Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Navy											Date: May 2021	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603724N *I Navy Energy Program*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	469.447	55.750	56.389	33.824	-	33.824	-	-	-	-	-	-
0829: *ENERGY CONSERVATION (ADV)*	91.581	5.388	5.785	9.764	-	9.764	-	-	-	-	-	-
0838: *Mobility Fuels (ADV)*	107.383	8.001	7.463	9.232	-	9.232	-	-	-	-	-	-
0928: *Shore Energy Technology*	55.664	1.571	1.872	1.917	-	1.917	-	-	-	-	-	-
0996: *Aircraft Energy Conservation*	159.163	10.390	8.269	6.998	-	6.998	-	-	-	-	-	-
2566: *Battery Development and Safety*	0.000	0.000	0.000	5.913	-	5.913	-	-	-	-	-	-
9999: *Congressional Adds*	55.656	30.400	33.000	0.000	-	0.000	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

This program supports projects to evaluate, adapt, and demonstrate energy related technologies for Navy aircraft and ship operations to: (a) increase fuel-related weapons systems capabilities such as range and time on station; (b) reduce energy costs; (c) apply energy technologies that improve environmental compliance; (d) examine restrictive fuel specification requirements to reduce cost and increase availability worldwide; (e) provide guidance to fleet operators for the safe use of commercial grade or off-specification fuels; and (f) make needed periodic changes to fuel specifications to ensure fuel quality and avoid fleet operating problems. This program supports the achievement of legislated, White House, Department of Defense, and Navy energy management goals.

JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under ADVANCED COMPONENT DEVELOPMENT AND PROTOTYPES because it includes all efforts necessary to evaluate integrated technologies, representative models or prototype systems in a high fidelity and realistic operating environment.

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Navy	Date: May 2021
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603724N *I Navy Energy Program*

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	58.014	23.422	29.646	-	29.646
Current President's Budget	55.750	56.389	33.824	-	33.824
Total Adjustments	-2.264	32.967	4.178	-	4.178
• Congressional General Reductions	-	-0.033			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	33.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.243	0.000			
• SBIR/STTR Transfer	-2.021	0.000			
• Program Adjustments	0.000	0.000	5.106	-	5.106
• Rate/Misc Adjustments	0.000	0.000	-0.928	-	-0.928

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2020	FY 2021
Project: 9999: *Congressional Adds*		
Congressional Add: *Program Increase*	14.471	15.000
Congressional Add: *Natural Gas Technologies*	0.000	7.500
Congressional Add: *Marine energy systems for sensors and microgrids*	11.102	0.000
Congressional Add: *Navy energy program/shore energy*	4.827	0.000
Congressional Add: *Marine Energy Converters for Sensors and Microgrids*	0.000	10.500
Congressional Add Subtotals for Project: 9999	30.400	33.000
Congressional Add Totals for all Projects	30.400	33.000

Change Summary Explanation

Funding: The FY 2022 funding request was due to the following: Increased by $2.0 million to fund Alternative Fuel Qualifications; Biofuel Qualification Study, LOE 3 Operational Energy Alternative 2; increased by $3.4M for additional tasking of critical energy projects in various functional areas including Power Generation & Storage, Hull Hydro, Underwater Hull Husbandry and Electrical; reduced by $0.928 million to account for support and Navy Working Capital rate adjustments; and reduced by $0.294 million to account for the availability of prior year execution balances.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy											Date: May 2021	
Appropriation/Budget Activity 1319 / 4					R-1 Program Element (Number/Name) PE 0603724N / *Navy Energy Program*				Project (Number/Name) 0829 / *ENERGY CONSERVATION (ADV)*			
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
0829: *ENERGY CONSERVATION (ADV)*	91.581	5.388	5.785	9.764	-	9.764	-	-	-	-	-	-
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Energy Conservation Advanced Project is designed to enhance lethality, resilience, reach, and sustainment of warfare systems through more effective generation, use and distribution of energy on existing and future surface fleet assets, including Unmanned Surface Vessels (USVs), and by developing and transitioning energy and maintenance improvements. This project, managed through NAVSEA 05T, will identify mature, promising energy related technologies through involvement with Fleet representatives, Life-Cycle Managers (LCMs), NAVSEA Technical Warrant Holders, In-Service Engineering Agents (ISEAs), PEOs, Top Management Attention/Top Management Interest (TMA/TMI), Industry, and Academia. The project directly supports Department of Navy goals for agility, resilient force posture, and innovation by maximizing energy to increase operational capability (e.g., extend range, increase time on station, enable high power combat systems). Potential technology areas include Power Generation and Storage (PG&S), Hull Hydrodynamics (HH), Underwater Hull Husbandry (UHH), Heating, Ventilation & Air Conditioning (HVAC) Systems, Thermal Management (TM), Main Propulsion Systems (MP), Electrical Systems (EL), Auxiliary Systems (AUX) and Energy Monitoring, Planning, and Assessment (EMP&A). Promising energy related proposals that improve the effective use, conversion, storage, distribution, and control of energy to enable the integration with future weapons and sensors onto platforms are developed each FY for evaluation. Projects are selected based on technical review and business case analysis. Not all proposals are pursued and funding changes between functional categories or fiscal years may occur based on fleet needs, technology maturity level, ship schedule changes, or other factors.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**
Title: Power Generation and Storage Sub Project	0.000	0.300	2.402	0.000	2.402
Articles:	-	-	-	-	-
Description: Power Generation & Storage System Sub Project - This project area will accomplish prototype development, laboratory and Fleet testing to determine overall effectiveness of technologies focused on improving efficiency of current power generation & storage methodologies.					
FY 2021 Plans: Perform research and development activities on promising power generation and energy storage technologies to support future sensors and weapons. Future systems like SEWIP Block III, Navy Laser programs, and other directed energy applications have unique and challenging power and energy requirements. This sub-project invests in novel approaches to generate, store, and manage energy to support future systems on current and future ship classes.					
FY 2022 Base Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0829 / *ENERGY CONSERVATION (ADV)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
FY22 funding will support DDG-51 Propulsion Derived Weapons Power (PDWP) Generation Demonstration and prototyping a 1500VA Uninterruptable Power Supply (UPS). The PDWP project examines Hybrid Electric Drive (HED) technology as a potential to enable back fit of Directed Energy on DDG-51 Flt IIA. This system could function as a HED for fuel savings in peacetime and alternatively push power to weapons grade lasers during combat operations. This effort will include collaborating with HED vendor, modifying HED drives and motor to serve as power generation source to provide augmentation of power for directed energy, and demonstrating the capability at a land based test facility. With FY22 funding, prototyping, testing and installation shipboard of the 1500VA Uninterruptable Power Supply (UPS) will begin. The focus is on improved 1500VA UPS Operation using safer LI-ion Batteries. Upon satisfactory testing, the UPS will be integrated into a ship for a long-term at-sea trial. In addition, continue to identify other promising Power Generation & Storage and Energy Storage technologies to support future sensors and weapons. ***FY 2022 OCO Plans:*** N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** FY22 increase of $2.102M supports PDWP demonstration and prototyping. The remaining increase of $0.152M is the combined result of a $4.143M increase in Budget Control and a $1.378M reduction in the EMP&A Functional Area due to Global Energy Information System (GENISYS) development efforts approaching maturity and leading to IOC. The reduced funding in EMP&A allows the program to adjust resources to the research and development of promising technologies in other Functional Areas in order to align with the Navy's priorities and requirements.					
Title: Underwater Hull Husbandry Sub Project ***Articles:*** ***Description:*** Hull Husbandry Sub Project - Project funds will be utilized to identify and evaluate new underwater hull/propeller coating systems and underwater hull cleaning and maintenance techniques to reduce hydrodynamic drag on the hull and thereby increase fuel efficiency. ***FY 2021 Plans:*** N/A ***FY 2022 Base Plans:***	0.000 -	0.000 -	0.783 -	0.000 -	0.783 -

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0829 / *ENERGY CONSERVATION (ADV)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
The project will complete earlier efforts to develop a Decision-making Tool for Management of Biofouling on Ship Hulls aimed at evaluating or estimating the effects of hull biofouling on ship powering condition and fuel use. This desk-top tool will employ simple computational approaches combined with ship operational data. Efforts include completing a Computational Fluid Dynamics (CFD) analysis, generating speed / resistance data for validation of calculations and incorporating those data into a Decision-making tool framework to assess hull roughness. In addition, continue to identify other energy saving/capability improvement technologies in Underwater Hull Husbandry and prepare proposals and business case analyses for promising technologies with potential to gain fuel economies and increase capability through increased time on station. ***FY 2022 OCO Plans:*** N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** FY22 increase of $0.783M is the combined result of a $4.143M increase in Budget Control and a $1.378M reduction in the EMP&A Functional Area due to Global Energy Information System (GENISYS) development efforts approaching maturity and leading to IOC. The reduced funding in EMP&A allows the program to adjust resources to the research and development of promising technologies in other Functional Areas in order to align with the Navy's priorities and requirements.					
Title: Hull Hydrodynamic Sub Project ***Articles:*** ***Description:*** Hull Hydrodynamic Sub Project - This project area will accomplish prototype development, modeling, laboratory and Fleet testing of ship modifications to propellers and/or hull appendages to determine overall mission, energy, and cost effectiveness of these improvements. ***FY 2021 Plans:*** Conduct assessments and mature hardware designs for hull hydrodynamic projects including "stern flaps." Perform stern flap integration studies on Fleet assets, which may include retrofit hardware for LCS-3 (and subsequent) or new construction designs for FFG(X). Overall project efforts include data analysis review, model development/update, finite element analysis, structural design, design development and selection of ship, development of Ship Change Document, ship construction drawings, insertion of stern flap installation into	0.000 -	0.735 -	1.274 -	0.000 -	1.274 -

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0829 / *ENERGY CONSERVATION (ADV)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Availability Plan and ship installation/test. FY21 efforts will focus on structural design and finite element analysis and identifying additional energy saving/capability improvement technologies in Hull Hydrodynamics. ***FY 2022 Base Plans:*** Transition LCS 3 stern flap design efforts begun in FY21 for LCS 3 to PMS505 by supporting the structural design, finite element analysis, and development Ship Change Document as needed. Institutionalize stern flap and bow bulb efforts by developing design guidance for future ship classes. In addition, continue to identify other energy saving/capability improvement technologies in Hull Hydrodynamics and prepare proposals and business case analyses for promising technologies with potential to gain fuel economies and increase capability through increased time on station. ***FY 2022 OCO Plans:*** N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** FY22 increase of $0.539M is the combined result of a $4.143M increase in Budget Control and a $1.378M reduction in the EMP&A Functional Area due to Global Energy Information System (GENISYS) development efforts approaching maturity and leading to IOC. The reduced funding in EMP&A allows the program to adjust resources to the research and development of promising technologies in other Functional Areas in order to align with the Navy's priorities and requirements.					
Title: Heating, Ventilation and Air Conditioning (HVAC) Sub Project ***Articles:*** ***Description:*** HVAC Sub Project - Project funds will be utilized to accomplish prototype development, land and shipboard testing of improvements aimed at more efficient climate control of shipboard spaces. ***FY 2021 Plans:*** N/A ***FY 2022 Base Plans:*** Tasking in this research and development effort investigate the topology and associated components of installed shipboard Fan Coil Assemblies (FCA) in order to optimize the airflow path for energy improvement. Although the primary focus will be energy savings, noise and acquisition cost reduction will be secondary goals. Efforts will be conducted using a three-pronged approach incorporating modeling, experimental measurement, and flow visualization techniques to demonstrate that a dramatic energy improvement and qualitative noise reduction	0.000 -	0.000 -	0.471 -	0.000 -	0.471 -

