Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Navy											Date: February 2020	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603724N / *Navy Energy Program*							
COST ($ in Millions)	**Prior Years**	**FY 2019**	**FY 2020**	**FY 2021 Base**	**FY 2021 OCO**	**FY 2021 Total**	**FY 2022**	**FY 2023**	**FY 2024**	**FY 2025**	**Cost To Complete**	**Total Cost**
Total Program Element	437.721	31.726	58.014	23.422	-	23.422	29.646	29.462	28.590	29.163	Continuing	Continuing
0829: *ENERGY CONSERVATION (ADV)*	85.049	6.532	5.607	5.811	-	5.811	5.874	5.983	6.102	6.223	Continuing	Continuing
0838: *Mobility Fuels (ADV)*	99.609	7.774	8.281	7.463	-	7.463	9.078	9.058	8.874	9.051	Continuing	Continuing
0928: *Shore Energy Technology*	53.982	1.682	1.869	1.879	-	1.879	1.920	1.960	1.998	2.039	Continuing	Continuing
0996: *Aircraft Energy Conservation*	150.182	8.981	10.757	8.269	-	8.269	12.774	12.461	11.616	11.850	Continuing	Continuing
9999: *Congressional Adds*	48.899	6.757	31.500	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	87.156

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.

B. Program Change Summary ($ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	32.656	26.514	26.915	-	26.915
Current President's Budget	31.726	58.014	23.422	-	23.422
Total Adjustments	-0.930	31.500	-3.493	-	-3.493
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	31.500			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.930	0.000			
• Program Adjustments	0.000	0.000	-3.518	-	-3.518
• Rate/Misc Adjustments	0.000	0.000	0.025	-	0.025

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Navy	Date: February 2020
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*

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2019	FY 2020
Project: 9999: *Congressional Adds*		
Congressional Add: *Program Increase*	0.000	15.000
Congressional Add: *Program Increase: Renewable Energy Development*	6.757	0.000
Congressional Add: *Marine energy systems for sensors and microgrids*	0.000	11.500
Congressional Add: *Navy energy program/shore energy*	0.000	5.000
Congressional Add Subtotals for Project: 9999	6.757	31.500
Congressional Add Totals for all Projects	6.757	31.500

Change Summary Explanation

Schedule:

Technical:

0838 - The FY 2021 funding request was reduced by $0.902 million to account for the availability of prior year execution balances.

0996 - Program pivoting to ASN energy guidance focusing on capability enhancing efficiency, power and energy technologies vice conservation. The FY 2021 funding request was reduced by $2.682 million to account for the availability of prior year execution balances.

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy			Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
0829: *ENERGY CONSERVATION (ADV)*	85.049	6.532	5.607	5.811	-	5.811	5.874	5.983	6.102	6.223	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

The Energy Conservation Advanced Project is designed to develop, test, and evaluate energy and maintenance saving improvements for existing and future Fleet assets with the aim of extending the operational reach of current and future platforms systems through more effective use of energy. This energy conservation project, managed through NAVSEA 05T, will identify mature potential energy saving areas by 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, employ high power and energy systems). Potential technology areas include Power Generation and Storage, Hull Hydrodynamics, Underwater Hull Husbandry, Heating, Ventilation & Air Conditioning (HVAC) Systems, Thermal Management, Main Propulsion Systems, Electrical Systems, Auxiliary Systems, and Energy Monitoring, Planning, and Assessment. Promising energy management 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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Power Generation and Storage Sub Project	0.000	0.000	0.300	0.000	0.300
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 2020 Plans: N/A					
FY 2021 Base 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					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
invests in novel approaches to generate, store, and manage energy to support future systems on current and future ship classes. ***FY 2021 OCO Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Increase of 0.300M reflects a decrease in Global Energy Information System (GENISYS) development efforts and development of technologies that improve energy conservation and increase operational capabilities in the Power Generation and Storage functional area.					
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 2020 Plans:*** N/A ***FY 2021 Base Plans:*** Conduct assessments and mature hardware designs for hull hydrodynamic projects including "stern flaps." Perform stern flap integration studies on Fleet assets, which may including retrofit hardware for LCS-3 (and subsequent) or new construction designs for FFG(X). Efforts include conducting 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 Availability Plan. ***FY 2021 OCO Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Increase of 0.735M reflects a decrease in GENISYS development efforts and development of technologies that improve energy conservation and increase operational capabilities in the hull hydrodynamic functional area.	0.000 -	0.000 -	0.735 -	0.000 -	0.735 -
Title: Thermal Management Sub Project ***Articles:***	0.256 -	0.000 -	0.000 -	0.000 -	0.000 -

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Description: (U) 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 2020 Plans:*** N/A ***FY 2021 Base Plans:*** N/A ***FY 2021 OCO Plans:*** N/A					
Title: Energy Monitoring & Assessment	6.276	5.607	4.776	0.000	4.776
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 2020 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. Continue GENISYS development efforts and shipboard evaluation including integration of GENISYS with enterprise Remote Monitoring (eRM) capabilities to support future fleet-wide implementation. Support expanding the use of the data collected by GENISYS to support Maritime Energy Operational Command and Control requirements currently being developed by DASN RD&A and US Fleet Forces Command. Continue to identify additional energy saving/capability improvement technologies and monitoring methodologies and prepare proposals and business case analyses for promising technologies with potential to reduce fossil fuel. ***FY 2021 Base 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.					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 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 2021 OCO Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Decrease of 0.906M is result of GENISYS development efforts winding down in FY21 and putting additional focus on pursuit of promising technologies in other functional areas such as Hull Hydrodynamics and Power Generation & Storage.					
Accomplishments/Planned Programs Subtotals	6.532	5.607	5.811	0.000	5.811

