

American Energy & Manufacturing Competitiveness Partnership

# Converge.

Highlights from 2013 and the Report on the Inaugural AEMC Summit



**Compete.**

Council on  
Competitiveness

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**Converge**

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## HIGHLIGHTS FROM 2013 AND THE REPORT ON THE INAUGURAL AEMC SUMMIT

# Letter from the President

On behalf of the Council on Competitiveness (Council), I am pleased to release *Converge*, a synthesis and summary of the 2013 activities of the path-breaking American Energy & Manufacturing Competitiveness (AEMC) Partnership—a three-year effort between the Council and the U.S. Department of Energy Office of Energy Efficiency and Renewable Energy (EERE) to bring together America’s pre-eminent leaders from industry, academia, labor, the national laboratories and government to address the grand challenges and opportunities afforded by an unprecedented and rapidly shifting national and global energy landscape.

America is in the early stages of a natural gas boom that is luring manufacturing investment to capitalize on stable, low-cost energy supplies. Furthermore, the United States retains rich resources in research, innovation, and venture capital assets. Wise policies and practices could unleash this potential and seize on the opportunity to make, commercialize and export new technologies and products—particularly next-generation clean energy technologies and products—at much higher rates.

Creating the conditions that foster the adoption of energy efficiency measures, the deployment of renewable technologies, and the deepening of clean technology manufacturing investment in the 21st century, while propelling private sector innovation and elevating energy efficiency and management to a more strategic level, has been at the core of the Council’s efforts in 2013 with EERE to dramatically bolster America’s economy and job growth, environment, national security and standard of living—in essence, America’s competitiveness.

The goals of the AEMC Partnership and its progressive dialogues have been straightforward:

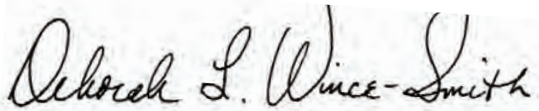
- State and define key barriers, challenges, and problems in U.S. competitiveness in manufacturing of clean energy products, energy efficiency products, and advanced manufacturing products.
- Dive deeply into these problems and generate possible policies, solutions, and models where the U.S. public and private sectors can work together to prioritize and solve these problems.
- Catalyze policy solutions—including models for scalable, public-private partnership pilot projects—to increase competitive manufacturing of clean energy and energy efficiency products in the United States.
- Elevate and increase awareness of the importance and benefits of competitive clean energy manufacturing in the United States, and explore other important energy and manufacturing issues impacting U.S. competitiveness.
- Understand how energy game-changers, like breakthrough technologies, impact U.S. clean energy and energy efficient manufacturing.

The Council on Competitiveness and I look forward to continuing to engage leaders in industry, academia, the national laboratories, and government as we build on year one of the AEMC Partnership. I extend special thanks to my partner—the Honorable David. T. Danielson, Assistant Secretary for Energy Efficiency and Renewable Energy—for his vision and leadership during the development and execution of this AEMC Partnership. Over the coming years,

the Council and EERE will work together across the country, engaging the nation's top energy and manufacturing stakeholders to define key barriers, challenges and problems in the manufacturing of clean energy products and energy efficient products—and further honing concepts for scalable, public-private partnerships to increase the competitive manufacturing of clean energy and energy efficient products, and energy productivity throughout the United States.

I would like to recognize the generosity of our dialogue co-hosts and the many Council members, friends and colleagues who have contributed to the success of the AEMC Partnership in 2013. I also want to extend special thanks Ms. Elizabeth Wayman, Ms. Jetta Wong and the entire team at EERE for their vision, creativity, and leadership. And I commend the hard work of a dedicated and innovative Council on Competitiveness team, led by our Executive Vice President Chad Evans, and including: Michael Anthony, Michael Bush, Lisa Hanna, Marie Plishka, Zachary Schafer, Clara Smith, and Phillip Typaldos.

Sincerely,



**The Honorable  
Deborah L. Wince-Smith**  
President & CEO  
Council on Competitiveness

*The AEMC Partnership dialogues are an open exchange of ideas. The opinions and positions presented in this report are those of the Council on Competitiveness or the individuals who offered them. The opinions and positions in the report do not reflect official positions of the federal government.*

## HIGHLIGHTS FROM 2013 AND THE REPORT ON THE INAUGURAL AEMC SUMMIT

# Inaugural AEMC Summit Agenda

### MORNING

#### 7:00 Registration and Networking Breakfast

Location: Amphitheater Lobby

#### 8:00 The American Advantage – Energy & Manufacturing

Location: Amphitheater

This session will describe efforts underway to increase U.S. competitiveness in creating clean energy products and increasing U.S. manufacturing competitiveness by increasing energy productivity.

The Honorable Deborah L. Wince-Smith  
President & CEO  
Council on Competitiveness

The Honorable Ernest J. Moniz  
U.S. Secretary of Energy  
U.S. Department of Energy

The Honorable Norman R. Augustine  
Former Chairman and Chief Executive Officer  
Lockheed Martin Corporation

#### 8:45 Clean Energy Manufacturing Initiative

Location: Amphitheater

The Honorable David T. Danielson  
Assistant Secretary for Energy Efficiency  
and Renewable Energy  
U.S. Department of Energy

#### 9:00 How to Compete in the Global Economy

Location: Amphitheater

This session will explore how companies remain competitive in an economy characterized by transition, turbulence, and transformation. Panel leaders will reflect on the strategic investments, partnerships, and vision needed to compete in the global economy. This session will provide perspective into the leadership of individual organizations and elucidate strengths and weaknesses in America's ability to support and cultivate world-class innovators.

##### Moderator

The Honorable Patrick D. Gallagher  
Under Secretary for Standards and Technology  
U.S. Department of Commerce, and  
Director  
National Institute of Standards and Technology

##### Speakers

Mr. Ramanath Ramakrishnan  
Executive Vice President and Chief Technology Officer  
Eaton Corporation

Mr. Tom Werner  
Chief Executive Officer  
SunPower Corporation

#### 9:45 A View from the Hill

Location: Amphitheater

In this session the group will hear from congressional leaders as they reflect on the changing energy landscape, the recent rebound in the U.S. manufacturing sector, and what this means for their home states.

##### Keynote Speaker

The Honorable Randall M. Hultgren  
U.S. House of Representatives

The Honorable Marcia C. Kaptur  
U.S. House of Representatives

**10:00 A View from the White House**

Location: Amphitheater

**Introduction**

The Honorable Deborah L. Wince-Smith  
President & CEO  
Council on Competitiveness

**Keynote Speaker**

The Honorable Gene B. Sperling  
Director  
National Economic Council and  
Assistant to the President for Economic Policy  
The White House

**10:30 Coffee and Networking Break**

Location: Amphitheater Lobby

**11:00 *Carpe Manufacturing!* Leveraging America's Advantages for U.S. Energy and Manufacturing Competitiveness**

Location: Amphitheater

With low energy prices, rising foreign labor costs, increasing concerns over quality and intellectual property protection, and a favorable exchange rate, the United States is, by many accounts, poised for a resurgence in manufacturing. This session brings together the actors in the innovation ecosystem—private industry, academia, the national laboratories, and the government—to explore methods to unleash this resurgence.

**Moderator**

Dr. James H. Stock  
Member  
Council of Economic Advisers

**Speakers**

Ms. Jacqui Dedo  
Chief Strategy Officer  
Dana Holding Corporation

Ms. Amy Ericson  
U.S. Country President  
Alstom Corporation

Dr. Lloyd Jacobs  
President  
University of Toledo

Mr. Jeff Wilcox  
Vice President, Engineering  
Lockheed Martin Corporation

Ms. Carol Williams  
Executive Vice President  
Manufacturing & Engineering, Supply Chain and  
Environmental, Health & Safety Operations  
The Dow Chemical Company

**AFTERNOON****12:00 Lunch**

Location: Main Atrium

**12:45 Lunch Keynote**

Location: Main Atrium

**Introduction**

The Honorable Barton J. Gordon

Partner

K&L Gates

**Speaker**

The Honorable Steny H. Hoyer

U.S. House of Representatives

**1:15 Coffee and Exhibits Showcase**

Location: Amphitheater Lobby

**1:30 Technologies Driving the United States to our Energy Future**

Location: Amphitheater

Over the last several years, global investment in the clean energy sector has risen nearly fivefold, growing from \$54 billion in 2004 to \$269 billion world-wide in 2012. The United States faces a stark choice: the energy technologies of the future can be developed and manufactured in America for export around the world, or we can cede global leadership and import those technologies from the rest of the world. The panel brings together leaders that create, enable, or deploy the technologies that drive U.S. competitiveness in the production of clean energy products and/or increase energy productivity across the U.S. industrial base to discuss the future of these technologies.

**Moderator**

The Honorable Alexander A. "Andy" Karsner

Chief Executive Officer

Manifest Energy

**Speakers**

Dr. Sujeet Chand

Senior Vice President and Chief Technology Officer  
Rockwell Automation

Mr. Peter Davidson

Executive Director

Loan Program Office

U.S. Department of Energy

Dr. Robert Easter

President

University of Illinois

Dr. Eric Isaacs

Director

Argonne National Laboratory

Mr. Michael Mansuetti

President

Robert Bosch LLC

**2:15 Platforms for Innovation and Manufacturing Competitiveness—the Roles of the National Laboratories**

Location: Amphitheater

National laboratories are recognized as the deepest repositories of technological expertise and the greatest assets in the national innovation ecosystem. The panel brings together national laboratory leaders to discuss how national laboratories can utilize their assets to encourage widespread economic development in the United States.

**Moderator**

The Honorable David T. Danielson

Assistant Secretary for Energy Efficiency

and Renewable Energy

U.S. Department of Energy

**Speakers**

Dr. William Goldstein  
Deputy Director for Science & Technology  
Lawrence Livermore National Laboratory

Dr. Thomas Mason  
Director  
Oak Ridge National Laboratory

Mr. Stephen C. Nolet  
Principal Engineer, and  
Senior Director of Innovation & Technology  
TPI Composites, Inc.

Dr. Jud Virden  
Associate Laboratory Director  
Energy and Environment Directorate  
Pacific Northwest National Laboratory

**3:15 Leadership Reflections: Energy & Manufacturing in the Innovation Economy**

Location: Amphitheater

Over the last 30 years, competitive pressures created by new and growing markets as well as technological progress have fundamentally changed the structure of most American companies. Many vertically integrated industrial giants shed business functions not defined as their core competency. Manufacturing tops the list of functions moved out from within four walls of a company to foreign or domestic subcontractors. These panelists will discuss the consequences of this structural shift in manufacturing and the role of manufacturing in an innovation-driven economy.

