Fiscal Year 2023 Energy and Fuel Budget Justification Report

Assistant Secretary of Defense for Energy, Installations, and Environment

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Introduction

The Fiscal Year (FY) 2023 Energy and Fuel Budget Justification Report satisfies the reporting request in House Report 112-479, page 121, accompanying H.R. 4310, the National Defense Authorization Act for FY 2013. House Report 112-479, page 121, requests the Secretary of Defense to submit in conjunction with the annual President's Budget request, a separate energy and fuel budget justification to include details of energy expenditures by account, energy investments by account across the Future Years Defense Program, and details of fuel expenditures. By statute, operational energy is defined as "energy required for training, moving, and sustaining military forces and weapons platforms for military operations," and includes energy used by ships, aircraft, combat vehicles, tactical power systems, and generators.[1]

Fuel Demand and Expenditures

In FY 2021, the Department consumed nearly 78 million barrels of fuel to power ships, aircraft, combat vehicles, and contingency bases with a total cost of $7.9 billion. To respond to the needs of a global force, the Department purchased 50 percent of this fuel outside of the U.S.

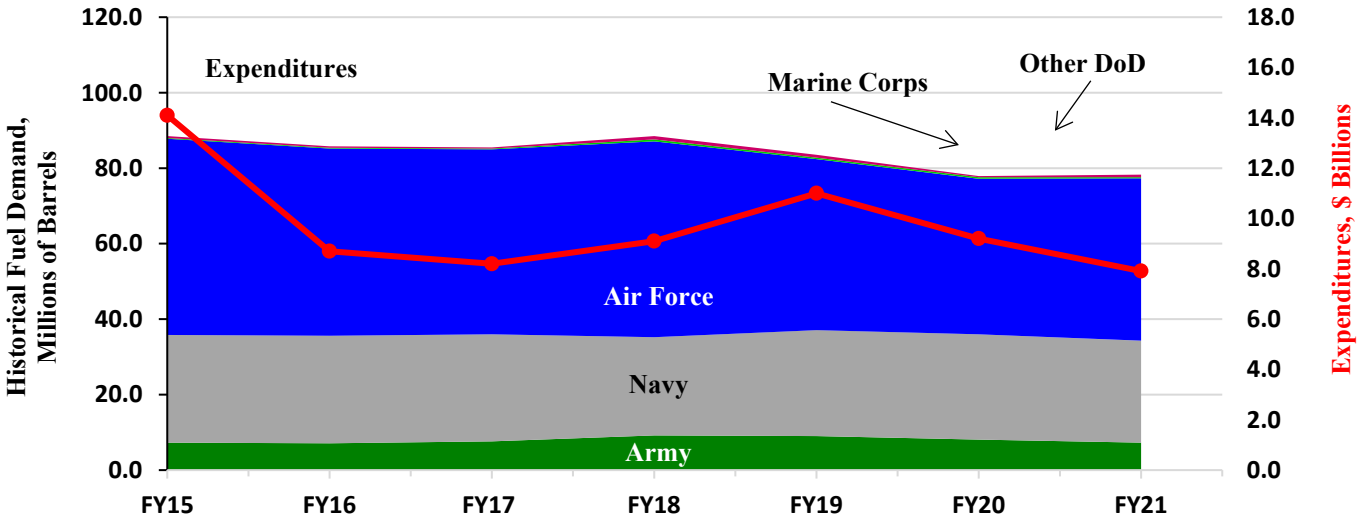
Table 1 and **Figure 1** describe the historical demand and expenditures of fuels in FY 2015 – 2021. Historical demand is based on net sales of selected liquid fuels by DLA Energy to the Services. Fuel expenditures are estimated using the average fuel sales price for the specific fuel provided to the customer at the point of sale, and include procurement and overhead costs. This price does not reflect additional costs imposed on the Department for force protection, storage, and transportation beyond the point of sale. As a purchaser of fuel on the open market, the Department is subject to the same price volatility experienced by commercial customers.[2]

Table 1. DoD Fuel Demand and Expenditures by Service

		FY15	FY16	FY17	FY18	FY19	FY20	FY21
Operational Energy Demand, Million Barrels	Army	7.3	7.1	7.6	9.2	9.0	8.1	7.3
	Navy	28.5	28.5	28.4	26.0	28.1	27.9	27.0
	Air Force	52.0	49.6	49	51.9	45.3	41.2	43.0
	Marines	0.2	0.2	0.2	0.5	.38	0.4	0.3
	Other DoD	0.5	0.4	0.3	0.9	.77	0.3	0.7
	Total Demand	**88.6**	**85.7**	**85.5**	**88.5**	**83.6**	**77.6**	**78.4**
	Expenditures (Billions)	**$14.1**	**$8.7**	**$8.2**	**$9.1**	**$11.0**	**$9.20**	**$7.91**

[1] 10 U.S.C. 2924(4).
[2] Standard DLA Energy fuel prices can be found at http://www.dla.mil/Energy/Business/StandardPrices.aspx

Figure 1. DoD Fuel Demand and Expenditures by Service, FY 2015 – FY 2021[3]



Operational Energy Investments

In support of the *National Defense Strategy*, operational energy investments assure the delivery of energy where and when needed and increase the ability to sustain mission effectiveness in contested operating environments. The Department's initiatives and programs increase resilience and support enhanced range, reach, time-on-station, and performance of the Joint Force. The President's Budget for FY 2023 requested more than $2.8 billion for the execution of operational energy initiatives. These investments procure new or upgrade existing vehicles and aircraft, increase the range and endurance of platforms, enhance energy resiliency at contingency bases, and plan and execute war-games to account for increasing risks to logistics and sustainment. As the Department prepares to operate in contested environments around the globe, these investments increase range, endurance, and lethality while decreasing risks to warfighters. **Table 2** shows the overall funding of the Department's operational energy investments aligned against the objectives of the *Operational Energy Strategy*. Detailed information on investments can be found in Appendix A.

[3] Updated analysis of expenditures may lead to different results from previous Operational Energy Annual Reports. Expenditures are not adjusted for inflation; data on historical demand may not capture final end use nor account for fuel transfers between the Services; Historical and Estimated Demand include Base and Overseas Contingency Operations (OCO) funding and purchases using Transportation Working Capital Fund (TWCF).

Table 2. DoD Operational Energy Investments by Strategy Objective, FY 2023 ($ Millions)

Operational Energy Strategy Objectives	OSD	Air Force	Army	Navy	Marine Corps	Total
Enhance Mission Effectiveness of the Current Force	$9	$454	$192	$21	$11	$687
Increase Future Warfighting Capability	$226	$465	$796	$313	$18	$1,819
Identify and Reduce Logistics and Operational Risks	$5		$54	$259		$318
Total	**$240**	**$920**	**$1,043**	**$593**	**$29**	**$2,824**

Fuel Estimates and Expenditures

This section describes the fuel estimates and projected fuel expenditures for the Department. The Standard Fuel Price estimates are developed, stabilized, and, when necessary, adjusted due to market volatility. The table below provides the Fuel Summary ($ in Millions) for the Department's Revolving Funds.

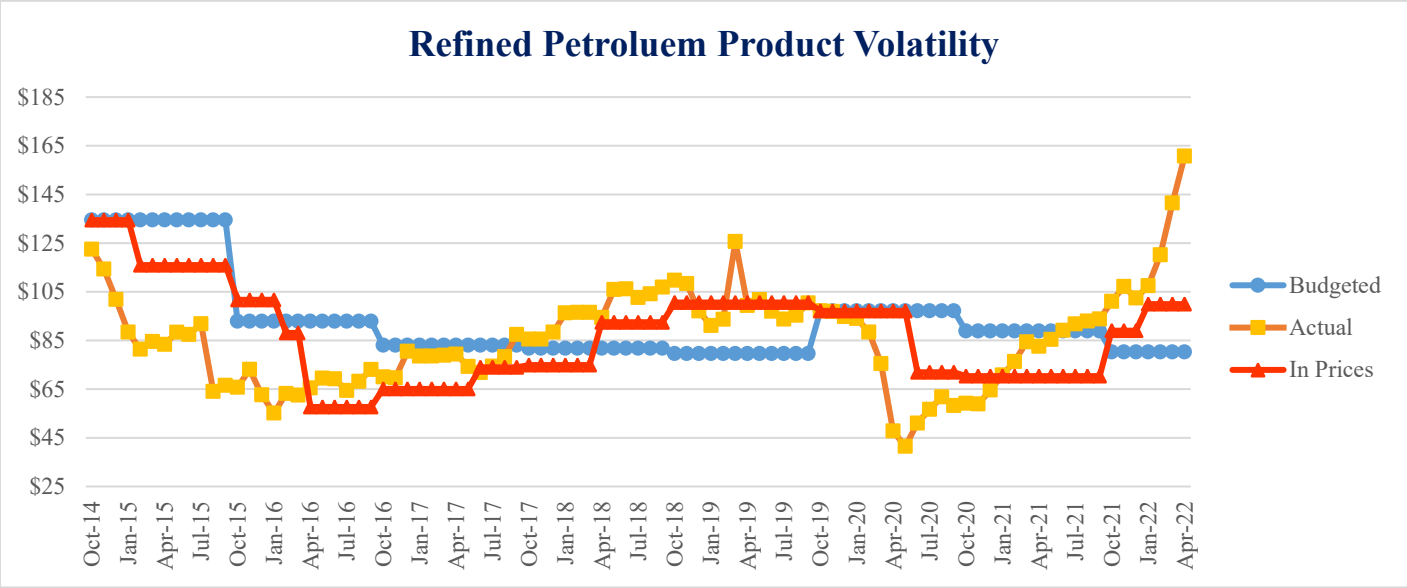
	FY 2021	FY 2022	FY 2022	FY 2023
	Executed[1]	Budgeted	Estimated[2]	Budgeted[3]
Standard Fuel Price (SFP)	$99.54	$109.62	$138.44	$119.70
DoD Barrels	78.221	82.349	76.608	76.189
Fuel Cost to DoD Customers	$7,858.6	$9,027.1	$10,605.6	$9,119.8

[1] The FY 2021 Executed column represents the fuel cost to DoD customers at the effective FY 2021 SFP.
[2] The FY 2022 Estimated column fuel cost is based on the weighted average SFP due to four fuel price increases in FY 2022 ($118.44; $129.36; $186.06 and $129.36).
[3] The FY 2023 Budgeted column fuel cost is based on the budgeted SFP requested in the FY 2023 President's Budget.

The Defense Logistics Agency – Energy (DLA-E) business area of the Defense-Wide Working Capital Fund (DWWCF) is the sole-source provider of refined petroleum products for the Department of Defense. The DLA-E buys refined fuel products on the open market using four purchase programs. DLA-E finances the purchases with DWWCF budget authority (contract authority) and is reimbursed by collections from sales. The cost of refined fuel products constitutes nearly 80 percent of the price DLA-E charges customers, so accuracy of the Office of Management and Budget's forecasted petroleum market prices is key to maintaining stabilized prices in the budget year.

The Working Capital Fund's (WCF) primary goal is to protect customer programs from fuel market volatility. Customers are charged standardized prices that assume fuel will remain relatively stable throughout the year of execution. Fuel price volatility can require funding reallocations that disrupt investment programs or threaten readiness, especially when budgets are declining in real terms and funds are increasingly limited. The following chart illustrates the

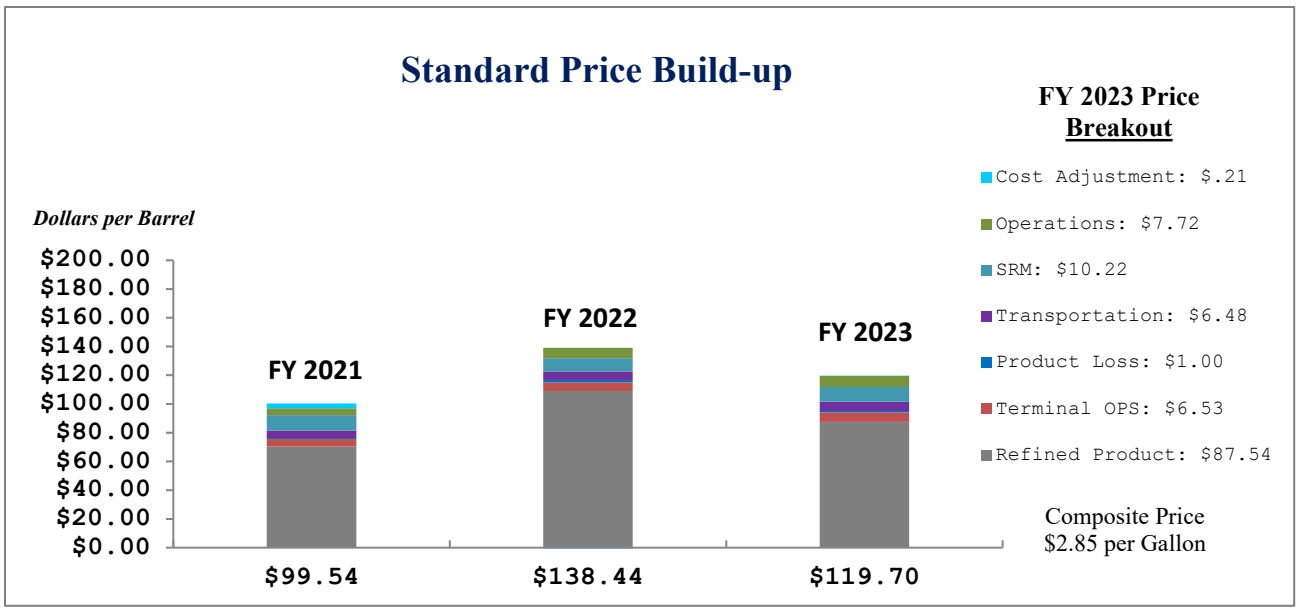
difficulty of setting prices that are sustainable for a full year, a year in advance of execution. The WCF loses cash whenever the cost for refined product (yellow line) exceeds the refined product prices (red line) established for DoD customers. Conversely, the WCF gains cash whenever the cost for refined product is less than the refined product prices established for the DoD customers.