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 2021 Navy		Date: February 2020
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 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	C/CPFF	NAVSEA HQ : Washington, DC	1.110	0.000		0.200	Jan 2020	0.000		-		0.000	0.000	1.310	-
Systems Engineering	WR	NSWC DD : Dahlgren, MD	0.100	0.000		0.000		0.000		-		0.000	0.000	0.100	-
Systems Engineering	WR	NSWC PHila : Philadelphia, PA	2.734	0.328	Nov 2018	0.100	Nov 2019	0.375	Nov 2020	-		0.375	0.000	3.537	-
Primary Hardware Development	WR	NSWC Carderock : Bethesda, MD	8.983	0.000		0.000		0.000		-		0.000	0.000	8.983	-
Systems Engineering	WR	NSWC PHD : Port Hueneme, CA	0.100	0.000		0.000		0.000		-		0.000	0.000	0.100	-
Systems Engineering	C/CPAF	NSWC Carderock : Bethesda, MD	6.948	0.000		0.000		0.000		-		0.000	0.000	6.948	-
Engineering Development	WR	NSWC Carderock : Bethesda, MD	8.369	0.000		0.000		0.633	Nov 2020	-		0.633	0.000	9.002	-
Demonstration & Evaluation	WR	NSWC Carderock : Bethesda, MD	8.149	0.000		0.000		0.000		-		0.000	0.000	8.149	-
System Development	C/BOA	NAWC-AD : Lakehurst, NJ	2.586	2.769	Jan 2019	0.883	Jan 2020	0.800	Jan 2021	-		0.800	0.000	7.038	-
Primary Hardware Development	C/CPAF	NSWC PHila : Philadelphia, PA	0.000	0.000		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	0.000	0.300	-
System Engineering	WR	NUWC NPT : Newport, Rhode Is	0.193	0.000		0.000		0.000		-		0.000	0.000	0.193	-
		Subtotal	39.572	3.097		1.183		1.808		-		1.808	0.000	45.660	N/A

Remarks

Decrease of 0.200M for Systems Engineering / NAVSEA HQ reflects reduced contract support in product development at HQ; Increase of 0.200M for Systems Engineering / NSWC Phila and 0.633M increase for Engineering Development / NSWC CD reflects gradual shift from GENISYS development to Warfare Center support of shipboard new technology product development. Decrease of 0.083M for System Development NAWC-AD reflects decrease of GENISYS product development as it's focus shifts toward test & evaluation.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy			Date: February 2020
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 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Support	WR	NSWC Carderock : Bethesda, MD	2.843	0.344	Nov 2018	0.217	Nov 2019	0.280	Nov 2020	-		0.280	Continuing	Continuing	Continuing
Software Support	WR	NSWC Carderock : Bethesda, MD	0.522	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Integrated Logistics Support	WR	NSWC Carderock : Bethesda, MD	1.200	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Study Anaylsis	WR	NSWC Carderock : Bethesda, MD	1.174	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Development Support	C/CPAF	NSWC SSES : Philadelphia, PA	0.878	0.100	Jan 2019	0.050	Jan 2020	0.000		-		0.000	0.000	1.028	-
Development Support	C/CPAF	NAVSEA HQ : Washington, DC	1.565	0.479	Jan 2019	0.421	Jan 2020	0.430	Jan 2021	-		0.430	0.000	2.895	-
Software Support	C/CPAF	NSWC SSES : Philadelphia, PA	0.281	0.000		0.000		0.000		-		0.000	0.000	0.281	-
Software Support	C/CPAF	NAVSEA HQ : Washington, DC	1.200	0.000		0.000		0.000		-		0.000	0.000	1.200	-
Development Support	WR	NSWC PHila : Philadelphia, PA	2.296	0.337	Nov 2018	0.397	Nov 2019	0.208	Nov 2020	-		0.208	0.000	3.238	-
Development Support	C/CPAF	SUPSHIP : Bath, MA	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
Development Support	WR	NSWC DD : Dahlgren, Va	0.050	0.000		0.000		0.000		-		0.000	0.000	0.050	-
Development Support	WR	SPAWAR : Charleston, SC	0.000	0.000		0.000		0.190	Nov 2020	-		0.190	0.000	0.190	-
		Subtotal	12.009	1.260		1.085		1.108		-		1.108	Continuing	Continuing	N/A

Remarks

Increase of 0.063M for Development Support / NSWC CD reflects increased support related to stern flap design; decrease of 0.50M and 0.189M for Development Support / NSWC Phila reflects shift from Support to Product Development and increase of 0.190M for Development Support / SPAWAR reflects support of GENISYS Software Cloud Hosting services.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy		Date: February 2020
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 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	NSWC Carderock : Bethesda, MD	9.961	0.085	Dec 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Operational Test & Evaluation	WR	NSWC Carderock : Bethesda, MD	10.645	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
LIve Fire Test & Evaluation	WR	NSWC Carderock : Bethesda, MD	0.382	0.000		0.000		0.000		-		0.000	0.000	0.382	-
Developmental Test & Evaluation	C/CPAF	NSWC Philadelphia : Philadelphia, PA	0.383	0.000		0.000		0.000		-		0.000	0.000	0.383	-
Developmental Test & Evaluation	WR	NSWC SSES : Philadelphia, PA	0.918	0.000		0.000		0.000		-		0.000	0.000	0.918	-
Developmental Test & Evaluation	WR	APL : Washington, DC	0.000	0.085	Jan 2019	0.000		0.000		-		0.000	0.000	0.085	-
System Development	C/BOA	NAWC-AD : Lakehurst, NJ	0.000	0.000		1.924	Jan 2020	1.715	Dec 2020	-		1.715	0.000	3.639	-
		Subtotal	22.289	0.170		1.924		1.715		-		1.715	Continuing	Continuing	N/A

Remarks

Decrease of 0.209M for System Development / NAWC-AD reflects reduced GENISYS Software development effort as it approaches Initial Operating Capability (IOC).