**Moderator**

Dr. Teresa A. Sullivan  
President  
University of Virginia

**Speakers**

Dr. Suzanne Berger  
Raphael Dorman-Helen Starbuck Professor  
of Political Science; and,  
Co-Chair, Production in the Innovation Economy Project  
Massachusetts Institute of Technology

Dr. Paul J. Hommert  
Director  
Sandia National Laboratories, and  
President  
Sandia Corporation

Mr. Michael Idelchik  
Vice President—Advanced Technologies  
GE Global Research

**4:00 Closing Remarks**

Location: Amphitheater

The Honorable David T. Danielson  
Assistant Secretary for Energy Efficiency  
and Renewable Energy  
U.S. Department of Energy

The Honorable Deborah L. Wince-Smith  
President & CEO  
Council on Competitiveness

**4:30 Summit Concludes**

## HIGHLIGHTS FROM 2013 AND THE REPORT ON THE INAUGURAL AEMC SUMMIT

# Introduction

This is a unique moment in our energy history, when several clean energy technologies are now—and a wide swath of clean energy technologies (solar modules, wind turbine blades, plug-in electric vehicle batteries and advanced biofuels, to name a few) are within five to ten years of—direct cost competitiveness with incumbent fossil-fuel based technologies. But America will only capture the promise of energy security and sustainability in this point in time if the country takes bold, decisive and collective action. Today's opportunity is to optimize how stakeholders across America come together to forge a new era of U.S. technology leadership in the energy and manufacturing sectors, to create jobs and lead the way to a sustainable, secure and prosperous future.

The natural gas revolution, as part of a broader, deeper, and more diverse energy portfolio, has created unprecedented energy strength, abundance, and independence—lowering energy costs, boosting the long-term prospects for economic competitiveness, reducing dependence on foreign sources of energy, and offering a bridge to a cleaner and distinctly American energy future. Concurrently, the nation's leadership in innovation and research is unparalleled, and America's strong entrepreneurship and investment ecosystem turbocharges limitless opportunities. However, without taking actions to ensure plentiful, affordable and secure future supplies of advanced manufacturing technologies and energy, the United States could face a loss of jobs and



entire industries and see erosion of its innovation capacity and manufacturing base. If this is allowed to happen, America stands to lose both the investment and the technological capacity needed to find new energy solutions, goods and services, and leadership in the global marketplace.

The AEMC Partnership brought together a cross-section of national leaders over 2013 to address the rapidly shifting national and global energy landscape and uncover actions that can be taken to enable America to take advantage of this distinctive time in its energy history and to bolster dramatically its energy, economic and manufacturing competitiveness over the next 20 years and beyond. This report, *Converge*, follows a progressive path set by the AEMC Partnership in 2013.<sup>1</sup>

The AEMC Partnership activities in 2013 culminated in the Inaugural AEMC Summit, held on December 12, 2013 where the Council and EERE convened more than 500 CEOs, university presidents, national laboratory directors and other stakeholders from across America.

<sup>1</sup> Post-reports for AEMC Partnership Dialogues 1-4 are available at [www.compete.org](http://www.compete.org).

*Participants at the inaugural AEMC Summit  
on December 12, 2013*



## ***Amplify: Two Public-Private Partnership Concepts***

The Council—through the AEMC Partnership progressive dialogues—worked with its stakeholder network to generate potential PPP concepts and proposals to increase U.S. clean energy manufacturing competitiveness, and released this report at the inaugural AEMC Summit.

Since its inception in 1986, the Council has recognized, supported and catalyzed public-private partnerships as an optimal model of investment and engagement to address large-scale, complex problems, and to develop scalable, sustainable solutions beyond the scope and capabilities of any one sector, company, university or laboratory.

*Amplify* outlines two PPP concepts—honed by intensive dialogues, conversations, interviews and research—that could be carried out by EERE and/or the Council to increase the competitive production of clean energy products, energy efficiency products, and advanced manufacturing in the United States. *Amplify's* two PPP concepts aim to bridge very specific gaps in the nation's innovation ecosystem generated from the AEMC Partnership's progressive dialogues and supporting activities:

- **Clean Energy Materials Accelerator:** This PPP concept focuses on reducing the risks associated with deploying newly developed materials in commercial products and processes by creating a platform to identify and address common challenges; increasing access to existing materials qualification and characterization tools; and creating standards for advanced materials with leaders in industry, academia, government, and other organizations.



*The Honorable Deborah L. Wince-Smith, President & CEO, Council on Competitiveness and the Honorable David T. Danielson, Assistant Secretary for Energy Efficiency and Renewable Energy, U.S. Department of Energy*

Why accelerate materials production? As the AEMC Partnership dialogue series and supporting research from the public and private sectors have documented, countries that lead in making next-generation materials will gain significant competitive advantage by unleashing a new wave of manufacturing innovation. Advanced materials can drive significant enhancements in energy products (more efficient solar cells; larger, lighter, and stronger wind turbines; longer range car batteries)—while also increasing the competitiveness of all manufacturing sectors.

- **Manufacturing and Energy Technology Accelerator:** This PPP concept is a new, physical and virtual collaborative resource platform designed to connect the nation's world-class innovation institutions—small and medium sized enterprises (SMEs), large multinational companies, universities, national laboratories, etc.—to facilitate the transition of cutting-edge clean energy technologies into products, processes, or services that are manufactured in the United States.

Why should public and private sector leaders in innovation partner and co-create a scale-up platform? The United States is already a mecca for the world's greatest minds in science and technology—drawn to our shores by world-class universities and opportunities to work with global leaders in innovation. Unfortunately, when it comes time to bring their ideas to market, technologists and entrepreneurs often choose, or are forced, to locate manufacturing overseas. The United States must regain its position in the world as a national scale-up platform for

next-generation technologies, and this PPP can help build the industrial ecosystem that makes this possible. When coupled with the U.S. ideas engine, the Manufacturing & Energy Technology Accelerator will create lasting, competitive asymmetries for the United States.

*Amplify* is an important step on this critical journey, led by the Council and EERE. The rest of the world is waking up to the opportunities associated with a strategic focus on manufacturing and energy competitiveness. Global competition is on the rise, and the stakes are high for the United States to act now, to act decisively, and to leverage inherent strengths to ensure a more prosperous, competitive future for decades to come.

## HIGHLIGHTS FROM 2013 AND THE REPORT ON THE INAUGURAL AEMC SUMMIT

# The American Advantage—Energy & Manufacturing

The United States is a global leader, due to its long history of innovation, entrepreneurship, and collaboration. While shifting political and economic factors threaten U.S. leadership, developments in the energy and manufacturing sectors present unique American advantages in the race to increase U.S. competitiveness. The Honorable Ernest J. Moniz, U.S. Secretary of Energy and the Honorable Norman R. Augustine, Former Chairman and Chief Executive Officer, Lockheed Martin Corporation opened the AEMC Summit highlighting efforts underway and opportunities to be seized to ensure the United States makes best use of this distinctive time in our history.

### The Honorable Ernest J. Moniz Secretary of Energy U.S. Department of Energy

Dr. Moniz opened the AEMC Summit aligning efforts at the Department of Energy (Department, DOE) with President Obama's all-of-the-above energy strategy and Climate Action Plan, released in June 2013<sup>2</sup>. At a prior speaking engagement, President Obama stated: "We can't have an energy strategy for the last century that traps us in the past. We need an energy strategy for the future—an all-of-the-above strategy for the 21st century that develops every source of American-made energy."<sup>3</sup>

The Department supports the President's all-of-the-above energy strategy and Climate Action Plan through its investment in end-to-end innovation. According to Dr. Moniz, end-to-end innovation is a non-linear process that relies on continuous feedback loops, beginning at R&D and including demonstra-



*The Honorable Ernest J. Moniz, Secretary of Energy, U.S. Department of Energy*

tion and deployment, scaling technologies, introducing these technologies to the private sector—and workforce development. Manufacturing, he argued, is at the center of this non-linear process, and thus an essential part of the innovation process.

According to Dr. Moniz, the United States still operates under the assumption that a variety of clean energy technologies will be economically competitive and ready for deployment several years into the future. Contrary to this belief, a recent report by the Department of Energy titled "Revolution Now: The Future Arrives for Four Clean Energy Technologies", shows that these four technologies are competitive now. The fact that the technologies are economically competitive now forces the United States to focus on the manufacturing side of the process—to produce deployable technologies and "capture the full fruits of that innovation chain." It is through the manufacturing of these innovations that we can glean information from the feedback loops and keep the cycle of innovation strong.

<sup>2</sup> Executive Office of the President. "The President's Climate Action Plan." 2013.

<sup>3</sup> Barack Obama, "Remarks by the President on Energy." (Prince George's Community College, Largo, Maryland, March 15, 2012.)

## Better Plants Program

Better Plants Program is carried out by the private sector but the Department of Energy has a convening role. The Program's goals are to:

1. Create a forum for companies to advance and share best practices,
2. Establish energy productivity,
3. Establish energy performance baselines,
4. Set goals and report on progress towards goals.

The Secretary was proud to note that 120 participating companies have reported nearly a 0.2 quads of energy savings over the last 3 years and \$1b cumulatively in energy cost savings.

The Department of Energy supports the advancement of clean energy technologies and advanced manufacturing in four ways: making direct investments, participating in cost-share investments, participating in public-private partnerships, and convening stakeholders. Dr. Moniz noted that Department of Energy direct investments through loans filled a financial gap in the utility-scale photovoltaic industry in 2011<sup>4</sup>. Because of this early investment, ten projects, after receiving an initial investment from the Department, are underway with later phases financed solely by the private sector. Another example of direct investment is the support provided to retool the ArcelorMittal steelworking plant in Cleveland, Ohio, which supplies the automobile industry. Because of this investment, the ArcelorMittal plant now makes more steel per worker than any other steel manufacturer in the world, and supplies steel to the automobile industry for use in their advanced vehicles.<sup>5</sup>

Dr. Moniz also provided an example of the Department's support of clean energy technologies and advanced manufacturing through participation in public-private partnerships. In 2012, the President announced his plan to create a network of manufacturing innovation institutes around the country<sup>6</sup>, and the pilot institute, the National Additive Manufacturing Innovation Institute, was announced in August 2012.

The Department of Energy also helps advance manufacturing in the United States by convening stakeholders. The Clean Energy Manufacturing Initiative (CEMI or Initiative) and the Better Plants Program are two initiatives through which the Department convenes stakeholders to promote clean energy practices and strengthen U.S. clean energy manufacturing competitiveness.

Dr. Moniz further invigorated Summit participants with a major announcement—awarding \$150 million in clean energy tax credits for domestic manufacturing equipment to 12 businesses<sup>7</sup> from the Department of Energy and the Department of Treasury (Figure 1), as part of the Advanced Energy Manufacturing Tax Credit program (48C Program). By supporting these initiatives and completing these actions, Dr. Moniz exemplified the Department's commitment to increased U.S. energy and manufacturing competitiveness.