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0829 / *ENERGY CONSERVATION (ADV)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
are possible for the FCA family. A report will document the study results, and recommended Technical Data Package for the modified design, will be generated. In addition, continue to identify other energy saving/capability improvement technologies in HVAC and prepare proposals and business case analyses for promising technologies with potential to reduce fuel demand and/or enable future combat system advancements. ***FY 2022 OCO Plans:*** N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase of $0.471M in HVAC is the combined result of a $4.143M increase in Budget Control and a $1.378M reduction in the EMP&A Functional Area due to Global Energy Information System (GENISYS) development efforts approaching maturity and leading to IOC. The reduced funding in EMP&A allows the program to adjust resources to the research and development of promising technologies in other Functional Areas in order to align with the Navy's priorities and requirements.					
Title: Thermal Management Sub Project ***Articles:*** ***Description:*** Thermal Management Sub Project - Project funds will be utilized to identify and evaluate potential uses for Thermal Management techniques designed to reduce overall shipboard heat generation as well as incorporating waste heat recovery techniques to reduce the shipboard electrical demand on HVAC and other systems. ***FY 2021 Plans:*** N/A ***FY 2022 Base Plans:*** This project includes development of a shipboard thermal management modeling tool. Many new weapons are under development that could improve the ability of a ship to defend itself but require significant electrical power and cooling. Being able to cost effectively integrate these new high-energy systems on existing and new US Navy platforms is of primary importance for the US to maintain superiority at sea. Being capable of determining actual cooling and electrical power margins is of primary importance. The output of this effort will be a documented, working model enabling ship designers to assess the impact of future cooling system growth on the total ship thermal management system.	0.000 -	0.000 -	0.296 -	0.000 -	0.296 -

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0829 / *ENERGY CONSERVATION (ADV)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
In addition, continue to identify additional energy saving/capability improvement technologies in Thermal Management that may be applicable to Navy ships and prepare proposals and business case analyses for promising technologies with potential to reduce fuel demand and/or enable future combat system advancements. ***FY 2022 OCO Plans:*** N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** FY22 increase of $0.296M is the combined result of a $4.143M increase in Budget Control and a $1.378M reduction in the EMP&A Functional Area due to Global Energy Information System (GENISYS) development efforts approaching maturity and leading to IOC. The reduced funding in EMP&A allows the program to adjust resources to the research and development of promising technologies in other Functional Areas in order to align with the Navy's priorities and requirements.					
Title: Main Propulsion Systems Sub Project	0.000	0.000	0.220	0.000	0.220
Articles:	-	-	-	-	-
Description: Propulsion Systems Sub Project - Project funds will be utilized to identify requirements and perform land based and at sea testing of surface ship and Unmanned Surface Vessel (USV) propulsion system improvements on Gas Turbine, Steam, and Diesel Engine systems to reduce overall fuel consumption and lower maintenance costs. ***FY 2021 Plans:*** N/A ***FY 2022 Base Plans:*** Continue to identify other energy saving/capability improvement technologies in Propulsion Systems and prepare proposals and business case analyses for promising technologies with potential to reduce fuel demand. ***FY 2022 OCO Plans:*** N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** FY22 increase of $0.220M is the combined result of a $4.143M increase in Budget Control and a $1.378M reduction in the EMP&A Functional Area due to Global Energy Information System (GENISYS) development efforts approaching maturity and leading to IOC. The reduced funding in EMP&A allows the program to adjust					

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0829 / *ENERGY CONSERVATION (ADV)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
resources to the research and development of promising technologies in other Functional Areas in order to align with the Navy's priorities and requirements.					
Title: Electrical Systems Sub Project ***Articles:***	0.000 -	0.000 -	0.725 -	0.000 -	0.725 -
Description: Electrical Systems Sub Project - Project funds will be utilized to identify and perform land based and shipboard testing of ship electrical system improvements to optimize power and energy use. ***FY 2021 Plans:*** N/A ***FY 2022 Base Plans:*** Future systems like Surface Electronic Warfare Improvement Program (SEWIP) Block III, Navy Laser programs, and other directed energy applications have unique and challenging power and energy requirements. Ensuring that the Navy has a process that can regularly and routinely gather loading data to help assess use of margin and available power will be paramount to ensuring that ships can be more rapidly modernized. Validating shipboard power via the installed Integrated Condition Assessment System (ICAS) will be examined, the products from which will include the software modifications, the demonstration, data analytics, and a set of recommendations to support transition of this capability to ship programs. The result will be a valuable tangible outcome, usable to inform efforts such as DDG modernization with directed energy weapons, and then ultimately characterize the platforms under operation. In addition, continue to identify other energy saving/capability improvement technologies in Electrical Systems and prepare proposals and business case analyses for promising technologies with potential to reduce fuel demand and/or enable future combat system enhancements. ***FY 2022 OCO Plans:*** N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** FY22 increase of $0.725M is the combined result of a $4.143M increase in Budget Control and a $1.378M reduction in the EMP&A Functional Area due to Global Energy Information System (GENISYS) development efforts approaching maturity and leading to IOC. The reduced funding in EMP&A allows the program to adjust					

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0829 / *ENERGY CONSERVATION (ADV)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
resources to the research and development of promising technologies in other Functional Areas in order to align with the Navy's priorities and requirements.					
Title: Auxiliary Systems Sub Project ***Articles:*** ***Description:*** Auxiliary Systems Sub Project -- Project funds will be utilized to identify, test and evaluate new technologies for shipboard auxiliary systems aimed at reducing fuel consumption. ***FY 2021 Plans:*** N/A ***FY 2022 Base Plans:*** Continue to identify additional energy saving/capability improvement technologies in auxiliary systems and prepare proposals and business case analyses for promising technologies with potential to reduce fuel demand and/or enable future combat system enhancements. ***FY 2022 OCO Plans:*** N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** FY22 increase of $0.221M is the combined result of a $4.143M increase in Budget Control and a $1.378M reduction in the EMP&A Functional Area due to Global Energy Information System (GENISYS) development efforts approaching maturity and leading to IOC. The reduced funding in EMP&A allows the program to adjust resources to the research and development of promising technologies in other Functional Areas in order to align with the Navy's priorities and requirements.	0.000 -	0.000 -	0.221 -	0.000 -	0.221 -
Title: Energy Monitoring, Planning & Assessment ***Articles:*** ***Description:*** This project area will focus on methods of capturing and displaying energy related data to shipboard personnel as actionable information for ships force to employ energy conservation measures underway and in port as mission requirements permit. ***FY 2021 Plans:*** Provide engineering, technical and programmatic support of energy initiatives that put in place shore and shipboard monitoring and assessment tools aimed at optimizing ships' energy profiles and increasing operational capabilities.	5.388 -	4.750 -	3.372 -	0.000 -	3.372 -

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0829 / *ENERGY CONSERVATION (ADV)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Continue GENISYS development and implementation efforts for operational energy evaluation includes integration of Condition Based Maintenance Plus applications. Support limited deployment testing and implement the initial operating capability release to Fleet Surface ship assets. Conduct analysis on collected GENISYS data to support Operational Energy requirements, such as Maritime Tactical Command and Control program. Continue to identify additional energy capability improvement technologies and monitoring methodologies while also preparing proposals and business case analyses for promising technologies within scope of NAVSEA technology objectives. ***FY 2022 Base Plans:*** GENISYS is set of software applications that provides energy information to the ship's CO and crew to enable more efficient operations. Continue GENISYS development efforts and shipboard evaluation including integration of enterprise Remote Monitoring (eRM) and Navy Energy Usage Reports (NEURS) automation capabilities to support future fleet-wide implementation. Continue security cross-domain solution analysis and interface development with other fuel related navy enterprise applications. Expand GENISYS capability to the LPD17 class ships providing real time energy information to support potential reduction in energy usage and historical energy monitoring. The R&D funds in FY22 include the expansion of capability from DDG-51 class to LPD-17 class. In addition, continue to identify other energy capability improvement technologies and monitoring methodologies and prepare proposals and business case analyses for promising technologies within scope of NAVSEA technology objectives. ***FY 2022 OCO Plans:*** N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** FY22 decrease of $1.378M in this EMP&A Functional Area reflects the maturing of GENISYS development effort as it nears completion of software development and testing associated with achieving IOC and funding for GENISYS shifts from RDT&E to fielding and sustainment appropriations.					
Accomplishments/Planned Programs Subtotals	5.388	5.785	9.764	0.000	9.764

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0829 / *ENERGY CONSERVATION (ADV)*

D. Acquisition Strategy

RDT&E Contracts are Competitive Procurements.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0829 / *ENERGY CONSERVATION (ADV)*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	C/CPFF	NAVSEA HQ : Washington, DC	1.110	0.200	Jan 2020	0.000		0.000		-		0.000	-	-	-
Systems Engineering	Grant	NSWC DD : Dahlgren, VA	0.100	0.000		0.000		1.112	Dec 2021	-		1.112	-	-	-
Systems Engineering	WR	NSWC PHila : Philadelphia, PA	3.062	0.100	Nov 2019	0.375	Nov 2020	1.297	Dec 2021	-		1.297	-	-	-
Primary Hardware Development	WR	NSWC Carderock : Bethesda, MD	8.983	0.000		0.000		0.000		-		0.000	-	-	-
Systems Engineering	WR	NSWC PHD : Port Hueneme, CA	0.100	0.000		0.000		0.000		-		0.000	-	-	-
Systems Engineering	C/CPAF	NSWC Carderock : Bethesda, MD	6.948	0.000		0.000		0.000		-		0.000	-	-	-
Engineering Development	WR	NSWC Carderock : Bethesda, MD	8.369	0.000		0.633	Nov 2020	1.053	Nov 2021	-		1.053	-	-	-
Demonstration & Evaluation	WR	NSWC Carderock : Bethesda, MD	8.149	0.000		0.000		0.000		-		0.000	-	-	-
System Development	C/BOA	NAWC-AD : Lakehurst, NJ	5.355	0.883	Jan 2020	0.800	Jan 2021	1.940	Dec 2021	-		1.940	-	-	-
Primary Hardware Development	C/CPAF	NSWC PHila : Philadelphia, PA	0.000	0.000		0.000		0.000		-		0.000	-	-	-
System Engineering	WR	NSWC CR : Crane, Indiana	0.300	0.000		0.000		0.000		-		0.000	-	-	-
System Engineering	WR	NUWC NPT : Newport, Rhode Is	0.193	0.000		0.000		0.000		-		0.000	-	-	-
		Subtotal	42.669	1.183		1.808		5.402		-		5.402	-	-	N/A