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	WR	NSWC Philadelphia : Philadelphia, PA	7.100	0.000		0.000		0.328	Dec 2020	-		0.328	0.000	7.428	-
Travel	Allot	NAVSEA HQ : Washington, DC	0.202	0.007	Dec 2018	0.007	Dec 2019	0.021	Dec 2020	-		0.021	0.000	0.237	-
Total Assets	WR	NSWC Carderock : Bethesda, MD	0.352	0.000		0.000		0.000		-		0.000	0.000	0.352	-
Program Management Support	C/CPAF	NAVSEA HQ : Washington, DC	2.493	1.978	Jan 2019	1.388	Jan 2020	0.729	Jan 2021	-		0.729	0.000	6.588	-
Program Management Support	WR	NSWC Carderock : Bethesda, MD	1.032	0.020	Mar 2019	0.020	Mar 2020	0.102	Oct 2020	-		0.102	0.000	1.174	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy		Date: February 2020
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 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Subtotal			11.179	2.005		1.415		1.180		-		1.180	0.000	15.779	N/A

Remarks

Increase of 0.328 for Program Management Support / NSWC Phila reflects need to manage efforts associated with Engineering Product Development; increase of 0.014M for travel reflects need to visit fleet activities; Decrease of 0.659M for Program Management Support reflects decrease in contractor support efforts; increase of 0.082M in Program Management support / NSWC CD reflects need to oversee engineering product development efforts.

	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	85.049	6.532		5.607		5.811		-		5.811	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0829 / *ENERGY CONSERVATION (ADV)*

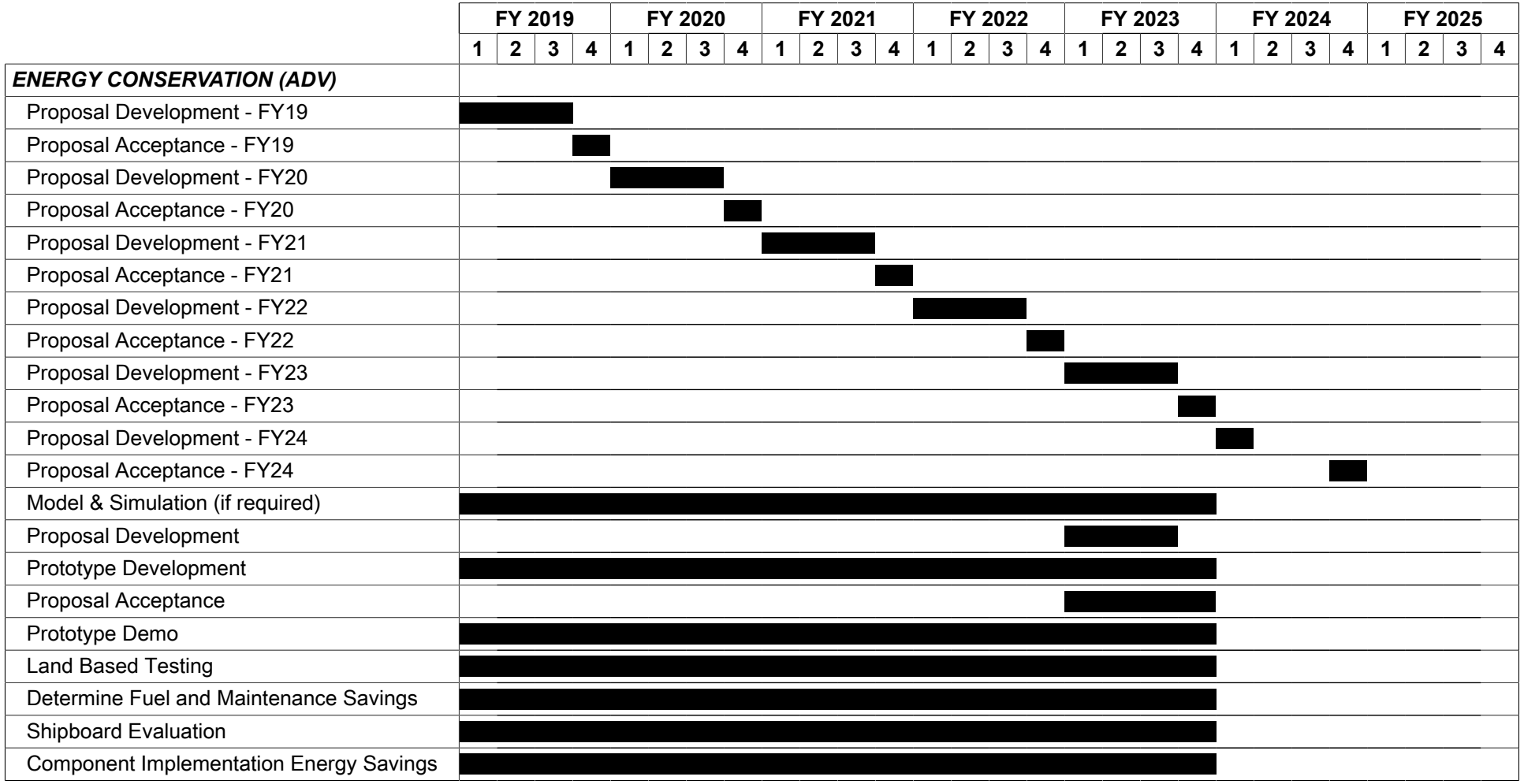

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0829 / *ENERGY CONSERVATION (ADV)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
ENERGY CONSERVATION (ADV)				
Proposal Development - FY19	1	2019	3	2019
Proposal Acceptance - FY19	4	2019	4	2019
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
Proposal Development - FY23	1	2023	3	2023
Proposal Acceptance - FY23	4	2023	4	2023
Proposal Development - FY24	1	2024	1	2024
Proposal Acceptance - FY24	4	2024	4	2024
Model & Simulation (if required)	1	2019	4	2023
Proposal Development	1	2023	3	2023
Prototype Development	1	2019	4	2023
Proposal Acceptance	1	2023	4	2023
Prototype Demo	1	2019	4	2023
Land Based Testing	1	2019	4	2023
Determine Fuel and Maintenance Savings	1	2019	4	2023
Shipboard Evaluation	1	2019	4	2023
Component Implementation Energy Savings	1	2019	4	2023

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy			Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
0838: *Mobility Fuels (ADV)*	99.609	7.774	8.281	7.463	-	7.463	9.078	9.058	8.874	9.051	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

The FY2021 funding request was reduced by $0.902 million to account for the availability of prior year execution balances.

