

DEPARTMENT OF THE AIR FORCE PRESENTATION  
TO THE SUBCOMMITTEE ON READINESS  
COMMITTEE ON ARMED SERVICES  
UNITED STATES HOUSE OF REPRESENTATIVES

SUBJECT: DEPARTMENT OF THE AIR FORCE ACTING ASSISTING SECRETARY OF  
THE AIR FORCE FOR ENERGY, INSTALLATIONS, AND ENVIRONMENT WRITTEN  
TESTIMONY FOR ENERGY, INSTALLATIONS, AND ENVIRONMENT PROGRAM  
UPDATE

STATEMENT OF:

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NOT FOR PUBLICATION UNTIL RELEASED  
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## Introduction

Chairman Waltz, Ranking Member Garamendi, and distinguished members of the Subcommittee, thank you for the opportunity to discuss Department of the Air Force (DAF) energy, installations, and environment programs.

Our installations remain the platforms from which we enable and project combat power in and through the air and space domain. Every DAF mission starts and ends on an installation. We train and equip for joint operations, generate readiness, test new weapon systems, control and sustain air and space weapon systems, and provide safe, healthy communities for our Airmen, Guardians, and their families at our Air and Space Force installations. DAF installations also serve as key nodes in a global network of operating locations enabling Joint Force mission success around the world. Hence, the readiness, resiliency, and sustainability of installations are matters of strategic importance.

For nearly 80 years, we have operated our installations with nearly unprecedented freedom of action. However, as the National Defense Strategy (NDS) clearly describes, the homeland is no longer a sanctuary. Our Nation faces the nexus of complex challenges: the rise of great power competition with China and Russia; the increasing complexity of multi-domain threats; the competition for access to resources; and the increasing rate of technology change. We must ensure our installations are resilient, optimized, and operationally efficient to successfully defend the homeland; prevail against the full range of man-made and natural threats; deter strategic attacks against the United States, our Allies, and our partners; deter aggression and be prepared to prevail in conflict when necessary; and build a resilient Joint Force and defense ecosystem. We recognize the foundational capability our installations provide in advancing these priorities through integrated deterrence, campaigning and building enduring advantages.

In the face of these challenges, we made hard choices to prioritize efforts focused on integrated deterrence in an environment of shrinking advantage against aggressive competitors, operating in an evolving security environment. Last year, we began the transition required to meet the challenge of pacing adversaries through a focus on seven operational imperatives. This year's budget reflects continued modernization efforts in a resilient, effective space order of battle; operationally-optimized Advanced Battle Management System; achieving Moving Target

Indication at scale; development and fielding of a Next Generation Air Dominance family-of-systems; cost-effective, resilient forward basing; global strike capabilities built around the B-21 Raider; and expeditious transition to a wartime posture.

In support of these imperatives, the DAF Military Construction (MILCON) program continues to prioritize nuclear enterprise modernization and Combatant Command (CCMD) infrastructure support with an emphasis on the European and Pacific theaters. The Facilities Sustainment, Restoration and Modernization (FSRM) portfolio remains focused on sustaining our existing infrastructure. Furthermore, we preserve the well-being and quality of life of our service members and their families through investments in housing, dormitories, and child development centers (CDCs). We also fund high return-on-investment operational energy initiatives, which increase our readiness and provide more combat capability for every gallon of fuel consumed—“lethality per gallon.” We remain committed to sustaining the DAF’s power projection, enabling platforms, and searching for operational energy improvements to increase range and operational capability. We appreciate the continued partnership with Congress to ensure Air and Space Forces are well-postured to compete, deter, and win.

### **Operational Energy**

We are pursuing policies, investments, and activities that increase our agility and “lethality-per-gallon,” while improving our ability to field and sustain a combat-credible force now and in the future. By reducing the energy demand of our aircraft, we can increase our range and time on-station, improve our fuel-offload capability, and boost engine performance. Diversifying energy sources also increases our capability. Current events in Ukraine highlight how energy can be used as a weapon and present significant logistical risk to the warfighter.

As a critical enabler to our global mission, operational energy (aviation fuel) comprises over 80% of the \$6 billion annual DAF energy bill. To remain ahead of our adversaries in a complex and ever-changing battlespace, we continue to develop a more agile and optimized approach to generating sorties and providing Airmen with fuel when and where they need it. Our FY23 enacted budget provided \$181 million in funding for the research, development, acquisition, and operation of modern technologies, data analysis, and innovative process improvements that will enhance our combat capability and mitigate operational risk to the warfighter.

### Optimal Operations Planning and Data Collection

We continue to collaborate with stakeholders across the DoD and industry to implement efficiency best practices, support modernized information systems and software applications, and collect and analyze data to optimize mission planning and execution, enable decision advantage, and maximize combat capability. Our data analysis capabilities and technologies facilitate greater visibility into Air Force aviation fuel use, increase stakeholder collaboration, and have uncovered numerous opportunities to optimize aircraft operations. We can now assess how energy optimization affects combat capability in warfighting scenarios. We have demonstrated that employing more efficient air refueling assets not only decreases fuel demand and sortie requirements, but also enables greater fuel offload. In some cases, the benefit to the warfighter overall may even double the efficiency improvement to tankers operations and enable greater mobility capacity to support force generation and critical deployment timelines.

