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**Statement of**  
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**Before the Senate Committee on Appropriations**  
**Subcommittee on Military Construction and Veterans Affairs**  
**Military Infrastructure and Climate Resilience**

**May 19, 2021**

## **Introduction**

Chairman Heinrich, Ranking Member Boozman, and distinguished members of the subcommittee: Thank you for the opportunity to speak with you on the important topic of military infrastructure and climate resilience.

Our installations are key platforms for our nation's defense. They are our power projection platforms and support every mission the DoD Components undertake to defend this nation.

Therefore, we must work to ensure installations and infrastructure are resilient to a wide range of challenges to include climate change, disruptions to energy or water supplies, and direct physical or cyber-attacks.

Federal law mandates that the Secretary of Defense "shall ensure readiness of the armed forces for their military missions by pursuing energy security and energy resilience" (10 U.S.C. 2911).

The term "military installation resilience" means the capability of a military installation to avoid, prepare for, minimize the effect of, adapt to, and recover from extreme weather events, or from anticipated or unanticipated changes in environmental conditions, that do, or have the potential to, adversely affect the military installation or essential transportation, logistical, or other necessary resources outside of the military installation that are necessary in order to maintain, improve, or rapidly reestablish installation mission assurance and mission-essential functions

The Department has been and will continue to be proactive in developing comprehensive policy, guidance, and tools to ensure installation resilience, with a focus on robust infrastructure, sound land management policies, and increased energy and climate resilience.

## **Climate Change**

To successfully execute the DoD mission, the Military Departments must have the energy, land, air, and water resources necessary to train and operate in a world adversely impacted by a changing climate. Additionally, the Department must build in climate resilience into our formations, equipment, human capital, and all enabling energy, water and communications systems.

Climate change is already negatively impacting the Department's missions. From melting Arctic sea ice and thawing permafrost, to wildfires, hurricanes, drought, and sea level rise, the impacts of climate change on the operational environment are placing significant demands on our forces, and our interagency and international partners.

Severe weather related events at Tyndall AFB, Offutt AFB, and Camp Lejeune over the past five years are sober reminders of the catastrophic effects that climate change can have on the

Department's missions. These events, including the recent degrading effects of Winter Storm Uri, are representative of the climate-changed weather conditions we can expect in the future.

Climate change impacts can affect sources of supplies, equipment, vehicles, and weapons systems as well as their distribution and storage. Environmental Justice considerations require that training and testing, as well as acquisition actions, are not disproportionately impacting low income and/or minority populations (EO 13985 and EO 13990). Risks and opportunities will be coordinated through the updated DoD Environmental Justice Strategy to be developed per EO 14008.

As the National Climate Assessment makes clear, continued growth in greenhouse gas emissions along the current trend risks "unanticipated changes and impacts, some of which are potentially large and irreversible." (Fourth National Climate Assessment, Vol 1)

In other words, we need to act now to ensure climate change effects do not outpace mitigation efforts. The Department of Defense, by the nature of our national security role, manages risk. The evidence is clear: we must act deliberately today to avoid untenable risk in the future.

Given the current trajectory, these demands are likely to increase. According to recent, authoritative, and actionable science, the effects of climate change will outpace mitigation efforts at least for the next 20-50 years. To avoid unmanageable effects impacting mission, we must begin mitigation now at the same time we are adapting to observed and reasonably foreseeable climate changes.

Executive Order 14008, *Tackling the Climate Crisis at Home and Abroad*, identifies climate change as a national security issue and directs the Secretary of Defense (SECDEF), in coordination with inter-agency stakeholders, to submit to the President, an analysis of the security implications of climate change (Climate Risk Analysis) that can be incorporated into modeling, simulation, war-gaming, and other analyses.

EO 14008 further directs the SECDEF and Chairman of the Joint Chiefs of Staff (CJCS) to consider the security implications of climate change, inclusive of Climate Risk Analysis findings, in developing the National Defense Strategy, Defense Planning Guidance, Chairman's Risk Assessment, and other relevant strategy, planning, and programming documents and processes.