A. Mission Description and Budget Item Justification

This project represents the Navy's only RDTE investment designed to maintain 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 of 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 project provides data through laboratory, component, engine, fuel system, 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 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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Naval Tactical Fuels	7.774	8.281	7.463	0.000	7.463
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					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
evolutionary changes in the fuel supply industry and e) improve fleet methods to ensure fuel quality and performance. ***FY 2020 Plans:*** Develop and evaluate forward-positioned fuel chemistry and property Quality Surveillance sensor systems. Continue development of interactive data visualization and data science tools to rapidly analyze fuel property, composition, performance, and logistics data. Field trial advance fuel contamination quality surveillance technology. Conduct lab, rig and component tests to assure interoperability with evolving commercial specification and platform requirements. ***FY 2021 Base Plans:*** 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 2021 OCO Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** The FY 2021 funding request was reduced to account for the availability of prior year execution balances. Decrease of FY21 funding will delay the development of advance composition measurement capability needed to expedite field problem root cause investigations by 18 months.					
Accomplishments/Planned Programs Subtotals	7.774	8.281	7.463	0.000	7.463

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 2021 Navy			Date: February 2020
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 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	WR	NRL : Washington, D.C.	6.152	0.800	Dec 2018	1.000	Dec 2019	1.000	Dec 2020	-		1.000	Continuing	Continuing	Continuing
Systems Engineering	WR	NAWCAD : Patuxent River, MD	19.115	2.046	Dec 2018	2.187	Dec 2019	2.200	Dec 2020	-		2.200	Continuing	Continuing	Continuing
Systems Engineering	WR	NSWC : Philadelphia, PA	3.928	0.453	Jan 2019	0.500	Jan 2020	0.500	Jan 2021	-		0.500	Continuing	Continuing	Continuing
Systems Engineering	WR	NSWC : Bethesda, MD	0.362	0.100	Mar 2019	0.000		0.000		-		0.000	0.000	0.462	-
Systems Engineering	C/FFP	Various : Various	2.083	0.652	Apr 2019	1.021	Apr 2020	1.000	Apr 2021	-		1.000	0.000	4.756	4.756
Prior year Prod Dev no longer funded in the FYDP	Various	Various : Various	0.161	0.000		0.000		0.000		-		0.000	0.000	0.161	-
		Subtotal	31.801	4.051		4.708		4.700		-		4.700	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Hardware Testing	WR	NAWCAD : Patuxent River, MD	4.649	0.200	Dec 2018	1.000	Dec 2019	0.500	Dec 2020	-		0.500	Continuing	Continuing	Continuing
Hardware Testing	C/CPFF	Life Cycle Engineering : Charleston, SC	14.980	1.943	Apr 2019	2.000	Mar 2020	2.000	Mar 2021	-		2.000	0.000	20.923	20.923
Hardware Testing	C/CPFF	Univ of Dayton Research Inst : Dayton, OH	0.889	0.400	Feb 2019	0.000		0.000		-		0.000	0.000	1.289	1.289
Hardware Testing	WR	US Naval Academy : Annapolis, MD	0.148	0.000	Apr 2019	0.040	Apr 2020	0.000		-		0.000	0.000	0.188	-
Hardware Testing	C/FFP	Various : Various	6.683	0.920	Feb 2019	0.223	Mar 2020	0.000		-		0.000	0.000	7.826	7.826
Fuel Delivery	MIPR	DLA-Energy : Ft. Belvoir, VA	0.647	0.000		0.050	Jan 2020	0.025	Jan 2021	-		0.025	0.000	0.722	-
Prior year T & E no longer funded in the FYDP	Various	Various : Various	31.545	0.000		0.000		0.000		-		0.000	0.000	31.545	-
		Subtotal	59.541	3.463		3.313		2.525		-		2.525	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy		Date: February 2020
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 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract

Remarks

All prior year lines have been consolidated.

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	WR	NAWCAD : Patuxent River, MD	1.591	0.250	Dec 2018	0.250	Dec 2019	0.228	Dec 2020	-		0.228	Continuing	Continuing	Continuing
Program Management Support	C/FFP	Coord Research Council : Alpharetta, GA	0.060	0.010	Nov 2018	0.010	Nov 2019	0.010	Nov 2020	-		0.010	0.000	0.090	0.080
Prior year Mgmt Supp no longer funded in the FYDP	Various	Various : Various	6.616	0.000		0.000		0.000		-		0.000	0.000	6.616	-
		Subtotal	8.267	0.260		0.260		0.238		-		0.238	Continuing	Continuing	N/A

Remarks

1.

	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	99.609	7.774		8.281		7.463		-		7.463	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0838 / *Mobility Fuels (ADV)*

