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# THE DIRECTED ENERGY SOURCEBOOK

# About the Directed Energy Sourcebook

The Directed Energy Sourcebook is a publication of the NDIA Emerging Technologies Institute (ETI) designed to provide a publicly available index of companies, government entities, and select universities related to directed energy. For the purposes of this report, the term “directed energy” includes both high energy lasers (HEL) and high-power microwaves (HPM). By compiling this directory as a comprehensive reference to the field, ETI hopes to direct agencies and companies who are looking for specific directed energy solutions towards providers who have demonstrated proficiency in a wide variety of directed energy components, materials, systems, and testing infrastructure. Many of the companies listed in this sourcebook have domain expertise in a wide range of potential defense and civilian applications, and defense is not necessarily their primary source of revenue.

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For more information please visit our website: [EmergingTechnologiesInstitute.org](https://EmergingTechnologiesInstitute.org)

Written by Rebecca Wostenberg, Wilson Miles, and Jordan Chase. The authors are grateful for the entire ETI team, past and present, for their input.

Typeset and produced by Hannah Meushaw, Alexander Feeser, and Eve Dorris.

Edited by Jacob Trask.

Media Queries: please email [Media@NDIA.org](mailto:Media@NDIA.org)

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# Foreword

After many years of relegation to the realms of science fiction, directed energy weapon (DEW) technologies have advanced to the point of near-term fielding for use by operational forces in multiple domains. While DEW systems are still primarily developed as prototypes, advancements in critical technologies such as adaptive optics, beam control, microwave generation, and energy storage have resulted in a variety of systems that are ready, or nearly ready, for production and deployment. For the Department of Defense (DoD), the integration of DEWs promises to revolutionize warfighting capabilities, providing cost effective solutions to the most challenging global threats, including, for example, extensive counter – unmanned aircraft system (C-UAS) capabilities. The widespread integration of DEW systems will optimize mission effectiveness, mitigate risks, and ultimately contribute to the preservation of lives.

The evolution of DEW capabilities has been accompanied by significant investments from industry, academia, and government agencies in research and development, testing, and the prototyping of new and improved weapon systems. The utility of directed energy technology extends far beyond defense applications, providing an opportunity for DoD to articulate a strategic vision and a corresponding demand signal, that can benefit the Directed Energy (DE) industrial base as well as multiple commercial sectors. DEW's potentially transformative impact on defense holds crucial importance amid the era of great power competition, challenging government agencies and decision-makers to keep pace with a myriad of companies, both new and established, some primarily commercial and some primarily focused on defense customers, capable of advancing their missions through directed energy solutions. As military services and government agencies seek to modernize, the need to connect with potential suppliers and solution providers capable of accelerating this transformation becomes imperative.

This Directed Energy Sourcebook, initiated by NDIA's Emerging Technologies Institute (ETI), aims to facilitate connections between directed energy suppliers and government agencies, providing a valuable tool for those seeking directed energy solutions. ETI anticipates that this sourcebook will serve as a guide to explore innovative ways of incorporating and leveraging highly effective directed energy capabilities.



**General (Ret.) John E. Hyten, USAF**  
11th Vice Chairman of the Joint Chiefs of Staff



**The Honorable Ellen M. Lord**  
Former Under Secretary of Defense  
for Acquisition and Sustainment

# What is the Directed Energy Sourcebook?

The 2024 Directed Energy Sourcebook builds upon NDIA's commitment to illuminating the complex supply chains surrounding directed energy technologies. This work began by publishing *Directed Energy Supply Chains: Securing the Path to the Future*, and continues in this sourcebook. By compiling this comprehensive directory, we aim to guide agencies, companies, and organizations in search of specific directed energy solutions toward providers showcasing proven proficiency in the field, thereby reducing uncertainties that currently surround this emerging defense technology.

The Directed Energy Sourcebook categorizes companies offering directed energy solutions and services using an ontology designed for directed energy technologies. It divides the broad field of directed energy into two primary categories: High Energy Lasers and High-Power Microwaves. Within each category, companies are further characterized using the categories in the Directed Energy Ontology. Each category encompasses components integral to directed energy as a technology. Additionally, many companies featured in this sourcebook possess domain expertise applicable to a wide range of potential commercial and defense applications, although not explicitly identified as such. While these aspects may not cover the entirety of the field, they form the foundational elements of directed energy solutions.

## Methodology

All information presented in the Directed Energy Sourcebook was gathered by ETI staff through open-source research and requests for information. The ETI staff also conducted outreach to NDIA membership and worked closely with the Directed Energy Professional Society (DEPS) to help identify key companies and organizations working in DE. Additionally, ETI staff used *Leadership Connect*. Among several tools available, *Leadership Connect* provides unclassified U.S. Department of Defense contract information which was queried to identify companies with previous or current DE-related contracts. Utilizing the Directed Energy Ontology and the company's offerings, the ETI staff identified the primary aspect in which each company exhibited proficiency or expertise. Every company in the Directed Energy Sourcebook is categorized by its Primary Aspect and listed alphabetically. For companies that focus on particular sub-system components, those groupings can also be found

below. A small list of universities is also provided in the Sourcebook. While countless universities across the country and around the world contribute to DE research and educating the future workforce, these three universities are unique in that they have directed energy testing facilities that can be rented out by industry or government, thereby providing a very particular service. Finally, a list of U.S. government entities involved in Directed Energy is also provided in the Sourcebook as a resource for industry and academia.

## Directed Energy Ontology

- **All Companies**
- **High Energy Lasers Companies**
  - Systems Integrators
  - Research & Development
  - Testing & Evaluation
  - Sub-system Categories:
    - **Battle Damage Assessment**
    - **Coatings**
    - **Diodes**
    - **Electronics/Sensors**
    - **Energy Supply**
    - **Gain Medium**
    - **Gimbal & Tracking System**
    - **Laser Source**  
Pulsed diode lasers, fiber lasers, etc
    - **Optics & Beam Control**  
Fast-Steering Mirrors, Adaptive Optics
    - **Thermal Management**
- **High-Power Microwave Companies**
  - Systems Integrators
  - Research & Development
  - Testing & Evaluation
  - Sub-System Categories:
    - **Antenna**
    - **Battle Damage Assessment**
    - **Energy Supply**
    - **Pulsed Power/Microwave Generation**
    - **Thermal Management**
- **U.S. Government Entities**
- **Select Universities**

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# All Companies

Name of Company	Company URL	HEL or HPM	Role in Directed Energy
Active Optical Systems, LLC	<a href="http://aos-llc.com">aos-llc.com</a>	HEL	Optics & Beam Control (Adaptive Optics)
Adsys Controls	<a href="http://adsyscontrols.com">adsyscontrols.com</a>	HEL	Optics & Beam Control (Fast-Steering Mirrors)
Advanced Cooling Technologies	<a href="http://1-act.com">1-act.com</a>	HEL & HPM	Thermal Management
Advanced Thin Films	<a href="http://idexot.com">idexot.com</a>	HEL	Optics
AIM Defence	<a href="http://aimdefence.com">aimdefence.com</a>	HEL	System Integrator
American Systems	<a href="http://americansystems.com">americansystems.com</a>	HEL & HPM	Research & Development
Applied Energetics	<a href="http://appliedenergetics.com">appliedenergetics.com</a>	HEL	Laser Source
Applied Research Associates	<a href="http://ara.com">ara.com</a>	HEL & HPM	Research & Development
Archer Laboratories	<a href="http://thearcherlabs.com">thearcherlabs.com</a>	HPM	Antenna • Pulsed Power Generation
ARKA	<a href="http://arka.org">arka.org</a>	HEL	Optics & Beam Control • Coatings
BAE Systems	<a href="http://baesystems.com">baesystems.com</a>	HEL & HPM	Systems Integrator
Barber-Nichols, LLC	<a href="http://barber-nichols.com">barber-nichols.com</a>	HEL & HPM	Thermal Management • Energy Supply
BlueHalo	<a href="http://bluehalo.com">bluehalo.com</a>	HEL	Systems Integrator • Beam Control • Tracking
BluGlass	<a href="http://bluglass.com">bluglass.com</a>	HEL	Diodes
Boeing	<a href="http://boeing.com/defense/missile-defense/directed-energy">boeing.com/defense/missile-defense/directed-energy</a>	HEL	Systems Integrator
Booz Allen Hamilton	<a href="http://boozallen.com">boozallen.com</a>	HEL & HPM	Research & Development • Testing & Evaluation
Bren-Tronics, Inc	<a href="http://bren-tronics.com">bren-tronics.com</a>	HEL & HPM	Energy Supply
CAES	<a href="http://caes.com">caes.com</a>	HEL	Beam Control
Candent Technologies	<a href="http://candent-technologies.com">candent-technologies.com</a>	HEL & HPM	Energy Supply
Coherent	<a href="http://coherent.com">coherent.com</a>	HEL	Optics & Beam Control • Gain Medium • Coatings • Laser Source
Communications & Power Industries, LLC	<a href="http://cpii.com">cpii.com</a>	HPM	Pulsed Power/Microwave Generation
EaglePicher Technologies	<a href="http://eaglepicher.com">eaglepicher.com</a>	HEL & HPM	Energy Supply