EO 14008 Section 211 directs the head of each agency to submit a draft Climate Action Plan to the National Climate Task Force and the Federal Chief Sustainability Officer that describes steps the agency can take with regard to its facilities and operations to bolster adaptation and increase resilience to the impacts of climate change. The Plan focuses on climate change adaptation in accordance with the Interim Instructions for Preparing Draft Climate Action Plans Under Executive Order 14008, released by the Council on Environmental Quality on 3 March 2021, and subsequent instructions.

The Department's Plan is almost complete and will be submitted on 27 May 2021. The plan integrates climate considerations across the full spectrum of our activities to ensure a ready and capable force. It complements the DoD Sustainability Report and Implementation Plan (SRIP), which addresses greenhouse gas reduction, real property management, fleet and mobility, sustainable procurement, and electronics stewardship and data centers.

#### *Climate Action Plan – Climate Literate Workforce*

DoD Senior Leaders are tasked with translating abstract climate hazards to address meaningful emerging risks and to identify gaps in existing knowledge and staff capacities. Building climate literacy and capability in the workforce appropriate for different functional areas will enable the Department to identify and address climate readiness actions across their areas of responsibility and successfully carry out the mission in an era of rapidly changing climatic conditions.

By focusing on climate literacy, the Department will ensure that climate change considerations and impacts are factored into all relevant and applicable DoD decisions. While some experts must know how to assess scientifically credible information about climate and communicate about climate and climate change in a meaningful way to support decision-makers, other staff will receive climate literacy training appropriate for their functions

The Department is committed to integrating climate change literacy into all its training and education efforts, from skill-specific military education to graduate training in the war colleges. This includes activities related to developing, acquiring, fielding, sustaining equipment and services, and installation practitioners. For example, installation management teams should attain climate literacy levels to support their risk-informed and responsible decisions.

#### *Climate Action Plan – Understanding Climate Vulnerabilities*

A key component of the Climate Action Plan task is a description of each agency's climate vulnerabilities, particularly in the area of installation, building and facility energy, and water efficiency. In mid-Fiscal Year (FY) 2019, Office of the Deputy Assistant Secretary of Defense for Environment and Energy Resilience chose to proceed with the development of the DoD Climate Assessment Tool (DCAT), a Department- wide, screening-level climate hazard assessment tool based on an existing geospatial tool developed by the U.S. Army Corps of Engineers (USACE) for the Department of Army (Office of the Assistant Secretary for the Army for Installations, Energy, and Environment).

The DCAT relies on the best available data and model outputs already produced and processed into forms amenable for producing actionable assessments of future climate exposure to eight hazards: coastal flooding, riverine flooding, heat, drought, energy demand, land degradation, wildfire, and historical extreme weather events. It includes customizable reports that can be used to prioritize installations for further, more detailed study of exposure, sensitivity, and adaptive capacity (ESAC); support effective and efficient planning; and identify climate resilience measures.

With the release of the DoD Climate Assessment Tool (DCAT), DoD now has the capability to quantify and compare installation exposure to climate hazards out into the future. On April 22, 2021 the Department published a report entitled “*DoD Installation Exposure to Climate Change at Home and Abroad*” which provides analysis of installation exposure to climate change hazards at over 1400 installations at home and abroad.

This assessment helps identify the climate hazards to which DoD installations are most exposed, which is the first step in addressing the potential physical harm, security impacts, and degradation in readiness resulting from global climate change. Assessing the sensitivity of an installation to its climate hazard exposure is the next step, followed by identifying measures to reduce exposure and sensitivity. Information in this report, combined with other DoD data and analytical results, will be used to support that Climate Risk Analysis.