The Defense-Wide WCF cash balance is the Department's tool to stabilize DoD customer prices despite refined product market volatility. Cash balances must be sufficient in the Defense-Wide account to absorb the impact of market changes in the year of execution. When the market volatility exceeds the capacity of the Defense-Wide account to absorb or causes a large cash increase, the Department will seek additional funds through reprogramming or by instituting a year of execution price change. The price change can be either an upward or downward adjustment based on market projections. A downward adjustment will provide additional buying power to customers while an upward adjustment creates an execution year bill for customers.

Recognizing the volatility in the fuel market, the Department makes every effort to accurately project fuel prices and is seeking opportunities to stabilize the year of execution price. The Department reviews various options that range from modifying the formula used to develop the standard price to changing the benchmark source.

The Department sets the price of fuel, typically 18 months in advance, to break even in the budget year by recouping the cost of refined products and the non-product costs of terminal operations, storage, transportation, facilities maintenance, and operations. The Department sets the standard fuel price based on the Administration's economic assumptions for refined petroleum products plus the non-product price of DLA-E's projected operating costs. The "Standard Price Build-up" table below displays the components actual standard price for FY 2021, the weighted average price for FY 2022, and the President's Budget FY 2023 request.



The goal of the Department is to maintain the Standard Fuel Price (SFP) at or below the budgeted prices throughout the fiscal year. In FY 2014, the Department experienced higher than expected fuel costs and the WCF lost $9.81 per barrel (bbl); however, the DWWCF cash account was able to absorb the loss without a year of execution price change. Conversely, market volatility in FY 2015 and FY 2016 led to reduced fuel product costs, resulting in a cash surplus and the Department was subsequently able to reprogram $1,206 million and $2,001 million out of the DWWCF to other Department accounts to support emerging requirements. Additionally, in FY 2016, Congress rescinded $1,038 million due to the build-up in the DWWCF cash balance. As fuel cost continued to decline in FY 2017, Congress imposed a reduction to the Services' FY 2017 budget of $1 billion. In order to offset the Congressional reduction, the Department adjusted the prices on October 1, 2016 and again on July 1, 2017, to react to the reduction to the Services' budget and help maintain readiness operations. Starting in FY 2018, fuel cost reversed direction and started to increase, which led to a change in the fuel price from the budgeted price of $104.58/bbl to $115.92/bbl. Overall, the average fuel price for FY 2018 was $103.11/bbl, which was $1.47 below the budgeted fuel price of $104.58/bbl. The average SFP charged to the Services in FY 2018 returned an estimated $110.8 million in reductions taken from the Services' Operation and Maintenance (O&M) appropriations in the 2018 Presidents' Budget; however, the lower SFP resulted in a decrease to the DWWCF cash balance as fuel cost outpaced the fuel price charged to the Services. This led to Congress approving the transfer of $691 million into the Department's WCF cash balance for Energy.

On October 1, 2018, the Department raised the FY 2019 SFP to $125.16/bbl, which was $21 higher than the FY 2019 Presidents Budget fuel price of $104.16/bbl, to match the true cost of fuel expected in FY 2019. Also, in the FY 2019 Presidents' Budget, Congress added $750 million to the Services O&M budget to mitigate higher than anticipated fuel costs.

On October 1, 2019, the FY 2020 SFP was set at the budgeted price at $124.32/bbl, but was later decreased to $99.12/bbl due to lower fuel costs experienced throughout the fiscal year. The lower fuel costs resulted in an increase to the DWWCF cash balance, of which the Department realigned $759 million to the DLA Supply activity and reprogrammed $241 million

to other WCF departments who were experiencing cash losses resulting from reduced sales in FY 2020 and increased disbursement related to prior year readiness investments.

On October 1, 2020, the FY 2021 SFP was set at $99.54/bbl, lower than the budgeted price of $118.02/bbl due to reduced fuel cost experienced in FY 2020. Additionally, Congress imposed a reduction to the Services' FY 2021 O&M budget of $1,000 million. Although fuel cost rose again later in the fiscal year, the DWWCF cash balance was sufficient to protect the DoD customers from further increases in the SFP.

On October 1, 2021, the FY 2022 SFP was set at $118.44/bbl above the budgeted price of $109.62/bbl, due to higher fuel cost experienced in the last six months of FY 2021. In FY 2022, the SFP was increased three more times, from $118.44/bbl to $129.36/bbl effective January 1, 2022; then to $186.06/bbl effective May 1, 2022; and then again to $129.36/bbl effective July 16, 2022. The SFP increase to $129.36 that became effective January 1st, created a cash impact of $1.8 billion bill to the DoD customers. The $1.8 billion bill to DoD customers was funded in the Consolidated Appropriations Act, FY 2022. The SFP increase to $186.06/bbl created an additional $1.9 billion bill to the DoD customers. However, Congress approved the Department's request for two fuel cost reprogrammings totaling $1.9 billion that transferred resources from the Foreign Currency Flunctuation, Defense (FCF, D) account to the DWCF DLA Energy account. The two reprogramming actions would ensure the DWCF remains cash solvent through the end of FY 2022. Additionally, lowering the SFP back to $129.36/bbl reduces the unfunded burden on the Military Services through the end of the fiscal year and mitigates the risk to the Services readiness activities.

Following the approval of the two DWCF Fuel Cost Prior Approval (PA) Reprogramming requests (FY 22-09 and FY 22-10), the FCF, D account have been replenished to $970 million, which is the statutory limit for this account under title 10 U.S.C. section 2779.

For FY 2023, the Department used the annual percent change in the Administration's pricing estimate for gasoline and oil projections to set the refined petroleum product price target. The budgeted SFP for FY 2023 is $119.70/bb. The budgeted SFP is significantly lower than the current fuel prices that the Department is experiencing and would require a fuel price increase in FY 2023.

Volatility in the refined fuel product market remains the number one cost driver impacting the DoD fuel budget. In FY 2023, additional fuel price changes could continue to impact the DWCF cash balance.

Appendix A. Fiscal Year 2023 Operational Energy Initiatives

Due to rounding, investment amounts may differ in the report.

ORG	OE Program Title	OE Initiative Title	OE Project Description	OE Strategy Objectives	OE Activity Classification	Treasury Code	BA Code	Program Element	FY2023 ($K)	FYDP ($K)
USAF	B-52H Re-Engine	B-52 Commercial Engine Replacement Program (CERP)	This sustainment program will replace the current unsustainable TF33 engine with engines of similar size, weight, and thrust characteristics. The development, production and installation of new engines and related subsystems will replace legacy equipment on 76 B-52H a/c.	Enhance Mission Effectiveness	Propulsion Upgrades_Air	3600	07	0101113F	395,736	1,596,930
USAF	B-52H Re-Engine	B-52 Commercial Engine Replacement Program (CERP)	This sustainment program will replace the current unsustainable TF33 engine with engines of similar size, weight, and thrust characteristics. The development, production and installation of new engines and related subsystems will replace legacy equipment on 76 B-52H a/c.	Enhance Mission Effectiveness	Propulsion Upgrades_Air	3010	05	0101113F	-	1,625,004
USAF	Aerospace Propulsion	Adaptive Engine Transition Program (AETP)	Matures adaptive engine technologies through a maturation/risk reduction effort to design, fabricate, and test the first-ever complete, flight-weight adaptive engines in preparation for next-gen propulsion system development for multiple combat aircraft. Drives revolutionary progress necessary to guarantee future U.S. air superiority achieving +25% fuel efficiency, +10% thrust, significantly increased thermal capacity, and maintains full-life durability. Much of the program is controlled unclassified information with ITAR restrictions; however, the program office is pursuing an exportability determination.	Increase Warfighter Capability	Propulsion Upgrades_Air	3600	04	0604004F	286,096	3,631,467
USAF	Aerospace Propulsion	Next Generation Adaptive Propulsion (NGAP)	Like AETP, NGAP matures and demonstrates the scalability of adaptive engine technologies through a maturation/risk reduction effort to design, fabricate, and test flight-weight prototype engines targeted for Next-Generation Air Dominance applications. The program is a mix of controlled unclassified and classified information with ITAR restrictions.	Increase Warfighter Capability	Propulsion Upgrades_Air	3600	04	0604004F	67,562	290,933
USAF	Aerospace Propulsion and Power Technology	Megawatt Aircraft Power and Thermal	Integrating new developments in Power and Thermal components to demonstrate advanced architectures to enable high powered mission systems for future Air Superiority platforms while maintaining energy efficiency. Technology maturation in advanced power and thermal architecture, modeling and simulation, and	Increase Warfighter Capability	Platform Thermal Management	3600	03	0603216F	18,205	18,205

ORG	OE Program Title	OE Initiative Title	OE Project Description	OE Strategy Objectives	OE Activity Classification	Treasury Code	BA Code	Program Element	FY2023 ($K)	FYDP ($K)
			integration. Developing flexible and adaptive Power and Thermal components that allow for synergetic architectures that leverage advanced engine capabilities and energy storage.							
USAF	Aerospace Vehicle Technologies	Attritable Structures (formerly Low Cost Attritable Aircraft Technology)	Develop, prototype and flight-demonstrate a series of low cost attritable aircraft that can be rapidly manufactured, in large or small numbers and on-demand, as-needed, for a base platform cost NTE $3M, plus the cost of the mission system/payload. The capability will enable the Air Force to be able to levy a cost-imposing strategy on potential adversaries, near-peer or otherwise, with a focus on the A2AD threat. The capability will be able to operate as needed with fractionated capabilities, limited training, minimal maintenance, certified analytically, and economically produced at very low production quantities.	Increase Warfighter Capability	Platform Upgrades_Air	3600	02	0602201F	3,445	27,819
USAF	Aerospace Vehicle Technologies	Off-Board Sensing Systems (Formerly Low Cost Attritable Aircraft Platform Sharing)	Develop 2 variants of a long range attritable UAS for $3M AUFC. Define aircraft open architecture concept. The primary program objective is to build and fly an off-board sensing station (OBSS) variant consistent with the philosophy and approach of the overarching LCAAT initiative and the platform-sharing concept. This approach is predicated on the cost and time benefit inherent in deriving multiple vehicle variant instantiations from a common shared platform. The program will include the design, fabrication, and flight test an OBSS variant in a relevant environment.	Increase Warfighter Capability	Platform Upgrades_Air	3600	03	0603211F	13,354	74,541
USAF	Materials Development	Low-Cost Attritable Structures	This program will provide manufacturing support to the Low Cost Attritable Aircraft Technology (LCAAT) Initiative by investigating and validating low cost manufacturing materials and processes that can be introduced to reduce aerospace vehicle costs and minimize vehicle manufacturing time.	Increase Warfighter Capability	Materials and Design	3600	03	0603680F	2,533	49,083
USAF	Software and Digital Technology Pilot Programs	Air & Space Operations Center (AOC) - Software Pilot Program	This program aims to optimize AOC processes and planning through agile software solutions. One example is KRADOS, the Kessel Run All Domain Operations Suite, a system of applications that address workflows within the Air Operations Center (AOC). Kessel Run has several applications in use at the 609th AOC, including the tanker planning application Jigsaw, and the Master Air Attack Plan (MAAP) application Slapshot. The integrated system	Increase Warfighter Capability	Current Operations Tools	3600	08	0608410F	6,000	30,000

ORG	OE Program Title	OE Initiative Title	OE Project Description	OE Strategy Objectives	OE Activity Classification	Treasury Code	BA Code	Program Element	FY2023 ($K)	FYDP ($K)
			allows for accurate and timely data sharing in an adaptable and complete system. KRADOS calculates solutions, offers a network of data delivery options, and provides real-time plans to inform decision-makers. A second example is Pythagoras, which builds on the existing tanker planning tool, Jigsaw, by adding an auto-planning feature to match refueling requests with tankers to optimize tanker utilization - Added capability aims to increase scheduling efficiency through optimization algorithms implemented by Kessel Run. Goal is to provide capability within Jigsaw for planners to quickly develop a feasible, optimized aerial refueling schedule, accounting for a host of constraints and planner judgement.							
USAF	Tech Transition Program	Mobility Asset Optimization	This program will enhance the efficiency of Mobility Air Fleet (MAF) operations through tools that optimize processes such as cargo loading, aircrew scheduling, and aircraft allocation. Optimized cargo load plans yield more efficient flight operations, and the possibility to decrease fuel use by maximizing loads and utilizing fewer aircraft. Improved load planning also requires a reassessment of under-loaded long distance flights. Loading techniques range from bi-level aircraft loading system, to dynamic re-planning software, to dual-rail swap and aggregation. For aircrew scheduling, Puckboard is a data-informed software application that plans aircrew flight qualification and ground training events. The tool, developed by and for Airmen, allows schedulers to rapidly match aircraft commanders, pilots, and loadmasters with available flights that complete currency requirements. Digital interface enables planners to visualize flight schedules and generate schedules for aircrew while considering required qualifications, crew rest, and conflicts. Overall increases in operational efficiency are expected. For aircraft allocation, Magellan is Air Mobility Commands' readiness-driven allocation process software program to synchronize aircraft and crew data, coordinate allocation cycles, enable real-time changes. These tools allow the force to fly more missions with the same amount of aircraft.	Increase Warfighter Capability	Current Operations Tools	3600	04	0604858F	13,000	41,000