### **The Honorable Norman R. Augustine Former Chairman and Chief Executive Officer Lockheed Martin Corporation**

Mr. Augustine opened the AEMC Summit by offering a business perspective on the future of energy in the United States. According to Mr. Augustine, the current energy situation should be approached with “considerable optimism bridled with not inconsiderable uncertainty.” Mr. Augustine acknowledged that horizontal drilling and hydraulic fracturing provided the United States with a windfall of domestic shale gas, which if used properly, allows the country to

4 Department of Energy, Loan Programs Office. “NRG Solar, LLC (Agua Caliente).”

5 Department of Energy. “Secretary Moniz Joins President Obama in Visit to Cleveland High-Strength Steel Factory.” 2013.

6 U.S. Department of Energy. “We Can't Wait: Obama Administration Announces New Public-Private Partnership to Support Manufacturing Innovation, Encourage Investment in America. 2012.

7 Department of Energy. “Energy Department Announces \$150 Million in Tax Credits to Invest in U.S. Clean Energy Manufacturing.”

build a bridge to a greatly improved future fueled by domestic energy resources. He noted that the greatest beneficiary of cheaper energy resources would be energy-intensive firms, such as steel and aluminum producers, and the users of their products, potentially a 5 to 25 percent advantage in the cost of their production.<sup>8</sup> Other forecasting reports estimate benefits to some sectors including petroleum refining, chemical production, metal production, and detriments to others including gas exploration and production, coal-fired power generation, and railroad operations.<sup>9</sup> Mr. Augustine also expressed concerns associated with shale gas—the geopolitical impact from shale gas production and the environmental stewardship of energy firms extracting gas. These issues create the atmosphere of inconsiderable uncertainty that Mr. Augustine mentioned.

To take advantage of the distinctive time in our energy history, Mr. Augustine encouraged industry and government to work together to overcome the two valleys of death in the innovation process and to achieve a better energy future. Mr. Augustine was slightly dismayed at the falling R&D investment by the U.S. government; based on data from 2011, the United States falls behind five other countries in R&D investment as a percentage of gross domestic product (GDP)<sup>10</sup>. Mr. Augustine noted that “Advanced Research Projects Agency—Energy (ARPA-E), helping advance high-potential, high-impact energy technologies<sup>11</sup> cross the first valley of death, is broadly considered to be one of the brightest spots in the Department of Energy and the government as a whole” and yet remains woefully underfunded.

According to Mr. Augustine, the United States finds itself at a “time of unusual opportunity for America’s energy business future if we grasp it...How we make use of it, only time will tell.” It is the job of the energy and manufacturing sectors stakeholders, including the AEMC Summit participants, to ensure the path towards increased U.S. competitiveness is taken.



“...this is a time of unusual opportunity for America’s energy business future. How we make use of it, only time will tell.”

**The Honorable Norman R. Augustine**  
Former Chairman and Chief Executive Officer  
Lockheed Martin Corporation

8 International Energy Agency. “World Energy Outlook 2013.”

9 Goldman Sachs Asset Management. “The US Energy Revolution: How Shale Energy Council Ignite the US Growth Engine.”

10 The World Bank. Research and Development Expenditure (% of GDP).

11 U.S. Department of Energy, ARPA-E.

## Figure 1: Companies Receiving the 48C Tax Credits

Source: Department of Energy, 48C Phase II Selections Project Descriptions

Company Name	Tax Credit*	Manufacturing Facility's City & State	Project Description
Carrier Corporation	\$5.1m	Indianapolis, IN	Expand production at its Indianapolis facility to meet increasing demand for its eco-friendly condensing gas furnace product line.
Corning Incorporated	\$30m	Erwin, NY	Expand the manufacturing capacity of its diesel emissions control products facility.
Cree Inc.	\$30m	Durham, NC and Racine, WI	Expand the company's manufacturing footprint in Durham, NC, and Racine, WI, where it produces energy-conserving lighting technologies.
Delphi Automotive Systems LLC	\$10.6m	Kokomo, IN	Invest in equipment and tooling at its Kokomo Power Electronics facility.
Ford Motor Company	\$30m	Wayne, MI	Invest in the Ford's Michigan Assembly Plant, the world's first and most flexible manufacturing facility for multiple electrified vehicles.
General Motors Company	\$20m	Detroit, MI	Invest in GM's Detroit-Hamtramck Assembly Plant where the company manufactures Extended Range Electric Vehicles-Chevrolet Volts and the Cadillac ELR electric luxury coupe—along with internal combustion cars.
Jyoti Americas, LLC	\$6.7m	Conroe, TX	Invest in the Jyoti Americas, LLC facility in Conroe, the only fully-automated lattice transmission tower manufacturing plant in the United States.
LM Wind Power Blades (ND)	\$700,000	Grand Forks, ND	Re-equip the LM Wind Power Blades (ND) Inc. Grand Forks, North Dakota, facility for increased participation in the North American large-blade market.
MC Ionic Solutions US Inc.	\$7.4m	Memphis, TN	Invest in the MC Ionic Solutions plant that produces electrolyte solutions for lithium ion batteries used in electric vehicles allowing the company to increase U.S. production.
Natel Energy Inc.	\$2m	Alameda, CA	Equip a manufacturing facility on California's former Alameda Naval Air Station to produce 200 turbines annually—roughly 90 megawatts—to enable environmentally friendly hydropower development worldwide.
OSRAM SYLVANIA Inc.	Not Disclosed	Not Disclosed	Expand production capacity of energy-efficient and cutting edge single-point LED systems for automotive low/high beam projectors, reducing wattages by approximately 70 percent.
Southwire Company	\$6.1m	Villa Rica, GA	Equip its facility, which is the leading manufacturer of cable and wire used in electricity distribution in the United States including control cable for use in renewable energy and smart grid applications.

## HIGHLIGHTS FROM 2013 AND THE REPORT ON THE INAUGURAL AEMC SUMMIT

# Clean Energy Manufacturing Initiative and the AEMC Partnership

## Clean Energy Manufacturing Initiative (CEMI)

CEMI was launched in March 2013 by Dr. Danielson as a strategic integration and commitment of manufacturing efforts across EERE's technology offices, focusing on American competitiveness in clean energy manufacturing with two objectives:

- Increase U.S. competitiveness in the production of clean energy products; and
- Increase U.S. manufacturing competitiveness across the board by increasing energy productivity.

There are success stories of advanced manufacturing technology and clean energy manufacturing creating jobs across the country. According to Dr. Danielson, what the United States needs now, and what CEMI and the AEMC Partnership are working towards, is the growth and integration of these successes in clean energy manufacturing into a national movement.

CEMI serves to both advise and implement President Obama's manufacturing initiatives in the energy field and aligns with the efforts of the Advanced Manufacturing National Program Office and the President's Export Initiative. With the progress and success of the Clean Energy Manufacturing Initiative over 2013, the initiative has expanded across the Department of Energy.

## AEMC Partnership

The AEMC Partnership is a three-year effort by the Council and EERE to bring together national leaders to address a rapidly shifting national and global energy and manufacturing landscape, formed under

## Tools to Promote U.S. Clean Energy Manufacturing Competitiveness

1. Funding for Manufacturing R&D;
2. Facilities for Manufacturing Innovation and Demonstration;  
Examples of these facilities include the NNMI Institutes and the Manufacturing Demonstration Facility at Oak Ridge National Laboratory
3. Energy Productivity Resources for Manufacturers;  
Examples of these resources include Industrial Assessment Centers, the Better Plants Challenge, and Combined Heat and power Technical Assistance Partnerships
4. Competitiveness Analysis and Strategies;
5. Regional and National Summits; and
6. Partnerships  
Examples of these partnerships include the creation of the Advanced Manufacturing National Program Office, the Trade Promotion and Coordinating Committee, and the American Energy & Manufacturing Competitiveness Partnership with the Council on Competitiveness

the Clean Energy Manufacturing Initiative. In the 2013 series of progressive dialogues, participants uncovered actions that can be taken now to enable America to bolster dramatically its energy, manufacturing and economic competitiveness for the coming decades and beyond.



*The Honorable David T. Danielson, Assistant Secretary for Energy Efficiency and Renewable Energy, U.S. Department of Energy*

The purpose of the AEMC Partnership dialogue series is to generate ideas, collect insights and serve as a platform for the creation and potential deployment of models for public-private partnerships (PPP) that increase U.S. clean energy manufacturing competitiveness. The AEMC Partnership is broadly divided into two phases:

### ***Phase One: Mapping the Landscape***

To cultivate topics for the progressive dialogue series, and to provide a foundation for the larger goals of the AEMC Partnership, the Council performed an extensive literature review and mapped 184 past and current research efforts across the United States and around the globe concerning three core topics:

- Linkages between energy efficiency efforts of manufacturers, renewable energy efforts and manufacturing competitiveness;
- Energy-related barriers to manufacturing competitiveness; and
- Models for PPPs for fostering competitive industries.

This work also identified links, barriers and public-private partnership models that have not been studied or on which studies are out of date.

The literature review is documented in the Council publication, *The Power of Partnerships*, and its companion piece, *A Summary of Public-Private Partnerships*.<sup>12</sup> These reports provide the foundation for the AEMC Partnership and the answers to the following questions:

<sup>12</sup> These reports are available at: <http://www.compete.org/about-us/initiatives/aemcp/>.

### What prevents the United States from leading in the manufacturing of clean energy and energy efficient products as well as energy productivity throughout the manufacturing sector?

- High capital requirements;
- Lack of innovation infrastructure;
- Low investment in advanced manufacturing technology;
- Structural costs;
- Public and cyber infrastructure;
- Trade policy; and
- Clean energy market risks.

### What are the essential ideas and strategies necessary to co-create a successful clean energy manufacturing PPP?

- Strong leadership;
- Clear, compelling mission;
- Early funding stream to establish a PPP, usually from the public sector; and
- Flexible intellectual property practices that draw corporate participation.

### **Phase Two: AEMC Partnership Dialogue Series**

The second phase of the AEMC Partnership includes a total of four progressive dialogues held in 2013 to generate new insights towards increasing U.S. clean energy manufacturing competitiveness—as well as informing the creation of a public-private partnership to further advance the Initiative's goals.

## Foundation of AEMC Partnership

### REPORTS

184 reviewed



28 selected for in-depth analysis



180 recommendations

26 policy categories analyzed

### PUBLIC-PRIVATE PARTNERSHIPS

30+ reviewed



19 selected for in-depth analysis



4 PPP models developed

### **Highlights from the Inaugural AEMC Partnership Dialogue**

The Inaugural dialogue, held in Washington, DC on April 11-12 launched the second phase of the AEMC Partnership. *Launch*, the post-report, details the conversation of more than 100 leaders discussed the importance of public-private partnerships in unleashing a resurgence of the energy and manufacturing sectors in the United States.



