"Leading the Way in Delivering Air Force Installation Energy Assurance"

ENERGY | express

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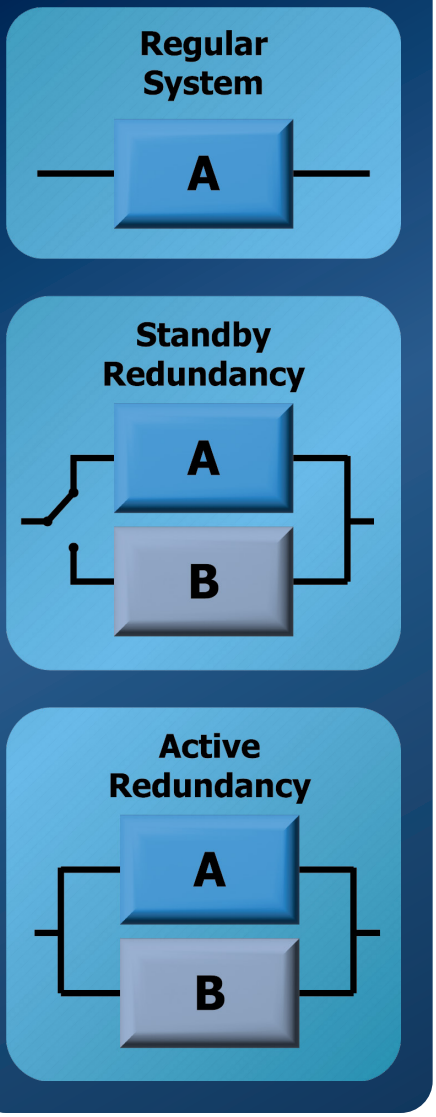
Energy Resiliency and "Redundancy"

Types of Redundancy



By Ken Gray
AFCEC/CNR Energy Resilience SME

Installations and mission owners face an increasing number of threats with aging utility infrastructure that is stressed and vulnerable, both on and off base. Department of Defense Instruction (DoDI) 1470.11 defines Energy Resilience as "the ability to prepare for and recover from energy disruptions that impact mission assurance on military installations." The Air Force must be prepared and have the ability to recover from energy disruptions to its infrastructure and mission-critical assets.

As part of its energy resilience strategy, the Air Force utilizes three preventative and two performance-based attributes known as the "5 Rs" - Redundancy, Robustness, Recovery, Responsiveness, and Resourcefulness - as an effective first-look approach that can be further used to prioritize energy investments in supporting mission requirements.

Each installation should incorporate redundancy to its utility infrastructure, mission essential functions, and/or critical assets. Redundancy is "the ability of a system, infrastructure, or mission to have adequate additional energy backup to maintain uninterruptable power requirements for mission-essential functions in the event of an energy disruption". The necessary level of redundancy requires careful consideration and should be clearly defined by mission owners and driven by mission and energy requirements.

Once mission requirements are established, the risk assessment can be used to support the decisionmaking process for redundant resilient solutions and prioritization. In an assessment, the risk of a particular failure occurring and the effect of that failure on the mission should be weighed and judged. The assessment should identify all interdependencies and single points of failure that can have a debilitating or degrading impact to mission essential functions. Priority should be given to those failures where both the risk probability and overall impact to the mission are highest. Sufficient mission decomposition/thread analysis is necessary to identify critical infrastructure, assets with 24/7 uninterruptable power requirements or mission elements that cannot be relocated. The Deputy Assistant Secretary of the Air Force for Environment, Safety, and Infrastructure is working with headquarters-level mission owners to identify critical nodes to eliminate these single points of failure and ensure the proper supply of energy in the event of a disruption.

The real challenge to mission owners comes in defining the right resilient investments and configuration to meet operational energy requirements and provide redundancy by eliminating single points of failure to the mission. There are two primary types of redundancy that can increase resilience and assure energy availability in the event of a disruption – Standby Redundancy and Active Redundancy. Standby redundancy refers to any additional power generation source or asset that remains inoperative until there is a disruption to the prime utility system to the point where mission essential functions are degraded. The standby or backup system is switched on upon

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In this issue:

SACA renews BLCC software certification

The Smart Automation Certification Alliance recently renewed Building Life Cycle Cost software. The latest software, named BLCC_3_22, can be found on the FEMP website here: https://www.energy.gov/eere/femp/building-life-cycle-cost-programs Air Force energy professionals should ensure they have the latest version of the software loaded to run for BLCC and Life-Cycle Cost Analysis calculations.

