

Advanced Manufacturing for a U.S. Clean Energy Economy

The Importance of Manufacturing

Manufacturing is central to our economy, culture, and history. The industrial sector produces 11% of U.S. gross domestic product (GDP), employs 12 million people, and generates 57% of U.S. export value. However, U.S. industry consumes about one-third of all energy produced in the United States, and significant cost-effective energy efficiency and advanced manufacturing opportunities remain unexploited. As a critical component of the National Innovation Policy for Advanced Manufacturing, the U.S. Department of Energy's (DOE's) Advanced Manufacturing Office (AMO) is focused on creating a fertile environment for advanced manufacturing innovation, enabling vigorous domestic development of transformative manufacturing technologies, promoting coordinated public and private investment in precompetitive advanced manufacturing technology infrastructure, and facilitating the rapid scale-up and market penetration of advanced manufacturing technologies.

The Advanced Manufacturing Office

AMO supports activities with the potential to lead to transformational change across manufacturing and industrial sectors. Programs within AMO are tailored to address specific barriers faced by technology developers and manufacturers to ensure that cost-effective technologies are effectively transitioned from fundamental



DOE's Advanced Manufacturing Office (AMO) is helping the nation's most energy-intensive manufacturing industries transform the way they use energy through a strategy of technology innovation, workforce development, and energy and carbon management.

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to applied research, developed into commercially available products, and effectively deployed where they are demanded throughout U.S. supply chains. AMO is also focused on strengthening the U.S. manufacturing workforce and research and development (R&D) culture to ensure that manufacturers are equipped with the skilled and highly trained workforce required to capitalize on these technologies. As a part of DOE's Office of Energy Efficiency and Renewable Energy (EERE), AMO's efforts increase industrial energy efficiency, promote a clean energy economy, and strengthen national energy security.

Office Mission: *Research, develop, and demonstrate at a convincing, production-relevant scale energy-efficient manufacturing processes and technologies to reduce the energy intensity and life-cycle energy consumption of manufactured products and promote a corporate culture of continuous improvement in energy efficiency among existing facilities and manufacturers.*

AMO's Strategic Approach

The United States has a strong foundation in early-stage basic research focused on identifying promising technologies with high technical potential. However, much of this research has not been successfully

developed into commercially available innovative products. Instead, many opportunities stall in the later development and demonstration stages, known as the "Technology Valley of Death." In addition, some commercially available innovative technologies remain under-deployed even after cost savings are demonstrated due to a variety of barriers to adoption that impede technology deployment and distort markets. To address these challenges, AMO programs adhere to the following guiding principles:

- Support technologies that are **broadly applicable, pervasive, pre-competitive, and relevant across manufacturing sectors**, including clean energy
- Support technologies at a **scale meaningful to manufacturers**
- Support **keystone technologies** with the ability to have a wider impact relative to other alternatives
- Support technologies with the potential to reduce energy use **across product life cycles** by 50% over 10 years compared to incumbent technologies (averaged across the research, development, and deployment (RD&D) portfolio)
- Support manufacturers through **effective and novel public-private partnership and collaborative models**

(federal, state, local, industry, academia) that leverage non-federal resources to address the causes of market or government failures related to advanced manufacturing technologies

- Support existing U.S. manufacturers through **technology deployment** efforts that are targeted at specific barriers to adoption for energy-efficient technologies
- Support and align with national goals and initiatives such as the **Advanced Manufacturing Partnership, Better Buildings, Better Plants**, and the **Materials Genome Initiative**.

AMO's Technology Deployment Portfolio

The goal of AMO's Technology Deployment efforts is to establish continuous improvement energy management programs in 10,000 U.S. manufacturing plants that represent 30% of the U.S. manufacturing energy footprint by



AMO works with major industries, such as steel and metal casting, to reduce energy intensity. *Photo from iStock/11783050*

2015, enabling accelerated adoption of technology to save 330 TBtu/year. This goal is achieved through education, recognition, and incentives activities that are tailored to challenges faced by manufacturers and the energy management industry:

- A network of Industrial Assessment Centers (IACs) supported by AMO conducts energy audits for small and medium sized manufacturers and simultaneously trains students to become energy management professionals.
- Superior Energy Performance is an implementation of ISO 50001 and a manufacturing plant certification that yields transparent and verifiable energy efficiency gains using international standards that encourages replication of energy management practices across the private sector.
- Clean Energy Regional Application Centers (RACs) provide outreach and technology assistance to industry stakeholders to accelerate the adoption of clean energy technologies—principally combined heat and power (CHP)—to save manufacturers energy and money.
- The Better Buildings, Better Plants Challenge and Program are focused on creating energy efficiency-oriented American jobs through a network of public/private partnerships. In this program, corporate partners make ambitious energy savings commitments to execute energy-saving programs and technologies and share best practices and examples/test cases with the rest of industry.



Advances in measurement and control systems help industry improve the bottom line. *Photo by Dennis Schroeder, NREL/PIX 18801*

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