ORG	OE Program Title	OE Initiative Title	OE Project Description	OE Strategy Objectives	OE Activity Classification	Treasury Code	BA Code	Program Element	FY2023 ($K)	FYDP ($K)
USAF	Tech Transition Program	Blended Wing Body Aircraft Prototype	Cargo, tanker, and non-stealth bomber aircraft account for approximately 40% of the DOD's total annual operational energy consumption: about 1.2B gallons per year. Reducing this number reduces energy logistics risks, a significant challenge in vast theaters such as the Pacific. Beyond legacy aircraft drag reduction initiatives and improved propulsion sustainment technologies, significant efficiency potential lies within revolutionary improvements in aircraft design and systems. Shifting cargo, tanker, and non-stealth bomber aircraft from tube-and-wing designs to blended wing body (BWB) designs, via a demonstrator aircraft, would yield a minimum 30% increase in range and payload capabilities from current Air Force capabilities, and a corresponding 30% reduction in emissions. Much like the development of the KC-135 and Boeing 707, advancing BWB designs at present will have a synergistic effect on the U.S. commercial aerospace sector, including both passenger and cargo aircraft. This project, in partnership with industry and other U.S. Government agencies, accelerates large aircraft performance improvement for the DOD by providing an alternative to traditional 20th century tube-and-wing aircraft for aerial tankers.	Increase Warfighter Capability	Platform Upgrades_Air	3600	04	0604858F	55,000	245,000
USAF	Tech Transition Program	Energy Supply Chain Risk Model	Develops methods and tools to inform energy supply chain risk reduction efforts	Enhance Mission Effectiveness	Current Operations Tools	3600	04	0604858F	2,500	6,500
USAF	AF Energy Program	Mission Execution Excellence Program	The MEIP program aims to incentivize operational units toward fuel-efficient operations such as: precision fuel planning, engine start technique, cruise altitude selection, descent profile, and reduced engine taxi. Based on historical data analysis, AF planners and operators require incentives to use fuel more efficiently and become an energy-optimized force. SAF/IEN, the AF Operational Energy Office, created a Mission Execution Incentive Strategy to re-align incentives and remove barriers. This strategy includes a competitive, voluntary program to incentivize Airmen to operate with fuel-use optimization in mind. Financial incentives will aim to create future savings and reinvestment in fuel-efficient education, training, and programs.	Enhance Mission Effectiveness	Policy and Oversight	3400	04	0905015F	10,000	50,000

ORG	OE Program Title	OE Initiative Title	OE Project Description	OE Strategy Objectives	OE Activity Classification	Treasury Code	BA Code	Program Element	FY2023 ($K)	FYDP ($K)
USAF	AF Energy Program	F108 Engine Detergent Wash (KC-135)	Jet engines ingest debris and contaminants during operations that reduces their time-on-wing and decreases engine efficiency and power. This causes increased fuel burn and exhaust gas temperature, leading to higher maintenance costs and decreased aircraft availability. Detergent engine washes reach deep into the engine core and apply full coverage to engine parts, removing buildup of contaminants. Detergent washing is expected to improve performance, reduce engine temperatures, and decrease fuel burn. This program focuses on the F108 engine, which is the engine used on the KC-135.	Enhance Mission Effectiveness	Propulsion Upgrades_Air	3400	04	0905015F	600	3,000
USAF	AF Energy Program	Operational Energy Education	Efforts to educate the Air Force and Joint Force regarding operational energy in DOD warfighting. Includes coordination with the AF Institute of Technology, Naval Post-Graduate School, and Defense Acquisition University. Includes initiatives such as curriculum development, force-wide education and strategic communications campaigns, and university or FFRDC-led studies to improve understanding of operational energy problem sets.	Enhance Mission Effectiveness	Policy and Oversight	3400	04	0905015F	2,000	10,000
USAF	Aircraft Engine Component Improvement Program	Mobility Aircraft Engine Compressor Blade Scanning Technology for Increased Fuel Efficiency	Develops technologies, processes, procedures to leverage commercial airline methods for improving fuel efficiency of legacy aircraft propulsion systems through sustainment innovation.	Enhance Mission Effectiveness	Propulsion Upgrades_Air	3600	07	0207268F	1,000	10,000
USAF	C-17	Legacy Aircraft Drag Reduction - C-17 Aft Body Drag Reduction Devices and Engine Pylon Fairings	Procures and installs aft body drag reduction devices and engine pylon fairings for C-17 fleet. Expected to result in a total 1.3% fuel efficiency improvement for C-17, which results in approximately $13M/year fuel savings (based on FY20 fuel prices).	Enhance Mission Effectiveness	Platform Upgrades_Air	3010	05	0401130F	5,500	5,500
USAF	KC-135	Legacy Aircraft Drag Reduction - KC-135 Vertical Windshield Wipers & Aft Body Drag Reduction Devices	Procures and installs vertical windshield wipers and aft body drag reduction devices for KC-135 fleet. Expected to result in a total 2% fuel efficiency improvement for KC-135, which results in approximately $14M/year fuel savings (based on FY20 fuel prices).	Enhance Mission Effectiveness	Platform Upgrades_Air	3010	05	0401218F	19,500	19,500
USAF	C-130	Legacy Aircraft Drag Reduction - C-130 Aft Body Drag Reduction Devices	Procures and installs aft body drag reduction devices for C-130 fleet. Expected to result in an average 4.5% fuel efficiency improvement across the C-130 fleet (range: 3-6%), which results in approximately $10M/year fuel savings (based on FY20 fuel prices).	Enhance Mission Effectiveness	Platform Upgrades_Air	3010	05	0401115F	17,500	17,500

ORG	OE Program Title	OE Initiative Title	OE Project Description	OE Strategy Objectives	OE Activity Classification	Treasury Code	BA Code	Program Element	FY2023 ($K)	FYDP ($K)
								Air & Space Forces Total	**919,531**	**7,751,982**

ORG	OE Program Title	OE Initiative Title	OE Project Description	OE Strategy Objectives	OE Activity Classification	Treasury Code	BA Code	Program Element	FY2023 ($K)	FYDP ($K)
ARMY	Integrated Soldier Power Data System - Core	Small Unit Tactical Power (ISPDS-C)	ISPDS-C RDTE	Increase Warfighter Capability	Individual/Warfighter Power	2040	05	0604827A	4,576	23,700
ARMY	Universal Battery Charger	Small Unit Tactical Power (ISPDS-C)	UBC RDTE	Enhance Mission Effectiveness	Individual/Warfighter Power	2040	05	0604827A	1,022	5,133
ARMY	Mobile Soldier Power	Integrated Soldier Power Data System - Core (ISPDS-C)	ISPDS-C OPA	Enhance Mission Effectiveness	Individual/Warfighter Power	2035	03	0211700A	6,725	34,797
ARMY	Mobile Soldier Power	Universal Battery Charger	UBC OPA	Enhance Mission Effectiveness	Individual/Warfighter Power	2035	03	0211700A	9,208	41,849
ARMY	Ground Soldier System	Small Unit Tactical Power (Nett Warrior)	Nett Warrior CWB+Next Gen HUB OPA	Enhance Mission Effectiveness	Individual/Warfighter Power	2035	03	0211700A	24,025	126,985
ARMY	Defense Research Sciences	CHEMICAL SYNTHESIS and POWER - 66	Basic research to achieve advanced energy control. Research efforts will lead to: light-weight, reliable, compact power sources.	Increase Warfighter Capability	Alternative Power Sources	2040	01	0601102A	5,882	29,778
ARMY	Defense Research Sciences	PROPULSION ENERGETICS FLIGHT - 97	Basic research for improved understanding of propulsion and combustion for improved efficiency and fuel flexibility and fluid dynamics for rotorcraft.	Increase Warfighter Capability	Propulsion Upgrades_Air	2040	01	0601102A	3,094	15,755
ARMY	Defense Research Sciences	Air Vehicle Structures and Dynamics Research - 118	Establish fundamental understanding in structural damage tracking methods, novel material/structures, and prognostic and diagnostic techniques to improve vehicle performance and capability. This includes the advancement of machine learning algorithms for deep learning, and the exploration of novel lightweight, durable, self-sensing structures for improved maneuver and reduced maintenance.	Increase Warfighter Capability	Propulsion Upgrades_Air	2040	01	0601102A	-	5,740
ARMY	Defense Research Sciences	Autonomous Vehicle Research - 120	Basic research focused on enabling robust autonomous mobility for small and human-scale robotic systems, including autonomous teaming behavior with hybrid human-robotic teams. Enablers for robust autonomous mobility include planning, behaviors, energy efficient maneuver,	Increase Warfighter Capability	Propulsion Upgrades_Land	2040	01	0601102A	1,844	9,351

ORG	OE Program Title	OE Initiative Title	OE Project Description	OE Strategy Objectives	OE Activity Classification	Treasury Code	BA Code	Program Element	FY2023 ($K)	FYDP ($K)
			and the interface of manipulation technologies to support manned-unmanned teaming constructs.							
ARMY	Defense Research Sciences	Fundamentals for Alternative Energy Applied Physics Research - 143	Explore novel concepts in energy generation and capture in technologies for efficient conversion of ambient energy to electrical energy for use and storage. Design novel structures to include microscale power devices for multimodal harvesting and efficient distributed power conversion.	Increase Warfighter Capability	Storage, Power Controls and Distribution	2040	01	0601102A	991	5,008
ARMY	Defense Research Sciences	Intelligent Systems - 48	Research in autonomous systems that supports and unburdens Soldiers in a flexible, robust, survivable and comprehensive manner. This work addresses the cognitive requirements of humans and (non-human) agents, both hardware and software based, operating individually or in collaboration, on the battlefield.	Increase Warfighter Capability	Platform Upgrades_Land	2040	01	0601102A	6,443	33,236
ARMY	Defense Research Sciences	Novel multi-fuel tolerant small vehicle power - 92	Basic research to enable highly efficient, multi-fuel conversion in small engines with reduced sensitivity to fuel property variation and extreme ambient conditions.	Increase Warfighter Capability	Propulsion Upgrades_Land	2040	01	0601102A	3,177	15,820
ARMY	Defense Research Sciences	Reconfigurable Platform Mechanics Propulsion - 146	Reconfigurable platform mechanics and propulsion science investigating technologies to enable subsystem configuration concepts for efficient hover and high-speed/range Vertical Take-Off and Landing (VTOL) aircraft.	Increase Warfighter Capability	Propulsion Upgrades_Air	2040	01	0601102A	1,046	5,287
ARMY	Defense Research Sciences	Research In Vehicle Mobility - 151	Research in support of advanced military mobility technologies with emphasis on Terramechanics (vehicle-terrain interaction), and complex vehicle dynamics and simulation.	Increase Warfighter Capability	Propulsion Upgrades_Land	2040	01	0601102A	791	4,125
ARMY	Defense Research Sciences	Sol Struct Mech - AMRDEC-AV - 101	Create robust experimental and computational approaches for understanding, modeling, and predicting the complex fluid flow and aerodynamics of next generation rotorcraft concepts.	Increase Warfighter Capability	Propulsion Upgrades_Air	2040	01	0601102A	2,731	13,806
ARMY	Defense Research Sciences	Unmanned Air System (UAS) Vehicle Research - 93	Basic research focused on topics that contribute to the body of knowledge required to create future intelligent, unmanned air systems that can effectively team with manned and unmanned aircraft, ground platforms, and human teammates.	Increase Warfighter Capability	Propulsion Upgrades_Air	2040	01	0601102A	3,199	16,179
ARMY	Defense Research Sciences	Vehicle Propulsion Power Research - 128	Investigate concepts and theories to provide enhanced tools, methods, and innovative concepts to enable improvements in propulsion power density, energy efficiency, reliability, and lifecycle costs for increased performance and capabilities in future Army systems.	Increase Warfighter Capability	Propulsion Upgrades_Land	2040	01	0601102A	1,633	8,456