**Left:** The Honorable David T. Danielson, Assistant Secretary for Energy Efficiency and Renewable Energy, Department of Energy; the Honorable Deborah L. Wince-Smith, President & CEO, Council on Competitiveness; Mr. Jason Miller, Special Assistant to the President for Manufacturing Policy, National Economic Council, The White House; Ms. Elizabeth Wayman, Director, Clean Energy Manufacturing Initiative, Office of Energy Efficiency and Renewable Energy, Department of Energy; and Mr. Chad Evans, Executive Vice President, Council on Competitiveness.

**Right:** Dr. Mark Peters, Deputy Laboratory Director for Programs, Argonne National Laboratory; Mr. John Mizroch, Senior Fellow, Council on Competitiveness; Major General Matthew Caulfield, Chairman and Chief Executive Officer, Hire Quality, Inc., Dr. Tomás Díaz de la Rubia, Director, Deloitte Consulting LLP; the Honorable Deborah L. Wince-Smith, President & CEO, Council on Competitiveness; Dr. Montgomery Alger, Senior Vice President for Research and Development, Myriant Corporation; Dr. J. Stephen Rottler, Vice President, California Laboratory and Vice President, Energy, Climate, and Infrastructure Security, Sandia National Laboratories; and the Honorable Alexander A. Karsner, Chairman and Chief Executive Officer, Manifest Energy, LLC.

### **Highlights from the AEMC Partnership Dialogue 2**

Dialogue 2, hosted by Dr. Lloyd Jacobs, President, The University of Toledo and held in Toledo, OH on June 20, convened 30 stakeholders around the discussion to bridge the innovation ecosystem through tangible and focused public-private partnership concepts. This dialogue also used the successful transformation of Toledo, Ohio as a case-study to examine how both informal and formal partnerships, leveraging materials science and engineering, can drive a regional manufacturing renaissance.



**Left:** Dr. Jay Kim, Director, School of Dynamic Systems, University of Cincinnati; Mr. Lorry Wagner, President, Lake Erie Energy Development Corporation; the Honorable Deborah L. Wince-Smith, President & CEO, Council on Competitiveness; Dr. Lloyd A. Jacobs, President, The University of Toledo; and the Honorable David T. Danielson, Assistant Secretary of Energy Efficiency and Renewable Energy, U.S. Department of Energy.

**Right:** AEMC Partnership Dialogue 2 Participants.

**Highlights from the AEMC Partnership Dialogue 3**

Dialogue 3, hosted by Dr. Mark Little, Senior Vice President and Chief Technology Officer, General Electric and Director, GE Global Research and held in Niskayuna, NY on August 12-13, gathered regional and national leaders to evaluate five distinct public-private partnership concepts with the potential to increase U.S. competitiveness in the energy and manufacturing sectors.



**Left:** Mr. Chad Evans, Executive Vice President, Council on Competitiveness; the Honorable Paul Tonko, U.S. House of Representatives; the Honorable Deborah L. Wince-Smith, President and CEO, Council on Competitiveness; the Honorable David T. Danielson, Assistant Secretary for Energy Efficiency and Renewable Energy, U.S. Department of Energy; Ms. Elizabeth Wayman, Director, Clean Energy Manufacturing Initiative, Office of Energy Efficiency & Renewable Energy, U.S. Department of Energy; Ms. Jetta Wong, Deputy Director, Clean Energy Manufacturing Initiative, Office of Energy Efficiency & Renewable Energy, U.S. Department of Energy; and Dr. Mark Little, Senior Vice President and Chief Technology Officer, General Electric and Director, GE Global Research.

**Right:** The Honorable Shirley Ann Jackson, President, Rensselaer Polytechnic Institute.

### ***Highlights from the AEMC Partnership Dialogue 4***

The fourth and final AEMC Partnership dialogue in 2013 was co-hosted by Mr. Michael Splinter, Executive Chairman, and Dr. Omkaram Nalamasu, Chief Technology Officer, of Applied Materials, at the Applied Global University in Santa Clara, CA on October 17, 2013. This dialogue charged stakeholders to focus on two expanded public-private partnership concepts and provide feedback on which public-private partnership concept maximizes increased U.S. competitiveness in the energy and manufacturing sectors.



**Left:** Mr. Michael R. Splinter, Executive Chairman of the Board, Applied Materials, Inc.

**Right:** AEMC Partnership Dialogue 4 Participants.

## HIGHLIGHTS FROM 2013 AND THE REPORT ON THE INAUGURAL AEMC SUMMIT

# How to Compete in the Global Economy

Speakers in the “How to Compete in the Global Economy” session of the AEMC Summit explored how companies remain competitive in an economy characterized by transition, turbulence, and transformation. The Honorable Patrick D. Gallagher, Under Secretary for Standards and Technology, U.S. Department of Commerce and Director of the National Institute of Standards and Technology moderated the discussion between Mr. Ramanath Ramakrishnan, Executive Vice President and Chief Technology Officer at Eaton Corporation, and Mr. Tom Werner, Chief Executive Officer at SunPower Corporation, who reflected on the strategic investments, partnerships, and vision needed to compete.

Dr. Gallagher started the panel session by highlighting the central role manufacturing plays in our country’s ethos and culture, especially as a source of higher quality and higher paying jobs. A healthy manufacturing sector is essential to maintaining a favorable balance of trade and has enormous economic spillover effects, including the generation of significant related economic activity. Beyond all this, Dr. Gallagher argued that by better understanding the essential role of manufacturing in the innovation system, we can change the rules of the game and increase our innovation—and therefore increase U.S. competitiveness.

Energy and manufacturing, from the perspective of two very different organizations, are strongly inter-related and interconnected. Eaton Corporation has a 100 year history, beginning as a manufacturing company for the truck industry and surviving turbulent economies by diversifying into a power management company. According to Mr. Ramakrishnan, the company aims to provide innovations and products



*The Honorable Patrick D. Gallagher, Under Secretary for Standards and Technology, U.S. Department of Commerce and Director, National Institute of Standards and Technology; Mr. Ramanath Ramakrishnan, Executive Vice President and Chief Technology Officer, Eaton Corporation; and Mr. Tom Werner, Chief Executive Officer, SunPower Corporation*

that make electrical, mechanical and hydraulic power management more efficient, reliable, and safe in a sustainable way. To thrive in today’s global economy, Eaton Corporation maintains a strong international presence: the company generates 50 percent of its revenue outside the United States. Mr. Ramakrishnan stated that despite the company’s diversification and global activities, the company flourishes because of the “power of one-Eaton”—where R&D, engineering and talent is available to Eaton across the globe.

In comparison, Mr. Werner shared his perspective on competitiveness in a global economy from the perspective of SunPower Corporation. Once a recipient of a loan guarantee from the U.S. government, SunPower Corporation is now building a joint 579 Mega-Watt plant in Antelope Valley, California—one of the largest photovoltaic power plants in the world—and no longer requires public assistance through loan



“Our ability as a country to innovate, to be entrepreneurial, and to create the new products and services of the future is embedded in our manufacturing sector.”

**The Honorable Patrick D. Gallagher**

Under Secretary for Standards and Technology,  
U.S. Department of Commerce, and  
Director  
National Institute of Standards and Technology

guarantees. Due to the company’s continuous innovation, SunPower Corporation not only survived the economic recession, but thrived. As an example, Mr. Werner described how the business model for SunPower Corporation evolved from offering solar cells, solar panels and systems to selling energy through its performance guarantee on SunPower systems—with plans to become an energy service provider in the future. SunPower Corporation, like other U.S. companies, innovates to create better products and remain above the competition created by companies in countries with lower operating costs.

Beyond excellence in products and business models, companies extract information from the marketplace to keep abreast with their customer’s needs. According to Mr. Ramakrishnan, Eaton extracts data such as demographics which helps forecast how and where people will live, work, and play. As an example, Mr. Ramakrishnan shared that by 2029, an estimated 11 billion people will travel by airplane<sup>13</sup>. This presents a business opportunity for Eaton Corporation, now working with engineers to manufacture more efficient and lighter materials for use in aerospace products.

Staying on the cutting-edge of the global marketplace also requires moving and adapting quickly. Mr. Werner believes that the United States is on the “cusp of a complete disruption of the energy infrastructure.” Going forward, Mr. Werner forecasted, the electric power industry will not solely operate gigantic power plants transmitting electricity across the country; distributed generation will increase in importance and an integration of energy generation, energy storage, and energy management will allow

<sup>13</sup> Boeing. “Long-Term Market: Current Market Outlook 2013-2032.” Available at: [http://active.boeing.com/commercial/forecast\\_data/index.cfm](http://active.boeing.com/commercial/forecast_data/index.cfm)

consumers to stop “passively paying their utility bill” and start actively managing their home energy use. SunPower is leading the charge by facilitating the change to solar panels—consumers today can buy a solar system without a down payment and make money in the first month with a lease.

These leaders spoke positively for the future of innovation in energy and manufacturing in the United States. When asked if globalization was an opportunity or a threat, both Mr. Ramakrishnan and Mr. Werner agreed—globalization presents an opportunity that should be seized. According to Mr. Ramakrishnan, a company that fails to view the world as a global marketplace misses huge opportunities every time they develop a new technology. Mr. Werner added that the United States does not have to suffer from globalization of the marketplace. The best manufacturing engineers are located in the United States and they are able to develop more innovative ideas faster than anywhere else. “Buying parts for less cost is not a sustainable differentiator for an organization—the low cost strategy is easily and quickly replicated in a global economy.” The United States should compete instead through innovation. Mr. Werner continued, “innovation is a sustainable differentiator.”



*Mr. Ramanath Ramakrishnan, Executive Vice President and Chief Technology Officer, Eaton Corporation*

## HIGHLIGHTS FROM 2013 AND THE REPORT ON THE INAUGURAL AEMC SUMMIT

# A View from the Hill

### The Honorable Randall M. Hultgren U.S. House of Representatives

Mr. Hultgren, Representative of Illinois's 14th District, shared with AEMC Summit participants his experiences and observations on energy and manufacturing in the United States. The manufacturing sector has declined in the state of Illinois. To provide the future for the next generation in the United States, U.S. voters must realize that the decisions in our immediate future will affect many generations. Congressman Hultgren outlined 4 issues that need the attention of U.S. policy-makers and voters:

- The United States tax policy should be revised. While the United States may never offer the lowest corporate tax rate, the United States has room to be more competitive;
- Regulations should be generated based on the results of a cost-benefit analysis. Furthermore, regulations should be routinely reviewed and discontinued if they are no longer necessary<sup>14</sup>;
- The United States should focus on its infrastructure—investing in infrastructure demonstrates a vote of confidence for the future of our country; and
- The United States should further encourage students to enter into STEM fields.

There is a need for increased communication between Congress and the private sector, to better understand the other's needs and potential solutions. With increased communication, the public and private sector can achieve major goals in energy and manufacturing and increase U.S. competitiveness across the board.



“What kind of nation do we want for our kids?... What type of opportunities and future do we want for them?... We need to lead as a nation in freedom and liberty—as well as leading in making the best things in the world.”