<b>Eclipse Energy Systems</b>	<a href="http://eclipsethinfilms.com">eclipsethinfilms.com</a>	HEL & HPM	Coatings • Antenna • Pulsed Power/ Microwave Generation
<b>Empower RF Systems</b>	<a href="http://empowerrf.com">empowerrf.com</a>	HPM	Pulsed Power/Microwave Generation
<b>EO Solutions</b>	<a href="http://e-o.solutions">e-o.solutions</a>	HEL	Beam Control • Laser Source • Research & Development • Testing & Evaluation
<b>EOS Defense Systems USA</b>	<a href="http://eosdsusa.com">eosdsusa.com</a>	HEL	Optics & Beam Control (Fast-Steering Mirrors, Adaptive Optics) • Gimbal & Tracking System • Coatings • Laser Source (Pulsed Diode Lasers, Fiber Lasers) • Battle Damage Assessment • Electronics/Sensors • Research & Development • Testing & Evaluation
<b>Epir, Inc.</b>	<a href="http://epirtech.com">epirtech.com</a>	HEL	Electronics/Sensors
<b>Epirus, Inc.</b>	<a href="http://epirusinc.com">epirusinc.com</a>	HPM	Thermal Management • Antenna • Pulsed Power/Microwave Generation • Testing & Evaluation • Research & Development
<b>Excelitas Technologies</b>	<a href="http://excelitas.com">excelitas.com</a>	HEL	Optics
<b>Ferrite Microwave Technologies</b>	<a href="http://ferriteinc.com">ferriteinc.com</a>	HPM	Pulsed Power/Microwave Generation
<b>FiberBridge Photonics</b>	<a href="http://fiberbridge-photonics.com">fiberbridge-photonics.com</a>	HEL	Systems Integrator • Research & Development • Testing & Evaluation • Optics & Beam Control • Laser Source
<b>Fibertek, Inc.</b>	<a href="http://fibertek.com">fibertek.com</a>	HEL	Laser Source
<b>FiveNine Optics</b>	<a href="http://fivenineoptics.com">fivenineoptics.com</a>	HEL	Optics & Beam Control
<b>Forward Photonics</b>	<a href="http://forwardphotonics.com">forwardphotonics.com</a>	HEL	Diodes
<b>Freedom Photonics</b>	<a href="http://freedomphotonics.com">freedomphotonics.com</a>	HEL	Electronics/Sensors • Diodes • Research & Development
<b>G&amp;H</b>	<a href="http://gandh.com">gandh.com</a>	HEL	Optics & Beam Control
<b>General Atomics Electromagnetic Systems</b>	<a href="http://ga.com/advanced-weapons-technology/laser-weapon-systems">ga.com/advanced-weap- ons-technology/ laser-weapon-systems</a>	HEL	Systems Integrator
<b>Gentec-EO</b>	<a href="http://gentec-eo.com">gentec-eo.com</a>	HEL	Testing & Evaluation • Electronics/Sensors
<b>Heraeus Conamic</b>	<a href="http://herae.us/optics">herae.us/optics</a>	HEL	Optical Material
<b>High Point Aerotechnologies</b>	<a href="http://highpointaerotech.com">highpointaerotech.com</a>	HEL	Systems Integrator
<b>Honeywell</b>	<a href="http://honeywell.com/us/en">honeywell.com/us/en</a>	HEL & HPM	Thermal Management • Energy Supply
<b>HRL Laboratories</b>	<a href="http://hrl.com">hrl.com</a>	HEL	Laser Source
<b>Intellisense Systems</b>	<a href="http://intellisenseinc.com">intellisenseinc.com</a>	HEL	Electronics/Sensors

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<b>Kratos Defense &amp; Security Solutions</b>	<a href="http://kratosdefense.com">kratosdefense.com</a>	HEL & HPM	Systems Integrator • Testing & Evaluation
<b>KULR Technology Corporation</b>	<a href="http://kulrtechnology.com">kulrtechnology.com</a>	HEL & HPM	Thermal Management
<b>L3Harris ATI</b>	<a href="http://l3harris.com">l3harris.com</a>	HPM	Pulsed Power Generation • Antenna
<b>Leidos</b>	<a href="http://leidos.com">leidos.com</a>	HEL & HPM	Systems Integrator
<b>Leonardo DRS</b>	<a href="http://leonardodrs.com">leonardodrs.com</a>	HEL & HPM	Systems Integrator
<b>LightPath Technologies</b>	<a href="http://lightpath.com">lightpath.com</a>	HEL	Optics & Beam Control
<b>Lockheed Martin</b>	<a href="http://lockheedmartin.com/en-us/capabilities/directed-energy.html">lockheedmartin.com/en-us/capabilities/directed-energy.html</a>	HEL & HPM	System Integrator • Optics & Beam Control • Thermal Management • Laser Source
<b>Mainstream Engineering</b>	<a href="http://mainstream-engr.com">mainstream-engr.com</a>	HEL & HPM	Thermal Management • Energy Supply
<b>ManTech</b>	<a href="http://mantech.com">mantech.com</a>	HEL & HPM	Research & Development
<b>Moog, Inc.</b>	<a href="http://moog.com">moog.com</a>	HEL	Gimbal & Tracking System
<b>MTSI</b>	<a href="http://mtsi-va.com">mtsi-va.com</a>	HEL	Testing & Evaluation
<b>MZA Associates</b>	<a href="http://hmza.com">hmza.com</a>	HEL	System Integrator • Research & Development • Testing & Evaluation • Optics & Beam Control (Fast-Steering Mirrors, Adaptive Optics) • Gimbal & Tracking System
<b>NanoElectromagnetics</b>	<a href="http://nanoelectromagnetics.com">nanoelectromagnetics.com</a>	HPM	Pulsed Power • Antenna
<b>Nanohmics</b>	<a href="http://nanohmics.com">nanohmics.com</a>	HEL & HPM	Electronics/Sensors • Coatings • Pulsed Power/Microwave Generation
<b>Navitas Systems</b>	<a href="http://navitassys.com">navitassys.com</a>	HEL & HPM	Energy Supply
<b>NKT Photonics</b>	<a href="http://nktphotonics.com">nktphotonics.com</a>	HEL	Laser Source (Fiber Lasers)
<b>nLight</b>	<a href="http://nlight.net">nlight.net</a>	HEL	System Integrator • Optics & Beam Control (Adaptive Optics) • Gimbal & Tracking System • Gain Medium • Diodes • Laser Source (Fiber Lasers) • Electronics/Sensors • Research & Development • Testing & Evaluation
<b>Nokomis</b>	<a href="http://nokomisinc.com">nokomisinc.com</a>	HEL & HPM	Battle Damage Assessment
<b>Northrop Grumman</b>	<a href="http://northropgrumman.com">northropgrumman.com</a>	HEL & HPM	Systems Integrator
<b>NP Photonics</b>	<a href="http://npphotonics.com">npphotonics.com</a>	HEL	Optics • Laser Source

<b>Nuburu</b>	<a href="http://nuburu.net">nuburu.net</a>	HEL	Optics • Laser Source
<b>NYFORS</b>	<a href="http://nyfors.com">nyfors.com</a>	HEL	Laser Source (Fiber Lasers)
<b>OFS</b>	<a href="http://ofsoptics.com">ofsoptics.com</a>	HEL	Optics
<b>Optimax Systems</b>	<a href="http://optimaxsi.com">optimaxsi.com</a>	HEL	Optics & Beam Control (Fast-Steering Mirrors) • Coatings
<b>Pacific Antenna Systems</b>	<a href="http://pasantennas.com">pasantennas.com</a>	HPM	Systems Integrators • Antenna • Thermal Management • Battle Damage Assessment • Testing & Evaluation • Research & Development
<b>Parsons</b>	<a href="http://parsons.com">parsons.com</a>	HEL	Systems Integrator
<b>Photonic Cleaning Technologies</b>	<a href="http://photoniccleaning.com">photoniccleaning.com</a>	HEL	Optics (Protecting and Cleaning)
<b>Physical Sciences, Inc.</b>	<a href="http://psicorp.com/our-company">psicorp.com/our-company</a>	HEL	Optics • Laser Source
<b>Plymouth Grating Laboratory, Inc.</b>	<a href="http://plymouthgrating.com">plymouthgrating.com</a>	HEL	Optics & Beam Control • Coatings
<b>Power Photonic</b>	<a href="http://powerphotonic.com">powerphotonic.com</a>	HEL	Beam Control
<b>Qinetiq</b>	<a href="http://qinetiq.com">qinetiq.com</a>	HEL	Systems Integrator
<b>Quantic ECI</b>	<a href="http://quanticeci.com">quanticeci.com</a>	HPM	Energy Supply
<b>Radiance Technologies</b>	<a href="http://radiancetech.com">radiancetech.com</a>	HEL & HPM	Systems Integrator • Testing & Evaluation • Research & Development • Optics & Beam Control • Energy Supply • Thermal Management • Gimbal & Tracking System • Battle Damage Assessment • Electronics/Sensors • Antenna • Pulsed Power/Microwave Generation
<b>Radiasoft</b>	<a href="http://radiasoft.net">radiasoft.net</a>	HEL	Research & Development
<b>Rafael Advanced Defense Systems</b>	<a href="http://rafael.co.il">rafael.co.il</a>	HEL	Systems Integrator
<b>Rheinmetall AG</b>	<a href="http://rheinmetall.com/de">rheinmetall.com/de</a>	HEL	Systems Integrator
<b>Rolls Royce</b>	<a href="http://rolls-royce.com">rolls-royce.com</a>	HEL & HPM	Energy Supply • Thermal Management
<b>RTX</b>	<a href="http://rtx.com">rtx.com</a>	HEL & HPM	Systems Integrator • Research & Development
<b>SAIC</b>	<a href="http://saic.com">saic.com</a>	HEL & HPM	Research & Development
<b>SCDUSA/QI</b>	<a href="http://scdusa-ir.com/quantum-imaging">scdusa-ir.com/quantum-imaging</a>	HEL	Electronics/Sensors
<b>SCHOTT</b>	<a href="http://schott.com/en-us">schott.com/en-us</a>	HEL & HPM	Optics • Pulsed Power/Microwave Generation • Thermal Management