Power Up Energy Expo 2022

Members of the Air Force Civil Engineer Center's Tyndall Air Force Base, Florida, team serve as expert panelists during the 2022 Power Up Energy Expo Oct. 19, in Panama City Beach, Florida. Questions from attendees concerned energy efficiency, climate change and maintaining resilient installations. (U.S. Air Force photo by Emily Mifsud)

REDUNDANCY

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failure of the primary power system until it is restored and the mission can continue operations with the required availability, quality, and quantity of power. An example of this would be generators backing up prime utility grid power serving a critical mission or modular assets to account for system component maintenance and down-time. Multiple systems or assets that maintain operation simultaneously to provide power and serve as load sharing rather than being switched on when needed are known as active or parallel redundant systems. A facility connected to a substation through two separate feeders or a grid connected microgrid with a distributed generation source are two examples of active redundancy.

The Air Force continues to prepare for uncertainties and disruptions to the mission. As the dependence of energy assurance to the success of the Air Force mission continues to rise; mission owners and installations must take a comprehensive and holistic approach making enhancements to their critical infrastructure. Mission-essential facilities and installations increasingly require access to energy to provide mission assurance. Several factors and threats, natural and/or human, can interrupt the supply of power and have a debilitating effect to the overall mission. It is imperative to work with mission owners to identify the vulnerabilities and add redundancy where needed to reduce or mitigate these risks. More information about Energy Resiliency, Redundancy and how to take those first steps to enhancing resiliency for your mission or at your installation are available on CE DASH (https://cs2.eis.af.mil/sites/10159/).

Meet Kirk Phillips, Air Force Office of Energy Assurance, Director

Please tell us about your experience/background.

I was born into a military family and have always enjoyed traveling. Some of my most formative years were in Thailand, and I still have a deep appreciation for the experiences. I received my Aerospace Engineering Bachelor of Science through a four-year Reserve Officers' Training Corps scholarship scholarship and my Engineering and Environmental Management Master of Science at the Air Force Institute of Technology. I was in the Air Force as a bioenvironmental engineer for over 28 years and served as the senior member of the career field for five years. I had 13 years of experience at base level and the remaining years at staff level working at HAF, SAF, and the ANG Readiness Center. Following my Air Force career, I was the vice president of a structural and civil engineering firm where I led the Energy, Environmental, Safety and Health practice where we designed solutions for companies to modify their facilities to resolve the EESOH risks.

Describe your role at AFCEC.

I have the distinct privilege of leading a terrific team of civilians, military and contractors as the director of the AF OEA. The directorate identifies resilience gaps in the utilities at DAF installations then develops and implements the most ideal solutions to close those gaps and deliver projects across the full enterprise. Obviously, this can't be done fully within the directorate and nearly every other AFCEC directorate provides support within their areas of expertise to deliver a truly cross-functional solution. Because of this dynamic, I am dual-hatted leading the energy assurance core capability for AFCEC.

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DAF is 'Powering Possibility' with new energy action theme

Secretary of the Air Force Energy, Installations, and Environment

ARLINGTON, Va. — In recognition of Energy Action Month in October, the Department of the Air Force showcased energy's essential role in assuring combat capability and readiness and the importance of developing energy solutions that bolster resilience in the face of climate change.

The DAF launched a new three-year theme, "Powering Possibility," which highlights the Department's forward-looking approach to energy innovation and powering the future force. Complex challenges including a competitive operating environment, accelerating climate change, adversarial cyber threats, and a changing geopolitical landscape all threaten critical DAF infrastructure, energy, and power supplies. As such, the DAF must be proactive in exploring the possibility to find safe, reliable, and efficient energy solutions that bolster our ability to fight and win in a changing world.

Operational energy, or aviation fuel, comprises the majority of DAF energy

usage, providing a tremendous opportunity to optimize energy consumption and model how the military can improve its warfighting capabilities, while meeting aggressive climate goals. The DAF is enhancing aviation fuel efficiency through improved aircraft drag reduction and engine sustainment technologies, agile software, process improvements, and advanced propulsion. Through joint wargaming efforts, the DAF is identifying and mitigating operational risk to logistics and energy supply chains to ensure a ready and lethal force.