**The Honorable Randall M. Hultgren**  
U.S. House of Representatives

<sup>14</sup> These are goals of the legislation H.R. 309: Regulatory Sunset and Review Act of 2013, introduced by Mr. Hultgren.

### **The Honorable Marcia C. Kaptur U.S. House of Representatives**

As a ranking member of the Subcommittee on Energy and Water Development; and a member of the House Appropriations Committee and the Defense Subcommittee, Ms. Kaptur, Representative of Ohio's 9th District, shared the breadth of the energy issues across all sectors of the economy and government with the AEMC Summit participants. As the United States plans for the future, Ms. Kaptur noted, "the challenge for our country is how to transition from the 20th century to the 22nd century through this 21st century."

Through her position on the Appropriations Committee, Ms. Kaptur works to provide funding for the Department of Energy and the range of actions needed to secure the U.S. energy future. Her time as a domestic policy staff member during the Arab oil embargo in the Carter administration demonstrated a key premise—energy independence for the United States is of the utmost importance. According to Ms. Kaptur, progress is being made on increasing energy independence not only at home but also in overseas defense facilities and related government infrastructure. As an example, the U.S. Marine Corps helped set this new course of energy independence for the U. S. Department of Defense with their continued efforts to reduce energy needs at bases by increasing the use of alternative energy sources.<sup>15</sup> She also noted that Ohio National Guard bases installed solar research arrays and measure energy production at each installation.



"...it was actually at the University of Toledo, at the western end of our district, that the Department of Energy held its first regional energy manufacturing summit... We appreciate that opportunity to showcase from America's heartland that we really are a hotspot for energy innovation."

**The Honorable Marcia C. Kaptur**  
U.S. House of Representatives

<sup>15</sup> United States Marine Corps. Expeditionary Energy Strategy and Implementation Plan: "Bases-to-Battlefield."

Innovation must be at the foundation of U.S. energy independence and the Congresswoman celebrated many examples of innovation happening in her district with AEMC Summit participants. Several innovative energy companies call her district home, including ArcelorMittal, Alcoa, manufacturing facilities for the Ford EcoBoost engine, a General Motors transmission facility, and the largest production center of the Chrysler Jeep Wrangler and Jeep Cherokee on the continent. Ms. Kaptur highlighted the Lake Erie Energy Development Corporation (LEEDCo) project, building the first offshore freshwater wind project in North America, as one of the most exciting wind energy projects in the country. With these projects, facilities, and companies as a small sample of her district's successes, it is clear that innovation occurs on a daily basis in the heart of America.

## HIGHLIGHTS FROM 2013 AND THE REPORT ON THE INAUGURAL AEMC SUMMIT

# A View from the White House

### **The Honorable Gene B. Sperling** **Director of the National Economic Council and** **Assistant to the President for Economic Policy** **The White House**

Mr. Sperling offered his insights on the importance of manufacturing to the United States and the Obama Administration and celebrated the “changing winds”—how companies have begun to view the United States as an attractive location to manufacture. This shift in perception of manufacturing in the United States began in 2010 when several factors that affect the decision on where to locate a new manufacturing facility began to change. Two factors that increase U.S. competitiveness in manufacturing are increasing wages in countries like China and decreased energy costs due to the sudden abundance of natural gas<sup>16</sup>. Concurrently, the private sector acknowledges that remote supply chains are vulnerable to disruptions from natural disasters or political instability. As Mr. Sperling shared with Summit participants, the private sector considers the situation carefully, and while the United States is not the automatic choice to site a facility, “it has become a close call—and what Washington does on policy can matter.”

While the United States has historically supported R&D efforts within its borders, the Obama Administration also supports the manufacturing sector because:

1. The productivity of all firms rise when a manufacturing plant moves into a community;
2. R&D benefits to manufacturing decline as distance between R&D and manufacturing increases; and



“We need to make the United States more of a magnet for companies, a magnet for middle class jobs, a magnet for the kind of innovation that has been the heartbeat of the United States and should remain the heartbeat of our economy in the decades to come.”

**The Honorable Gene B. Sperling**  
 Director, National Economic Council, and  
 Assistant to the President for Economic Policy  
 The White House

<sup>16</sup> Trading Economics, “China Average Yearly Wages in Manufacturing,” 2014.

3. Relocating companies or parts of companies overseas can negatively impact the supply chain and the United States' chances of being competitive in future endeavors.

Corporate tax reform, the expansion of R&D tax credits, the creation of national credentials for use in educating the workforce, and the National Network for Manufacturing Innovation, or NNMI<sup>17</sup> are efforts underway by the Obama Administration to further support manufacturing in the United States. The NNMI receives bipartisan support to build and support a manufacturing ecosystem and foster regional partnerships between industry and universities. Through these activities, the Obama Administration works to foster a manufacturing renaissance in the United States, where government supported public goods benefit many companies, whose benefits spill into other sectors and together, improve the whole economy.

<sup>17</sup> Advanced Manufacturing Portal. "From Discovery to Scale-up: About the National Network for Manufacturing Innovation."

## HIGHLIGHTS FROM 2013 AND THE REPORT ON THE INAUGURAL AEMC SUMMIT

# *Carpe Manufacturing!* Leveraging America's Advantages for U.S. Energy and Manufacturing Competitiveness

The panel "*Carpe Manufacturing!* Leveraging America's Advantages for U.S. Energy and Manufacturing Competitiveness" brought together actors in the innovation ecosystem to discuss the future direction of the energy and manufacturing sectors, taking into consideration the opportunity provided by the introduction of shale gas resources. Dr. James H. Stock, Member of the Council of Economic Advisers moderated the conversation between Ms. Amy Ericson, U.S. Country President of Alstom Corporation; Dr. Lloyd Jacobs, President of the University of Toledo; Mr. Jeffrey Wilcox, Vice President, Engineering at Lockheed Martin; and Ms. Carol Williams, Executive Vice President, Manufacturing & Engineering, Supply Chain and Environmental, Health and Safety Operations for The Dow Chemical Company, which centered on opportunities U.S. companies and universities can seize to increase competitiveness in a changing energy and technology landscape.

Dr. Stock began the conversation sharing that shale gas dramatically impacted the U.S. economy, creating half a million jobs,<sup>18</sup> and non-conventional oil and gas production will likely cut the monthly trade deficit by \$6 billion.<sup>19</sup> Dr. Stock noted that these changes provide opportunities for manufacturing industries, supply team management, improvements in energy technology, and enhanced workforce training for engineers today and in the future. Ms. Ericson agreed with Dr. Stock and underscored the importance of shale gas for electricity generation specifically—especially given the many changes occurring in electricity generation: the need to balance intermittent renewable energy sources, continuously advancing technology enabling a smart grid, and changing consumer habits.

Innovation happens when people talk to people. We tend to think of this as a conversation about things, but it's not. It's about people.

**Mr. Jeff Wilcox**  
Vice President, Engineering  
Lockheed Martin

The United States has the potential to continue its leadership in the energy technology leadership. Dr. Stock mentioned that the federal government supports an improved energy and manufacturing future through PPPs like the NNMI Institutes and the 48C Manufacturing Tax Credits announced earlier in the day. According to Mr. Wilcox, partnerships with the government are critical to pull technologies—like those associated with intermittent renewable energy sources—across the valley of death and into the marketplace. Ms. Ericson and Mr. Wilcox both offered concrete examples of successful technologies that evolved from partnerships with the Department of Energy and collaborations with national laboratories in the following areas: smart grid, off-shore wind, shale gas drilling<sup>20</sup>, carbon capture, and materials science. Ms. Ericson also credited public-private partnerships with the graduation of Alstom products from the testing phase to pilot-scale installations. However, further funding is needed for large-scale demonstrations for major infrastructure projects for generation and transmission.

18 Financial Times. "US shale boom to create half-million jobs." June 13, 2012.

19 About Oil. "US economy expanding despite limited shale oil contribution."

20 U.S. Department of Energy. "DOE's Unconventional Gas Research Programs 1976-1995: An Archive of Important Results." 2007.



**Top:** Dr. James H. Stock, Member, Council of Economic Advisers; Ms. Amy Ericson, U.S. Country President, Alstom Corporation; Dr. Lloyd Jacobs, President, University of Toledo; Mr. Jeffrey Wilcox, Vice President, Engineering, Lockheed Martin Corporation; and Ms. Carol Williams, Executive Vice President, Manufacturing & Engineering, Supply Chain and Environmental, Health & Safety Operations, The Dow Chemical Company

**Bottom Left:** Dr. Lloyd Jacobs, President, University of Toledo and Mr. Jeffrey Wilcox, Vice President, Engineering, Lockheed Martin Corporation  
**Bottom Right:** Ms. Carol Williams, Executive Vice President, Manufacturing & Engineering, Supply Chain and Environmental, Health & Safety Operations, The Dow Chemical Company

Dr. Jacobs offered some insights on academic contributions to the innovation ecosystem. Universities have two roles to play: one as the grounds for innovation through research and the other through training the workforce of today and tomorrow. Dr. Jacobs applauded interactions between the public sector and private industry—such close cooperation is essential, especially for multi-sector and multi-disciplinary efforts like transforming Ohio's "Rust Belt" into a "Resilience Belt." As an example of collaborations in Ohio, Dr. Jacobs described the efforts between, two-year and four-year universities and industry to train workers in World Class Manufacturing, a version of lean manufacturing.

With the leadership of innovative companies and universities, the United States has developed a broad and rich range of technologies over the last decade—distributed and centralized energy, and alternative fuels for vehicles in the form of electricity and biofuels, summarized Dr. Stock. By seizing the opportunities in the energy and manufacturing sectors, and working together, the future will bring more, varied and innovative solutions.



*Dr. James H. Stock, Member, Council of Economic Advisers; Ms. Amy Ericson, U.S. Country President, Alstom Corporation; and Dr. Lloyd Jacobs, President, University of Toledo*

## HIGHLIGHTS FROM 2013 AND THE REPORT ON THE INAUGURAL AEMC SUMMIT

# The Value of Making it in America

At the inaugural AEMC Summit, the Honorable Steny Hoyer, Democratic Minority Whip and Representative of Maryland's fifth congressional district, U.S. House of Representatives shared his perspective on the role of Congress in securing and improving the future of the U.S. manufacturing sector. Congress has a vital role in encouraging private sector growth through the creation and implementation of policies, such as the America COMPETES Act and the Make It In America plan. The America COMPETES Act of 2007, rooted in the work of the Council's National Innovation Initiative,<sup>21</sup> creates valuable programs to enhance innovation including ARPA-E.<sup>22</sup>

"America continues to be the innovation, invention, and development center of the world," promoted Congressman Hoyer. Unfortunately, innovators historically face hurdles when scaling their new products into mass-manufactured products in the United States. By implementing and increasing the use of advanced technologies, such as robotics, the United States has an opportunity to re-shore manufacturing jobs. To dissipate any fear that the advancement of technology in the manufacturing sector will reduce jobs, Congressman Hoyer explains that advanced manufacturing organizations may employ fewer workers, but the United States has the ability to attract a larger number of organizations with desirable jobs to the United States because of our expertise in advanced technology. Advanced manufacturing technologies make us "more efficient, more effective, in many ways more accurate"—technologies truly have the potential to make the United States more competitive.