Remarks

Increase of $0.922M for Systems Engineering / NSWC PHILA reflects a shift from GENISYS development to Warfare Center (WC) support of shipboard new technology product development. Increase of $0.420M for Engineering Development / NSWC Carderock reflects budget available for Stern Flap development. Increase of $1.140M in System Development / NAWC-AD reflects an increased budget amount for expanded GENISYS development to LPD 17 Class. Increase of $1.112M in Systems Engineering / NSWC DD reflects increased budget amount for PDWP.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0829 / *ENERGY CONSERVATION (ADV)*

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Support	WR	NSWC Carderock : Bethesda, MD	3.187	0.217	Nov 2019	0.280	Nov 2020	0.000		-		0.000	-	-	-
Software Support	WR	NSWC Carderock : Bethesda, MD	0.522	0.000		0.000		0.000		-		0.000	-	-	-
Integrated Logistics Support	WR	NSWC Carderock : Bethesda, MD	1.200	0.000		0.000		0.000		-		0.000	-	-	-
Study Anaylsis	WR	NSWC Carderock : Bethesda, MD	1.174	0.000		0.000		0.000		-		0.000	-	-	-
Development Support	C/CPAF	NSWC SSES : Philadelphia, PA	0.978	0.050	Jan 2020	0.000		0.100	Dec 2021	-		0.100	-	-	-
Development Support	C/CPAF	NAVSEA HQ : Washington, DC	2.044	0.421	Jan 2020	0.430	Jan 2021	0.123	Jan 2022	-		0.123	-	-	-
Software Support	C/CPAF	NSWC SSES : Philadelphia, PA	0.281	0.000		0.000		0.000		-		0.000	-	-	-
Software Support	C/CPAF	NAVSEA HQ : Washington, DC	1.200	0.000		0.000		0.000		-		0.000	-	-	-
Development Support	WR	NSWC PHila : Philadelphia, PA	2.633	0.397	Nov 2019	0.208	Nov 2020	0.300	Nov 2021	-		0.300	-	-	-
Development Support	C/CPAF	SUPSHIP : Bath, MA	0.000	0.000		0.000		0.000		-		0.000	-	-	-
Development Support	WR	NSWC DD : Dahlgren, Va	0.050	0.000		0.000		0.069	Nov 2021	-		0.069	-	-	-
Development Support	WR	SPAWAR : Charleston, SC	0.000	0.000		0.190	Nov 2020	0.000		-		0.000	-	-	-
		Subtotal	13.269	1.085		1.108		0.592		-		0.592	-	-	N/A

Remarks

Decrease of $0.280M for Development Support / NSWC Carderock reflects shift from support to operational test and evaluation (T&E) for research and development of new technologies; Decrease of $0.307M for Development Support / HQ and increase of $0.092M for Development Support / NSWC Phila reflects a shift of support from HQ to WC for support of new product development; Finally, a Decrease of $0.190M for Development Support / SPAWAR reflects an anticipated transfer of GENISYS Software Cloud Hosting services to sustainment costs following Initial Operating Capability (IOC). Increase of $0.100M for Development Support / NSWC PD supports PDWP Development/ Test. Increase of $0.069M for Development Support / NSWC DD supports PDWP Development / Test.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0829 / *ENERGY CONSERVATION (ADV)*

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	NSWC Carderock : Bethesda, MD	10.046	0.000		0.000		0.000		-		0.000	-	-	-
Operational Test & Evaluation	WR	NSWC Carderock : Bethesda, MD	10.645	0.000		0.000		0.562	Nov 2021	-		0.562	-	-	-
LIve Fire Test & Evaluation	WR	NSWC Carderock : Bethesda, MD	0.382	0.000		0.000		0.000		-		0.000	-	-	-
Developmental Test & Evaluation	C/CPAF	NSWC Philadelphia : Philadelphia, PA	0.383	0.000		0.000		0.000		-		0.000	-	-	-
Developmental Test & Evaluation	WR	NSWC SSES : Philadelphia, PA	0.918	0.000		0.000		0.662	Nov 2021	-		0.662	-	-	-
Developmental Test & Evaluation	WR	APL : Washington, DC	0.085	0.000		0.000		0.000		-		0.000	-	-	-
System Development	C/BOA	NAWC-AD : Lakehurst, NJ	0.000	1.924	Jan 2020	1.689	Dec 2020	0.733	Jan 2022	-		0.733	-	-	-
Operational Test & Evaluation	C/CPAF	NAWC-AD : Lakehurst, NJ	0.000	0.000		0.000		0.000		-		0.000	-	-	-
Operational Test & Evaluation	WR	NSWC Crane : Crane, IN	0.000	0.000		0.000		0.000		-		0.000	-	-	-
Developemental Test & Evaluation	WR	NSWC Crane : Crane, IN	0.000	0.000		0.000		0.000		-		0.000	-	-	-
		Subtotal	22.459	1.924		1.689		1.957		-		1.957	-	-	N/A

Remarks

Increase of $0.562M in Test & Evaluation / NSWC Carderock reflects testing and evaluation of products and tools developed for Hull Hydrodynamics and Underwater Hull Husbandry areas; Decrease of $0.956M for System Development / NAWC-AD reflects reduced GENISYS Software development effort as it approaches Initial Operating Capability (IOC). Increase of $0.662M for Development Test & Evaluation /NSWC PD reflects land based test and evaluation of PDWP.

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	WR	NSWC Philadelphia : Philadelphia, PA	7.100	0.000		0.328	Dec 2020	0.158	Nov 2021	-		0.158	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy			Date: May 2021
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603724N / *Navy Energy Program*	Project (Number/Name) 0829 / *ENERGY CONSERVATION (ADV)*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Travel	Allot	NAVSEA HQ : Washington, DC	0.209	0.007	Dec 2019	0.021	Dec 2020	0.015	Dec 2021	-		0.015	-	-	-
Total Assets	WR	NSWC Carderock : Bethesda, MD	0.352	0.000		0.000		0.000		-		0.000	-	-	-
Program Management Support	C/CPAF	NAVSEA HQ : Washington, DC	4.471	1.169	Jan 2020	0.729	Jan 2021	1.463	Jan 2022	-		1.463	-	-	-
Program Management Support	WR	NSWC Carderock : Bethesda, MD	1.052	0.020	Mar 2020	0.102	Oct 2020	0.177	Nov 2021	-		0.177	-	-	-
		Subtotal	13.184	1.196		1.180		1.813		-		1.813	-	-	N/A

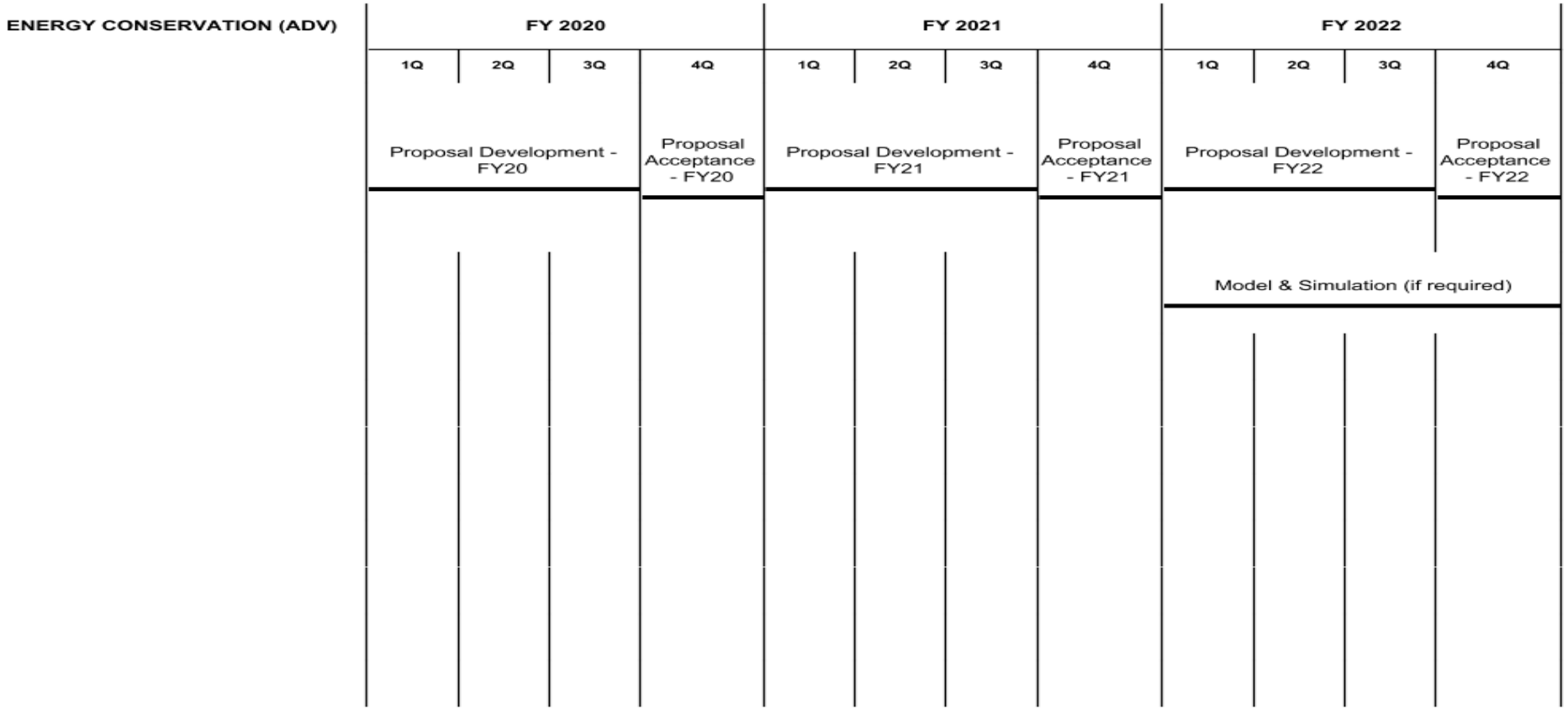
Remarks

Decrease of $0.170M for Program Management Support / NSWC Phila reflects an increased effort for Systems engineering in Product Development while still providing management and oversight of WC tasks; Decrease of $0.006M in Travel / HQ reflects anticipated reduced travel requirements; Increase of $0.734M for Program Management Support / HQ reflects increased contractor support of new product area development efforts as efforts shift from GENISYS development to other technology areas; Increase of $0.075M in Program Management support / NSWC CD reflects need to oversee engineering product development efforts for new technology areas.