Installations across the country are exploring innovative energy initiatives including microgrids, electric vehicle infrastructure, solar arrays, and a micro-reactor pilot to enhance installation resilience and reduce greenhouse gas emissions. Additionally, the DAF is undergoing extensive planning efforts like Installation Energy and Climate Resilience Plans to advance mission critical energy and water systems and is conducting Energy Resilience Readiness Exercises to help installations assess mission readiness during a controlled loss of power.

The DAF is developing a comprehensive Climate Action Plan aligned with national security imperatives that lays out climate priorities and actionable goals to address the complex threat of climate change, including objectives related to energy efficiency, which should be released soon.

Energy is critical to the DAF's ability to achieve the mission to fly, fight, and win in air, space, and cyberspace. To help spread awareness of energy initiatives, visit the Energy Action Month website and follow the hashtag #PowerDAFPossibility on Facebook and Twitter.

PHILLIPS

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What is the best thing about your job?

Working together as a team to deliver innovative solutions to improve resilience at power projection platforms, our installations, that provide transformational energy supply technologies to achieve mission assurance through energy assurance.

Tell us about the hobbies you enjoy in your down time.

My children are grown and live in a multi-family community so I have the luxury to spend my free time at leisure. I enjoy hiking and ultralight backpacking. I also enjoy making stained glass windows and traveling for vacation which is one of my first loves.

What do you see as the biggest energy challenge?

Getting after the sheer magnitude of the issues in the timelines we have and with the resources we have available. We are making steady progress, but I am always seeking ways to deliver our solutions quicker.

What motivates you about working with Air Force Energy?

Making a difference. I naturally think strategically for both the near-term delivering goals and the far-term, essentially a futurist. There has never been a time where we had the political will, operational or societal imperative and financing to change the way we supply ourselves with power and water. As an engineer, I want to leave the world a better place and the people in it better off with my work and by leading the terrific team at AF OEA working on closing gaps with innovative solutions, I am living my dream.

What is your favorite energy-saving tip for Airmen?

I see a future where we supply sufficient carbon-free energy where we are no longer using up a limited fuel supply and conservation won't be necessary except from a budgetary standpoint. Therefore, I would recommend Airmen to embrace opportunities personally and professionally and to participate in the energy future so we all get to the future faster.

Energy lease powers MacDill AFB resilience

By Breanne Humphreys
AFIMSC Public Affairs

JOINT BASE SAN ANTONIO-LACKLAND, Texas — The Department of the Air Force signed an Energy Assurance Lease Nov. 9 with Tampa Electric Company to construct, maintain and operate a 75-megawatt producing natural gas peaking plant at MacDill Air Force Base in Florida.

Under the terms of the MacDill AFB lease, the Air Force is leasing 2.7 acres to TEC for 33 years. In exchange for lease of the land to TEC, the installation will receive first rights to electricity produced by the system during commercial electric grid failures or a declared emergency.

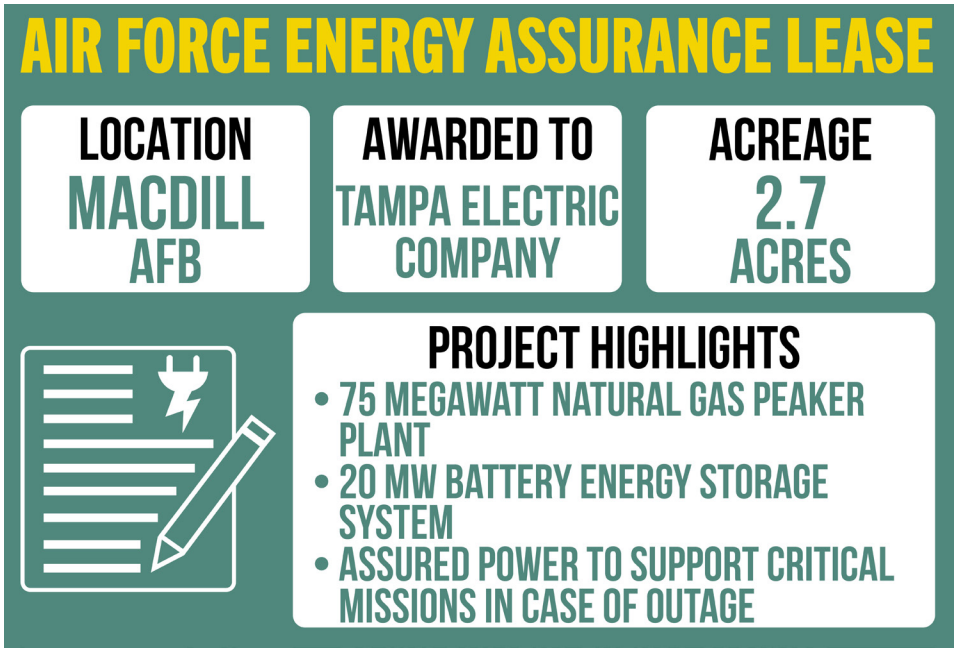
The land is made available through the lease of non-excess, underutilized Air Force-managed real estate. The Air Force Civil Engineer Center Installations Directorate's Real Estate Development Division is responsible for negotiating and managing long-term energy assurance lease agreements between the Air Force and developers.

