American Energy & Manufacturing Competitiveness Partnership

Evaluate.

Dialogue 3

Compete.

Council on Competitiveness

THE COUNCIL ON COMPETITIVENESS has developed this report with the support of the U.S. Department of Energy Office of Energy Efficiency and Renewable Energy, in fulfillment of Contract #DE-EE0006099.000.

THE COUNCIL is a nonprofit, 501 (c) (3) organization as recognized by the U.S. Internal Revenue Service. The Council's activities are funded by contributions from its members, foundations, and project contributions. To learn more about the Council on Competitiveness, visit www.compete.org.

Printed in the United States of America

Dialogue 3
Table of Contents

Letter from the President 4
Participants 6
Agenda 9
PART 1: AEMC PARTNERSHIP DIALOGUE 3 PRIMER
Executive Summary 18
The American Energy and Manufacturing Competitiveness (AEMC) Partnership 19
- Phase One: Mapping the Landscape 19
- Phase Two: AEMC Partnership Dialogues 21
  - Reviewing Previous AEMC Partnership Dialogues 21
    - Summary of the Inaugural AEMC Partnership Dialogue 21
    - Summary of the AEMC Partnership Dialogue 2 23
  - Setting the Stage for the AEMC Partnership Dialogue 3 26
    - PPP Concept 1: Innovation Exchange Fellowship Program 27
    - PPP Concept 2: Leveraging the U.S. Innovation Ecosystem 34
    - PPP Concept 3: Advanced Materials Characterization, Experimentation and Standardization 41
    - PPP Concept 4: Facilitating the Transition of Prototypes to Deployable Products 47
    - PPP Concept 5: Industrial Kickstarter and Manufacturing Marketplace 53

Looking Forward 59
Appendix: Measuring the Success of Public-Private Partnerships 60
PART 2: FINDINGS FROM AEMC PARTNERSHIP DIALOGUE 3
Introduction 62
Fireside Chat 65
Perspectives from New York Officials 67
Keynote: Clean Energy Manufacturing—A National Focus Can Unlock a Potential Treasure Chest 69
Perspectives from Industry: Participating in Public-Private Partnerships 71
Evaluation of the Five Presented Public-Private Partnership Concepts 73
Overarching Perspectives of the Presented PPP Concepts 93
Discussion: Facilitating Knowledge Spillover 94
The Path Forward 95
About the Council on Competitiveness 98

Letter from the President

On behalf of the Council on Competitiveness (Council), it is my pleasure to release *Evaluate*, the third report of the American Energy & Manufacturing Competitiveness (AEMC) Partnership. The AEMC Partnership, a three-year effort between the Council and the U.S. Department of Energy Office of Energy Efficiency and Renewable Energy (EERE), brings together national leaders to address a rapidly shifting national and global energy landscape—and to uncover actions that can be taken now to enable America to build on this distinctive time in its energy history over the next five to ten years and to dramatically bolster its energy, manufacturing and economic competitiveness over the next 20, 30, 40 years and beyond.

Dialogue 3, held on August 12-13, 2013, at GE Global Research Center in Niskayuna, New York, was part of a year-long, progressive conversation taking place across the nation that convenes leaders from industry, academia, national laboratories and government. The inaugural dialogue took place in Washington, D.C. on April 11-12, 2013, and the second followed at the University of Toledo on June 20. A fourth and concluding dialogue will follow Dialogue 3—taking place at Applied Materials Global University in Santa Clara, California on October 17, 2013. These dialogues will culminate in the inaugural American Energy & Manufacturing Competitiveness Summit in Washington, D.C. on December 12, 2013.

I extend special thanks to my partner for this dialogue series, the Honorable David. T. Danielson, Assistant Secretary of EERE, for his vision and leadership during the development of this collaboration. 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 then generate potential models for scalable, public-private partnerships, to increase the competitive manufacturing of clean energy and energy efficient products, and the energy productivity of the U.S. manufacturing sector.

Dialogues 1 and 2 generated five potential concepts for scalable public-private partnerships, and the third dialogue provided a venue to evaluate them. *Evaluate* details the work and presents insights captured during the third dialogue in two parts. Part one, a primer developed in advance of the AEMC Partnership third dialogue, maps out the five public-private partnerships proposed to the dialogue participants, and details the resources and methods manufacturing and energy sectors national leaders can leverage to create good jobs, new innovations and higher living standards.

Part two reports on the proceedings of the August 12-13, 2013 AEMC Partnership third dialogue held at the GE Global Research Center. This post-report presents the insights gained from plenary sessions and from working group discussions on the five public-private partnerships proposed, and provides a basis for further down-selecting to two public-private partnership concepts for discussion at the AEMC Partnership fourth dialogue on October 17, 2013 in Santa Clara, California.

I would like to recognize the generosity of Council members and participants in contributing to the success of the AEMC Partnership third dialogue. The Council thanks our dialogue co-host, Dr. Mark Little, Senior Vice President and Chief Technology Officer of General Electric and Director of GE Global

Research, as well as the co-chair for the Council's Technology Leadership and Strategy Initiative. I also am grateful to our many speakers, including the Honorable Paul Tonko of the U.S. House of Representatives; and Council Executive Committee members the Honorable Shirley Ann Jackson, President of Rensselaer Polytechnic Institute; Mr. James Phillips, Chairman and Chief Executive Officer of NanoMech, Inc.; and Dr. Kenan Sahin, Founder & President of TIAX LLC. The Council also thanks Dr. Mark Peters, Deputy Laboratory Director for Programs at Argonne National Laboratory; Dr. William Banholzer, former Chief Technology Officer, New Business Development, and Executive Vice President of The Dow Chemical Company for their speaking roles during this dialogue.

I look forward to continuing to engage leaders in industry, academia, national laboratories and government as the Council continues to capture insights and recommendations from this and future dialogues, and set forward a path of action to increase U.S. competitiveness and meet the goals of the AEMC Partnership.

Sincerely,

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.

AEMC PARTNERSHIP DIALOGUE 3

Participants

CO-HOSTS

The Honorable David T. Danielson
Assistant Secretary for Energy Efficiency and Renewable Energy
United States Department of Energy

Dr. Mark M. Little
Senior Vice President & Chief Technology Officer
General Electric -and-
Director
GE Global Research

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

DIALOGUE PARTICIPANTS

Mr. Jeffery "Jeff" Ballew
Director of Strategic Marketing
Honeywell Fluorine Products

Dr. William F. Banholzer
Chief Technology Officer,
New Business Development, and
Executive Vice President
The Dow Chemical Company

Dr. Suresh Baskaran
Chief Science and Technology Officer
Pacific Northwest National Laboratory

Dr. Craig Blue
Energy Materials Program Director
Oak Ridge National Laboratory

Mr. Nolan Browne
Managing Director
Fraunhofer CSE

Mr. Scott Cohen
Co-Founder
New Lab

Mr. Peter Christensen
Manager
Technology Commercialization
Pacific Northwest National Laboratory

Mr. Steve Derezinski
CEO
INFINIUM, Inc.

Mr. Craig Dory
Director
Business Development
Center for Automation Technologies and Systems
Rensselaer Polytechnic Institute

Dr. Glenn Eisman
Chief Technology Officer & Founder
H2Pump

Mr. Chad Evans
Executive Vice President
Council on Competitiveness

Dr. Matthew "Matt" Evans
Senior Manager
Advanced Technology
Corporate Entrepreneur & Technology
Lockheed Martin Corporation

Mr. Andrew Garman
Founder & Managing Partner
New Venture Partners LLC

Mr. Thomas C. Halbouty
Vice President, Chief Information Officer & Chief Technology Officer
Pioneer Natural Resources Company

Mr. David Hauber
Vice President of Engineering
Automated Dynamics

Mr. Rodney Heiple
Director
EPS Business Technology
Alcoa, Inc.

The Honorable Shirley Ann Jackson
President
Rensselaer Polytechnic Institute

Ms. Arianna Kalian
Senior Vice President
Operations
ClearEdge Power

Dr. Timothy Killeen
President
SUNY Research Foundation

Dr. Alex King
Director
Critical Materials Institute
Ames Laboratory

Mrs. Traute "Trudy" F. Lehner
Senior Director
Marketing and Government Affairs
Super Power

Dr. Patrick Looney
Chairman
Sustainable Energy Technologies Department
Brookhaven National Laboratory

Mr. Bernard D. Lupien
Vice President for Sales
TIAX LLC

Dr. Ajay Malshe
Founder, Executive Vice President, and Chief Technology Officer
NanoMech, Inc.

Ms. Kelly Mandarano
Communications Director
Eastman Kodak Company

Mr. Andy Marsh
President & Chief Executive Officer
Plug Power

Mr. Gavin McIntyre
Chief Scientist
Ecovative Design

Mr. John Mizroch
Senior Fellow
Council on Competitiveness

Mr. Francis J. Murray, Jr.
President & Chief Executive Officer
New York State Energy Research and Development Authority

Mr. Galen Nelson
Director of Market Development
Massachusetts Clean Energy Center

Mr. Michael Newell
Chief Executive Officer
Ener-G-Rotors

Ms. Allison Newman
Acting Vice President
Rennselaer Polytechnic Institute

Dr. Tomas Palacios
Career Development Associate & Professor of Electrical Engineering & Computer Science
Massachusetts Institute of Technology

Dr. Mark Peters
Deputy Laboratory Director
Programs
Argonne National Laboratory

Mr. James M. Phillips
Chairman & Chief Executive Officer
NanoMech, Inc.

Dr. William "Bill" Provine
Director
Science & Technology
External Affairs
DuPont

Mr. Nagesh Rao
Co-Founder & Deputy Executive Director
Made in America

Ms. Jean Redfield
President & Chief Executive Officer
NextEnergy

Mr. Ed Reinfurt
Director
NYSTAR
Empire State Development

Mr. Mike Russo
U.S. Government Relations & Regulatory Affairs
Global Foundries

Dr. Kenan E. Sahin
Founder & President
TIAX LLC

Mr. D. Scott Seaton
Vice President
Engineering R&D Division
SRI International

Dr. Prabhakar Singh
Director
Center for Clean Energy Engineering
-and-
UTC Endowed Chair Professor in Fuel Cell Technology
Department of Material Science and Engineering
University of Connecticut

Ms. Marilyn Smith
Business Liason
Office of Congressman Paul Tonko

Mr. Larry Thomas
CEO
Primet Precision Materials, Inc.