Mobility Fuels– Project 0838 Schedule

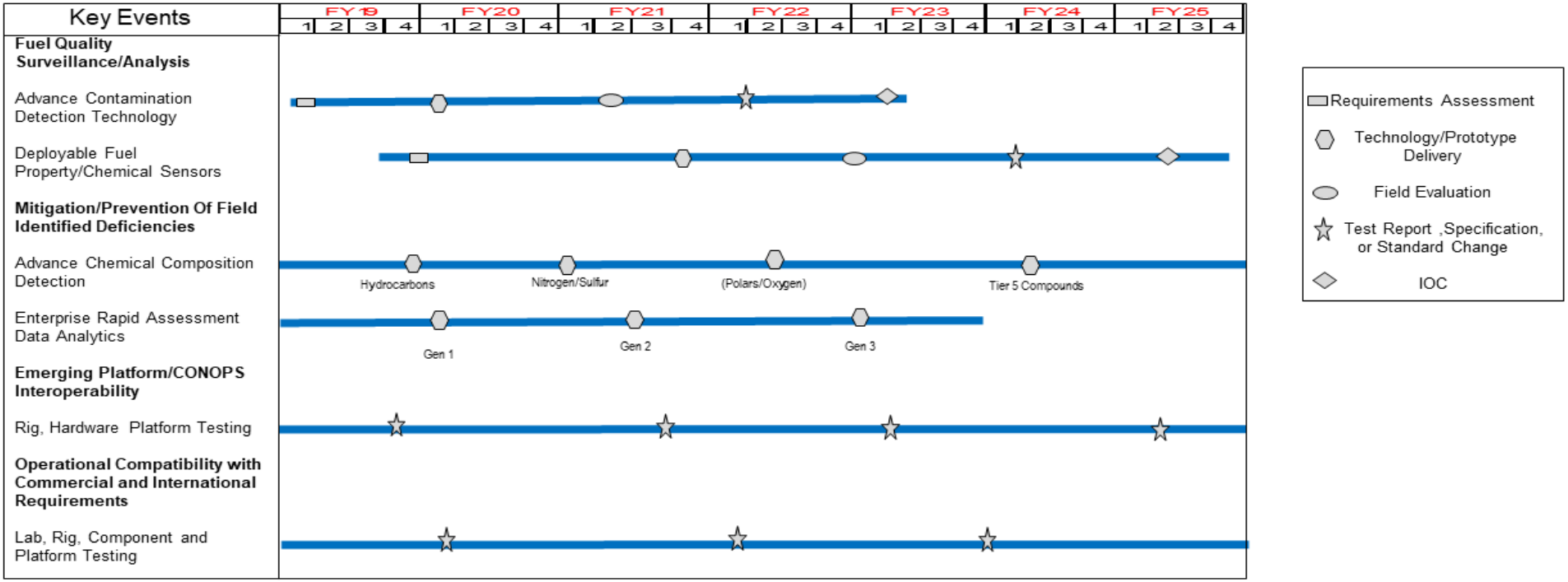

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0838 / *Mobility Fuels (ADV)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Mobility Fuels (ADV)				
Fuel Quality Surveillance/Analysis: Advance Chemical Composition Detection	1	2019	2	2023
Fuel Quality Surveillance/Analysis: Deployable Fuel Property/Chemical Sensors	3	2019	4	2025
Mitigation of Field Identified Deficiencies: Develop and Implement advance fuel chemistry and properties analysis test methods and technologies	1	2019	4	2025
Mitigation of Field Identified Deficiencies: Enterprise Rapid Assessment Data Analytics	1	2019	4	2023
Emerging platform/CONOPS fuel interoperability: Conduct rig, component and hardware testing	1	2019	4	2025
Maintain operational compatibility with Commercial and International Fuel Specifications: Conduct laboratory, rig and hardware testing.	1	2019	4	2025

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy			Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
0928: *Shore Energy Technology*	53.982	1.682	1.869	1.879	-	1.879	1.920	1.960	1.998	2.039	Continuing	Continuing
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Shore Energy Technology	1.682	1.869	1.879	0.000	1.879
Articles:	-	-	-	-	-
FY 2020 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 2021 Base Plans: -Development and demonstrate of large-scale energy storage sites to include cyber security measures. -Development and demostrate 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 2021 Navy		Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
-Development and demonstrate predictive modeling, neural network, and predictive energy tools. ***FY 2021 OCO Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** - FY 2020 to FY 2021 Increase/Decrease Statement: Increase of $0.01 in FY2021 budget due to additional investment in the demonstration of large-scale energy storage in operational locations.					
Accomplishments/Planned Programs Subtotals	1.682	1.869	1.879	0.000	1.879

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 2021 Navy			Date: February 2020
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 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Renewable Energy	WR	EXWC : Port Hueneme, CA	42.260	0.000		0.040	Mar 2020	0.027	Oct 2020	-		0.027	Continuing	Continuing	Continuing
Energy Resiliency and Reliability, Security and Systems (Includes cybersecurity)	Various	EXWC : Port Hueneme, CA	6.400	1.682	Oct 2018	1.374	Oct 2019	0.800	Oct 2020	-		0.800	Continuing	Continuing	Continuing
Energy Storage	WR	EXWC : Port Hueneme, CA	5.322	0.000		0.455	Mar 2020	0.842	Oct 2020	-		0.842	Continuing	Continuing	Continuing
Renewable Energy (Direct Cite)	Various	EXWC : Port Hueneme, CA	0.000	0.000		0.000		0.210	Dec 2020	-		0.210	0.000	0.210	-
		Subtotal	53.982	1.682		1.869		1.879		-		1.879	Continuing	Continuing	N/A

Remarks

-Renewable Energy: ($0.040 FY20 - $0.27 in FY21): Increase in FY21 budget due to additional investment in demonstration of advanced large-scale energy collection technologies
- Energy Resiliency: ($1.374 FY20 - $0.800 in FY21): Decreased in FY21 due to shifting funding to renewable energy and to energy storage.
- Energy Storage: ($0.455 FY20 - $0.842 in FY21): Increase in FY21 budget due to additional investment in the demonstration of large-scale energy storage in operational locations

	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	53.982	1.682		1.869		1.879		-		1.879	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0928 / *Shore Energy Technology*