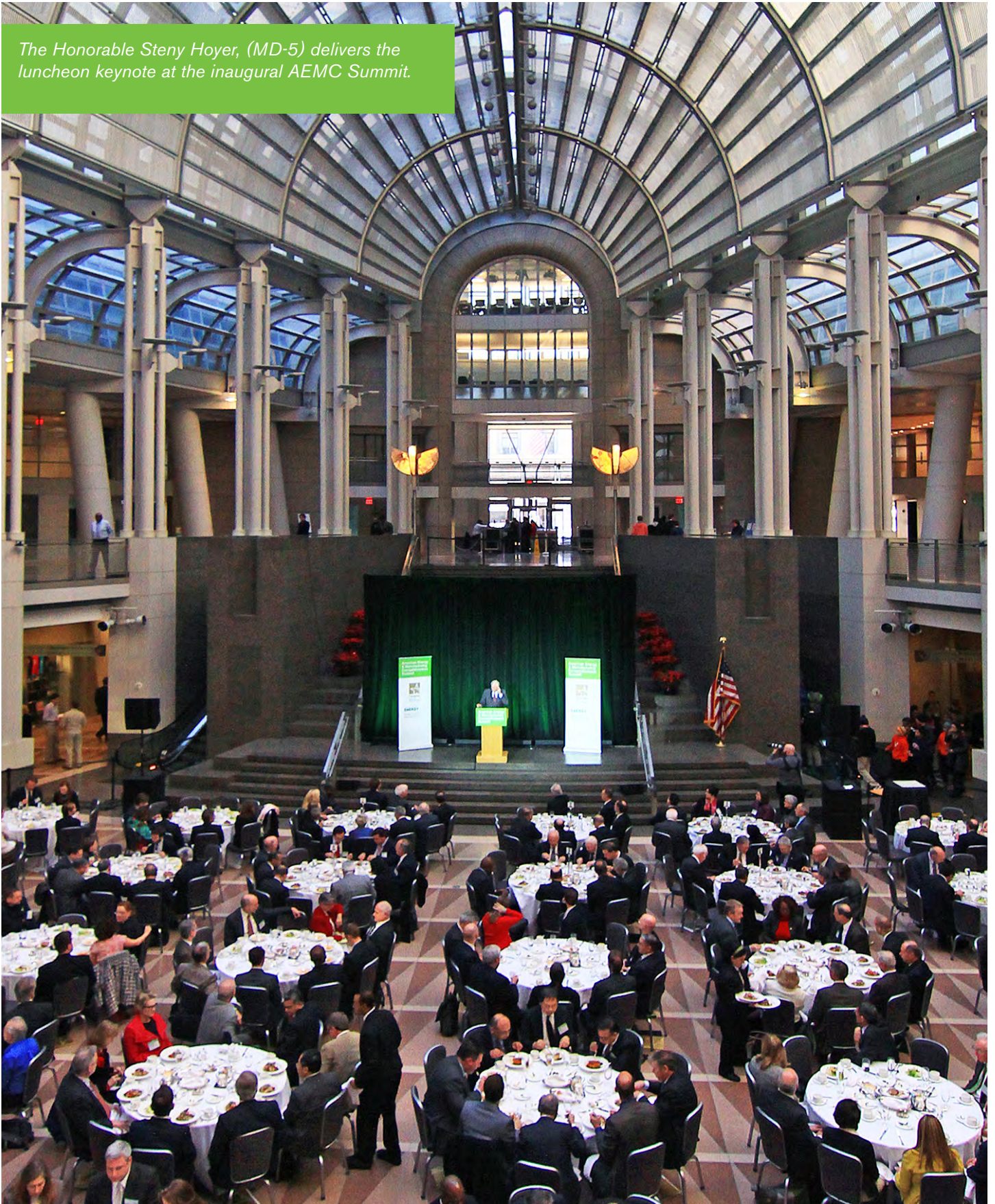
**"If, however, that which is invented, innovated and developed in the United States is taken to scale overseas, inevitably our inventors, innovators and developers will follow—to where the product is being taken to scale."**

**The Honorable Steny Hoyer**  
U.S. House of Representatives

21 Council on Competitiveness. "Innovate America – National Innovation Initiative Summit and Report." 2005. The America COMPETES Act was sponsored by the Honorable Barton J. Gordon, signed into law by President Bush in 2007, and re-authorized by President Obama in 2010.

22 The White House. "Fact Sheet: America Competes Act of 2007." 2007.

*The Honorable Steny Hoyer, (MD-5) delivers the luncheon keynote at the inaugural AEMC Summit.*



The Make It In America plan is another avenue through which Mr. Hoyer supports increased U.S. competitiveness. The plan receives bipartisan support because it works to create an environment for business to thrive and encourages manufacturers to create jobs to mass-produce products in the United States. The plan places a heavy focus on advanced manufacturing in the high-technology and energy sectors. Bills in all four priority areas have recently been introduced in both the U.S. House of Representatives and the U.S. Senate (see sidebar). These efforts are aligned through four priorities of the Make It In America plan:

1. Adopt and pursue a national manufacturing strategy,
2. Promote the export of U.S. goods,
3. Encourage businesses to bring jobs and innovation back to the United States, and
4. Train and secure a twenty-first century workforce.<sup>23</sup>

By aligning the efforts of Congress, other branches of the federal government, private industry, academia, and the public at large, the United States is well poised to resume leadership in the manufacturing sector, enhance U.S. competitiveness, and increase the prosperity of all Americans.

## Selection of Recently Introduced Legislation Related to the Make It In America Plan<sup>1</sup>

- H.R. 905: Research and Development Tax Credit Extension Act of 2013
- H.R. 1424: Security in Energy and Manufacturing (SEAM) Act of 2013 or the SEAM Act of 2013<sup>2</sup>
- H.R. 400: Clean Energy Technology Manufacturing and Export Assistance Act of 2013
- H.R. 2873: Economy, Energy, and Environment (E3) Initiative Evaluation Act
- H.R. 1747: Workforce Development Investment Act of 2013
- H.R. 1271: Job Skills for America's Students Act of 2013
- H.R. 1716 (112th): Job Opportunities Between Our Shores Act

<sup>1</sup> Bill details listed below are exactly as they appear on THOMAS, Library of Congress, accessed on 1/13/2013 at [http://thomas.loc.gov/home/bills\\_res.html](http://thomas.loc.gov/home/bills_res.html)

<sup>2</sup> As mentioned previously, \$150 million in tax credits announced by Dr. Moniz, U.S. Secretary of Energy, at this Summit to 12 companies encourage and expand the breadth of the Security in Energy and Manufacturing Act of 2013.

<sup>23</sup> The Democratic Whip Steny Hoyer. "Make It In America in the 113th Congress."

**HIGHLIGHTS FROM 2013 AND THE REPORT ON THE INAUGURAL AEMC SUMMIT**

# Inaugural AEMC Summit Exhibits

Several high-impact, hands-on technology demonstrations were on exhibit as a key component of the AEMC Summit from some of America's most innovative manufacturers and technology organizations.



## Additive Manufacturing in the 21st Century

Additive manufacturing (AM) techniques build precisely detailed and complex 3-D parts from scratch by depositing materials only where they are specified in a digital design, layer by layer. This new approach to manufacturing has the potential to change the way we design, produce and use products while saving energy, shortening time-to-market, and enabling entirely new designs and products that cannot be produced any other way. In this hands-on AM exhibit, AM parts were available—including a robot with more than 80 AM parts designed and built entirely by students, and a commercial-scale machine building parts in real-time. America Makes and Oak Ridge National Laboratory's Manufacturing Demonstration Facility are examples of organizations working on AM.



## The Future of Everyday Cars

Emerging battery technology allows an all-electric operation to fulfill the daily needs of most drivers. For very long car trips, plug-in hybrids pair an internal combustion engine with the electric drive system, and for battery electric vehicles, the availability of fast-charging infrastructure is on the rise. These vehicles demonstrate the future of everyday cars and will soon be more readily available on the market. DOE has supported the development of electric drive technologies (e.g., batteries, motors) and utilizes plug-in electric vehicles in its fleet—illustrating its commitment to clean, fuel-efficient vehicles. GM's Chevy Volt is an example of a plug-in hybrid vehicle with battery and manufacturing technologies based on enterprising technologies developed with the support of DOE.



## Advanced Manufacturing Innovation Trends

Several innovation trends are emerging that will either disrupt or augment the future of manufacturing. These technologies arise from ongoing work at start-ups and major technology companies. Integration and deployment into existing manufacturing companies will be vitally important to ensure competitive advantages are maintained. This hands-on exhibit showcased three key technologies: Baxter the robot, designed to work alongside humans on the shop floor; Google glass, that enables dynamic instructions to communicate with a factory shop floor; and nano-scaled particles that lower energy consumption and extends the life of tooling. The exhibit included examples of innovation integrations into manufacturing processes presented by John Deere, along with Rethink Robotics and NanoMech, Inc.



## 21st Century Smart Manufacturing: Building Infrastructure Powering Smart Decisions

Smart Manufacturing (SM) infrastructure enables information about the manufacturing process to be available when, where, and in the form it is needed across the entire manufacturing value-chain to power smart decisions. Islands of efficiency become interoperable and networked, and resilient solutions drive transformational manufacturing enterprise performance for any size, level of technical sophistication, or resource availability at low cost. A scalable, cross-industry, networked-information SM Platform is needed to integrate existing and future plant-level data, simulations and systems across manufacturing seams and orchestrate business in real-time. An open architecture will attract entirely new communities of solution providers to merge with and enhance existing solutions. In this exhibit, Smart Manufacturing Leadership Coalition (SMLC) and Rockwell Automation (SMLC Member), shared their work in a national initiative to develop and sustain SM infrastructure at a U.S. Army manufacturing plant testing facility. Through the SM platform, Rockwell Automation technology will be able to extract previously unavailable energy data, correlating energy use data with production data and enable real-time energy reductions in this facility.



## Geothermal Heat Pump System

Geothermal heat pump systems are the most energy and cost efficient systems on the market for heating and cooling. The technology uses the relatively constant temperature of the earth (thermal energy), available about six feet below the earth's surface, to provide resources for heating, air conditioning and hot water. The use of the earth's thermal energy allows the system to provide extremely efficient heating or cooling all year long in virtually any climate. At the AEMC Summit, Robert Bosch LLC exhibited a geothermal heat pump system that is manufactured in Ft. Lauderdale, Florida, for domestic use and export.



