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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2024 Air Force **Date:** March 2023

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604860F / <i>Operational Energy and Installation Resilience</i>
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COST (\$ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	-	100.839	25.500	46.305	0.000	46.305	50.396	36.652	21.722	17.458	Continuing	Continuing
644860: <i>Operational Energy and Installation Resilience</i>	-	100.839	25.500	46.305	0.000	46.305	50.396	36.652	21.722	17.458	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**  
This program, BA 4, PE 0604860F, project 644860, Tech Transition Program, is a new start.

**A. Mission Description and Budget Item Justification**

The Operational Energy and Installation Resilience program develops, matures, prototypes, and demonstrates technologies, software, and processes focused in two areas: decreasing operational energy risk and increasing installation resilience. The Air Force is DOD's largest consumer of operational energy, and also requires resilient installations to execute its missions. Technology transition, agile software development, and process integration efforts with a focus in these areas enable the Air Force to optimize operational energy use for maximum combat capability, and mitigate multi-domain energy threats to installations. The objective of this program is to prioritize, validate, and implement solutions to that end.

In similar manner to the Tech Transition Program (0604858F), the Operational Energy and Installation Resilience program allows acquisition program managers and warfighters to prototype, demonstrate, and transition candidate technologies and processes, including assessments in operationally relevant environments.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605827F, 0605828F, 0605829F, 0605831F, 0605832F, 0605833F, 0605898F, 0606398F. In FY 2022 \$0.170 million was expended for civilian pay expenses in this program element. In FY 2023, no more than 5% of the total program element funds will be used for this purpose.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024 Base</b>	<b>FY 2024 OCO</b>	<b>FY 2024 Total</b>
Previous President's Budget	104.000	0.000	0.000	0.000	0.000
Current President's Budget	100.839	25.500	46.305	0.000	46.305
Total Adjustments	-3.161	25.500	46.305	0.000	46.305
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	10.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-3.161	0.000			
• Other Adjustments	0.000	15.500	46.305	0.000	46.305

**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** 644860: *Operational Energy and Installation Resilience*

Congressional Add: *Program Increase - Energy and Climate Resilience*

Congressional Add: *Hydrogen Fuel Cell Microgrid Technology*

Congressional Add Subtotals for Project: 644860

Congressional Add Totals for all Projects

	<b>FY 2022</b>	<b>FY 2023</b>
	70.000	-
	-	10.000
Congressional Add Subtotals for Project: 644860	70.000	10.000
Congressional Add Totals for all Projects	70.000	10.000

**Change Summary Explanation**

Air Force requested Congress transfer \$15.500 million Tech Transition Program into this program.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>
<b>Title:</b> Operational Energy	30.839	0.000	30.805
<b>Description:</b> Operational energy efforts seek to decrease overall mission energy intensity (i.e. energy demand reduction). Efforts in this program can include prototyping, demonstration, and transition of technologies, software, and processes that maximize combat capability by optimizing the following areas: platform energy use, mission planning and execution, propulsion sustainment, and energy logistics. Energy education, energy-informed wargaming, digital engineering, and modeling and simulation efforts typically support these areas. Specific examples of prototype and demonstration projects that optimize energy use and decrease energy intensity include: legacy aircraft drag reduction technologies, alternate-fuel propulsion systems, ultra-efficient airframe designs, mission scheduling software, air-asset allocation tools, cargo load planning tools, and turbine engine sustainment enhancements for increased fuel efficiency.			

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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604860F / <i>Operational Energy and Installation Resilience</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>
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While similar efforts may be found in other program elements, Operational Energy projects in these technology and process areas are viewed through an "energy lens," specifically geared toward cost-effectively optimizing energy use to maximize combat capability. Ideally, as the Air Force progresses toward an energy-aware culture, all acquisition efforts will incorporate this tenet from the beginning of, and throughout, the acquisition life cycle. This program aims to advance such a culture through successful project execution.

**FY 2023 Plans:**

Operational energy software development, test, and deployment including feature improvement operational tools, enabling of data analytics for decision advantage, and prototyping of new applications to improve mission effectiveness and energy intensity of operations; technology development to optimize Mobility Air Forces allocation and long range planning, unit readiness, and tactical and operational cargo planning processes; modeling and simulation for the energy supply chain to help DOD members understand the energy effects of decisions and the impacts on the total force, enabling better decision making and a more proactive energy posture.

**FY 2024 Plans:**

Continued software development on FY 2022-2023 projects will be enhanced by additional effort in combat air forces training scheduling, advanced data analytics systems for strategic airlift assets, air refueling optimization, and aerial refueling aircraft availability; additional efforts will support augmented reality training tools, aircraft drag reduction technology prototyping and demonstrations, advanced engine sustainment techniques, and mobile applications to support MAF command and control. These efforts expand the readiness impacts of current efforts and integrate energy logistics in both training and operations.

**FY 2023 to FY 2024 Increase/Decrease Statement:**

Additional funding supports development in logistics and sustainment, expansion of mission planning and execution tools, and further prototyping of aerospace technologies that reduce drag and improve range and combat capability.

**Title:** Tech Transition Program

**Description:** Tech transiton improves operational energy and installation resilience through prototyping, integration, and demonstration of energy technologies. The technologies will be assessed in an operational systems environment.

**FY 2023 Plans:**

Prototype, integrate, demonstrate and assess operational energy and resilience technology.