ORG	OE Program Title	OE Initiative Title	OE Project Description	OE Strategy Objectives	OE Activity Classification	Treasury Code	BA Code	Program Element	FY2023 ($K)	FYDP ($K)
ARMY	Soldier Lethality Technology	Efficient Compact Portable Power - 959	Develop more efficient power and thermal management for small systems and alternative energy technologies to substantially reduce the number of batteries required to accomplish dismounted Soldier/Squad mission objectives	Increase Warfighter Capability	Individual/Warfighter Power	2040	02	0602143A	950	4,816
ARMY	Soldier Lethality Technology	Tactical Power for Soldier Lethality - 938	Designs, and develops innovative power generation and energy storage technologies that support next generation Soldier systems to decrease Soldier load and power burden, and increase power capabilities by providing more energy to prolong mission run-time.	Increase Warfighter Capability	Individual/Warfighter Power	2040	02	0602143A	5,154	28,886
ARMY	Ground Technology	Advanced Distributed Power for Autonomous Systems	Research power distribution concepts and architectures for autonomous systems.	Increase Warfighter Capability	Storage, Power Controls and Distribution	2040	02	0602144A	976	7,582
ARMY	Ground Technology	Advanced Battery Charging and Power Management	Research advanced control methods to improve fast battery charging, advanced power transfer concepts, advanced control methodologies and advanced transformers with high frequency switching.	Increase Warfighter Capability	Storage, Power Controls and Distribution	2040	02	0602144A	1,606	8,468
ARMY	Next Generation Combat Vehicle Technology	Beyond Lithium-Ion Energy Storage 16	Research Lithium-Ion and other battery technologies to increase energy storage density.	Increase Warfighter Capability	Storage, Power Controls and Distribution	2040	02	0602145A	1,195	2,375
ARMY	Next Generation Combat Vehicle Technology	Combat Electric Power Architecture - 1061	Researches combat vehicle power control architecture for the heavy combat vehicles	Increase Warfighter Capability	Platform Upgrades_Land	2040	02	0602145A	-	8,702
ARMY	Next Generation Combat Vehicle Technology	Electric Drive Motors/Power Controllers/Conv 18	Research Electric Drive Motors, Power Controllers, and Converters to enable hybrid powertrains with electric drive for silent mobility and watch and to improve fuel efficiency of manned and unmanned combat vehicles.	Increase Warfighter Capability	Propulsion Upgrades_Land	2040	02	0602145A	2,019	2,019
ARMY	Next Generation Combat Vehicle Technology	Extreme Energy Density Energy Storage	Mature extremely high energy density energy storage for all-electric combat vehicles with advanced suspension designs.	Increase Warfighter Capability	Storage, Power Controls and Distribution	2040	02	0602145A	1,185	7,481
ARMY	Next Generation Combat Vehicle Technology	High Density In-Sprocket Drive Applied Technology	Researches components for hybrid-electric track drive combat vehicles.	Increase Warfighter Capability	Propulsion Upgrades_Land	2040	02	0602145A	1,534	3,458
ARMY	Next Generation Combat Vehicle Technology	High Performance In-Hub Wheel Motor - 1060	Researches in-hub wheel motor designs for combat vehicles with advanced suspension designs.	Increase Warfighter Capability	Propulsion Upgrades_Land	2040	02	0602145A	-	1,872
ARMY	Next Generation Combat Vehicle Technology	High Speed Battlefield Charging for Hybrid Platforms	Research concepts for high speed battlefield charging capability for hybrid and battery electric vehicles to enable charging at a comparable rate to refueling.	Increase Warfighter Capability	Storage, Power Controls and Distribution	2040	02	0602145A	2,021	10,131
ARMY	Next Generation Combat Vehicle Technology	High Voltage Modular Li-Ion Battery 17	Research High Voltage Modular Li-Ion Battery technologies to increase energy storage density and enable electrification of manned and unmanned combat vehicles.	Increase Warfighter Capability	Storage, Power Controls and Distribution	2040	02	0602145A	1,234	2,396

ORG	OE Program Title	OE Initiative Title	OE Project Description	OE Strategy Objectives	OE Activity Classification	Treasury Code	BA Code	Program Element	FY2023 ($K)	FYDP ($K)
ARMY	Next Generation Combat Vehicle Technology	OMT Traction Turret Drive Motors Electric Cooling	Researches electric traction drive motors for turret operation.	Increase Warfighter Capability	Platform Upgrades_Land	2040	02	0602145A	1,415	2,429
ARMY	Next Generation Combat Vehicle Technology	Next Generation Tank Mobility System (NGTMS) - Power Dense Propulsion System - 1063	Researches power dense propulsion system for Heavy Combat Vehicles	Increase Warfighter Capability	Propulsion Upgrades_Land	2040	02	0602145A	-	7,836
ARMY	Next Generation Combat Vehicle Technology	Next Generation Tank Mobility System (NGTMS) - Power Dense Propulsion System - 1064	Researches power dense propulsion system for Heavy Combat Vehicles	Increase Warfighter Capability	Propulsion Upgrades_Land	2040	02	0602145A	-	6,119
ARMY	Next Generation Combat Vehicle Technology	Power Dense Range Extender Tech	Researches range extending fuel cell design that uses solid-state energy storage.	Increase Warfighter Capability	Storage, Power Controls and Distribution	2040	02	0602145A	-	4,946
ARMY	Next Generation Combat Vehicle Technology	RCV Silent Watch and Mobility Range Extension	Researches JP8 reformer based silent watch and mobility extension subsystem.	Increase Warfighter Capability	Storage, Power Controls and Distribution	2040	02	0602145A	1,714	3,233
ARMY	Next Generation Combat Vehicle Technology	Scalable Electrification & Control Architecture 19	Research scalable Electrification & Control Architectures to enable electrified and energy efficient manned and unmanned combat vehicles.	Increase Warfighter Capability	Platform Upgrades_Land	2040	02	0602145A	1,981	3,981
ARMY	Network C3I Technology	Energy Efficient Devices Technology 84	Develop supply and demand electronics for energy-constrained platforms that will extend mission duration (dismounted Soldier), reduce frequency of battery replacement (unattended Sensors) and increase endurance (Unmanned Aerial Vehicles (UAVs)).	Increase Warfighter Capability	Individual/Warfighter Power	2040	02	0602146A	5,480	27,886
ARMY	Future Vertical Lift Technology	Transmission Improvements & Gearing Enhancements for Rotorcraft (TIGER) Components	Investigate advanced drive train technologies focused on the following goals: of 60:1 ratio in two stages; and 2X increase in life which provides improvements in payload, range and affordability. This effort will support Future Vertical Lift and other Aviation platforms.	Increase Warfighter Capability	Propulsion Upgrades_Air	2040	02	0602148A	-	5,455
ARMY	Future Vertical Lift Technology	Adaptive Power Component Technologies	Project develops power and thermal management technologies to provide significantly higher electrical power capability to FVL aircraft while addressing consequential size, weight and thermal issues. Provides power capability for advanced electric aeromechanical effectors, advanced mission systems algorithms for route planning and teaming, and advanced electronic warfare devices	Increase Warfighter Capability	Platform Upgrades_Air	2040	02	0602148A	-	9,939
ARMY	Future Vertical Lift Technology	Power & Thermal Management Components	Project develops power and thermal management technologies to provide significantly higher electrical power capability to FVL aircraft while	Increase Warfighter Capability	Platform Upgrades_Air	2040	02	0602148A	2,428	2,428

ORG	OE Program Title	OE Initiative Title	OE Project Description	OE Strategy Objectives	OE Activity Classification	Treasury Code	BA Code	Program Element	FY2023 ($K)	FYDP ($K)
			addressing consequential size, weight and thermal issues. Provides power capability for advanced electric aeromechanical effectors, advanced mission systems algorithms for route planning and teaming, and advanced electronic warfare devices							
ARMY	Future Vertical Lift Technology	Optimized Energy for C4ISR Platforms	Researches power components and control for high power aviation mission systems.	Increase Warfighter Capability	Storage, Power Controls and Distribution	2040	02	0602148A	5,185	26,071
ARMY	Air Platform Applied Research	Future UAS Engine Technology 01	Research to enable intelligent and robust propulsion performance and noise signature reduction via multi-fuel and optimized hybrid electric capability for small engines (20-150kW) powering future aerial and ground systems.	Increase Warfighter Capability	Propulsion Upgrades_Air	2040	02	0602183A	3,414	17,682
ARMY	Air Platform Applied Research	High Reduction-Ratio Transmission (HRT) 63	Project develops FVL advanced drive train technologies that increase performance and double current drivetrain life cycles while improving their reliability and maintainability	Increase Warfighter Capability	Propulsion Upgrades_Air	2040	02	0602183A	1,482	2,986
ARMY	Soldier Applied Research	Technologies for Alternative Energy	Conducts applied research and development on materials and component level power and energy technologies in the areas of energy storage, power generation, alternative energy, and intelligent power distribution and thermal management designs that support Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) and Soldier power needs to include next generation squad weapons and advanced optical devices and sensors. ?	Increase Warfighter Capability	Individual/Warfighter Power	2040	02	0602184A	2,387	12,068
ARMY	Air Platform Advanced Technology	High Reduction Ratio Transmission (HRT) Tech	Develops variable speed transmission to optimize aircraft efficiency and range.	Increase Warfighter Capability	Propulsion Upgrades_Air	2040	03	0603043A	4,235	12,799
ARMY	Soldier Lethality Advanced Technology	Soldier Power and Energy Technology Demonstration - 936	Matures, integrates, and demonstrates advanced Soldier Power and Energy (P&E) technologies to power the dismounted Soldier and small unit's command and control, communications, computers, and sensor devices during tactical operations.	Increase Warfighter Capability	Individual/Warfighter Power	2040	03	0603118A	4,189	22,013
ARMY	Ground Advanced Technology	Advanced Tribology Research 58	Mature tribology techniques to evaluate fluids and fuels.	Increase Warfighter Capability	Conventional Fuels Testing	2040	03	0603119A	480	3,235
ARMY	Ground Advanced Technology	Enhanced Jet Fuel for Ground System Durability 56	Evaluate Enhanced Jet Fuel to determine its impact to Ground System Durability.	Increase Warfighter Capability	Alternative Fuels Certification and Testing	2040	03	0603119A	539	3,170

ORG	OE Program Title	OE Initiative Title	OE Project Description	OE Strategy Objectives	OE Activity Classification	Treasury Code	BA Code	Program Element	FY2023 ($K)	FYDP ($K)
ARMY	Ground Advanced Technology	Fuel Additive Detection and Qualification - 677	Evaluate fuel additive effects on engine performance and methods to identify additives in fuel to optimize performance.	Increase Warfighter Capability	Conventional Fuels Testing	2040	03	0603119A	314	2,003
ARMY	Ground Advanced Technology	Fuel Asset Visibility	Evaluate smart meter performance baseline and transfer data via the server to a fuel dashboard.	Increase Warfighter Capability	Fuel Infrastructure	2040	03	0603119A	518	4,156
ARMY	Ground Advanced Technology	Smart Fuel Metering - 675	Develop technologies to automate awareness of fuel supplies during operations.	Increase Warfighter Capability	Fuel Infrastructure	2040	03	0603119A	-	1,134
ARMY	Next Generation Combat Vehicle Advanced Technology	AVPTA - Electrification Technology 11	Develop Electrification Technology in collaboration with the Department of Energy through the Advanced Vehicle Power Technology Alliance.	Increase Warfighter Capability	Platform Upgrades_Land	2040	03	0603462A	2,207	4,446
ARMY	Next Generation Combat Vehicle Advanced Technology	Diesel Electric Power Generator 09	Develop Diesel Electric Power Generator to enable hybrid powertrains for combat vehicles and silent mobility and watch.	Increase Warfighter Capability	Propulsion Upgrades_Land	2040	03	0603462A	1,646	3,642
ARMY	Next Generation Combat Vehicle Advanced Technology	Electric Drive Motors/Power Controllers/Conv 07	Develop Electric Drive Motors, Power Controllers and Converters to enable hybrid powertrains for combat vehicles and silent mobility and watch.	Increase Warfighter Capability	Propulsion Upgrades_Land	2040	03	0603462A	1,210	2,820
ARMY	Next Generation Combat Vehicle Advanced Technology	Extreme Energy Density Energy Storage	Mature extremely high energy density energy storage for all-electric combat vehicles with advanced suspension designs.	Increase Warfighter Capability	Storage, Power Controls and Distribution	2040	03	0603462A	-	8,214
ARMY	Next Generation Combat Vehicle Advanced Technology	High Density Component Testing	Evaluate high energy density components for performance in high voltage architecture.	Increase Warfighter Capability	Propulsion Upgrades_Land	2040	03	0603462A	-	5,925
ARMY	Next Generation Combat Vehicle Advanced Technology	High Density In-Sprocket Drive Advanced Technology	Develops components for hybrid-electric track drive combat vehicles.	Increase Warfighter Capability	Propulsion Upgrades_Land	2040	03	0603462A	-	5,229
ARMY	Next Generation Combat Vehicle Advanced Technology	High Voltage Modular Li-Ion Battery 10	Develop High Voltage Modular Li-Ion Battery technologies to increase energy storage density and enable electrification of manned and unmanned combat vehicles.	Increase Warfighter Capability	Storage, Power Controls and Distribution	2040	03	0603462A	3,031	6,074
ARMY	Next Generation Combat Vehicle Advanced Technology	Highly Electrified and Autonomous Platforms - GVSC/AAL 16	Demonstrate Highly Electrified Autonomous Platform components and architectures.	Increase Warfighter Capability	Storage, Power Controls and Distribution	2040	03	0603462A	4,469	9,278
ARMY	Next Generation Combat Vehicle Advanced Technology	Next Generation Tank Mobility System (NGTMS) - Power Dense Propulsion System - 1069	Develop power dense propulsion system for the Next Generation Tank	Increase Warfighter Capability	Propulsion Upgrades_Land	2040	03	0603462A	-	18,248

