

FY 2022 Military Construction President's Budget Submission, Defense-Wide Distribution Plan
Energy Resilience and Conservation Investment Program (ERCIP)

Project No.	Project Title	Location	State	Project Description	Request (\$000)	Project Type ¹	SIR ^{2,3}	Payback ³ (years)	MBV Cost ³	EC M&V Plan or ER Mission Support Description ⁴
Army										
97470	Construct 10 MW Microgrid Utilizing Existing and New Generators	Fort Bragg	NC	Constructs a secure integrated feeder level microgrid, including a smart grid control system consisting of a new 2 megawatt (MW) diesel generator connected to four (4) existing 2 MW diesel generators for a total of 10 MW generation capacity to provide baseload power to a feeder-wide microgrid. Also included is fuel storage and a new 1.5 MW photovoltaic (PV) underground electrical distribution system to provide power to mission critical facilities located at the Joint Special Operations Command (JSOC).	\$19,464	ER	NA	NA	NA	Increases energy resilience by enabling continuous power generation for critical missions. This microgrid generation technology will allow for automatic switching to operate in an islanded mode during grid outages. These technologies will integrate to create an islandable microgrid capable of supporting JSOC's base during contingency operations, keeping up and integrating existing equipment to the microgrid significantly reduces project cost while increasing the reliability of operations and mission assurance.
93359	Construct 4.8MW Generation and Microgrid	Fort Benning	GA	Constructs a 4.8 megawatt (MW) natural gas generation plant connected to Fort Benning's electrical distribution system and a new 4.3 MW from an existing Photovoltaic (PV) generation asset utilizing Battery Energy Storage System (BESS) technology to maintain power quality. Additionally, microgrid controls will be installed to enable self-sufficient islanding capability to the distribution system during commercial grid outages.	\$17,593	ER	NA	NA	NA	Bridges energy resilience gaps by utilizing solar power during times of grid outages and will manage energy delivery with automated control systems. Current operations of generation during outages are manual. This project will provide a critical facility with a self-sufficient power source. The Mission Center of Excellence (MCOE) and Infrared Brigades and requires 24/7 operations. Storage and generators will be incorporated for blackout capability and serve as firm generation sources. This combination of generation technologies will work in conjunction with and provide reliable power to critical facilities to support mission assurance.
93412	Construct 650 kW Gas-Fired Micro-Turbine Generation System	Camp Grayling	MI	Constructs a 650 kilowatt (kW) gas-fired micro-turbine power generation system capable of supporting the critical load at the Grayling Army Airfield (GAFA) in order to provide backup power in the event of power outages. This project will build redundancy to existing single source electrical and gas systems. Currently, only the air traffic control tower has the backup power generation.	\$5,700	ER	NA	NA	NA	Enhance energy resilience by eliminating a single point of failure for critical missions by establishing on-site power plant to allow total replacement of power. Supports the critical load for the installation by providing approximately 500 kW of electricity, which will meet the critical electricity and heating needs of the installation in the event of a grid failure. The turbine will have heat recovery systems in place to provide direct heat to nearby buildings(s) and allow installation power and heating to operate during a utility outage preserving critical information systems, security, force protection, and mobilization.
93395	Construct a 10 MW RICE Generator Plant and Micro-Grid Controls	Fort Rucker	AL	Constructs a 10 megawatt (MW) Generator plant which consists of installing four (4) 2.5 MW Reciprocating Internal Combustion Engine (RICE) generators connected to the Fort Rucker electrical distribution system and incorporates a maximum of 2 MW of energy from the existing Photovoltaic (PV) generating asset and microgrid controls to serve mission-critical loads in the event of a grid outage.	\$24,000	ER	NA	NA	NA	Increases energy resilience by enabling power generation capability for critical missions, extends the capacity of current generator operations, and decreases risks associated with a single distribution source since the installation is currently unable to sustain operations during extended outages. Additionally, provides operational reliability, maintenance sustainability, safety, and intelligent management to more loads by utilizing both new and existing generation assets compared to traditional backup power.