### **Building Installation and Range Resiliency**

The Department incorporates climate resilience as a cross-cutting consideration for our planning and decision-making processes, and not as a separate program or specific set of actions. Specifically, the Department considers resilience in the installation planning and basing processes. This includes consideration of environmental vulnerabilities in installation master planning, management of natural resources, design and construction standards, utility systems and service, as well as emergency management operations.

The DoD has a worldwide footprint – almost 3 million military and civilian personnel, more than 26 million acres, and over 603,385 facilities encompassing more than 2.2 billion square feet and valued at more than \$1,210 billion (B); many of which serve specialized, mission-critical purposes. These assets are distributed across the Services (Army, Air Force, Navy, Marine Corps, and Space Force) and numerous DoD agencies, each with distinct operations.

The Department’s installations remain critical components of its ability to fight and win wars. Our warfighters cannot do their job without bases from which to fight, on which to train, or in which to live when they are not deployed. Our installations support our families – many of whom live there and all of whom use their support services. The bottom line is that installations support our military readiness. To ensure that our installations are prepared to support the defense of this nation, the Department takes a broad, systemic approach that considers climate and man-made threats to built and natural infrastructure. Not only must we ensure that facilities themselves are resilient in the face of a range of threats, but we must also ensure that the surrounding land, water, and airspace can support mission-essential activities.

Since 2010, DoD has developed a comprehensive set of policies, directives, and plans to manage the effects of climate change on its operations, missions, and facilities. The Department has a comprehensive approach to building climate-ready installations. This approach considers resilience in installation planning: installation master planning, installation energy planning (IEP), management of natural resources, design and construction standards, utility systems and service, and emergency management operations.

## Facilities

Regarding the built environment, the Department pursues resilience through application of its building codes in both installation planning, and design and construction of individual facilities. The Department updates these building codes, collectively known as Unified Facilities Criteria and Unified Facilities Guide Specifications, on a regular basis to reflect revised industry and federal standards. As building technologies improve and data from natural disasters increases over time, these standards become more stringent towards protecting life and property in these types of events.

The National Defense Authorization Act for Fiscal Year 2020 amended 10 USC Section 2864 to require that installation master plans address risks and threats to installation resilience, including those from climate change. The Department's September 2020 update to UFC 2-100-01, *Installation Master Planning* directs installations to incorporate climate resilience analysis in master planning activities to ensure mission sustainment over the intended lifespan of infrastructure and assets. The UFC also provides instruction on the use of climate scenario planning, and refers to the DoD Climate Assessment Tool (DCAT) and the DoD Regional Sea Level Database (DRSL). To aid in implementation, the Military Departments have established handbooks to support installation staff as they incorporate climate change into installation planning.

Outputs from the Department's forthcoming Climate Risk Analysis and Climate Action Plan will be used to further inform and update the Department's installation master planning efforts. In master planning for effects of climate change, the Department is taking a broad and holistic approach. For example, sea walls might reduce risks on an installation, however, without considerations for managing local circulation effects, they could result in induced flooding elsewhere. Additionally planning and design of built and natural infrastructure must assess the effects of infrastructure projects on local areas to avoid disproportionate impacts to low income and minority communities.

The challenge to maintain present built and natural infrastructure into the future will vary depending on location, climate hazard exposure, and sensitivity of missions and operations. Improving understanding of infrastructure components and ecosystems is critical.

Information about how natural ecosystems contribute to ecosystem services and climate resilience, and how they overlap with the built environment provide insight into how to design better solutions that account for the condition and benefits of the whole system. For example, as we have previously reported, coastal ecosystems—including wetlands, marshes, and mangroves—may shield communities from the impacts of climate change.

Planning for future infrastructure and new DoD installations can also take decades. The DoD's global property holdings are worth nearly \$1.2 trillion (DoD 2020b). As the frequency of extreme weather events has increased, the DoD must consider the related risks and make wise investment decisions to mitigate the impacts of extreme weather on the DoD's mission.