SemQuest	<a href="http://semquest.com">semquest.com</a>	HEL	Testing & Evaluation
Sem-Sol	<a href="http://sem-sol.com">sem-sol.com</a>	HPM	Pulsed Power/Microwave Generation • Antenna • Research & Development • System Integrator
SIE	<a href="http://siecompany.com">siecompany.com</a>	HEL & HPM	Research & Development
Spectral Energies	<a href="http://spectralenergies.com">spectralenergies.com</a>	HEL	Laser Source (Pulsed High-Energy Laser Source)
Spica Technologies	<a href="http://spicatech.com">spicatech.com</a>	HEL	Optics • Testing & Evaluation
SRI International	<a href="http://sri.com">sri.com</a>	HPM	Microwave Generation
Stellar Science	<a href="http://stellarscience.com">stellarscience.com</a>	HPM	Testing & Evaluation
Teknicare	<a href="http://teknicare.com">teknicare.com</a>	HEL & HPM	Testing & Evaluation • Research & Development
Telaztec, LLC	<a href="http://telaztec.com">telaztec.com</a>	HEL	Coatings
Thales UK	<a href="http://thalesgroup.com/en/countries/europe/thales-united-kingdom">thalesgroup.com/en/countries/europe/thales-united-kingdom</a>	HEL	Research & Development
Thermo Analytics	<a href="http://thermoanalytics.com">thermoanalytics.com</a>	HEL & HPM	Thermal Management
Torrent Photonics LLC	<a href="http://torrentphotonics.com">torrentphotonics.com</a>	HEL	Optics • Coatings
Verus Research	<a href="http://verusresearch.net">verusresearch.net</a>	HEL & HPM	Research & Development
VTG Defense	<a href="http://vtgdefense.com">vtgdefense.com</a>	HEL	Systems Integrator
Zygo	<a href="http://zygo.com">zygo.com</a>	HEL	Optics & Beam Control (Fast-Steering Mirrors, Adaptive Optics) • Coatings • Testing & Evaluation

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# High Energy Laser Companies (by Categories)

Name of Company	Company URL	HEL or HPM	Role in Directed Energy
<b>Systems Integrator</b>			
AIM Defence	<a href="http://aimdefence.com">aimdefence.com</a>	HEL	<b>System Integrator</b>
BAE Systems	<a href="http://baesystems.com/en/home">baesystems.com/en/home</a>	HEL & HPM	<b>Systems Integrator</b>
BlueHalo	<a href="http://bluehalo.com">bluehalo.com</a>	HEL	<b>Systems Integrator</b> • Beam Control • Tracking
Boeing	<a href="http://boeing.com/defense/missile-defense/directed-energy">boeing.com/defense/missile-defense/directed-energy</a>	HEL	<b>Systems Integrator</b>
FiberBridge Photonics	<a href="http://fiberbridge-photonics.com">fiberbridge-photonics.com</a>	HEL	<b>Systems Integrator</b> • Research & Development • Testing & Evaluation • Optics & Beam Control • Laser Source
General Atomics Electromagnetic Systems	<a href="http://ga.com/advanced-weapons-technology/laser-weapon-systems">ga.com/advanced-weapons-technology/laser-weapon-systems</a>	HEL	<b>Systems Integrator</b>
High Point Aerotechnologies	<a href="http://highpointaerotech.com">highpointaerotech.com</a>	HEL	<b>Systems Integrator</b>
Kord Technologies	<a href="http://kordtechnologies.com">kordtechnologies.com</a>	HEL	<b>Systems Integrator</b> • Optics & Beam Control • Energy Supply • Thermal Management • Gimbal & Tracking System • Electronics/Sensors • Research & Development • Testing & Evaluation
Kratos Defense & Security Solutions	<a href="http://kratosdefense.com">kratosdefense.com</a>	HEL & HPM	<b>Systems Integrator</b> • Testing & Evaluation
Leidos	<a href="http://leidos.com">leidos.com</a>	HEL & HPM	<b>Systems Integrator</b>
Leonardo DRS	<a href="http://leonardodrs.com">leonardodrs.com</a>	HEL & HPM	<b>Systems Integrator</b>
Lockheed Martin	<a href="http://lockheedmartin.com/en-us/capabilities/directed-energy.html">lockheedmartin.com/en-us/capabilities/directed-energy.html</a>	HEL & HPM	<b>System Integrator</b> • Optics & Beam Control • Thermal Management • Laser Source
MZA Associates	<a href="http://hmza.com">hmza.com</a>	HEL	<b>System Integrator</b> • Research & Development • Testing & Evaluation • Optics & Beam Control (Fast-Steering Mirrors, Adaptive Optics) • Gimbal & Tracking System
nLight	<a href="http://nlight.net">nlight.net</a>	HEL	<b>System Integrator</b> • Optics & Beam Control (Adaptive Optics) • Gimbal & Tracking System • Gain Medium • Diodes • Laser Source (Fiber Lasers) • Electronics/Sensors • Research & Development • Testing & Evaluation
Northrop Grumman	<a href="http://northropgrumman.com">northropgrumman.com</a>	HEL & HPM	<b>Systems Integrator</b>
Parsons	<a href="http://parsons.com">parsons.com</a>	HEL	<b>Systems Integrator</b>
Qinetiq	<a href="http://qinetiq.com">qinetiq.com</a>	HEL	<b>Systems Integrator</b>

<b>Radiance Technologies</b>	<a href="http://radiancetech.com">radiancetech.com</a>	HEL & HPM	<b>Systems Integrator</b> • Testing & Evaluation • Research & Development • Optics & Beam Control • Energy Supply • Thermal Management • Gimbal & Tracking System • Battle Damage Assessment • Electronics/Sensors • Antenna • Pulsed Power/Microwave Generation
<b>Rafael Advanced Defense Systems</b>	<a href="http://rafael.co.il">rafael.co.il</a>	HEL	<b>Systems Integrator</b>
<b>Rheinmetall AG</b>	<a href="http://rheinmetall.com/de">rheinmetall.com/de</a>	HEL	<b>Systems Integrator</b>
<b>RTX</b>	<a href="http://rtx.com">rtx.com</a>	HEL & HPM	<b>Systems Integrator</b> • Research & Development
<b>VTG Defense</b>	<a href="http://vtgdefense.com">vtgdefense.com</a>	HEL	<b>Systems Integrator</b>

## Research & Development

<b>American Systems</b>	<a href="http://americansystems.com">americansystems.com</a>	HEL & HPM	<b>Research &amp; Development</b>
<b>Applied Research Associates</b>	<a href="http://ara.com">ara.com</a>	HEL & HPM	<b>Research &amp; Development</b>
<b>Booz Allen Hamilton</b>	<a href="http://boozallen.com">boozallen.com</a>	HEL & HPM	<b>Research &amp; Development</b> • Testing & Evaluation
<b>EO Solutions</b>	<a href="http://e-o.solutions">e-o.solutions</a>	HEL	Beam Control • Laser Source • <b>Research &amp; Development</b> • Testing & Evaluation
<b>EOS Defense Systems USA</b>	<a href="http://eosdsusa.com">eosdsusa.com</a>	HEL	Optics & Beam Control (Fast-Steering Mirrors, Adaptive Optics) • Gimbal & Tracking System • Coatings • Laser Source (Pulsed Diode Lasers, Fiber Lasers) • Battle Damage Assessment • Electronics/Sensors • <b>Research &amp; Development</b> • Testing & Evaluation
<b>FiberBridge Photonics</b>	<a href="http://fiberbridge-photonics.com">fiberbridge-photonics.com</a>	HEL	Systems Integrator • <b>Research &amp; Development</b> • Testing & Evaluation • Optics & Beam Control • Laser Source
<b>Freedom Photonics</b>	<a href="http://freedomphotonics.com">freedomphotonics.com</a>	HEL	Electronics/Sensors • Diodes • <b>Research &amp; Development</b>
<b>Kord Technologies</b>	<a href="http://kordtechnologies.com">kordtechnologies.com</a>	HEL	Systems Integrator • Optics & Beam Control • Energy Supply • Thermal Management • Gimbal & Tracking System • Electronics/Sensors • <b>Research &amp; Development</b> • Testing & Evaluation
<b>ManTech</b>	<a href="http://mantech.com">mantech.com</a>	HEL & HPM	<b>Research &amp; Development</b>
<b>MZA Associates</b>	<a href="http://hmza.com">hmza.com</a>	HEL	System Integrator • <b>Research &amp; Development</b> • Testing & Evaluation • Optics & Beam Control (Fast-Steering Mirrors, Adaptive Optics) • Gimbal & Tracking System
<b>nLight</b>	<a href="http://nlight.net">nlight.net</a>	HEL	System Integrator • Optics & Beam Control (Adaptive Optics) • Gimbal & Tracking System • Gain Medium • Diodes • Laser Source (Fiber Lasers) • Electronics/Sensors • <b>Research &amp; Development</b> • Testing & Evaluation



