitate dialogue and collaboration regarding climate security; (4) identify gaps in the exchange of information, data, expertise, or knowledge about climate security amongst Roundtable participants and consider viable

solutions to those gaps; and (5) provide any assistance or resources deemed necessary to carry out the council’s duties and/or responsibilities.²⁰³

Congress also required DOD to submit a report on its “total level of greenhouse gas [(GHG)] emissions for each of the last 10 fiscal years.”²⁰⁴ Specifically, the report required a breakdown of each military branch’s GHG emissions and individual installation and operational emissions.²⁰⁵ DOD published its unclassified report in April 2023.²⁰⁶ In a similar manner, a pilot program was established for alternative fuel vehicle purchasing (electric, hybrid, etc.), where DOD would select two bases for each military service to participate.²⁰⁷

The NDAA for FY 2022 defined “climate resilience” and “extreme weather.” They are respectively defined as follows:

The term “climate resilience” means the capability to avoid, prepare for, minimize the effect of, adapt to, and recover from, extreme weather, or from anticipated or unanticipated changes in environmental conditions, that do (or have the potential to) adversely affect the national security of the United States or of allies and partners of the United States.²⁰⁸

The term “extreme weather” means recurrent flooding, drought, desertification, wildfires, thawing permafrost, sea level fluctuation, changes in mean high tides, or any other weather-related event, or anticipated change in environmental conditions, that present (or are projected to present) a recurring annual threat to the climate security of the United States or of allies and partners of the United States.²⁰⁹

The NDAA for FY 2022 also presented a DOD “Climate Resilience Infrastructure Initiative,” which required the implementation of resilience plans for “backup utilities, communications, and transportation to ensure that the critical infrastructure of [DOD] facilities” can quickly recover from extreme weather and natural disasters.²¹⁰ Congress mandated the DOD Secretary to develop requirements for sustainment and modernization of facili-

194. *Id.* §2805(a)(1), 133 Stat. at 1884.

195. Rachel Jacobson & Matthew F. Ferraro, *Environmental Deconfliction 2020: The National Defense Authorization Act for Fiscal Year 2020*, 50 ELR 10983, 10986 (Dec. 2020), <https://www.elr.info/articles/elr-articles/environmental-deconfliction-2020-national-defense-authorization-act-fy-2020> (discussing NDAA for FY 2020, Pub. L. No. 116-92, §223(a)(2)(C), 133 Stat. 1264 (2019)).

196. *Id.* at 10984.

197. *Id.* at 10985.

198. HOUSE SELECT COMMITTEE ON CLIMATE CRISIS, 116th CONGRESS MAJORITY STAFF REPORT, SOLVING THE CLIMATE CRISIS: THE CONGRESSIONAL ACTION PLAN FOR A CLEAN ENERGY ECONOMY AND A HEALTHY, RESILIENT, AND JUST AMERICA (2020) (citing NDAA for FY 2020, H.R. REP. NO. 116-333 §§326, 327, 328, 2801, 2801a, 2801b, 2804, 2805 (2019), <https://www.congress.gov/116/crpt/hrpt333/CRPT-116hrpt333.pdf>) (stating that the NDAA for FY 2020 had other specifications for the master plans, and even limited DOD’s spending from MILCON planning and design funds until they began the process for updating the UFC and “building standards for [MILCON] for energy and climate resilience at military installations”).

199. William M. (Mac) Thornberry NDAA for FY 2021, Pub. L. No. 116-283, §327(a), 134 Stat. 3388, 3525.

200. *Id.*

201. *Id.* §327(b)(2)(A), 134 Stat. at 3525.

202. *Id.* §1622(a), 134 Stat. at 4054.

203. *Id.* §1622(b).

204. *Id.* §328(a), 134 Stat. at 3527.

205. *Id.*

206. This report will be discussed elsewhere along with DOD’s other responses and actions regarding climate change, adaptation, and mitigation efforts. See OFFICE OF THE UNDER SECRETARY OF DEFENSE FOR ACQUISITION AND SUSTAINMENT, DOD, DEPARTMENT OF DEFENSE PLAN TO REDUCE GREENHOUSE GAS EMISSIONS (2023).

207. Rachel Jacobson et al., *Environmental Deconfliction 2021: The National Defense Authorization Act for Fiscal Year 2021*, 51 ELR 11025, 11029 (Dec. 2021), <https://www.elr.info/articles/elr-articles/environmental-deconfliction-2021-national-defense-authorization-act-fy-2021> (discussing NDAA for FY 2022, Pub. L. No. 117-81, §321, 135 Stat. 1541, 1635-36 (2021)).

208. NDAA for FY 2022, Pub. L. No. 117-81, §332(b), 135 Stat. 1541, 1638 (2021) (amending 10 U.S.C. §2285(c) & 10 U.S.C. §101(a), by adding subsection (19)).

209. *Id.* (amending 10 U.S.C. §2285(c) & 10 U.S.C. §101(a), by adding subsection (20)).

210. *Id.* §332(a), 135 Stat. at 1637 (amending ch. 136, 10 U.S.C., by adding §2285(b)).

ties for climate resilience.²¹¹ Where possible, the military installations must develop plans for infrastructure climate resiliency and establish collaborative efforts with the state, regional, tribal, and/or local agencies.²¹²

3. NDAA for FYs 2023 and 2024

The NDAA for FY 2023 authorized the Secretary of Defense or Secretaries of each military branch to establish a pilot program for prototypes of facilities' architecture and design methods using the OTA.²¹³ These prototypes can be used for new construction or facility improvements on military installations.²¹⁴ However, aside from expiring on September 30, 2025, this pilot program has other limitations.²¹⁵ The program is limited to two prototype projects beginning each year and the aggregate value of all transactions cannot exceed \$200 million per year.²¹⁶

The NDAA for FY 2023 also had other climate-focused directives for DOD. The law created four "Interagency Regional Coordinator for Resilience Pilot Project" positions, which were later assigned to geographical areas with "significant sea level rise and recurrent flooding," which affects military members' ability to reach their military posts or otherwise jeopardizes military readiness, and where the neighboring communities have collaborated on "multi-jurisdictional climate adaptation planning efforts."²¹⁷ The NDAA for FY 2023 similarly addressed climate matters for international military operations and relations.

The draft NDAA for FY 2024 began as a reversal of its predecessors for policy on the military and climate, although the enacted law was not as restrictive as initially proposed.²¹⁸ Passed on December 22, 2023, the NDAA for FY 2024 generally prohibits defense contracting offices from, as a condition of awarding a contract, requiring nontraditional federal contractors to disclose GHG emis-

sions or inventory thereof.²¹⁹ A "nontraditional defense contractor" is defined as a procurement contractor who has not performed a government contract for at least one year preceding DOD's solicitation of sources for the project at issue.²²⁰

For a one-year period beginning on the date of the NDAA's enactment, Congress also prohibited the same from defense contractors other than nontraditional ones.²²¹ The NDAA for FY 2024 effectively terminated the Climate Security Advisory Council (CSAC) a year earlier than previously authorized.²²² The CSAC will sunset on December 31, 2024, instead of December 31, 2025.²²³

Nevertheless, Congress increased the authorized amount for certain funds for military installation resiliency projects and granted authority to undertake certain construction projects in friendly foreign countries.²²⁴ Congress also modified the NDAA for FY 2023's language for prototype and demonstration projects for energy resilience at certain military installations. It added authorization for projects on "hydrogen creation, storage, and power generation technologies using natural gas or renewable electricity."²²⁵

Congress also established requirements for military installation infrastructure and requisite planning for supporting covered non-tactical vehicles before such vehicles can be deployed to the base.²²⁶ These vehicles are defined as electric, hydrogen-powered, or advanced biofuel-powered.²²⁷ Similarly, Congress expanded the OTA for the installation or facility prototyping pilot program authorized in the previous NDAA. Such prototype projects for repairing a facility were no longer counted in the two-project limitation per FY, and the aggregate value of all OTs for this pilot program was increased to \$300 million.²²⁸

4. Federal Policies for Civilian Application: Infrastructure Investment and Jobs Act and IRA

The Infrastructure Investment and Jobs Act, enacted on November 15, 2021, is designed to fund major civilian transportation and related projects, such as roads, bridges,

211. *Id.* (amending ch. 136, 10 U.S.C., by adding §2285(d)).