The Honorable Paul Tonko
U.S. House of Representatives

Mr. F. Michael Tucker
President & Chief Executive Officer
Center for Economic Growth

Mr. Michael Ulsh
Fuel Cell Manufacturing Project Lead
National Renewable Energy Laboratory

Ms. Elizabeth "Libby" Wayman
Director
Clean Energy Manufacturing Initiative
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy

Mr. Frank Wolak
Vice President
FuelCell Energy, Inc.

Dr. Phillip Yu
Director
Corporate Science & Technology
PPG Industries, Inc.

KEY PARTNERS

Ms. Adriana Costello-Dougherty
Special Assistant
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy

Mr. Arthur "Chip" Cotton
Program Manager, Energy R&D
GE Global Research -and-
National Operations Co-Lead
GE Veterans Network

Dr. Lynn Daniels
Technical Advisor to the Assistant Secretary
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy

Dr. Steven J. Duclos
Chief Scientist -and-
Leader
Material Systems and Nanotechnology
Advanced Technology Program
GE Global Research

Dr. Luana Iorio
Technology Leader—Manufacturing Technologies
GE Global Research

Dr. Robert "Rob" W. Ivester
Deputy Program Manager
Advanced Manufacturing Office
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy

Mr. James "Jim" Knapp
Lead Specialist
Media Relations
GE Global Research Center

Mr. Michael VanDerwerken
Business Development Operations Leader
GE Global Research

Ms. Kelly Visconti
Technology Manager
Advanced Manufacturing Office
U.S. Department of Energy

Dr. Todd Wetzel
Technology Leader—Thermal Systems
GE Global Research

COUNCIL STAFF

Mr. Michael Bush
Policy Director
Council on Competitiveness

Mr. Zachary Schafer
Senior Policy Director
Council on Competitiveness

Dr. Clara Smith
Senior Policy Director
Council on Competitiveness

AEMC PARTNERSHIP DIALOGUE 3

Agenda
August 12, 2013

EVENING

7:00 Reception

7:30 Welcoming Remarks

Dr. Mark M. Little
Senior Vice President &
Chief Technology Officer
General Electric -and-
Director
GE Global Research

7:45 Fireside Chat

Moderator

Dr. Mark M. Little
Senior Vice President &
Chief Technology Officer
General Electric -and-
Director
GE Global Research

Kick-off Discussants

Dr. Alex King
Director
Critical Materials Institute
Ames Laboratory

Mr. Francis J. Murray, Jr.
President & Chief Executive Officer
New York State Energy Research and
Development Authority

Mr. Nolan Browne
Managing Director
Fraunhofer Center for Sustainable Energy

8:30 Closing Remarks
Dr. Mark M. Little
Senior Vice President &
Chief Technology Officer
General Electric -and-
Director
GE Global Research

9:00 Reception concludes

AEMC PARTNERSHIP DIALOGUE 3

Agenda
August 13, 2013

MORNING

7:30 Registration and Light Breakfast

8:00 Welcome and Opening Remarks

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
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy

8:30 Perspectives from New York Officials

Moderator

Dr. Mark M. Little
Senior Vice President &
Chief Technology Officer
General Electric -and-
Director
GE Global Research

Speakers

The Honorable Paul Tonko
United States House of Representatives

Mr. Edward Reinfurt
Director
Division of Science, Technology and Innovation (NYSTAR)
Empire State Development

9:00 Keynote

The Honorable Shirley Ann Jackson
President
Rensselaer Polytechnic Institute

9:40 The AEMC Partnership: Purpose, Status and Trajectory

This session will describe the progress made over AEMC Partnership Dialogues 1 and 2, and provide a description of the panel topics selected for discussion. This will lead into a discussion on the interests of stakeholders in building a successful PPP with kick-off discussants from government, industry, academia, national laboratories.

Mr. Chad Evans
Executive Vice President
Council on Competitiveness

Ms. Jetta Wong
Deputy Director
Clean Energy Manufacturing Initiative
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy

9:55 Perspectives from Industry: Participating in Public-Private Partnerships

This session will describe the interests from industry in participating in public-private partnerships based on past and present collaborations in PPPs. Discussants will outline incentives and disincentives that may shape the decision-making process to engage in the specific PPPs detailed in the Dialogue 3 primer.

Moderator

Dr. Mark M. Little
Senior Vice President & Chief Technology Officer
General Electric -and- Director
GE Global Research

Kick-off Discussants

Mr. Andrew Marsh
President and Chief Executive Officer
Plug Power

Dr. William “Bill” Provine
Director
Science & Technology External Affairs
DuPont

Dr. Kenan E. Sahin
Founder & President
TIAX LLC

10:40 Overview of the Breakout Sessions

This session provides an overview of the five PPP models, detailed in the Dialogue 3 primer, that participants will evaluate in the three break-out sessions.

Mr. Chad Evans
Executive Vice President
Council on Competitiveness

10:45 Coffee Break and PPP Breakout Session Assembly

11:00 Break-out Session 1: State and Define the Purpose of the PPP

Participants will break out into five parallel sessions in which they will discuss and evaluate one of five PPP models. In this session, moderators of the five working groups will outline the suggested PPPs and highlight what barriers the PPP helps manufacturing sectors overcome. Each option will be briefly discussed so participants have an overview of the different PPP possibilities. Participants will then focus on identifying which Target Areas and Governance Structure options are most important to their organization.

Target Area: Each PPP has a suggested target area. Are these relevant to today's business and economic climate? Does the target area increase U.S. competitiveness in clean energy manufacturing?

Governance Structure: Each PPP has options suggested for structure in governance. What suggested structure or new structure best facilitates participation in the public-private partnership for SMEs, OEMs and the U.S. federal government? Does this structure best facilitate the cooperation and success of all partners?

PPP Concept 1: Innovation Exchange Fellowship Program

Moderator

Dr. Todd Wetzel
Technology Leader—Thermal Systems
GE Global Research

Facilitators

Mr. Michael Bush
Policy Director
Council on Competitiveness

Dr. Robert "Rob" W. Ivester
Deputy Program Manager
Advanced Manufacturing Office
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy

Respondent

Mr. Peter Christensen
Manager, Technology Commercialization
Pacific Northwest National Laboratory

PPP Concept 2: Leveraging the Innovation Ecosystem

Moderator

Mr. Michael VanDerwerken
Business Development Operations Leader
GE Global Research

Facilitators

Dr. Lynn Daniels
Technical Advisor to the Assistant Secretary
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy

Dr. Clara Smith
Senior Policy Director
Council on Competitiveness

Respondent

Dr. Phillip Yu
Director
Corporate Science & Technology
PPG Industries, Inc.

PPP Concept 3: Advanced Materials Characterization, Experimentation and Standardization

Moderator

Dr. Steven J. Duclos
Chief Scientist -and- Leader
Material Systems and Nanotechnology
Advanced Technology Program
GE Global Research

Facilitators

Mr. Chad Evans
Executive Vice President
Council on Competitiveness

Ms. Kelly Visconti, P.E.
Technology Manager
Advanced Manufacturing Office
U.S. Department of Energy

Respondent

Mr. D. Scott Seaton
Vice President
Engineering R&D Division
SRI International

PPP Concept 4: Facilitating the Transition of Prototypes to Deployable Products

Moderator

Mr. Arthur "Chip" Cotton
Program Manager Energy R&D
GE Global Research -and-
National Operations Co-Lead
GE Veterans Network

Facilitators

Mr. Zachary Schafer
Senior Policy Director
Council on Competitiveness

Ms. Jetta Wong
Deputy Director
Clean Energy Manufacturing Initiative
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy

Respondent

Mr. Michael Newell
Chief Executive Officer
Ener-G-Rotors

PPP Concept 5: Industrial Kickstarter and Manufacturing Marketplace

Moderator

Dr. Luana Iorio
Technology Leader—Manufacturing Technologies
GE Global Research

Facilitator

Ms. Elizabeth "Libby" Wayman
Director
Clean Energy Manufacturing Initiative
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy

Respondent

Dr. Patrick Looney
Chairman
Sustainable Energy Technologies Department
Brookhaven National Laboratory

AFTERNOON

12:00 Lunch

12:30 Luncheon Discussion: Facilitating Knowledge Spillover

This session will present "case-studies" of exchanging experts from one organization to another. PPP collaborations facilitate and increase knowledge spillover in a community. The discussion will highlight best-practices to incorporate and pitfalls to avoid when fostering collaborations.

Moderator

Ms. Elizabeth Wayman
Director
Clean Energy Manufacturing Initiative
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy

Kick-off Discussants

Dr. William F. Banholzer
Chief Technology Officer,
New Business Development, and Executive Vice President
The Dow Chemical Company

Dr. Mark Peters
Deputy Laboratory Director
Programs
Argonne National Laboratory

1:00 Break-out Session 2: What could your organization contribute to this PPP?

In this session, participants of the five working groups will discuss how each type of organization could contribute to the PPP. Participants will discuss Membership Structure and Funding options from different stakeholder perspectives.

Membership Structure: Do you see your organization participating in any of these Membership structures? Are there changes or combinations of structures that could be developed? What would you change about any of the structures so your organization would contribute?

Contribution/Funding: Each specific PPP has suggested options for funding. Which option will encourage the participation of a broad cross-section of the innovation ecosystem? Which option could produce a self-sustaining PPP in 5-10 years?

This session will open with an overview of the funding and agreement options presented for the specific PPP and open the discussion for new suggestions. Participants will converge on the best funding and agreement options for the specific PPP.