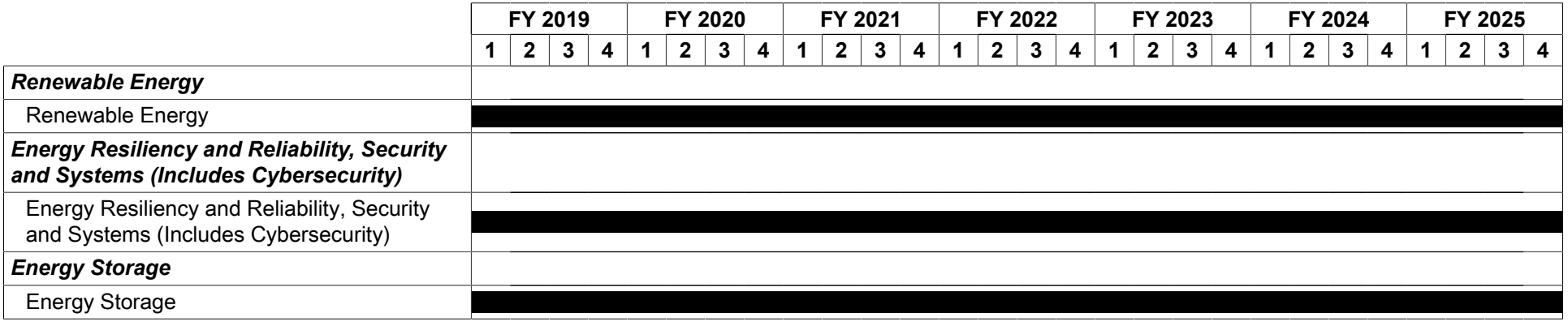


Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0928 / *Shore Energy Technology*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Renewable Energy				
Renewable Energy	1	2019	4	2025
Energy Resiliency and Reliability, Security and Systems (Includes Cybersecurity)				
Energy Resiliency and Reliability, Security and Systems (Includes Cybersecurity)	1	2019	4	2025
Energy Storage				
Energy Storage	1	2019	4	2025

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy			Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
0996: *Aircraft Energy Conservation*	150.182	8.981	10.757	8.269	-	8.269	12.774	12.461	11.616	11.850	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

The FY2021 funding request was reduced by $2.682 million to account for the availability of prior year execution balances.

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 energy efficiency has a direct relationship to enhanced combat capability in austere operating environments and meet the challenges of emerging threats. This program engages technical experts from across Naval aviation, industry, and academia to identify potential energy efficiency, best practices and technologies for development, testing and assessment to determine technical viability and potential benefit to mission capability.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Aircraft Operational Energy	8.981	10.757	8.269	0.000	8.269
Articles:	-	-	-	-	-
FY 2020 Plans: Continue identification, testing and assessment of energy efficiency best practices, technologies and metrics. Conduct MQ-8C engine efficiency technology air vehicle integration testing. Continue fielding and assessing algorithm to optimize trim/reduce drag of F-18 during flight. Assess potential to expand Naval Aviation Energy Dashboard with maintenance/reliability metrics. Develop multiple classes of lithium ion battery designs for aviation applications.					
FY 2021 Base 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 2021 OCO Plans: N/A					
FY 2020 to FY 2021 Increase/Decrease Statement:					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0996 / *Aircraft Energy Conservation*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
The FY 2021 funding request was reduced to account for the availability of prior year execution balances. Decrease identified engine related efficiency testing by 18 months delaying potential validation of efficiencies and implementation.					
Accomplishments/Planned Programs Subtotals	8.981	10.757	8.269	0.000	8.269

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

This is a non-acquisition program that develops, evaluates, and validates mature technologies in support of energy efficiency and increased mission capability.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy		Date: February 2020
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 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	WR	NAWCAD : Patuxent River, MD	7.369	1.100	Dec 2018	2.257	Dec 2019	2.500	Dec 2020	-		2.500	Continuing	Continuing	Continuing
Systems Engineering	C/CPFF	The Boeing Company : Seattle, WA	1.150	0.850	Jan 2019	0.000		0.000		-		0.000	0.000	2.000	1.750
Systems Engineering	C/CPFF	Various : Various	8.009	4.394	Mar 2019	3.100	Mar 2020	2.439	Apr 2021	-		2.439	0.000	17.942	18.611
Systems Engineering	C/BA	Deloitte Consulting : Alexandria, VA	1.600	0.971	Apr 2019	1.000	Apr 2020	1.000	Apr 2021	-		1.000	0.000	4.571	4.800
Prior year Sys Eng no longer funded in the FYDP	Various	Various : Various	3.612	0.000		0.000		0.000		-		0.000	0.000	3.612	-
		Subtotal	21.740	7.315		6.357		5.939		-		5.939	Continuing	Continuing	N/A

Remarks

3. Decrease of $0.661 in FY21 will delay the development and validation of aircraft thermal management models.
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 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Hardware Testing	WR	NAWCAD : Patuxent River, MD	4.885	0.651	Dec 2018	1.000	Jan 2020	1.000	Jan 2021	-		1.000	Continuing	Continuing	Continuing
Hardware Testing	C/CPFF	Various : Various	0.000	0.740	Mar 2019	3.000	Mar 2020	1.000	Mar 2021	-		1.000	0.000	4.740	5.000
Prior year T&E no longer funded in the FYDP	Various	Various : Various	117.125	0.000		0.000		0.000		-		0.000	0.000	117.125	-
		Subtotal	122.010	1.391		4.000		2.000		-		2.000	Continuing	Continuing	N/A

Remarks

2. Decrease of 2.000 in FY21 will delay the testing of identified component engine efficiency technologies.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy		Date: February 2020
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 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	WR	NAWCAD : Patuxent River, MD	1.920	0.275	Dec 2018	0.400	Nov 2019	0.330	Dec 2020	-		0.330	Continuing	Continuing	Continuing
Prog Mgnt no longer funded in the FYDP	Various	Various : Various	4.512	0.000		0.000		0.000		-		0.000	0.000	4.512	-
		Subtotal	6.432	0.275		0.400		0.330		-		0.330	Continuing	Continuing	N/A