## Accelerating Manufacturing Innovation

The rapid transition of innovative technologies and processes from the laboratory to production is essential to the success of manufacturing enterprises in the 21st century. Accelerating manufacturing innovation includes focuses on: additive manufacturing, advanced materials, the digital tapestry for manufacturing, and next-generation electronics. These four strategic threads are presented as part of a multi-year Advanced Manufacturing Initiative launched by Lockheed Martin with the potential to drive breakthrough performance and affordability in new products and systems and closely align with newly formed institutes in the NNMI. The exhibit features graphics, videos, and next-generation hardware that demonstrate the power, potential, and business value of investments in advanced manufacturing.

## HIGHLIGHTS FROM 2013 AND THE REPORT ON THE INAUGURAL AEMC SUMMIT

# Technologies Driving the United States to our Energy Future

The panel “Technologies Driving the United States to our Energy Future” brought together leaders that create, enable, and deploy technologies that drive U.S. competitiveness in the production of clean energy products or increase energy productive across the U.S. industrial base. The Honorable Alexander A. “Andy” Karnser, Chief Executive Officer, Manifest Energy moderated a solutions-focused discussion on partnerships between and amongst private industry, national laboratories and universities with Dr. Sujeet Chand, Senior Vice President and Chief Technology Officer, Rockwell Automation; Mr. Peter Davidson, Executive Director, Loan Program Office, U.S. Department of Energy; Dr. Robert Easter, President, University of Illinois; Dr. Eric Isaacs, Director, Argonne National Laboratory, and Mr. Michael Mansuetti, President, Robert Bosch LLC.

Partnerships throughout the innovation ecosystem can align relevant organizations to achieve more comprehensive results faster. As described by Dr. Isaacs, cutting-edge science and technology efforts are not localized, but occur regionally, nationally, and internationally. These partnerships provide an opportunity for organizations to be involved with developments on the cutting edge of technologies without investing all of the resources required. Dr. Chand and Mr. Mansuetti agreed and added that partnerships bring benefits to the private sector, benefits that ultimately bring value to the customer. Mr. Mansuetti added that partnerships satisfy key needs of innovation, bringing relevant people into proximity and increasing the interaction of people.



**Top:** Mr. Peter Davidson, Executive Director, Loan Program Office, U.S. Department of Energy; Dr. Eric Isaacs, Director, Argonne National Laboratory; the Honorable Alexander A. “Andy” Karsner, Chief Executive Officer, Manifest Energy; Mr. Michael Mansuetti, President, Robert Bosch LLC; Dr. Sujeet Chand, Senior Vice President and Chief Technology Officer, Rockwell Automation; and Dr. Robert Easter, President, University of Illinois

**Bottom:** Dr. Eric Isaacs, Director, Argonne National Laboratory and Mr. Michael Mansuetti, President, Robert Bosch LLC

While partnerships have existed between national laboratories, academia, and large industry in many configurations for some time, research centers in national laboratories and universities are increasingly encouraged to grow their interactions with a wider audience—to include companies of all sizes. One recent creation to facilitate this interaction is the Energy Systems Integration Facility, funded by EERE, to make the facilities and experts at national laboratories available to start-up companies. Another method to encourage collaborations, shared Dr. Easter, is demonstrated by the resolution passed by the State of Illinois in the late 1990s, mandating that universities work in economic development—resulting in the creation of a research park at the University of Illinois at Urbana-Champaign.

The federal government likewise demonstrates its goal to address the energy sector's challenges with initiatives in the Loan Program Office to bring innovation to market. Mr. Davidson exemplified the federal government's efforts with a major announcement at the inaugural AEMC Summit—a new solicitation by the Department of Energy for \$8 billion in loans and loan guarantees<sup>24</sup> to address the full spectrum of advanced fossil fuels, “from the extraction side of the energy sector to deployment, power generation and factory retrofits, all the way to the end use: energy efficiency, combined heat and power, microgrids, the whole range of what we can do,” shared Mr. Davidson.



*Dr. Sujeet Chand, Senior Vice President and Chief Technology Officer, Rockwell Automation*

At the Loan Program Office, companies come to us with their projects, we finance it so the company can prove that the technology and the innovation works to the larger funding world, then get out of the way so the private sector can take over.

**Mr. Peter Davidson**

Executive Director, Loan Program Office  
U.S. Department of Energy

<sup>24</sup> U.S. Department of Energy, Loan Programs Office. “Department of Energy Releases \$8 Billion Solicitation for Advanced Fossil Energy Projects.” 2013.

Dr. Chand and Mr. Mansuetti elaborated on the benefits that partnerships bring to the private sector, and ultimately benefit the customer. According to Dr. Chand, manufacturing companies now realize that energy does not have to be another cost of doing business; rather, the cost of energy consumption can be optimized just as a business optimizes the cost of its raw materials. Companies like Rockwell Automation work with businesses to figure out how they use energy and how to better optimize it to increase energy efficiency and decrease costs.

Through collaborations and partnerships, organizations learn more about the needs and capabilities of others. In response to interactions between universities and the private sector, Mr. Karsner and Dr. Easter discussed the transformation of curriculum—especially in STEM education. For example, Dr. Easter detailed changes to the curriculum at the University of Illinois, including degree offerings that have become more specific, a need of both the students and their future employers and the development of educational programs that cover more specific topics such as energy technologies.



*Dr. Robert Easter, President, University of Illinois and Mr. Peter Davidson, Executive Director, Loan Program Office, U.S. Department of Energy*

**HIGHLIGHTS FROM 2013 AND THE REPORT ON THE INAUGURAL AEMC SUMMIT**

# Platforms for Innovation and Manufacturing Competitiveness—the Roles of the National Laboratories

In the session “Platforms for Innovation and Manufacturing Competitiveness—the Roles of the National Laboratories,” Dr. Danielson took the opportunity to announce new efforts within the Department of Energy: Dr. Moniz created the Under Secretary for Science and Energy to lead the laboratory system and provide more effective research coordination; a National Laboratory Engagement initiative focused on dramatically increasing the amount of commercial impact from the national laboratories, led by Ms. Jetta Wong; and a National Laboratories Industry Fellows Program to increase communication between the private sector and the national laboratories.

Following these announcements, Dr. Danielson enlisted Dr. Williams Goldstein, Deputy Director for Science and Technology, Lawrence Livermore National Laboratory; Dr. Thomas Mason, Director, Oak Ridge National Laboratory; Mr. Stephen C. Nolet, Principal Engineer and Senior Director of Innovation and Technology, TPI Composites, Inc.; and Dr. Jud Virden, Associate Laboratory Director, Energy and Environment Directorate, Pacific Northwest National Laboratory to offer solutions to his two major priorities: increasing manufacturing in the United States and unlocking innovation inside the national laboratories to enhance the competitiveness of U.S. manufacturing and the broader industrial landscape.

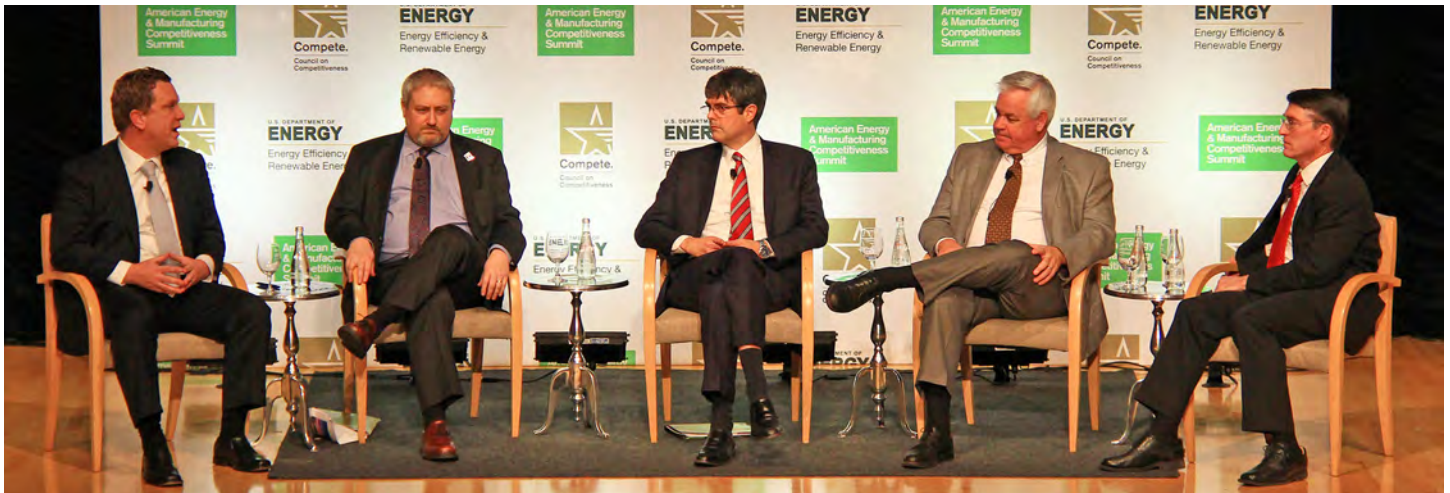
To foster collaborations between the private sector and national laboratories in the future, Dr. Danielson requested best practices from the panelists. In response, Dr. Virden suggested three points: facilitating the communication between the private sector and national laboratories; finding a champion to



For collaborations, you need a national laboratory champion from within the national laboratories. From the DOE, you need funding and the national challenge—the glue that brings everyone together.

**Dr. Jud Virden**

Associate Laboratory Director  
Energy and Environment Directorate  
Pacific Northwest National Laboratory



**Top:** The Honorable David T. Danielson, Assistant Secretary for Energy Efficiency and Renewable Energy, U.S. Department of Energy; Dr. William Goldstein, Deputy Director for Science & Technology, Lawrence Livermore National Laboratory; Dr. Thomas Mason, Director, Oak Ridge National Laboratory; Mr. Stephen C. Nolet, Principal Engineer and Senior Director of Innovation & Technology, TPI Composites, Inc.; and Dr. Jud Virden, Associate Laboratory Director, Energy and Environment Directorate, Pacific Northwest National Laboratory

**Bottom Left:** The Honorable David T. Danielson, Assistant Secretary for Energy Efficiency and Renewable Energy, U.S. Department of Energy and Dr. William Goldstein, Deputy Director for Science & Technology, Lawrence Livermore National Laboratory

**Bottom Right:** Dr. Thomas Mason, Director, Oak Ridge National Laboratory and Mr. Stephen C. Nolet, Principal Engineer and Senior Director of Innovation & Technology, TPI Composites, Inc.

foster collaboration in both the private sector company and the national laboratory; and increase the speed of work at the national laboratories to match that of the private sector. National laboratories value interaction with the private sector in order to understand what technologies would make a major impact in society shared Dr. Goldstein, in addition to finding uses for technologies developed by laboratory scientists and engineers.

