

Notice of Intent No. DE-FOA-0001262

**Notice of Intent to Issue
Funding Opportunity Announcement No. DE-FOA-0001263
“Clean Energy Manufacturing Innovation Institute on Smart Manufacturing:
Advanced Sensors, Controls, Platforms, and Modeling for Manufacturing”**

The Office of Energy Efficiency and Renewable Energy (EERE) intends to issue, on behalf of the Advanced Manufacturing Office (AMO), a Funding Opportunity Announcement (FOA) entitled “Clean Energy Manufacturing Innovation Institute on Smart Manufacturing: Advanced Sensors, Controls, Platforms, and Modeling for Manufacturing.”

BACKGROUND: This FOA supports the establishment of a “Clean Energy Manufacturing Innovation Institute on Smart Manufacturing: Advanced Sensors, Controls, Platforms, and Modeling for Manufacturing.” Smart Manufacturing represents an emerging opportunity faced broadly by the U.S. manufacturing sector to merge information and communications technologies with the manufacturing environment for the real-time management of energy, productivity, and costs in American factories all across the country. Smart Manufacturing was recently identified by private sector and university leaders in the White House’s Advanced Manufacturing Partnership 2.0 as one of the highest priority manufacturing technology areas in need of federal investment.¹ AMO held a Multi-Topic Workshop in October 2014 that included discussion about Smart Manufacturing.² With this Smart Manufacturing Innovation Institute, EERE seeks to develop, demonstrate, and transition to industry advanced sensing, instrumentation, monitoring, control, and process optimization using both advanced hardware and software platforms, as well as real-time and predictive modeling and simulation technologies, for industrial automation.³ The Smart Manufacturing topic addresses the development of affordable advanced industrial data collection sensors that monitor each stage of the manufacturing process, with particular interest in sensors that can operate remotely and in high temperature, high pressure environments for real-time in-situ monitoring of manufacturing processes; control systems and data analytics that utilize advanced algorithms for pervasive low cost monitoring, control, and process optimization; industrial community modeling and simulation platforms; and technologies that enable enterprise-wide integration to reduce energy use and greenhouse gas emissions (GHG) from manufacturing. Smart Manufacturing is also central to the implementation of big data and analytics for decision support in manufacturing enterprises.⁴ Significant operational efficiency and productivity improvements in processes will be the focus of this effort as these technologies would provide enabling capability for the

¹ President’s Council of Advisors on Science and Technology, “Accelerating U.S. Advanced Manufacturing,” October 2014.

² <http://energy.gov/eere/amo/downloads/manufacturing-innovation-multi-topic-workshop>

³ M. Bryner “Smart Manufacturing: the Next Revolution” Chemical Engineering and Processing, AIChE (Oct 2012) 4-12.

⁴ S. Qin “Process Data Analytics in the Era of Big Data” AIChE Journal 60, 9 (2014) 3092-3100.

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dynamic management of energy and material resources in manufacturing.^{5,6} While many Smart Manufacturing technology elements exist in some form and level of maturity today, the scale of the required industry collaboration and development needed for Smart Manufacturing technology integration, open and interoperable platforms, and widespread cost-effective adoption of these technologies is beyond the scope of individual private sector organizations (particularly for small- and medium-sized enterprises).

Continued rapid development and accelerated deployment of Smart Manufacturing technologies and platforms into the U.S. manufacturing enterprise will result in a significant positive impact on the U.S. economy and the overall state of domestic manufacturing, while reducing energy consumption and greenhouse gas emissions (GHG) in energy-related manufacturing industries and creating new business opportunities.

Areas of interest for this FOA may include, but are not limited to, the following:

- Advanced sensors to monitor each stage of manufacturing, including sensors suitable for withstanding high temperature, high-pressure environments or sensors with embedded knowledge that makes them smarter and easier to integrate into sensor networks employed in manufacturing. Robust sensors have potential application in harsh, energy-related manufacturing processes.
- Control systems and data analytics, including 1) algorithms for real-time control and performance optimization; 2) sensor network strategies to enable pervasive low cost monitoring and control; and 3) advanced sensor analytics to capture, manipulate, fuse, and display the collected sensor data to provide the operator options for process improvement and control.
- High fidelity real-time and predictive modeling and simulation of advanced manufacturing processes and data analytics; accurate and robust mathematical models are needed to simulate advanced manufacturing processes and enable complex control algorithms.
- Application toolkits, or apps, for workflow design, process monitoring, and big data analysis for factory and enterprise wide real-time decision support.
- Open-architecture, open-standard, and open-source (when possible) software and communication platforms to enable plug-and-play connectivity to ease integration and customization across Smart Manufacturing components, different manufacturing requirements, and the latest IT hardware and standards.

⁵ J. Davis, T. Edgar, J. Porter, J. Bernaden, M. Sarli “Smart Manufacturing, Manufacturing Intelligence and Demand-Dynamics Performance” *Computers and Chemical Engineering*, 47 (2012)145-156.

⁶ J. Wassick “Enterprise-wide optimization in an integrated chemical complex” *Computers and Chemical Engineering*, 33 (2009) 1950-1963

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- Testbeds to ensure that technologies are tested in conditions similar to those in the manufacturing environment, including hardware-in-the-loop testing and factory floor testing to reduce risks associated with implementation.
- Integration of technology from all the areas of interest would be expected to make a significant contribution.

EERE envisions awarding one financial assistance award in the form of a cooperative agreement with approximately \$70M of federal funding and a minimum non-federal cost share of 50% of the total allowable costs. The estimated period of performance for the award will be approximately 5 years with the goal of the Institute to be self-sustaining by the end of the award period.

This Notice is issued so that interested parties are aware of the EERE's intention to issue this FOA in the near term. All of the information contained in this Notice is subject to change. EERE will not respond to questions concerning this Notice. Once the FOA has been released, EERE will provide an avenue for potential Applicants to submit questions.

EERE plans to issue the FOA early in calendar year 2015 via the EERE Exchange website (<https://eere-exchange.energy.gov/>). If Applicants wish to receive official notifications and information from EERE regarding this FOA, they should register in EERE Exchange. When the FOA is released, applications will be accepted only through EERE Exchange.

In anticipation of the FOA being released, Applicants are advised to complete the following steps, which are **required** for application submission:

- Register and create an account in EERE Exchange at <https://eere-exchange.energy.gov/>. This account will allow the user to register for any open EERE FOAs that are currently in EERE Exchange. It is recommended that each organization or business unit, whether acting as a team or a single entity, use only one account as the contact point for each submission.

Questions related to the registration process and use of the EERE Exchange website should be submitted to: EERE-ExchangeSupport@hq.doe.gov.

- Obtain a Dun and Bradstreet Data Universal Numbering System (DUNS) number (including the plus 4 extension, if applicable) at <http://fedgov.dnb.com/webform>.
- Register with the System for Award Management (SAM) at <https://www.sam.gov>. Designating an Electronic Business Point of Contact (EBiz POC) and obtaining a special password called an MPIN are important steps in SAM registration. Please update your SAM registration annually.
- Register in FedConnect at <https://www.fedconnect.net/>. To create an organization account, your organization's SAM MPIN is required. For more information about the SAM MPIN or

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other registration requirements, review the FedConnect Ready, Set, Go! Guide at https://www.fedconnect.net/FedConnect/PublicPages/FedConnect_Ready_Set_Go.pdf.

- Register in Grants.gov to receive automatic updates when Amendments to a FOA are posted. However, please note that applications will not be accepted through Grants.gov. <http://www.grants.gov/>. All applications must be submitted through EERE Exchange.

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