Recent updates to Unified Facilities Criteria to incorporate forward-looking projections of climate-related data into its planning and design criteria include the following:

- **UFC 3-201-01, *Civil Engineering*.** Includes sections on minimum design flood elevation and flood mitigation requirements, flood resistant design options, and flood protection systems. Establishes a technical approach for using the DoD Regional Sea Level Database at coastal installations to determine future inundated areas, future floodplains, and design flood elevations.
- **UFC 3-201-02, *Landscape Architecture*.** Directs all DoD projects to design plantings for climate resiliency. States DoD projects must consider potential climate change effects and address the effects through strategic land use planning, modifications, and design interventions.
- **UFC 1-200-02, *High Performance and Sustainable Building Requirements*.** Requires that new building designs are “responsive to any Government-provided projections of climate change and determination of acceptable risk.” Directs DoD Components to identify and implement operations and maintenance policies that improve the climate resiliency of facilities and operations.

Related Unified Facilities Criteria updates for extreme events include the following:

- **UFC 3-301-01, *Structural Engineering*.** Provides design load combinations for designing structural components that are sensitive to vertical earthquake ground motion.
- **UFC 3-400-02, *Engineering Weather Data*.** Directs installation planners to request engineering weather data from Air Force’s 14th Weather Squadron that focuses on climatic variables of temperature, humidity, precipitation, and winds.

## **Environmental Conservation and Compatible Development**

The Department’s lands and waters are vital to readiness. As training, testing, and operational requirements expand and new weapons systems are introduced, access and use of ranges becomes increasingly important. Managing for healthy and resilient natural landscapes, such as reducing fire risks, avoiding wildlife conflicts, removing invasive species, and improving range and training areas, provides the conditions necessary for mission-essential activities.

This includes opportunities to maintain and improve “natural infrastructure,” implementing solutions outside installation boundaries to enhance the benefits provided by natural systems. Natural infrastructure solutions encompasses a wide range of possible actions that can help promote installation resilience and preserve access to critical installation and range assets and capabilities.

For example: restoring historical hydrology (e.g., wetlands and coastal marshes) can help reduce flooding impacts on coastal infrastructure; reestablishing oyster reefs and restoring shoreline and dune vegetation can help reduce impacts of storm surge on low-lying installations; restoring high-value habitat can enhance wildlife corridors for threatened, endangered, or at-risk

species and avoid or mitigate regulatory restrictions on training, testing, and operations; and removing vegetation and managing fuel loads can minimize wildfire risk to infrastructure, personnel, and operations.

To assist installations in developing plans to manage the evolving natural resources challenges, the DoD worked with the National Wildlife Federation to develop planning guidance – “Climate Adaptation for DoD Natural Resource Managers.” The guide, published in June 2019, provides an overview of how a changing climate may affect military lands and other resources, and outlines a process to incorporate adaptation strategies into Integrated Natural Resource Management Plans (INRMP).

Two key programs that are facilitating the Department’s sustainment efforts are the Readiness and Environmental Protection Integration Program (REPI) and the Sentinel Landscapes Program.

*Readiness and Environmental Protection Integration Program (REPI)* – The REPI program preserves test, training, and operational capabilities that enable readiness, strengthens strategic partnerships, and supports test, training, and operational capability. The REPI program stimulates innovative and diverse partnerships between local communities and military installations that increase collaboration and promote installation resilience. Partnership agreements provide installation commanders, trainers, testers, and operators with increased mission flexibility by preventing, mitigating, or removing restrictions that can result from nearby incompatible development. In the last 16 years, REPI partnerships have protected more than 586,000 acres of land around 106 installations in 33 states.

In FY 2019, the Department was provided expanded authority under 10 U.S.C. 2684a to specifically address military installation resilience as a key element of the REPI program. This authority further enhances the REPI program’s ability to engage in collaborative land protection and natural resource management activities to help installations avoid, prepare for, minimize the effect of, adapt to, and recover from extreme weather events, or from anticipated or unanticipated changes in environmental conditions.