We invested in 21<sup>st</sup> century planning software to optimize how we schedule aircrew to optimize readiness and allocate aircraft to best accomplish mission requirements. *Puckboard*, a real-time collaborative squadron operations platform, provides scheduling capability to aircrew anywhere in the world, on or off the DoD network, and is now available to over 24,000 service members and 550 organizations, and counting. *Puckboard* integrates digital forms with programs of record and aims to increase training events accomplished per sortie through its AI Solver. Additionally, we continue to enhance the tanker planning tool *Jigsaw* with optimization and auto-planning features, further streamlining aerial refueling schedules and reducing planning process times for the Air & Space Operations Center weapon system. The automation capability will reduce planning time to seconds or minutes rather than hours and increase scheduling efficiency by at least 10% over the baseline. This is equivalent to supplying fuel to approximately 250 aircraft with 5 fewer tankers, enabling crew reallocation and saving approximately 400,000 gallons of fuel per week.

We are also working to optimize cargo loading and planning of global airlift missions with partners in Air Mobility Command and the Air Force Institute of Technology. By better utilizing allowable cargo space, the DAF can use fewer aircraft, and therefore use less fuel, to accomplish the same mission. For example, we are working with Air Force Research Laboratory's Future Force Energy and Power Office to build and test the Vertical Stacking Pallet

prototype, an Airmen-developed technology that allows cargo to be stacked vertically within mobility aircraft, enabling more efficient use of cargo space. The DAF is also funding Aerial Port of the Future, a suite of mobile applications and technology improvements to legacy systems supporting aerial ports and the Global Air Mission Support System.

Furthermore, as part of our effort to streamline operations and increase aircraft range and capability, Air Mobility Command Headquarters launched the Mission Execution Excellence Program (MEEP), a pilot program to incentivize optimized flying on the largest fuel consumers in the Air Force, heavy mobility aircraft. MEEP encourages Airmen to increase their use of efficient flying best practices through direct and indirect incentives—and importantly, does not negatively impact mission and training requirements. In fact, initial estimates show that employing MEEP can improve energy intensity—or the mission effectiveness per gallon of fuel—by 3%. Based on performance during the 2022 pilot phase, the two participating MEEP C-17 wings are on track to reduce fuel consumption by over one million gallons per year.

Finally, under the authority provided by Congress in Title 10 USC 2912, the DAF is implementing the Operational Energy Savings Account (OESA) program to further incentivize energy-aware behavior and processes. By documenting fuel savings from previous operational energy initiatives, the OESA program allows those funds to be re-invested in other optimization efforts making it a self-sustaining program. In 2021 and 2022, we recovered \$24 million in fuel cost savings derived from C-17 and C-5 operational efficiencies and tanker planning in the USCENTCOM AOR. We fully implemented the OESA program in 2022, funding a multiple-MAJCOM virtual reality aircraft maintenance training effort and delivering electric aircraft positioners to support Air Force Special Operations Command operations.

### *Weapon System Sustainment*

We depend on the readiness of our weapon systems to maintain global reach and power. Through partnerships with the aviation and commercial industries, we identify innovative solutions to modernize legacy aircraft and weapon systems while maintaining our lethality. By leveraging infrared imaging and laser scanning methods of engine compressor blades for the inspection and rework of engine components, paired with innovative coatings of engine compressor blades, we are ensuring overhauled legacy engines deliver optimized engine performance for the DAF. The commercial aviation industry is realizing fuel savings of 2-4% for

the combined execution of these processes. Our updated nucleated foam engine washing pilot programs provide significant operational impacts and energy consumption efficiencies.

Specifically, the Air Force Special Operations Command CV-22 and AC-130J programs return impressive benefits including longer engine life, improved performance, and decreased maintenance requirements. We are expanding this pilot program to KC-135s and C-17s to explore added benefits to the DoD's two largest aviation fuel consumers. Additionally, we added detergent to our existing engine water wash contracts for B-52, C-5, E-3, and KC-135 fleets with additional analysis needed to compare the multiple programs to inform future decisions.

### *Fuel Logistics and Alternative Fuels*

We remain engaged with commercial stakeholders such as the Commercial Aviation Alternative Fuels Initiative, International Civil Aviation Organization, our Operational Equipment Manufacturer (OEM), and other government agencies, to maintain awareness of the research, development, testing, certification, and commercialization of "drop-in" alternative aviation fuel in the ASTM International approval process. We continue to team with DoD and Air Force stakeholders, such as the Defense Logistics Agency-Energy, Air Force Petroleum Office, Air Force Research Laboratory, and Air Staff, as well as international allies and partners, to monitor alternative fuel production, pricing, and commercial use to better position the DAF to support changes in the defense alternative fuels strategy and provide operational flexibility based on fuel availability in specific regions and circumstances. Additionally, we leverage our research and analysis to better identify logistical gaps and propose resiliency improvements to the jet fuel supply chain in energy-constrained environments.

### *Energy-Informed Wargaming*

Through wargaming and analysis, we analyze how fuels and energy logistics support requirements could affect combat operations in an evolving threat environment. Realistically addressing operational energy challenges helps inform leadership decisions essential to achieving desired levels of lethality, readiness, and interoperability. Results from the Air Force's Global Engagement and Long Duration Logistics Wargames and Joint Forces Energy Wargame highlighted the criticality of energy distribution infrastructure and the necessity for energy planning across all phases of an operation. Joint-service wargames such as these allow

participants to analyze the jet fuel supply network in an energy-constrained environment and reduce operational risk to joint logistics.

Through modeling and simulation tools, we increased our awareness of future energy requirements and the potential for fuel supply gaps, disruptions, and adversarial threats. We continue to develop methods to analyze our strategic energy posture and the unique challenges in the Western Pacific and European theaters to inform infrastructure and capability investments to enhance operational readiness.