Remarks

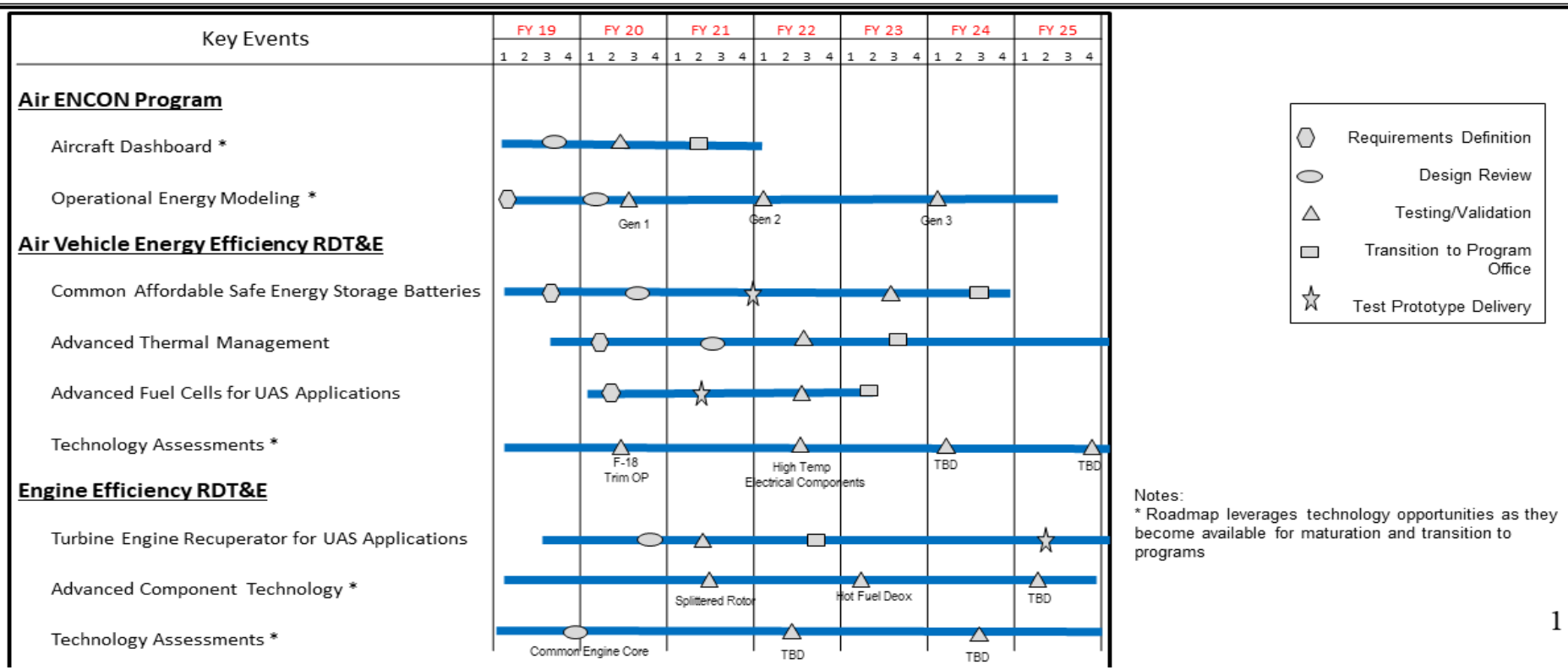
1. Decrease of 0.070 in FY21 to NAWCAD for program management support.

	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	150.182	8.981		10.757		8.269		-		8.269	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 0996 / *Aircraft Energy Conservation*

Aviation Energy - 0996



Notes:
* Roadmap leverages technology opportunities as they become available for maturation and transition to programs

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy		Date: February 2020
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	2019	1	2022
Air ENCOM Program: Operational Energy Modeling	1	2019	3	2025
Air Vehicle Energy Efficiency RDT&E: Common Affordable Safe Energy Storage Batteries	1	2019	4	2024
Air Vehicle Energy Efficiency RDT&E: Advanced Thermal Management	3	2019	4	2025
Air Vehicle Energy Efficiency RDT&E: Advanced Fuel Cells for UAS Applications	1	2020	2	2023
Air Vehicle Energy Efficiency RDT&E: Technology Assessments	1	2019	4	2025
Engine Efficiency RDT&E: Turbine Engine Recuperator for UAS Applications	3	2019	4	2025
Engine Efficiency RDT&E: Advanced Component Technology	1	2019	4	2025
Engine Efficiency RDT&E: Technology Assessments	1	2019	4	2025

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy			Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
9999: *Congressional Adds*	48.899	6.757	31.500	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	87.156
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Congressional Add for Hydrokinetic Energy Research
Congressional Add for Natural Gas Technologies.
Congressional Add for C545-Marine energy systems for sensors and microgrids
Congressional Add for C546-Navy energy program/shore energy

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020
Congressional Add: Program Increase ***FY 2019 Accomplishments:*** N/A ***FY 2020 Plans:*** Commence and complete Battery Development and Safety Enterprise efforts.	0.000	15.000
Congressional Add: Program Increase: Renewable Energy Development ***FY 2019 Accomplishments:*** NAVFAC will continue to research and develop land- and ocean-based energy generation and energy efficiency technologies, and renewable energy systems, that have the potential to reduce the cost of energy and increase energy security, reliability and resiliency at Department of Defense facilities. NAVFAC will also continue its program of marine and hydrokinetic energy development and demonstration activities in coordination with other Federal agencies and entities. ***FY 2020 Plans:*** N/A	6.757	0.000
Congressional Add: Marine energy systems for sensors and microgrids ***FY 2019 Accomplishments:*** N/A ***FY 2020 Plans:*** N/A	0.000	11.500
Congressional Add: Navy energy program/shore energy ***FY 2019 Accomplishments:*** N/A ***FY 2020 Plans:*** N/A	0.000	5.000
Congressional Adds Subtotals	6.757	31.500