*Sentinel Landscapes Program* – The Sentinel Landscapes Program coordinates between DoD, the US Department of Agriculture (USDA), and the Department of the Interior (DOI). This coalition of federal agencies, state governments, local communities, and private conservation organizations works to advance shared land-use goals around military bases.

The program works closely to identify landscapes across the country where all three missions of the federal agencies—promoting sustainable agricultural and forestry rural lands, strengthening national defense, and building community resilience to climate change—intersect. Once identified, the three agencies coordinate to target their various conservation programs to properties within these priority areas. Each project site, or “sentinel landscape” has been remarkably successful in collaborating across agricultural, defense, and conservation sectors to tackle complex issues related to water quantity and quality, imperiled species habitat, and wildfire mitigation.



## *Office of Local Defense Community Cooperation*

Many states and communities across the country support the mission of the DoD. Through its Office of Local Defense Community Cooperation (OLDCC), the Department is leveraging the capabilities of state and local partners through grants and technical assistance to enhance the readiness of its installations and ranges, and to deliver safe places for its members and their families where capabilities in DoD do not otherwise exist.

OLDCC's program portfolio is comprised of over 200 separate grants, exceeding \$1.3 billion. Recently through its Defense Community Infrastructure Program (DCIP), OLDCC has funded projects to support communities serving Fort Huachuca, Arizona, and Joint Region Marianas, at Tinian. These projects are improving community utility infrastructure which in turn is strengthening the resilience of the strategic support area serving the bases. In the NDAA for FY2021, Congress amended 10 USC Section 2391 to enhance DCIP's ability to facilitate investments in community infrastructure projects that bolster military installation resilience. As part of its holistic approach, the Department is continuing to explore ways to use the DCIP program to enhance its internal climate and energy resilience approach.

### **Research**

DoD's Strategic Environmental Research and Develop Program (SERDP) and Environmental Security Technology Certification Program (ESTCP) invest in research focused on improving DoD understanding of environmental and climate related risks to installations and mission. DoD uses the SERDP and ESTCP programs to validate and fund sustainable design initiatives and cutting-edge clean energy technologies that can reduce DoD's vulnerability to climate change and increase resilience to unavoidable impacts. The following are a few examples of SERDP research efforts related to infrastructure and climate resiliency:

- In response to coastal threats associated with rising sea level, SERDP initiated the DoD-led Coastal Assessment Regional Scenario Working Group and developed the DoD Regional Sea Level Database (DRSL) to provide authoritative, scenario driven sea level change information relevant to each coastal installation. The DRSL is now publicly available so that contracted third parties (e.g., engineering firms), can use the future sea level change information for coastal installation and facilities planning. This availability is critical since DoD installation master planning standards and civil engineering design standards now incorporate DRSL information into installation planning.
- In response to drought risk, SERDP initiated a study to understand and assess environmental vulnerabilities on installations in the desert southwest. This research seeks to detect and assess drought response of sensitive riparian forests to drought stress over recent decades and will be carried out within three DoD bases in the Southwest, with widely applicable results.
- In response to wildfire risk, SERDP developed a Fire Science Strategy in 2014 focused on the following: improved characterization, monitoring, modeling, and mapping of fuels

to support enhanced smoke management and fire planning at DoD installations; enhanced smoke management using advanced monitoring and modeling approaches; and research to quantify, model, and monitor post-fire effects.

- SERDP and ESTCP investments seek to understand changes to the Arctic terrestrial environment relevant to DoD infrastructure. Permafrost degradation can impact soil, vegetation, buildings, roads, and airfields. SERDP and ESTCP investments are leading to tools for making Arctic infrastructure more “aware” of permafrost changes before costly failures occur. An example is Lawrence Berkeley National Laboratory’s fiber-optic geophysical sensing package capable of providing real-time information on subsurface conditions relevant to infrastructure performance and failure in Arctic environments.