"Real estate is a powerful tool," said Jeffrey Domm, AFCEC installations director, "We negotiate real estate development opportunities to boost installations' energy assurance and operational resilience."

For MacDill, one of those energy assurance enhancements is a 20-megawatt Battery Energy Storage System that can provide backup power.

Being a coastal installation, MacDill faces threats posed by severe weather and climate change, said David Mairs, Enhanced Use Lease asset manager for the real estate development division.

"Assured power is essential for MacDill," Mairs said. "Relying on a single substation for power creates too great of a mission risk — this EAL creates a redundant energy source that can immediately mitigate grid disruption impacts."



The Department of the Air Force recently signed an Energy Assurance Lease to Tampa Electric Company that delivers receive first rights to electricity produced by a new system during commercial electric grid failures or a declared emergency. (U.S. Air Force information graphic by Courtney Strzelczyk)

From inception to award, the project was successfully executed due to the incredible teamwork and collaboration from personnel at MacDill, AFCEC, Air Mobility Command and TEC, said Kevin Kish, installation management flight chief for the 6th Civil Engineer Squadron at MacDill AFB.

Together, the project team navigated challenging requirements such as the Environmental Impact Analysis Process and established a foundation for greater energy assurance, said Andy Rider, 6th CES Environmental Element chief.

"Climate change is a huge issue for MacDill AFB since it is surrounded by Hillsborough and Tampa Bays on two sides," Rider said. "Providing redundant energy is a key part of the equation to creating a resilient installation."

Construction is expected to begin in early 2023.

The AFCEC Installations Directorate's Real Estate Development Division provides cradle-to-grave management of the Air Force EUL and EAL programs, ranging from source selection acquisition and lease closing to post-closing management. To date, AFCEC, a primary subordinate unit of the Air Force Installation and Mission Support Center, has executed two EALs and five Energy- EULs.

"Climate change is a huge issue for MacDill AFB since it is surrounded by Hillsborough and Tampa Bays on two sides. Providing redundant energy is a key part of the equation to creating a resilient installation."

Andy Rider, 6th CES Environmental Element chief

DAF already taking steps to meet Climate Action Plan goals

A KC-135 Stratotanker assigned to the 171st Air Refueling Wing flies over a park while descending to land at the Pittsburgh Airport in Moon Township, Pa., May 17, 2022. Department of the Air Force installations are implementing innovative Climate Action Plan solutions and pilot programs to meet the goals outlined in the plan, bolstering mission readiness through installation energy resilience. (U.S. Air Force photo by Joshua J. Seybert)

Secretary of the Air Force Energy, Installations, and Environment

WASHINGTON (AFNS) — The Department of the Air Force recently released its Climate Action Plan formulated in foresight and response to climate change and its reshaping of the increasingly complex global security environment. DAF installations are implementing innovative solutions and pilot programs to meet the goals outlined in the plan, bolstering mission readiness through installation energy resilience.

Priority one places emphasis on modernizing infrastructure and investing in climate-ready installations to maintain air and space dominance in the face of climate risks. Infrastructure is the foundation on which installations project airpower and readiness, which makes securing these assets a top priority for the force.