PPP Concept 1: Innovation Exchange Fellowship Program

Moderator

Dr. Todd Wetzel
Technology Leader—Thermal Systems
GE Global Research

Facilitators

Mr. Michael Bush
Policy Director
Council on Competitiveness

Dr. Robert "Rob" W. Ivester
Deputy Program Manager
Advanced Manufacturing Office
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy

Respondent

Mrs. Traute "Trudy" F. Lehner
Senior Director
Marketing and Government Affairs
Super Power

PPP Concept 2: Leveraging the Innovation Ecosystem

Moderator

Mr. Michael VanDerwerken
Business Development Operations Leader
GE Global Research

Facilitators

Dr. Lynn Daniels
Technical Advisor to the Assistant Secretary
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy

Dr. Clara Smith
Senior Policy Director
Council on Competitiveness

Respondent

Mr. James M. Phillips
Chairman & Chief Executive Officer
NanoMech, Inc.

PPP Concept 3: Advanced Materials Characterization, Experimentation and Standardization

Moderator

Dr. Steven J. Duclos
Chief Scientist -and- Leader
Material Systems and Nanotechnology
Advanced Technology Program
GE Global Research

Facilitators

Mr. Chad Evans
Executive Vice President
Council on Competitiveness

Ms. Kelly Visconti, P.E.
Technology Manager
Advanced Manufacturing Office
U.S. Department of Energy

Respondent

Mr. F. Michael Tucker
President & Chief Executive Officer
Center for Economic Growth

PPP Concept 4: Facilitating the Transition of Prototypes to Deployable Products

Moderator

Mr. Arthur "Chip" Cotton
Program Manager Energy R&D
GE Global Research -and-
National Operations Co-Lead
GE Veterans Network

Facilitators

Mr. Zachary Schafer
Senior Policy Director
Council on Competitiveness

Ms. Jetta Wong
Deputy Director
Clean Energy Manufacturing Initiative
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy

Respondent

Dr. Craig Blue
Energy Materials Program Director
Oak Ridge National Laboratory

PPP Concept 5: Industrial Kickstarter and Manufacturing Marketplace

Moderator

Dr. Luana Iorio
Technology Leader—Manufacturing Technologies
GE Global Research

Facilitators

Ms. Elizabeth "Libby" Wayman
Director
Clean Energy Manufacturing Initiative
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy

Respondent

Mr. Thomas C. Halbouty
Vice President, Chief Information Officer &
Chief Technology Officer
Pioneer Natural Resources Company

2:15 Break

2:20 Break-out Session 3: What benefits would your organization receive by participating in this PPP?

In this session, participants of the five working groups will focus on each Membership Structure option and the benefits each organization receives by participating in the PPP and suggest metrics associated with the benefit. Given the previous discussion on the resources PPP partners could contribute, this discussion should revolve around the benefits provided by SMEs, OEMs, universities, national laboratories, non-profits, and the U.S. federal government available to one joining one of the suggested Member Structures.

PPP Concept 1: Innovation Exchange Fellowship Program

Moderator

Dr. Todd Wetzel
Technology Leader—Thermal Systems
GE Global Research

Facilitators

Mr. Michael Bush
Policy Director
Council on Competitiveness

Dr. Robert "Rob" W. Ivester
Deputy Program Manager
Advanced Manufacturing Office
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy

Respondent

Mr. Mike Russo
U.S. Government Relations & Regulatory Affairs
Global Foundries

PPP Concept 2: Leveraging the Innovation Ecosystem

Moderator

Mr. Michael VanDerwerken
Business Development Operations Leader
GE Global Research

Facilitators

Dr. Lynn Daniels
Technical Advisor to the Assistant Secretary
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy

Dr. Clara Smith
Senior Policy Director
Council on Competitiveness

Respondent

Ms. Jean Redfield
President & Chief Executive Officer
NextEnergy

PPP Concept 3: Advanced Materials Characterization, Experimentation and Standardization

Moderator

Dr. Steven J. Duclos
Chief Scientist -and-
Leader, Material Systems and Nanotechnology
Advanced Technology Program
GE Global Research

Facilitators

Mr. Chad Evans
Executive Vice President
Council on Competitiveness

Ms. Kelly Visconti, P.E.
Technology Manager
Advanced Manufacturing Office
U.S. Department of Energy

Respondent

Mr. Jeffrey "Jeff" Ballew
Director of Strategic Marketing
Honeywell Fluorine Products

PPP Concept 4: Facilitating the Transition of Prototypes to Deployable Products

Moderator

Mr. Arthur "Chip" Cotton
Program Manager Energy R&D
GE Global Research -and-
National Operations Co-Lead
GE Veterans Network

Facilitators

Mr. Zachary Schafer
Senior Policy Director
Council on Competitiveness

Ms. Jetta Wong
Deputy Director
Clean Energy Manufacturing Initiative
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy

Respondent

Dr. Matthew "Matt" Evans
Senior Manager
Advanced Technology
Corporate Engineering & Technology
Lockheed Martin Corporation

PPP Concept 5: Industrial Kickstarter and Manufacturing Marketplace

Moderator

Dr. Luana Iorio
Technology Leader—Manufacturing Technologies
GE Global Research

Facilitators

Ms. Elizabeth "Libby" Wayman
Director
Clean Energy Manufacturing Initiative
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy

Respondent

Mr. Frank Wolak
Vice President
FuelCell Energy, Inc.

3:35 Coffee

4:00 Report out from Breakout Sessions

A representative from each Breakout Session will report out suggestions and decisions in two minutes for each of three breakout session topics. Discussions on each PPP model will be moderated and participants will have the opportunity to share their thoughts and assess all five PPP models presented on a form.

Moderator

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

Kick-off Discussants
Representative from Public-Private Partnerships 1-5

4:40 Closing Remarks

The Honorable Paul Tonko
United States House of Representatives

Dr. Mark M. Little
Senior Vice President &
Chief Technology Officer
General Electric -and-
Director
GE Global Research

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

5:00 Conclude

5:30 Reception

6:30 Reception Concludes

PART 1
AEMC Partnership Dialogue 3 Primer
Presenting Five Public-Private Partnership Concepts Capable of Achieving the AEMC Partnership Goals

PART 1: AEMC PARTNERSHIP DIALOGUE 3 PRIMER

Executive Summary

On August 13, 2013, on the GE Global Research Center campus in Niskayuna, New York, the Council on Competitiveness (Council) and the U.S. Department of Energy Office of Energy Efficiency and Renewable Energy (EERE) will hold the third in a series of leadership dialogues. The dialogues are taking place across the country as part of the American Energy and Manufacturing Competitiveness (AEMC) Partnership[1]; a three-year effort to bring together national leaders to address a rapidly shifting national and global energy landscape. This third dialogue continues the conversation begun during the foundational, AEMC Partnership Inaugural Dialogue in Washington, D.C., on April 11-12, 2013, and the second AEMC Partnership Dialogue at the University of Toledo in Toledo, Ohio on June 20, 2013.

For the third AEMC Partnership dialogue, the Council and EERE have partnered with GE—an iconic American business that has demonstrated success in creating innovative technologies and transitioning them into commercially deployable products. Building on more than 130 years of tradition and innovation, GE has actively engaged in public private collaborations to address challenges in clean energy and advanced manufacturing—and with more than 25 percent of the world's electricity generated using GE equipment, the Council and EERE have found an exceptional partner.

This third AEMC Partnership dialogue will bring together leaders from industry, academia, the national laboratories, government and the non-profit community. The Honorable David T. Danielson, Assistant Secretary for Energy Efficiency and Renewable Energy, U.S. Department of Energy, will lead the discussion alongside the Honorable Deborah L. Wince-Smith, President & CEO, Council on Competitiveness, and Dr. Mark Little, Senior Vice President and Chief Technology Officer of General Electric, Director of the GE Global Research Center, and the dialogue host.

The AEMC Partnership will convene a fourth regional dialogue this year hosted by Applied Materials Chairman and CEO, Mr. Michael Splinter—who also serves as the Council's Vice Chair—and Applied Materials Chief Technology Officer (CTO), Dr. Omkaram Nalamasu, in Santa Clara, California, on October 17, 2013. The first year of the AEMC Partnership will culminate in a major, first-ever, Washington D.C.-based, American Energy and Manufacturing Competitiveness Summit on December 12, 2013.

1 More information available at: http://www.compete.org/about-us/initiatives/aemcp/.

PART 1: AEMC PARTNERSHIP DIALOGUE 3 PRIMER

The American Energy and Manufacturing Competitiveness (AEMC) Partnership

The AEMC Partnership is a three-year effort by the Council and the EERE to bring together national leaders to address a rapidly shifting national and global energy and manufacturing landscape. In a series of progressive dialogues during 2013, participants are uncovering actions that can be taken now to enable America to bolster dramatically its energy, manufacturing and economic competitiveness for the coming decades and beyond. This is a new partnership formed under EERE's Clean Energy Manufacturing Initiative[1], a strategic integration of and commitment to manufacturing efforts focusing on American competitiveness in clean energy manufacturing. The goals of the AEMC Partnership are:

- Increase U.S. competitiveness in the production of clean energy products: Strategically investing in technologies that leverage American competitive advantages and overcome competitive disadvantages.
- Increase U.S. manufacturing competitiveness across the board by increasing energy productivity: Strategically investing in technologies and practices to enable U.S. manufacturers to increase their competitiveness through energy efficiency, combined heat and power, and taking advantage of low-cost, domestic energy sources.

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) to advance the AEMC Partnership goals.

The AEMC Partnership is broadly divided into two phases, the first of which has been completed as described below.

AEMC Partnership 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.

1 More information available at: http://www1.eere.energy.gov/energymanufacturing/index.html.

The literature review is documented in the Council publication, *The Power of Partnerships*, and its companion piece, *A Summary of Public-Private Partnerships*.[2] These reports provide the foundation for the AEMC Partnership and the answers to the following questions:

- 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.

As the AEMC Partnership dialogue series progresses, participants will discuss and expand on the findings in these reports.