### *Acquisitions and Capability Development*

We work closely with the Air Force Research Laboratory and Defense Innovation Unit to push the technology envelope and help advance key disruptive technologies to maximize operational energy efficiency and outpace our competitors. We help guide acquisition policy to address operational energy requirements associated with new platforms and major modification programs through the Energy Key Performance Parameter and Energy Supportability Analysis. We also play an active role in the capability development process, which helps ensure future systems will not only be optimized for energy considerations, but also will be sustainable in their intended operational environments.

We have invested in and advocated for several technologies and platforms that increase range or endurance and optimize fuel use for numerous critical missions. For example, drag reduction initiatives on legacy aircraft include C-17 Microvanes, KC-135 Vertical Wipers, C-17 and KC-135 Active Winglets, and C-17 Engine Pylon Fairings, among others. Together, these technologies equate to improved aircraft range and capability, reduced greenhouse gas emissions, and tens of millions of dollars' worth of fuel cost savings.

One of the most impactful projects the DAF is exploring is the transformational design of blended wing body (BWB) aircraft, which is expected to increase fuel efficiency of large aircraft by 30% (with today's engines). For an aerial tanker, this can equate to nearly a doubling of mission radius at a given fuel offload, or a doubling of offload at a given radius. This platform demonstration project aims to accelerate future flexibility for tanker, cargo, and bomber fleets while leveraging significant private capital to maximize DoD return on investment. The project aims to complete the first flight of a full-scale BWB aircraft by December 2026 and completion of initial flight testing by September 2027.

## Installations

We advance our commitment to optimizing installation investment through implementing the Infrastructure Investment Strategy (I2S), increasing senior leader oversight of the portfolio, and pursuing reforms within our MILCON program. First introduced in 2019, the I2S is the Department's long-term strategy to cost-effectively modernize and restore infrastructure readiness, improve the resiliency of mission-critical nodes, and drive innovative installation management practices. We are refining and refreshing our strategy and expect to complete an update by late 2023.

We oversee I2S implementation efforts through recurring Infrastructure Councils and Infrastructure Program Management Reviews to assess resourcing and asset management practices on infrastructure readiness. The Council developed a series of metrics that quantify the impact of I2S policies and investment decisions on infrastructure condition, facility space use, and MILCON cost growth. Regular assessments of the I2S allow senior leaders to make timely decisions, which affect program execution and future budget decisions.

## Military Construction

In FY23, Congress provided the DAF nearly \$4 billion in MILCON funds. I would like to thank Congress for the funding, which helps mitigate rising costs due to inflation and supply chain issues, and fund critical priorities. This funding supports the DAF's commitment to fulfilling NDS requirements, posturing for the future high-end fight, and taking care of our Airmen, Guardians, and their families, caregivers, and survivors. We continue to focus on the Pacific and European theaters and modernizing the nuclear enterprise, as well as support fielding new weapon systems to ensure the DAF remains the world's premier Air and Space Force.

Balanced with combatant command priorities and new mission beddowns, our MILCON program also recapitalizes facilities that have outlived their useable life or no longer meet mission requirements.

Planning and Design (P&D) reinforces program stability and consistency, making it the central focus of the DAF MILCON program. Sufficient P&D enables projects to progress rapidly through design and meet maturity criteria for admissibility into the program, provides more accurate cost estimates, and maximizes the opportunity to award projects in the year of appropriation. With the \$295 million in P&D funds provided in FY23 appropriations, the DAF



intends to fully fund designs for our planned FY24 and FY25 projects, initiate design for FY26 projects, and move forward on designs for 28 projects at 19 separate locations inserted into the FY23 legislation by members of Congress. The outcome of our two-year budget lock policy is a stable MILCON program that allows us to efficiently use P&D for future projects.

### *Sentinel Program*

The Sentinel program will recapitalize the ground-based leg of the Nuclear Triad. We are investing in facilities supporting 450 Intercontinental Ballistic missile Launch Facilities and supporting infrastructure across three Wings in five states to reach Full Operational Capability in the 2030s. The projects supported in the FY23 enacted legislation will enable the Sentinel MILCON program to remain on schedule and align with weapons system deployment milestones. This includes the first phase of land acquisition associated with the F.E. Warren AFB missile fields. The US Army Corps of Engineers (USACE) will begin formal negotiations with landowners at F.E. Warren AFB in the second quarter of FY23. The USACE target is to complete negotiations with landowners who own property within the Operational Weapon System Article (OWSA) requirement in the first quarter of FY24. This phase of land acquisition will allow the program to meet the OWSA weapon system deployment schedule. The DAF appreciates your support in FY23 with the \$34 million land acquisition MILCON funding and your continued support in future years.

### *Natural Disaster Recovery Efforts*

The DAF will make use of the \$360 million Congress provided in FY23 to address inflationary and supply chain cost increases in our Natural Disaster Recovery (NDR) program. To date, we awarded 43 MILCON projects (approximately 75% of the NDR program) totaling over \$2.9 billion. In calendar year 2022, we awarded 28 projects, totaling \$2 billion. Through this program, we are improving mission readiness and resilience at Tyndall AFB, FL and Offutt AFB, NE.

### *Facility Sustainment, Restoration, and Modernization (FSRM)*

We view the FSRM and MILCON programs as interdependent; together, these two funding streams serve as the foundation of sustainable DAF installations. FSRM provides a non-

MILCON pathway to repair facilities and infrastructure, maximizing their lifespan. In FY23, Congress provided the DAF over \$5.3 billion in FSRM funding. Our priority for FSRM continues to be sustaining our existing infrastructure with increased emphasis on quality-of-life projects (i.e. dormitories, CDCs) and our operational and training infrastructure. Our I2S drove changes in how we execute the FSRM program by prioritizing projects based on mission risk and timing investments at the optimal point in the asset lifecycle.