# DIRECTED ENERGY WEAPON SUPPLY CHAINS REPORT

SECURING THE PATH TO THE FUTURE

Directed energy weapons (DEWs), including high energy lasers (HELs) and high-power microwaves (HPMs), have emerged as potentially transformative weapons on the modern battlefield. Recent advancements have made DEWs more capable than ever, with many systems possessing the power and range necessary to engage a wide variety of threats, more affordably than current systems. Recent conflicts in the Middle East and Europe have highlighted the importance of munitions capacity as well as the need to both efficiently and effectively counter different kinetic threats. The ability of some DEW systems to engage many targets at once with an “unlimited” magazine could yield enormous economic and tactical benefits. However, the DoD has often wavered in its commitment to fielding DEWs at scale. As such, current DEW supply chains, including critical raw materials, the manufacturing base and workforce, and testing infrastructure, are incapable of supporting

DEW deployment at scale. The current DEW supply chains are only able to produce small quantities of systems with long lead times. Without a clear and sustained demand signal from DoD, and therefore a return on investment, industry is hesitant to make the investments necessary to have secure, healthy, and resilient DEW supply chains. While addressing these vulnerabilities is a formidable task, it is not insurmountable. To strengthen DEW supply chains and fulfill the potential of these cutting-edge technologies, a series of concrete steps by government, industry, and academia are necessary.



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<b>Radiasoft</b>	<a href="http://radiasoft.net">radiasoft.net</a>	HEL	<b>Research &amp; Development</b>
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<b>SAIC</b>	<a href="http://saic.com">saic.com</a>	HEL & HPM	<b>Research &amp; Development</b>
<b>SIE</b>	<a href="http://siecompany.com">siecompany.com</a>	HEL & HPM	<b>Research &amp; Development</b>
<b>Teknicare</b>	<a href="http://teknicare.com">teknicare.com</a>	HEL & HPM	Testing & Evaluation • <b>Research &amp; Development</b>
<b>Thales UK</b>	<a href="http://thalesgroup.com/en/countries/europe/thales-united-kingdom">thalesgroup.com/en/countries/europe/thales-united-kingdom</a>	HEL	<b>Research &amp; Development</b>
<b>Verus Research</b>	<a href="http://verusresearch.net">verusresearch.net</a>	HEL & HPM	<b>Research &amp; Development</b>

## Testing & Evaluation

<b>Booz Allen Hamilton</b>	<a href="http://boozallen.com">boozallen.com</a>	HEL & HPM	Research & Development • <b>Testing &amp; Evaluation</b>
<b>EO Solutions</b>	<a href="http://e-o.solutions">e-o.solutions</a>	HEL	Beam Control • Laser Source • Research & Development • <b>Testing &amp; Evaluation</b>
<b>EOS Defense Systems USA</b>	<a href="http://eosdsusa.com">eosdsusa.com</a>	HEL	Optics & Beam Control (Fast-Steering Mirrors, Adaptive Optics) • Gimbal & Tracking System • Coatings • Laser Source (Pulsed Diode Lasers, Fiber Lasers) • Battle Damage Assessment • Electronics/Sensors • Research & Development • <b>Testing &amp; Evaluation</b>
<b>FiberBridge Photonics</b>	<a href="http://fiberbridge-photonics.com">fiberbridge-photonics.com</a>	HEL	Systems Integrator • Research & Development • <b>Testing &amp; Evaluation</b> • Optics & Beam Control • Laser Source
<b>Gentec-EO</b>	<a href="http://gentec-eo.com">gentec-eo.com</a>	HEL	<b>Testing &amp; Evaluation</b> • Electronics/Sensors
<b>Kord Technologies</b>	<a href="http://kordtechnologies.com">kordtechnologies.com</a>	HEL	Systems Integrator • Optics & Beam Control • Energy Supply • Thermal Management • Gimbal & Tracking System • Electronics/Sensors • Research & Development • <b>Testing &amp; Evaluation</b>
<b>Kratos Defense &amp; Security Solutions</b>	<a href="http://kratosdefense.com">kratosdefense.com</a>	HEL & HPM	Systems Integrator • <b>Testing &amp; Evaluation</b>
<b>MTSI</b>	<a href="http://mtsi-va.com">mtsi-va.com</a>	HEL	<b>Testing &amp; Evaluation</b>
<b>MZA Associates</b>	<a href="http://hmza.com">hmza.com</a>	HEL	System Integrator • Research & Development • <b>Testing &amp; Evaluation</b> • Optics & Beam Control (Fast-Steering Mirrors, Adaptive Optics) • Gimbal & Tracking System

nLight	<a href="http://nlight.net">nlight.net</a>	HEL	System Integrator • Optics & Beam Control (Adaptive Optics) • Gimbal & Tracking System • Gain Medium • Diodes • Laser Source (Fiber Lasers) • Electronics/Sensors • Research & Development • <b>Testing &amp; Evaluation</b>
Radiance Technologies	<a href="http://radiancetech.com">radiancetech.com</a>	HEL & HPM	Systems Integrator • <b>Testing &amp; Evaluation</b> • Research & Development • Optics & Beam Control • Energy Supply • Thermal Management • Gimbal & Tracking System • Battle Damage Assessment • Electronics/Sensors • Antenna • Pulsed Power/Microwave Generation
SemQuest	<a href="http://semquest.com">semquest.com</a>	HEL	<b>Testing &amp; Evaluation</b>
Spica Technologies	<a href="http://spicatech.com">spicatech.com</a>	HEL	Optics • <b>Testing &amp; Evaluation</b>
Teknicare	<a href="http://teknicare.com">teknicare.com</a>	HEL & HPM	<b>Testing &amp; Evaluation</b> • Research & Development
Zygo	<a href="http://zygo.com">zygo.com</a>	HEL	Optics & Beam Control (Fast-Steering Mirrors, Adaptive Optics) • Coatings • <b>Testing &amp; Evaluation</b>

## Battle Damage Assessment

EOS Defense Systems USA	<a href="http://eosdsusa.com">eosdsusa.com</a>	HEL	Optics & Beam Control (Fast-Steering Mirrors, Adaptive Optics) • Gimbal & Tracking System • Coatings • Laser Source (Pulsed Diode Lasers, Fiber Lasers) • <b>Battle Damage Assessment</b> • Electronics/Sensors • Research & Development • Testing & Evaluation
Nokomis	<a href="http://nokomisinc.com">nokomisinc.com</a>	HEL & HPM	<b>Battle Damage Assessment</b>
Radiance Technologies	<a href="http://radiancetech.com">radiancetech.com</a>	HEL & HPM	Systems Integrator • Testing & Evaluation • Research & Development • Optics & Beam Control • Energy Supply • Thermal Management • Gimbal & Tracking System • <b>Battle Damage Assessment</b> • Electronics/Sensors • Antenna • Pulsed Power/Microwave Generation

## Coatings

ARKA	<a href="http://arka.org">arka.org</a>	HEL	Optics & Beam Control • <b>Coatings</b>
Coherent	<a href="http://coherent.com">coherent.com</a>	HEL	Optics & Beam Control • Gain Medium • <b>Coatings</b> • Laser Source
Eclipse Energy Systems	<a href="http://eclipsethinfilms.com">eclipsethinfilms.com</a>	HEL & HPM	<b>Coatings</b> • Antenna • Pulsed Power/Microwave Generation
Nanohmics	<a href="http://nanohmics.com">nanohmics.com</a>	HEL & HPM	Electronics/Sensors • <b>Coatings</b> • Pulsed Power/Microwave Generation
Optimax Systems	<a href="http://optimaxsi.com">optimaxsi.com</a>	HEL	Optics & Beam Control (Fast-Steering Mirrors) • <b>Coatings</b>

Plymouth Grating Laboratory, Inc.	<a href="http://plymouthgrating.com">plymouthgrating.com</a>	HEL	Optics & Beam Control • <b>Coatings</b>
Telaztec, LLC	<a href="http://telaztec.com">telaztec.com</a>	HEL	<b>Coatings</b>
Torrent Photonics LLC	<a href="http://torrentphotonics.com">torrentphotonics.com</a>	HEL	Optics • <b>Coatings</b>
Zygo	<a href="http://zygo.com">zygo.com</a>	HEL	Optics & Beam Control (Fast-Steering Mirrors, Adaptive Optics) • <b>Coatings</b> • Testing & Evaluation