ORG	OE Program Title	OE Initiative Title	OE Project Description	OE Strategy Objectives	OE Activity Classification	Treasury Code	BA Code	Program Element	FY2023 ($K)	FYDP ($K)
ARMY	Next Generation Combat Vehicle Advanced Technology	OMT Traction Turret Drive Motors Electric Cooling Advanced Technology	Researches electric traction drive motors for turret operation.	Increase Warfighter Capability	Platform Upgrades_Land	2040	03	0603462A	1,515	7,681
ARMY	Next Generation Combat Vehicle Advanced Technology	Parallel Hybrid Electric Combat System	Will develop architecture to enable an electric clutch with position sensor to enable silent mobility in parallel hybrid-electric tracked combat systems.	Increase Warfighter Capability	Propulsion Upgrades_Land	2040	03	0603462A	1,865	14,341
ARMY	Next Generation Combat Vehicle Advanced Technology	Power Dense Range Extender Adv Technology	Develops range extending fuel cell design that uses solid-state energy storage.	Increase Warfighter Capability	Storage, Power Controls and Distribution	2040	03	0603462A	-	5,812
ARMY	Next Generation Combat Vehicle Advanced Technology	RCV Silent Watch and Mobility Range Extension Advanced Technology	Matures and integrates JP8 reformer components and sub-systems in order to demonstrate extended silent watch and mobility as part of a modular electrification architecture supporting robotic combat vehicles.	Increase Warfighter Capability	Storage, Power Controls and Distribution	2040	03	0603462A	2,021	5,367
ARMY	Next Generation Combat Vehicle Advanced Technology	scalable Electrification and Control Architecture - 856	Validates component-level performance and integrates the power distribution and control components to implement a common, scalable, electrified vehicle power architecture on combat platforms from 15 to 50 tons.	Increase Warfighter Capability	Platform Upgrades_Land	2040	03	0603462A	3,536	7,593
ARMY	Next Generation Combat Vehicle Advanced Technology	SiC Gen 4 Electronics Improvement - 1071	Mature Silicon Carbide-based High Power Electronic Subsystems for Combat Vehicles.	Increase Warfighter Capability	Storage, Power Controls and Distribution	2040	03	0603462A	-	17,190
ARMY	Next Generation Combat Vehicle Advanced Technology	System Vehicle Integration and Test - 857	Mature Silicon Carbide-based High Power Electronic Subsystems for Combat Vehicles.	Increase Warfighter Capability	Propulsion Upgrades_Land	2040	03	0603462A	3,983	12,188
ARMY	Next Generation Combat Vehicle Advanced Technology	Tactical and Wheeled Vehicles Hybrid Electric System	Develop parallel hybrid-electric vehicle technologies including high voltage energy storage system, bi-directional power converter for systems, subsystem controls and supervisory control system for anti-idle capability, electric clutch, regenerative braking, and electric launch assist. Develop multi-vehicle microgrid dashboard and vehicle networking capability.	Increase Warfighter Capability	Propulsion Upgrades_Land	2040	03	0603462A	6,632	31,375
ARMY	Next Generation Combat Vehicle Advanced Technology	Urban Mobility Technologies - Extreme High Power Electric Power Pack - 1065	Mature extremely high energy density energy storage for combat vehicles with advanced suspension designs.	Increase Warfighter Capability	Propulsion Upgrades_Land	2040	03	0603462A	-	769
ARMY	Next Generation Combat Vehicle Advanced Technology	Urban Mobility Technologies - High Performance in-Hub Wheel Motor - 1067	Mature in-hub wheel motor designs for combat vehicles with advanced suspension designs.	Increase Warfighter Capability	Propulsion Upgrades_Land	2040	03	0603462A	-	2,838

ORG	OE Program Title	OE Initiative Title	OE Project Description	OE Strategy Objectives	OE Activity Classification	Treasury Code	BA Code	Program Element	FY2023 ($K)	FYDP ($K)
ARMY	Future Vertical Lift Advanced Technology	Transmission Improvements & Gearing Enhancements for Rotorcraft (TIGER)	Develop advanced drive train technologies focused on the following goals: of 60:1 ratio in two stages; and 2X increase in life which provides improvements in payload, range and affordability. This effort will support Future Vertical Lift and other Aviation platforms.	Increase Warfighter Capability	Propulsion Upgrades_Air	2040	03	0603465A	-	1,447
ARMY	Future Vertical Lift Advanced Technology	Power & Thermal Management Tech Demo	Project effort will develop and demonstrate integrated power and thermal management technologies to provide significantly higher electrical power capability for FVL aircraft	Increase Warfighter Capability	Propulsion Upgrades_Air	2040	03	0603465A	2,353	16,798
ARMY	Future Vertical Lift Advanced Technology	Optimized Energy for C4ISR Platforms Adv Tech	Develops power components and control for high power aviation mission systems.	Increase Warfighter Capability	Propulsion Upgrades_Air	2040	03	0603465A	2,043	10,196
ARMY	Abrams Upgrade Program	Improved Abrams	Power Initiative for Abrams M1A2SEPv3 (Power ECP) vehicle - Auxiliary Power Unit (APU) for fuel efficiency	Increase Warfighter Capability	Platform Upgrades_Land	2033	01	0211702A	3,542	31,874
ARMY	Robotic Combat Vehicle	Hybrid Electric Power Pack	Hybrid Electric Power Pack (Prototype)	Increase Warfighter Capability	Propulsion Upgrades_Land	2040	05	0604641A	3,083	8,666
ARMY	Robotic Combat Vehicle	Hybrid Electric Power Pack	Hybrid Electric Power Pack (Production)	Enhance Mission Effectiveness	Propulsion Upgrades_Land	2033	01	0904901A	-	14,267
ARMY	Bradley Program (MOD)	Improved Bradley	More efficient Bradley - The Bradley improved engine and transmission generate an overall fuel reduction of 3%	Increase Warfighter Capability	Propulsion Upgrades_Land	2033	01	0211702A	19,420	19,420
ARMY	Engine-Driven Generators Engineering Development	Small Tactical Electric Power (STEP)	Small Tactical Electric Power (STEP)	Increase Warfighter Capability	Contingency Basing	2040	05	0604804A	14,497	53,112
ARMY	Generators and Associated Equipment	Advanced Medium Mobile Power Source	Advanced Medium Mobile Power Sources (AMMPS) consolidated	Increase Warfighter Capability	Contingency Basing	2035	03	0216300A	50,092	344,861
ARMY	Generators and Associated Equipment	Power Distribution Illumination Systems Electrical (PDISE) Expansion	Power Distribution Illumination Systems Electrical (PDISE) Expansion	Increase Warfighter Capability	Contingency Basing	2035	03	0216300A	1,042	23,493
ARMY	Generators and Associated Equipment	Small Tactical Electric Power (STEP)	Small Tactical Electric Power (STEP)	Increase Warfighter Capability	Contingency Basing	2035	03	0216300A	1,562	34,497
ARMY	Mobile Soldier Power	Platoon Power Generator (PPG)	Platoon Power Generator (PPG)	Increase Warfighter Capability	Contingency Basing	2035	03	0211700A		19,994
ARMY	Combat Service Support Equipment	Heaters' and ECU's	IMPROVED ENVIRONMENTAL CONTROL UNITS (IECU)	Enhance Mission Effectiveness	Contingency Basing	2035	03	0216300A	7,432	36,754

ORG	OE Program Title	OE Initiative Title	OE Project Description	OE Strategy Objectives	OE Activity Classification	Treasury Code	BA Code	Program Element	FY2023 ($K)	FYDP ($K)
ARMY	Soldier Systems - Warrior Dem/Val	Platoon Power Generator (PPG)	Platoon Power Generator (PPG)	Increase Warfighter Capability	Individual/Warfighter Power	2040	05	0604827A	4,000	8,000
ARMY	Inland Petroleum Distribution System	Fuel Infrastructure	IPDS Fuel Unit COSIS	Reduce Logistics Risks to Mission	Fuel Infrastructure	2020	02	0208031A	14,304	80,011
ARMY	800k Fuel System Supply Point	Fuel Infrastructure	800k FSSP COSIS	Reduce Logistics Risks to Mission	Fuel Infrastructure	2020	02	0208031A	557	2,731
ARMY	Distribution Systems, Petroleum & Water	Early Entry Fluid Distribution System (E2FDS)	Early Entry Fluid Distribution System (E2FDS)	Reduce Logistics Risks to Mission	Fuel Infrastructure	2035	03	0216300A	228	228
ARMY	Distribution Systems, Petroleum & Water	Bulk Fuel Distribution System (BFDS)	BFDS - Bulk Fuel Distribution System	Reduce Logistics Risks to Mission	Fuel Infrastructure	2035	03	0216300A	16,774	142,634
ARMY	Improved Turbine Engine	Aviation - Improved Turbine Engine Program (ITEP)	Aviation - Improved Turbine Engine Program (ITEP)	Increase Warfighter Capability	Propulsion Upgrades_Air	2040	07	0607139A	220,045	719,495
ARMY	Improved Turbine Engine	Aviation - Improved Turbine Engine Program (ITEP)	Aviation - Improved Turbine Engine Program (ITEP)	Increase Warfighter Capability	Propulsion Upgrades_Air	2031	01	0216300A		1,143,549
ARMY	Aviation Ground Support Equipment	Next Generation Aviation Ground Power Unit (NGAGPU)	Next Generation Aviation Ground Power Unit (NGAGPU)	Increase Warfighter Capability	Contingency Basing	2040	05	0605830A	2,855	2,855
ARMY	Common Ground Equipment	Next Generation Aviation Ground Power Unit (NGAGPU)	Next Generation Aviation Ground Power Unit (NGAGPU)	Increase Warfighter Capability	Contingency Basing	2031	04	0210100A	20,078	64,485
ARMY	UH-60 Black Hawk M Models	Black Hawk Aircrew Simulators	Black Hawk Aircrew Simulators	Enhance Mission Effectiveness	Simulators Air	2031	01	0210101A	14,100	46,362
ARMY	UH-60 Black Hawk A and L Models	Black Hawk Aircrew Simulators and Concurrency	Black Hawk Aircrew Simulators	Enhance Mission Effectiveness	Simulators Air	2031	01	0210101A	29,004	40,951
ARMY	Stryker Brigade Combat Team	Stryker Power System	Development and testing of a non-primary power solution for the Stryker platform. Enable extended (4hrs-12hrs) Silent Watch/Engine-off operation of mission critical systems, reduce fuel consumption & engine wear for Stryker vehicles.	Enhance Mission Effectiveness	Platform Upgrades_Land	2040	07	0203735A	5,750	5,750
ARMY	Stryker Brigade Combat Team	910 AMP Alternator	Increased electrical power generation capability and efficient distribution.	Enhance Mission Effectiveness	Platform Upgrades_Land	2033	01	0211705A	1,070	9,872

ORG	OE Program Title	OE Initiative Title	OE Project Description	OE Strategy Objectives	OE Activity Classification	Treasury Code	BA Code	Program Element	FY2023 ($K)	FYDP ($K)
ARMY	Armored Multi-Purpose Vehicle (AMPV)	Armored Multi-Purpose Vehicle (AMPV)	N/A	Increase Warfighter Capability	Propulsion Upgrades_Land	2033	01	0211702A	330,026	2,456,025
ARMY	Maneuver Combat Systems (MCS)	OMFV Maneuver Battle Labs	The Maneuver Battle Lab will use the USG surrogate concepts to help create operational effectiveness to support the A-CDD. Understand Survivability and Lethality (cannon) trade impact to Operational Effectiveness, with Soldier application of TTPs.	Increase Warfighter Capability	M&S, Studies, and Wargames	2040	05	0605625A	586	956
ARMY	Joint Light Tactical Vehicle	Electrical System Energy Related Improvements - Engine Upgrade	Electrical System Energy Related Improvements - Engine Upgrade	Enhance Mission Effectiveness	Propulsion Upgrades_Land	2035	01	0216300A	85,793	440,242
ARMY	Joint Light Tactical Vehicle	Electrical System Energy Related Improvements - Alternator and Li Battery	Electrical System Energy Related Improvements - Alternator and Li Battery	Enhance Mission Effectiveness	Platform Upgrades_Land	2035	01	0216300A	8,252	41,415
ARMY	Joint Light Tactical Vehicle	Anti-Idle Kits (TVEK) (RDTE Development Engineering Effort)	Anti-idle kit for legacy JLTVs to reduce overall fuel consumption up to 20% (duty cycle dependent)	Reduce Logistics Risks to Mission	Propulsion Upgrades_Land	2040	05	0605812A	7,500	15,000
ARMY	Joint Light Tactical Vehicle	Anti-Idle Kits (TVEK) (Procurement Effort)	Anti-idle kit for legacy JLTVs to reduce overall fuel consumption up to 20% (duty cycle dependent) (Production Kits)	Reduce Logistics Risks to Mission	Propulsion Upgrades_Land	2035	01	0216300A		111,352
ARMY	Family of Medium Tactical Vehicles	Anti-Idle Kits (TVEK) (RDTE Development Engineering Effort)	Anti-idle kit for FMTVs to reduce overall fuel consumption up to 20% (duty cycle dependent) and other climate related efforts for the TWV fleet	Reduce Logistics Risks to Mission	Propulsion Upgrades_Land	2040	05	0604604A	15,000	30,000
ARMY	Family of Medium Tactical Vehicles	Anti-Idle Kits (TVEK) (Procurement Effort)	Anti-idle kit for legacy FMTVs to reduce overall fuel consumption up to 20% (duty cycle dependent) and other climate related efforts for the TWV fleet (Production Kits)	Reduce Logistics Risks to Mission	Platform Upgrades_Land	2035	01	0216300A		277,880
								Army Total	**1,043,125**	**7,088,961**

