

**COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
SUBCOMMITTEE ON RESEARCH & TECHNOLOGY AND
SUBCOMMITTEE ON ENERGY
U.S. HOUSE OF REPRESENTATIVES
HEARING CHARTER**

Revitalizing American Leadership in Advanced Manufacturing

Tuesday, March 26, 2019

10:00 AM EST

2318 Rayburn House Office Building

PURPOSE

The purpose of this hearing is to review the successes and further opportunities for the Manufacturing USA Institutes to achieve the goal of improving the competitiveness of U.S. manufacturing. In particular, we will discuss the long-term sustainability of the Institutes and explore how the Institutes are working to accelerate the development of an advanced manufacturing workforce; leverage the existing national network of small and medium manufacturers; and develop local and regional economic opportunities in advanced manufacturing across America. An additional purpose of this hearing is to examine ways to enable decarbonization of the manufacturing sector in an effort to transition to a carbon-free future, and the role of the Manufacturing USA Institutes in achieving this goal.

WITNESSES

- **Mr. Ryan Myers** is the Director of Business Development, DoD for Hexagon Manufacturing Intelligence (Hexagon MI). Hexagon MI is a member of three Manufacturing USA Institutes: America Makes, Manufacturing times Digital (MxD), and the Lightweight Institute for Tomorrow (LIFT).
- **Mr. Mike Molnar** is the Director of the Office of Advanced Manufacturing at the National Institute of Standards and Technology (NIST), the headquarters for the interagency Advanced Manufacturing National Program Office that oversees coordination for the Manufacturing USA Institutes.
- **Dr. John Hopkins** is the CEO of the Institute for Advanced Composites Manufacturing Innovation (IACMI), a Manufacturing USA Institute.
- **Ms. Valri Lightner** is the Acting Director of the Advanced Manufacturing Office under the Office of Energy Efficiency and Renewable Energy at the U.S. Department of Energy (DOE), the office that oversees the five DOE-funded Manufacturing USA Institutes.
- **Dr. Mitchell Dibbs** is the Associate R&D Director for External Technology - Government Programs at the Dow Chemical Company.

MANUFACTURING USA

Background

The Manufacturing USA Institutes are a national network of institutes focused on accelerating innovation in industry-relevant manufacturing technologies to support the commercialization of these technologies.¹ Each Institute is a public-private partnership that leverages industry, academic, and federal resources to solve non-competitive/pre-competitive technical challenges in select advanced manufacturing sectors.² The federal share of costs for each Institute is equal to or less than the nonfederal share. The Institutes started as an initiative of the Obama Administration in 2012 and were authorized by Congress in 2014 through passage of the Revitalizing American Manufacturing and Innovation (RAMI) Act, included in the FY15 Appropriations Act.³ Technology areas for the fourteen Institutes vary widely, and include 3D printing, advanced robotics, smart manufacturing, and advanced composites.⁴

The Institutes have many purposes, including: “to improve the competitiveness of United States manufacturing and to increase the production of goods manufactured predominantly within the United States; to stimulate United States leadership in advanced manufacturing research, innovation, and technology;...[and] to accelerate the development of an advanced manufacturing workforce.”² The RAMI Act also establishes a national program office at NIST to oversee the Manufacturing USA Institutes and serve as a convener of the Institutes. Of the existing fourteen Institutes, eight have been established by the Department of Defense, five by the Department of Energy, and one by the Department of Commerce.

Current performance and future prospects

General consensus from formal reviews of the Manufacturing USA Institutes is that the Institutes are successfully leveraging the public-private partnership model to convene industry and academic partners to make joint R&D investments in technologies essential to commercializing cutting-edge advanced manufacturing techniques.⁵ An independent review conducted by Deloitte concluded that the Institutes “deliver greater return on R&D spending for members than they could achieve on their own,” which is enabled by the Institutes “providing access to expensive equipment, pooling project costs, creating technology roadmaps, and promoting knowledge exchange” to industry members.⁶

¹ CRS Report R44371, *The National Network for Manufacturing Innovation*, John F. Sargent, Updated January 2017

