



U.S. Department of Energy

# Public-Private Partnerships Give the United States an Edge in Manufacturing

Federal investment in scientific discovery and technology is vital to maintaining U.S. economic leadership in the world and in growing such key emerging sectors as clean energy

## Overview

The United States has long been a global leader in innovation and entrepreneurship.<sup>1</sup> The clean energy sector is expected to grow from its current level of \$250 billion in private investment annually to an estimated \$7 trillion by 2030. Manufacturing will be a cornerstone of this quickly maturing sector.<sup>2</sup> In 2013, manufacturing represented a \$2.08 trillion area of the U.S. economy—12.5 percent of gross domestic product—and accounted for 1 in 6 private sector jobs.<sup>3</sup> Continued innovation has the potential to support future U.S. growth in international energy manufacturing industries as well as to bolster domestic business and create jobs.

Government investment in public-private partnerships allows businesses, universities, and nongovernmental organizations to leverage national testing and production facilities and is critical to strengthening the country's leadership in manufacturing. To compete in the rapidly expanding global clean energy sector, ongoing funding for research and technology development is necessary.

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## Stages of Innovation

The introduction of advanced ideas, devices, or processes drives the emergence and creation of market sectors and supports the U.S. economy. The three stages of progression for discovery and invention are:

- **Basic science and early stage R&D.** Fundamental exploration to acquire new knowledge of materials and processes leading to novel theories and products.
- **Applied research.** Establishment of state-of-the-art concepts and prototype advancements, and exploration of the feasibility of scaling up these modern commodities.
- **Technology maturation and deployment.** Evaluation of materials, components, and efficiencies to optimize performance, demonstrate concepts, and support market adoption.

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## Public-private coordination confers an advantage to the United States in the global clean energy race

Through Department of Energy initiatives such as the **National Network for Manufacturing Innovation** and the **Clean Energy Manufacturing Initiative**, along with the development of state-of-the-art facilities such as the **Oak Ridge National Laboratory's Manufacturing Demonstration Facility**, the United States is establishing regional hubs that enable public-private alliances.

## National institutes foster scientific discovery

Under the National Network for Manufacturing Innovation, government investment supports manufacturing partnerships that create and deploy new capabilities, products, and processes, improving overall production. Industry, academia, and corporate partners collaborate and co-invest to nurture product maturation and accelerate commercialization.<sup>4</sup> Two existing institutes and one planned hub have implications for clean energy:

- At the **Next Generation Power Electronics Manufacturing Innovation Institute**, the DOE is investing \$70 million over five years, matched by another \$70 million from industry, universities, and the state of North Carolina, for shared facilities and equipment, as well as testing and modeling capabilities. The institute's goal is to make more efficient, less expensive, and smaller motors, consumer electronics, and power grid technologies.<sup>5</sup>
- The **Lightweight and Modern Metals Manufacturing Innovation Institute**, headquartered near Detroit and led by the Defense Department, combines the efforts of more than 60 companies, universities, labs, and other organizations to assist U.S. industry in incorporating lightweight and advanced metals production into airplanes, vehicles, and other products.<sup>6</sup>

- The DOE is also preparing to establish a new manufacturing institute, the **Clean Energy Manufacturing Innovation Institute for Composite Materials and Structures**, aimed at attracting investment into low-cost, energy-efficient manufacturing of composite materials for use across industries and markets, including transportation, wind turbine systems, and others.<sup>7</sup>

Through these institutes, federal agencies are helping industry cost-effectively introduce cutting-edge technologies into a variety of applications; create the next generation of stronger, safer, and more efficient products; reduce harmful emissions; and increase U.S. competitiveness in manufacturing sectors.



Smart grid research at North Carolina State University.