### *Child Development Centers and Dorms*

We strive to provide a high quality of life for our members and their families, and at the heart of that goal is affordable, accessible childcare for our Airmen and Guardians and safe, high-quality dorms for our unaccompanied members. The DAF is using a two-prong programmatic approach to improve CDCs: targeted investments in FSRM and MILCON projects to address facility condition concerns and increase capacity. In FY23, we are spending \$7.6 million in FSRM funding on four CDC projects, and in FY24 we intend to commit \$50 million in FSRM funds for CDC requirements. For MILCON, three of our top priority CDCs—JBSA-Randolph, TX; Scott AFB, IL; and Wright-Patterson AFB, OH—were authorized in the FY23 NDAA and funded within the FY23 appropriations totaled \$98.4 million. The DAF also received \$2.7 million in MILCON Planning and Design (P&D) funds to start designing a CDC at Luke AFB, AZ, which will posture this project for future execution. The DAF will strategically use a portion of the \$370 million inflation offset funding to address cost increases in several previously authorized and appropriated CDC projects.

Equally important to us is providing unaccompanied service members high quality housing in our dormitory campuses. Commanders' responsibilities include protecting the health and safety of unaccompanied Airmen and Guardians. It is their responsibility to enforce inspection criteria to identify and report conditions requiring immediate and future maintenance. Funded from the DAF FSRM account, the investment strategy for dormitories focuses on sustainment, restoration, and modernization of these facilities. This enables the DAF to focus MILCON funds to replace dormitories in poor condition beyond economical repair and installations with dormitory deficits. We intend to invest an average of \$220 million per year in FSRM funds across the five-year Future Years Defense Program to repair and improve the

condition of the current inventory of dormitories. This level of investment is a significant increase of over dormitory investments in recent years.

### DAF Basing

Our strategic basing process integrates strategic planning, resource allocation, and installation platforms to optimize basing of individual missions while ensuring overall strategic posture for readiness and power projection. Total Force synchronization enhances posture in basing of flying and non-flying missions while guaranteeing training, readiness, and operational capabilities to COCOMs. With tiered authorities, DAF leadership is engaged at key decision nodes to align actions with the NDS, while notifying Congress at significant decision points.

We appreciate congressional interest and legislative language supporting Military Family Readiness, to include the FY23 additions of healthcare and housing, alongside the existing licensure portability in making certain basing decisions. This focus affirms the central importance of families and caregivers as a key aspect in recruitment and retention, as they reside in the very same communities which support our installations. Additional engagement by states and localities continues to be a critical facet for providing adequate and accessible healthcare and housing, while also bolstering against encroachment around installations, airfields, and ranges.

### Housing, Construction, Operation and Maintenance

The DAF Housing program provides for housing construction, planning and design, and operations and maintenance (O&M) while focusing on eliminating inadequate housing from the DAF inventory and correcting health and safety deficiencies. In addition to enabling planning studies, design for future construction projects, renovation of existing DAF-owned homes, the military family housing construction program also supports the restructure of privatized housing projects.

Our military family housing O&M program sustains, improves, and modernizes our inventory of approximately 15,200 DAF-owned family housing units and provides enhanced oversight of over 52,000 privatized homes. However, the high cost of construction requires solutions within the DAF family housing construction program to achieve the full scope of other projects. Combined, the family housing O&M and construction programs will ensure continued support for the housing needs of Airmen, Guardians, their families and caregivers, as well as our Army, Navy, and Marine Corps teammates living in DAF owned and privatized family housing.

### Privatized Family Housing

Quality, affordable housing has a direct correlation to recruitment, retention, and readiness. Hence, we remain focused on improved oversight, long-term financial health, and sustainment of the housing inventory. We are committed to ensuring Military Housing Privatization Initiative (MHPI) projects provide safe, quality, and well-maintained housing where military members and their families and caregivers will want and choose to live.

We continue our efforts to improve our privatized housing portfolio and address the remaining elements of the MHPI reforms set out in the FY 2020-23 National Defense Authorization Acts (NDAA). We made significant progress to implement reforms to enhance our oversight of privatized housing and hold MHPI companies accountable for providing quality housing. Specifically, several congressionally mandated NDAA provisions were implemented throughout various DAF housing programs including:

- FY 2020 NDAA Section 3011: We collaborated with the private-sector MHPI companies to universally agree to adopt 18 rights set out in the MHPI Tenant Bill of Rights. All but two companies have either implemented or agreed to implement all 18 of these rights. While the remaining two companies do not yet provide the MHPI Tenant Rights to dispute resolution, or rent segregation, these projects remain fully compliant with their project legal agreements with DAF and associated state and local landlord requirements. As Congress has recognized, applying many of the Tenant rights at existing MHPI housing projects requires voluntary agreement by the MHPI companies. The DAF continues to seek voluntary agreement of the remaining two MHPI companies by working to resolve their remaining concerns and achieve their full implementation of all 18 Tenant Rights at their MHPI projects at the following installations: Joint Base Elmendorf Richardson, Alaska and Wright Patterson AFB, Ohio
- FY 2020 NDAA Section 3036: We implemented the amended section 606 payments to MHPI Projects to focus on the most urgent needs of underfunded MHPI projects and ensure the projects invest these funds investing appropriately to safeguard long-term project viability.
- FY 2020 NDAA Section 3051: We began the process to complete standardized privatized housing and government-owned housing inspections and assessments at all

locations, using DoD's uniform housing standards, completing inspections at 15 installations in CY22.

