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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Office of the Secretary Of Defense **Date:** February 2019

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603924D8Z I <i>High Energy Laser Advanced Development</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	0.000	0.000	74.364	85.223	-	85.223	81.152	84.070	84.002	85.784	Continuing	Continuing
924: <i>High Energy Laser Initiative</i>	0.000	0.000	74.364	85.223	-	85.223	81.152	84.070	84.002	85.784	Continuing	Continuing

**Note**

This work continues/expands on research initiated by the Missile Defense Agency in PE 0603178C (Weapons Technology) with the goal of focusing on common non-Service/Agency specific improvements in High Energy Laser (HEL) components/systems.

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

This program element funds HEL 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. HEL weapons systems have many potential advantages, including speed-of-light time-to-target, high precision, nearly unlimited magazine depth, low cost per kill, and reduced logistics requirements because of no need for stocks of munitions or warheads. As a result, HELs 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 HEL missions across the Department of Defense (DoD).

**B. Program Change Summary (\$ in Millions)**

	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020 Base</u>	<u>FY 2020 OCO</u>	<u>FY 2020 Total</u>
Previous President's Budget	0.000	69.533	75.438	-	75.438
Current President's Budget	0.000	74.364	85.223	-	85.223
Total Adjustments	0.000	4.831	9.785	-	9.785
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	5.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• FFRDC Reduction	-	-0.169	-	-	-
• Other Program Adjustments	-	-	9.785	-	9.785

**Change Summary Explanation**

The increase in FY 2020 will support the broad area of improved HEL capability, focusing on increased output power, improved beam quality, efficient power and thermal management schemes, and other common component activities that will benefit HEL programs across the DoD Enterprise. Similar research and developmental work is currently being undertaken by the Services/Agencies; therefore, activities within this PE will support and be closely coordinated with other

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<b>Appropriation/Budget Activity</b>	<b>R-1 Program Element (Number/Name)</b>
0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide / BA 3: Advanced Technology Development (ATD)</i>	PE 0603924D8Z / <i>High Energy Laser Advanced Development</i>

DoD HEL efforts directed at specific Service and Agency missions. Moreover, in FY 2020, the Department will initiate the centralization of high energy laser lethality and damage effects research into a single unified database and will develop the Directed Energy Joint Munition Effectiveness Manual.

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**Exhibit R-2A, RDT&E Project Justification:** PB 2020 Office of the Secretary Of Defense **Date:** February 2019

<b>Appropriation/Budget Activity</b> 0400 / 3	<b>R-1 Program Element (Number/Name)</b> PE 0603924D8Z / High Energy Laser Advanced Development	<b>Project (Number/Name)</b> 924 / High Energy Laser Initiative
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
924: High Energy Laser Initiative	0.000	0.000	74.364	85.223	-	85.223	81.152	84.070	84.002	85.784	Continuing	Continuing

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

This program element is part of an overall Defense strategy in High Energy Laser (HEL) science and technology development focused on scaling the output power of HELs to reach operationally effective power levels applicable to broad mission areas across the DoD. Efforts will also pursue improvements in common HEL system components such as efficient power and/or thermal management approaches, effective power supplies, and beam combining/beam director designs. This program element complements, and will be closely coordinated with, other DoD HEL efforts directed at specific Service and Agency missions.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2018	FY 2019	FY 2020
<b>Title:</b> High Energy Laser Power Scaling	-	74.364	85.223
<b>Description:</b> This effort is focused on scaling HEL power levels important to mission areas across the DoD, and leverages and/or builds upon other investments in HEL development.			
<b>FY 2019 Plans:</b> Implement a research strategy to scale the output power of HEL to meet Department-wide mission area needs based on findings from the DoD HEL Roadmap Assessment and other technical sources. Establish key performance metrics based on power, power-in-the-bucket (beam quality), electrical-optical efficiency, including size and weight constraints. Determine appropriate technologies and initiate the development efforts.			
<b>FY 2020 Plans:</b> Continue the base effort of scaling HELs to the 300 kW-class power level. Determine atmospheric effects, such as thermal blooming of higher-power lasers through data collection in the field. In addition, will initiate the centralization of high energy laser lethality and damage effects research into a single unified database and the development of a Directed Energy Joint Munition Effectiveness Manual.			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> The increase in funding supports the broad area of improved HEL capability, focusing on increased output power, improved beam quality, increased electrical-optical efficiency (which drive size, weight and power constraints), and other common component activities that benefit HEL programs across the DoD Enterprise. Activities within this PE will support and be closely coordinated with other DoD HEL efforts directed at specific Service and Agency missions.			
<b>Accomplishments/Planned Programs Subtotals</b>	-	74.364	85.223

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

N/A

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<b>Appropriation/Budget Activity</b> 0400 / 3	<b>R-1 Program Element (Number/Name)</b> PE 0603924D8Z / <i>High Energy Laser Advanced Development</i>	<b>Project (Number/Name)</b> 924 / <i>High Energy Laser Initiative</i>

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

**Remarks**

N/A

**D. Acquisition Strategy**

N/A

**E. Performance Metrics**

N/A