Companies tend to approach the national laboratories with complex problems outside of their core business focus—to explore new space and share the risk of exploration with national laboratories, stated Dr. Viriden. To even begin this approach, companies need to have some idea of the capabilities within the national laboratories. According to Dr. Mason, increasing connections through the Under Secretary for Science and Energy will ensure that tools developed throughout the Department can be utilized in different projects. However, from his experience, Dr. Mason has seen that national laboratories find it easier to work with large corporations rather than SMEs, in part because large corporations have R&D scientists and engineers who can easily and technically speak with national laboratory scientists and interact in the scientific realm—and therefore have some knowledge of national laboratory capabilities. Encouraging regular meetings between the national laboratories and industry to discuss industry needs and available national laboratory assets could increase the speed and frequency of collaborations between these organizations, suggested Dr. Viriden.

Mr. Nolet offered his perspective on partnering with national laboratories from his work at TPI Composites, Inc., a wind blade manufacturing company. TPI Composites, Inc. faced competitiveness challenges in Newton, Iowa due to high labor costs. In order to combat this competitive disadvantage, TPI Composites, Inc. improved productivity by integrating advanced manufacturing techniques. Under the Advanced Manufacturing Initiative, TPI Composites, Inc., the State of Iowa, and Sandia National Laboratories partnered to deploy robotics technology in wind turbine production. In this project, the national laboratory contributed technical expertise that neither TPI Composites, Inc., nor similar companies in this industry had available. Supporting Dr. Viriden's second point, Mr. Nolet credited a champion within Sandia National Laboratory for making this partnership possible.

A barrier to overcome in these collaborations, beyond raising awareness around the capabilities of within the national laboratories, is understanding the procedure to be followed in creating a partnership. Mr. Nolet suggested the creation of a primer that details the steps needed to partner with national laboratories through the Cooperative Research and Development Agreement (CRADA) system. By understanding this process better, more companies will likely partner with national laboratories and leverage their capabilities to increase manufacturing in the United States.

## HIGHLIGHTS FROM 2013 AND THE REPORT ON THE INAUGURAL AEMC SUMMIT

# Leadership Reflections: Energy & Manufacturing in the Innovation Economy

In the panel “Leadership Reflections: Energy and Manufacturing in the Innovation Economy,” panelists discussed how the economy of the United States should embrace the future. Moderated by Dr. Teresa A. Sullivan, President of the University of Virginia, panelists Dr. Suzanne Berger, Raphael Dorman-Helen Starbuck Professor of Political Science, and Co-Chair, Production in the Innovation Economy Project, Massachusetts Institute of Technology (MIT); Dr. Paul J. Himmert, Director, Sandia National Laboratories and President, Sandia Corporation; and Mr. Michael Idelchik, Vice President—Advanced Technologies, GE Global Research discussed the strong industrial ecosystem which should serve as the base for the future economy—also the subject of a new project at MIT and numerous Council reports.

The U.S. economy has evolved from one with a heavy focus on agriculture to manufacturing to services—and the next direction has yet to be defined. According to Dr. Sullivan, this next direction could be based in a form of manufacturing—one more closely linked to R&D and using more advanced technologies. To understand the importance of this linkage, Dr. Sullivan asked Mr. Idelchik if the co-location of R&D and manufacturing matters in the eyes of the private sector, a matter of interest for the federal government shared by Mr. Sperling earlier during the day. Mr. Idelchik shared with the audience that GE firmly believes that manufacturing is a key competency of the business. GE invests in advanced manufacturing in a variety of fields, and co-location with R&D allows the company to respond more quickly to real problems in the marketplace. Mr. Idelchik believes that advanced material science, combined with the use of novel manufacturing technologies, creates a sustainable competitive differentiation for GE.



*Dr. Paul J. Himmert, Director, Sandia National Laboratories and President, Sandia Corporation and Mr. Michael Idelchik, Vice President-Advanced Technologies, GE Global Research*

Transforming the mindset of others in the ecosystem to match with GE’s practices can only occur with the support of a strong industrial—where SME suppliers stay abreast of future trends, innovative ideas and technology spill over from the research community, and workforce training and technologies flow to and from different corporations. Without the strong industrial ecosystem, however, this potential direction and the U.S. production capacity may entirely disappear.

The industrial ecosystem that cannot scale the products it invents and innovates may be characterized as broken or missing links. Supporting this idea, Mr. Idelchik noted the steady depletion of workers with expertise in scaling a complex enterprise. Another factor, observed by a Summit participant, is the rise in the number of serial entrepreneurs—those who look to sell start-up companies to a larger company for a healthy sum of money. According to Dr.



*Dr. Teresa A. Sullivan, President, University of Virginia; Dr. Suzanne Berger, Raphael Dorman-Helen, Starbuck Professor of Political Science and Co-Chair, Production in the Innovation Economy Project, Massachusetts Institute of Technology; Dr. Paul J. Hommert, Director, Sandia National Laboratories and President, Sandia Corporation; and Mr. Michael Idelchik, Vice President, Advanced Technologies, GE Global Research*

Berger, the high number of serial entrepreneurs in the United States is a symptom of a broken industrial ecosystem. Start-up companies no longer grow into big companies, creating an incentive for start-up companies to cash out as soon as possible. Mr. Idelchik added that the only way to reverse this culture of consumed start-up and small companies is to rebuild the industrial ecosystem.

All stakeholders have a role to play in rebuilding the industrial ecosystem. Dr. Berger and Dr. Hommert agreed that a role for government was to reduce risk for companies as new technologies are introduced. One successful model of reducing risk by the government is SEMATECH. Originally a semiconductor manufacturing consortium, SEMATECH was started with government funds but has continued largely on

private sector funding. The key, Dr. Berger said, is to build an institution that remains resilient even if one company disengages. To create more institutions like SEMATECH, Mr. Idelchik and Dr. Berger agreed that the government must lead and convene potential partners.

In reorienting for the current market's needs, the University of Virginia created several programs in an effort to strengthen the ecosystem, including the Commonwealth Center for Advanced Manufacturing, a new R&D center co-located with a new advanced manufacturing center, and the creation of a new middle school curriculum with the University of Virginia Curry School of Education and School of Engineering and Applied Science, along with the National Science Foundation and the Commonwealth

of Virginia. In creating this new middle school curriculum, this consortium also brings technology to the school, using 3D printers to demonstrate real-life applications of geometry as an example.

National laboratories can make the most impact on rebuilding the industrial ecosystem by solving problems that require understanding of fundamentals and helping bridge the gap between these fundamentals and what can be turned into a practical design, shared Dr. Hommert. Sandia National Laboratories has collaborated with companies of all sizes, from large companies like GE, with their own R&D departments to start-up companies. One success story from Sandia National Laboratories—through the New Mexico Small Business Alliance—is Micro-Analytics, which increased their workforce by 50% after increasing confidence in their product line through the collaboration.

During this session, Dr. Berger said that the United States is still the best country to start a business and grow it for 5 to 9 years. However, when it comes time to commercialize a product, a small firm cannot find the amount of financial investments it needs; sending innovative firms to other countries in search of money. Having identified the production capabilities needed to bring innovation to the commercial market as part of a two year project at MIT, Dr. Berger stated that many production capabilities are not available to innovative SMEs within the U.S. industrial ecosystem—unless they were housed within their own four walls and paid with funds from their own accounts. This is a stark difference to resources available to companies in Germany, for example, where local and regional banks are available to provide funds and help launch start-up companies.



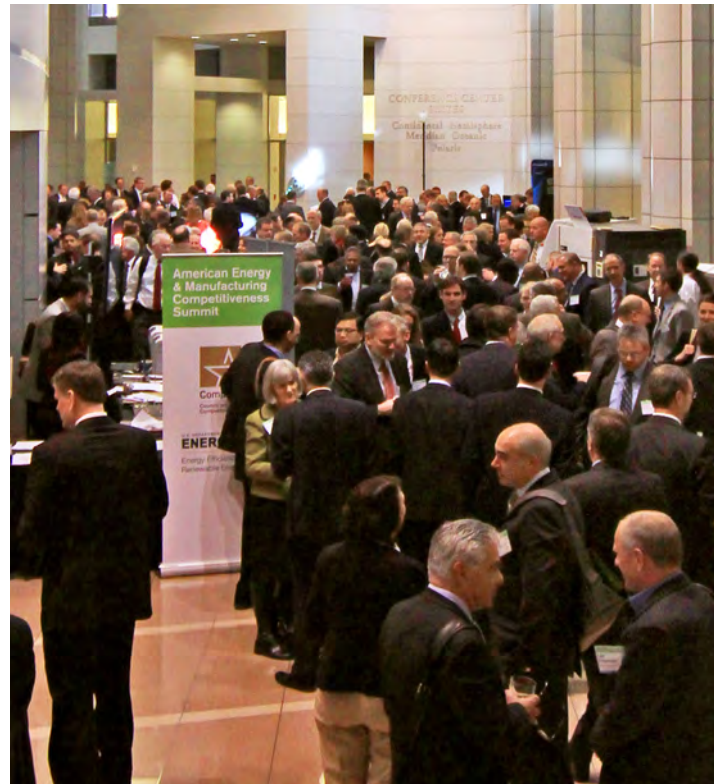
*Mr. Michael Idelchik, Vice President, Advanced Technologies, GE Global Research; Dr. Suzanne Berger, Raphael Dorman-Helen, Starbuck Professor of Political Science and Co-Chair, Production in the Innovation Economy Project, Massachusetts Institute of Technology; Dr. Teresa A. Sullivan, President, University of Virginia; and Dr. Paul J. Hommert, Director, Sandia National Laboratories and President, Sandia Corporation*

Even with this stark reality, the leaders in this panel session found exciting opportunities to create a better future. The creation of comparative differentiation and the transformation of the supply chain are two innovative disruptions that Mr. Idelchik believes will increase U.S. competitiveness in the future. Dr. Hommert and Dr. Berger both feel confident that the U.S. manufacturing sector will continue to strengthen, especially with the attention and interest of the country's leading thinkers and actors. This window of opportunity for manufacturing holds promise for a more innovative, resilient and competitive U.S. economy.

**HIGHLIGHTS FROM 2013 AND THE REPORT ON THE INAUGURAL AEMC SUMMIT**

# The Path Forward

This report details the activities accomplished in 2013 under the American Energy & Manufacturing Competitiveness Partnership and offers rich detail on the conversations, policies, partnerships, and barriers that are relevant to technology commercialization and manufacturing from the inaugural AEMC Summit. With this foundation, the AEMC Partnership will continue conversations through dialogues and summits with leaders in industry, academia, government, labor, national laboratories, and non-profit organizations to elucidate high impact actions that can be implemented now to unleash the potential of clean energy manufacturing throughout the United States.



*Participants at the inaugural AEMC Summit.*

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