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	91.581	5.388		5.785		9.764		-		9.764	-	-	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0829 / *ENERGY CONSERVATION (ADV)*



2022PB - 0603724N - 0829

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0829 / *ENERGY CONSERVATION (ADV)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
ENERGY CONSERVATION (ADV)				
Proposal Development - FY20	1	2020	3	2020
Proposal Acceptance - FY20	4	2020	4	2020
Proposal Development - FY21	1	2021	3	2021
Proposal Acceptance - FY21	4	2021	4	2021
Proposal Development - FY22	1	2022	3	2022
Proposal Acceptance - FY22	4	2022	4	2022
Model & Simulation (if required)	1	2022	4	2022

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy											Date: May 2021	
Appropriation/Budget Activity 1319 / 4					R-1 Program Element (Number/Name) PE 0603724N / *Navy Energy Program*				Project (Number/Name) 0838 / *Mobility Fuels (ADV)*			
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
0838: *Mobility Fuels (ADV)*	107.383	8.001	7.463	9.232	-	9.232	-	-	-	-	-	-
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This program represents the Navy's only RDTE investment designed to maintain and enhance its capability to operate as a "smart" customer for aviation and ship tactical fuels that are an operationally critical, single point of failure, $4.0+ billion per year consumable requiring worldwide availability and interoperability.

Recent field problems have demonstrated the adverse effects that fuel-related problems can have on ship and aircraft performance, durability, and readiness. The potential risk and adverse operational impacts from fuel-related problems over the next decade, given the evolving production technologies, changing feedstocks, more stringent environmental regulations and the introduction of new operational requirements and platforms will continue to increase.

This program provides data through laboratory, component, fuel system, engine, and platform tests, which relate the effects of changes in the Navy fuel properties and chemistry to the performance and durability of Naval ship, aircraft, ground and fuel distribution systems. The information is required by technical authorities and decision makers to: (a) assure interoperability with fuel procured from commercial/ international specifications, (b) determine the extent to which unnecessarily restrictive military specification requirements can be relaxed to reduce cost and increase availability worldwide, (c) provide guidance to fleet operators for the safe use of off-specification fuels or emerging CONOPS requiring the use of non-traditional fuels,(d) assure operational interoperability with evolving changes in fuel production technology, feedstocks, environmental regulations and tactical system demands, (e) improve the capability and reduce the cost of field fuel quality surveillance and (f) facilitate rapid identification and resolution of field identified fuel deficiencies.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Naval Tactical Fuels	8.001	7.463	9.232	0.000	9.232
Articles:	-	-	-	-	-
Description: Perform development, test and evaluation work on Naval tactical fuels to: a) assure interoperability with commercial/international fuel specifications, b) determine the extent to which unnecessarily restrictive military specification features can be relaxed to reduce cost and increase availability worldwide; c) provide guidance to fleet operators for the safe use of off-specification or non-primary fuels , d) validate periodic changes to the Navy tactical fuel specifications to ensure fuel quality and avoid fleet operating problems while accommodating evolutionary changes in the fuel supply industry and e) improve fleet methods to ensure fuel quality and performance.					
FY 2021 Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0838 / *Mobility Fuels (ADV)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Continue development of forward-positioned fuel chemistry and property Quality Surveillance sensors. Augment rapid data analysis tool to include hardware fuel performance test data. Conduct lab, rig and component tests to assure interoperability with evolving commercial specification and platform requirements. Develop advanced fuel compositional measurement capability. ***FY 2022 Base Plans:*** Conduct lab, rig, component and engine testing to assure fuel interoperability with evolving commercial fuel specifications and emerging operational and platform requirements. Develop advanced algorithms to enable predictive capabilities of rapid data analysis applications. Field trial prototype sensors to increase autonomous quality surveillance. Continue development of advance fuel composition capability. ***FY 2022 OCO Plans:*** N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase in budget is to fund a Biofuel qualification study; LOE 3 Operation Energy Alt 2.					
Accomplishments/Planned Programs Subtotals	8.001	7.463	9.232	0.000	9.232

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Testing efforts will be competitively contracted, and performed under Cost Plus Fixed Fee and Firm Fixed Price contracts.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy			Date: May 2021
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603724N / *Navy Energy Program*	Project (Number/Name) 0838 / *Mobility Fuels (ADV)*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	WR	NRL : Washington, D.C.	6.952	1.000	Dec 2019	1.000	Dec 2020	1.214	Nov 2021	-		1.214	-	-	-
Systems Engineering	WR	NAWCAD : Patuxent River, MD	21.161	1.907	Dec 2019	2.200	Dec 2020	2.000	Nov 2021	-		2.000	-	-	-
Systems Engineering	WR	NSWC : Philadelphia, PA	4.381	0.500	Jan 2020	0.500	Jan 2021	0.450	Nov 2021	-		0.450	-	-	-
Systems Engineering	WR	NSWC : Bethesda, MD	0.462	0.000		0.000		0.000		-		0.000	-	-	-
Systems Engineering	C/FFP	Various : Various	2.735	1.021	Apr 2020	1.000	Apr 2021	2.500	Mar 2022	-		2.500	-	-	-
Prior year Prod Dev no longer funded in the FYDP	Various	Various : Various	0.161	0.000		0.000		0.000		-		0.000	-	-	-
Systems Engineering	MIPR	Army Ground Vehicle Systems Center : Warren, MI	0.000	0.000		0.000		0.500	Nov 2021	-		0.500	-	-	-
Systems Engineering	MIPR	AFRL : Dayton, OH	0.000	0.000		0.000		0.221	Nov 2021	-		0.221	-	-	-
		Subtotal	35.852	4.428		4.700		6.885		-		6.885	-	-	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Hardware Testing	WR	NAWCAD : Patuxent River, MD	4.849	1.000	Dec 2019	0.500	Dec 2020	0.500	Dec 2021	-		0.500	-	-	-
Hardware Testing	C/CPFF	Life Cycle Engineering : Charleston, SC	16.923	2.000	Mar 2020	2.000	Mar 2021	1.500	Apr 2022	-		1.500	-	-	-
Hardware Testing	C/CPFF	Univ of Dayton Research Inst : Dayton, OH	1.289	0.000		0.000		0.000		-		0.000	-	-	-
Hardware Testing	WR	US Naval Academy : Annapolis, MD	0.148	0.040	Apr 2020	0.000		0.040	Apr 2022	-		0.040	-	-	-
Hardware Testing	C/FFP	Various : Various	7.603	0.223	Mar 2020	0.000		0.000		-		0.000	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy			Date: May 2021
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603724N / *Navy Energy Program*	Project (Number/Name) 0838 / *Mobility Fuels (ADV)*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Fuel Delivery	MIPR	DLA-Energy : Ft. Belvoir, VA	0.647	0.050	Jan 2020	0.025	Jan 2021	0.030	Apr 2022	-		0.030	-	-	-
Prior year T & E no longer funded in the FYDP	Various	Various : Various	31.545	0.000		0.000		0.000		-		0.000	-	-	-
		Subtotal	63.004	3.313		2.525		2.070		-		2.070	-	-	N/A

Remarks

All prior year lines have been consolidated.

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	WR	NAWCAD : Patuxent River, MD	1.841	0.250	Dec 2019	0.228	Dec 2020	0.267	Dec 2021	-		0.267	-	-	-
Program Management Support	C/FFP	Coord Research Council : Alpharetta, GA	0.070	0.010	Nov 2019	0.010	Nov 2020	0.010	Nov 2021	-		0.010	-	-	-
Prior year Mgmt Supp no longer funded in the FYDP	Various	Various : Various	6.616	0.000		0.000		0.000		-		0.000	-	-	-
		Subtotal	8.527	0.260		0.238		0.277		-		0.277	-	-	N/A

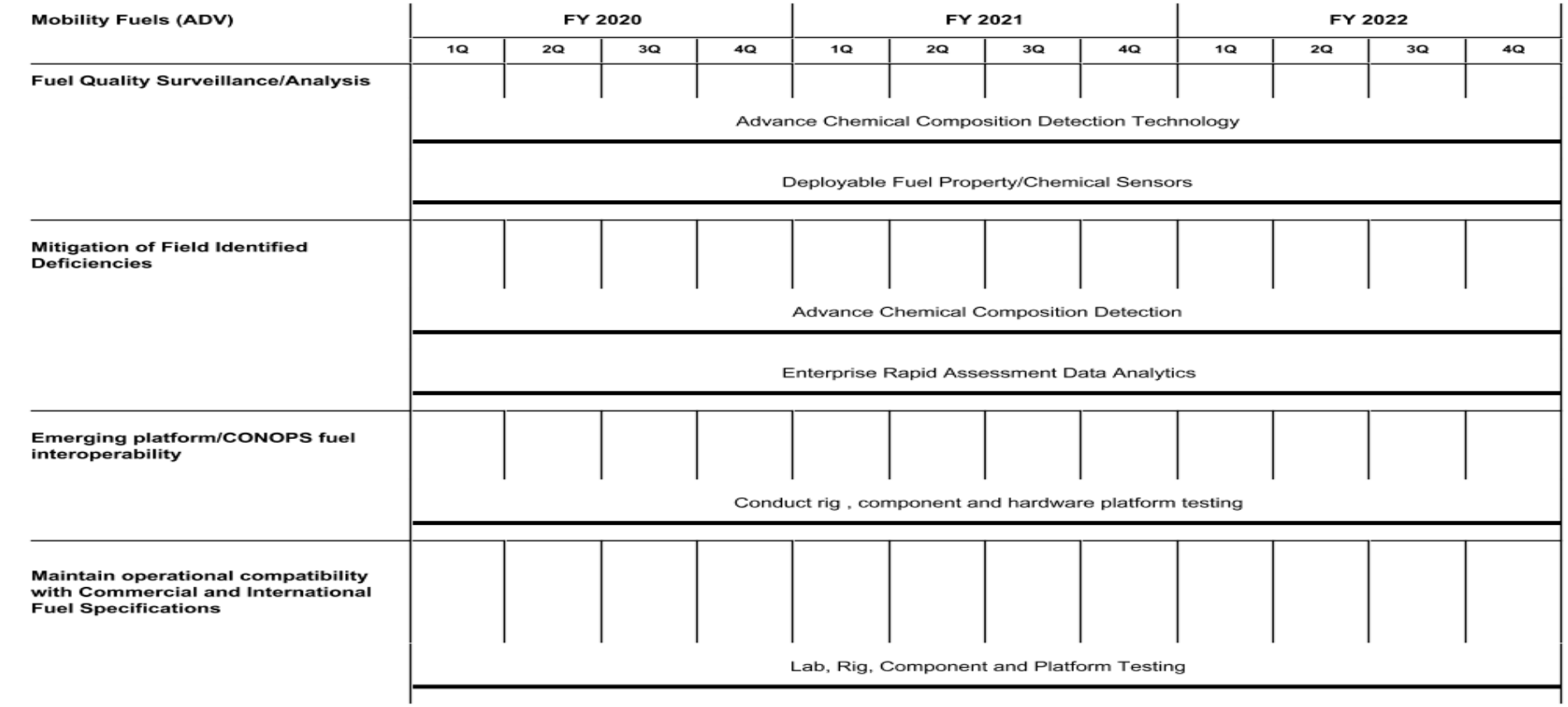
Remarks

1.