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
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 2021 Navy			Date: February 2020
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 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 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	0.000	15.915	-
Renewable Energy Development	Various	EXWC : Port Hueneme, CA	24.148	6.757	Jan 2020	0.000		0.000		-		0.000	0.000	30.905	-
Installation Energy Efficiency Enhancements	Various	EXWC : Port Hueneme, CA	4.836	0.000		0.000		0.000		-		0.000	0.000	4.836	-
Natural Gas Technology	Various	EXWC : Port Hueneme, CA	4.000	0.000		0.000		0.000		-		0.000	0.000	4.000	-
Marine energy systems for sensors and microgrids	Various	EXWC : Port Hueneme, CA	0.000	0.000		1.000	Sep 2020	0.000		-		0.000	0.000	1.000	-
C545-Marine energy systems for sensors and microgrids	TBD	University Affialisted Research Center : Port Hueneme, CA	0.000	0.000		8.000	Sep 2020	0.000		-		0.000	0.000	8.000	-
C545-Marine energy systems for sensors and microgrids	TBD	Wage energy Support Contractor : Port Hueneme, CA	0.000	0.000		2.500	Sep 2020	0.000		-		0.000	0.000	2.500	-
C546-Navy energy program/shore energy	TBD	EXWC : Port Hueneme, CA	0.000	0.000		5.000	Sep 2020	0.000		-		0.000	0.000	5.000	-
Battery Development and Safety Enterprise	TBD	TBD : TBD	0.000	0.000		15.000	Sep 2020	0.000		-		0.000	0.000	15.000	-
		Subtotal	48.899	6.757		31.500		0.000		-		0.000	0.000	87.156	N/A

	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	48.899	6.757		31.500		0.000		-		0.000	0.000	87.156	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 9999 / *Congressional Adds*

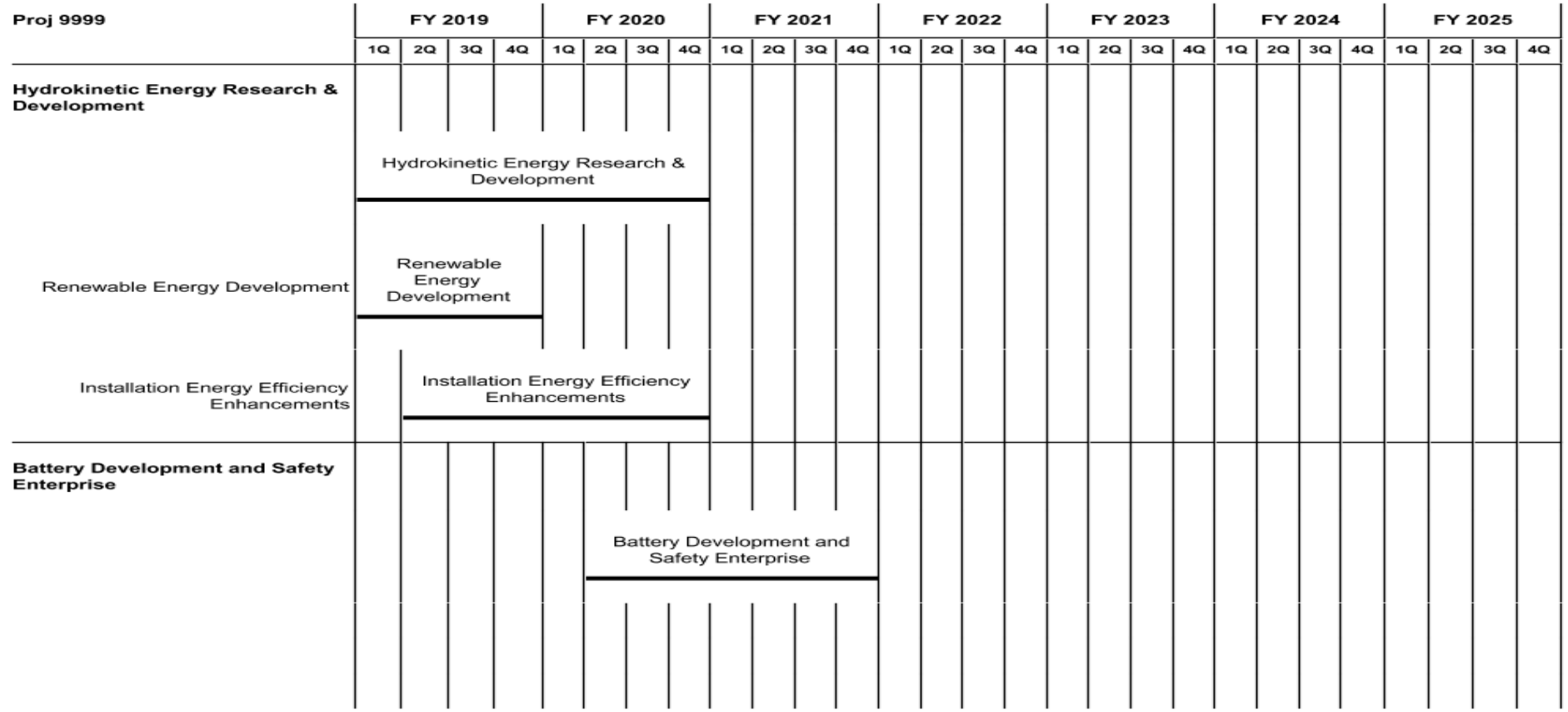

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603724N / *Navy Energy Program*	**Project (Number/Name)** 9999 / *Congressional Adds*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 9999				
Hydrokinetic Energy Research & Development: Hydrokinetic Energy Research & Development	1	2019	4	2020
Hydrokinetic Energy Research & Development: Renewable Energy Development: Renewable Energy Development	1	2019	4	2019
Hydrokinetic Energy Research & Development: Installation Energy Efficiency Enhancements: Installation Energy Efficiency Enhancements	2	2019	4	2020
Hydrokinetic Energy Research & Development: Installation Energy Efficiency Enhancements: Project C545-Marine energy systems for sensors and microgrids	4	2020	1	2025
Hydrokinetic Energy Research & Development: Installation Energy Efficiency Enhancements: Project C546-Navy energy program/shore energy	4	2020	1	2025
Battery Development and Safety Enterprise: Battery Development and Safety Enterprise	2	2020	4	2021