ORG	OE Program Title	OE Initiative Title	OE Project Description	OE Strategy Objectives	OE Activity Classification	Treasury Code	BA Code	Program Element	FY2023 ($K)	FYDP ($K)
NAVY	MQ-25	MQ-25 Development	Development of first CVN-based organic mission and recovery tanker. MQ-25 will extend the range and increase lethality of the CSG's CVW, and will contribute to F/A-18EF shortfall by	Reduce Logistics Risks to Mission	Mobile Fuel Assets	1319	05	0605414N	238,643	814,579

ORG	OE Program Title	OE Initiative Title	OE Project Description	OE Strategy Objectives	OE Activity Classification	Treasury Code	BA Code	Program Element	FY2023 ($K)	FYDP ($K)
			relieving tanker duties and returning a/c to the strike fighter role. MQ-25 will also have a secondary ISR capability. IOC 4QFY24.							
NAVY	Advance Surface Machinery Sys	Integrated Power & Energy Systems	Development of Next Generation Integrated Power and Energy System (NGIPES) technology aboard Navy Ships to enable current and future weapons and sensor systems.	Increase Warfighter Capability	Storage, Power Controls and Distribution	1319	04	0603573N	72,841	291,620
NAVY	FORCE PROTECTION APPLIED RESEARCH	Naval Power Systems	Technology programs focused on providing technologically superior warfighting capabilities at reduced total ownership costs for surface and subsurface platforms through investments in applied research of programs such as the Electric Ship Research and Development Consortium (ESRDC), which is composed of eight leading universities and is focused on afloat power systems, and leads efforts to address a national shortage of electric power engineers, and ensure U.S. superiority in electric systems; activities linked with newly established Combat Power and Energy Systems (CPES);.and activities in support of digital twin, heat transfer/thermal management, distribution/control of power and energy storage and power management. PBIS Issue 50698: PDM II - Climate DDGX IPS of $400K in FY23 and 24."	Increase Warfighter Capability	Platform Upgrades_Sea	1319	02	0602123N	24,909	130,814
NAVY	OPLOG IPT Development	Seabased Petroleum Distribution System (SPDS)	Development of an offshore bulk fuel cache storage and over the shore transfer system. Replaces and improves on legacy OPDS systems.	Reduce Logistics Risks to Mission	Fuel Infrastructure	1319	04	0603564N	15,506	21,306
NAVY	Defense Research Sciences	Naval Power Materials Research	Energy storage and power generation materials basic research	Increase Warfighter Capability	Materials and Design	1319	01	0601153N	8,943	8,943
NAVY	FORCE PROTECTION APPLIED RESEARCH	Propulsion Task Force Energy (TFE)	This Program, in partnership with the Variable Cycle Advance Technology (VCAT) program, has the objective to develop variable geometry and adaptive cycle gas turbine engine technology for next generation air dominance aircraft. The benefits of these technologies are anticipated to be reduced fuel consumption and hence greater operational range and reduced logistics tail, mostly by reducing the demand for deployed fuel and tanker aircraft support.	Increase Warfighter Capability	Propulsion Upgrades_Air	1319	02	0602123N	8,585	44,798
NAVY	Unmanned Undersea Vehicle (UUV) Core Technologies	Li-Ion Battery: Propagation Resistant Architecture	Project is focused on the development of a propagation resistant battery architecture including integration and demonstration in a medium sized UUV. Effort also includes modeling and simulation capabilities geared	Increase Warfighter Capability	Propulsion Upgrades_Sea	1319	04	0604029N	4,460	41,710

ORG	OE Program Title	OE Initiative Title	OE Project Description	OE Strategy Objectives	OE Activity Classification	Treasury Code	BA Code	Program Element	FY2023 ($K)	FYDP ($K)
			toward predicting the propagation resistance of a battery architecture.							
NAVY	Future Naval Capabilities Applied Research	SW-FY21-02 Robust Combat Power Control (RCPC)	Develop Combat Power and Energy Control System to anticipate, align and configure shipboard resources based on system state and mission context.	Increase Warfighter Capability	Platform Upgrades_Sea	1319	03	0603673N	6,347	6,347
NAVY	Defense Research Sciences	Naval Power Systems	Advancing power and energy science through fundamental research in the areas of conductor and permanent magnet materials, energy conversion, combustion, and cyber physical system modeling. Advancing thermal science and technology through fundamental studies of multi-phase heat transfer, fluid dynamics, and nanostructured materials to efficiently acquire, transport, and reject heat and enable higher power density electronic systems. Fulfill the power and energy needs of the Navy's next-generation weapons and platforms by improving (1) Education, (2) Reliability of power electronic devices, (3) Power density of power systems, and (4) Power Electronics Manufacturing costs.	Increase Warfighter Capability	Platform Upgrades_Sea	1319	01	0601153N	7,036	64,738
NAVY	Unmanned Undersea Vehicle (UUV) Core Technologies	Warehousing: Robotic Cell Screening	Development of a robust screening process geared toward discarding battery cell outliers that show signs of internal shorting early in the battery assembly process. The discarded outliers will have the effect of increasing both system reliability and safety by eliminating poorer performing cells and cells with signs of internal shorts. This will also have the effect of reducing the probability of a future latent cell defect and catastrophic battery system failures for UUVs. Program will establish a Quality Assurance protocol and procedure for quality control oversight and documentation of battery assembly and configuration control.	Increase Warfighter Capability	Propulsion Upgrades_Sea	1319	04	0604029N	6,500	33,210
NAVY	Defense Research Sciences	NRL - Energy	Long term Basic and Applied research into phenomena and mechanisms allowing for more efficient conversion of power; generation of power from solar illumination; from hydrogen conversion in fuel cells; storage of energy in improved battery technologies; augmentation of liquid fuels for greater energy density and exploitation of biological mechanisms for long-duration energy sources.	Increase Warfighter Capability	Alternative Fuels Production	1319	01	0601153N	3,970	20,660

ORG	OE Program Title	OE Initiative Title	OE Project Description	OE Strategy Objectives	OE Activity Classification	Treasury Code	BA Code	Program Element	FY2023 ($K)	FYDP ($K)
NAVY	FORCE PROTECTION APPLIED RESEARCH	Sea Based Aviation Propulsion Applied Research	This Program provides medium-term, applied research to demonstrate advanced engine technologies applicable to engine components for naval aviation platforms in propulsion-related technology areas. The specific areas addressed in this program are: (1) Propulsion Cycles, Subsystems, and Engine-Airframe Integration (2) High Stage-Loading, Variable-Geometry, and Enhanced Durability Turbomachinery (3) Jet Noise Reduction for tactical aircraft (4) Hot Section Materials and Coatings, (5) Higher Power Density and Stability Combustion Systems, and (6) Small Propulsion Engine Technology for Autonomous Air Vehicles.	Increase Warfighter Capability	Propulsion Upgrades_Air	1319	02	0602123N	3,573	18,644
NAVY	Ocean Warfighting Environment Applied Research	Integrated Climate Weather and Ocean Decision Support	Long term Applied Research on improved integration of weather and ocean forecasts into ship routing, ship response and propulsion efficiency planning, and Refueling at Sea logistics planning, as well as prediction of hazardous and extreme weather events and trends for climate adaptation, resiliency, and mitigation.	Enhance Mission Effectiveness	Current Operations Tools	1319	02	0602435N	3,747	21,930
NAVY	Energy Conservation	Energy Monitoring, Planning & Assessment	This project area focuses on methods of capturing and displaying energy related data to shipboard personnel and navy engineers and planners as actionable information to employ energy conservation measures underway and in port as mission requirements permit.	Increase Warfighter Capability	Metering and Monitoring	1319	04	0603724N	279	2,310
NAVY	Mobility Fuels	Rapid fuel analysis and impact assessment	Develop test methods, fuel-hardware interaction correlations and analytic tools to reduce operational impacts from field identified deficiencies	Reduce Logistics Risks to Mission	Conventional Fuels Testing	1319	04	0603724N	2,800	14,910
NAVY	FORCE PROTECTION APPLIED RESEARCH	Naval Platform Operational Endurance & Climate Resiliency Science	Advancing design tools focused on climate resilience and predicting emissions from platforms. Pursue technology development efforts addressed to impact climate remediation, including evaluation of Low Global Warming Potential (GWP) refrigerants, Subsea & Seabed Warfare (SSW) Energy Harvesting and Direct Air Capture & Blue Carbon fuel synthesis. This effort received funding via PBIS Issue 50402: "PDM I Climate - Green Tech carbon sequestration and capture FY24," $7M/year 23-27.	Increase Warfighter Capability	Platform Upgrades_Sea	1319	02	0602123N	10,647	51,903
NAVY	Defense Research Sciences	Sea Based Aviation Propulsion Basic Research	This Program provides long-term basic research that discovers new phenomena related power propulsion and thermal management, with the intent that they mature to provide transition	Increase Warfighter Capability	Propulsion Upgrades_Air	1319	01	0601153N	2,775	13,802

ORG	OE Program Title	OE Initiative Title	OE Project Description	OE Strategy Objectives	OE Activity Classification	Treasury Code	BA Code	Program Element	FY2023 ($K)	FYDP ($K)
			opportunities for the associated applied research program. This Program also supports university research in these areas and the associated graduate student support to help build the number and quality of Scientists and Engineers with relevant skills to help further develop power and propulsion systems for future Sea Based Aviation platforms and weapon systems.							
NAVY	Aircraft Energy	Aircraft Turbine Engine Recuperator	Demonstrate using M250 engine utilizing an advanced recuperator design enabling 25% reduced specific fuel consumption (SFC). Reduced SFC would provide extended time on station improvement of 25 - 35%, critical to ISR mission.	Increase Warfighter Capability	Propulsion Upgrades_Air	1319	04	0603724N	587	967
NAVY	Energy Conservation	Power Generation and Storage	This project area accomplishes development, laboratory and Fleet testing to determine overall mission and cost effectiveness of improved power generation and storage technologies.	Increase Warfighter Capability	Storage, Power Controls and Distribution	1319	04	0603724N	370	3,411
NAVY	Defense Research Sciences	NRL - Energy	Long term Basic and Applied research into phenomena and mechanisms allowing for more efficient conversion of power; generation of power from solar illumination; from hydrogen conversion in fuel cells; storage of energy in improved battery technologies; augmentation of liquid fuels for greater energy density and exploitation of biological mechanisms for long-duration energy sources.	Increase Warfighter Capability	Alternative Power Sources	1319	01	0601153N	2,454	12,770
NAVY	Mobility Fuels	Fuel Hardware Impact analysis	Conduct RDTE necessary to allow operational and/or technical decision makers the ability to assess risk of fuel properties/chemistry on current and emerging operational or platform requirements	Enhance Mission Effectiveness	Conventional Fuels Testing	1319	04	0603724N	2,572	14,191
NAVY	FORCE PROTECTION APPLIED RESEARCH	NRL - Energy	Long term Basic and Applied research into phenomena and mechanisms allowing for more efficient conversion of power; generation of power from solar illumination; from hydrogen conversion in fuel cells; storage of energy in improved battery technologies; augmentation of liquid fuels for greater energy density and exploitation of biological mechanisms for long-duration energy sources.	Increase Warfighter Capability	Storage, Power Controls and Distribution	1319	02	0602123N	1,636	8,188
NAVY	Battery Development and Safety Enterprise	Battery Hazard Reduction	This project area will reduce the hazard of fielded batteries. Allowing more battery based systems to be deployed more quickly will provide gains in fielding green energy sources and increasing combat capabilities.	Enhance Mission Effectiveness	Storage, Power Controls and Distribution	1319	04	0603724N	3,920	15,483

ORG	OE Program Title	OE Initiative Title	OE Project Description	OE Strategy Objectives	OE Activity Classification	Treasury Code	BA Code	Program Element	FY2023 ($K)	FYDP ($K)
NAVY	Aircraft Energy	Integrated Thermal and Power Management Modelling	Development and validation of Integrated Power and thermal management models to develop integrated solutions in legacy and emerging platforms	Increase Warfighter Capability	Platform Thermal Management	1319	04	0603724N	1,900	7,610
NAVY	Undersea Warfare Applied Research	Naval Power Undersea Weaponry (USW)	Applied research to develop component, subsystem and system technologies that are the critical building blocks for advanced high-energy-density and power-density propulsion systems, enabling increased endurance (days/weeks/months) and reliability in an air-independent environment. Approaches include modeling and simulation, fuel cells, engines, novel fuels/oxidizers and reactant storage/delivery systems.	Increase Warfighter Capability	Propulsion Upgrades_Sea	1319	02	0602747N	1,212	1,212
NAVY	Battery Development and Safety Enterprise	Battery Safety Certification	This project area will accomplish improvements in the battery safety certification process increasing the rapid safe deployment of advanced battery systems to the DoN. Allowing more battery based systems to be deployed more quickly will provide gains in fielding green sources and increasing combat capabilities.	Enhance Mission Effectiveness	Storage, Power Controls and Distribution	1319	04	0603724N	2,940	12,742
NAVY	Aircraft Energy	Common Affordable Safe Energy Storage	Optimize aircraft battery performance, safety and cost through development of a common, scalable Li ion battery	Increase Warfighter Capability	Platform Upgrades_Air	1319	04	0603724N	2,116	5,820
NAVY	Mobility Fuels	Deployed Sensor Development and Validation	Develop and validate technology to reduce time and resources necessary to provide fuel quality surveillance in forward deployed environments	Reduce Logistics Risks to Mission	Metering and Monitoring	1319	04	0603724N	1,120	4,648
NAVY	Defense Research Sciences	Naval Platform Operational Endurance & Climate Resiliency Science	Advancing research in novel materials and processes to reduce fossil fuel use and decrease emissions. Developing design tools to: - explicitly target climate resilience to increase awareness of carbon footprint, or GHG emissions from platforms, fleets, etc. - provide the capacity for predicting emissions from platforms, including unmanned platforms for power architecture design, performance, and performance prediction (to include emissions).	Increase Warfighter Capability	Platform Upgrades_Sea	1319	01	0601153N	999	4,571
NAVY	Battery Development and Safety Enterprise	Battery Technology Development	This project area will accomplish development, laboratory and Fleet testing to determine overall mission and cost effectiveness of improved storage technologies allowing for the transition to green energy and power sources.	Enhance Mission Effectiveness	Storage, Power Controls and Distribution	1319	04	0603724N	1,960	4,245
NAVY	Mobility Fuels	Interoperability with Commercial and Allied forces	Conduct RDTE necessary to assure that Naval tactical forces (air, sea and ground) can operate seamlessly using allied and/or commercially procured fuels	Enhance Mission Effectiveness	Alternative Fuels Certification and Testing	1319	04	0603724N	950	4,810