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	107.383	8.001		7.463		9.232		-		9.232	-	-	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0838 / *Mobility Fuels (ADV)*



2022PB - 0603724N - 0838

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0838 / *Mobility Fuels (ADV)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Mobility Fuels (ADV)				
Fuel Quality Surveillance/Analysis: Advance Chemical Composition Detection Technology	1	2020	4	2022
Fuel Quality Surveillance/Analysis: Deployable Fuel Property/Chemical Sensors	1	2020	4	2022
Mitigation of Field Identified Deficiencies: Advance Chemical Composition Detection	1	2020	4	2022
Mitigation of Field Identified Deficiencies: Enterprise Rapid Assessment Data Analytics	1	2020	4	2022
Emerging platform/CONOPS fuel interoperability: Conduct rig, component and hardware platform testing	1	2020	4	2022
Maintain operational compatibility with Commercial and International Fuel Specifications: Lab, Rig, Component and Platform Testing	1	2020	4	2022

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy											Date: May 2021	
Appropriation/Budget Activity 1319 / 4					R-1 Program Element (Number/Name) PE 0603724N / *Navy Energy Program*				Project (Number/Name) 0928 / *Shore Energy Technology*			
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
0928: *Shore Energy Technology*	55.664	1.571	1.872	1.917	-	1.917	-	-	-	-	-	-
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Legislation, Executive Orders (EO), and SECNAV Guidance direct DoN to increase energy security through resiliency, efficiency, reliability, cybersecurity and alternative energy sources. This guidance includes the National Defense Strategy (NDS) of 2018, A Design for Maintaining Maritime Superiority 2.0, and the NAVFAC Strategic Design 2.0. Guidance directs DOD to posture logistics capability (projected from Navy Installations) ashore and at sea in ways that allow the fleet to operate globally, at a pace that can be sustained over time. Improved resilience of our installations (employing key technology focus areas defined in the NDS) will enable platform refueling, re-arming, resupply and repair. Installations shall enable Dynamic Force Employment and Distributed Lethality.

This Energy RDT&E Project will test, evaluate, and validate components as well as demonstrate cost-effective and technical viability of energy security , efficiency, resilience, reliability, and technologies. All efforts will be coordinated across DOD and with other agencies as appropriate. Specifically, this project aims to pursue three areas of development, testing and evaluation: (A) Modeling and possible prototype testing of new energy sources for use at Naval installations with potential for widespread applicability to energy security; (B) It will support demonstration and validation of advanced electric grid management systems, known as "Smart Grid" and "Micro Grid" technology, for use at Naval installations to enable improved energy security; (C) Demonstration and Validation of Alternative Energy, Energy Efficiency, and Resiliency and Smart Energy Management Technology: This project will support the testing, demonstration, validation, and application of innovative facility energy efficiency and alternative energy technology.Cyber Security resilience technology shall align to NIST 800-82 and be interoperable within the NAVFAC cybersecurity enclave.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Shore Energy Technology	1.571	1.872	1.917	0.000	1.917
Articles:	-	-	-	-	-
FY 2021 Plans: -Continue development and demonstration of large-scale energy storage sites to include cyber security measures for execution. -Continue development and demostration of adaptable microgrids that utilize artificial intelligence and high voltage solid-state power electronics using renewable energy test bed. -Continue development and demonstration of predictive modeling, neural network, and predictive energy tools.					
FY 2022 Base Plans: -Develop and demonstrate of large-scale energy storage sites to include cyber security measures. -Develop and demonstrate adaptable microgrids that utilize artificial intelligence and high voltage solid-state power electronics using renewable energy test bed.					

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603724N / *Navy Energy Program*	Project (Number/Name) 0928 / *Shore Energy Technology*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
-Develop and demonstrate predictive modeling, neural network, and predictive energy tools. ***FY 2022 OCO Plans:*** N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase of $.045 from FY2021 to FY2022 is due to additional investment in demonstration of advanced energy collection technologies					
Accomplishments/Planned Programs Subtotals	1.571	1.872	1.917	0.000	1.917

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Demonstration and validation are conducted for maximum transfer and interaction with industry such as to influence the industry COTS with the results of this demonstration and prototype validation. Acquisition is based on performance specifications enabled by this project.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy			Date: May 2021
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603724N / *Navy Energy Program*	Project (Number/Name) 0928 / *Shore Energy Technology*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Renewable Energy	WR	EXWC : Port Hueneme, CA	42.260	0.040	Mar 2020	0.027	Mar 2021	0.400	Jan 2022	-		0.400	-	-	-
Energy Resiliency and Reliability, Security and Systems (Includes cybersecurity)	Various	EXWC : Port Hueneme, CA	8.082	1.076	Oct 2019	0.800	Mar 2021	0.730	Dec 2021	-		0.730	-	-	-
Energy Storage	WR	EXWC : Port Hueneme, CA	5.322	0.455	Mar 2020	0.842	Mar 2021	0.515	Dec 2021	-		0.515	-	-	-
Renewable Energy (Direct Cite)	Various	EXWC : Port Hueneme, CA	0.000	0.000		0.203	Mar 2021	0.272	Dec 2021	-		0.272	-	-	-
		Subtotal	55.664	1.571		1.872		1.917		-		1.917	-	-	N/A

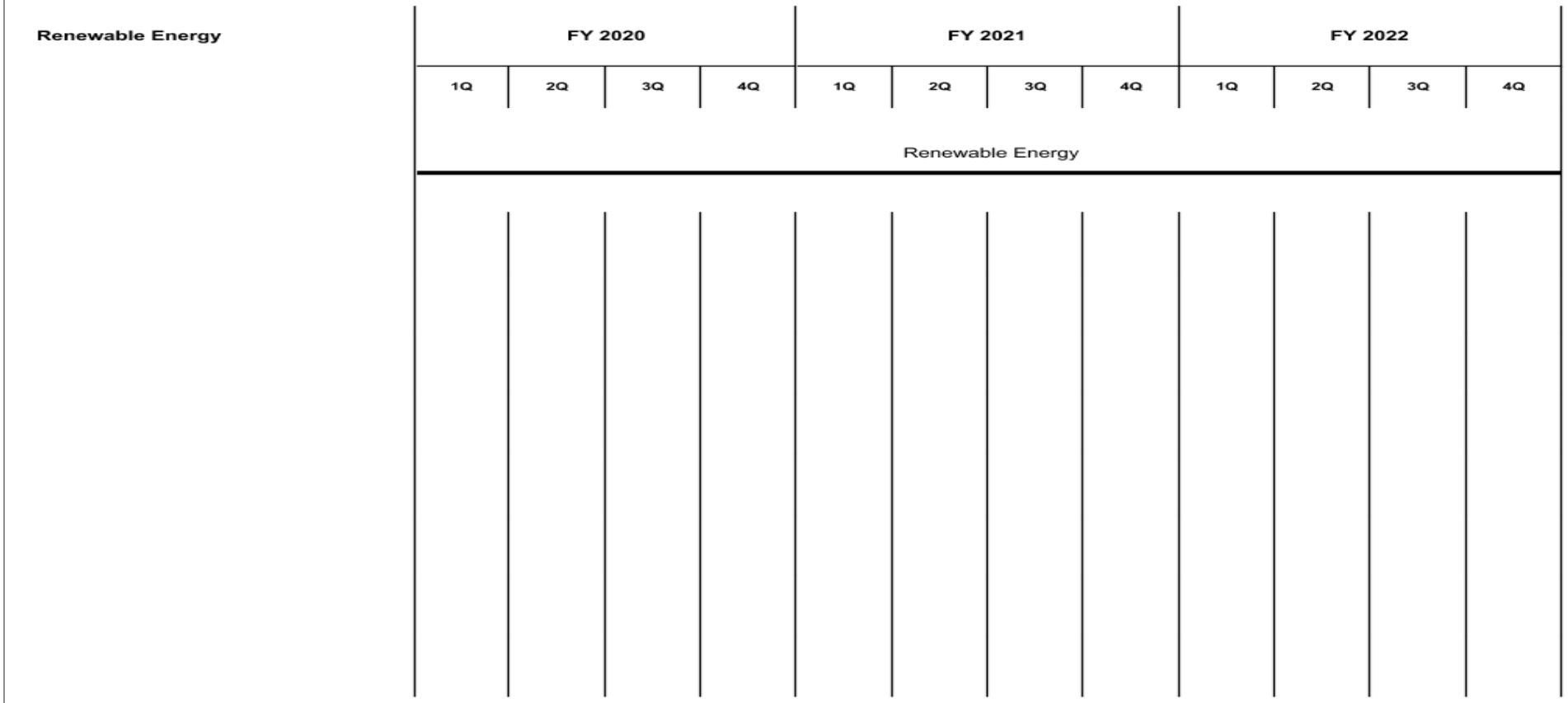
Remarks

-Renewable Energy & Direct Cite: Increase in FY22 budget due to additional investment in demonstration of advanced energy collection technologies
- Energy Resiliency: Decreased in FY22 due to shifting funding to renewable energy.
- Energy Storage: Decrease in FY22 budget due to shifting funding to renewable energy additional investment in the demonstration of energy storage in operational locations

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	55.664	1.571		1.872		1.917		-		1.917	-	-	N/A

