Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Office of the Secretary Of Defense	Date: April 2022
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603924D8Z / *High Energy Laser Advanced Development*

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Total Program Element	-	109.113	83.159	111.149	0.000	111.149	113.765	115.518	117.947	120.306	Continuing	Continuing
924: *High Energy Laser Initiative*	-	109.113	83.159	111.149	0.000	111.149	113.765	115.518	117.947	120.306	Continuing	Continuing

Note

New Start (Y/N): No

Beginning in FY 2022 this Program will focus on Advanced Technology Development for Directed Energy (DE) technologies divided into the following areas: (1) DE Sources; (2) Beam Control & Propagation; (3) Lethality & Vulnerability; and (4) Power & Thermal Management to reflect the Department of Defense Science and Technology (S&T) strategy and Office of the Secretary of Defense (OSD) Science and Technology (S&T) priorities for DE.

A. Mission Description and Budget Item Justification

This program supports the Departments initiatives to Build a Sustainable and Long-Term Advantage, and Build a Resilient Joint Force and Defense Ecosystem.

This program element funds Directed Energy (DE) advanced technology development aimed at translating technology solutions for broadly defined military problems into demonstrated performance pay-offs, increased capabilities, increased supportability, and/or increased affordability. DE weapons systems have many potential advantages, including speed-of-light time-to-target, high precision, low incremental cost per kill, and a magazine that is recharged through on-board, fuel-based power and thermal management systems that reduce logistics requirements in contrast to stocks of munitions or warheads. As a result, DE systems have the potential to perform a wide variety of military missions. Activities conducted under this program element will develop and demonstrate the technology necessary to enable DE system missions across the Department of Defense (DoD).

B. Program Change Summary ($ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	112.842	107.397	0.000	0.000	0.000
Current President's Budget	109.113	83.159	111.149	0.000	111.149
Total Adjustments	-3.729	-24.238	111.149	0.000	111.149
• Congressional General Reductions	-	-23.900			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-3.707	-			
• Other Reprogramming	-0.022	-	-	-	-
• FFRDC	-	-0.338	-	-	-

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Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 3: *Advanced Technology Development (ATD)*			R-1 Program Element (Number/Name) PE 0603924D8Z *I High Energy Laser Advanced Development*		
• Adjustments to Budget Year	-	-	107.315	-	107.315
• Economic Assumption	-	-	3.834	-	3.834

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

	FY 2021	FY 2022
Project: 924: *High Energy Laser Initiative*		
Congressional Add: *Power and Thermal Systems*	7.500	-
Congressional Add Subtotals for Project: 924	7.500	-
Congressional Add Totals for all Projects	7.500	-

Change Summary Explanation

In FY2022, program reduced by -$23.900 million for additional HELSI directed energy system excess to Phase II requirement.
FY 2023 funding increase reflects the fact that the FY 2022 President's Budget request did not include out-year funding.

Exhibit R-2A, RDT&E Project Justification: PB 2023 Office of the Secretary Of Defense			Date: April 2022
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603924D8Z / *High Energy Laser Advanced Development*	Project (Number/Name) 924 / *High Energy Laser Initiative*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
924: *High Energy Laser Initiative*	-	109.113	83.159	111.149	0.000	111.149	113.765	115.518	117.947	120.306	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Beginning in FY 2022 this Program will focus on Directed Energy (DE) technologies divided into the following areas: (1) DE Sources; (2) Beam Control & Propagation; (3) Lethality & Vulnerability; and (4) Power & Thermal Management to reflect the Department of Defense Science and Technology (S&T) strategy and Office of the Secretary of Defense (OSD) Science and Technology (S&T) priorities for DE.