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**

2 Both of these documents are available at http://www.compete.org/about-us/initiatives/aemcp/.

Phase Two: AEMC Partnership Dialogues

Reviewing Previous AEMC Partnership Dialogues

The second phase of the AEMC Partnership includes a total of four progressive dialogues generating new insights pertaining to the overall goals of the Partnership—as well as informing the creation of a public-private partnership model to further advance the initiative's goals. The inaugural dialogue, held in Washington, D.C., on April 11-12, 2013, laid out the objectives of the AEMC Partnership and began examining a range of PPPs. The second dialogue hosted by the University of Toledo on June 20th continued the discussions sparked during the inaugural dialogue. This dialogue used Toledo as a case study to examine how both informal and formal partnerships, leveraging materials science and engineering, can drive regional manufacturing transformation.

This third dialogue, hosted by Dr. Little at the GE Global Research Center in Niskayuna, New York, presents five specific PPP models for dialogue participants to discuss and critique to continue the process of honing in on potential PPP concepts. The focus will remain on specific technology areas and barriers/opportunities for the deployment and scaling of clean energy manufacturing in the United States.

A fourth dialogue will be hosted by Mr. Splinter and Dr. Nalamsu on October 17, 2013, in Santa Clara, California. This dialogue will focus squarely on designing the attributes of a clean energy manufacturing public-private partnership that may be presented and announced at the first annual American Energy and Manufacturing Competitiveness Summit on December 12, 2013, in Washington, D.C. Future dialogues to evaluate proposed PPP concepts and to elaborate upon success metrics will continue this conversation in 2014 and 2015—along with future, annual summits.

Summary of the Inaugural AEMC Partnership Dialogue

The inaugural dialogue convened and engaged over 100 senior leaders from industry, government, academia, labor, and the national laboratory system. Co-hosted by Ms. Wince-Smith and Dr. Danielson, the dialogue laid the foundation for future discussions by gathering input on fields in the clean energy manufacturing sector that could benefit from the creation of a public-private partnership and evaluate the benefits and challenges of different PPP structures—all with an eye toward enhancing the competitiveness of the U.S. manufacturing sector.

An important function of the inaugural dialogue was to identify, understand, and discuss the opportunities

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; Mr. Jason Miller, Special Assistant to the President for Manufacturing Policy, National Economic Council; Ms. Elizabeth Wayman, Director, Clean Energy Manufacturing Initiative, U.S. Department of Energy; and Mr. Chad Evans, Executive Vice President, Council on Competitiveness.

offered by clean energy manufacturing. Much of this exploration was intended to highlight the convergence of market forces, public interest, and private sector strategies making clean energy manufacturing compelling for public-private collaboration. In her opening remarks, Ms. Wince-Smith noted:

> *"Half of the new electricity-generating capacity installed to meet the growing global energy demand during the next 25 years is expected to come from clean energy. Furthermore, businesses, governments, and communities are embracing energy saving behaviors and technologies. These market and political forces are converging to create the national will to invest in developing, manufacturing, and deploying clean energy technologies, as well as ensuring that all industrial sectors of our economy are using energy efficiently to, in turn, drive industrial productivity."*

This quotation conveys the sense of urgency expressed at the dialogue and around the country as to the importance of developing a clean energy manufacturing strategy and increasing energy productivity broadly in the U.S. manufacturing sector. With this common understanding of the current clean energy manufacturing landscape, the AEMC Partnership tasked dialogue participants to generate ideas around two main themes:

- Leverage points in national investment in the clean energy manufacturing landscape—e.g.

foundational technologies, road mapping, standards, policy tools, supplier relationships, domestic production barriers, etc.—with the potential to produce exponential impact and competitive advantage for all manufacturing sectors; and,

- Public-private partnership models that would best use these leverage points and launch the United States ahead of international competitors.

The exceptional cross-section of industry, academic, labor, national laboratory and public sector leaders in attendance produced a robust discourse. Some key insights regarding potential leverage points and public-private partnership models from the inaugural dialogue include the following:

Insights on Potential Leverage Points

- Scaling technologies from prototypes to mass-manufactured products;
- Building a workforce that understands the challenges of scaling the production of newly created technologies in the United States;
- Developing and deploying advanced materials; and
- Diffusing tools including modeling and simulation, robotics, automation, sensor technologies, and additive manufacturing into the manufacturing sector.

Insights on Public-Private Partnership Models

- Designing the project with input from all stakeholders and with the outcome in mind greatly increases the likelihood of success;
- Shouldering the indirect cost of research facilities and equipment is a barrier to private sector participation in a PPP;

The Honorable Deborah L. Wince-Smith, President & CEO, Council on Competitiveness; Dr. Pradeep Khosla, Chancellor, University of California, San Diego; and Dr. J. Michael McQuade, Senior Vice President, Science & Technology, United Technologies Corporation.

- Facilitating the progress and success of a PPP is contingent on strong leadership by a single entity, such as a board, company, or other administrative body; and
- Creating boundaries and trust through intellectual property agreements is essential to develop an environment attractive for broad stakeholder participation.

Summary of AEMC Partnership Dialogue 2

The second AEMC Partnership dialogue convened over 40 leaders from industry, academia, and the national laboratory system. Co-hosted by Ms. Wince-Smith, Dr. Danielson and Dr. Lloyd A. Jacobs, President of the University of Toledo; this dialogue strategically developed and built on ideas generated during the inaugural dialogue into potential public-

private partnership concepts capable of driving the goals of the AEMC Partnership.

The agenda and content for this progressive dialogue follows directly from several key themes strategically culled from the inaugural dialogue, including:

- Leveraging advanced materials as a platform for energy productivity and renewable energy products;
- Overcoming the second "valley of death" to translate domestically invented products and processes into domestic manufacturing capacity; and
- Measuring the success of public-private partnerships.

The selection of the location, Toledo, Ohio, was also strategic, as was the targeted selection of participants with a deep well of experience in both public-private partnerships and the manufacturing sector. The University of Toledo—acting as an engine for regional economic development—has played a catalytic role in the transformation of Ohio's glass-centric manufacturing base into the high-tech, high valued-added solar energy cluster that exists today.

The Honorable David T. Danielson, Assistant Secretary of Energy Efficiency and Renewable Energy, U.S. Department of Energy; Dr. Lloyd A. Jacobs, President of the University of Toledo; and the Honorable Deborah L. Wince-Smith, President & CEO, Council on Competitiveness.

"Toledo and Northwest Ohio are clearly competing for the future in solar energy research and manufacturing. Seeing how this region is successfully leveraging its deep manufacturing history and technical expertise—embodied in the University of Toledo, local businesses and government—to re-emerge as a 21st century global competitor in the energy space is exciting. Applying similar transformations across the nation is exactly what the AEMC Partnership is working to achieve."

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

Dr. Jay Kim, Professor, Department of Mechanical Engineering, University of Cincinnati; Dr. Lorry Wagner, President, Lake Erie Energy Development Corporation; the Honorable Deborah L. Wince-Smith, President & CEO, Council on Competitiveness; Dr. Lloyd A. Jacobs, President of the University of Toledo; and the Honorable David T. Danielson, Assistant Secretary of Energy Efficiency and Renewable Energy, U.S. Department of Energy

With a significant contingent of Northwest Ohio business, technical, and academic leaders, this dialogue tapped into the experience of these regional leaders to inform the efforts of the AEMC Partnership.

Though the fundamental tasks of this regional conversation remained similar to the inaugural dialogue—identify nascent areas of innovation-driven strength for national investment in clean energy manufacturing and recommend PPP models to accelerate these strengths—this dialogue moved beyond the high-level ideation of the inaugural dialogue and into determining actionable outcomes in preparation for the third dialogue. Dr. Danielson implored participants to take this action-oriented approach in his opening remarks:

> *"I'm excited for this dialogue…for specific ideas, specific outcomes. I admit that we have a bias toward action. Be careful - we are likely to implement your good idea."*
>
> **The Honorable David T. Danielson**
> Assistant Secretary for Energy Efficiency and Renewable Energy, U.S. Department of Energy

Participants provided valuable suggestions and insights throughout the dialogue. They:

- Suggested several distinct PPP models;
- Quantified barriers to increasing the use of advanced materials in mass-manufacturing; of these barriers, participants elevated materials characterization and qualification as a potential target for a PPP;
- Identified institutional, practical, and administrative barriers to bridging the gap between businesses and external sources of innovation (e.g. university or national laboratories);
- Proposed moving beyond conventional funding models, potentially leveraging the philanthropic community and crowd-sourcing to broaden the base of available risk capital; and
- Articulated a need to institutionalize knowledge spillover—an essential driver of cluster development—into a PPP.

Setting the Stage for AEMC Partnership Dialogue 3

The third dialogue continues to build on, yet refine, the outcomes from the first and second dialogues. This primer presents for discussion five public-private partnerships—designed to drive the goals of the AEMC Partnership.

In preparation for this dialogue, the Council has used insights from *The Power of Partnerships*, input from clean energy manufacturing stakeholders generated in the AEMC Partnership dialogue series, and the institutional knowledge of both the Council and EERE to develop the general framework for each proposed PPP. Nonetheless, AEMC Partnership participants, stakeholders and leaders must make critical decisions regarding each of the proposed PPP concepts with the goal of converging on two or three of the five presented PPPs to advance the dialogue series to the next level of consideration and evaluation.

To achieve this goal, participants must evaluate each PPP objectively—as it relates to U.S. competitiveness in clean energy manufacturing—as well as subjectively to determine which PPP concepts are most interesting and/or beneficial to their respective organizations. Moreover, there remain decision points within each of the developed PPP frameworks. This dialogue will ask participants to provide preferred structural and organizational vision for each of the proposed PPPs.

The day will start with plenary sessions with perspectives from New York officials and industry leaders. Following these plenary sessions, participants will gather in five assigned working groups for a series of three breakout sessions. Each working group will discuss, evaluate, and score options for one of five PPP concepts detailed in the following section of the primer.