## **Demonstration facilities advance manufacturing**

The DOE's **Manufacturing Demonstration Facility** is another public-private partnership that assists industry in adopting manufacturing processes to reduce electricity consumption and greenhouse gas emissions, make production less expensive, and commercialize high-quality products. Based at Oak Ridge National Laboratory in Tennessee, the project will advance technologies and methods that benefit the U.S. clean energy sector, including lightweight materials; sophisticated batteries; and new techniques to produce solar power, storage devices, and other electronic systems.<sup>8</sup>

This facility has already contributed to advancements in manufacturing processes. Phoenix-based Local Motors recently demonstrated the world's first three-dimensional printed car. The Oak Ridge National Laboratory played a significant role by contributing expertise in materials science and manufacturing techniques. The company was able to print the vehicle, called the Strati, in 44 hours.<sup>9</sup>

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“ [The Manufacturing Demonstration Facility] project represents the unique opportunity DOE’s National Laboratory System offers to the industry, to collaborate in an open environment to deliver fast, innovative, manufacturing solutions. ... [The project] partnerships are pushing the envelope on emerging technologies, such as large-scale additive manufacturing, and accelerating the growth of manufacturing in the United States.”

—Craig Blue, director, Advanced Manufacturing Program and Manufacturing Demonstration Facility

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Source: **Local Motors**

## **Interdisciplinary relationships support U.S. global competitiveness**

The DOE’s continued support of all stages of innovation is essential for securing the U.S. position as a leader in clean energy industries. With hundreds of millions of dollars in federal investment committed to these institutes and demonstration centers, industry partners and government agencies are sharing equipment, facilities, and testing and modeling capabilities to invent and produce novel technologies and processes that will make American industry more competitive. Domestic clean energy companies, which have the potential to reap huge benefits by producing lighter-weight materials, better power electronics, and new composites, are eagerly joining national laboratories and agencies along with university and other partners to increase U.S. competitiveness internationally. Continued public funding for innovation and technology development is crucial to supporting these advancements.

**For more information on the role the DOE plays in furthering the efficiency and competitiveness of U.S. manufacturing, including in the clean energy sector, see the following links:**

- **National Network for Manufacturing Innovation**
- **Department of Energy’s Clean Energy Manufacturing Initiative**
- **Oak Ridge National Laboratory’s Manufacturing Demonstration Facility**

## Endnotes

- 1 The Pew Charitable Trusts, "Advantage America: The U.S.-China Clean Energy Technology Trade Relationship in 2011" (March 2013), <http://www.pewtrusts.org/~media/legacy/uploadedfiles/peg/publications/report/USChinaReportFINALpdf.pdf>.
- 2 Bloomberg New Energy Finance, "Spending on New Renewable Energy Capacity to Total \$7 Trillion Over Next 20 Years," Nov. 16, 2011, <http://bnef.com/PressReleases/view/173>.
- 3 National Association of Manufacturers, "Facts About Manufacturing in the United States" (2014), <http://www.nam.org/Statistics-And-Data/Facts-About-Manufacturing/Landing.aspx>.
- 4 U.S. Department of Commerce, "Advanced Manufacturing Portal," 2014, <http://manufacturing.gov/nmi.html>.
- 5 The White House, "President Obama Announces New Public-Private Manufacturing Innovation Institute," Jan. 15, 2014, <http://www.whitehouse.gov/the-press-office/2014/01/15/president-obama-announces-new-public-private-manufacturing-innovation-in>.
- 6 The White House, "President Obama Announces Two New Public-Private Manufacturing Innovation Institutes and Launches the First of Four New Manufacturing Innovation Institute Competitions," Feb. 25, 2014, <http://www.whitehouse.gov/the-press-office/2014/02/25/president-obama-announces-two-new-public-private-manufacturing-innovatio>.
- 7 U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, "Clean Energy Manufacturing Innovation Institute for Composite Materials and Structures," March 6, 2014, [http://www1.eere.energy.gov/manufacturing/financial/solicitations\\_detail.asp?sol\\_id=760](http://www1.eere.energy.gov/manufacturing/financial/solicitations_detail.asp?sol_id=760).
- 8 Oak Ridge National Laboratory, "Manufacturing Demonstration Facility," fact sheet (2014), <http://www.ornl.gov/user-facilities/mdf>.
- 9 Local Motors, news release, 2014, <https://localmotors.com/LM-Kate/worlds-first-3d-printed-car-to-be-live-printed-assembled-during-imts-the-international-manufacturing-technology-show-2014-by-local-motors-cincinnati-incorp/>.

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## For further information, please visit:

[pewtrusts.org/cleanenergy](http://pewtrusts.org/cleanenergy)

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