Initiatives are underway to assess climate effects, modernize infrastructure, and adapt installations to minimize impacts from future climate threats. For example, MacDill Air Force Base, Florida has partnered with the local community to build oyster reefs as a nature-based solution to combat erosion and buffer against storm surges. MacDill AFB's eastern shoreline is prone to coastal erosion, and oyster reefs aid in stabilizing the shoreline as well as improving MacDill AFB's vast natural habitats and water quality. The build is part of an ongoing Oyster Reef Shoreline Stabilization project, which started in 2004, and is helping to enhance installation and community resilience and local ecosystem.

In support of priority two, to make climate-informed decisions, the DAF has begun working to incorporate climate attributes into their policy and practice to make energy and infrastructure projects resilient to climate impacts while maximizing operational capability and reducing greenhouse gas emissions where possible.

Priority three focuses on pursuing alternative energy sources, optimizing energy usage and working toward 100% carbon-pollution free electricity and zero emission vehicle targets. The DAF is realizing the key objectives outlined in this priority through innovative investments and pilot programs at installations across the country.

In September 2022, the DAF released its request for proposal of its first micro-reactor at Eielson AFB, Alaska. This groundbreaking pilot program will use small nuclear reactors to produce up to five megawatts of safe, reliable and clean energy to supplement current installation energy sources. The technology's ability to operate independently from the commercial grid and reduce greenhouse gas emissions make micro-reactors a promising power source for remote domestic military installations critical to national security infrastructure.

Additionally, Edwards AFB, California, will complete one of the country's largest solar array projects in 2022, adding 464 MW of renewable electricity to the grid and enhancing energy resilience for the installation and community. This effort builds on initiatives from installations like Hill AFB, Utah, and Vandenberg Space Force Base, California, to augment base power supply with solar energy.

In alignment with the CAP, priority three and Executive Orders 14008 and 14057, the DAF also plans to convert 100% of its eligible non-tactical vehicle fleet to zero-emission vehicles by 2035. With more than 48,000 vehicular assets across installations, the DAF sees fleet electrification as an opportunity to improve resiliency, decrease operation and maintenance costs, and reduce greenhouse gas emissions.

In December 2021, the DAF kicked off this ambitious effort at two pilot sites, Joint Base Andrews, Maryland, and JB McGuire-Dix-Lakehurst, New Jersey, to help understand infrastructure risks and determine preferred functional requirements for vehicles. In 2022, the Department kicked off efforts at 15 additional installations and is working rigorously to develop policy guidance in pursuit of full new terrain vehicle fleet electrification conversion.

The DAF is leveraging existing energy resilience efforts – like Installation Development Plans, Installation Energy Plans, and Energy Resilience Readiness Exercises – to ensure this transition is done with future needs and mission capabilities in mind.

These initiatives showcase the important steps that the DAF is taking to elevate readiness, develop next-generation energy technology to enhance installation energy resilience, realize the objectives outlined in the Climate Action Plan, and ultimately create global longevity of the environment and future force.

Department of the Air Force wins 3 federal energy, water management awards

Secretary of the Air Force Public Affairs

ARLINGTON, Va. (AFNS) — The Department of Energy's Federal Energy Management Program recognized three Department of the Air Force teams and multiple individuals with 2022 Federal Energy and Water Management Awards for their significant contributions to energy and water efficiency within the federal government.

"Congratulations to the winners of this year's FEMP Awards," said Nancy Balkus, deputy assistant secretary for Environment, Safety, and Infrastructure. "These awards showcase the dedication of our energy professionals who are creating cradle-to-grave resilience so that our installations are prepared to deliver energy and water when and where needed, and to protect the nation, its values, and its interests."

Keesler Air Force Base, Mississippi, won for its energy savings performance contract. The project, contracted through the Defense Logistics Agency in collaboration with the Air Force Civil Engineer Center, advances installation resiliency, security, and renewable energy usage, and includes $69 million dollars in guaranteed energy savings.

The ESPC includes a 1.5 megawatt solar photovoltaic carport array, integration of several different legacy control systems into a single cybersecure Energy Management Control System, optimized chilled water plants, and lighting upgrades.