212. *Id.* (amending ch. 136, 10 U.S.C., by adding §2285(e)).

213. HOUSE ARMED SERVICES COMMITTEE, FINAL TEXT SUMMARY OF THE NATIONAL DEFENSE AUTHORIZATION ACT FOR FISCAL YEAR 2023, at 13 (2022), https://houlahan.house.gov/uploadedfiles/20221207_fy23ndaa_bill-summary_vfinal.pdf (citing James M. Inhofe NDAA for FY 2023, Pub. L. No. 117-263, 136 Stat. 2396 (2022)).

214. James M. Inhofe NDAA for FY 2023, Pub. L. No. 117-263, §843(2)-(3), 136 Stat. 2395, 2718-19 (2022) (further amending 10 U.S.C. §4022, as amended by §842).

215. *Id.* §843(3), 136 Stat. at 2719 (further amending 10 U.S.C. §4022, as amended by §842).

216. *Id.*

217. *Id.* §2872, 136 Stat. at 3014.

218. The U.S. House of Representatives Armed Services Committee published its "FY24 National Defense Authorization Act Booklet," which includes a section titled "Ending Wokeness in the Military," which begins with "The FY24 NDAA pushes back against the radical woke ideology being forced on our [servicemembers] and restores the focus of our military on lethality." The booklet also states this NDAA "[prevents] a Military Green New Deal"; "[d]oes not authorize any climate change programs"; "[p]revents DoD from deploying electric vehicles at installations until it certifies that doing so will not impact installation readiness and that sufficient charging infrastructure is in place"; and "[p]rohibits the DoD from issuing costly new greenhouse gas rules on defense contractors." See HOUSE ARMED SERVICES COMMITTEE, FY24 NDAA SUMMARY 1, https://drive.google.com/file/d/1DBBuHJUI3L5FwR91xM_Me9v6GHqJn7/view.

219. NDAA for FY 2024, Pub. L. No. 118-31, §318(a)(1), 137 Stat. 136, 218, (2023).

220. Congress carved out a waiver on this disclosure prohibition for the Secretary of Defense to use "on a contract-by-contract basis provided that the information provided is directly related to the performance of the contract." *Id.* §318(b), 137 Stat. at 219.

221. *Id.* §318(a)(2), 137 Stat. at 218-19.

222. *Id.* §7319, 137 Stat. at 1036 (by making this change, Congress amended the National Security Act of 1947, §120(e), 50 U.S.C. §3060(e)).

223. *Id.*

224. The amount authorized by Congress for domestic military installation resiliency construction projects was increased to \$125 million from \$100 million. *Id.* §2804, 137 Stat. at 744 (amending 10 U.S.C. §2815(e)(3)), *id.* §2805, 137 Stat. at 744-45 (amending 10 U.S.C. prec. 2801, adding §2817).

225. *Id.* §316(a), 137 Stat. at 217 (amending Pub. L. No. 117-263, §322, 136 Stat. 2395, 2511, 10 U.S.C. §2911 note).

226. *Id.* §319, 137 Stat. at 219.

227. *Id.* §319(c)(1), 137 Stat. at 219-20 (citing to term definitions found in Pub. L. No. 117-263, §328, 136 Stat. 2395, 2519).

228. *Id.* §822, 137 Stat. at 327 (amending 10 U.S.C. §4022(i)).

congestion relief, railroads, and carbon reduction.²²⁹ Commonly referred to as the Bipartisan Infrastructure Law (BIL), this Act cumulatively allocated \$550 billion to a variety of such projects.²³⁰

Aside from devoting billions in funding for civilian domestic infrastructure projects, the BIL also provides DOD's Army Corps of Engineers with millions for O&M, port infrastructure development program grants, rehabilitation of rivers and harbors, coastal zone risk management, hurricane and storm/flood damage reduction, aquatic environmental restoration, and other projects or programs.²³¹ The Army Corps of Engineers has a variety of responsibilities, both on civilian and military jurisdiction. Thus, perhaps some of these allocated funds will be spent on domestic DOD installations.

Like the BIL, the IRA made billions in federal funding available to targeted infrastructure and environmental projects. Passed on August 16, 2022, the IRA included \$369 billion in funding for American climate and energy projects, with one-third of that funding available through tax incentives.²³² The IRA was the single biggest American government investment in energy.²³³ It apportioned funds for a variety of clean energy projects, environmental restoration, and other domestic needs.²³⁴ For example, \$2.6 billion was allocated to coastal ecosystems, conservation, and resiliency efforts, which includes restoring marsh lands that help buffer floods and storm surges.²³⁵ The IRA provided the U.S. Department of Energy (DOE) Loan Programs Office with \$40 billion in loan authority for revolutionary clean energy projects and processes in nuclear and renewable energy, recycling, manufacturing, and others.²³⁶

With the BIL, IRA, and other policies and actions, DOE predicts that the United States will achieve a 40% reduction in economywide GHG emissions below year 2005 levels by year 2030.²³⁷ Although these civilian-applicable laws do not specifically address military or defense projects, they do not preclude the military from engaging in clean energy and climate-friendly projects.

Of note, the military benefits from these laws in significant ways, including adoption of the innovative technol-

ogy and processes created as a result. Also, DOD's recent prioritization of environmental justice (EJ) considerations complement the IRA's EJ provisions.²³⁸ The military can also partner with civilian, public, and/or state entities that may have received some funding for infrastructure projects. As private companies develop clean energy projects and systems, the military can contract and thereby benefit for their own infrastructure development.

B. Presidential EOs With Climate Change Considerations

An executive order can be a powerful tool for effectuating change.²³⁹ Indeed, in circumstances where the president has sole or primary authority over an issue, an EO efficiently mandates action or inaction. As with many legal actions in a checks-and-balances system, an EO can be overturned by congressional or judicial action and by a subsequent president.²⁴⁰ Nonetheless, while active, the EO unilaterally orders government personnel and agencies to act in a specific manner or refrain from acting.²⁴¹

Presidents have used EOs for climate change-related policy. Indeed, where the president and Congress-controlling parties are in conflict, presidents are more likely to use EOs for policy-specific purposes.²⁴² On January 27, 2021, President Joseph Biden signed EO No. 14008, Executive Order on Tackling the Climate Crisis at Home and Abroad.²⁴³ This EO first established climate change as an essential element of U.S. national security and foreign policy.²⁴⁴

The EO orders varying government agencies to act; DOD is no exception. In coordination with several environmental organizations and agencies, DOD must submit to the president "an analysis of the security implications of climate change [that] can be incorporated into modeling, simulation, war-gaming, and other analyses."²⁴⁵ Additionally, DOD must consider the security implications of climate change and provide annual updates to the National Security Council on progress with incorporating such implications into controlling military strategy, guidance, and other relevant documents and processes.²⁴⁶

President Biden also required strategies and implementation plans from agencies with extensive international work and agency-managed infrastructure, like the military.²⁴⁷ Further, EO No. 14008 established the National Climate

229. THE WHITE HOUSE, BUILDING A BETTER AMERICA: A GUIDEBOOK TO THE BIPARTISAN INFRASTRUCTURE LAW FOR STATE, LOCAL, TRIBAL, AND TERRITORIAL GOVERNMENTS, AND OTHER PARTNERS 5, 9-10 (2022), <https://www.whitehouse.gov/wp-content/uploads/2022/05/BUILDING-A-BETTER-AMERICA-V2.pdf> (citing Infrastructure Investment and Jobs Act, Pub. L. No. 117-58, 135 Stat. 430 (2021)).

