

The Advanced Manufacturing Office (AMO) brings together manufacturers, research institutions, suppliers, and universities to investigate manufacturing processes, information, and materials technologies critical to advance domestic manufacturing of clean energy products, and to support energy productivity across the entire manufacturing sector.

### What We Do

The Advanced Manufacturing Office uses an integrated approach that relies on three pillars to deliver energy and consumer cost savings:

- ✓ **Advanced Manufacturing Research and Development R&D** projects support manufacturing projects at American companies and research organizations that focus on specific high-impact manufacturing technology and process challenges.
- ✓ **Advanced Manufacturing R&D** facilities help the U.S. become a world leader in manufacturing by bringing together manufacturers, suppliers, and researchers in public-private R&D consortia. These consortia facilitate the transition of innovative advanced materials, information and process technologies to industry and enable manufacturing scale-up. Such technology development efforts help develop national capabilities that enable future global leadership in manufacturing.
- ✓ **Industrial Technical Assistance** supports the deployment of energy efficient technologies and practices to support 40 gigawatts of new, cost-effective combined heat and power (CHP) by 2020, and helps individual manufacturers reduce their energy intensity by 25%, over 10 years. In addition, Industrial Assessment Centers provide assistance in energy efficient, productivity, and waste/water use reduction to small and medium-sized manufacturers.

### Program Goals/Metrics

- By 2020, demonstrate market-based industrial programs and practices yielding energy savings of 25% or more.
- By 2025, introduce manufacturing technologies and advanced materials that lower facility-level energy costs 50% or more, and/or provide 50% savings over targeted product lifecycles, compared to a 2010 baseline.
- Apply research, development and technical assistance to support the adoption of cost-competitive CHP technologies, which complies with Executive Order 13624. The national goal is to realize 40 GW of new CHP by 2020.
- Demonstrate energy management information tools and technologies building off of International Organization for Standardization (ISO) 50001.
- Establish up to six Clean Energy Manufacturing Institutes as the DOE-led component of the national network of manufacturing innovation institutes.

### FY 2017 Priorities

- **Energy-Water Desalination Hub** will serve as a center of research for developing solutions and enabling technologies to de-energize, decarbonize, and reduce the cost of desalination to provide clean and safe water. FY 2017 is the first year of funding.
- **Critical Materials Hub** will receive the first annual increment of renewed funding to continue focusing on technologies that help American manufacturers make better use of existing critical materials, as well as to reduce or eliminate the need for materials that are subject to supply disruptions. FY 2017 is the first year of support for the second, final five-year phase.

(Dollars in Thousands)	FY 2015 Enacted	FY 2016 Enacted	FY 2017 Requested
Next Generation Manufacturing R&D Projects	\$84,000	\$101,500	\$102,500
Advanced Manufacturing R&D Facilities	\$92,500	\$98,500	\$129,000
Industrial Technical Assistance	\$23,500	\$28,500	\$29,500
<b>Total, Advanced Manufacturing</b>	<b>\$200,000</b>	<b>\$228,500</b>	<b>\$261,000</b>

- **Clean Energy Manufacturing Innovation Initiative** will support five existing Institutes for Power Electronics/Wide Band Gap (WBG), Advanced Composites, Smart Manufacturing, and two institutes that have not been announced from prior year FOAs. Establish one new institute in FY 2017 focused on one of the advanced manufacturing challenges identified in the DOE Quadrennial Technology Review (QTR) published in 2015, not previously addressed in existing institutes.
- **Direct Energy Conversion R&D Projects** will enable materials for high-efficiency, low-GHG potential solid-state cooling systems for air conditioning, refrigeration, and freezing, to separation and liquefaction of gases.
- **High-Performance Computing for Manufacturing R&D** assists U.S. industry with their most challenging problems by partnering world-class experts with corporate researchers to model their technologies on some of the world's fastest supercomputers.
- **Manufacturing Demonstration Facility/Carbon Fiber Test Facility** supports industrial research projects at these facilities related to additive manufacturing and carbon fiber materials, including a specific focus on materials and structures used in extreme environments.
- **Advanced Manufacturing Incubator** provides incentives for small and medium-size manufacturing companies to pursue emerging high-risk, high-impact advanced manufacturing technology developments.
- Led Department of Energy contribution to the establishment of the National Network for Manufacturing Innovation, including the Institute for Advanced Composites Manufacturing Innovation that includes more than 100 industry, SME, and academic partners and members. The Institute is supported by \$70 million of federal funding and more than \$180 million of non-federal funding over 5 years.
- During its first two and a half years of operation, the Critical Materials Institute (CMI) and its researchers have had one technology licensed by industry and have filed 38 invention disclosures and 15 patent disclosures. Led by Ames Laboratories, the CMI is a five-year investment of up to \$120 million to improve the supply, efficiency and recycling of materials and reduce dependence on foreign supplies, such as rare earths, for clean energy applications.
- The Superior Energy Performance program welcomed Hilton Worldwide as a partner and three of their facilities—the Washington, Waikiki, and San Francisco Hiltons—reduced their energy consumption by 15.8%, 8.4%, and 6.3%, respectively, between 2011 and 2015. They look to meet a 20% portfolio-wide energy savings goal within 10 years.
- The Better Buildings, Better Plants Program grew close to 160 partners, representing more than 2,400 plants and 11.4% of the total U.S. manufacturing energy footprint. Partners have committed to reduce their energy intensity by 25% over 10 years, or a similarly ambitious level for their sector.

## Key Accomplishments

- In a technical demonstration of state-of-the art 3-D printing, a 3-D printed Shelby Cobra was created at the Manufacturing Demonstration Facility and debuted at the Detroit Auto Show as an all-electric version of the iconic sports car. The Cobra was an experiment in Big Area Additive Manufacturing and contained roughly 500 pounds of 3-D printed parts. The design and manufacturing process took only six weeks—including 24 hours of print time—compared to processes that would normally take months to prototype a new car. Additive manufacturing not only showcases the potential to speed up prototyping processes, it also allows for innovation with materials that are stronger, lighter, and less expensive than traditional materials.
- CHP TAPs provided technical support to about 780 CHP projects in Fiscal Years 2009-2014. Of those projects, more than 220 are currently under development or online, with an estimated installed capacity of 1.7 GW.
- Industrial Assessment Centers located at accredited engineering programs at 24 universities across the nation, conduct assessments to identify opportunities to save energy, improve productivity, and decrease waste at small and medium-sized manufacturers. On average, each manufacturer identifies about \$140,000 in potential annual energy savings and implements more than one-third of these within the first year of the assessment.