95170	Construct a 10 MW Generation Plant, with Microgrid Controls	Fort Stewart	GA	Constructs a 10 megawatt (MW) generation plant connected to Fort Stewart's electrical distribution system and incorporates up to 10 MW from an existing Photovoltaic (PV) generation asset. Installs microgrid controls to enable self-sufficient islanding capability to the distribution system during commercial grid outage.	\$22,000	ER	NA	NA	NA	Increases energy resilience by providing power to critical buildings during grid power outage. Currently, in the event of a prolonged grid outage, diesel generators sized for specific buildings would be used causing a reliability and logistical problem due to the difficulty of maintaining a diesel fuel source. Installation of microgrid controls and connections to the existing solar array will enable a self-sufficient islanding capability and continuous power to the distribution system and mission critical facilities for 14+ days during commercial grid outage.
94876	Install Microgrid Controller, 1.25 MW Solar PV, and 1.5 MWh Battery	Camp Arifjan, Kuwait	Kuwait	Installs 1.25 megawatt (MW) roof mounted Photovoltaic (PV) solar arrays and microgrid system. The microgrid system will include a master microgrid controller, synchronization controllers, and automatic transfer switches controlling the generation resources within it. Installs a 1.5 MW, 1.5 megawatt-hour (MWh) battery energy storage system (BESS) to help resolve power quality issues. This includes the energy storage unit, inverters, distribution lines, transformers, controls and communication, AC/DC wiring with conduit, and security measures.	\$15,000	ER	NA	NA	NA	Increases energy resilience by providing reliable, long-term on-site generation to missions in emergencies or extended outages that only have short-term solutions in place. Utilizes a hybrid energy system that will provide resilient power (diesel genset, solar PV, and BESS) to part of the installation and obviate the load bank. As a result, these critical loads will be less prone to losing power and Essential Missions will be able to function longer during an extended outage in line with submarine requirements and seamless transition to backup generators in the event of a grid outage.
Army Program Totals					\$103,757	NA		NA	NA	
USN										
P696	Inner Apra Harbor Resiliency Upgrades (Phase I)	Naval Base, Guam	Guam	Constructs a 12 megawatt (MW) backup power generation system and a 12 MW Battery Energy Storage System (BESS) at Polaris Point, Naval Base Guam (NBG). The scope of work includes construction of an Industrial Control System (ICS) to improve operational reliability and power quality at Polaris Point. A power control monitoring system (PCMS) will be implemented that integrates the controls from the generator paralleling switchgear, the main medium voltage switchgear, the battery switchgear, the fuel delivery system, and the building management system, which will be controlled from a local ICS with a human machine interface (HMI) screen.	\$38,300	ER	NA	NA	NA	Increases energy resilience by installing a BESS to provide voltage and frequency support for critical loads supporting two (2) guided missile submarines and six (6) ballistic missile submarines. The BESS will improve operational reliability and power quality at Polaris Point by increasing power reliability and resiliency, providing a redundant source of power for up to 30 minutes (at full 12 MW load) to include improved power quality to meet mission requirements. The backup generation and battery energy storage will be integrated to ensure regulated power quality in line with submarine requirements and seamless transition to backup generators in the event of a grid outage.
P693	Electrical Transmission and Distribution	SUBASE Kings Bay	GA	Modernizes the electrical transmission and distribution infrastructure to minimize downtime due to failure and maintenance. This will include replacing thirteen (13) Oil-Filled 230 kilovolt (kV) circuit breakers with new industry approved breakers and integrated current transformers for relaying and metering to reduce downtime for maintenance and failure. Thirty-four (34) medium voltage Kearney SFE gas switches with new vacuum bottle pad mount switches will also be replaced. Three (3) facilities will be refit with medium-voltage switchgear, shore power unit substations, low-voltage shore power switchgear, breakers, and feeder cables to the pier side power mound. All new equipment shall be connected and integrated into the existing Kings Bay Utility Supervisory Control and Data Acquisition (SCADA) system for advanced remote monitoring and control of systems.	\$19,314	ER	NA	NA	NA	Bridges energy security gaps with the requirements of critical missions by repairing high voltage priority equipment, medium voltage and nation switches, and shore power stations at the pier which to installation critical infrastructure is covered by the BESS. This project will improve power quality, increase resiliency for this DoD priority mission. The scope of this project will improve redundancy in the transmission network and ensure transmission resiliency and power distribution enhancing readiness for the Nation's strategic nuclear deterrent mission and waterfront operations missions.