## Diodes

BluGlass	<a href="http://bluglass.com">bluglass.com</a>	HEL	<b>Diodes</b>
Forward Photonics	<a href="http://forwardphotonics.com">forwardphotonics.com</a>	HEL	<b>Diodes</b>
Freedom Photonics	<a href="http://freedomphotonics.com">freedomphotonics.com</a>	HEL	Electronics/Sensors • <b>Diodes</b> • Research & Development
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## Electronics/Sensors

EOS Defense Systems USA	<a href="http://eosdsusa.com">eosdsusa.com</a>	HEL	Optics & Beam Control (Fast-Steering Mirrors, Adaptive Optics) • Gimbal & Tracking System • Coatings • Laser Source (Pulsed Diode Lasers, Fiber Lasers) • Battle Damage Assessment • <b>Electronics/Sensors</b> • Research & Development • Testing & Evaluation
Epir, Inc.	<a href="http://epirtech.com">epirtech.com</a>	HEL	<b>Electronics/Sensors</b>
Freedom Photonics	<a href="http://freedomphotonics.com">freedomphotonics.com</a>	HEL	<b>Electronics/Sensors</b> • Diodes • Research & Development
Gentec-EO	<a href="http://gentec-eo.com">gentec-eo.com</a>	HEL	Testing & Evaluation • <b>Electronics/Sensors</b>
Intellisense Systems	<a href="http://intellisenseinc.com">intellisenseinc.com</a>	HEL	<b>Electronics/Sensors</b>
Kord Technologies	<a href="http://kordtechnologies.com">kordtechnologies.com</a>	HEL	Systems Integrator • Optics & Beam Control • Energy Supply • Thermal Management • Gimbal & Tracking System • <b>Electronics/Sensors</b> • Research & Development • Testing & Evaluation
Nanohmics	<a href="http://nanohmics.com">nanohmics.com</a>	HEL & HPM	<b>Electronics/Sensors</b> • Coatings • Pulsed Power/Microwave Generation
nLight	<a href="http://nlight.net">nlight.net</a>	HEL	System Integrator • Optics & Beam Control (Adaptive Optics) • Gimbal & Tracking System • Gain Medium • Diodes • Laser Source (Fiber Lasers) • <b>Electronics/Sensors</b> • Research & Development • Testing & Evaluation

Radiance Technologies	<a href="http://radiancetech.com">radiancetech.com</a>	HEL & HPM	Systems Integrator • Testing & Evaluation • Research & Development • Optics & Beam Control • Energy Supply • Thermal Management • Gimbal & Tracking System • Battle Damage Assessment • <b>Electronics/Sensors</b> • Antenna • Pulsed Power/Microwave Generation
SCDUSA/QI	<a href="http://scdusa-ir.com/quantum-imaging">scdusa-ir.com/quantum-imaging</a>	HEL	<b>Electronics/Sensors</b>

## Energy Supply

Barber-Nichols, LLC	<a href="http://barber-nichols.com">barber-nichols.com</a>	HEL & HPM	Thermal Management • <b>Energy Supply</b>
Bren-Tronics, Inc	<a href="http://bren-tronics.com">bren-tronics.com</a>	HEL & HPM	<b>Energy Supply</b>
Candent Technologies	<a href="http://candent-technologies.com">candent-technologies.com</a>	HEL & HPM	<b>Energy Supply</b>
EaglePicher Technologies	<a href="http://eaglepicher.com">eaglepicher.com</a>	HEL & HPM	<b>Energy Supply</b>
Honeywell	<a href="http://honeywell.com">honeywell.com</a>	HEL & HPM	Thermal Management • <b>Energy Supply</b>
Kord Technologies	<a href="http://kordtechnologies.com">kordtechnologies.com</a>	HEL	Systems Integrator • Optics & Beam Control • <b>Energy Supply</b> • Thermal Management • Gimbal & Tracking System • Electronics/Sensors • Research & Development • Testing & Evaluation
Mainstream Engineering	<a href="http://mainstream-engr.com">mainstream-engr.com</a>	HEL & HPM	Thermal Management • <b>Energy Supply</b>
Navitas Systems	<a href="http://navitassys.com">navitassys.com</a>	HEL & HPM	<b>Energy Supply</b>
Radiance Technologies	<a href="http://radiancetech.com">radiancetech.com</a>	HEL & HPM	Systems Integrator • Testing & Evaluation • Research & Development • Optics & Beam Control • <b>Energy Supply</b> • Thermal Management • Gimbal & Tracking System • Battle Damage Assessment • Electronics/Sensors • Antenna • Pulsed Power/Microwave Generation
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nLight	<a href="http://nlight.net">nlight.net</a>	HEL	System Integrator • Optics & Beam Control (Adaptive Optics) • Gimbal & Tracking System • <b>Gain Medium</b> • Diodes • Laser Source (Fiber Lasers) • Electronics/Sensors • Research & Development • Testing & Evaluation

Gimbal & Tracking System			
BlueHalo	<a href="http://bluehalo.com">bluehalo.com</a>	HEL	Systems Integrator • Beam Control • <b>Tracking</b>
EOS Defense Systems USA	<a href="http://eosdsusa.com">eosdsusa.com</a>	HEL	Optics & Beam Control (Fast-Steering Mirrors, Adaptive Optics) • <b>Gimbal &amp; Tracking System</b> • Coatings • Laser Source (Pulsed Diode Lasers, Fiber Lasers) • Battle Damage Assessment • Electronics/Sensors • Research & Development • Testing & Evaluation
Kord Technologies	<a href="http://kordtechnologies.com">kordtechnologies.com</a>	HEL	Systems Integrator • Optics & Beam Control • Energy Supply • Thermal Management • <b>Gimbal &amp; Tracking System</b> • Electronics/Sensors • Research & Development • Testing & Evaluation
Moog, Inc.	<a href="http://moog.com">moog.com</a>	HEL	<b>Gimbal &amp; Tracking System</b>
MZA Associates	<a href="http://hmza.com">hmza.com</a>	HEL	System Integrator • Research & Development • Testing & Evaluation • Optics & Beam Control (Fast-Steering Mirrors, Adaptive Optics) • <b>Gimbal &amp; Tracking System</b>
nLight	<a href="http://nlight.net">nlight.net</a>	HEL	System Integrator • Optics & Beam Control (Adaptive Optics) • <b>Gimbal &amp; Tracking System</b> • Gain Medium • Diodes • Laser Source (Fiber Lasers) • Electronics/Sensors • Research & Development • Testing & Evaluation
Radiance Technologies	<a href="http://radiancetech.com">radiancetech.com</a>	HEL & HPM	Systems Integrator • Testing & Evaluation • Research & Development • Optics & Beam Control • Energy Supply • Thermal Management • <b>Gimbal &amp; Tracking System</b> • Battle Damage Assessment • Electronics/Sensors • Antenna • Pulsed Power/Microwave Generation

Laser Source			
Applied Energetics	<a href="http://appliedenergetics.com">appliedenergetics.com</a>	HEL	<b>Laser Source</b>
Coherent	<a href="http://coherent.com">coherent.com</a>	HEL	Optics & Beam Control • Gain Medium • Coatings • <b>Laser Source</b>
EO Solutions	<a href="http://e-o.solutions">e-o.solutions</a>	HEL	Beam Control • <b>Laser Source</b> • Research & Development • Testing & Evaluation

EOS Defense Systems USA	<a href="http://eosdsusa.com">eosdsusa.com</a>	HEL	Optics & Beam Control (Fast-Steering Mirrors, Adaptive Optics) • Gimbal & Tracking System • Coatings • <b>Laser Source</b> (Pulsed Diode Lasers, Fiber Lasers) • Battle Damage Assessment • Electronics/Sensors • Research & Development • Testing & Evaluation
FiberBridge Photonics	<a href="http://fiberbridge-photonics.com">fiberbridge-photonics.com</a>	HEL	Systems Integrator • Research & Development • Testing & Evaluation • Optics & Beam Control • <b>Laser Source</b>
Fibertek, Inc.	<a href="http://fibertek.com">fibertek.com</a>	HEL	<b>Laser Source</b>
HRL Laboratories	<a href="http://hrl.com">hrl.com</a>	HEL	<b>Laser Source</b>
Lockheed Martin	<a href="http://lockheedmartin.com/en-us/capabilities/directed-energy.html">lockheedmartin.com/en-us/capabilities/directed-energy.html</a>	HEL & HPM	System Integrator • Optics & Beam Control • Thermal Management • <b>Laser Source</b>
NKT Photonics	<a href="http://nktphotonics.com">nktphotonics.com</a>	HEL	<b>Laser Source</b> (Fiber Lasers)
nLight	<a href="http://nlight.net">nlight.net</a>	HEL	System Integrator • Optics & Beam Control (Adaptive Optics) • Gimbal & Tracking System • Gain Medium • Diodes • <b>Laser Source</b> (Fiber Lasers) • Electronics/Sensors • Research & Development • Testing & Evaluation
NP Photonics	<a href="http://npphotonics.com">npphotonics.com</a>	HEL	Optics • <b>Laser Source</b>
Nuburu	<a href="http://nuburu.net">nuburu.net</a>	HEL	Optics • <b>Laser Source</b>
NYFORS	<a href="http://nyfors.com">nyfors.com</a>	HEL	<b>Laser Source</b> (Fiber Lasers)
Physical Sciences, Inc.	<a href="http://psicorp.com/our-company">psicorp.com/our-company</a>	HEL	Optics • <b>Laser Source</b>
Spectral Energies	<a href="http://spectralenergies.com">spectralenergies.com</a>	HEL	<b>Laser Source</b> (Pulsed High-Energy Laser Source)