Traditionally, the Department has been challenged in transferring clean energy technologies from the SERDP and ESTCP programs over the “valley of death” from concept to programs of record. The Department is revitalizing efforts to facilitate technology transfer through directed programs such as the Energy Resilience and Conservation Investment Program (ERCIP), as well as third-party financed authorities.

### **Energy Programs**

Unlike the Department’s MilCon and Environmental Remediation programs, where the budget request includes specific line items, our energy programs are subsumed across other accounts.

### **Energy Resilience Policies, Programs, and Tools**

As defined in Section 101 of Title 10, energy resilience is the “ability to avoid, prepare for, minimize, adapt to, and recover from anticipated and unanticipated energy disruptions in order to ensure energy availability and reliability sufficient to provide for mission assurance and readiness, including mission essential operations related to readiness, and to execute or rapidly reestablish mission essential requirements.”

The Department utilizes a portfolio of appropriated and third party financed programs to pursue energy resilience. These programs are governed by key instructions and policies to ensure warfighter requirements are addressed holistically and in a prioritized and cost effective manner.

### **Policies and Programs**

The Office of the Assistant Secretary of Defense for Sustainment (ASD(S)) provides policy and oversight to the military departments and defense agencies that align to the energy resilience requirements of Title 10 and Department of Defense Instruction (DoDI) 4170.11, *Installation Energy Management*. The Department implements policies through critical initiatives, such as installation energy planning, energy resilience assessments, and black start

exercises. The Department also pursues partnerships with other agencies, such as the Department of Energy.

*Department of Defense Instruction 4170.11, Installation Energy Management –*

This formal policy provides guidance, assigns responsibilities, and prescribes procedures for all DoD installation energy management activities to include energy and climate resilience requirements. It is currently being rewritten to further strengthen the role of installation energy plans and the inclusion of energy resilience, climate and cybersecurity provisions.

*Installation Energy Plans –*

Through the Installation Energy Planning (IEP) process, military installations are tasked with identifying mission critical loads, assessing energy resilience and cybersecurity gaps, and developing scalable and cost effective solutions to close those gaps. The Services are finishing IEPs for priority mission installations and are submitting plans for top energy consuming installations by the end of FY21. All remaining installations are targeted for completion by the end of FY22.

The Department's IEP framework is being enhanced to address the short, medium, and long-term impacts of climate change. Specifically, climate scenario planning, using the DoD Climate Assessment Tool (DCAT) and the DoD Regional Sea Level Database (DRSL), is informing the Department's Installation Master Planning and Installation Energy Planning (IEP) processes. Additionally, the IEP process is being reviewed to potentially integrate climate objectives and weighting factors such as GHG reduction, the social cost of carbon, and environmental justice in its decision-making calculus.

In the IEP process installations leverage a portfolio of energy authorities and technology solutions to close critical energy and climate resilience gaps. As part of its climate adaptation and mitigation efforts, the Department is seeking ways to increase the use of clean energy and other GHG reducing solutions in its pursuit of energy resilience. Presently, more than 15% of the electricity used by DoD facilities is from renewable sources, and DoD is the largest producer of onsite renewable energy in the federal government.

The intermittency of clean energy technologies has historically presented a challenge in terms of closing energy resilience gaps identified in the IEP process. The Department is "moving the needle forward" by exploring ways to integrate renewables with other technologies (i.e., micro-grids, battery energy storage, etc.) to overcome these challenges. IEPs are "living documents", and the Department will update them frequently to incorporate advancements in clean energy technologies and battery storage.

*Energy Resilience and Conservation Investment Program (ERCIP) –*

ERCIP is a subset of the Defense-Wide Military Construction Program, specifically intended to fund projects that improve energy resilience, contribute to mission assurance, save

energy, and reduce DoD's energy costs. ERCIP accomplishes these goals through construction of new, high-efficiency energy systems or through modernizing existing energy systems.