- FY 2022 NDAA Section 2813: We verified the appropriate application of Disability Laws and Collection of Modification Costs requirements are documented in existing MHPI projects' transaction documents. These requirements ensure the projects make reasonable accommodations for any resident with a disability.

In 2020, we added 218 government positions across the privatized housing program, increased inspections, provided additional training to housing personnel, and revamped housing governance. We continue to maintain Resident Councils for two-way communication between the residents and installation and project owner leadership. We then utilize feedback from tenant satisfaction surveys to develop action plans for improving the residents' experiences and encourage our Airmen and Guardians, and their families to engage with Resident Advocates to help resolve any disputes and improve communications among all relevant DAF stakeholders.

We also expanded our metrics for assessing the health of the privatized housing portfolio, particularly with regards to resident satisfaction, maintenance quality and responsiveness, and property management operations. Most of our private partners meet or exceed DAF standards as prescribed in our metrics. However, when we identify concerns with operational performance, we have placed a small number of private partners on Community Action Plans, or if more systemic, on Performance Improvement Plans with milestones and schedules. The goal is to remedy deficiencies and ensure our military families receive quality service and housing.

Some privatized housing projects will require financial restructuring to continue to remain financially stable and market-comparable. The restructure goals are to ensure the projects can fully fund operational expenses, debt servicing, and sustainment of the homes for the life of the lease and also fund reinvestment needs during the mid-term reinvestment period. We plan to include DAF investments for select MHPI project restructures in future President's Budget requests at select locations.

### *Community Partnerships as a Solution for Infrastructure Divestment and Management*

We apply commercial best practices and innovative solutions to base infrastructure asset management through creative partnerships that (1) monetize underutilized/non-excess land and

buildings; (2) enable proactive divestment and disposition strategies to offset required recapitalization of mission critical assets; and, (3) decrease or eliminate the risk and total cost of ownership of asset classes that are common to defense communities, state and local government, or private industry. Noteworthy examples of this capital investment strategy are:

- **Edwards Air Force Base Solar Enhanced Use Lease:** Out-leased 2,600 acres of underutilized/non-excess land, providing 464 megawatts (MW) of energy to the California Grid, 3,287 MWh of battery storage capability, 320,000 tons per year of CO<sub>2</sub> reduction, and generating \$75.8 million in In-Kind consideration for the base to offset unfunded operational and capital requirements.
- **Fairchild Air Force Base Joint Use Indoor Firing Range:** Entered into a historic first-of-its-kind IGSA with Spokane County, WA to obtain exclusive access to a new state of the art firing range funded, constructed, owned, and operated by the county. This enables active, reserve, and guard forces at Fairchild to complete small arms training, qualification and proficiency firing requirements at an average estimated annual savings of \$1 million over a 10-year contract.
- **Joint Base Cape Cod Water/Wastewater Utility Systems Exchange.** We executed a first-of-its-kind exchange agreement which will divest water and wastewater utility systems owned by the Air Force and operated by the Massachusetts Air National Guard, 102d Intelligence Wing (102d IW) to a private utility operator in exchange for construction of facilities of equal or greater value than the FMV of the divested assets. This innovative approach will support missions on the base more affordably with long term price certainty and provide the 102d IW with up to \$60 million of cost avoidance of future capital investment.

### Installation Resilience

Our Installation Energy Program focuses on ensuring Air and Space Force installations are truly resilient to the broad range of threats from adversaries, changing climate, and cyber-attacks. We define resilience within the “5 Rs” of robustness, redundancy, resourcefulness, response, and recovery. Installation Energy Plans apply the “5Rs” to assess gaps and prioritize energy, water, and climate projects to ensure mission readiness. The “5Rs” help describe how a system is prepared for crises using the preventative attributes of robustness, redundancy, and

resourcefulness, as well as how the system functions during crises using the performance attributes of response and recovery.

Adversarial threats and natural hazards pose a growing risk for prolonged power outages for installations. Using a mission thread perspective, we are working to identify key nodes on and off installations that, in a denial-of-service scenario, may result in a significant impact on our ability to deliver key capabilities. A comprehensive understanding of mission requirements, current system operations, accurate reporting, and historical outage data assist in identifying possible service vulnerabilities. We strive to mitigate operational impacts from disruptions to energy and water through increasing investment in and improving maintenance of energy systems.

### Enhancing Energy and Water Resilience

Reliable access to sufficient, quality power and water enables our operational and training missions. We view energy and water as essential and linked resources; our energy initiatives consider both. Our vision of “Mission Assurance through Energy and Water Assurance” focuses on sustaining warfighting capabilities, while simultaneously optimizing resource use through enhanced planning, technology, and process improvements. We assess near and long-term energy and water needs based on resilience, cost considerations, and the opportunity to leverage clean sources.

We conduct Energy Resilience Readiness Exercises (ERREs) to help installations assess mission readiness during a controlled denial of service. Under an ERRE, also referred to as “pull-the-plug” or “black start” exercise, an installation intentionally shuts down its primary power for 8-12 hours to test its onsite backup power systems and identify how infrastructure and mission interdependencies might play out during a denial of service. ERREs serve as a cornerstone of both mission and energy assurance efforts across the DAF by actively testing key enabling systems under “blue sky” conditions to identify gaps in energy, water, and mission capabilities. In 2022, we conducted ERREs at seven installations, including its largest regional exercise, to bring the total number of ERREs conducted to 13. This large-scale regional exercise was conducted at three Space Force installations in Colorado. It uncovered valuable lessons learned for each individual installation as well as insights regarding inter-installation capabilities

for USSF. Looking ahead, we will continue to execute five ERREs per fiscal year through at least FY27.