A. Mission Description and Budget Item Justification

This program element is part of an overall Department strategy in Directed Energy (DE) weapon system advanced technology development. This effort will focus on scaling the output power of DE systems to reach operationally effective power levels applicable to broad mission areas across the DoD. Additionally, efforts will also pursue improvements in common DE system components such as beam control & propagation, lethality & vulnerability, and efficient power and thermal management approaches. This program element complements, and will be closely coordinated with other DoD DE efforts directed at specific Service and Agency missions. This program leverages and/or builds upon other investments in DE by the Services and Agencies.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: Directed Energy Sources	88.483	66.159	93.532
Description: Develop, mature and demonstrate directed energy sources that will provide system level performance commensurate with fieldable directed energy devices. ***FY 2022 Plans:*** Ongoing 300 kW-class high energy laser (HEL) sources will be completed and tested. The HEL sources will be transitioned and integrated into Service HEL system testbeds and demonstrators. The additional 300 kW-class HEL source, started in FY 2021, will be de-scoped to a lower-power demonstration. Planning for 500 kW-class laser source development will begin as open architectures and components are matured to support scaling from 300 to 500 kW. ***FY 2023 Plans:*** Scaling HEL sources from 300 to 500 kW will begin utilizing two laser builders who best demonstrate scaling to 300 kW. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Increase is due to minor budget fluctuations.			
Title: Beam Control and Propagation	1.715	3.385	3.480

Exhibit R-2A, RDT&E Project Justification: PB 2023 Office of the Secretary Of Defense		Date: April 2022
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603924D8Z / *High Energy Laser Advanced Development*	**Project (Number/Name)** 924 / *High Energy Laser Initiative*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Description: Develop, mature and demonstrate technologies that support improving beam control and beam propagation for DE weapon systems. ***FY 2022 Plans:*** Continue to collect data on thermal blooming effects of high-power lasers, including the effects of aerosols. Continue to model beam propagation for Service HEL tactical engagements. Collect data on thermal blooming effects at higher laser powers to validate HEL propagation models. Advance technologies for atmospheric compensation and thermal blooming mitigation. Evaluate beam control efforts across the Department and develop an investment strategy for cross-cutting technology development in beam control systems. ***FY 2023 Plans:*** Collect data on thermal blooming effects at higher laser powers to validate HEL propagation models. Collect tracking and atmospheric compensation data leveraging beam control testbed efforts across the Department to assess maturity of components developed under applied research. Continue to mature cross-cutting technology development in beam control systems. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Increase is due to minor budget fluctuations.			
Title: Lethality and Vulnerability ***Description:*** Conduct directed energy lethality & vulnerability experiments on materials, components, and targets. Develop a lethality database, and integrate into a systems-level architecture plan and lethality models. ***FY 2022 Plans:*** Collect lethality damage effects on common threats across the services for high energy lasers and high power microwaves. These results, along with additional data from the services, include modeling and simulation analysis that will be used by the services to generate key vulnerability modules (VMs) for use in DE weapons effectiveness, mission and campaign level utility studies. The establishment of a unified lethality database that began in FY 2020 and will be completed in early FY 2022. As new lethality and vulnerability data are collected by the Services, the information will be integrated into the unified lethality database. Investigate the military utility of pulsed lasers. - Power & Thermal: Complete efforts begun in FY 2021 and evaluate technologies for further advanced development investments. ***FY 2023 Plans:*** Collect lethality damage effects and vulnerability data on common cruise missile (CM) threats of all classes for both high energy laser and high power microwave technologies. Continuous wave and pulsed laser technologies will be investigated. Testing and	11.415	13.615	14.137

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
modeling and simulation (M&S) results will be used to develop vulnerability modules (VMs) for use in DE weapons' effectiveness tools, mission and campaign level utility studies. A chartered, lethality database will begin transition to the Joint Technical Coordinating Group for Munitions Effectiveness (JTCG/ME) for analyst's use. Development efforts will continue to include HPM lethality inputs for a more complete DE lethality database product. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Increase is due to minor budget fluctuations.			
Accomplishments/Planned Programs Subtotals	101.613	83.159	111.149

	FY 2021	FY 2022
Congressional Add: Power and Thermal Systems	7.500	-
FY 2021 Accomplishments: Investigated power & thermal management technologies for 300-500 kW laser systems under the High Energy Laser sources scaling efforts. Developed and built a modular, transportable refrigerant direct-to-diode cooling system. Evaluated Nickel-based batteries and high-voltage-input pump-diodes for high energy laser systems.		
Congressional Adds Subtotals	7.500	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

N/A

D. Acquisition Strategy

N/A