Working Groups: Breakout Session 1

In this breakout session, each working group will discuss the PPP concept presented. In particular, the topics of Target Area and Governance Structure should be reviewed in detail and the group should come to agreement on findings to be shared at the end of the day.

Working Groups: Breakout Session 2

In this breakout session, each working group will discuss how stakeholders in the innovation ecosystem can contribute to the PPP concept presented. In particular, the topics of Membership Structure and Funding/Contributions should be discussed in detail and the group should come to agreement on findings to be shared at the end of the day.

Working Groups: Breakout Session 3

In this breakout session, each working group will discuss how stakeholders in the innovation ecosystem benefit from participation in the PPP concept presented. In particular, the topics of Benefits and Metrics should be discussed in detail and the group should come to agreement on findings to be shared at the end of the day.

In addition to the Benefits and Metrics topics, the working group should conclude by analyzing the PPP concept using the provided EERE Core Statements listed on the next page. The answers to the EERE Core Statements will be instrumental in converging on two or three PPP concepts for further discussion in the AEMC Partnership.

Plenary Report Out Session

Following the breakout sessions, working groups will reconvene in a plenary session to share their findings. At this time, all participants will be able to share input on each PPP concept—including those that were not the focus of each participant's working group. This will allow participants to gauge the range of opinions, and engage in a broader conversation on narrowing and converging on two or three of the five presented PPPs for further future discussion.

EERE's 5 Core Statements

To help evaluate each PPP, participants should consider the applicability of each following statement to each PPP concept:

1. **High-Impact:** This is a high impact problem.
2. **Additionality:** EERE funding will make a large difference relative to what the private sector (and other funding entities) is doing.
3. **Openness:** This PPP concept focuses on a broad problem we are trying to solve and is open to new ideas, new approaches, and new performers.
4. **Enduring Economic Benefit:** EERE funding and participation will result in enduring economic benefit to the United States.
5. **Proper Role of Government:** EERE funding and participation represent a high-impact role of government versus something the private sector should do on its own.

PPP Concept 1: Innovation Exchange Fellowship Program

This PPP will target the development of manufacturing leadership—and the enhancement of knowledge spillover in the innovation ecosystem—by expanding the intersections and points of exchange between the private sector and U.S. national laboratories and research universities through a fellowship program. The U.S. laboratory and university research systems contain a wealth of institutional knowledge and specialized technical infrastructure capable of facilitating and accelerating research in advanced materials (as an example), the development of prototypes, and the commercialization of promising technologies. This PPP will extend the knowledge held by national laboratory and university experts to the private sector, and provide small and medium-sized enterprises (SMEs) and original equipment manufacturers (OEMs) access to public sector capabilities and equipment otherwise too expensive to maintain and operate by any one private sector company.

In this PPP, organizations will exchange and possibly host Innovation Fellows for rotations and exchanges for at least one year. At the conclusion of their deployment, Fellows will form an alumni network and continue sharing their knowledge over the long term, continuously improving communications and mutual understanding of capabilities across both the public and private sectors of the innovation ecosystem. Through the creation of an elite Corps of Innovation Fellows from this alumni network, this PPP will address specific manufacturing challenges to the development of energy efficient and clean energy technologies and materials by sharing human capital and knowledge between the nation's public institutions and private industry.

Justification

Communication is a key barrier to successful transfer of knowledge and technology between different actors in the innovation ecosystem. The imperatives that drive product development and commercialization in the private sector are different than those driving basic and early stage applied research with university or national laboratories. Moreover, there are numerous barriers that prevent successful collaborations and partnerships between the public and private sectors from developing fully. This PPP attempts to overcome these barriers by increasing connections between the different players in the innovation ecosystem.

Additionally, Fellows returning to their parent laboratory or university will bring valuable industry perspective that will inform approaches in national efforts in research and development. There are also opportunities for members of private industry to enter into a national laboratory or university research system through this Innovation Exchange Fellowship Program. This two-way interaction has the potential to create more market pull for Department of Energy (DOE)-funded technologies and to increase the commercialization of national laboratory/university intellectual property.

For the purposes of this discussion, the following definitions will be used:

Parent organization: The organization from which a prospective Fellow is currently an employee.

Host organization: The organization to which a prospective Fellow would be placed "in residence" for the duration of the fellowship.

Breakout Session 1: State and Define the Purpose of the PPP

Target Area

The target area of the Innovation Exchange Fellowship will define the scope of work supported by the PPP and affect the applications submitted for participation.

Options

1. Increasing energy efficiency in manufacturing processes, and
2. Development of clean energy manufacturing technology and materials.

Governance Structure

The governance structure defines the governing body for the PPP. The governing body chosen would appoint a committee for the selection of fellows according to mutually agreed upon guidelines.

Options

1. This PPP could be managed by the DOE/EERE.
2. This PPP could be managed by a contracted organization.
3. This PPP could be managed by a contracted organization and governed by an Executive Committee made up of selected representatives from government, the national laboratory system, the university research system, OEMs and SMEs.

PPP Evaluation Rubric: PPP Concept 1, Breakout Session 1

TARGET AREA				
1: Strongly dislike	**2: Dislike**	**3: No preference**	**4: Preferred**	**5: Strongly Preferred**
Option	**Target Area**		**Score (1-5)**	**Comments**
1	Energy efficiency in manufacturing processes			
2	Development of clean energy manufacturing technologies and materials			
GOVERNANCE STRUCTURE				
1: Strongly dislike	**2: Dislike**	**3: No preference**	**4: Preferred**	**5: Strongly Preferred**
Option	**Governance Structure**		**Score (1-5)**	**Comments**
1	Managed by DOE			
2	Contracted organization			
3	Contracted organization with Executive Committee			

Breakout Session 2: What could your organization contribute to this PPP?

Membership Structure

The membership structure defines the terms of the fellowship. Depending on the objectives of the fellowship program, time in-residence, number of private sector partners, and management of IP are all important issues. Some flexibility in time-share between the parent and host organization may be necessary for all options. A fellowship could result in a complete one-year exchange, a series of shorter-term rotations that add up to one year, or an exchange in which the fellow spends only a certain percentage of his or her time with the hosting organization. A default could be a one-year exchange where the fellow spends 100 percent of his or her time with the host. There could also be an option to renew for a second year provided all parties agree. Additionally, when a fellowship is being agreed upon, the host and parent organization will develop the IP terms of the agreement. One type of IP agreement will not be sufficient for the wide-ranging research and development opportunities that exist.

All active and former Innovation Fellows will remain integrated in the Corps of Innovation Fellows through an alumni network via a web-based platform coordinated by the Fellows' governing body. This would be a virtual information exchange where Fellows from one national laboratory, university, or company could ask about capabilities present at other organizations and bring that information back to his or her host organization, expanding the scope of national laboratory or university capabilities available to the host organizations.

Options

1. *Senior Fellowship:* Long-term, senior-level scientists from national laboratories or universities that interact with executives of their host organization. The Senior Fellow acts in a consulting capacity to the host organization, evaluating the company's R&D ideas and roadmaps and identifying lab capabilities that could be utilized. This approach provides solutions to the host organization and the potential to bring business to the lab. The Senior Fellow would also serve as a mentor to Junior Fellows.
2. *Junior Fellowship:* One- to two-year termed earlier-career scientists from national laboratories or universities that would be exchanged with SMEs generally (though also possible with larger multinational companies). The Junior Fellow would work alongside researchers at the company to develop technology solutions, while also serving in a similar consulting capacity as a Senior Fellow by identifying key laboratory capabilities that would benefit their host.
3. *Exchange Fellows:* Exchanging scientists and researchers from the private industry to the national laboratory. Mutual exchange could offset the loss of personnel for the duration of the exchange. Additionally, shorter-term exchanges or periodic rotations over the course of two years may be an alternative option.
4. *Sponsored Fellowship:* A large company could recommend one or more companies from its supply chain to house Junior Fellows from multiple national laboratories or universities, while the large company itself could host a Senior Fellow. The large company could sponsor the Junior Fellows and push its supply chain to participate in the program. The large company could also run a competition among suppliers to identify which would house a Junior Fellow.

Funding

This PPP will not likely generate income sufficient to make the program self-sustaining. There are several options to defray costs to participants.

Options

1. Each parent or host organization funds the salary and all expenses for the employee that they recommend.

PPP Evaluation Rubric: PPP Concept 1, Breakout Session 2

MEMBERSHIP STRUCTURE			
1: Strongly dislike	2: Dislike	3: No preference	4: Preferred	5: Strongly Preferred		
Option	**Membership Structure**	**Score (1-5)**	**Comments**
1	Senior Fellowship		
	Contributions from:		
	SMEs		
	OEMs		
	U.S. Government		
	Non-Profit		
	University/National Laboratories		
2	Junior Fellowship		
	Contributions from:		
	SMEs		
	OEMs		
	U.S. Government		
	Non-Profit		
	University/National Laboratories		
3	Exchange Fellowship		
	Contributions from:		
	SMEs		
	OEMs		
	U.S. Government		
	Non-Profit		
	University/National Laboratories		
4	Sponsorship Fellowship		
	Contributions from:		
	SMEs		
	OEMs		
	U.S. Government		
	Non-Profit		
	University/National Laboratories		

FUNDING			
1: Strongly dislike	2: Dislike	3: No preference	4: Preferred	5: Strongly Preferred		
Option	**Funding**	**Score (1-5)**	**Comments**
1	Parent organization funds the salary and expenses		
2	Parent organization funds the salaries, DOE funds expenses		
3	DOE and private sponsor match funds for salary and expenses		

2. Each organization funds the salary for the employee that they recommend, DOE funds a stipend to cover expenses incurred during the fellowship.
3. DOE and a private sponsor provide matching contributions to cover all expenses for the employee they recommend.

Breakout Session 3: What benefits would your organization receive by participating in this PPP?

Benefits and Metrics

An effective PPP is one that provides an enticing value proposition to each of the engaged stakeholders. For the purpose of this section, benefits are understood to be the benefits of participation to each stakeholder within the proposed PPP. These benefits may be different depending on the Membership Structure built into the partnership. Thus, it is essential to understand which Membership Structure will provided benefits to the largest number of stakeholders.