Our installations are increasingly automated with interconnected control systems that, when vulnerable, open our multi-domain operations to adversarial cyber threats. In compliance with the FY17 NDAA Sec. 1650, we completed assessments of DAF critical infrastructure to identify vulnerabilities. These assessments exposed risks to missions we unknowingly accepted, and validated the mitigation measures we are already pursuing to increase control systems' cybersecurity and resiliency. In March 2021, we published our DAF Strategic Plan for Control Systems detailing a unified and enduring approach to protecting and defending these control systems which assure our critical infrastructure and mission capabilities.

Per the FY22 NDAA (Sec. 2833), we completed the military installation resilience component of a master plan, known as an Installation Climate Resilience Plan, at two installations in CY22: Vandenberg Space Force Base and Joint Base Langley-Eustis.

### *Managing Water Resources*

We are placing greater emphasis on water resilience, recognizing that water resources are finite, yet essential to sustained mission capabilities. Water availability faces many threats, including aging infrastructure, scarcity, malicious attacks, natural hazards, changes in climate, rising costs of supply, quality issues, and encroachment. We take a risk-based approach to water management and links water security directly to mission assurance.

Current water initiatives include increasing transparency into mission needs and readiness, comprehensively identifying and assessing water risks, expanding external stakeholder engagement, analyzing capability gaps, and developing mitigation strategies. We created an Installation Water Dashboard, an interactive data repository for all installations including Active, Guard, and Reserve to streamline water data and reporting to support our goal of determining water vulnerabilities and aid future water resilience planning. The Dashboard enhances our efforts to support mission assurance for all installations.

### *Conducting Installation Energy and Water Planning*

Installation Energy Plans (IEPs) utilize a standardized framework based on the “5Rs” to integrate strategic guidance, plans, and policies into a holistic roadmap for each installation to



advance mission critical energy and water goals. Through 2022, we completed 70 Installation Energy Plans, including 49 at our priority installations and the top 75% of energy-consuming installations. These plans resulted in developing over 150 resilience initiatives to address installation energy and water vulnerabilities identified through ERREs, and mission thread analyses. By June 2023, we will complete IEPs at all U.S. priority installations and the top 75% of energy-consuming installations. The IEPs will result in improved installation energy and water resilience.

### Financing Energy and Water Infrastructure

The DAF Installation Energy Program does not have a dedicated budget line; rather, it relies on direct investment, third-party financing, and innovative funding solutions. Direct investment typically comes from FSRM, MILCON, or the Energy Resilience and Conservation Investment Fund (ERCIP). Third-party financing and other contracts include vehicles such as Energy Savings Performance Contracts (ESPCs), Utility Energy Service Contracts (UESCs), and Utilities Privatization contracts (UP).

We shifted the focus of our installation energy program from being solely concentrated on conservation to incorporating solutions for achieving resilience. This mission-focused, climate-informed approach is evident in our efforts to leverage the authorities provided by Congress to use ERCIP funds on third-party financed projects. For example, we are using ERCIP funds at Vandenberg Space Force Base to develop a microgrid with battery storage. The energy will be provided through a solar power purchase agreement and the commercial grid.

### Resilient, Innovative Infrastructure

We are implementing innovative solutions to build energy efficient and resilient systems for the installations of the future. These efforts include pilots to accomplish 100% carbon-pollution free electricity and 100% zero emission non-tactical vehicles by fiscal years 2030 and 2035, respectively; exploring alternative energy opportunities through nuclear, geothermal, and solar energy means; and changing the overall DAF approach for future energy initiatives. We are exploring pilot projects that will utilize new or non-traditional design and construction practices to construct hyper-efficient facilities. Efficient design and construction practices include passive heating and cooling, super-efficient HVAC systems, air and ground source heat pumps, tight and

efficient building envelopes. These initiatives will reduce energy consumption and free up resources for operational imperatives.

Additionally, we identified Eielson Air Force Base, AK as the preferred location for our first nuclear micro-reactor pilot site due to the base's existing infrastructure, arctic location, and critical mission resilience requirement. We are working with DLA-Energy to execute a firm-fixed price power purchase agreement under 10 U.S.C 2922a with a third-party developer. The developer will own, operate, and maintain the microreactor and deliver zero emission electricity on Air Force property in exchange for long-term purchase of the generated energy. The DAF and DLA released a formal request for proposal in September 2022 to attract the best possible commercial partner for this project. Once completed, the first of its kind micro-reactor at Eielson AFB is expected to produce 1-5 MWs of energy to supplement current installation energy sources as a redundant resilience measure, which will help ensure mission critical infrastructure is protected against physical and cyber security threats. We work closely with Alaskan state, local and Tribal Nation leaders as it aims to reach full operational capability by 2027.

We seek to leverage geothermal technological innovation from the industry to meet installation electricity needs at Mountain Home AFB in southwest Idaho and Joint Base San Antonio in southcentral Texas. We are working with the Defense Innovation Unit to administer a competitive down-selection process for a geothermal pilot under a sole-source, follow-on contract vehicle to support our intent to implement the technology at other locations across the enterprise.

Finally, with more than 60,000 vehicular assets across installations, we need to be prepared for changes in the direction of the commercial market to ensure we continue to have access to the tools and equipment we need for our mission. As the industry transitions to electric vehicles, we look at fleet electrification as an opportunity to improve resiliency, decrease operation and maintenance costs, and embrace cutting edge technologies. In 2021, we identified Joint Base Andrews and Joint Base McGuire-Dix-Lakehurst as pilots for the use of electric vehicle technology. In 2022, we identified an additional 16 installations for the next phase of the pilot. We are incorporating lessons learned from different geographies, utility partners, acquisition pathways, mission type, and weather into a comprehensive planning guidance that

will provide a step-by-step process to incorporate vehicles into existing fleets. This will include a catalog of acquisition pathways to secure charging infrastructure.