230. U.S. Department of Transportation Federal Highway Administration, *Bipartisan Infrastructure Law*, <https://www.fhwa.dot.gov/bipartisan-infrastructure-law/> (last modified Aug. 7, 2024).

231. See THE WHITE HOUSE, *supra* note 229, at 267-69.

232. Jeremy Fauber & Bryan Kinch, *Buried Gold: Leveraging the Inflation Reduction Act to Support Electrification*, 40 ENGINEERED Sys. 20, 20 (Feb. 2023), (discussing the Inflation Reduction Act of 2022, Pub. L. No. 117-169, 136 Stat. 1818 (2022)).

233. *Id.*

234. *Id.*

235. THE WHITE HOUSE, BUILDING A CLEAN ENERGY ECONOMY: A GUIDEBOOK TO THE INFLATION REDUCTION ACT'S INVESTMENTS IN CLEAN ENERGY AND CLIMATE ACTION VERSION 2, at 145 (2023), <https://www.whitehouse.gov/wp-content/uploads/2022/12/Inflation-Reduction-Act-Guidebook.pdf>.

236. *Id.* at 10.

237. See THE WHITE HOUSE, *supra* note 235, at 6 (internal citations omitted).

238. DOD Environment, Safety, and Occupational Health Network and Information Exchange, *Department of Defense Environmental Justice*, <https://denix.osd.mil/ej/> (last updated July 22, 2024).

239. Noah Cohen, *Using the Military to Fight Climate Change*, 49 ECOLOGY L.Q. 539 (2022).

240. *Id.* at 541-42 (internal citations omitted). The enacting president can also retract the EO if the EO is no longer necessary.

241. *Id.* (internal citations omitted).

242. See *id.* at 542 (internal citations omitted).

243. *Id.* at 543 (citing Exec. Order No. 14008, 86 Fed. Reg. 7617 (Feb. 1, 2021)).

244. *Id.*

245. Exec. Order No. 14008, §103(c), 86 Fed. Reg. 7617 (Jan. 27, 2021).

246. *Id.* §103(d).

247. *Id.* §103(a)(ii).

Task Force, codifying its mission as organizing and deploying a “[g]overnment-wide approach to combat the climate crisis.”²⁴⁸ The Secretary of Defense is a designated member of that task force.²⁴⁹ This EO compels action from federal agencies, including DOD and DAF.²⁵⁰

Notably, President Biden also passed EO No. 14057, Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability.²⁵¹ This sweeping EO declares the Administration’s policy goal “to achieve a carbon pollution-free electricity sector by 2035 and net-zero emissions economy-wide by no later than 2050.”²⁵² Heads of agencies are required to comply with the purposes and goals of the EO, as much as possible, but not to the detriment of national security.²⁵³ The EO allows federal agencies (including the military) to exempt vehicles, aircraft, or nonroad equipment used in combat support, military, or related, specified activities.²⁵⁴

C. DOD’s and DAF’s Climate Change Policy Responses for Infrastructure Resiliency

Historically, DOD received broad exemptions from federal legislation focused on environmental preservation.²⁵⁵ Though contentious, DOD asserted exemptions to the Migratory Bird Treaty Act, Endangered Species Act (ESA), Clean Air Act (CAA), and other environmental laws where necessary to ensure military readiness in training and activities.²⁵⁶ DOD has responded to several legislative and presidential directives with varying reports, plans, and changes in policies.

In 2012, the agency released its first Climate Change Adaptation Roadmap (Roadmap), in response to EO No. 13514. The Roadmap included the agency’s goals for identifying and adapting to the impacts of climate change, through collaboration with other stakeholders.²⁵⁷ In 2016, DOD released its DOD Directive 4715.21, Cli-

mate Change Adaptation and Resilience.²⁵⁸ This directive implemented the Roadmap, defined key terms, and created assigned responsibilities to key military leaders regarding assessing and managing risks associated with the changing climate’s impacts on the military’s missions, effectively creating DOD’s climate change policy.²⁵⁹

In 2018 and 2019, DOD reported on the varying effects that climate change-related weather events had on military installations.²⁶⁰ In 2018, DOD required all installations to develop a master plan, which now requires inclusion factors impacting present and future physical development and base operation.²⁶¹ The NDAA for FY 2019 set new floodplain requirements on MILCON projects, where applicable, and required DOD to incorporate climate environmental conditions into the Unified Facilities Criteria (UFC).²⁶² The UFC is a series of directives for varied, specific types of MILCON across DOD, and provides structural engineering, design, maintenance, and other specifications for such DOD-led projects.²⁶³ Another significant change to the UFC was an amendment in the NDAA for FY 2020, which required DOD to update the UFC to promote energy, structural, and cyber resiliency in MILCON.²⁶⁴

In its 2021 Climate Adaptation Plan, DOD presented five “Lines of Effort” (LOEs) for fortifying its resiliency and adaptation efforts.²⁶⁵ All LOEs involve infrastructure in one form or another. The first is ensuring that any military strategy or planning include climate-informed decisionmaking.²⁶⁶ The second LOE ensures DOD personnel are trained and equipped for a climate-ready force, while the third LOE focuses on building both resilient and natural infrastructure.²⁶⁷ The fourth LOE requires resiliency and innovation in military supply chains, and the

248. *See id.* §203.

249. *Id.*

250. There are other examples of EOs on climate change and the environment. For example, in 2013, President Barack Obama issued EO No. 13653, Preparing the United States for the Impacts of Climate Change. EO No. 13653 required federal agencies to assess how climate change will impact their future activities and required them to take necessary steps to prepare for its effects and implement resiliency efforts. *See* Cohen, *supra* note 239, at 547.

251. Exec. Order No. 14057, 86 Fed. Reg. 70935 (Dec. 13, 2021).

252. *Id.* §101.

253. *Id.* §602(a).

254. *Id.* §602(b). Even though the exemption exists for specific military operations and equipment, DOD has spent millions in environmentally aware or sustainable acquisitions. For example, in 2019, the agency spent \$820 million on contracts for clean and efficient energy in facilities. *See* Adam Aton, *Military Exempt From Biden Order to Cut Federal Emissions*, CLIMATEWIRE (Dec. 22, 2021, 6:53 AM), <https://www.eenews.net/articles/military-exempt-from-biden-order-to-cut-federal-emissions/>.

255. DAVID M. BEARDEN, CONGRESSIONAL RESEARCH SERVICE, RS22149, EXEMPTIONS FROM ENVIRONMENTAL LAW FOR THE DEPARTMENT OF DEFENSE: BACKGROUND AND ISSUES FOR CONGRESS CRS-1 (2007).

256. *See id.* at CRS-4 to CRS-6; 16 U.S.C. §§1531-1544, ELR STAT. ESA §§2-18; 42 U.S.C. §§7401-7671q, ELR STAT. CAA §§101-618.

257. OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE (ENERGY, INSTALLATIONS, AND ENVIRONMENT), DOD, DEPARTMENT OF DEFENSE 2014 CLIMATE CHANGE ADAPTATION ROADMAP 1 (2014).

258. This directive was also established in accordance with the direction given in EO No. 13653. DOD Directive 4715.21, *supra* note 3.

259. *Id.* para. 1.1.