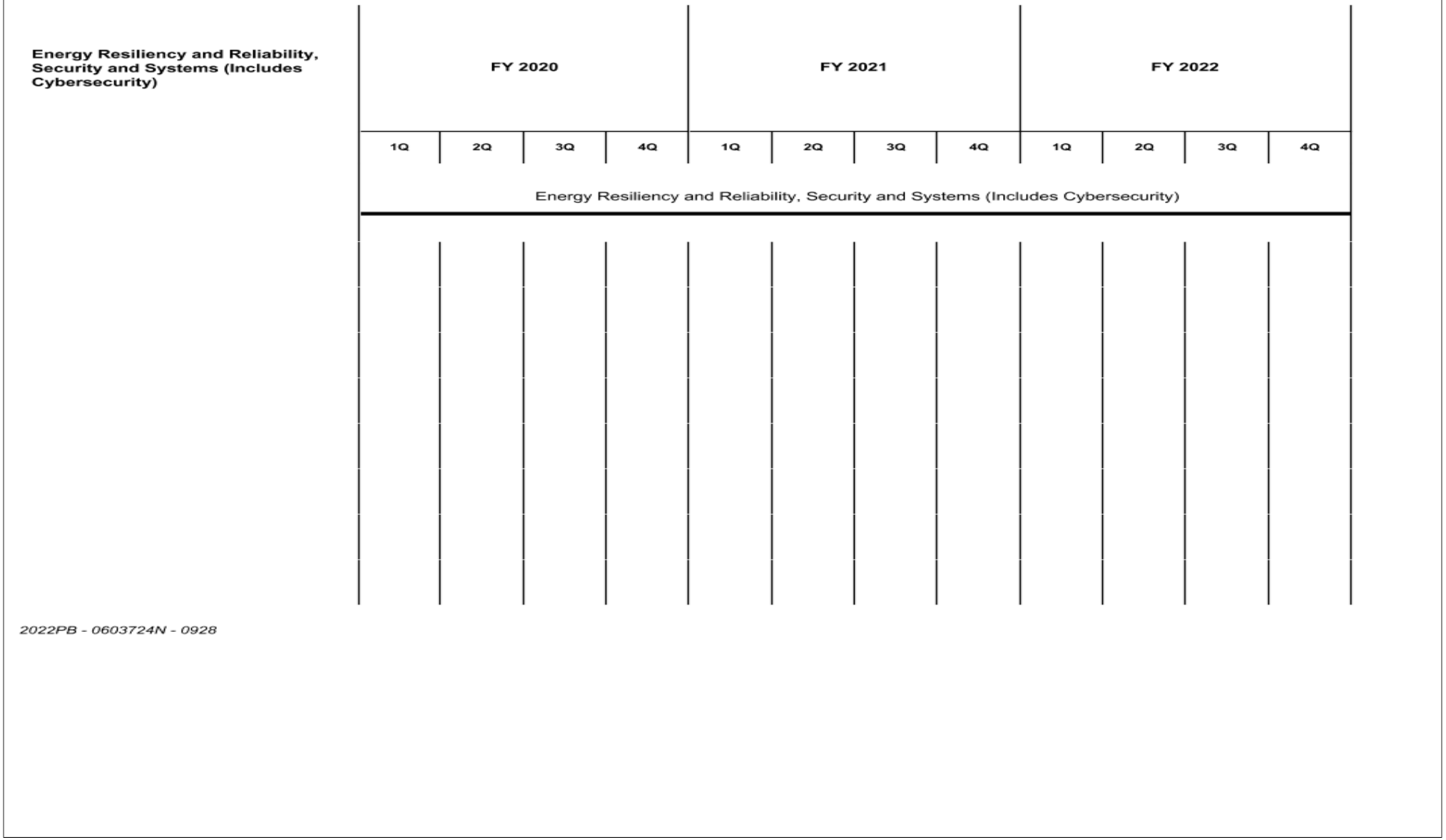
Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0928 / *Shore Energy Technology*



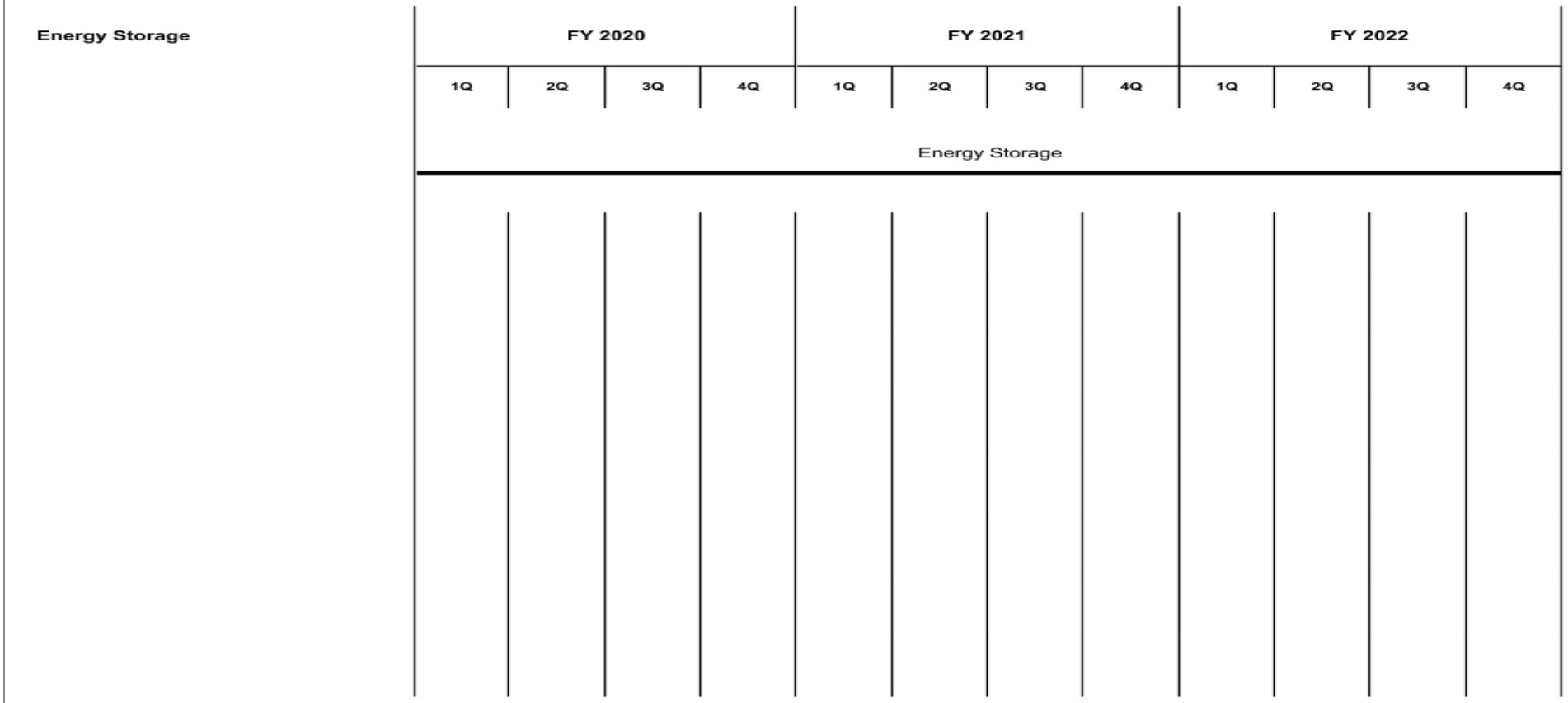
2022PB - 0603724N - 0928

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0928 / *Shore Energy Technology*



2022PB - 0603724N - 0928

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0928 / *Shore Energy Technology*



2022PB - 0603724N - 0928

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0928 / *Shore Energy Technology*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Renewable Energy				
Renewable Energy	1	2020	4	2022
Energy Resiliency and Reliability, Security and Systems (Includes Cybersecurity)				
Energy Resiliency and Reliability, Security and Systems (Includes Cybersecurity)	1	2020	4	2022
Energy Storage				
Energy Storage	1	2020	4	2022

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy											Date: May 2021	
Appropriation/Budget Activity 1319 / 4					R-1 Program Element (Number/Name) PE 0603724N / *Navy Energy Program*				Project (Number/Name) 0996 / *Aircraft Energy Conservation*			
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
0996: *Aircraft Energy Conservation*	159.163	10.390	8.269	6.998	-	6.998	-	-	-	-	-	-
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Naval aviation must operate independently worldwide often with limited logistics support. Additionally, legacy and emerging aircraft continually add capability to enhance their lethality and survivability. Improving an aircraft's utilization and management of energy has a direct relationship to enhanced combat capability to meet the challenges of emerging threats. This program engages technical experts from across Naval aviation, industry, and academia to identify best practices and technologies for development, testing and validation to determine technical viability and assess benefit to mission capability..

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Aircraft Operational Energy	10.390	8.269	6.998	0.000	6.998
Articles:	-	-	-	-	-
FY 2021 Plans: Continue identification, testing and assessment of energy efficiency best practices, technologies and metrics. Validate models and technologies to mitigate emerging thermal management challenges. Validate aircraft lithium ion battery designs.					
FY 2022 Base Plans: Continue identification, testing and assessment of Operational Energy technologies, best practices and metrics to enhance Naval Aviation operational capability. Build and validate integrated models to identify and support resolution of thermal management challenges. Build and validate common safe and affordable lithium ion battery prototypes. Validate advance aircraft generator technology. Assess engine recuperator technology.					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: Decrease to reflect reduction in program requirements from FY 2021 to FY 2022.					
Accomplishments/Planned Programs Subtotals	10.390	8.269	6.998	0.000	6.998

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0996 / *Aircraft Energy Conservation*

C. Other Program Funding Summary ($ in Millions)

Remarks

D. Acquisition Strategy

This is a non-acquisition program that develops, evaluates, and validates technologies in support of Navy Operational Energy goals for increasing aircraft mission capability..

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy			Date: May 2021
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603724N / *Navy Energy Program*	Project (Number/Name) 0996 / *Aircraft Energy Conservation*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	WR	NAWCAD : Patuxent River, MD	8.469	2.257	Dec 2019	2.500	Dec 2020	2.463	Dec 2021	-		2.463	-	-	-
Systems Engineering	C/CPFF	The Boeing Company : Seattle, WA	2.000	0.000		0.000		0.000		-		0.000	-	-	-
Systems Engineering	C/CPFF	Various : Various	12.403	2.733	Mar 2020	2.439	Apr 2021	2.884	Apr 2022	-		2.884	-	-	-
Systems Engineering	C/BA	Deloitte Consulting : Alexandria, VA	2.571	1.000	Apr 2020	1.000	Apr 2021	0.000		-		0.000	-	-	-
Prior year Sys Eng no longer funded in the FYDP	Various	Various : Various	3.612	0.000		0.000		1.100	Jan 2022	-		1.100	-	-	-
		Subtotal	29.055	5.990		5.939		6.447		-		6.447	-	-	N/A

Remarks

5. All Prior Year lines have been consolidated.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Hardware Testing	WR	NAWCAD : Patuxent River, MD	5.536	1.000	Jan 2020	1.000	Jan 2021	0.201	Dec 2021	-		0.201	-	-	-
Hardware Testing	C/CPFF	Various : Various	0.740	3.000	Mar 2020	1.000	Mar 2021	0.000		-		0.000	-	-	-
Prior year T&E no longer funded in the FYDP	Various	Various : Various	117.125	0.000		0.000		0.000		-		0.000	-	-	-
		Subtotal	123.401	4.000		2.000		0.201		-		0.201	-	-	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	WR	NAWCAD : Patuxent River, MD	2.195	0.400	Nov 2019	0.330	Dec 2020	0.350	Dec 2021	-		0.350	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy			Date: May 2021
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603724N / *Navy Energy Program*	Project (Number/Name) 0996 / *Aircraft Energy Conservation*	

