Exhibit R-2, RDT&E Budget Item Justification: PB 2012 Air Force		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602890F: *High Energy Laser Research*	

COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
Total Program Element	51.647	53.384	54.059	-	54.059	52.297	54.174	55.038	55.974	Continuing	Continuing
625096: *High Energy Laser Research*	51.647	53.384	54.059	-	54.059	52.297	54.174	55.038	55.974	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program funds Department of Defense (DoD) high energy laser (HEL) applied research through the HEL Joint Technology Office (JTO). HEL weapon systems have many potential advantages, including speed-of-light delivery, precision target engagement, significant magazine depth, low-cost per kill, and reduced logistics requirements. HELs have the potential to perform a wide variety of military missions including interception of ballistic missiles in boost phase; defeat of high-speed, maneuvering anti-ship and anti-aircraft missiles; and the ultra-precision negation of targets in urban environments with no/little collateral damage. This program is part of an overall DoD HEL Science and Technology program. In general, efforts funded under this program are chosen for their potential to have an impact on multiple HEL systems and multiple Service missions while complimenting Service/Agency programs that are directed at specific Service needs. A broad range of technologies are addressed in key areas such as chemical lasers, solid state lasers, free electron lasers, laser beam control, and laser lethality mechanisms. Efforts in this program have been coordinated through the Reliance 21 process to harmonize efforts and eliminate duplication. This program is in Budget Activity 2, Applied Research, since it develops and determines the technical feasibility and military utility of evolutionary and revolutionary technologies.

B. Program Change Summary ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Previous President's Budget	53.229	53.384	54.059	-	54.059
Current President's Budget	51.647	53.384	54.059	-	54.059
Total Adjustments	-1.582	-	-	-	-
• Congressional General Reductions		-			
• Congressional Directed Reductions		-			
• Congressional Rescissions	-	-			
• Congressional Adds		-			
• Congressional Directed Transfers		-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.386	-			
• Other Adjustments	-0.196	-	-	-	-

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2010	FY 2011
Project: 625096: *High Energy Laser Research*		
Congressional Add: *Advanced Deformable Mirrors for High Energy Laser Weapons.*	1.593	-
Congressional Add: *High Bandwidth, High Energy Storage, Exawatt Laser Glass Development.*	2.788	-

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Congressional Add Details ($ in Millions, and Includes General Reductions)	**FY 2010**	**FY 2011**
Congressional Add: *Planar Lightwave Circuit Development for High Power Military Laser Applications.*	2.390	-
Congressional Add Subtotals for Project: 625096	6.771	-
Congressional Add Totals for all Projects	6.771	-

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force			DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602890F: *High Energy Laser Research*	PROJECT 625096: *High Energy Laser Research*	

COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
625096: *High Energy Laser Research*	51.647	53.384	54.059	-	54.059	52.297	54.174	55.038	55.974	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program funds Department of Defense (DoD) high energy laser (HEL) applied research through the HEL Joint Technology Office (JTO). HEL weapon systems have many potential advantages, including speed-of-light delivery, precision target engagement, significant magazine depth, low-cost per kill, and reduced logistics requirements. HELs have the potential to perform a wide variety of military missions including interception of ballistic missiles in boost phase; defeat of high-speed, maneuvering anti-ship and anti-aircraft missiles; and the ultra-precision negation of targets in urban environments with no/little collateral damage. This program is part of an overall DoD HEL Science and Technology program. In general, efforts funded under this program are chosen for their potential to have an impact on multiple HEL systems and multiple Service missions while complimenting Service/Agency programs that are directed at specific Service needs. A broad range of technologies are addressed in key areas such as chemical lasers, solid state lasers, free electron lasers, laser beam control, and laser lethality mechanisms. Efforts in this program have been coordinated through the Reliance 21 process to harmonize efforts and eliminate duplication. This program is in Budget Activity 2, Applied Research, since it develops and determines the technical feasibility and military utility of evolutionary and revolutionary technologies.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Title: Major Thrust 1.	8.230	12.650	12.759	-	12.759
Description: Advance solid-state laser development.					
FY 2010 Accomplishments: Initiated a joint-high power electric laser product improvement program that emphasizes efficiency, affordability, and ruggedization. Established parameters for efficiency improvements into size, weight and packing reductions. With Space and Missile Defense Command and Air Force Research Laboratory jointly awarded four contracts under the Robust Electric Laser Initiative.					
FY 2011 Plans: Conduct a joint-high power electric laser product improvement program. Design verification experiments will be conducted as risk-reduction efforts.					
FY 2012 Base Plans: Conduct a joint high power electric laser product improvement program. Prepare for government-sponsored measurements to validate performance.					
FY 2012 OCO Plans:					

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Title: Major Thrust 2. ***Description:*** Mature solid state laser device technologies that will provide improved system level performance. ***FY 2010 Accomplishments:*** Combined high performance single modules in optimum module combination schemes to demonstrate the path to weapons-class scaling. Continued development of high reliability diode pump sources. Investigated eye-safer laser technologies. Conducted an industry proposal call for FY 2010. ***FY 2011 Plans:*** Demonstrate building block for highly efficient, compact, modular laser system with weapons-class applications. Demonstrate high reliability of diode pump sources. Scale eye-safer laser technologies to higher powers. Conduct Service and Agency proposal call for FY 2011. ***FY 2012 Base Plans:*** Develop high reliability/cost efficient diode pump sources. Scale eye-safer laser technologies to higher powers. Conduct an industry proposal call for FY 2012. ***FY 2012 OCO Plans:***	9.189	9.880	9.830	-	9.830
Title: Major Thrust 3. ***Description:*** Investigate new technologies that have revolutionary potential for HEL applications. ***FY 2010 Accomplishments:*** Incorporated new materials into a laser device and demonstrate properties in terms of wavelength selection, thermal handling, and overall laser efficiency. Scaled short pulse laser technologies for military applications. Conducted an industry proposal call for FY 2010. ***FY 2011 Plans:*** Explore novel laser technologies to improve efficiency and decrease mass/volume. Demonstrate applications for short pulse laser technology. Scale electrically pumped alkali lasers to moderate power levels. Conduct a Service and Agency proposal call for FY 2011. ***FY 2012 Base Plans:***	6.897	8.950	9.700	-	9.700