260. *See* CRAWFORD, *supra* note 103, at 27-28 (internal citations omitted).

261. DOD INSPECTOR GENERAL, REPORT NO. DODIG-2023-061, AUDIT OF MILITARY DEPARTMENT CLIMATE CHANGE ASSESSMENTS AND ADAPTATION PLANS IN THE SOUTHEASTERN CONTINENTAL UNITED STATES 5 (2023) [hereinafter DODIG-2023-061] (citing DOD Instruction 4165.70, Real Property Management (Apr. 6, 2005; Incorporating Change 1, Aug. 31, 2018)).

262. Rachel Jacobson & Matthew F. Ferraro, *Environmental Deconfliction 2019: The National Defense Authorization Act for FY 2019*, 40 ELR 10220, 10225 (Mar. 2019), <https://www.elr.info/articles/elr-articles/environmental-deconfliction-2019-national-defense-authorization-act-fy-2019> (citing Whole Building Design Guide, National Institute of Building Sciences, *Unified Facilities Criteria (UFC)*, <https://www.nibs.org/wbdg/ffc-dod> (last visited Nov. 5, 2024)).

263. OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE FOR ENERGY, INSTALLATIONS, AND ENVIRONMENT, DOD, SPECIAL PROGRAM AREAS: UNIFIED FACILITIES CRITERIA PROGRAM, https://www.acq.osd.mil/eie/FIM/FIM_Special.html.

264. *See* Jacobson & Ferraro, *supra* note 195, at 10989 (citing NDAA for FY 2020 §2804(a)). DOD has conducted more than 35 site-level energy resilience assessments and other exercises for climate adverse impact and disruption on military installations. OFFICE OF THE UNDERSECRETARY OF DEFENSE (ACQUISITION AND SUSTAINMENT), DOD, DEPARTMENT OF DEFENSE CLIMATE ADAPTATION PLAN 24 (2021), <https://www.sustainability.gov/pdfs/dod-2021-cap.pdf> [hereinafter 2021 CLIMATE ADAPTATION PLAN].

265. 2021 CLIMATE ADAPTATION PLAN, *supra* note 264.

266. *Id.* at 4.

267. *Id.*

final LOE promotes enhancing adaptation and resiliency through collaboration.²⁶⁸

DOD resolved to leverage its purchasing power in deploying “climate mitigation technologies such as microgrids and power storage when such items align with DOD’s mission requirements.”²⁶⁹ The agency also urged potential major suppliers to disclose their GHG emissions, and “treat climate change vulnerabilities as a ‘material weakness’ on financial reports, and expect commitments to public reporting on Environment, Social and Governance (ESG) features of their business operations.”²⁷⁰ In 2022, DOD noted that the LOEs are in progress throughout the agency.²⁷¹ DOD discussed many aspects and examples of its training, operational, planning, and logistical measures, including the existing and forthcoming climate action plans (CAPs) of the individual military services.²⁷²

Published in October 2022, DAF’s CAP provides:

The department recognizes that we are contributing to global climate change. The department is responsible for the largest portion of [DOD’s] greenhouse gas emissions. While the Air Force fulfills much-needed global mobility and transportation requirements for the DoD, these same capabilities drive a huge demand for fuel. The increased risks driven by climate change cannot be addressed by emission reductions in the Air Force alone, but the [DAF] will be part of the solution.²⁷³

The CAP’s stated goal is to create a DAF that is resilient to climate change’s effects while preserving “a combat-credible force that can compete, deter, and win against pacing threats.”²⁷⁴ DAF’s objective for optimizing and adopting alternative energy sources includes a substantial goal of 100% “carbon pollution-free electricity on a net annual basis by FY 2030, including 50[%] 24/7 carbon pollution-free electricity.”²⁷⁵ Aside from making climate-informed decisions, DAF aims to mitigate its impact with energy alternatives that reduce its fossil fuel demand and GHG emissions.²⁷⁶ In FY 2021, renewable sources accounted for

6.9% of DAF’s consumed electricity, with three major DAF installations using solar arrays for electrical power.²⁷⁷

Another primary objective was to modernize infrastructure and facilities, identifying a \$36 million investment in improving base resiliency for FY 2023, and projecting to increase investments to \$100 million per FY by FY 2027.²⁷⁸ DAF set a net-zero emissions goal by FY 2046 for its installations, with a 50% GHG emissions reduction from 2008 levels by FY 2033.²⁷⁹ Aside from flying-related goals, DAF also hopes to achieve 100% zero emissions from non-tactical vehicle, light-duty vehicle, and aircraft support equipment acquisitions by FY 2035, 2027, and 2032, respectively.²⁸⁰

In March 2023, the DOD inspector general (DODIG) published its audit findings about whether the military assessed and planned for installation facility adaptation required to address climate change and extreme weather events.²⁸¹ The DODIG specifically audited installations located in the southeastern region of the United States and reviewed the military-conducted climate resilience assessments as required by the UFC and the NDAA for FY 2020.²⁸² The DODIG found that the military departments “did not consistently develop the climate resilience assessments” as required; the DOD directives lacked sufficient language for assessment standardization; and DOD Instruction 4165.70 does not include “language requiring all installations to include climate resilience in their Master Plans.”²⁸³ The DODIG report documents its recommendations and DOD’s agreement to those proposed terms.²⁸⁴

D. OTA in Defense Procurement

Naturally, OTs are not appropriate for all defense procurement. For example, there are statutory mandates that require government contracting personnel to use FAR-based procurement for commercially available widgets and services.²⁸⁵ However, where appropriate, OTs can be a powerful, efficient tool in defense procurement. This section begins with a brief discussion of the genesis of the OTA. It reviews DOD’s OTA, and later discusses DOD’s guidelines for OT procurement. The seemingly broad, loosely regulated OTA, along with Congress’ growing expansion of DOD’s OTA for usage on facilities’ modernization projects, may make this procurement tool a powerful weapon against climate change.

268. *Id.*

269. *See id.* at 16.

270. *Id.* While the NDAA for FY 2024 now generally prohibits requiring disclosure of GHG emissions as a condition for award, defense contracting officials may still explore the other methods of leveraging purchasing power.

271. OFFICE OF THE UNDERSECRETARY OF DEFENSE (ACQUISITION AND SUSTAINMENT), DOD, CLIMATE ADAPTATION PLAN 2022 PROGRESS REPORT 1 (2022).

272. *Id.* at 2. DOD also released its “Climate Risk Analysis” report in October 2021. This report similarly highlights the changing climate’s impact on national security, associated risks, and the need to incorporate climate risk into strategic documents and planning. DOD CLIMATE RISK ANALYSIS, *supra* note 102, at 16.

273. *See* DAF CLIMATE ACTION PLAN, *supra* note 107, at 3.

274. *See id.* at 4.

275. *Id.* at 19. The CAP defines “24/7 Carbon Pollution-Free Electricity” as “[c]arbon pollution-free electricity procured to match actual electricity consumption on an hourly basis and produced within the same regional grid where the energy is consumed. (Executive Order 14057, Catalyzing Clean Energy Industries and Jobs through Federal Sustainability).” *Id.* at 20.

276. *Id.* at 6.

277. *Id.* at 18.

278. *Id.* at 10.

279. *Id.*

280. *Id.* at 19.

281. DODIG-2023-061, *supra* note 261, at i.

282. *Id.*

283. *Id.*

284. *Id.* at ii.

285. *See* FAR §12.102.