P815	Solar Energy Storage System	NMWS China Lake / Ridgecrest	CA	Installs a nominal 1,500 kilowatt (kW) / 6,000 kilowatt-hour (kWh) energy storage system (ESS) for capture of curtailed solar energy, which assists with demand management through peak shaving and renewable generation leveling and acts as an incremental building block for the energy resilient installation microgrid.	\$9,120	ER	NA	NA	NA	Increases energy resilience by alleviating a shortage of backup generation on the installation for both critical facilities and for community support facilities in the event of grid outage during extreme temperature conditions. Connects 51 backup power generation gaps for 40 facilities. The ESS will immediately improve operating efficiency of the electrical distribution system and the ability to purchase electricity at the best rates. It will also have a grid forming capability to support a future microgrid system further improving energy resilience on the installation.

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P349	NM F Atsugi Smart Grid for Utility and Facility Controls	Naval Air Facility Atsugi	Japan	Constructs an end-to-end Industrial Controls System (ICS) for energy management and the electrical, steam, and water/wastewater utilities. This will provide separate monitoring and control of installation energy management and utility systems from the point of generation, or interconnection with the local utility company, down to the end-use equipment inside the buildings to directly remediate disruption risks to electrical power. Stand-alone ICS such as Supervisory Control and Data Acquisition (SCADA), Direct Digital Control (DDC), and Advanced Metering Infrastructure (AMI) for electrical meters will be integrated to allow for seamless and efficient monitoring and operations of utility and building energy systems. Multiple networks will be consolidated into a fiber optic network improving communications, resiliency, and cybersecurity supporting critical mission operations.	\$3,810	ER	NA	NA	NA	Adds known resilience vulnerabilities to installation electrical, steam, potable water, and wastewater utility systems, contributing to mission assurance and energy resiliency. Also effectively mitigates disruptions to electrical service and other vital utilities with cyber-secure controls and operation protocols that promote resiliency. Significant risks to critical infrastructure and mission were identified in the installation Mission Assurance Assessment in May 2018. The Smart Grid will minimize utility disruptions to critical missions by integrating HVAC DDC, Automated Metering Infrastructure (smart meters), and utility SCADA systems into a Common Operation Picture (COP) to analyze electrical, water, and HVAC problems at facility and installation levels.
<p>USN Program Totals</p> <p>4 Projects \$70,544 NA NA NA NA</p>										
<p>USAF</p>										
NVZR200026	Transmission and Switching Stations	MacDill AFB	FL	Constructs an on-site power plant capable of generating between 25 and 60 megawatts (MW) that will be paired with a battery energy storage system (BESS) and upgrades the switchgear capacity at the Tanker Way Gate Switching Station from 25 to 35 MW. Also installs a new 15 kilovolt (kV) underground distribution line between the Tanker Way Gate Switching Station and the MacDill Gate Switching Station to increase capacity to 35 MW and a new 15 kV underground distribution line to the Dale Mabey Main Gate. The utility provider has agreed to upgrade the feed from their new interbay substation to the Tanker Way Gate Switching Station. A new 35 MW Switching Station will also be installed at the southeastern end of the South Apron to include a new 15 kV underground distribution line from the Tanker Way Gate Switching Station feeder to the new South Apron Switching Station.	\$22,000	ER	NA	NA	NA	Improves energy resiliency by eliminating total reliance on commercial power with construction of an on-site power plant paired with a battery energy storage system (BESS), upgrades switching stations, and installs new underground distribution lines. This will enable resilient power feeds directly into the substation near Tanker Way for re-distribution to South Tampa or the base as needed, providing vital electrical power to the installation's critical facilities supporting mission assurance. The MacDill Gate feeder and switch is currently the only main substation feed capable of supplying the full Base load which includes HQUSCOM & HQUSCENTCOM. The existing power distribution grid in the eastern half of the Base will be back-fed from the new distribution line that will run to the south end of the South Apron to provide reliable power to the two major COCOMs.