This section also prompts participants to begin thinking about success metrics. Today's need to measure success and provide accountability for investments in science and technology is not only a mandate driven by fiscal austerity, but also a necessity in the U.S. innovation-driven economy. Economic competitiveness and, in turn, national prosperity in the United States are more dependent than ever on our ability to leverage the scientific and technological advancements achieved in public and private sector laboratories across the country. As such, it is essential to understand which tools (e.g. PPPs) are most effective at this task—and this cannot be achieved without the proper metrics.

A Metrics Appendix will be distributed along with the Evaluation Rubric for this third breakout session that will include a list of possible metrics divided into three categories: short-term, medium-term and long-term. After providing a description of the value that your organization hopes to obtain from each type of fellowship, please identify the metric or metrics best able to quantify this value. Please note that the Metrics Appendix is not comprehensive; feel free to write in the optimal metric even if it is not provided in the Appendix.

EERE Core Statements

To quantify benefits to the innovation ecosystem that this PPP concept provides, each participant is asked to evaluate this PPP according to the following core statements:

1. This a high-impact problem.
2. EERE funding will make a large difference relative to what the private sector (and other funding entities) is already doing.
3. This PPP concept focuses on a broad problem we are trying to solve and is open to new ideas, new approaches, and new performers.
4. EERE funding and participation will result in enduring economic benefit to the United States.
5. EERE funding and participation will represent a proper high-impact role of government versus something best left to the private sector to do on its own.

PPP Evaluation Rubric: PPP Concept 1, Breakout Session 3

BENEFITS AND METRICS
1: Strongly dislike 2: Dislike 3: No preference 4: Preferred 5: Strongly Preferred

Option	Benefits by Membership Option	Score (1-5)	Comments	Associated Metric(s)
1	Senior Fellowship			
	Benefits to:			
	SMEs			
	OEMs			
	U.S. Government			
	Non-Profit			
	University/National Laboratories			
2	Junior Fellowship			
	Benefits to:			
	SMEs			
	OEMs			
	U.S. Government			
	Non-Profit			
	University/National Laboratories			
3	Exchange Fellowship			
	Benefits to:			
	SMEs			
	OEMs			
	U.S. Government			
	Non-Profit			
	University/National Laboratories			
4	Sponsorship Fellowship			
	Benefits to:			
	SMEs			
	OEMs			
	U.S. Government			
	Non-Profit			
	University/National Laboratories			

EERE CORE STATEMENTS
SD: Strongly Disagree D: Disagree A: Agree SA: Strongly Agree

Number	EERE Core Statements	Opinion	Comments
1	This is a high impact problem.		
2	EERE funding will make a large difference relative to what the private sector (and other funding entities) is doing.		
3	This PPP concept focuses on a broad problem we are trying to solve and is open to new ideas, new approaches, and new performers.		
4	EERE funding and participation will result in enduring economic benefit to the United States.		
5	EERE funding and participation represent a high-impact role of government versus something the private sector should do on its own.		

PPP Concept 2: Leveraging the U.S. Innovation Ecosystem

This effort will create a PPP around key national laboratory and university resources and provide manufacturers competitive user grants to reduce fees and lower barriers to use existing facilities. Accessing existing resources can help overcome high equipment cost and infrastructure barriers to the development and manufacturing of critical new energy technologies and manufacturing processes.

Justification

The network of U.S. national laboratories and research universities retain tremendous assets to facilitate the research, development, prototype, and production of advanced materials and technologies. Over the course of the AEMC Partnership dialogues, participants have frequently mentioned that assets in this network are vast, but to access them is confusing and difficult. This PPP attempts to establish framework for accessing these facilities, and provides a funding structure to lower barriers to use and cultivate access and participation of industry at all levels and stages of development.

This PPP will help manufacturers leverage national laboratory and university resources, a core foundation of the U.S. innovation infrastructure, to determine solutions to R&D and manufacturing challenges. This access will have the added benefit of increasing knowledge spillover and awareness and interaction with national laboratories and their facilities among industry. For the public sector, this PPP may also have the added benefit of increasing private sector participation with and funding of public institutions through fee-for-service activities and continued use after the conclusion of PPP-funded projects. This will help increase spillover knowledge and provide for a more robust and innovative manufacturing sector.

Breakout Session 1: State and Define the Purpose of the PPP

Target Area

The target area of the Leveraging the Innovation Ecosystem PPP will define the scope of work supported by the PPP and affect the applications submitted for participation. The target area of this PPP will focus the primary direction of the effort.

Options

1. Increasing energy efficiency in manufacturing processes, and
2. Development of clean energy manufacturing technology and materials.

Governance Structure

The governance structure defines the governing body for the PPP. The governing body chosen would decide upon the level of detail to be covered in this effort and manage the participants and ensure goals are being met throughout the agreed upon period of time.

Options

1. This PPP could be managed by the DOE/EERE.
2. This PPP could be bid and awarded to a contracted organization.
3. This PPP could be bid and awarded to a contracted organization. The contracted organization could manage the PPP and be governed by an Executive Committee made up of selected representatives from government, the national laboratory system, the university research system, OEMs and SMEs.

PPP Evaluation Rubric: PPP Concept 2, Breakout Session 1

TARGET AREA				
1: Strongly dislike	**2: Dislike**	**3: No preference**	**4: Preferred**	**5: Strongly Preferred**
Option	**Target Area**	**Score (1-5)**	**Comments**	
1	Energy efficiency in manufacturing processes			
2	Development of clean energy manufacturing technologies and materials			
GOVERNANCE STRUCTURE				
1: Strongly dislike	**2: Dislike**	**3: No preference**	**4: Preferred**	**5: Strongly Preferred**
Option	**Governance Structure**	**Score (1-5)**	**Comments**	
1	Managed by DOE			
2	Contracted organization			
3	Contracted organization with Executive Committee			

Breakout Session 2: What could your organization contribute to this PPP?

Membership Structure

The membership structure defines the workflow of the PPP.

Options

1. *Governing Board:* This effort will create a PPP around key national laboratory and university resources, to be selected by the governing board of the PPP and made available to manufacturers through competitive user grants. The board of the PPP will be comprised of representatives of a range of private sector manufacturers from small companies to large companies, and new companies in pre-manufacturing stages, as well as representatives from government, the national laboratory system, and the university research system. The board would select key topics for the user grants each year, and identify key resources required to address those topics. The private sector would contribute its perspective on priority areas; the national laboratory and university representatives would identify facilities, resources, and expertise that could be relevant and critical to these priorities; and the public sector representatives would provide their perspective on priorities of the federal government and can serve a coordination function. The board would then select recipients of the user grants based on a collaboratively developed set of criteria.
2. *Tiers:* This PPP would be structured as a broader membership package with several tiers, combining multiple concepts (including, for example, the Innovation Fellows program) for how to better leverage university and DOE's national laboratory system assets. In this tiered structure, a member could sign up, create a profile identifying their own equipment, capabilities and expertise, and agree to participate in one or more elements of the PPP, including funding or in-kind commitments. Participants would gain access to, or be reimbursed for sharing resources, skills and expertise across the partnering organizations. Tiers would be determined by the level of support, and would afford increasing levels of access. Examples of tiers and the access granted by each could include:
   - Tier 1: ($20K) Participate in a 50/50 cost-share technology collaboration grant to conduct a short-term project or task at a national laboratory.
   - Tier 2: ($50K) Directly support development of tools (or fund personnel to run an internal program) to translate national laboratory capabilities or drive suppliers to use the capabilities, by proactively connecting them to relevant laboratory points of contact, or combinations of the above.
   - Tier 3: ($200K) House a number of Innovation Fellows, or exchange a number of Fellows between your company and a national laboratory, or combinations of the above.
   - Tier 4: ($500K) Sponsor a number of suppliers to use the products of the PPP and fund their time on laboratory equipment, or combinations of the above.

- Tier 5: ($1,000K) Support the tool or products, House a number of Fellows, and sponsor a number of suppliers, or combinations of the above.

3. *Innovative Suppliers:* Large corporate partners in this PPP could leverage their supplier networks. These companies could provide funding to cover the cost of their suppliers to access laboratory equipment. Additionally, the broad advertising reach and capacity of larger companies could be utilized to disseminate the products of this PPP throughout their supply chain, and thus generate a return to the large manufacturer. This promotion from innovation leaders in the private sector would serve to increase demand for the laboratory resources and benefit the company through a more innovative, efficient supply chain.
4. *Vouchers:* DOE could use mechanisms similar to the SunShot Bridging Research Interactions through collaborative Development Grants in Energy (BRIDGE) Funding Opportunity Announcement (FOA) that required applicants to identify a technologist who has never worked with the laboratories and partner them with a laboratory for an R&D project. DOE could work with the national laboratories ahead of time to determine what resources they have that could help solve specific technological challenges related to the FOA topic area. Resources would then be highlighted in the FOA to provide greater visibility to those resources.

Funding

This PPP will not likely generate income in a manner which will make the program self-sustaining. There are several options to defray costs to participants.

Options

1. DOE provides funding for the development of the selected membership structure and associated projects.
2. Governing Board members, including EERE, will seed the development of the selected membership structure and associated projects.
3. Large companies sponsor and fund work for companies in their supply chain to work with national laboratories.
4. DOE provides vouchers or grants to work with the national laboratories on specific projects, as specified by the selected membership structure. Funding would be determined and allocated on a case-by-case basis depending on the nature and scope of the specific research project being proposed.