ORG	OE Program Title	OE Initiative Title	OE Project Description	OE Strategy Objectives	OE Activity Classification	Treasury Code	BA Code	Program Element	FY2023 ($K)	FYDP ($K)
NAVY	Defense Research Sciences	NRL - Energy	Long term Basic and Applied research into phenomena and mechanisms allowing for more efficient conversion of power; generation of power from solar illumination; from hydrogen conversion in fuel cells; storage of energy in improved battery technologies; augmentation of liquid fuels for greater energy density and exploitation of biological mechanisms for long-duration energy sources.	Increase Warfighter Capability	Storage, Power Controls and Distribution	1319	01	0601153N	872	4,541
NAVY	LCS In-Service Modernization	Littoral Combat Ship (LCS) Stern Flaps	Complete engineering for stern flap installations on LCS	Increase Warfighter Capability	Platform Upgrades_Sea	1810	01	0204230N	1,270	2,544
NAVY	Energy Conservation	HVAC	This project will be utilized to accomplish prototype development, land and shipboard testing to determine cost effectiveness of improvements aimed at more efficient climate control of shipboard spaces.	Increase Warfighter Capability	Platform Upgrades_Sea	1319	04	0603724N	1,007	2,817
NAVY	ICAS/eRM	Condition Assessment System	Supports Installation and Procurement of ICAS (Integrated Condition Assessment System) and eRM (Enterprise Remote Monitoring). These systems enables remote monitoring and real time health assessments of shipboard equipment.	Enhance Mission Effectiveness	Platform Upgrades_Sea	1810	01	0204228N	827	4,286
NAVY	Energy Conservation	Hull Husbandry	This project is utilized to identify and evaluate new underwater hull coating systems and underwater hull cleaning and maintenance techniques to reduce hydrodynamic drag on the hull and thereby increase fuel efficiency.	Increase Warfighter Capability	Platform Upgrades_Sea	1319	04	0603724N	849	2,041
NAVY	Undersea Warfare Applied Research	NRL - Energy	Long term Basic and Applied research into phenomena and mechanisms allowing for more efficient conversion of power; generation of power from solar illumination; from hydrogen conversion in fuel cells; storage of energy in improved battery technologies; augmentation of liquid fuels for greater energy density and exploitation of biological mechanisms for long-duration energy sources.	Increase Warfighter Capability	Alternative Power Sources	1319	02	0602747N	743	3,864
NAVY	Energy Conservation	Electrical Systems	This project area is utilized to identify and perform land based and shipboard testing of ship electrical system improvements to reduce energy consumption.	Increase Warfighter Capability	Platform Upgrades_Sea	1319	04	0603724N	676	4,082
NAVY	Warfighter Sustainment Applied Research	Biocentric Technology (Energy)	Program focuses on microbes that produce electricity from organic matter found in sediment or wastewater, and is targeting two distinct naval applications: (1) Powering of undersea devices and sensors for environmental monitoring, and (2) shipboard/submarine wastewater degradation	Reduce Logistics Risks to Mission	Alternative Power Sources	1319	02	0602236N	720	2,795

ORG	OE Program Title	OE Initiative Title	OE Project Description	OE Strategy Objectives	OE Activity Classification	Treasury Code	BA Code	Program Element	FY2023 ($K)	FYDP ($K)
NAVY	Energy Conservation	Hull Hydrodynamics	This project area accomplishes development, modeling, laboratory and Fleet testing of ship modifications to propellers such as fouling release coatings and/or hull appendages to determine overall mission and cost effectiveness of these improvements.	Increase Warfighter Capability	Platform Upgrades_Sea	1319	04	0603724N	587	4,621
NAVY	FORCE PROTECTION APPLIED RESEARCH	NRL - Energy	Long term Basic and Applied research into phenomena and mechanisms allowing for more efficient conversion of power; generation of power from solar illumination; from hydrogen conversion in fuel cells; storage of energy in improved battery technologies; augmentation of liquid fuels for greater energy density and exploitation of biological mechanisms for long-duration energy sources.	Increase Warfighter Capability	Alternative Power Sources	1319	02	0602123N	461	2,401
NAVY	Defense Research Sciences	Bioengineering and Life Sciences (Energy)	Basic research exploring the fundamental mechanism of bacterial spores' water-responsive behaviors in order to develop practical applications using the evaporation energy harvesting technique, and next generation actuators.	Increase Warfighter Capability	Alternative Power Sources	1319	01	0601153N	600	2,676
NAVY	Battery Development and Safety Enterprise	Battery Commonality	This project area will accomplish development of battery commonality efforts. Battery commonality will save DoN money and time when fielding advanced weapon systems	Enhance Mission Effectiveness	Storage, Power Controls and Distribution	1319	04	0603724N	1,035	4,301
NAVY	Defense Research Sciences	Naval Biosciences - Microbial Fuel Cells	Microbial fuel cells (MFC) provide electricity harvested from specialized natural bacteria that use non-hazardous organic compounds as fuel, and then provide electrical current to an electrode. Can be used to sustainably power seafloor sensors/systems in place of batteries. Program focuses on study of fundamental mechanisms used for extracellular electron transport.	Increase Warfighter Capability	Alternative Power Sources	1319	01	0601153N	450	1,453
NAVY	Energy Conservation	Thermal Management	This project will be utilized to identify and evaluate potential uses for Thermal Management techniques designed to reduce or dissipate overall shipboard heat generation and reduce the shipboard electrical demand on HVAC systems.	Increase Warfighter Capability	Platform Thermal Management	1319	04	0603724N	437	2,872
NAVY	Aircraft Energy	Advanced Fuel Cells for UAS Applications	Design, build, and test a drop-in ready hydrogen fuel cell power and propulsion (P&P) system for the VTOL Stalker to demonstrate improved operational performance.	Increase Warfighter Capability	Platform Upgrades_Air	1319	04	0603724N	300	425
NAVY	Defense Research Sciences	Bioengineering and Life Sciences (Energy)	Basic research exploring biofabrication for generation of inorganic energy harvesting/conversion materials; bacterial-inorganic hybrid materials for fuel cells; nano-	Increase Warfighter Capability	Materials and Design	1319	01	0601153N	477	1,677

ORG	OE Program Title	OE Initiative Title	OE Project Description	OE Strategy Objectives	OE Activity Classification	Treasury Code	BA Code	Program Element	FY2023 ($K)	FYDP ($K)
			biomaterials for generating high intensity light sources; silk composites for energy harvesting and energy sources; and novel humidity responsive materials for harnessing energy for natural evaporation.							
NAVY	Battery Development and Safety Enterprise	Battery Standards	This project area will develop clear battery, battery system, and containment oriented standards and requirements. Allowing more advanced battery systems to be deployed more quickly will provide gains in fielding greener energy sources and increasing combat capabilities.	Enhance Mission Effectiveness	Storage, Power Controls and Distribution	1319	04	0603724N	783	2,285
NAVY	Aircraft Energy	P-8 Finlets	Optimize design, installation and demonstrate of drag reducing finlets on P-8 test aircraft	Increase Warfighter Capability	Platform Upgrades_Air	1319	04	0603724N	70	130
NAVY	Aircraft Energy	High Efficiency Generator	Evaluate and demonstrate alternative aircraft power generation/conversion technologies to provide more efficient power generation to meet legacy platform power deficiencies	Increase Warfighter Capability	Platform Upgrades_Air	1319	04	0603724N	1,300	1,784
NAVY	Aircraft Energy	Opportunity Studies	Provide seed funding to investigate potential aircraft Operational Energy solutions (Power and Thermal) and identify potential candidates to select for detailed projects.*	Increase Warfighter Capability	M&S, Studies, and Wargames	1319	04	0603724N	650	12,358
NAVY	Energy Conservation	Propulsion Systems	This project is utilized to identify requirements and perform land based and shipboard testing of ship propulsion system improvements on Gas Turbine, Steam, and Diesel Engine systems to reduce overall fuel consumption and lower maintenance costs.	Increase Warfighter Capability	Propulsion Upgrades_Sea	1319	04	0603724N	237	2,454
NAVY	Energy Conservation	Auxiliary Systems	This project area is utilized to identify, test and evaluate new technologies for shipboard auxiliary systems aimed at reducing fuel consumption.	Increase Warfighter Capability	Platform Upgrades_Sea	1319	04	0603724N	487	1,929
NAVY	Defense Research Sciences	ONRG International Research	Basic research with international principle investigators doing collaborative and cooperative research with the Naval research enterprise.	Increase Warfighter Capability	Alternative Power Sources	1319	01	0601153N	198	917
NAVY	Warfighter Sustainment Applied Research	ONRG International Research	Early applied research with international principle investigators doing collaborative and cooperative research with the Naval research enterprise.	Increase Warfighter Capability	Alternative Power Sources	1319	02	0602236N	149	760
NAVY	Aircraft Energy	Variable Vapor Cycle System	Design, build and demonstrate variable vapor cycle system that provides continuous cold liquid flow and heat rejection at a higher temperatures for greater thermal control on future aircraft applications.	Increase Warfighter Capability	Platform Upgrades_Air	1319	04	0603724N	55	55
NAVY	Aircraft Energy	Aerial Refueling Drogue Stabilization	Develop, design and demonstrate Aerial Refueling Drogue Stabilization technology to reduce refueling drogue captures. Benefit is	Increase Warfighter Capability	Mobile Fuel Assets	1319	04	0603724N	6,000	18,500

ORG	OE Program Title	OE Initiative Title	OE Project Description	OE Strategy Objectives	OE Activity Classification	Treasury Code	BA Code	Program Element	FY2023 ($K)	FYDP ($K)
			reducing fuel used by fleet during refueling operations that can be used for mission prosecution.							
NAVY	Aircraft Energy	On-Board Thermal Management	Demonstrate deoxygenation technology to increase fuel heat sink capability in order to maximize aircraft thermal management and increase engine efficiency	Increase Warfighter Capability	Platform Thermal Management	1319	04	0603724N	55	7,080
NAVY	Aircraft Energy	Operational Modeling and Simulation	Leverage modeling, simulation and data sources to develop assessments and tools to support operational capability assessments	Increase Warfighter Capability	M&S, Studies, and Wargames	1319	04	0603724N	120	2,100
NAVY	Aircraft Energy	Splittered Rotor Compressor	Development and validation of advance compressor design to increase efficiency and reduce weight.	Increase Warfighter Capability	Propulsion Upgrades_Air	1319	04	0603724N	50	50
NAVY	Advance Surface Machinery Sys	Integrated Power Systems (IPS)	Funds land based test site for the integrated power and energy system for DDG(X) (PDM II)	Increase Warfighter Capability	Storage, Power Controls and Distribution	1319	04	0603573N	94,800	308,400
NAVY	Energy Conservation	Power Generation and Storage - PA6B Electronic Fuel Injection	Funds added by PDM II - Climate: This specific project is to complete an Electronic Fuel Injection Upgrade for the Fairbanks Morse (FM) PA6B Diesel Engine. Upgrading the fuel delivery system to electronic fuel injection will improve fuel efficiency of the engine, reduces emissions and visible smoke, and reduce maintenance man hours and costs.	Increase Warfighter Capability	Storage, Power Controls and Distribution	1319	04	0603724N	2,590	2,590
NAVY	Energy Conservation	Propulsion Systems - LM2500 Variable Stator Vane Optimization	Funds added by PDM II - Climate: This specific project aims to test and analyze the fuel consumption impacts of varying the stator vane angles on the LM2500 Marine Gas Turbine. The SFC benefit at multiple part power steady state conditions will be documented along with any risks or issues to equipment reliability.	Increase Warfighter Capability	Propulsion Upgrades_Sea	1319	04	0603724N	4,450	6,950
NAVY	Energy Conservation	Propulsion Systems - LM2500 Compressor Blade Polishing	Funds added by PDM II - Climate: This specific project aims to perform empirical testing of an LM2500 marine gas turbine to define the fuel efficiency benefit of using polished compressor airfoils and tip lengthened compressor blades during the overhaul of these engines.	Increase Warfighter Capability	Propulsion Upgrades_Sea	1319	04	0603724N	300	575
NAVY	Energy Conservation	Energy Monitoring Integration with LOG IT	Integrates energy monitoring tools developed for DDG-51 Class ships into Navy Logistics IT systems.	Increase Warfighter Capability	Metering and Monitoring	1319	04	0603724N	1,787	7,111
NAVY	Air and Missile Defense Radar	Efficient SPY-6 Transmit/Receive Integrated Multichip Modules (TRIMM)s (PDM II)	The SPY-6 TRIMMs are the main DC power consuming devices in the SPY-6 family of radars. They contain the Radio Frequency (RF) components, including the High Power Amplifiers (HPAs) that generate the RF energy for transmit. There are 3,552 TRIMMs per AN/SPY-6(V)1 system. This project would	Increase Warfighter Capability	Platform Upgrades_Sea	1319	05	0604522N	2,000	5,300