PKL152013	PV Arrays and Battery Storage	Memphis IAP	TN	Constructs photovoltaic (PV) generation and support systems to provide resiliency power to facilities on-base. PV arrays will be located and mounted on rooftops or ground (measured to supply the Air National Guard (ANG) facilities. In addition, a battery energy storage system (BESS) will be installed to work with the PV array systems. Inverter system and performance monitoring equipment will also be provided. Meters will be installed, compatible, and linked to the local energy management system for instantaneous and historic performance tracking.	\$4,780	ER	NA	NA	NA	Enhance energy resiliency by creating flexibility in the PV, Battery, and Generator systems so they are set up as needed in three (3) self-sustainable building arrangements. If one node goes down then the mission functions can be consolidated to keep missions operating in the two remaining nodes. By ensuring all three (3) systems work together, the installation can support mission assurance for the Memphis Air National Guard Base, part of the National Disaster Medical System (NDMS), by maintaining longer periods without commercial power. Memphis ANGB supports nationwide medical responses that supplement state/local medical resources during an emergency or disaster and provide backup medical support to the military/VA medical care systems during an overseas conflict.
QZ14072111	Construct Water Treatment Plant and Pump Station	Mountain Home AFB	ID	Constructs a treatment plant for processing surface water to drinking water standards, including connections to existing distribution systems. Construction will consist of reinforced concrete foundations, structural steel framing, metal cladding curtain walls, and standing seam metal roofs. The plant will be capable of producing 3.5 million gallons per day of drinking water.	\$39,800	ER	NA	NA	NA	Increases water resiliency by remedialing the risk of mission failure due to absence of potable water resources. Currently, the two on-base wells can only sustain 50% of the installation demand, causing wide-spread shortages of potable water needed for life, health, and safety, and firefighting systems. This project eliminates water quality and quantity issues, creates onsite storage with a distribution system to address fire flow capability gap in response to real time demands, and provides a primary potable water source with back-up for natural disasters.
WARR209001	Install Base-wide Microgrid with Natural Gas Generator, Photovoltaic & Battery Storage	Springfield-Beckley MAP	OH	Reconfigures electrical utility services electrical distribution by constructing a 1,000 kilowatt (kW)/1,000 kilowatt-hours (kWh) battery storage (BS) and integrated 835 kW natural gas generator with 600kW AC photovoltaic (PV) system to provide a base-wide electrical loop with microgrid controls to provide resilient power for essential missions. The system will include meters interfacing with all distributed generation, paralleling transfer switches, building energy meters, a primary isolation switch, and the base energy management system for performance tracking and verification. This project will ensure energy resiliency to 24/7 unmanned aircraft (MQ-9 Reaper) operations and intelligence missions and provide base-wide resilient power supporting facilities which include critical communications for these missions.	\$4,700	ER	NA	NA	NA	Increases energy resiliency enabling uninterrupted unmanned aircraft operations and intelligence missions by utilizing a base electrical microgrid comprised of PV arrays, battery storage, and generators that will increase redundancy of the electrical power needed to support all critical facilities so they can function at or near 100% of normal capacity. The 179 AW plays a key role in providing national defense through intelligence products and MQ-9 Reaper operations. If commercial power is lost during daylight periods then the PV system can take control while still charging the battery storage. If commercial power is lost during nighttime periods then the generator power can be enabled. In times of minimal daylight, the combination of battery and generators can take over, extending uninterrupted power over a longer period of time and providing mission assurance during times of commercial power outages.
<p>USAF Program Totals</p> <p>4 Projects \$65,280 NA NA NA NA</p>										
<p>USMC</p>										
P-381	Additional LFG Power Meter Station	MCAS Miramar	CA	Installs a landfill gas (LFG) power metering station that includes an SF-6 switch, transformer, switchgear, meters, controls, and fiber communications that will provide the high voltage connection to the new 1.6 megawatt (MW) landfill gas power generator to provide additional resilient resources to the existing microgrid. The project features will be in accordance with current Unified Facilities Criteria (UFC) and MCAS Miramar specifications and requirements. Metering station equipment (hardware and software) that is open protocol will have the ability to connect to existing and future systems and include proper cybersecurity/NIST 800 requirements so the system can be accredited to operate on the network.	\$4,054	ER	NA	NA	NA	Improves energy resiliency in support of mission assurance by providing a more capable microgrid that integrates high-voltage power delivery controls with photovoltaic systems, energy storage systems, and sophisticated Artificial Intelligence (AI) integration controls. The AI integration tool will provide direct digital control of the power plant and the gas generator. The gas generator will provide the primary power source with the ability to provide backup power to the microgrid during this features that will enable better management of thermal energy storage, with the demand response program, resulting in improved energy resiliency and mission assurance for the installation. Furthermore, it will align the installation with the City of San Diego Intergovernmental Services Agreement (IGSA) for landfill power delivery.