1. OTA's Brief Legislative History as Applied to DOD

The use of OTs precedes Congress' codification of the FAR.²⁸⁶ The OTA was statutorily authorized in 1989; however, Congress authorized use of OTs only for specific governmental agencies.²⁸⁷ Congress initially only allowed use of OTs to DOD for advanced research via its DARPA program.²⁸⁸ The OTAs for prototype project use and research projects were extended to the military services in 1996 and 1998, respectively.²⁸⁹ The NDAA for FY 2016 provides a preference for using OTs when procuring prototypes or research projects.²⁹⁰

Some designated agencies like the National Aeronautics and Space Administration (NASA) are statutorily allowed to use OTs for “[a]ll functions of agency,” while DOD and military departments are limited to prototype and basic, applied, and advanced research projects.²⁹¹ Congress provided some definition of a “prototype project” in the NDAA for FY 2023.²⁹² A prototype project can be a “proof of concept, model, or process, including a business process[;] a pilot or novel application of commercial technologies for defense purposes[;] or the creation, design, development, or demonstration of operational utility,” among other examples.²⁹³

Some federal agencies have released guidance to assist personnel with using OTs.²⁹⁴ DOD, via its OTA, can develop a prototype with the unique ability to procure directly with its developer for a follow-on production of such prototype.²⁹⁵ However, this follow-on production is conditioned on whether (1) the initial prototype OT was awarded after use of competitive procedures in the selection process; and (2) the prototype result was successful.²⁹⁶

An OT is not generally governed either by the FAR or traditional procurement statutes.²⁹⁷ Contracts formed under the FAR must adhere to basic contracting principles, like ensuring full and open competition, while also being notorious for often taking a long time to award and complete.²⁹⁸ Nontraditional defense contractors are often

attracted to the prospect of entering into an OT with DOD to develop or engage in an innovative, cutting-edge research or prototype project.²⁹⁹ However, DOD's OTA is limited and dependent on the agency and Congress' authorization thereof.

2. DOD's OTs Guide

DOD, like some other federal agencies, has published helpful guidance on the OTA's use by the agency. The current version of the “Other Transactions Guide” (Guide) was released in July 2023.³⁰⁰ This Guide highlights OT planning and discusses the required and recommended steps for a legally sufficient OT process and life cycle. Each military department's senior procurement executive is authorized to approve a prototype OT worth up to \$500 million, but they may delegate approval authority for prototype projects up to \$100 million to the head of contracting authority and agreement officers (AOs).³⁰¹ Generally, the OTA is not directly available to military base commanders; instead, AOs tend to be located in the major military research organizations like DARPA, federal laboratories, and the Army Corps of Engineers.³⁰²

DOD can also engage in prototype OTs where the prototype will be “directly relevant to enhancing the mission effectiveness of [DOD personnel] or improving platforms, systems, components, or materials proposed to be acquired or developed by the [DOD or armed forces].”³⁰³ The Guide reminds AOs and other procurement practitioners that financing a prototype project is not limited to one type of funding or account.³⁰⁴ Though OTs for research projects do not have a statutory approval threshold, prototype and follow-on production projects do have varying dollar thresholds and approval levels.³⁰⁵

When a prototype is successfully completed, one or more government organizations can award the follow-on production, even if the initial prototype-procuring agency decided not to proceed with follow-on production for its own purposes.³⁰⁶ Further, the Guide requires AOs to upload the OT and any supporting documentation to the

286. The National Aeronautics and Space Administration (NASA) began using OTs in the late 1950s, via the National Aeronautics and Space Act of 1958. Nancy K. Sumption, *Other Transactions: Meeting the Department of Defense's Objectives*, 28 PUB. CONT. L.J. 365, 382 (1999) (citing 46 U.S.C. §2473(c)(5)).

287. *Id.* at 380.

288. *Id.* at 383 (citation omitted).

289. *Id.* at 383-84.

290. JOHN CIBINIC JR. ET AL., FORMATION OF GOVERNMENT CONTRACTS 10-5 (5th ed. 2023) (citing NDAA for FY 2016, Pub. L. No. 114-92, §876, 129 Stat. 726, 941-42 (2015)).

291. *Id.* at 10-4 tbl.

292. Pub. L. No. 117-263, §843(2), 136 Stat. 2395, 2718 (2022) (amending 10 U.S.C. §4022(e) by adding a new paragraph at (5)).

293. *Id.* (amending 10 U.S.C. §4022(e) by adding a new paragraph at (5)).

294. See CIBINIC ET AL., *supra* note 290, at 10-5, 10-6.

295. See *id.* at 10-7.

296. *Id.* (citing 10 U.S.C. §4022(f)).

297. *Id.* at 10-3. OTs are subject to laws that are generally applicable, like the Civil Rights Act, 42 U.S.C. §§2000d et seq., False Claims Act, 18 U.S.C. §287 (criminal) and 31 U.S.C. §§3729 et seq. (civil), among several others. *Id.* at 10-16, 10-17.

298. *Id.* at 10-4.

299. See MAYER ET AL., *supra* note 166, at iii, 29; see also Thomas C. Modeszto, *The Department of Defense's Section 845 Authority: An Exception for Prototypes or a Prototype for a Revised Government Procurement System?*, 34 PUB. CONT. L.J. 211, 213 (2005).

300. See OT GUIDE, *supra* note 163. The first version of the Guide was released in November 2018. On May 11, 2022, the DODIG published its audit of DOD's tracking of follow-on production OTs and OTs for experimental purposes. The DODIG made several recommendations and conclusions, including DOD's improper reporting of varying OTs and improper reporting and labeling of some OTs, among others. DODIG, MANAGEMENT ADVISORY: TRACKING OF FOLLOW-ON PRODUCTION OTHER TRANSACTION AGREEMENTS AND TRACKING AND AWARDED OF EXPERIMENTAL PURPOSE OTHER TRANSACTIONS (2022), <https://media.defense.gov/2022/May/13/2002996685/-1/-1/1/DODIG-2022-094.PDF>.

301. See OT GUIDE, *supra* note 163, §II, para. (D)(1)(a)(iv) (citing 10 U.S.C. §4022).

302. See Dean W. Korsak, *Pathways to Expedite Facilities Projects*, JAG REP., Jan. 30, 2023, at 1, 4.

303. See OT GUIDE, *supra* note 163, app. A, at 35.

304. *Id.* §II, para. (D)(5).

305. *Id.* §II, para. (D)(6)(c).

306. *Id.* §II, para. (E)(3)(b)(viii).

Electronic Document Access (EDA) military website.³⁰⁷ In an effort to control access, the Procurement Integrated Enterprise Environment (PIEE) notes the EDA site is only accessible to government personnel who are deemed authorized users.³⁰⁸ Many OTs are also posted on the Federal Procurement Data System website at [FPDS.gov](https://fpds.gov), which is open to the public, but with limited visible information and seemingly no access to procedural or otherwise supporting documentation for each transaction.³⁰⁹

III. Proposed Top-Down Solutions for Facilities' Modernization With Defense-Specific Procurement

OTs are crucial for environmentally sustainable infrastructure projects, now more than ever. Even with the looming national threat of climate change, there are still inefficiencies that must be addressed through law, presidential EOs, and DOD- and/or DAF-specific directives. Although the controlling party in Congress and the president's priorities may conflict, money can transcend political party beliefs.

The billions spent on rebuilding efforts at DAF installations' facilities after an extreme weather event is difficult to ignore. Reasonably expected to continue, repeated natural disasters requiring billions more in base renovation efforts should inspire bipartisan, fruitful negotiations to avoid or limit such financial liabilities to the maximum extent possible. If American domestic military installations require temporary (or later, permanent) full or partial closures with years of rebuilding, the United States will be exposed to adversarial interference, attack, and/or other threats, as well as being vulnerable to other future devastating environmental threats.