## Optics & Beam Control

Active Optical Systems, LLC	<a href="http://aos-llc.com">aos-llc.com</a>	HEL	<b>Optics &amp; Beam Control</b> (Adaptive Optics)
Adsys Controls	<a href="http://adsyscontrols.com">adsyscontrols.com</a>	HEL	<b>Optics &amp; Beam Control</b> (Fast-Steering Mirrors)
Advanced Thin Films	<a href="http://idexot.com">idexot.com</a>	HEL	<b>Optics</b>
ARKA	<a href="http://arka.org">arka.org</a>	HEL	<b>Optics &amp; Beam Control</b> • Coatings
BlueHalo	<a href="http://bluehalo.com">bluehalo.com</a>	HEL	Systems Integrator • <b>Beam Control</b> • Tracking
CAES	<a href="http://caes.com">caes.com</a>	HEL	<b>Beam Control</b>
Coherent	<a href="http://coherent.com">coherent.com</a>	HEL	<b>Optics &amp; Beam Control</b> • Gain Medium • Coatings • Laser Source
EO Solutions	<a href="http://e-o.solutions">e-o.solutions</a>	HEL	<b>Beam Control</b> • Laser Source • Research & Development • Testing & Evaluation



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Excelitas Technologies	<a href="http://excelitas.com">excelitas.com</a>	HEL	<b>Optics</b>
FiberBridge Photonics	<a href="http://fiberbridge-photonics.com">fiberbridge-photonics.com</a>	HEL	Systems Integrator • Research & Development • Testing & Evaluation • <b>Optics &amp; Beam Control</b> • Laser Source
FiveNine Optics	<a href="http://fivenineoptics.com">fivenineoptics.com</a>	HEL	<b>Optics &amp; Beam Control</b>
G&H	<a href="http://gandh.com">gandh.com</a>	HEL	<b>Optics &amp; Beam Control</b>
Heraeus Conamic	<a href="http://herae.us/optics">herae.us/optics</a>	HEL	<b>Optical Material</b>
Kord Technologies	<a href="http://kordtechnologies.com">kordtechnologies.com</a>	HEL	Systems Integrator • <b>Optics &amp; Beam Control</b> • Energy Supply • Thermal Management • Gimbal & Tracking System • Electronics/Sensors • Research & Development • Testing & Evaluation
LightPath Technologies	<a href="http://lightpath.com">lightpath.com</a>	HEL	<b>Optics &amp; Beam Control</b>
Lockheed Martin	<a href="http://lockheedmartin.com/en-us/capabilities/directed-energy.html">lockheedmartin.com/en-us/capabilities/directed-energy.html</a>	HEL & HPM	System Integrator • <b>Optics &amp; Beam Control</b> • Thermal Management • Laser Source
MZA Associates	<a href="http://mza.com">mza.com</a>	HEL	System Integrator • Research & Development • Testing & Evaluation • <b>Optics &amp; Beam Control</b> (Fast-Steering Mirrors, Adaptive Optics) • Gimbal & Tracking System
nLight	<a href="http://nlight.net">nlight.net</a>	HEL	System Integrator • <b>Optics &amp; Beam Control</b> (Adaptive Optics) • Gimbal & Tracking System • Gain Medium • Diodes • Laser Source (Fiber Lasers) • Electronics/Sensors • Research & Development • Testing & Evaluation
NP Photonics	<a href="http://np Photonics.com">np Photonics.com</a>	HEL	<b>Optics</b> • Laser Source
Nuburu	<a href="http://nuburu.net">nuburu.net</a>	HEL	<b>Optics</b> • Laser Source
OFS	<a href="http://ofs Photonics.com">ofs Photonics.com</a>	HEL	<b>Optics</b>
Optimax Systems	<a href="http://optimaxsi.com">optimaxsi.com</a>	HEL	<b>Optics &amp; Beam Control</b> (Fast-Steering Mirrors) • Coatings
Photonic Cleaning Technologies	<a href="http://photoniccleaning.com">photoniccleaning.com</a>	HEL	<b>Optics</b> (Protecting and Cleaning)
Physical Sciences, Inc.	<a href="http://psicorp.com/our-company">psicorp.com/our-company</a>	HEL	<b>Optics</b> • Laser Source
Plymouth Grating Laboratory, Inc.	<a href="http://plymouthgrating.com">plymouthgrating.com</a>	HEL	<b>Optics &amp; Beam Control</b> • Coatings

Power Photonic	<a href="http://powerphotonic.com">powerphotonic.com</a>	HEL	<b>Beam Control</b>
Radiance Technologies	<a href="http://radiancetech.com">radiancetech.com</a>	HEL & HPM	Systems Integrator • Testing & Evaluation • Research & Development • <b>Optics &amp; Beam Control</b> • Energy Supply • Thermal Management • Gimbal & Tracking System • Battle Damage Assessment • Electronics/Sensors • Antenna • Pulsed Power/Microwave Generation
SCHOTT	<a href="http://schott.com">schott.com</a>	HEL & HPM	<b>Optics</b> • Pulsed Power/Microwave Generation • Thermal Management
Spica Technologies	<a href="http://spicatech.com">spicatech.com</a>	HEL	<b>Optics</b> • Testing & Evaluation
Torrent Photonics LLC	<a href="http://torrentphotonics.com">torrentphotonics.com</a>	HEL	<b>Optics</b> • Coatings
Zygo	<a href="http://zygo.com">zygo.com</a>	HEL	<b>Optics &amp; Beam Control</b> (Fast-Steering Mirrors, Adaptive Optics) • Coatings • Testing & Evaluation

## Thermal Management

Advanced Cooling Technologies	<a href="http://1-act.com">1-act.com</a>	HEL & HPM	<b>Thermal Management</b>
Barber-Nichols, LLC	<a href="http://barber-nichols.com">barber-nichols.com</a>	HEL & HPM	<b>Thermal Management</b> • Energy Supply
Honeywell	<a href="http://honeywell.com">honeywell.com</a>	HEL & HPM	<b>Thermal Management</b> • Energy Supply
Kord Technologies	<a href="http://kordtechnologies.com">kordtechnologies.com</a>	HEL	Systems Integrator • Optics & Beam Control • Energy Supply • <b>Thermal Management</b> • Gimbal & Tracking System • Electronics/Sensors • Research & Development • Testing & Evaluation
KULR Technology Corporation	<a href="http://kulrtechnology.com">kulrtechnology.com</a>	HEL & HPM	<b>Thermal Management</b>
Lockheed Martin	<a href="http://lockheedmartin.com/en-us/capabilities/directed-energy.html">lockheedmartin.com/en-us/capabilities/directed-energy.html</a>	HEL & HPM	System Integrator • Optics & Beam Control • <b>Thermal Management</b> • Laser Source
Mainstream Engineering	<a href="http://mainstream-engr.com">mainstream-engr.com</a>	HEL & HPM	<b>Thermal Management</b> • Energy Supply
Radiance Technologies	<a href="http://radiancetech.com">radiancetech.com</a>	HEL & HPM	Systems Integrator • Testing & Evaluation • Research & Development • Optics & Beam Control • Energy Supply • <b>Thermal Management</b> • Gimbal & Tracking System • Battle Damage Assessment • Electronics/Sensors • Antenna • Pulsed Power/Microwave Generation
Rolls Royce	<a href="http://rolls-royce.com">rolls-royce.com</a>	HEL & HPM	Energy Supply • <b>Thermal Management</b>
SCHOTT	<a href="http://schott.com">schott.com</a>	HEL & HPM	Optics • Pulsed Power/Microwave Generation • <b>Thermal Management</b>
Thermo Analytics	<a href="http://thermoanalytics.com">thermoanalytics.com</a>	HEL & HPM	<b>Thermal Management</b>

# High-Power Microwave Companies

## (by Categories)

Name of Company	Company URL	HEL or HPM	Role in Directed Energy
<b>Systems Integrator</b>			
BAE Systems	<a href="http://baesystems.com">baesystems.com</a>	HEL & HPM	<b>Systems Integrator</b>
Kratos Defense & Security Solutions	<a href="http://kratosdefense.com">kratosdefense.com</a>	HEL & HPM	<b>Systems Integrator</b> • Testing & Evaluation
Leidos	<a href="http://leidos.com">leidos.com</a>	HEL & HPM	<b>Systems Integrator</b>
Leonardo DRS	<a href="http://leonardodrs.com">leonardodrs.com</a>	HEL & HPM	<b>Systems Integrator</b>
Lockheed Martin	<a href="http://lockheedmartin.com/en-us/capabilities/directed-energy.html">lockheedmartin.com/en-us/capabilities/directed-energy.html</a>	HEL & HPM	<b>System Integrator</b> • Optics & Beam Control • Thermal Management • Laser Source
Northrop Grumman	<a href="http://northropgrumman.com">northropgrumman.com</a>	HEL & HPM	<b>Systems Integrator</b>
Pacific Antenna Systems	<a href="http://pasantennas.com">pasantennas.com</a>	HPM	<b>Systems Integrators</b> • Antenna • Thermal Management • Battle Damage Assessment • Testing & Evaluation • Research & Development
Radiance Technologies	<a href="http://radiancetech.com">radiancetech.com</a>	HEL & HPM	<b>Systems Integrator</b> • Testing & Evaluation • Research & Development • Optics & Beam Control • Energy Supply • Thermal Management • Gimbal & Tracking System • Battle Damage Assessment • Electronics/Sensors • Antenna • Pulsed Power/Microwave Generation
RTX	<a href="http://rtx.com">rtx.com</a>	HEL & HPM	<b>Systems Integrator</b> • Research & Development
Sem-Sol	<a href="http://sem-sol.com">sem-sol.com</a>	HPM	Pulsed Power/Microwave Generation • Antenna • Research & Development • <b>System Integrator</b>