**FY 2024 Plans:**

	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>
<p><b>Title:</b> Tech Transition Program</p> <p><b>Description:</b> Tech transiton improves operational energy and installation resilience through prototyping, integration, and demonstration of energy technologies. The technologies will be assessed in an operational systems environment.</p> <p><b>FY 2023 Plans:</b> Prototype, integrate, demonstrate and assess operational energy and resilience technology.</p> <p><b>FY 2024 Plans:</b></p>	-	15.500	15.500

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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>
Continue to prototype, integrate, demonstrate and assess operational energy and resilience technology.			
<b>Accomplishments/Planned Programs Subtotals</b>	30.839	15.500	46.305

	<b>FY 2022</b>	<b>FY 2023</b>
<b>Congressional Add:</b> Program Increase - Energy and Climate Resilience	70.000	-
<b>FY 2022 Accomplishments:</b> Conduct Congressionally Directed Efforts		
<b>Congressional Add:</b> Hydrogen Fuel Cell Microgrid Technology	-	10.000
<b>FY 2023 Plans:</b> Develop and test hydrogen fuel cell microgrid technology.		
<b>Congressional Adds Subtotals</b>	70.000	10.000

**D. Other Program Funding Summary (\$ in Millions)**

<b>Line Item</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024 Base</b>	<b>FY 2024 OCO</b>	<b>FY 2024 Total</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>FY 2027</b>	<b>FY 2028</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• RDTE 04 0604858F: <i>Tech Transition Program</i>	-	58.000	8.000	-	8.000	8.000	8.000	1.000	-	Continuing	Continuing

**Remarks**  
Operational Energy and Installation Resilience efforts were previously funded under the Tech Transition Program (0604858F), primarily through congressional adds (e.g. Alternative Energy). A new program element dedicated to these areas was congressionally directed in the FY 2022 Appropriations Bill.

**E. Acquisition Strategy**

The efforts within this program element are variable and will employ multiple different acquisition strategies. In general, projects will seek to inform senior decision makers regarding the suitability of technology and process transition. As an example, for legacy aircraft drag reduction technologies, solutions will be prototyped and demonstrated via ground and/or flight assessments; drag reduction and fuel savings estimates will be validated or refined, suitability for fleet implementation will be assessed (maintainability, return-on-investment, etc.), and recommendations for transition will be made. Both FAR-based contracts and Other Transactions will be utilized.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Air Force** **Date:** March 2023

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604860F / <i>Operational Energy and Installation Resilience</i>	<b>Project (Number/Name)</b> 644860 / <i>Operational Energy and Installation Resilience</i>
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<b>Product Development (\$ in Millions)</b>				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Operational Energy	Various	Various : Various	-	-		-		-		-		-	Continuing	Continuing	-
C-17 Aft Body Drag Reduction	Various	Various : Various	-	2.900	Jul 2022	-		-		-		-	Continuing	Continuing	-
C-17 Drag Reduction - Other	Various	Various : Various	-	1.400	Jul 2022	-		-		-		-	Continuing	Continuing	-
C-130 Aft Body Drag Reduction	Various	Various : Various	-	2.900	Jul 2022	-		-		-		-	Continuing	Continuing	-
KC-135 Aft Body Drag Reduction	Various	Various : Various	-	3.700	Jul 2022	-		-		-		-	Continuing	Continuing	-
KC-135 Vertical Windshield Wipers	Various	Various : Various	-	1.800	Jun 2022	-		-		-		-	Continuing	Continuing	-
Mobility Aircraft Control Surface Analysis	Various	Various : Various	-	1.800	Jul 2022	-		-		-		-	Continuing	Continuing	-
Cargo Optimization - Improved Load Planning	Various	Various : Various	-	2.739	Jul 2022	-		0.900	Jul 2024	-		0.900	Continuing	Continuing	-
Mobility Air Force Long Range Planning and Allocation Tools	Various	Various : Various	-	5.900	Jul 2022	-		2.850	Jul 2024	-		2.850	Continuing	Continuing	-
Puckboard Scheduling Engine	Various	Various : Various	-	5.900	Jul 2022	-		2.850	Jul 2024	-		2.850	Continuing	Continuing	-
Energy Supply Chain Risk Model	TBD	Various : Various	-	-		-		1.000	Aug 2024	-		1.000	Continuing	Continuing	-
Program Increase - Energy & Climate Resilience	Various	Various : Various	-	67.000	Aug 2022	-		22.805	Feb 2024	-		22.805	Continuing	Continuing	-
Hydrogen Fuel Cell Microgrid	TBD	TBD : TBD	-	-		10.000	May 2023	-		-		-	Continuing	Continuing	-
Tech Transition	TBD	TBD : TBD	-	-		15.500	May 2023	15.500	Feb 2024	-		15.500	Continuing	Continuing	-
<b>Subtotal</b>			-	96.039		25.500		45.905		-		45.905	Continuing	Continuing	N/A



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2024 Air Force		<b>Date:</b> March 2023
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604860F / <i>Operational Energy and Installation Resilience</i>	<b>Project (Number/Name)</b> 644860 / <i>Operational Energy and Installation Resilience</i>

FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027				FY 2028			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>Operational Energy</b>	
All	
<b>Program Increase -Energy and Climate Resilience</b>	
All	
<b>Tech Transition</b>	
No event title.	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2024 Air Force		<b>Date:</b> March 2023
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604860F / <i>Operational Energy and Installation Resilience</i>	<b>Project (Number/Name)</b> 644860 / <i>Operational Energy and Installation Resilience</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Operational Energy</i></b>				
All	2	2022	4	2027
<b><i>Program Increase -Energy and Climate Resilience</i></b>				
All	3	2022	4	2028
<b><i>Tech Transition</i></b>				
No event title.	3	2023	4	2028