PPP Evaluation Rubric: PPP Concept 2, Breakout Session 2

MEMBERSHIP STRUCTURE			
1: Strongly dislike	2: Dislike	3: No preference	4: Preferred	5: Strongly Preferred			
Option	**Membership Structure**	**Score (1-5)**	**Comments**
1	Governing Board		
	Contributions from:		
	SMEs		
	OEMs		
	U.S. Government		
	Non-Profit		
	University/National Laboratories		
2	Tiers		
	Contributions from:		
	SMEs		
	OEMs		
	U.S. Government		
	Non-Profit		
	University/National Laboratories		
3	Innovative Suppliers		
	Contributions from:		
	SMEs		
	OEMs		
	U.S. Government		
	Non-Profit		
	University/National Laboratories		
4	Vouchers		
	Contributions from:		
	SMEs		
	OEMs		
	U.S. Government		
	Non-Profit		
	University/National Laboratories		

FUNDING			
1: Strongly dislike	2: Dislike	3: No preference	4: Preferred	5: Strongly Preferred			
Option	**Funding**	**Score (1-5)**	**Comments**
1	DOE provides funding		
2	Governing Board, with EERE, seeds development and projects		
3	OEMs fund suppliers		
4	DOE provides vouchers		

Breakout Session 3: What benefits would your organization receive by participating in this PPP?

Benefits and Metrics

An effective PPP is one that provides an enticing value proposition to each of the engaged stakeholders. For the purpose of this section, benefits are understood to be the benefits of participation to each stakeholder within the proposed PPP. These benefits may be different depending on the Membership Structure built into the partnership. Thus, it is essential to understand which Membership Structure will provided benefits to the largest number of stakeholders.

This section also prompts participants to begin thinking about success metrics. Today's need to measure success and provide accountability for investments in science and technology is not only a mandate driven by fiscal austerity, but also a necessity in the U.S. innovation-driven economy. Economic competitiveness and, in turn, national prosperity in the United States are more dependent than ever on our ability to leverage the scientific and technological advancements achieved in public and private sector laboratories across the country. As such, it is essential to understand which tools (e.g. PPPs) are most effective at this task—and this cannot be achieved without the proper metrics.

A Metrics Appendix will be distributed along with the Evaluation Rubric for this third breakout session that will include a list of possible metrics divided into three categories: short-term, medium-term and long-term. After providing a description of the value that your organization hopes to obtain from each type of fellowship, please identify the metric or metrics best able to quantify this value. Please note that the Metrics Appendix is not comprehensive; feel free to write in the optimal metric even if it is not provided in the Appendix.

EERE Core Statements

To quantify benefits to the innovation ecosystem that this PPP concept provides, each participant is asked to evaluate this PPP according to the following core statements:

1. This is a high-impact problem.
2. EERE funding will make a large difference relative to what the private sector (and other funding entities) is already doing.
3. This PPP concept focuses on a broad problem we are trying to solve and is open to new ideas, new approaches, and new performers.
4. EERE funding and participation will result in enduring economic benefit to the United States.
5. EERE funding and participation will represent a proper high-impact role of government versus something best left to the private sector to do on its own.

PPP Evaluation Rubric: PPP Concept 2, Breakout Session 3

BENEFITS AND METRICS
1: Strongly dislike 2: Dislike 3: No preference 4: Preferred 5: Strongly Preferred

Option	Benefits by Membership Option	Score (1-5)	Comments	Associated Metric(s)
1	Governing Board			
	Benefits to:			
	SMEs			
	OEMs			
	U.S. Government			
	Non-Profit			
	University/National Laboratories			
2	Tiers			
	Benefits to:			
	SMEs			
	OEMs			
	U.S. Government			
	Non-Profit			
	University/National Laboratories			
3	Innovative Suppliers			
	Benefits to:			
	SMEs			
	OEMs			
	U.S. Government			
	Non-Profit			
	University/National Laboratories			
4	Vouchers			
	Benefits to:			
	SMEs			
	OEMs			
	U.S. Government			
	Non-Profit			
	University/National Laboratories			

EERE CORE STATEMENTS
SD: Strongly Disagree D: Disagree A: Agree SA: Strongly Agree

Number	EERE Core Statements	Opinion	Comments
1	This is a high impact problem.		
2	EERE funding will make a large difference relative to what the private sector (and other funding entities) is doing.		
3	This PPP concept focuses on a broad problem we are trying to solve and is open to new ideas, new approaches, and new performers.		
4	EERE funding and participation will result in enduring economic benefit to the United States.		
5	EERE funding and participation represent a high-impact role of government versus something the private sector should do on its own.		

PPP Concept 3: Advanced Materials Characterization, Experimentation, and Standardization

Advanced materials are a cross-cutting and enabling factor in many energy and manufacturing technologies. This PPP will address materials whose inventors have already proven the technical viability and utility of a material, produced small quantities of it, and are ready to take the first steps toward commercialization, characterization, testing in experiments and creation of standards. The PPP will ensure new materials function reliably and predictably before integration into new technologies and systems.

Justification

The market has failed to provide an adequate mechanism to cost-effectively qualify, characterize, and create standards for new materials—key precursors to the deployment of advanced materials in products. SMEs and entrepreneurs rarely have the capital or infrastructure to qualify materials on their own, and OEMs have been reluctant to fund the characterization of unproven materials. Overcoming this roadblock is necessary to accelerate the transition of fundamental materials research conducted by our national laboratories, research universities, OEMs and SMEs into profitable, commercially deployable, high-impact products. Participants at the first two AEMC Partnership dialogues stressed the need for and potential high impact of such an entity to target materials including carbon fiber, solar energy applications, catalysis, power electronics, and batteries.

This PPP would benefit the industrial and materials space by providing a central mechanism for SMEs and OEMs to access equipment and expertise normally either too dispersed across the innovation ecosystem, or financially out of reach for many smaller firms and entrepreneurs. Additional benefits could be captured by aligning this PPP with existing federal priorities. This PPP could serve to raise awareness in the private sector of public sector capabilities and resources, promoting increased collaboration and knowledge spillover between the public and private sector.

Breakout Session 1: State and Define the Purpose of the PPP

Target Area

The target area for the Advanced Materials Characterization, Experimentation, and Standardization PPP will define the scope of work supported by the PPP and affect the applications submitted for participation.

Options

1. Reducing processing time for advanced materials in current technologies.
2. Qualifying advanced materials for applications in current technologies.
3. Reducing the energy intensity and production cost of existing advanced materials.

Governance Structure

The governance structure defines the governing body for the PPP. The governing body chosen would appoint a committee for the selection of projects, equipment, and people to be acquired and supported by the PPP according to mutually agreed upon guidelines.

Options

1. This PPP could be governed and managed by the DOE/EERE.
2. This PPP could be governed and managed by a contracted organization.
3. This PPP could be managed by a contracted organization and governed by an Executive Committee made up of selected representatives from government, the national laboratory system, the university research system, OEMs and SMEs.

PPP Evaluation Rubric: PPP Concept 3, Breakout Session 1

TARGET AREA			
1: Strongly dislike	2: Dislike	3: No preference	4: Preferred	5: Strongly Preferred
Option	**Target Area**	**Score (1-5)**	**Comments**
1	Reducing processing time for advanced materials		
2	Qualifying advanced materials		
3	Reducing energy intensity and production costs of advanced materials		

GOVERNANCE STRUCTURE			
1: Strongly dislike	2: Dislike	3: No preference	4: Preferred	5: Strongly Preferred
Option	**Governance Structure**	**Score (1-5)**	**Comments**
1	Managed by DOE		
2	Contracted organization		
3	Contracted organization with Executive Committee		

Breakout Session 2: What could your organization contribute to this PPP?

Membership Structure

The membership structure defines the workflow of the PPP and the method for partners to access capabilities and expertise fostered by the PPP.

Options

1. *Facility:* This PPP would consist of a brick and mortar facility to house an organization that could leverage scientific equipment and resources for material sciences. This facility would contain several discrete laboratories with relevant manufacturing, testing, and demonstration equipment, including equipment for fatigue testing, temperature performance testing, degradation, etc. Each laboratory section would be a private, secure environment, with access restricted to protect intellectual property and sensitive information on product development. The facility could be staffed by a core group of materials scientists and testing and characterization experts, and could be supplemented on an as-needed basis, drawing in relevant experts from the national laboratories and the university system. This platform could be combined with and leverage other PPP concepts, such as innovation exchange fellows, to bring together experts from the public and private sector at a single location with specialized equipment and resources. Partners in the PPP could pay a fee to access the equipment of the facility by contracting with the facility scientists to complete a task or reach a goal for an agreed upon fee. A fee schedule will be outlined by the governing body. Members of the PPP could also pay a fee for a period of time (1 year, 3 years, etc.) to access the expertise and capabilities in the PPP. This could also be structured in tiers where greater interaction in research is gained for higher fees.

2. *Materials Advisory Consortium:* This PPP would serve an advisory capacity to inform future R&D pathways and approaches for DOE EERE. The materials space is a very well-funded area in terms of federal research dollars, although in recent years the focus has shifted toward next-generation materials and away from traditional materials such as glass, steel, aluminum, and materials mining. Care must be taken to avoid duplication of existing efforts and to ensure that products add value to the private sector. There is significant ongoing work at EERE and other federal agencies in the materials space; this PPP could provide valuable private sector perspective and input that would serve to guide and shape materials roadmaps for federal R&D programs. This could include identifying laboratory equipment for characterization; road mapping for material categories; development of reference data for materials properties; and EERE investment strategies.
3. *Energy Materials Prize:* EERE and a manufacturing industry association could develop a prize that would identify a "dream material" with specific properties for a particular application as well as the amount of the material that needs to be produced (perhaps at a given cost). At the end of the prize period, or whenever the conditions of the competition are met, a designated sum of money would be awarded either to the company or individual that (a) produces the material at quantity with the desired properties or (b) has the greatest percentage improvement in material over the prize period or (c) comes closest to the "dream" material.

Funding

This PPP could ultimately generate sufficient funds to become self-supporting. A public investment could increase the incentives for participation by both public and private sector organizations, and could play a catalytic role in seeding the partnership.