Hanscom AFB, Massachusetts, won for its innovative energy conservation and resiliency project, which included the construction of a Natural Gas Take Station and a dependent 4.6 MW cogeneration plant. The cogeneration plant represents the single largest energy resiliency improvement ever made on Hanscom AFB and provides over $3 million a year in energy savings.

Lastly, the Department of the Air Force Installation Energy Program won for its mission-centric approach to improve the resilience of energy and water systems. In 2021, the program published its Installation Energy Strategic Plan, an innovative living roadmap to bolster energy resilience for mission assurance. The resulting initiatives and projects, including installation energy plans, energy resilience readiness exercises, and its water program, have helped the department reduce energy use intensity on its installations by nearly 32% from the fiscal year 2003 baseline, and to decrease water intensity by nearly 27% from the fiscal year 2007 baseline.

Additionally, the Installation Energy Program is helping the department generate annual savings, meet mandates, and identify project priorities so it can continue to fly, fight, and win in air, space, and cyberspace.

These Department of the Air Force winners are great examples of what bases and people are doing to develop and implement, cost-effective projects and programs that cut energy waste and advance America's progress toward energy independence, resilience, and security.

More information on Air Force current and past award recipients can be found here.

Recapping Energy Exchange: An Interview with Ms. Nancy Balkus

Secretary of the Air Force Public Affairs

Energy and water professionals across the federal government recently attended the annual Energy Exchange conference in Cincinnati, Ohio. The three-day training event and trade show event helps agencies optimize their facility and fleet operations. Ms. Nancy Balkus, Deputy Assistant Secretary for Environment, Safety and Infrastructure, took the time to speak about this year's event and how it relates to the ongoing installation energy and water initiatives across the Department of the Air Force:

Why is Energy Exchange important?

With dozens of training sessions, the conference provides one of the best opportunities for our energy and water community to engage in important discussions to develop and implement innovative solutions that can make the federal government a leader in adapting to and overcoming the effects of climate change to ensure mission success across the force. This year's event will drive important conversations around planning for net-zero installations and non-tactical vehicle fleet electrification, climate resilient infrastructure, and best practices for contracting, procurement, and project development.

What were some of the DAF's priority areas going into this conference?

This year's Energy Exchange theme is "Advancing Federal Infrastructure through Innovation." I think this theme really captures how we at the Department of the Air Force are working to meet some of our nation's biggest challenges through innovative solutions that maximize operational capability, while promoting cleaner, more efficient resource use.

A major focus for us right now is the DAF's Climate Action Plan, which

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outlines priorities including modernizing infrastructure and investing in climate-ready installations, making climate-informed decisions, optimizing energy use, and pursuing alternative energy sources. This plan aligns with and drives toward achieving the objectives laid out in the recent climate-related Executive Orders by the Administration. The SAF/IEE portfolio is unique in that is both bears the brunt of climate impacts and is key to mitigating them. Thus, we must all think innovatively and collaboratively to deliver infrastructure solutions that support our warfighters, adapt to climate change, and mitigate emissions where possible to support mission assurance through energy assurance.

It is my goal for our Airman and Guardians to leave this conference knowing the Department's priorities and their role in developing efforts that are mission-centric, resilience-focused, water-inclusive, and climate-informed.

Do you think the conference was successful?

Yes, I do. After a two-year hiatus, I think the in-person nature of the event allowed our energy and water professionals to engage more meaningfully – both within formal sessions and in numerous conversations I had the pleasure of participating in surrounding the events. The events of this week allowed all of us to share in the challenges and successes of navigating our new realities and begin down a path of implementing a cleaner, healthier future Force.

I was also glad to honor the recipients of the Federal Energy and Management Water Awards as part of this year's conference. The sheer number of DAF nominees and winners over the past two years is a testament to the ingenuity of our service professionals and their commitment to enhancing the resiliency, efficiency, and readiness of our installations to meet critical mission needs.

What topics do you hope will be covered at next year's event?

The various lines of effort relating to Executive Order 14057, Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability, including the ambitious targets for zero emissions non-tactical vehicles, net zero emissions installation portfolios, and carbon-pollution free electricity procurement and technologies will likely continue to be a major focus of Energy Exchange in the coming years.

If you would like to nominate someone to be profiled in an upcoming issue, please contact us at AFIMSC.PA.Workflow@us.af.mil.

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