<p>USMC Program Totals</p> <p>1 Project \$4,054 NA NA NA NA</p>										

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NGA										
037	LED Upgrade Package	Fort Belvoir, NCE Springfield	VA	Retrofits existing lighting fixtures in the Main Office Building, stairwells, Central Utility Plant high bay lighting, and the 6-story parking garage with energy efficient LED bulbs. Upgrading to energy efficient LED fixtures will lower overall energy demand and energy costs at NGA Campus East (NCE), NGA's headquarters.	\$365	EC	2.23 ¹	2.35	\$500	The MBV Plan for the lighting efficiency retrofit at the NGA will follow FEMP MBV Option A, Method LE-A-02. The variables affecting savings from this lighting project are fixture powers and hours of operation. Operating hours are currently 24/7 for all affected areas. Option A has been selected for this retrofit due to the measure's relatively small cost savings contribution of all the retrofits installed at the Federal Center and the high confidence with which the fixture demand and operating hours may be determined. The MBV cost for the LED Upgrade project is minimal. Almost all of the Measurement and Verification tasks are already included in the existing Base Operations Support Contract under Energy Management. Any remaining tasks not under contract (subject to negotiation) are estimated to be under \$500,000.
NGA Program Totals					1 Project		2.23¹	2.35	\$500	
WHS										
WHS1-07	Recommissioning of HVAC Systems, Part B	Pentagon, Mark Center, and Raven Rock Mountain Complex	VA	Recommissioning HVAC Systems in Washington Headquarters Services (WHS) facilities in the National Capital Region, including the Pentagon, Mark Center, and Raven Rock Mountain Complex. It will improve energy efficiency and extend the useful life of the existing equipment and mechanical systems. Traditional operations and maintenance activities respond to tenant complaints when systems breakdown or during scheduled activities, whereas recommissioning activities will identify systems that are functioning sub-optimally and restore them to acceptable operating parameters before they break down. This project will leverage automatic fault detection and diagnostics tools to identify equipment that requires repair and maintenance.	\$2,600	EC	1.27 ¹	5.00	\$5,000	The MBV Plan for the recommissioning project will use Option A: retrofit, isolation with key parameter measurements. This MBV option can be performed due to robust Supervisory Control and Data Acquisition (SCADA) system that continually collects and stores trends on the majority of sensors and meters in the building. Since MBV is semi-automated, the expectation is 40 hours of MBV support by the contractor at \$125/hour for the year, for a total of \$5,000. MBV funding is provided through the WHS budget. MBV functions will include verification of the MBV process, additional service order calculations, refining the automated fault energy savings calculations, and summarizing data.
WHS Program Totals					1 Project		1.27¹	5.00	\$5,000	
ERCIP Project Totals					17 Projects					
					\$246,600					
					\$243,635		NA			
					\$2,965		1.32²			
					\$246,600		1.32²			
					ERCIP Construction Projects Total (17 Projects)					
					ERCIP Planning and Design (P&D) Funds					
					ERCIP P&D					
					\$30,150					
					Electrical Vehicle Infrastructure Upgrades P&D					
					\$10,000					
					ERCIP P&D Funds Total					
					\$40,150					
					ERCIP Program Total					
					\$286,750					

¹ ER is for Energy Resilience projects and EC is for Energy Conservation projects

² SIR is Savings to Investment Ratio (multiply the useful life of the product by the \$ savings per year associated with the project. Then divide the result by the total cost of the project)

³ 10 USC 2934 requires that SIR, Payback and Measurement and Verification (M&V) Cost Estimate be included for EC projects only

⁴ 10 USC 2934 requires a brief description of the MBV plan and planned funding source for EC projects only. For ER projects, a description is required to explain how the project would enhance mission assurance, support mission critical functions, and address known vulnerabilities.