### **Environmental Stewardship**

The safety and health of the Airmen and Guardians who work and live on our installations, their families, and the surrounding communities are among our highest priorities. We greatly appreciate congressional support for our efforts to address per- and polyfluoroalkyl substances (PFAS) and facilitate Environmental Restoration Program progress.

#### **Environmental Restoration**

We remain focused on meeting our cleanup obligations under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the Resource Conservation and Recovery Act (RCRA). Investigation objectives and environmental response actions performed under these statutes aim to reduce risk to human health and the environment in a risk-based, prioritized manner at the approximately 13,000 restoration sites at our active and closed installations. Currently, much of our restoration program focus is on chemicals of emerging concern, most notably, PFAS.

Our PFAS strategy uses CERCLA to investigate, define, and, as necessary, remediate groundwater, surface water, sediment, and soil impacted by DAF activities. We also conduct a robust effort to communicate and collaborate with local communities, State and Federal agencies, and elected officials at all levels. The DAF PFAS response framework is built on three themes: (1) protect human health; (2) prevent future releases; and (3) promote meaningful communication and collaboration with communities.

The primary source of PFAS compounds from DAF activities is aqueous film forming foam (AFFF). The two main PFAS compounds in AFFF are perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA). While AFFF is the primary source of DAF-related PFAS impacts, there are other minor DAF sources such as electroplating and photofinishing. We are committed to addressing all of these sources under federal CERCLA cleanup law and meet the requirements in Sec 341 of the 2022 NDAA and Sec 346 of the 2023 NDAA.

We remain committed to align our PFAS research and remediation efforts with the scientific progress and state and federal regulatory frameworks. Scientific progress and the state

and federal regulatory framework surrounding PFAS are rapidly evolving as we investigate and remediate PFAS impacts, and these developments can increase our scope and extend our implementation schedules. For example, in June 2022, the U.S. Environmental Protection Agency (EPA) published more stringent Regional Screening Levels (RSLs) that we now use to delineate or define the extent of PFAS impacts during CERCLA investigations. This required the DAF to review sites to determine if additional work is necessary. This work is ongoing and could result in the need for additional sampling, thereby affecting the project schedule. In addition, several states have promulgated drinking water standards and the EPA is committed to establishing a national primary drinking water regulation for certain PFAS.

We look forward to the clarity that national drinking water regulation will provide. In the interim, DoD is continuing to use exceedances of 70 parts per trillion (ppt) to trigger the provision of alternate drinking water under our CERCLA removal authority until EPA establishes a nationwide, enforceable drinking water standard. Pursuant to DoD policy, once initiation of a CERCLA Removal Action is triggered, we may use a more stringent promulgated state drinking water standard for PFAS cleanup instead of 70 ppt.

In anticipation of this EPA drinking water regulation and to account for emerging science that shows potential health effects of PFOS and PFOA at levels lower than 70 ppt, we, in coordination with DoD, are evaluating our efforts to address PFAS in drinking water at DAF sites, and what actions we can take to be prepared to incorporate this standard, such as reviewing our current data and additional sampling where necessary. We remain committed to fulfilling our cleanup responsibilities, operating within the law and authorities provided by federal cleanup laws, and clearly communicating and engaging with communities.

In prioritizing CERCLA environmental response actions, we use a risk-based decision-making framework with protection of human health and the environment as the highest priority. Action is prioritized on a “worst first” basis, meaning sites that pose a greater potential risk to human health and the environment are addressed before sites posing a lesser risk. Although the Department does not program environmental restoration funds by chemical, we obligated \$1.34 billion to identify, investigate, and respond to PFAS releases. Drinking water response actions are complete at nine Base Realignment and Closure (BRAC) installations and 39 DAF Active, Reserve and Air National Guard (ANG) installations. Implemented response actions include

supplying bottled water, installing point-of-use filtration, whole-house filtration, and connecting residents to municipal water supplies.

The FY23 appropriations provided \$216.4 million above the budget request, of which \$68 million is allotted to address PFAS at BRAC installations. As of December 2022, we completed initial PFAS CERCLA Site Inspections at 149 installations and initiated CERCLA Remedial Investigations for 111 DAF installations, 14 of which are BRAC installations. While we take prompt actions under CERCLA to address drinking water impacts, the remaining response efforts are primarily intended to address PFAS in groundwater and soil, which can be technically complex and lengthy to complete.

The evolving regulatory environment and complex nature of the challenges posed by PFAS remediation require the use of a collaborative and cohesive team effort. In 2019, the DoD PFAS Task Force was developed to meet this need, and we are an active member. This PFAS Task Force is focused on addressing and eliminating the use of AFFF as currently formulated, understanding the impacts of PFAS on human health, and ensuring we fulfill our cleanup responsibilities related to PFAS. We are working with the PFAS Task Force Working Group to develop and implement the NDAA data reporting requirements.

We proactively engage with community members who are concerned about the possible environmental and health effects from PFAS impacts resulting from DAF activities to support our Restoration Advisory Boards (RABs) as we constantly strive to improve our community outreach programs to be more inclusive and responsive. By using Technical Assistance for Public Participation (TAPP) grants, we can provide communities with independent technical assistance to improve their understanding of highly technical cleanup information and provide advice to decision makers. This year, we supported the Barnes Air National Guard Base community in Westfield, MA through TAPP grant assistance for their RAB.

