

UNCLASSIFIED

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

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604004F / <i>Advanced Engine Development</i>
--	--

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	-	562.717	220.363	595.352	0.000	595.352	579.834	456.876	291.118	0.000	Continuing	Continuing
643608: <i>Advanced Engine Dev</i>	-	562.717	220.363	595.352	0.000	595.352	579.834	456.876	291.118	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Advanced Engine Development Program enables demonstration of advanced engine technology prototypes, like the adaptive cycle engines. Adaptive cycle engine technology enables next generation combat aircraft capabilities by combining the efficiency of high bypass turbofans used by commercial airlines with the performance demanded of military fighter engines. This technology has undergone initial development under the auspices of the Air Force Research Laboratory through the Adaptive Versatile Engine Technology (ADVENT) and Adaptive Engine Technology Demonstrator (AETD) programs. This program is maturing fuel efficient adaptive engine component technologies and reducing associated risk in preparation for next-generation propulsion system development for combat aircraft applications.

The Adaptive Engine Transition Program (AETP) was moved out of this program element and into new program element 0604534F, Adaptive Engine Transition Program (AETP) in FY 2023 to comply with 2023 Appropriations Bill and accompanying Joint Explanatory Statement direction to maintain separate budget lines for the AETP and Next Generation Adaptive Propulsion (NGAP) efforts. This is a congressionally directed administrative realignment to provide increased transparency to Congress and is not a new start.

This program element may include necessary emergent or unanticipated civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such program 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 \$3.803 million was expended for civilian pay expenses in this program element, and in FY 2023 \$2.305 million is forecasted for civilian pay expenses in this program element.

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.

UNCLASSIFIED

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

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604004F / <i>Advanced Engine Development</i>
--	--

B. Program Change Summary (\$ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	583.712	353.658	757.468	0.000	757.468
Current President's Budget	562.717	220.363	595.352	0.000	595.352
Total Adjustments	-20.995	-133.295	-162.116	0.000	-162.116
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	152.800			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-20.995	0.000			
• Other Adjustments	0.000	-286.095	-162.116	0.000	-162.116

Change Summary Explanation

FY 2022 - Annual SBIR/STTR transfer

FY 2023 - Congress established separate budget lines for AETP (\$286.095 million) and NGAP (\$67.562 million) and added \$152.800 million for NGAP (new total \$220.362 million). DAF established new program element 0604534F, Adaptive Engine Transition Program (AETP) and moved AETP into the new program element (-\$286.095 million) to comply with the 2023 Appropriations Bill and accompanying Joint Explanatory Statement congressional direction.

FY 2024 - AETP moved out of this program element and now addressed in PE 0604534/AF RDT&E Line #56. NGAP Funding increased by \$375.500 million to appropriately resource a competitive program through detailed design. FY25-28 funding enables competitive prototyping through prototype testing.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2022	FY 2023	FY 2024
---	----------------	----------------	----------------

Title: Adaptive Engine Transition Program

457.141	0.000	0.000
---------	-------	-------

Description: The Adaptive Engine Transition Program (AETP) will design and manufacture multiple adaptive engine prototypes, complete component rig assessments, characterize materials, and inform manufacturing process improvements. The program will demonstrate adaptive engine technology can be scaled to meet military fighter engine size requirements, while ensuring appropriate manufacturing and technology readiness levels by producing flight-weight prototypes. The prototype engines will demonstrate fuel efficiency increases, thrust increases, and new component technologies by performing sea-level, altitude, and durability assessments across multiple power settings. These assessments will provide data to quantify the capability and reduce risk in areas such as thermal capacity, reliability, and supportability, among others.

FY 2022 was the last year the entirety of AETP reported in Program Element 0604004F, Advanced Engine Development, Project 643608, Advanced Engine Development. FY 2023 is executing in its entirety in Program Element 0604534F, Adaptive Engine Transition Program, Project 640866: Advanced Engine Transition Program (AETP).