The ERCIP program has executed over 511 high priority projects from FY09-21 including the implementation of micro-grids, renewable energy generation (i.e., solar PV, solar thermal, wind, etc.) building efficiency enhancements, and utility distribution improvements [~\$900M+ portfolio].

For example, at Marine Corps Air Station (MCAS) Miramar the ERCIP program facilitated the implementation of an installation level micro-grid which enables the base to operate during disruptions to the commercial grid. The base has a power plant with both diesel and natural gas generation to supplement existing landfill gas and solar power, providing a total of 11.2 MW of on-site power generation. Additionally, a new energy and water operations center was built to consolidate the microgrid control system with other utility management systems at the air station.

The Department is exploring ways to better integrate ERCIP with broader climate and modernization initiatives (including technology transfer). Additionally, as part of the NDAA for FY2021, congress has provided the authority to use ERCIP with other funding sources such as Energy Savings Performance Contracts and Utilities Privatization.

#### *Energy Savings Performance Contracts (ESPC)/Utility Energy Savings Contracts (UESC) –*

DoD seeks opportunities to enhance energy efficiency and reduce energy consumption as part of its efforts to strengthen energy resilience. Energy efficiency bolsters installation energy resilience by helping reduce the energy demand from distributed energy production resources during commercial grid disruptions. Energy efficiency is also a practical way that the DoD is reducing its carbon footprint in alignment with the tenets of EO14008, the Energy Act of 2020, the Federal Sustainability Framework, and broader DoD climate mitigation goals.

The Department continues to utilize performance contracting (i.e., ESPCs/UESCs) as a significant part of its efforts to enhance energy resilience through energy efficiency.

For example, through an ESPC at Marine Corps Recruitment Depot (MCRD) Parris Island the Marine Corps has enhanced readiness through the installation of a 3.5 megawatt combined heat and power plant (CHPP), 6.7 megawatts of solar photovoltaic panels with integrated energy storage, and a microgrid control system. Built above the flood zone, the CHPP is less susceptible to hurricanes, storms and sea level rise. Implementation of clean energy technologies and other equipment upgrades will reduce energy consumption by 88% and water consumption by 25%. Based in part to savings from the ESPC, MCRD Parris Island decreased its electricity purchased from the commercial grid by more than 50% in FY20 compared to FY19.

Additionally, in July 2019, the Navy awarded its largest ever ESPC to Naval Station Guantanamo Bay, Cuba, to build a new power plant, improve resiliency and reliability, increase efficiency, and add renewable generation to this self-sufficient critical installation. The project

will provide 12 MW of solar photovoltaic energy generation, battery energy storage, water and sewer improvements, major building system upgrades, and a dual-fuel (F76 fuel oil and Liquefied Natural Gas) Combined Cycle Power Plant. Annual savings for this ESPC are expected to reach nearly 4 million BTUs and 1 million gallons of water.

Since 2011 the Department has awarded over \$5.1B in performance contracts and its portfolio is the largest in the federal government. Due in large part to efficiencies from these contracts, the Department has also achieved an energy intensity reduction of 20.9% from FY 2003 to 2019, contributing to GHG reductions.

In furtherance of its forthcoming Climate Action Plan and in alignment of the Installation Energy Planning process, the Department is posturing itself for further performance contracting investments in FY2022 and beyond. The Department's efforts will be informed and enabled by the Energy Act of 2020.

#### *10 USC 2912 Energy Cost Savings –*

The Military Services continue to leverage authority granted under 10 U.S.C. Section 2912 to retain amounts equal to energy cost savings in order to fund additional energy resilience, energy efficiency, and installation quality of life projects. In FY2019 and FY2020, the Military Departments piloted efforts to retain \$115M in installation energy cost savings using the authority. Presently, the Military Departments are piloting efforts to utilize funds pursuant to the statute and DoD financial regulations.