² GAO report 17-320, *Advanced Manufacturing: Commerce Could Strengthen Collaboration with Other Agencies on Innovation Institutes*, April 2017

³ Title VII, Division B, *Consolidated and Further Continuing Appropriations Act, 2015* (P.L. 113-235)

⁴ *Manufacturing USA Institutes*, <https://www.manufacturingusa.com/institutes>, accessed 20 March 2019

⁵ National Academies Proceedings of a Workshop, *Securing Advanced Manufacturing in the United States: The Role of Manufacturing USA*, 2017

⁶ Deloitte report, *Manufacturing USA: A Third-Party Evaluation of Program Design and Progress*, January 2017

However, these reviews have found that there is still room for improvement for the Institutes to deliver on some of the identified purposes. Some suggestions for improvement include:

- Increasing the involvement of small and medium-sized manufacturers (SMMs) to ensure that Manufacturing USA R&D results in implementation by manufacturers^{5,6};
- Strengthening and scaling workforce development programs at the Institutes by leveraging existing federal programs^{5,6}; and
- Improving the effectiveness of the Institutes in delivering regional economic benefits to state and local areas⁵.

This hearing will examine the successes of the Manufacturing USA Institutes and the potential for implementing these and other improvements within the existing Manufacturing USA framework.

DECARBONIZATION OF THE MANUFACTURING SECTOR

The five Manufacturing USA Institutes that are funded by the DOE focus on different ways to decarbonize the manufacturing sector. According to a draft report from the Environmental Protection Agency (EPA), the industrial sector is the third largest source of greenhouse gas (GHG) emissions at 22%, behind electricity (28%) and transportation (28%).⁷ Efforts to achieve economy-wide decarbonization in the U.S. have focused primarily on reducing GHG emissions from the electricity sector, despite projections that GHG emissions from the industrial sector will increase in the next thirty years.⁸

Industrial emissions come from a variety of manufacturing sectors and processes, including cement, steel, and iron production; heating processes; and chemical processes. In order to address this issue, research and development (R&D) is needed on technologies that will help reduce and eliminate GHG emissions from these sectors, as well as R&D on new materials that have structural properties similar to cement and steel, but can be manufactured in more sustainable and energy efficient ways.⁹

The Advanced Manufacturing Office (AMO) at DOE engages in a number of R&D efforts to address these issues, including efforts in combined heat and power, high performance computing

⁷ EPA report 430-P-19-001, *Draft Inventory of U.S. Greenhouse Gas Emissions and Sinks, 1990-2017*, 2019

⁸ C2ES report, *Decarbonizing U.S. Industry*, July 2018

⁹ Science journal article, *Net-zero emissions energy systems*, June 2018

for manufacturing, and advanced materials. AMO is also the office responsible for overseeing the five DOE-funded Manufacturing USA Institutes. These Institutes include¹⁰:

- *Clean Energy Smart Manufacturing Innovation Institute (CESMII)*, focused on developing smart manufacturing capabilities (e.g. sensors, automation, big data) to enable more energy-efficient manufacturing processes;
- *Institute for Advanced Composites Manufacturing Innovation (IACMI)*, focused on developing lower-cost, more energy efficient manufacturing and recycling for composite materials, i.e. materials made from two or more very different constituent materials, whose CEO is represented on the witness panel;
- *Rapid Advancement in Process Intensification Deployment (RAPID) Institute*, focused on breakthrough manufacturing processes to increase energy efficiency in several areas, including chemicals, natural gas, and renewable bioproducts;
- *Reducing Embodied-Energy and Decreasing Emissions (REMADE)*, focused on innovations in material recovery, reuse, recycling, remanufacturing, and optimization to improve overall manufacturing energy efficiency; and
- *PowerAmerica*, focused on developing advanced manufacturing processes for power electronics made from advanced materials beyond the conventionally-used silicon.

This hearing will explore the current role and future opportunities for DOE in R&D into reducing GHG emissions from manufacturing processes and the contributions of the DOE-funded Manufacturing USA Institutes to achieving this goal.

¹⁰ DOE Advanced Manufacturing Office, R&D Consortia, <https://www.energy.gov/eere/amo/research-development-consortia>, accessed 20 March 2019