This part provides proposed solutions in a top-down approach, beginning with changes that Congress can and should address—for example, expansion of the pilot prototype program for facility modernization, and of DOD's OTA statutory authorization. Perhaps Congress can even create a new line of accounting or budget exclusively for OTs, rather than OT projects being funded via O&M or MILCON budgets. The latter budgets are already thinly stretched with facility deferred maintenance and new buildings or renovations to existing structures. Congress may also consider other proposals considered thereafter.

The president's EO power is another potential source of law reform, as demonstrated by key EO examples from the COVID-19 pandemic and era of artificial intelligence

(AI). These examples can inform a president's use of EOs for the climate change national security threat. Finally, where Congress and the president cannot or will not act, DOD, DAF, and, ultimately, the individual installation commanders may have options available to them to modernize base facilities expeditiously and proactively via their OTA or FAR-based procurement, if necessary.

A. Proposed Amendments to Extend Limited OTA for Prototype Pilot Program and Expand the OTA

Through NDAAs, Congress has slowly expanded DOD's and military departments' OTA and authorized uses. Currently, Congress' pilot program for military installation facilities' design or related prototypes is severely limited and due to expire in September 2025.³¹⁰ Per current statutory limits, only two new projects are authorized per military department each year, with a current accompanying aggregate value cap of \$300 million.³¹¹

Congress most recently exempted prototypes for repairs of facilities from the two-project limit.³¹² Although this move is a step in the right direction, Congress should also remove the project limitation and increase the maximum allotted amount.³¹³ DOD alone spends billions on OTs annually, which has generally increased in the past five to 10 years.

Additionally, military installations face varied extreme weather dangers depending on their location, military department, base mission, and other factors. One prototyped facility design or proof of concept could be effective for coastal bases, for example, but not particularly helpful for bases at heightened risk of wildfires or earthquakes. Like facility repairs, enhancing military departments' capacity to seek innovative, tailored prototype facilities improvements, new builds, and modernization projects allows for quicker transactions and projects, and could lead to more efficient follow-on production.

Tyndall AFB can serve as the model for proactive modernization efforts on other installations facing higher probabilities of extreme weather events. Tyndall AFB's rebuilding efforts include several novel projects that can benefit DOD. If using a prototype OT or a quicker FAR-based contract, that same OT should be used for follow-on production elsewhere, or that same contract can be rep-

307. See *id.* §II, para. (E)(3)(b)(x).

308. PIEE, *Overview of Electronic Data Access (EDA) Government Access*, <https://piee.eb.mil/xhtml/unauth/web/registration/userRolesEdaGovernment.xhtml> (last visited Oct. 18, 2024).

309. Compare [FPDS.gov](https://fpds.gov), *Other Transaction*, <https://www.fpds.gov/ezsearch/fpdsportal?s=FPDS.GOV&templateName=1.5.3&indexName=initiative&q=other+transaction> (last visited Oct. 18, 2024), with [SAM.gov](https://sam.gov), *Home Page*, <https://sam.gov/content/home> (last visited Oct. 18, 2024), where FAR-based contracts (and the vast majority of government procurement) and their major procedural supporting documentation are posted for public view and access.

310. Pub. L. No. 117-263, §843, 136 Stat. 2395, 2718-19 (2022) (further amending 10 U.S.C. §4022, as amended by §842, by adding new subsection (i)(3)(A)).

311. Pub. L. No. 118-31, §822(a)(1), 137 Stat. 136, 327 (2023) (amending 10 U.S.C. §4022(i)(2)(B)).

312. *Id.* (amending 10 U.S.C. §4022(i)(2)(A)).

313. Richard N. Kuyath, *The Untapped Potential of the Department of Defense's "Other Transaction" Authority*, 24 PUB. CONT. L.J. 521, 575 (1995) (internal citations omitted) ("All government agencies should be given authority to issue [OTs] in the Small Business Innovation Research Program[.]"). Richard Kuyath also recommends a statute that would provide all federal agencies the OTA for prototype projects and "should not be subject to any cost-sharing requirement[.] among other interesting proposals for further statutory expansion of OTAs for DoD and federal agencies."

licated elsewhere, as needed. DOD can and should use Tyndall AFB's rebuilding efforts and lessons learned in other locations before a damaging weather event occurs. If responding to extreme weather events defensively, DOD cannot sustainably invest billions into an installation for rebuilding as they have with Tyndall AFB.

Given the national security threat, Congress should also require the military departments to first determine whether an OT is appropriate for all facilities' projects before considering FAR-based procurement.³¹⁴ If the appropriate contracting officials determine a FAR-based contract better serves their needs, they must create a "justification and approval" and otherwise explain the rationale for their decision. This statutory mandate will require a contractual cultural shift in defense acquisitions, possibly causing an increase in innovative proposals for prototyping and research projects.³¹⁵

Perhaps, another next step for congressional action is creating an OTA line of accounting (i.e., fund or budget), like that of the O&M or MILCON accounts. OTA projects can be costly and one such project can take a large chunk of the MILCON FY budget. Contracting officials may be reluctant to fund an OT when much of that money is needed for routine upkeep of the existing infrastructure. This may also be the case where an agency or installation has an extensive deferred maintenance backlog at the mercy of other, more costly MILCON projects.

The NDAA-created pilot program prototype for military facilities has a current budget of \$300 million. With an expiration date in September 2025, this pilot program should be expanded and extended for broader use. With \$10.9 billion spent in OTs in FY 2022 by DOD alone, the \$300 million pilot program apportionment is insufficient to meet the rapid and growing demands of this innovative procurement method.³¹⁶

B. *EOs Should Compel Maximum Use of OTs, With Incentives and a Push for Base Mitigation in Addition to Resilience*

Where Congress is unable or unwilling to make such sweeping climate and procurement reforms, the president can issue an EO for some related measures. An EO is a powerful tool to compel federal agency action, and has proven so in many pivotal moments in American history. No U.S. president has issued an EO directing his federal agencies to first consider OTs for procurement projects, and certainly not in the context of combating the effects

of climate change nor to mitigate their individual environmental impacts.

Like the COVID-19 pandemic, climate change is impacting countries all over the world. Between 2020 and 2023, Presidents Trump and Biden issued many EOs that were designed to address pandemic relief and response.³¹⁷ In June 2020, President Trump issued EO No. 13927, which sought to expedite infrastructure investments for economic recovery during the pandemic, including Army Corps of Engineers civil works projects, projects on federal lands, and other specifications.³¹⁸ President Trump also issued an EO on ensuring priority access of COVID-19 vaccines to Americans and "timely distributions of such vaccines."³¹⁹ The U.S. government's rapid response and coordination with industry to create and disperse inoculations was remarkable. In fact, several federal agencies allocated \$12.5 billion in flexible contracting, like OTs, for COVID-19 response.³²⁰

Like the pandemic, another pivotal moment in recent human history is the continually evolving use of AI. Presidents Trump and Biden used their executive power to issue EOs for federal agencies' use, monitoring, and implementation of AI in their operations. In February 2019, President Trump's EO directed agencies with R&D authority to prioritize AI R&D projects.³²¹ Post-pandemic, in October 2023, President Biden issued a compelling EO directing federal agencies' actions on AI, essentially urging agencies to be forward-thinking, innovative, and secure, within specified parameters and instruction.³²² In fact, this EO promoted innovative uses of AI and competition directed at, for example, the Secretaries of State and Homeland Security, for streamlining immigration visa processes and attracting top talent for AI and related science, technology, engineering, and mathematics (STEM) for domestic studies.³²³

With climate change labeled a national security threat, the government's response to the threat should be as creative, broad, and nuanced as its actions during the COVID-19 pandemic and in the new era of AI. The president can issue EOs similarly requiring military departments to consider OTs for any installation infrastructure project, with a mandate to justify their decision should they decide to use a FAR-based contract. Without a statutory preclusion, the president can also include a directive for use of follow-on production across the agencies.