#### *Other Alternative Financing Authorities –*

The Department continues to leverage other alternative financing authorities to implement energy resilient, climate-ready and cyber-secure solutions. These include, but are not limited to, power purchase agreements (PPAs), enhanced use leases (EULs), and utilities privatization (UP), when supported by the business case and/or IEP.

For example, at Edwards AFB, the Department is moving forward on an 800 megawatt renewable energy project that could be one of the largest solar arrays in the country, and would be the largest in the DoD. The Air Force estimates the project could provide power for an average of 238,000 homes in California, and could yield cash rent consideration up to \$80 million throughout the expected 35-year enhanced use lease.

#### *Micro-reactor Demonstration –*

As directed in the FY 2019 National Defense Authorization Act, the Department of Defense is seeking to demonstrate a commercially developed, Nuclear Regulatory Commission (NRC) licensed, very Small Modular Reactor (vSMR) to power critical loads at a permanent domestic military installation by December 2027. An RFP for the pilot base currently under development, to be issued this year; planned selection of a vendor by 2022 to demonstrate a micro-reactor on a DoD (Air Force) installation by 2027. Industry is making steady progress in developing advanced micro-reactors with the potential to enhance installation resilience through

assured access to power in support of critical missions and remote operations. The Department will use the proposed demonstration to assess the energy resilience capability and the cost effectiveness of vSMR technology.

### *Exercises and Tools*

To facilitate the implementation of energy resilience policy, the Department is utilizing exercises and analysis tools to continually improve our approach.

#### *Black Start Exercises (BSEs) –*

In accordance with U.S. Code Title 10 Section 2911 and DoD instruction 4170.11, the Department is performing BSEs to evaluate energy resilience risks to readiness while completely separated from the commercial electric grid. Since 2015, the Department has conducted over 35 site-level energy resilience assessments, tabletop exercises, and black start exercises to implement its policies. The lessons learned from these initiatives have been used to develop Department-wide policies and procedures to drive behavioral and cultural awareness for installation personnel and energy managers.

To ensure the readiness of its installations, the Department routinely conducts statutory “black start exercises” where installations are disconnected from the wider power grid to determine the resilience of on-site power generation. These black start exercises were completed at Fort Stewart, Fort Greely, Fort Bragg, Hanscom AFB, Vandenberg AFB, Joint Base McGuire-Dix-Lakehurst, and Marine Corps Air Station Miramar. BSEs identify critical energy vulnerabilities and interdependencies that could degrade critical missions, assess latent risks in an installations energy resilience posture, and inform the development of appropriate mitigations.

### **Cyber Secure Facilities**

Given the importance of energy resilient facilities as nodes for projecting and sustaining power, the Department is reducing the cyber risks to facility related control systems (FRCS). Building on the July 2018 Deputy Secretary of Defense memorandum, *Enhancing Cybersecurity Risk Management for Control Systems (CS) Supporting DoD Owned Defense Critical Infrastructure*, my office has integrated the cyber security of industrial control systems into energy policies and guidance.

The Department is developing internal requirements for ‘inside the fence’ as well as requirements for external partners ‘outside the fence’ to be cyber-secure and cyber-resilient. For example, military installations are including cyber security considerations in the development of their installation energy plans, and FRCS considerations are now required for utility privatization agreements, ESPCs, and UESCs.

We will continue to work with the Department’s Chief Information Officer and Principal Cyber Advisor toward solutions and resources ensuring FRCS are defensible, survivable, and resilient to operate and sustain critical functions in a cyber-contested environment. My office also plans

to incorporate relevant and timely FRCS cybersecurity requirements in our forthcoming rewrite of DoDI 4170.11

### **Conclusion**

Thank you for the opportunity to testify on the Department's efforts to build resilient and climate ready installations. Your continued support of Department of Defense's mission and for our military members and their families is appreciated.