UNCLASSIFIED

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

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604004F / <i>Advanced Engine Development</i>
--	--

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2022	FY 2023	FY 2024
<p><i>FY 2023 Plans:</i> See Program Element 0604534F/Line #56.</p> <p><i>FY 2024 Plans:</i> See Program Element 0604534F/Line #56.</p> <p><i>FY 2023 to FY 2024 Increase/Decrease Statement:</i> See Program Element 0604534F/Line #56.</p>			
<p><i>Title:</i> Next Generation Adaptive Propulsion</p> <p><i>Description:</i> The Next Generation Adaptive Propulsion (NGAP) effort will design and perform component risk reduction for adaptive engine prototypes enabling Next Generation Air Dominance (NGAD) capabilities. NGAP will select appropriate adaptive engine technologies that can meet Next Generation Air Dominance (NGAD) engine requirements while ensuring appropriate manufacturing and technology readiness levels.</p> <p><i>FY 2023 Plans:</i> Continue adaptive prototyping planning, complete preliminary design activities, and transition to NGAP detailed design activities for Next Generation Air Dominance (NGAD) capabilities. More details can be provided in an appropriate forum.</p> <p><i>FY 2024 Plans:</i> Continue adaptive prototyping planning and complete NGAP detailed design activities for Next Generation Air Dominance (NGAD) capabilities. More details can be provided in an appropriate forum.</p> <p><i>FY 2023 to FY 2024 Increase/Decrease Statement:</i> Funding increased by \$374.989 million to appropriately resource a competitive program through detailed design.</p>	105.576	220.363	595.352
Accomplishments/Planned Programs Subtotals	562.717	220.363	595.352

D. Other Program Funding Summary (\$ in Millions)
N/A

Remarks

E. Acquisition Strategy
The Air Force awarded two limited source, cost plus incentive fee contracts in FY 2016 to General Electric and Pratt & Whitney due to their unique qualifications to design a high performance, flight-weight adaptive turbine engine in the thrust class for the Adaptive Cycle Engine Transition Program (AETP). Embedded in each AETP contract was an option for the Next Generation Adaptive Propulsion (NGAP) effort. In FY 2018, these options were exercised and awarded to optimize risk reduction for Next Generation Air Dominance (NGAD) capabilities through the NGAP effort.

UNCLASSIFIED

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

Appropriation/Budget Activity	R-1 Program Element (Number/Name)
3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	PE 0604004F / <i>Advanced Engine Development</i>

NGAP remains focused on delivering low risk, capability enabling propulsion options to NGAD, and in fourth quarter FY 2022 new indefinite delivery, indefinite quantity (IDIQ) contracts for completion of NGAP detailed design and prototyping were awarded to General Electric (GE), Pratt & Whitney (PW), Boeing, Lockheed Martin (LM), and Northrop Grumman (NG). The new contracts include digital transformation requirements, scope to complete prototype detail design and execute prototype engine testing, digital Weapon System integration activity to reduce technology transition risk, and a contracting approach that enhances the program's acquisition agility. Competitively awarded orders and options under the IDIQ contracts enable work to be rapidly defined to accommodate available funding, provide continued competitive incentives to contractors, and enable rapid and efficient execution of funds. The government agency responsible for managing this program is the Air Force Life Cycle Management Center, Propulsion Directorate, Wright-Patterson Air Force Base, Ohio.

UNCLASSIFIED

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

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604004F / <i>Advanced Engine Development</i>	Project (Number/Name) 643608 / <i>Advanced Engine Development</i>
--	--	---

Product Development (\$ in Millions)				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			
Adaptive Engine Transition Program - GE	C/CPIF	GE : Evendale, OH	-	279.365	Oct 2021	-		-		-		-	0.000	279.365	-
Adaptive Engine Transition Program - PW	C/CPIF	PW : East Hartford, CT	-	163.715	Oct 2021	-		-		-		-	0.000	163.715	-
Next Generation Adaptive Propulsion (Preliminary Design) - GE	C/CPIF	GE : Evendale, OH	-	50.000	Oct 2021	-		-		-		-	0.000	50.000	-
Next Generation Adaptive Propulsion (Preliminary Design) - PW	C/CPIF	PW : East Hartford, CT	-	45.000	Oct 2021	-		-		-		-	0.000	45.000	-
Next Generation Adaptive Propulsion (Detailed Design & Prototyping) - GE	C/Various	GE : Evendale, OH	-	1.421	Jul 2022	100.771	Oct 2022	280.325		-		280.325	Continuing	Continuing	-
Next Generation Adaptive Propulsion (Detailed Design & Prototyping) - PW	C/Various	PW : East Hartford, CT	-	2.933	Aug 2022	102.567	Oct 2022	280.325		-		280.325	Continuing	Continuing	-
Next Generation Adaptive Propulsion (Detailed Design & Prototyping) - Boeing	C/Various	Boeing : St Louis, MO	-	1.239	Aug 2022	3.244	Oct 2022	5.000	Oct 2023	-		5.000	Continuing	Continuing	-
Next Generation Adaptive Propulsion (Detailed Design & Prototyping) - LM	C/Various	LM : Ft Worth, TX	-	1.007	Aug 2022	3.244	Oct 2022	5.000	Oct 2023	-		5.000	Continuing	Continuing	-
Next Generation Adaptive Propulsion (Detailed Design & Prototyping) - NG	C/Various	NG : Palmdale, CA	-	0.982	Aug 2022	3.244	Oct 2022	5.000	Oct 2023	-		5.000	Continuing	Continuing	-
Subtotal			-	545.662		213.070		575.650		-		575.650	Continuing	Continuing	N/A