314. In fact, Congress could amend FAR §7.105 to require OT consideration in the initial acquisition planning stage of defense procurement projects.

315. The author extends thanks to George Washington University Law School Prof. Hallie Balkin for her insightful conversation on the potentials for DOD's OTA. Several of the proposals in this section flourished from that conversation, including congressional expansion and considerations, and government contract personnel's necessary cultural shift in including OTs, among others. Professor Balkin's expertise, insight, and availability were greatly valued.

316. See YEAR IN REVIEW REPORT 2022, *supra* note 170.

317. EOs issued since 1996 are easily accessible on the *Federal Register* site, divided by president and each year in their term(s) in office. See *Federal Register, Executive Orders*, <https://www.federalregister.gov/presidential-documents/executive-orders> (last visited Oct. 18, 2024).

318. Exec. Order No. 13927, 85 Fed. Reg. 35165 (June 9, 2020).

319. Exec. Order No. 13962, 85 Fed. Reg. 79777 (Dec. 11, 2020).

320. Amanda Arnold, *Innovation Governance During Crisis: Lessons Learned at Warp Speed During the Covid-19 Pandemic 106* (May 2023) (Ph.D. dissertation, Arizona State University) (on file electronically with Arizona State University).

321. Exec. Order No. 13719, §4, 84 Fed. Reg. 3967 (Feb. 14, 2019). Prior to that EO, President Trump also issued EO No. 13960, *Promoting the Use of Trustworthy Artificial Intelligence in the Federal Government*, in December 2020.

322. Exec. Order No. 14110, 88 Fed. Reg. 83809 (Oct. 30, 2023).

323. *Id.* §5.

For example, if the DAF-procured OT results in a successful prototype for a specific facility design that has both adaptation and mitigation features, perhaps another federal agency, like DOE, can benefit from having that designed facility constructed on its site. Allowing for cross-agency follow-on production helps ensure the successful prototype is deployed where it is most needed without the unnecessary duplication of efforts.

To ensure that federal agencies, private industry, and the public can readily access OT information, the president should also consider implementing a centralized website specifically for OT tracking, but comparable to the U.S. General Services Administration's System for Award Management website, SAM.gov. DOD's current site for document upload is limited to authorized users only.³²⁴ In turn, the FPDS.gov site may show some OTs, but the information (and documentation) visible are limited.³²⁵

A centralized, accessible site is critical for federal leaders, including military commanders, to be aware of the latest innovation, so that they may implement such ideas and projects in their own installations. Similarly, access to private industry can promote competition and creativity as it is able to see what others are developing and what the government needs now and for the future. For all of these reasons, the EO power can effectuate expeditious change with agencies' (including DOD's) modernization for climate-resilient infrastructure.

C. DOD, DAF, and Individual Commanders' Expedited Procurement Options for Facility Modernization and Mitigation Measures

Like the top-down governmental approach to policy changes, the military hierarchy offers a similar pattern. DOD's policy is binding on the military branches. However, where policy is silent or affords services discretion, DAF can implement facility modernization, adaptation, and mitigation measures. Further, individual base commanders have entrusted responsibilities and specific liberties for their own jurisdictional authority.

1. DOD-Wide Mandates for Use of OTs for Prototyping and Follow-On Production for Resiliency Infrastructure and Projects

Instead of waiting for Congress or the president to act, DOD, DAF leadership, and installation commanders can take immediate action to not only adapt to climate pressures, but also mitigate their facilities' impacts. DOD should first create a directive or policy for use of OTAs, mandating when to use OTAs, discussing incentives for such use, and the need for transparency of such transactions for agencywide access and training purposes.

324. See PREE, *supra* note 308.

325. See *supra* note 309.

While DOD has published its OT Guide, it is not a formal policy document.³²⁶ Instead, a directive can require agency contracting personnel to consider OTA for procurement before they may consider procurement under the FAR. This shift in procurement will require an adjustment and learning period as such consideration would be on a much greater scale than at present, but such a shift is necessary if modernizing DOD facility infrastructure is a national security priority.

If one military department uses the OTA to develop a successful prototype that complies with the competitive solicitation requirements, DOD should require all AOs to consider that successful prototype for follow-on production on their own installations. In fact, DOD can provide a timeline for such consideration, such as a requirement for consideration within six months of prototype delivery. Such a mandate would at least enhance communication between personnel of the ongoing and completed OTs and the nature of their prototypes.³²⁷

Additionally, in incentivizing the use of OTA and climate-related projects for infrastructure, DOD must tackle the risk-averse procurement culture. DOD can promote innovative ideas, establish think-tank groups among contracting personnel and across military services, and even host contests for fully funded prototype ideas because funding is often an issue for individual base projects.³²⁸ Finally, DOD can centrally publish OT awards online like it publishes contracts awarded.³²⁹ Visibility of these projects can be vital for both government personnel, and for attracting nontraditional defense contractors and private industry collaborators.

DOD could delegate its OTA to the lower echelons of military departments.³³⁰ In so doing, DAF could extend delegation authority to major command (MAJCOM) commanders, who tend to be high-ranking senior officials.³³¹ It follows that AOs must be placed at each of these locations to participate in and potentially lead the OT project. This may require hiring or training more contracting officials to become AOs.

326. See DODIG, REPORT NO. DODIG-2022-127, AUDIT OF DoD OTHER TRANSACTIONS AND THE USE OF NONTRADITIONAL CONTRACTORS AND RESOURCE SHARING 4 (2022).

327. The specifics of the requirement can be left to the Office of the Under Secretary of Defense for Acquisition and Sustainment. The mandate can require the consideration's justification for prototype applicability across the agency (including military installations), and whether follow-on production is suitable for their infrastructure needs. Such consideration may be written or verbal and can be submitted to a designated office/program for tracking and monitoring of OTs and their agencywide application.

328. One example is the DARPA project for "Reefense" technology discussed in Section I.A.2 of this Article.

329. DOD, *Contracts*, <https://www.defense.gov/News/Contracts/> (last visited Oct. 18, 2024).

330. If statutorily precluded from delegating their OTA, then this is an additional proposal for Congress to statutorily authorize delegation to the individual military branches.

331. There are nine MAJCOMs, with seven located within the United States. See Air Force Historical Research Agency, *United States Air Force—Major Commands*, <https://www.afhra.af.mil/Information/Organizational-Records/Major-Commands/> (last visited Oct. 18, 2024).

2. DAF Mandate for New Construction or Major Renovation Projects With Existing OTA Projects or Traditional Procurement Methods

DAF may have agency-specific options available for confronting future extreme weather events and further mitigating its own installations' environmental impacts. In recent years, the deferred maintenance backlog for DAF has steadily worsened. A looming fear is the potential for an installation to be partially or entirely closed (i.e., BRAC), as Homestead ARB's history shows. Should bases become more expensive to maintain, base closures due to old or deteriorating infrastructure can decrease the domestic military presence. Such a decrease threatens to diminish the potency of the American military force.

A growing deferred maintenance backlog, the aging infrastructure, and limited O&M and MILCON budgets require installations to prioritize repairs and maintenance on the most critical facilities, while deciding whether other facilities should be vacated or demolished due to safety or structural concerns. These existing issues are compounded by the growing threat of extreme weather events to installation infrastructure. This is arguably unsustainable for the future of DAF and, more broadly, DOD domestic installations, not to mention the safety of the base personnel and their families.