We are also working with community members at several bases to seek their input on distribution of RAB community interest surveys. We are looking beyond federal regulatory public outreach programs to identify other means to expand community engagement. For example, we held a treatment plant tour and technical workshop at the former Wurtsmith Air Force Base in October 2022 to further the community's technical understanding of our cleanup processes and progress. We are also participating with EPA in an environmental justice pilot at Dover AFB.

## Environmental Quality

We ensure resilient natural infrastructure and maintain sound environmental stewardship by implementing compliance programs which adhere with applicable environmental laws and regulations. Our environmental compliance programs focus on multiple environmental media and encompass efforts to identify and minimize or eliminate environmental impacts from DAF activities. Specific efforts to ensure compliance include detailed air quality assessments, management and inspection of underground and above ground storage tanks, hazardous and solid waste management and disposal, and environmental planning and permitting procedures. Additionally, we operate a forward leaning pollution prevention program that includes maximizing the diversion of solid waste from landfills to reduce the volume and cost of solid waste disposal. We recycle batteries, used oil, fluorescent light bulbs, and spent solvents; and support our hazardous materials pharmacies to effectively reduce, track for reporting, and safely manage the use of hazardous materials. Through these compliance programs, we continue to protect the health of our Airmen, Guardians, and the environment by making investments to meet regulatory requirements and promote efforts to prevent non-compliance through pollution prevention programs and routine inspections.

We remain firmly committed to a robust program of integrated conservation management covering a full suite of environmental, natural, and cultural resources. Conservation funding has allowed us to invest in natural and cultural activities on and around our installations and training ranges that provide direct support to mission readiness. The conservation program in FY23 supports ongoing habitat and species management for 123 threatened and endangered species found across 54 DAF installations and provides for continued cooperation and collaboration with the other military Services, federal government agencies such as the United States Fish and Wildlife Service, and applicable State fish and game agencies. The DAF Cultural Resources Program supports mission needs through maintaining our Integrated Cultural Resources Management Plans. These 117 plans work to preserve 6,141 historic buildings and structures and 20,669 archaeological sites.

We also executed a National Historic Preservation Act Programmatic Agreement for decommissioning the Minuteman III intercontinental ballistic missile weapon system and replacing it with the Sentinel program. This Programmatic Agreement will serve as a roadmap on how historic properties will be identified, how adverse effects to those properties will be

resolved, and the way consultation will occur over the course of the program. Parties to the agreement include seven State Historic Preservation Offices, one Tribal Historic Preservation Office, the National Park Services, the Advisory Council on Historic Preservation, 57 Tribal governments, nine other Federal agencies, 11 state agencies and local governments, and five historical resource focused non-governmental organizations.

Recent efforts carried out at Eglin AFB, FL exemplify integrated conservation management. Archaeologists at Eglin teamed with biologists and conservationists from the Choctawhatchee Basin Alliance to construct a series of “Living Shorelines” to protect sensitive archaeological sites from shoreline erosion while also enhancing natural habitat and water quality. Partnerships like these help us preserve cultural resources and provide effective ecosystem and habitat management, including wildland fire and invasive species management. These partnerships also support ongoing natural resource management efforts that focus on addressing imperiled and invasive species, critical habitats, and other key natural resources on installations to avoid or minimize mission impacts. Through the DoD Recovery and Sustainment Partnership, we collaborated with the United States Fish and Wildlife Service to enhance mission operations and increased range access while protecting at-risk species. This successfully resulted in the proposed down-listing of the red-cockaded woodpecker from Endangered to Threatened status and the delisting of the Okaloosa Darter.

We remain committed to responsible environmental stewardship. As trustee for more than 8.3 million acres of land including forests, prairies, deserts, wetlands, and coastal habitats, we understand the important role natural resources play in maintaining our mission capability. To maintain military readiness, we need realistic test and training environments, which themselves are ecosystems. Quite simply, if we do not maintain the ecosystems we rely upon to continue our test and training mission, and clean up the impacts of past mission activities, we will not be able to achieve or maintain military readiness.

#### Base Realignment and Closure (BRAC)

The FY23 appropriation for BRAC cleanup is \$175 million, including an additional \$68 million Congressional add-ons to address PFAS. We greatly appreciate congressional support for our PFAS efforts as we continue the cleanup and transfer of BRAC properties. This funding will facilitate environmental restoration and property transfer activities at 34 former DAF

installations closed through prior BRAC law and keep us on-track to transfer the remaining 1,651 acres at five former installations by 2027.

### **Conclusion**

Our FY23 budget balanced risk between maintaining current readiness in support of combatant commanders today, while investing in the force infrastructure we need for the future. The seven operational imperatives served as our “north star” in guiding this transformation and continue to serve as our guide in the FY24 budget submission. We remain committed to ensuring resilient, optimized installations and operational energy for effective mission execution to deliver the foundational capabilities resident in a changing operating environment. While we remain extremely capable, we cannot deliver these capabilities alone. We must operate as One Team—within our Department, across the Joint Force and interagency, and in lockstep with our allies and partners. Only through true partnership can we successfully compete, deter, and if necessary, win our One Fight against a very capable peer adversary in China and the acute threat that is Russia. With congressional support, I am confident we can preserve the platforms necessary to enable and project combat power in Air and Space; deliver right-sized and sustainable built and natural infrastructure; and provide energy resilience and increased “lethality per gallon.”

Thank you for the opportunity to discuss our programs supporting energy, installations, and environment. We appreciate Congress’ continued support for our enterprise and look forward to working with you.