UNCLASSIFIED

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

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604004F / <i>Advanced Engine Development</i>	Project (Number/Name) 643608 / <i>Advanced Engine Dev</i>
--	--	---

Management Services (\$ in Millions)				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			
Adaptive Engine Transition Program - Program Management Support	Various	Various : TBD	-	14.044	Dec 2021	-		-		-		-	0.000	14.044	-
Next Generation Adaptive Propulsion - Program Management Support	Various	Various : TBD	-	3.011	Dec 2021	7.293	Dec 2022	19.702	Dec 2023	-		19.702	Continuing	Continuing	-
Subtotal			-	17.055		7.293		19.702		-		19.702	Continuing	Continuing	N/A

	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract	
Project Cost Totals		-	562.717	220.363	595.352	-	595.352	Continuing	Continuing	N/A

Remarks
 GE - General Electric PW - Pratt & Whitney LM - Lockheed Martin NG - Northrop Grumman

FY 2022 Adaptive Engine Transition Program (AETP) distributions reflect the 460 million congressional program increase.

The Adaptive Engine Transition Program (AETP) was moved out of this program element and into new program element 0604534F, Adaptive Engine Transition Program (AETP) in FY 2023 to comply with 2023 Appropriations Bill and accompanying Joint Explanatory Statement direction to maintain separate budget lines for the AETP and Next Generation Adaptive Propulsion (NGAP) efforts. This is a congressionally directed administrative realignment to provide increased transparency to Congress and is not a new start.

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2024 Air Force		Date: March 2023
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604004F / <i>Advanced Engine Developm</i> <i>ent</i>	Project (Number/Name) 643608 / <i>Advanced Engine Dev</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

<i>Adaptive Engine Transition Program</i>	
Detailed Design, Engine Fabrication, Engine Assessments	
<i>Next Generation Adaptive Propulsion</i>	
Initial Design, Preliminary Design	
Adaptive Prototyping Plan, Detailed Design, Engine Fabrication, Engine Assessments	

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2024 Air Force		Date: March 2023
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604004F / <i>Advanced Engine Development</i>	Project (Number/Name) 643608 / <i>Advanced Engine Dev</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Adaptive Engine Transition Program</i>				
Detailed Design, Engine Fabrication, Engine Assessments	1	2022	4	2023
<i>Next Generation Adaptive Propulsion</i>				
Initial Design, Preliminary Design	1	2022	1	2023
Adaptive Prototyping Plan, Detailed Design, Engine Fabrication, Engine Assessments	3	2022	3	2027

Note

The Adaptive Engine Transition Program consists of four phases: detailed design, engine fabrication, engine assessments and transition.

Program deliverables include: military adaptive engine detailed design parameters and models; multiple engine sets of hardware (plus spare parts); matured technologies; major rig assessment data (controls, combustor, etc.); program reviews; and technology, afford-ability, sustainability and integration studies.

The Adaptive Engine Transition Program (AETP) was moved out of this program element and into new program element 0604534F, Adaptive Engine Transition Program (AETP) in FY 2023 to comply with 2023 Appropriations Bill and accompanying Joint Explanatory Statement direction to maintain separate budget lines for the AETP and Next Generation Adaptive Propulsion (NGAP) efforts. FY 2023 activities reflect expenditure of remaining FY 2022 funding; execution of FY 2023 funding reflected in its entirety under PE 0604534F, Adaptive Engine Transition Program. This is a congressionally directed administrative realignment to provide increased transparency to Congress and is not a new start.

The Next Generation Adaptive Propulsion effort consists of six phases initial design, preliminary design, adaptive prototyping planning, detailed design, engine fabrication, and engine assessments.

Program deliverables include: military adaptive engine detailed design parameters and models; engine hardware (plus spare parts); matured technologies; major rig assessment data (controls, combustor, etc.); program reviews; and technology, afford-ability and sustainability studies for capability enabling propulsion systems providing options to the Next Generation Air Dominance (NGAD) family of systems.

Additional details can be provided in the appropriate forum.