The Secretary of DAF can order immediate implementation of "green" infrastructure projects already in use by some civilian organizations and localities. Such projects include alternative energy purchases (solar, wind, etc.); installation of electric base taxis, shuttles, and any government vehicles used in the local area; garden or "green" roofs; and solar paneling in uncovered parking lots.³³² Because many of these goods or services already exist in the marketplace, these projects can arguably be acquired rather quickly via traditional FAR set-aside procurement methods.³³³ There are other procurement methods, like blanket purchase agreements, which may satisfy the agency's need.³³⁴ However, when appropriate in prototype projects, OTs are useful in attracting nontraditional defense contractors for totally innovative or never-before-used private-sector products and processes that may be applied to the defense.³³⁵

332. Some installations have implemented some of these projects; however, many DAF installations have expansive golf courses and generally outdated recreational activities and facilities for the incoming generations of airmen. If an installation commander (or delegated authority) is so inclined, they can implement a basewide study of the usage of the golf course and available activities. If the results show the golf course is hardly used or only used seasonally by few, perhaps the authority can apportion the golf course, entirely or in part, for reforestation. Of course, the type of flora for reforestation would be base-specific as flying missions may be impacted by taller trees, but perhaps not by shorter trees or other vegetation varieties. A full discussion of this issue is beyond the scope of this Article.

333. FAR subpt. 19.5.

334. *Id.* §8.405-3.

335. See MAYER ET AL., *supra* note 166, at iii, 29; see also Modeszto, *supra* note 299, at 213.

The statutorily required mitigation plans, if applicable, and master plans are key to understanding the base's specific vulnerabilities and deficiencies. Installation master plans already should plan for and assess facilities' vulnerability to extreme weather events. Assuming the master plans exist at every installation, the Secretary of DAF should require initiation of at least three green projects within six months of the mandate.³³⁶ Each installation will be able to decipher which climate-resilient projects are most beneficial or helpful to their extreme weather exposure.

There is little doubt that this will be a massive undertaking across the agency, but climate change disruption has already caused billions in damage. Where an installation commander determines there is no suitable project, or if they require more time for brainstorming, they must notify the Secretary of DAF within a specified period and provide justification for their delay. Several bases already had to "go to the drawing board" for modernization, repair, adaptation, and mitigation projects due to devastating weather events. Perhaps, this agencywide mandate would serve as the catalyst for all bases and promote greater accountability, particularly at bases that are most vulnerable to extreme weather.

3. Tools and Actions Available to Individual Installation Commanders

If base commanders remain without OTA from Congress, presidential EO, or DOD, then they must use the tools available to them. While DAF's goals for renewable energy and reducing its carbon footprint are laudable, the service must issue a directive to leaders for basewide implementation. If no DAF agencywide direction is provided, installation commanders must take charge with the means they have necessary; namely, FAR-based procurement.

Commanders play a pivotal role in climate resiliency and adaptation measures for their bases. The longer a base's infrastructure goes without modernization, the facilities, mission, personnel, and their families are exposed to the dangers of extreme weather events, especially those located in areas prone to worsening conditions. Installation commanders must prioritize modernizing infrastructure in a rapid, relevant manner, maximizing the means available to them.³³⁷

Modernization for adaptation should not be the sole focus for fortifying installation infrastructure. Doing so is essentially analogous to taking a defensive approach to climate change. Defense alone does not win wars. Coastal shore fortification, floodgates, and hurricane-wind-resis-

336. If the master plans are not uniformly maintained across DAF, then a mandate is justified for immediate cooperation on having one for each installation. To promote enhanced accountability, the installations without a master plan must develop one or report the delay and its justification to the Secretary of DAF.

337. Installation commanders are limited by their budgets and their individual "colors of money." The commander will have to work closely with their team to determine which projects are feasible. They must also advocate any concerns to senior leaders who manage the budget or who can share their concerns with Congress for legislative change.

tant buildings are examples of adaptation tactics. Yet, while valuable for modernizing infrastructure and facilities to withstand much of the climate exposure, many adaptation projects do not mitigate DOD's impact on climate change.

There are green infrastructure projects that can both adapt the installation to the increasingly pervasive and dangerous weather events and help mitigate their impact. Projects for clean and renewable energy can serve for both adaptation and mitigation measures. Logically, installation commanders will need to create task forces or teams where accounting, budgeting, and contracting officials all can work together to understand the parameters of projects and financing available.

In pursuit of innovation, communication must occur across the service between commanders and these teams to best understand the benefits, limitations, and other lessons learned from their own base's sustainable procurement journeys. Incentives such as bonuses, time off, and intra-office contests could be used to generate interest, and creative ideas may also flourish. Via expanded communication, an installation may learn there was an OT for facility design, which resulted in a successful prototype. All installation commanders should consider that prototype for follow-on production on their respective bases. Contracting officials on installations should be privy to the ongoing OTs across the agency and update the base commander routinely on these advancements and their applicability to the local mission.

Beyond facilities, installations can procure for wider infrastructure mitigation purposes. If such procurement is not pursued with OTs, then it can be secured with FAR-based procurement. There are many commercially available items and services offered by small businesses. Procurement set-asides for small businesses can be quickly executed, thanks to Congress' FAR mandate.³³⁸ Installations should also look beyond the traditional O&M or MILCON budget to fund these projects. They can consider working with the REPI Program, or other agencies that share common interests in projects.

Because these and related goods and services for sustainable procurement are already widely available and in use, most base leaders can issue orders for initiation of at least two mitigation projects within a specified amount of time.³³⁹ For example, the commander can order their procurement personnel to present draft procurement solicitations within 60 days. The presented plan must include preliminary market research of available vendors and goods and services, and within 30 days, produce a timeline for posting the solicitation for bids or proposals.

As with the COVID-19 pandemic, DAF's response to the national security threat of climate change must span

across the service, with ample communication and coordination for adaptation and mitigation efforts, where feasible. These are only a few options available to installation commanders and their teams as they tackle the latest domestic threat, while remaining within the bounds of legal and ethical procurement.

IV. Conclusion

There are many examples of extreme weather events impacting DOD and DAF installations. Just in the last 10 years, such events have collectively caused billions in damages and rebuilding and repairing costs. The recently declared national security threat of climate change will likely only continue to wreak havoc on unprepared installations. All bases, personnel, and their families, including those in California and Florida, must plan for worst-case weather scenarios while also looking ahead to reduce their own carbon footprints.

The recent NDAs have generally included environmental considerations for DOD's implementation. Over time, the legislation created and expanded on the OTA granted to specific federal agencies for specific purposes. However, the slow creep of statutory, DOD, and DAF policy to the climate change threat has been costly to taxpayers. Rather than take defensive and reactionary measures once a devastating weather event occurs, the military must quickly shift to proactively modernizing base facilities for climate resiliency. In partnership with procurement and community partners, DOD can also include innovative mitigation measures in their end products and designs.

This Article proposes a top-down approach of immediately available solutions. Where Congress can statutorily expand DOD's OTA and budget allocation(s), the president can issue sweeping EOs like during the COVID-19 pandemic and address the nuanced, untapped capabilities of AI. DOD, the Secretary of DAF, and, finally, installation commanders all have options available for quick modernization, contracting a cultural shift to OTs and quicker FAR-based procurement tools.

A reactionary, fractured, and defensive approach to climate change may allow for many installations to eventually adapt to its dangers. However, as recent examples have shown, that process will be slow and expensive for taxpayers. The yet unquantifiable cost to servicemembers, base personnel, and their families also warrants serious consideration. Instead, an immediate concerted effort to the maximum extent possible is necessary to meet and withstand the threat via adaptive infrastructure modernization projects, which also incorporate mitigation measures, where appropriate.

338. FAR subpt. 19.5.

339. Although this approach may be more time-intensive for remote or rural bases, the individual base leadership can determine appropriate, reasonable timelines for their mandated modernization adaptation or mitigation efforts.