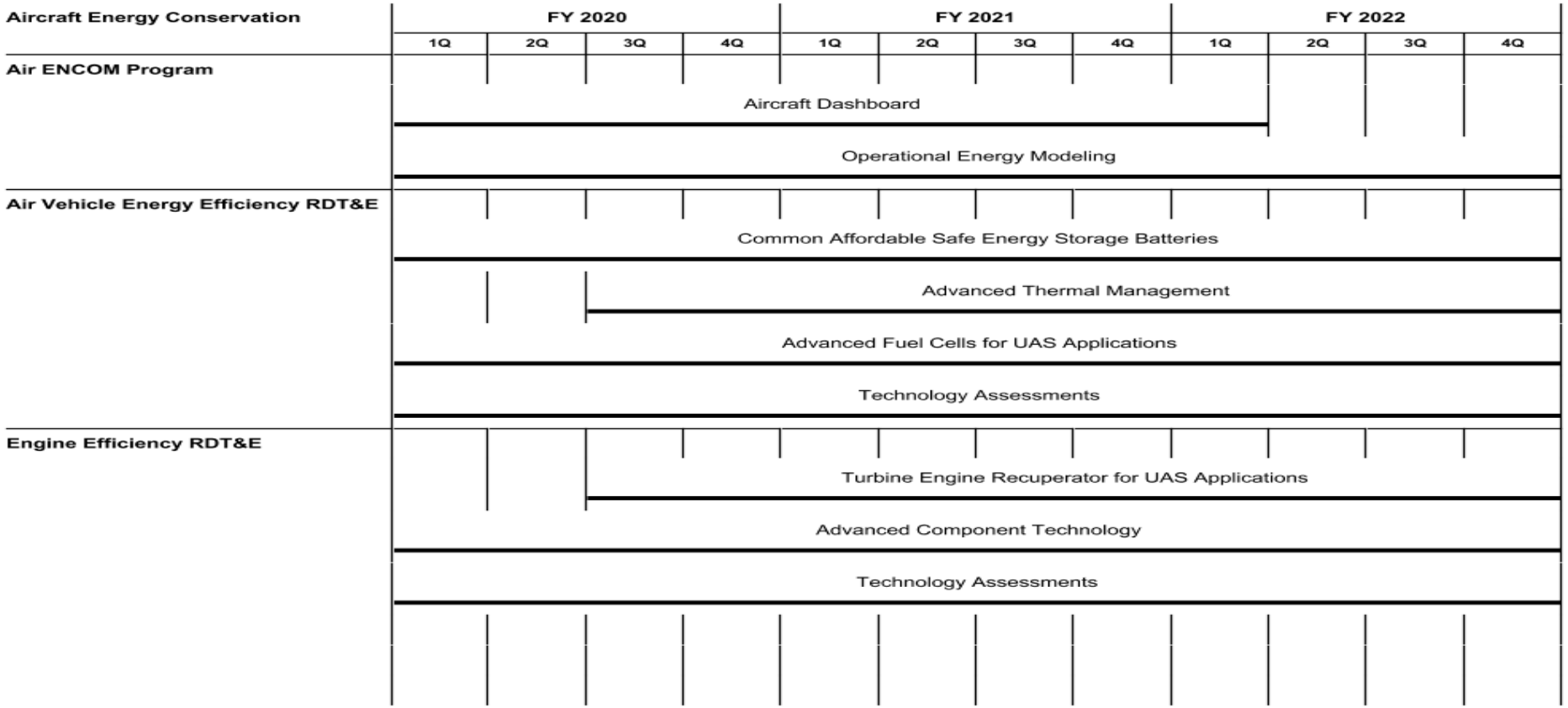
Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prog Mgnt no longer funded in the FYDP	Various	Various : Various	4.512	0.000		0.000		0.000		-		0.000	-	-	-
		Subtotal	6.707	0.400		0.330		0.350		-		0.350	-	-	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	159.163	10.390		8.269		6.998		-		6.998	-	-	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0996 / *Aircraft Energy Conservation*



2022PB - 0603724N - 0996

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0996 / *Aircraft Energy Conservation*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Aircraft Energy Conservation				
Air ENCOM Program: Aircraft Dashboard	1	2020	1	2022
Air ENCOM Program: Operational Energy Modeling	1	2020	4	2022
Air Vehicle Energy Efficiency RDT&E: Common Affordable Safe Energy Storage Batteries	1	2020	4	2022
Air Vehicle Energy Efficiency RDT&E: Advanced Thermal Management	3	2020	4	2022
Air Vehicle Energy Efficiency RDT&E: Advanced Fuel Cells for UAS Applications	1	2020	4	2022
Air Vehicle Energy Efficiency RDT&E: Technology Assessments	1	2020	4	2022
Engine Efficiency RDT&E: Turbine Engine Recuperator for UAS Applications	3	2020	4	2022
Engine Efficiency RDT&E: Advanced Component Technology	1	2020	4	2022
Engine Efficiency RDT&E: Technology Assessments	1	2020	4	2022

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy			Date: May 2021
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603724N / *Navy Energy Program*	Project (Number/Name) 2566 / *Battery Development and Safety*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
2566: *Battery Development and Safety*	0.000	0.000	0.000	5.913	-	5.913	-	-	-	-	-	-
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Provide an advanced battery database with standard battery families for program offices to use to allow for selection of batteries early in the design process increasing the likelihood of design and fielding success, 2) leverage the battery database to begin common battery design efforts to save cost, 3) establish common battery standards and design requirements (e.g., propagation resistant designs, standard battery monitoring and casualty detection systems, etc.) to make advanced batteries safer and therefore deployable, 4) develop and test standard battery storage/container systems that can safely house batteries and withstand catastrophic failure (thermal runaway) of the batteries within the container while minimizing damage to surrounding equipment and platforms, 5) streamline the battery safety certification process especially for high energy storage magazines and other large battery designs (lasers) to allow
battery based weapon systems to be fielded in time to support strategic needs, 6) develop hazard mitigation technologies to support rapid safe deployment of advanced batteries to support weapon systems.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Battery Development and Safety	0.000	0.000	5.913	0.000	5.913
Articles:	-	-	-	-	-
FY 2021 Plans: N/A					
FY 2022 Base Plans: Provide an advanced battery database with standard battery families for program offices to use to allow for selection of batteries early in the design process increasing the likelihood of design and fielding success, 2) leverage the battery database to begin common battery design efforts to save cost, 3) establish common battery standards and design requirements (e.g., propagation resistant designs, standard battery monitoring and casualty detection systems, etc.) to make advanced batteries safer and therefore deployable, 4) develop and test standard battery storage/container systems that can safely house batteries and withstand catastrophic failure (thermal runaway) of the batteries within the container while minimizing damage to surrounding equipment and platforms, 5) streamline the battery safety certification process especially for high energy storage magazines and other large battery designs (lasers) to allow battery based weapon systems to be fielded in time to support strategic needs, 6)					

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 2566 / *Battery Development and Safety*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
develop hazard mitigation technologies to support rapid safe deployment of advanced batteries to support weapon systems. ***FY 2022 OCO Plans:*** N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** $38K Decrease due to Program Sponsor Reduction.					
Accomplishments/Planned Programs Subtotals	0.000	0.000	5.913	0.000	5.913

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

RDT&E Contracts are Competitive Procurements.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy			Date: May 2021
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603724N / *Navy Energy Program*	Project (Number/Name) 2566 / *Battery Development and Safety*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	WR	NSWC PD : Philadelphia, PA	0.000	0.000		0.000		0.500	Nov 2021	-		0.500	-	-	-
Primary Hardware Development	WR	NSWC CD : Bethesda, MD	0.000	0.000		0.000		0.632	Nov 2021	-		0.632	-	-	-
Engineering Development	WR	NSWC CD : Bethesda, MD	0.000	0.000		0.000		0.200	Nov 2021	-		0.200	-	-	-
Demonstration & Evaluation	WR	NSWC CD : Bethesda, MD	0.000	0.000		0.000		0.200	Nov 2021	-		0.200	-	-	-
System Development	C/BOA	NAWC-AD : Lakehurst, NJ	0.000	0.000		0.000		0.300	Dec 2021	-		0.300	-	-	-
Systems Engineering	WR	NSWC DD : Dahlgren, VA	0.000	0.000		0.000		0.000		-		0.000	-	-	-
		Subtotal	0.000	0.000		0.000		1.832		-		1.832	-	-	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Support	WR	NSWC CD : Bethesda, MD	0.000	0.000		0.000		0.500	Dec 2021	-		0.500	-	-	-
Study Analysis	WR	NSWC CD : Bethesda, MD	0.000	0.000		0.000		0.500	Nov 2021	-		0.500	-	-	-
Development Support	C/CPAF	NSWC PD : Philadelphia, PA	0.000	0.000		0.000		0.500	Dec 2021	-		0.500	-	-	-
Development Support	WR	NSWC PD : Philadelphia, PA	0.000	0.000		0.000		0.300	Dec 2021	-		0.300	-	-	-
		Subtotal	0.000	0.000		0.000		1.800		-		1.800	-	-	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy			Date: May 2021
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603724N / *Navy Energy Program*	Project (Number/Name) 2566 / *Battery Development and Safety*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	NSWC CD : Bethesda, MD	0.000	0.000		0.000		0.436	Jan 2022	-		0.436	-	-	-
Operational Test & Evaluation	WR	NSWC CD : Bethesda, MD	0.000	0.000		0.000		0.455	Jan 2022	-		0.455	-	-	-
Operational Test & Evaluation	C/CPAF	NAWC-AD : Paxtuxtent, MD	0.000	0.000		0.000		0.300	Feb 2022	-		0.300	-	-	-
Operational Test & Evaluation	WR	NSWC CR : Crane, IN	0.000	0.000		0.000		0.300	Nov 2021	-		0.300	-	-	-
Developmental Test & Evaluation	WR	NSWC CR : Crane, IN	0.000	0.000		0.000		0.400	Nov 2021	-		0.400	-	-	-
		Subtotal	0.000	0.000		0.000		1.891		-		1.891	-	-	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	WR	NSWC PD : Philadelphia, PA	0.000	0.000		0.000		0.100	Nov 2021	-		0.100	-	-	-
Travel	Allot	NAVSEA HQ : Washington, DC	0.000	0.000		0.000		0.030	Jan 2022	-		0.030	-	-	-
Total Assets	WR	NSWC CD : Bethesda, MD	0.000	0.000		0.000		0.200	Feb 2022	-		0.200	-	-	-
Program Management Support	WR	NSWC CD : Bethesda, MD	0.000	0.000		0.000		0.060	Dec 2021	-		0.060	-	-	-
		Subtotal	0.000	0.000		0.000		0.390		-		0.390	-	-	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		0.000		5.913		-		5.913	-	-	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 2566 / *Battery Development and Safety*