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Explore novel laser technologies to improve efficiency and decrease mass/volume. Demonstrate applications for short pulse laser technology. Scale electrically pumped alkali lasers to moderate power levels. Conduct an industry proposal call for FY 2012. ***FY 2012 OCO Plans:***					
Title: Major Thrust 4. ***Description:*** Conduct system level technology development and trade studies to facilitate scaling free electron lasers (FELs) to weapons-class power levels and shipboard integration. ***FY 2010 Accomplishments:*** Continued the development path for scaling to a 100 kW (kilowatt) laboratory demonstration, with emphasis on technologies that can support one megawatt (MW) future FEL performance. Conducted an industry proposal call for FY 2010. ***FY 2011 Plans:*** Demonstrate scaling to a 100 kW laboratory demonstration, with emphasis on technologies that can support one MW future FEL performance. Conduct a Service and Agency proposal call for FY 2011. ***FY 2012 Base Plans:*** Demonstrate scaling to a 100 kW laboratory demonstration, with emphasis on technologies that can support one MW future FEL performance. Conduct a Service and Agency proposal call for FY 2012. ***FY 2012 OCO Plans:***	4.120	4.460	4.320	-	4.320
Title: Major Thrust 5. ***Description:*** Develop technology to support high performance beam control systems and integrated demonstrations. ***FY 2010 Accomplishments:*** Demonstrated advanced component and control techniques for difficult environments, such as high speed flight, high turbulence, and extended ranges. Conducted an industry proposal call for FY 2010. ***FY 2011 Plans:***	9.333	9.980	9.890	-	9.890

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Implement beam control technology options for laser weapon use on multiple platforms (aircraft, ground vehicles and shipboard systems) in stressing environments. Conduct a Service and Agency proposal call for FY 2011. ***FY 2012 Base Plans:*** Implement beam control technology options for laser weapon use on multiple platforms (aircraft, ground vehicles and shipboard systems) in stressing environments. Conduct an industry proposal call for FY 2012. ***FY 2012 OCO Plans:***					
Title: Major Thrust 6. ***Description:*** Conduct laser vulnerability experiments on materials, components, and targets. Develop a lethality database, and integrate into a systems-level architecture plan and lethality models. ***FY 2010 Accomplishments:*** In close coordination with existing HEL models, integrated lethality data into campaign-level HEL system models. Conducted laser vulnerability experiments on materials, components, and targets. Updated laser systems inputs for the Joint Munitions Effect Manual. ***FY 2011 Plans:*** In close coordination with existing HEL models, integrate lethality data into campaign-level HEL system models. Conduct laser vulnerability experiments on materials, components, and targets. Update laser systems inputs for the Joint Munitions Effect Manual. ***FY 2012 Base Plans:*** In close coordination with existing HEL models, integrate lethality data into campaign-level HEL system models. Conduct laser vulnerability experiments on materials, components, and targets. Update laser systems inputs for the Joint Munitions Effect Manual. ***FY 2012 OCO Plans:***	4.323	4.544	4.580	-	4.580
Title: Major Thrust 7. ***Description:*** Maintain and evaluate high-fidelity engineering models for HEL scenario evaluation. Provide for HEL system modeling for mission-level wargaming activities. ***FY 2010 Accomplishments:***	2.784	2.920	2.980	-	2.980

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Completed, tested, and demonstrated solid state laser model. Completed HEL system scenario model and demonstrated engagement applications. ***FY 2011 Plans:*** Provide maintenance, verification, validation, and accreditation for updated system level HEL models. Conduct mission-level HEL engagement scenarios and wargame HEL concepts. Incorporate predictive avoidance modeling into existing HEL toolkit. ***FY 2012 Base Plans:*** Provide maintenance, verification, validation, and accreditation for updated system level HEL models. Conduct mission-level HEL engagement scenarios and wargame HEL concepts. Incorporate predictive avoidance modeling into existing HEL toolkit. ***FY 2012 OCO Plans:***					
Accomplishments/Planned Programs Subtotals	44.876	53.384	54.059	-	54.059

	FY 2010	FY 2011
Congressional Add: Advanced Deformable Mirrors for High Energy Laser Weapons. ***FY 2010 Accomplishments:*** Conducted Congressionally-directed effort. ***FY 2011 Plans:***	1.593	-
Congressional Add: High Bandwidth, High Energy Storage, Exawatt Laser Glass Development. ***FY 2010 Accomplishments:*** Conducted Congressionally-directed effort. ***FY 2011 Plans:***	2.788	-
Congressional Add: Planar Lightwave Circuit Development for High Power Military Laser Applications. ***FY 2010 Accomplishments:*** Conducted Congressionally-directed effort. ***FY 2011 Plans:***	2.390	-
Congressional Adds Subtotals	6.771	-

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C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
• Activity Not Provided: *Title Not Provided*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

D. Acquisition Strategy

N/A

E. Performance Metrics

Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.