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[EmergingTechnologiesInstitute.org/Podcast](http://EmergingTechnologiesInstitute.org/Podcast)

## Research & Development

American Systems	<a href="http://americansystems.com">americansystems.com</a>	HEL & HPM	<b>Research &amp; Development</b>
Applied Research Associates	<a href="http://ara.com">ara.com</a>	HEL & HPM	<b>Research &amp; Development</b>
Booz Allen Hamilton	<a href="http://boozallen.com">boozallen.com</a>	HEL & HPM	<b>Research &amp; Development</b> • Testing & Evaluation
Epirus, Inc.	<a href="http://epirusinc.com">epirusinc.com</a>	HPM	Thermal Management • Antenna • Pulsed power/microwave generation • Testing & Evaluation • <b>Research &amp; Development</b>
ManTech	<a href="http://mantech.com">mantech.com</a>	HEL & HPM	<b>Research &amp; Development</b>
Pacific Antenna Systems	<a href="http://pasantennas.com">pasantennas.com</a>	HPM	Systems Integrators • Antenna • Thermal Management • Battle Damage Assessment • Testing & Evaluation • <b>Research &amp; Development</b>
Radiance Technologies	<a href="http://radiancetech.com">radiancetech.com</a>	HEL & HPM	Systems Integrator • Testing & Evaluation • <b>Research &amp; Development</b> • Optics & Beam Control • Energy Supply • Thermal Management • Gimbal & Tracking System • Battle Damage Assessment • Electronics/Sensors • Antenna • Pulsed Power/Microwave Generation
RTX	<a href="http://rtx.com">rtx.com</a>	HEL & HPM	Systems Integrator • <b>Research &amp; Development</b>
SAIC	<a href="http://saic.com">saic.com</a>	HEL & HPM	<b>Research &amp; Development</b>
Sem-Sol	<a href="http://sem-sol.com">sem-sol.com</a>	HPM	Pulsed Power/Microwave Generation • Antenna • <b>Research &amp; Development</b> • System Integrator
SIE	<a href="http://siecompany.com">siecompany.com</a>	HEL & HPM	<b>Research &amp; Development</b>
Teknicare	<a href="http://teknicare.com">teknicare.com</a>	HEL & HPM	Testing & Evaluation • <b>Research &amp; Development</b>
Verus Research	<a href="http://verusresearch.net">verusresearch.net</a>	HEL & HPM	<b>Research &amp; Development</b>

## Testing & Evaluation

Booz Allen Hamilton	<a href="http://boozallen.com">boozallen.com</a>	HEL & HPM	Research & Development • <b>Testing &amp; Evaluation</b>
Epirus, Inc.	<a href="http://epirusinc.com">epirusinc.com</a>	HPM	Thermal Management • Antenna • Pulsed Power/Microwave Generation • <b>Testing &amp; Evaluation</b> • Research & Development
Kratos Defense & Security Solutions	<a href="http://kratosdefense.com">kratosdefense.com</a>	HEL & HPM	Systems Integrator • <b>Testing &amp; Evaluation</b>
Pacific Antenna Systems	<a href="http://pasantennas.com">pasantennas.com</a>	HPM	Systems Integrators • Antenna • Thermal Management • Battle Damage Assessment • <b>Testing &amp; Evaluation</b> • Research & Development

<b>Radiance Technologies</b>	<a href="http://radiancetech.com">radiancetech.com</a>	HEL & HPM	Systems Integrator • <b>Testing &amp; Evaluation</b> • Research & Development • Optics & Beam Control • Energy Supply • Thermal Management • Gimbal & Tracking System • Battle Damage Assessment • Electronics/Sensors • Antenna • Pulsed Power/Microwave Generation
<b>Stellar Science</b>	<a href="http://stellarscience.com">stellarscience.com</a>	HPM	<b>Testing &amp; Evaluation</b>
<b>Teknicare</b>	<a href="http://teknicare.com">teknicare.com</a>	HEL & HPM	<b>Testing &amp; Evaluation</b> • Research & Development

## Antenna

<b>Archer Laboratories</b>	<a href="http://thearcherlabs.com">thearcherlabs.com</a>	HPM	<b>Antenna</b> • Pulsed Power Generation
<b>Eclipse Energy Systems</b>	<a href="http://eclipsethinfilms.com">eclipsethinfilms.com</a>	HEL & HPM	Coatings • <b>Antenna</b> • Pulsed Power/Microwave Generation
<b>Epirus, Inc.</b>	<a href="http://epirusinc.com">epirusinc.com</a>	HPM	Thermal Management • <b>Antenna</b> • Pulsed Power/Microwave Generation • Testing & Evaluation • Research & Development
<b>L3Harris ATI</b>	<a href="http://l3harris.com">l3harris.com</a>	HPM	Pulsed Power Generation • <b>Antenna</b>
<b>NanoElectromagnetics</b>	<a href="http://nanoelectromagnetics.com/home.html">nanoelectromagnetics.com/home.html</a>	HPM	Pulsed Power • <b>Antenna</b>
<b>Pacific Antenna Systems</b>	<a href="http://pasantennas.com">pasantennas.com</a>	HPM	Systems Integrators • <b>Antenna</b> • Thermal Management • Battle Damage Assessment • Testing & Evaluation • Research & Development
<b>Radiance Technologies</b>	<a href="http://radiancetech.com">radiancetech.com</a>	HEL & HPM	Systems Integrator • Testing & Evaluation • Research & Development • Optics & Beam Control • Energy Supply • Thermal Management • Gimbal & Tracking System • Battle Damage Assessment • Electronics/Sensors • <b>Antenna</b> • Pulsed Power/Microwave Generation
<b>Sem-Sol</b>	<a href="http://sem-sol.com">sem-sol.com</a>	HPM	Pulsed Power/Microwave Generation • <b>Antenna</b> • Research & Development • System Integrator

## Battle Damage Assessment

<b>Nokomis</b>	<a href="http://nokomisinc.com">nokomisinc.com</a>	HEL & HPM	<b>Battle Damage Assessment</b>
<b>Pacific Antenna Systems</b>	<a href="http://pasantennas.com">pasantennas.com</a>	HPM	Systems Integrators • Antenna • Thermal Management • <b>Battle Damage Assessment</b> • Testing & Evaluation • Research & Development
<b>Radiance Technologies</b>	<a href="http://radiancetech.com">radiancetech.com</a>	HEL & HPM	Systems Integrator • Testing & Evaluation • Research & Development • Optics & Beam Control • Energy Supply • Thermal Management • Gimbal & Tracking System • <b>Battle Damage Assessment</b> • Electronics/Sensors • Antenna • Pulsed Power/Microwave Generation

## Energy Supply

Barber-Nichols, LLC	<a href="http://barber-nichols.com">barber-nichols.com</a>	HEL & HPM	Thermal Management • <b>Energy Supply</b>
Bren-Tronics, Inc	<a href="http://bren-tronics.com">bren-tronics.com</a>	HEL & HPM	<b>Energy Supply</b>
Candent Technologies	<a href="http://candent-technologies.com">candent-technologies.com</a>	HEL & HPM	<b>Energy Supply</b>
EaglePicher Technologies	<a href="http://eaglepicher.com">eaglepicher.com</a>	HEL & HPM	<b>Energy Supply</b>
Honeywell	<a href="http://honeywell.com">honeywell.com</a>	HEL & HPM	Thermal Management • <b>Energy Supply</b>
Mainstream Engineering	<a href="http://mainstream-engr.com">mainstream-engr.com</a>	HEL & HPM	Thermal Management • <b>Energy Supply</b>
Navitas Systems	<a href="http://navitassys.com">navitassys.com</a>	HEL & HPM	<b>Energy Supply</b>
Quantic ECI	<a href="http://quanticeci.com">quanticeci.com</a>	HPM	<b>Energy Supply</b>
Radiance Technologies	<a href="http://radiancetech.com">radiancetech.com</a>	HEL & HPM	Systems Integrator • Testing & Evaluation • Research & Development • Optics & Beam Control • <b>Energy Supply</b> • Thermal Management • Gimbal & Tracking System • Battle Damage Assessment • Electronics/Sensors • Antenna • Pulsed Power/Microwave Generation
Rolls Royce	<a href="http://rolls-royce.com">rolls-royce.com</a>	HEL & HPM	<b>Energy Supply</b> • Thermal Management