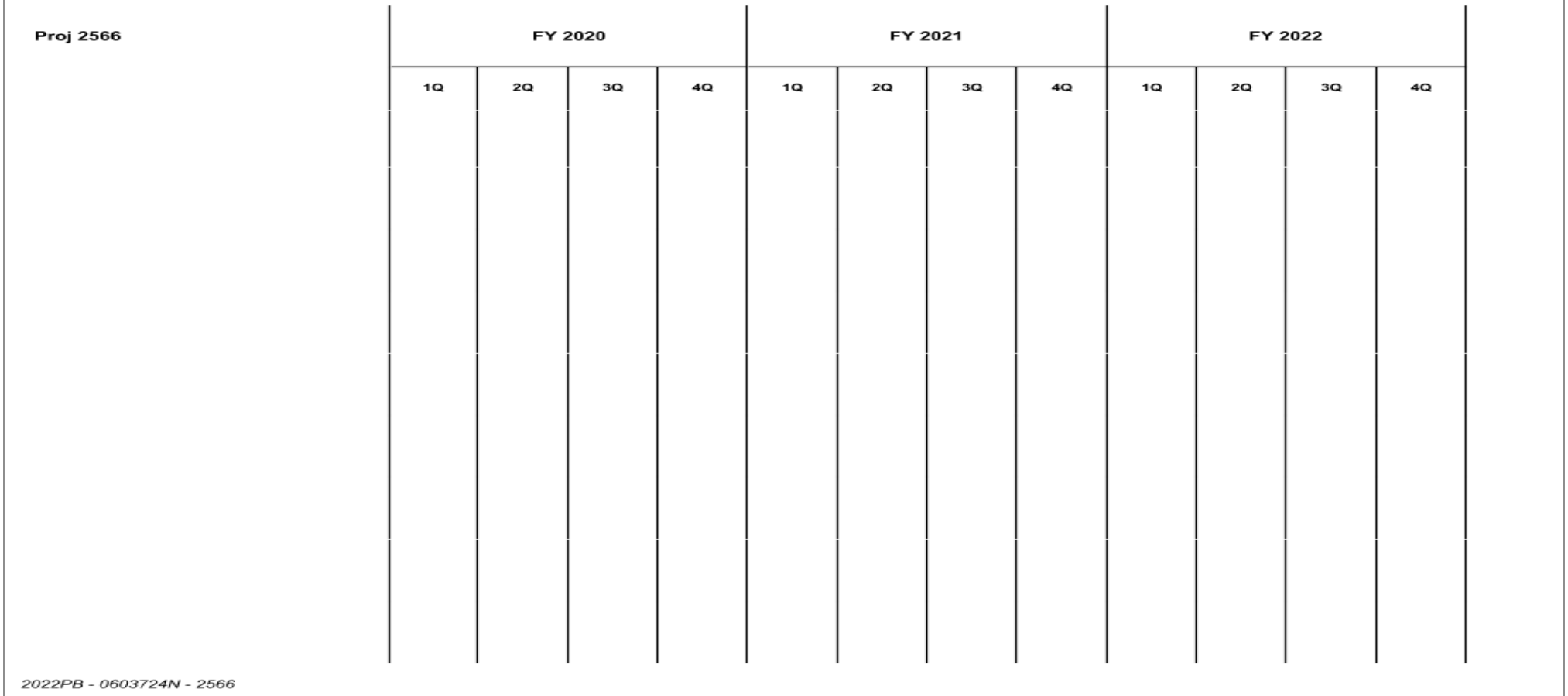


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 2566 / *Battery Development and Safety*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2566				
Establish Standard Family of Battery Database	1	2022	4	2022
Streamline the Battery Safety Certification Process	1	2022	4	2022
Establish Common Battery Standards and Requirements	1	2022	4	2022
Develop and Test Standard Battery Storage/Container Systems	2	2022	4	2022

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy											Date: May 2021	
Appropriation/Budget Activity 1319 / 4					R-1 Program Element (Number/Name) PE 0603724N / *Navy Energy Program*				Project (Number/Name) 9999 / *Congressional Adds*			
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
9999: *Congressional Adds*	55.656	30.400	33.000	0.000	-	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

FY2020 Congressional Add for C545-Marine energy systems for sensors and microgrids
FY2020 Congressional Add for C546-Navy energy program/shore energy.
FY2021 Congressional Add for C492 - Natural Gas Technologies.
FY2021 Congressional Add for C671 - System Sensors Microgrids.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021
Congressional Add: Program Increase ***FY 2020 Accomplishments:*** N/A ***FY 2021 Plans:*** N/A	14.471	15.000
Congressional Add: Natural Gas Technologies ***FY 2020 Accomplishments:*** N/A ***FY 2021 Plans:*** N/A	0.000	7.500
Congressional Add: Marine energy systems for sensors and microgrids ***FY 2020 Accomplishments:*** N/A ***FY 2021 Plans:*** N/A	11.102	0.000
Congressional Add: Navy energy program/shore energy ***FY 2020 Accomplishments:*** N/A ***FY 2021 Plans:*** N/A	4.827	0.000
Congressional Add: Marine Energy Converters for Sensors and Microgrids ***FY 2020 Accomplishments:*** N/A ***FY 2021 Plans:*** N/A	0.000	10.500
Congressional Adds Subtotals	30.400	33.000

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 9999 / *Congressional Adds*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

RDTEN Contracts are Competitive Procurements

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy			Date: May 2021
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603724N / *Navy Energy Program*	Project (Number/Name) 9999 / *Congressional Adds*	

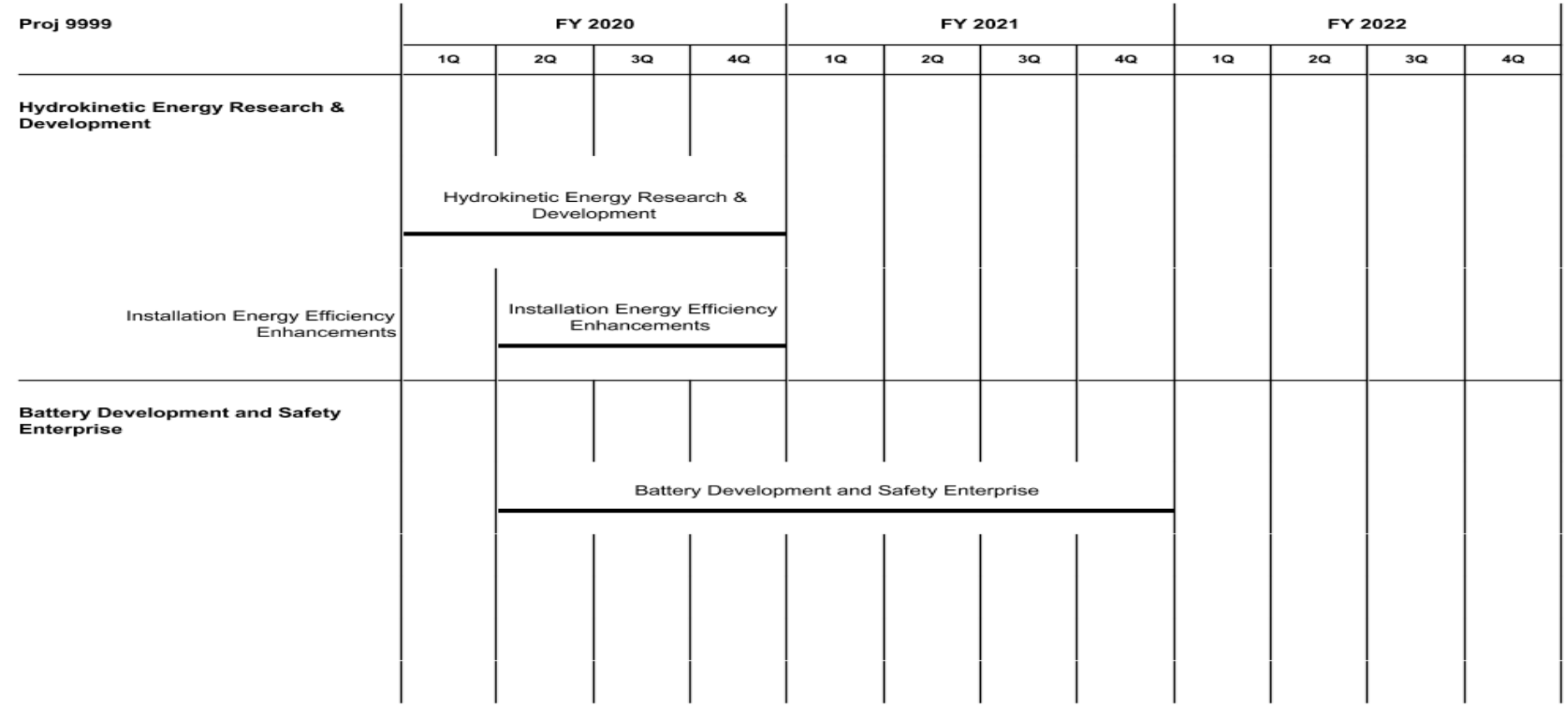
Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Hydrokinetic Energy Research & Development	Various	EXWC : Port Hueneme, CA	15.915	0.000		0.000		0.000		-		0.000	-	-	-
Renewable Energy Development	Various	EXWC : Port Hueneme, CA	30.905	0.000		0.000		0.000		-		0.000	-	-	-
Installation Energy Efficiency Enhancements	Various	EXWC : Port Hueneme, CA	4.836	0.000		0.000		0.000		-		0.000	-	-	-
Natural Gas Technology	Various	EXWC : Port Hueneme, CA	4.000	0.000		0.000		0.000		-		0.000	-	-	-
C545-Marine energy systems for sensors and microgrids	Various	University Affialisted Research Center : Port Hueneme, CA	0.000	8.000	Sep 2020	0.000		0.000		-		0.000	-	-	-
C545-Marine energy systems for sensors and microgrids	Various	Wage energy Support Contractor/ EXWC : Port Hueneme, CA	0.000	3.102	Sep 2020	0.000		0.000		-		0.000	-	-	-
C546-Navy energy program/shore energy	Various	EXWC : Port Hueneme, CA	0.000	4.827	Sep 2020	0.000		0.000		-		0.000	-	-	-
Battery Development and Safety Enterprise	TBD	TBD : TBD	0.000	14.471	Sep 2020	15.000	Sep 2021	0.000		-		0.000	-	-	-
C492 - Natural Gas Technologies	Various	EXWC : Port Hueneme, CA	0.000	0.000		7.500	Sep 2021	0.000		-		0.000	-	-	-
C671 - System Sensors Microgrids	Various	EXWC : Port Hueneme, CA	0.000	0.000		10.500	Sep 2021	0.000		-		0.000	-	-	-
		Subtotal	55.656	30.400		33.000		0.000		-		0.000	-	-	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	55.656	30.400		33.000		0.000		-		0.000	-	-	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 9999 / *Congressional Adds*



2022PB - 0603724N - 9999

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 9999 / *Congressional Adds*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 9999				
Hydrokinetic Energy Research & Development: Hydrokinetic Energy Research & Development	1	2020	4	2020
Hydrokinetic Energy Research & Development: Installation Energy Efficiency Enhancements: Installation Energy Efficiency Enhancements	2	2020	4	2020
Hydrokinetic Energy Research & Development: Installation Energy Efficiency Enhancements: Project C545-Marine energy systems for sensors and microgrids	4	2020	4	2022
Hydrokinetic Energy Research & Development: Installation Energy Efficiency Enhancements: Project C546-Navy energy program/shore energy	4	2020	4	2022
Battery Development and Safety Enterprise: Battery Development and Safety Enterprise	2	2020	4	2021