ORG	OE Program Title	OE Initiative Title	OE Project Description	OE Strategy Objectives	OE Activity Classification	Treasury Code	BA Code	Program Element	FY2023 ($K)	FYDP ($K)
			replace the HPAs with higher efficiency power amplifiers, reducing the overall DC power consumption on the ship.							
NAVY	SEWIP Block 3	Efficient SEWIP Block 3 Transmit Integrated Multichip Modules (TIMM)s	This project will replace the TIMMs in SEWIP Block 3 with a higher efficiency High Power Amplifier (HPA)s. The would reduce the DC Power required to power SEWIP and reduce ship fuel consumption	Increase Warfighter Capability	Platform Upgrades_Sea	1319	05	0604757N	2,000	5,300
NAVY	Ship Depot Operations Support	Global Energy Information System (GENISYS)	The goal of this funding is to field and sustain GENISYS on the DDG-51 class and LPD-17 class with fleet wide implementation to follow. The GENISYS software suite increases operational reach and endurance through the capture and utilization of shipboard power and energy data. The Electronic Logbook (eLogBook) application replaces engineering, deck and other paper logs with electronic versions. The Shipboard Energy Assessment System (SEAS) application digitizes & aggregates energy and logbook data to inform crew decision-making. The ashore application, Fleet Energy Conservation Dashboard (FECD), supports fleet fuel planning by collecting surface fleet power and energy data from a variety of sources to analyze and display energy production, consumption and efficiency of the fleet, ship class, ship, or ship system.	Enhance Mission Effectiveness	Metering and Monitoring	1804	01	0708020N	2,263	10,525
NAVY	Aircraft Energy	C-130 Finlets	Develop, demonstrate, test and analyze an optimized finlet design to reduce drag on Navy and USMC C-130, and then retrofit to fleet aircraft. Benefits will be lower fuel consumption for a mission or increase in Range or Time on Station metrics.	Increase Warfighter Capability	Platform Upgrades_Air	1319	04	0603724N	4,000	9,000
NAVY	Aircraft Energy	Aircraft Engine Foam Wash	Develop and test nucleated foam wash for Navy turbine engines. This technology will significantly increase cleaning capability resulting in much lower engine temperatures, which results in lower fuel consumption.	Increase Warfighter Capability	Propulsion Upgrades_Air	1319	04	0603724N	1,000	5,000
NAVY	Aircraft Energy	Engine Blade Scanning and Coating development	Develop, and demonstrate blade scanning technology and turbine engine coatings for compressors blades for naval aircraft to increase in compressor efficiency, resulting in lower fuel consumption.	Increase Warfighter Capability	Propulsion Upgrades_Air	1319	04	0603724N	3,000	23,000
NAVY	Aircraft Energy	Fleet Drag and Flight Planning improvements	Fleet Drag - Conduct analysis on drag reduction technologies for large Navy/USMC aircraft, test these technologies for suitability and transition to fleet assets. Drag reduction results in less fuel	Increase Warfighter Capability	Platform Upgrades_Air	1319	04	0603724N	5,000	19,000

ORG	OE Program Title	OE Initiative Title	OE Project Description	OE Strategy Objectives	OE Activity Classification	Treasury Code	BA Code	Program Element	FY2023 ($K)	FYDP ($K)
			used for missions or benefits range and Time on Station metrics. Flight Planning - Develop digital tools to optimize flight planning across DoD to efficiently schedule assets and resources to support the Air Tasking Order.							
NAVY	Lithium Ion Battery Abusive Testing Facility	Battery Testing Facility	Military Construction of battery testing facilities at the warfare centers at Crane and Carderock	Increase Warfighter Capability	Storage, Power Controls and Distribution	1205	01	0816376N		34,000
NAVY	MCON Design Funds	Battery Testing Facility	Design of battery testing facilities at the warfare centers at Crane and Carderock	Increase Warfighter Capability	Storage, Power Controls and Distribution	1205	03	0901211N	1,250	1,250
NAVY	Base Operating Support	Battery Testing Facility	Planning for battery testing facilities construction at the warfare centers at Crane and Carderock	Increase Warfighter Capability	Storage, Power Controls and Distribution	1804	01	0206079N	750	750
								Navy Total	**592,952**	**2,239,441**

ORG	OE Program Title	OE Initiative Title	OE Project Description	OE Strategy Objectives	OE Activity Classification	Treasury Code	BA Code	Program Element	FY2023 ($K)	FYDP ($K)
USMC	Mobile Power Equipment	Advance Mobile Medium Power Sources	The Family of Mobile Power Equipment is a family-of-systems to continuously procure, update, and replenish approximately 19,000 items of Mobile Tactical Power Generation & Distribution Equipment to include the AMMPS system, and 22 different TAMCNs. The Family of Mobile Electric Power Equipment consists of skid & trailer mounted tactical generators ranging from 2 to 200 kilowatts, Mobile Electric Power Distribution Systems, Floodlight Sets, Load Banks & Electricians Tool Kits. This equipment is procured & fielded to provide electricity on the battlefield. Combat, combat support & combat service support units all require tactical power to operate weapons systems, C4I systems, medical & messing facilities, environmental control equipment, & water purification systems.	Enhance Mission Effectiveness	Contingency Basing	1106	01	0206624M	858	4,284
USMC	Mobile Power Equipment	Advance Mobile Medium Power Sources	The Family of Mobile Power Equipment is a family-of-systems to continuously procure, update, and replenish approximately 19,000 items of Mobile Tactical Power Generation & Distribution Equipment to include the AMMPS system, and 22 different TAMCNs. The Family of Mobile Electric Power Equipment consists of skid & trailer mounted tactical generators ranging from 2 to 200 kilowatts, Mobile Electric Power	Enhance Mission Effectiveness	Contingency Basing	1109	06	0206211M	321	87,897

ORG	OE Program Title	OE Initiative Title	OE Project Description	OE Strategy Objectives	OE Activity Classification	Treasury Code	BA Code	Program Element	FY2023 ($K)	FYDP ($K)
			Distribution Systems, Floodlight Sets, Load Banks & Electricians Tool Kits. This equipment is procured & fielded to provide electricity on the battlefield. Combat, combat support & combat service support units all require tactical power to operate weapons systems, C4I systems, medical & messing facilities, environmental control equipment, & water purification systems.							
USMC	Mobile Power Equipment	Advance Mobile Medium Power Sources	The Family of Mobile Power Equipment is a family-of-systems to continuously procure, update, and replenish approximately 19,000 items of Mobile Tactical Power Generation & Distribution Equipment to include the AMMPS system, and 22 different TAMCNs. The Family of Mobile Electric Power Equipment consists of skid & trailer mounted tactical generators ranging from 2 to 200 kilowatts, Mobile Electric Power Distribution Systems, Floodlight Sets, Load Banks & Electricians Tool Kits. This equipment is procured & fielded to provide electricity on the battlefield. Combat, combat support & combat service support units all require tactical power to operate weapons systems, C4I systems, medical & messing facilities, environmental control equipment, & water purification systems.	Enhance Mission Effectiveness	Contingency Basing	1109	06	0502511M	1,894	9,473
USMC	Mobile Power Equipment	Advance Mobile Medium Power Sources	The Family of Mobile Power Equipment is a family-of-systems to continuously procure, update, and replenish approximately 19,000 items of Mobile Tactical Power Generation & Distribution Equipment to include the AMMPS system, and 22 different TAMCNs. The Family of Mobile Electric Power Equipment consists of skid & trailer mounted tactical generators ranging from 2 to 200 kilowatts, Mobile Electric Power Distribution Systems, Floodlight Sets, Load Banks & Electricians Tool Kits. This equipment is procured & fielded to provide electricity on the battlefield. Combat, combat support & combat service support units all require tactical power to operate weapons systems, C4I systems, medical & messing facilities, environmental control equipment, & water purification systems.	Enhance Mission Effectiveness	Contingency Basing	1109	06	0502514M	2,884	14,423
USMC	Mobile Power Equipment	Advance Mobile Medium Power Sources	The Family of Mobile Power Equipment is a family-of-systems to continuously procure, update, and replenish approximately 19,000 items of Mobile Tactical Power Generation & Distribution Equipment to include the AMMPS	Enhance Mission Effectiveness	Contingency Basing	1319	07	0206624M	4,662	16,353

ORG	OE Program Title	OE Initiative Title	OE Project Description	OE Strategy Objectives	OE Activity Classification	Treasury Code	BA Code	Program Element	FY2023 ($K)	FYDP ($K)
			system, and 22 different TAMCNs. The Family of Mobile Electric Power Equipment consists of skid & trailer mounted tactical generators ranging from 2 to 200 kilowatts, Mobile Electric Power Distribution Systems, Floodlight Sets, Load Banks & Electricians Tool Kits. This equipment is procured & fielded to provide electricity on the battlefield. Combat, combat support & combat service support units all require tactical power to operate weapons systems, C4I systems, medical & messing facilities, environmental control equipment, & water purification systems.							
USMC	Family of Expeditionary Fuel Systems	Low Profile Fuel Distribution	Development of an Autonomous littoral focused fuel distribution system to enable distributed operations and persistence of the Marine Littoral Regiment	Increase Warfighter Capability	Contingency Basing	1109	06	0206315M	-	6,921
USMC	Medium Tactical Vehicle Replacement (MTVR)	Fuel Efficient MTVR FNC Transition	Through analysis, modeling and simulation, hardware development, integration, test, and evaluation, the Fuel Efficient Medium Tactical Vehicle Replacement (MTVR) FNC program will select, bench test, and integrate a suite of affordable fuel efficiency enablers.	Increase Warfighter Capability	Platform Upgrades_Land	1109	05	0206315M	6,933	34,666
USMC	Expeditionary Energy Office	Expeditionary Energy Office	E2O is currently focused on analyzing and developing Operational Energy solutions to support distributed operations, Expeditionary Advanced Base Operations, and the Marine Littoral Regiments. This is done through modelling and simulation and the Small Unit Power initiative.	Increase Warfighter Capability	Individual/Warfighter Power	1319	07	0206313M	2,734	12,129
USMC	MCWL/Futures Directorate	Hybrid Electric ITV Trailer (HEIT)	Combining proven technologies in a novel way, program seeks to provide an ITV-towable, V-22/CH-53/C130 transportable, Mobile Hybrid Power source that can use multiple fuel types to provide quiet sustained power.	Increase Warfighter Capability	Contingency Basing	1319	03	0603640M	733	3,975
USMC	Applied Research	Marine Corps Operational Energy: Energy Efficiency and Demand Reduction	Applied Research to increase energy efficiency in weapons systems, platforms, vehicles and equipment and extend tactical range/operational reach.	Increase Warfighter Capability	Individual/Warfighter Power	1319	02	0602131M	1,966	9,829
USMC	Advanced Technology Demo	Marine Corps Operational Energy: Energy Optimization and Logistic Burden Reduction	Advanced Technology Demonstration research to optimize energy usage and/or meet operational energy demand with renewable energy sources and reduce excess capacity or reduce logistic footprint/burden energy sources.	Increase Warfighter Capability	Individual/Warfighter Power	1319	03	0603640M	5,339	30,382
USMC	Family of Expeditionary Fuel Systems	Low Profile Fuel Distribution	Development of an Autonomous littoral focused fuel distribution system to enable distributed operations and persistence of the Marine Littoral Regiment	Increase Warfighter Capability	Contingency Basing	1319	07	0206623M	-	16,680

ORG	OE Program Title	OE Initiative Title	OE Project Description	OE Strategy Objectives	OE Activity Classification	Treasury Code	BA Code	Program Element	FY2023 ($K)	FYDP ($K)
USMC	Family of Shelters and Shelter Equipment	Shelters, Shelter Liners, Lighting upgrades	R&D for future shelter systems and USMC lighting solution of the future.	Increase Warfighter Capability	Contingency Basing	1319	07	0206623M	171	829
USMC	Medium Tactical Vehicle Replacement (MTVR)	Fuel Efficient MTVR FNC Transition	Through analysis, modeling and simulation, hardware development, integration, test, and evaluation, the Fuel Efficient Medium Tactical Vehicle Replacement (MTVR) FNC program will select, bench test, and integrate a suite of affordable fuel efficiency enablers.	Increase Warfighter Capability	Platform Upgrades_Land	1106	01	0702808M	189	945
USMC	Medium Tactical Vehicle Replacement (MTVR)	Fuel Efficient MTVR FNC Transition	Through analysis, modeling and simulation, hardware development, integration, test, and evaluation, the Fuel Efficient Medium Tactical Vehicle Replacement (MTVR) FNC program will select, bench test, and integrate a suite of affordable fuel efficiency enablers.	Increase Warfighter Capability	Platform Upgrades_Land	1319	07	0206624M	36	181
								USMC Total	**28,270**	**248,967**