## Pulsed Power/Microwave Generation

Archer Laboratories	<a href="http://thearcherlabs.com">thearcherlabs.com</a>	HPM	Antenna • <b>Pulsed Power Generation</b>
Communications & Power Industries, LLC	<a href="http://cpii.com">cpii.com</a>	HPM	<b>Pulsed Power/Microwave Generation</b>
Eclipse Energy Systems	<a href="http://eclipsethinfilms.com">eclipsethinfilms.com</a>	HEL & HPM	Coatings • Antenna • <b>Pulsed Power/Microwave Generation</b>
Empower RF Systems	<a href="http://empowerrf.com">empowerrf.com</a>	HPM	<b>Pulsed Power/Microwave Generation</b>
Epirus, Inc.	<a href="http://epirusinc.com">epirusinc.com</a>	HPM	Thermal Management • Antenna • <b>Pulsed Power/Microwave Generation</b> • Testing & Evaluation • Research & Development
Ferrite Microwave Technologies	<a href="http://ferriteinc.com">ferriteinc.com</a>	HPM	<b>Pulsed Power/Microwave Generation</b>
L3Harris ATI	<a href="http://l3harris.com">l3harris.com</a>	HPM	<b>Pulsed Power Generation</b> • Antenna
NanoElectromagnetics	<a href="http://nanoelectromagnetics.com/home.html">nanoelectromagnetics.com/home.html</a>	HPM	<b>Pulsed Power</b> • Antenna
Nanohmics	<a href="http://nanohmics.com">nanohmics.com</a>	HEL & HPM	Electronics/Sensors • Coatings • <b>Pulsed Power/Microwave Generation</b>

<b>Radiance Technologies</b>	<a href="http://radiancetech.com">radiancetech.com</a>	HEL & HPM	Systems Integrator • Testing & Evaluation • Research & Development • Optics & Beam Control • Energy Supply • Thermal Management • Gimbal & Tracking System • Battle Damage Assessment • Electronics/Sensors • Antenna • <b>Pulsed Power/Microwave Generation</b>
<b>SCHOTT</b>	<a href="http://schott.com">schott.com</a>	HEL & HPM	Optics • <b>Pulsed Power/Microwave Generation</b> • Thermal Management
<b>Sem-Sol</b>	<a href="http://sem-sol.com">sem-sol.com</a>	HPM	<b>Pulsed Power/Microwave Generation</b> • Antenna • Research & Development • System Integrator
<b>SRI International</b>	<a href="http://sri.com">sri.com</a>	HPM	<b>Microwave Generation</b>

## Thermal Management

<b>Advanced Cooling Technologies</b>	<a href="http://1-act.com">1-act.com</a>	HEL & HPM	<b>Thermal Management</b>
<b>Barber-Nichols, LLC</b>	<a href="http://barber-nichols.com">barber-nichols.com</a>	HEL & HPM	<b>Thermal Management</b> • Energy Supply
<b>Epirus, Inc.</b>	<a href="http://epirusinc.com">epirusinc.com</a>	HPM	<b>Thermal Management</b> • Antenna • Pulsed Power/Microwave Generation • Testing & Evaluation • Research & Development
<b>Honeywell</b>	<a href="http://honeywell.com">honeywell.com</a>	HEL & HPM	<b>Thermal Management</b> • Energy Supply
<b>KULR Technology Corporation</b>	<a href="http://kulrtechnology.com">kulrtechnology.com</a>	HEL & HPM	<b>Thermal Management</b>
<b>Lockheed Martin</b>	<a href="http://lockheedmartin.com/en-us/capabilities/directed-energy.html">lockheedmartin.com/en-us/capabilities/directed-energy.html</a>	HEL & HPM	System Integrator • Optics & Beam Control • <b>Thermal Management</b> • Laser Source
<b>Mainstream Engineering</b>	<a href="http://mainstream-engr.com">mainstream-engr.com</a>	HEL & HPM	<b>Thermal Management</b> • Energy Supply
<b>Pacific Antenna Systems</b>	<a href="http://pasantennas.com">pasantennas.com</a>	HEL & HPM	Systems Integrators • Antenna • <b>Thermal Management</b> • Battle Damage Assessment • Testing & Evaluation • Research & Development
<b>Radiance Technologies</b>	<a href="http://radiancetech.com">radiancetech.com</a>	HEL & HPM	Systems Integrator • Testing & Evaluation • Research & Development • <b>Optics &amp; Beam Control</b> • Energy Supply • Thermal Management • Gimbal & Tracking System • Battle Damage Assessment • Electronics/Sensors • Antenna • Pulsed Power/Microwave Generation
<b>Rolls Royce</b>	<a href="http://rolls-royce.com">rolls-royce.com</a>	HEL & HPM	Energy Supply • <b>Thermal Management</b>
<b>SCHOTT</b>	<a href="http://schott.com/en-us">schott.com/en-us</a>	HEL & HPM	Optics • Pulsed Power/Microwave Generation • <b>Thermal Management</b>
<b>Thermo Analytics</b>	<a href="http://thermoanalytics.com">thermoanalytics.com</a>	HEL & HPM	<b>Thermal Management</b>

# U.S. Government Entities

Name of Entity	URL	HEL or HPM
<b>Services</b>		
Air Force Research Laboratory	<a href="http://afrl.af.mil">afrl.af.mil</a>	HEL & HPM
Office of Naval Research	<a href="http://nre.navy.mil">nre.navy.mil</a>	HEL & HPM
Naval Surface Warfare Center Dahlgren Division	<a href="http://navsea.navy.mil/Home/Warfare-Centers/NSWC-Dahlgren/">navsea.navy.mil/Home/Warfare-Centers/NSWC-Dahlgren/</a>	HEL & HPM
U.S. Army Space and Missile Defense Command Technical Center's DESIL	<a href="http://t2.army.mil/T2-Laboratories/Designated-Laboratories/Space-and-Missile-Defense-Command-Technical-Center/">t2.army.mil/T2-Laboratories/Designated-Laboratories/Space-and-Missile-Defense-Command-Technical-Center/</a>	HEL & HPM
Army Rapid Capabilities and Critical Technologies Office	<a href="http://army.mil/rccto">army.mil/rccto</a>	HEL & HPM
Letterkenny Army Depot	<a href="http://letterkenny.army.mil">letterkenny.army.mil</a>	HEL & HPM

<b>Department of Energy/National Labs</b>		
U.S. Department of Energy	<a href="http://energy.gov">energy.gov</a>	HEL & HPM
Lawrence Livermore National Labs	<a href="http://llnl.gov">llnl.gov</a>	HEL & HPM
Los Alamos National Labs	<a href="http://lanl.gov">lanl.gov</a>	HEL & HPM
Sandia National Laboratories	<a href="http://sandia.gov">sandia.gov</a>	HEL & HPM

<b>Office of Secretary of Defense Entities</b>		
OUSD A&S, Industrial Base Policy	<a href="http://businessdefense.gov">businessdefense.gov</a>	HEL & HPM
OUSD A&S, Acquisition Integration and Interoperability (AI2)	<a href="http://acq.osd.mil/asda/ai2/index.html">acq.osd.mil/asda/ai2/index.html</a>	HEL & HPM
OUSD R&E, Principal Director for Directed Energy	N/A	HEL & HPM
OUSD R&E, Joint Directed Energy Transition Office	N/A	HEL & HPM
Office of the Secretary of Defense Manufacturing Technology	<a href="http://dodmantech.mil/JDMTP/OSD-ManTech/">dodmantech.mil/JDMTP/OSD-ManTech/</a>	HEL & HPM
OUSD Policy, Force Development and Emerging Capabilities	<a href="http://policy.defense.gov/OUSSDP-Offices/ASD-for-Strategy-Plans-and-Capabilities/Force-Development-and-Emerging-Capabilities/">policy.defense.gov/OUSSDP-Offices/ASD-for-Strategy-Plans-and-Capabilities/Force-Development-and-Emerging-Capabilities/</a>	HEL & HPM

## DOD Manufacturing Innovation Institutes

DOD Manufacturing Innovation Institutes (Power America)	<a href="http://poweramericainstitute.org">poweramericainstitute.org</a>	HEL & HPM
DOD Manufacturing Innovation Institutes (AIM Photonics)	<a href="http://dodmantech.mil/About-Us/Manufacturing-Innovation-Institutes-MIIs/ AIM-Photonics/">dodmantech.mil/About-Us/Manufacturing-Innovation-Institutes-MIIs/ AIM-Photonics/</a>	HEL & HPM

## Other DOD Agencies

Missile Defense Agency	<a href="http://mda.mil">mda.mil</a>	HEL & HPM
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# Select Universities

Per the methodology (pg 5), only universities providing DE testing facilities that can be rented out by industry or government were included.

Name of University	URL	HEL or HPM
Texas A&M University	<a href="http://tamu.edu">tamu.edu</a>	HEL
University of Alabama in Huntsville	<a href="http://uah.edu">uah.edu</a>	HEL
University of Central Florida	<a href="http://ucf.edu">ucf.edu</a>	HEL



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