Options

1. *EERE Cost-Share:* DOE provides initial 50/50 cost-share with an organization to fund the development and construction of a facility that an organization maintains and operates. Once in full operation, operating costs are not covered by DOE but by member organizations or through fee-for-service activities. Where appropriate, members could provide equipment and/or donate expertise in lieu of or to complement investment capital.
2. *Founding Partners:* Founding partners contribute the initial investment for the instantiation of the PPP. Once in full operation, DOE covers some fraction of operating costs with the remainder covered by membership fees or through fee-for-service activities.
3. *Sponsored/Subsidized Membership:* Several dialogue participants have noted that access to PPPs has the greatest value for SMEs, who are also least able to set aside funds or time to participate. To better facilitate SME participation, their membership fees or fee-for-service could be subsidized by their affiliated OEMs or by DOE support.
4. *Membership Fee:* Partners pay a fee for a period of time (1 year, 3 years, etc.) to be a part of the consortium that develops the road maps and sets the standards, and to access the expertise and capabilities in the PPP. This could also be structured in tiers where greater interaction in research is gained for higher fees.
5. *DOE Vouchers/Grants:* DOE provides vouchers or grants for the prize.

PPP Evaluation Rubric: PPP Concept 3, Breakout Session 2

MEMBERSHIP STRUCTURE			
1: Strongly dislike	2: Dislike	3: No preference	4: Preferred	5: Strongly Preferred		
Option	**Membership Structure**	**Score (1-5)**	**Comments**
1	Facility		
	Contributions from:		
	SMEs		
	OEMs		
	U.S. Government		
	Non-Profit		
	University/National Laboratories		
2	Materials Advisory Consortium		
	Contributions from:		
	SMEs		
	OEMs		
	U.S. Government		
	Non-Profit		
	University/National Laboratories		
3	Energy Materials Prize		
	Contributions from:		
	SMEs		
	OEMs		
	U.S. Government		
	Non-Profit		
	University/National Laboratories		

FUNDING			
1: Strongly dislike	2: Dislike	3: No preference	4: Preferred	5: Strongly Preferred		
Option	**Funding**	**Score (1-5)**	**Comments**
1	EERE Cost-Share		
2	Founding Partners		
3	Sponsored/Subsidized Membership		
4	Membership Fee		
5	DOE Vouchers/Grants		

Breakout Session 3: What benefits would your organization receive by participating in this PPP?

Benefits and Metrics

An effective PPP is one that provides an enticing value proposition to each of the engaged stakeholders. For the purpose of this section, benefits are understood to be the benefits of participation to each stakeholder within the proposed PPP. These benefits may be different depending on the Membership Structure built into the partnership. Thus, it is essential to understand which Membership Structure will provided benefits to the largest number of stakeholders.

This section also prompts participants to begin thinking about success metrics. Today's need to measure success and provide accountability for investments in science and technology is not only a mandate driven by fiscal austerity, but also a necessity in the U.S. innovation-driven economy. Economic competitiveness and, in turn, national prosperity in the United States are more dependent than ever on our ability to leverage the scientific and technological advancements achieved in public and private sector laboratories across the country. As such, it is essential to understand which tools (e.g. PPPs) are most effective at this task—and this cannot be achieved without the proper metrics.

A Metrics Appendix will be distributed along with the Evaluation Rubric for this third breakout session that will include a list of possible metrics divided into three categories: short-term, medium-term and long-term. After providing a description of the value that your organization hopes to obtain from each type of fellowship, please identify the metric or metrics best able to quantify this value. Please note that the Metrics Appendix is not comprehensive; feel free to write in the optimal metric even if it is not provided in the Appendix.

EERE Core Statements

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1. This is a high-impact problem.
2. EERE funding will make a large difference relative to what the private sector (and other funding entities) is already doing.
3. This PPP concept focuses on a broad problem we are trying to solve and is open to new ideas, new approaches, and new performers.
4. EERE funding and participation will result in enduring economic benefit to the United States.
5. EERE funding and participation will represent a proper high-impact role of government versus something best left to the private sector to do on its own.

PPP Evaluation Rubric: PPP Concept 3, Breakout Session 3

BENEFITS AND METRICS

1: Strongly dislike 2: Dislike 3: No preference 4: Preferred 5: Strongly Preferred

Option	Benefits by Membership Option	Score (1-5)	Comments	Associated Metric(s)
1	Facility			
	Benefits to:			
	SMEs			
	OEMs			
	U.S. Government			
	Non-Profit			
	University/National Laboratories			
2	Materials Advisory Committee			
	Benefits to:			
	SMEs			
	OEMs			
	U.S. Government			
	Non-Profit			
	University/National Laboratories			
3	Energy Materials Prize			
	Benefits to:			
	SMEs			
	OEMs			
	U.S. Government			
	Non-Profit			
	University/National Laboratories			

EERE CORE STATEMENTS

SD: Strongly Disagree D: Disagree A: Agree SA: Strongly Agree

Number	EERE Core Statements	Opinion	Comments
1	This is a high impact problem.		
2	EERE funding will make a large difference relative to what the private sector (and other funding entities) is doing.		
3	This PPP concept focuses on a broad problem we are trying to solve and is open to new ideas, new approaches, and new performers.		
4	EERE funding and participation will result in enduring economic benefit to the United States.		
5	EERE funding and participation represent a high-impact role of government versus something the private sector should do on its own.		

PPP Concept 4: Facilitating the Transition of Prototypes to Deployable Products

This "match-making" PPP will facilitate the connection of manufacturers and technology developers to manufacturing tools, equipment, services and expertise needed to move prototypes and ideas to scalable products. Focused on providing knowledge to improve the ability to mass-manufacture demonstrated prototypes, the PPP will facilitate the graduation of prototypes to products ready for mass manufacturing. It will function to improve communication and transparency into the private sector—providing a mechanism for innovators and researchers to find the resources needed to help re-design products for mass manufacturing and prepare products for the commercial market.

Justification

The transition of prototypes to deployable products marks the second of two traditional valleys of death in the technology innovation cycle. Without expertise, infrastructure and capital to scale production of a new technology, prototypes can be stranded—unable to make the transition to a commercially deployable product. Feedback from the participants at the first two AEMC Partnership dialogues has defined a gap in this transition that inhibits promising new technologies from reaching the market. By creating and raising awareness about methods to facilitate this transition, more viable technologies will traverse the second traditional valley of death. Such match-making services could lead to more domestic sourcing of components or materials and, by physically or virtually pulling capabilities from multiple industries together it will create opportunities for cross-fertilization of ideas from one sector to another. This takes advantage of inherent strengths in the U.S. manufacturing sector to promote cost-effective, domestic manufacturing in clean energy manufacturing. This will increase U.S. manufacturing competitiveness—encouraging knowledge spillover and increased innovation in the manufacturing sector. Ultimately, this will lower the risk of developing new technologies and accelerate the timeline of domestic innovation.

Breakout Session 1: State and Define the Purpose of the PPP

Target Area

The target area of the Facilitating the Transition of Prototypes to Deployable Products PPP will define the scope of work supported by the PPP and affect the applications submitted for participation.

Options

1. Technologies increasing energy efficiency in manufacturing processes, and
2. Technologies increasing the production of clean energy products.

Governance Structure

The governance structure defines the governing body for the PPP. The governing body chosen would appoint a committee for the selection of fellows according to mutually agreed upon guidelines.

Options

1. This could be managed by the DOE/EERE.
2. This could be managed by a contracted organization.
3. This could be managed by a contracted organization and governed by an Executive Committee made up of selected representatives from government, the national laboratory system, the university research system, OEMs and SMEs.

PPP Evaluation Rubric: PPP Concept 4, Breakout Session 1

TARGET AREA				
1: Strongly dislike	2: Dislike	3: No preference	4: Preferred	5: Strongly Preferred
Option	**Target Area**	**Score (1-5)**	**Comments**	
1	Technologies increasing energy efficiency in manufacturing processes			
2	Technologies increasing the production of clean energy products			

GOVERNANCE STRUCTURE				
1: Strongly dislike	2: Dislike	3: No preference	4: Preferred	5: Strongly Preferred
Option	**Governance Structure**	**Score (1-5)**	**Comments**	
1	Managed by DOE			
2	Contracted organization			
3	Contracted organization with Executive Committee			

Breakout Session 2: What could your organization contribute to this PPP?

Membership Structure

The membership structure defines the workflow of the PPP and the method for partners to access capabilities and expertise fostered by the PPP.

Options

1. *National Tools and Services:* This national organization/consortium could develop specific match-making tools and services through which companies could create a profile with relevant points of contact and advertise their capabilities, equipment, or needs. Essentially, this platform would be a one-stop-shop for manufacturers trying to find information for technical assistance in the area of clean energy manufacturing. For example, companies could identify:
   - Other companies or universities with complementary capabilities to partner with when applying to DOE Funding Opportunity Announcements;
   - Appropriate federal or state agency points of contact or local and regional economic development organizations for particular services or assistance; or
   - Suppliers, parts, or resources to conduct R&D.

   This PPP could also potentially involve an ongoing analytical component intended to compile catalogues of resources, capabilities, and existing private-sector matchmaking services with the goal of identifying and filling any revealed gaps. The tool or service, potentially virtual, would be user-friendly and require full-time staff to maintain and respond to users.

2. *Innovative Machine Shop:* This PPP would operate and maintain a brick-and-mortar facility with access to manufacturing and analytical equipment, along with experts to help technology innovators re-design and prepare new products for mass-manufacturing. This would be focused on providing interested SMEs access to equipment that they may not be able to afford on their own. Large companies could sponsor SMEs in their supply chain to use or access this facility or the equipment. There is a strong benefit to OEMs who are able to better understand SME needs and in turn strengthen their own supplier network.
3. *Regional Innovation Enhancements:* This PPP is focused on bolstering existing state and regional assistance providers. These local networks provide a full suite of assistance to SMEs and are aware of the needs of their region. State funding has significantly reduced in recent years and PPP funding could help sustain these organizations via seed grants to focus their services on needs identified by the PPP. This PPP could also connect assistance providers into a national network to better identify core capabilities that do not exist within their region.

Funding

The Department of Energy will provide the initial investment for the instantiation of any of the PPPs with a 50/50 cost-share with the private sector. Once in full operation there would be several options for defray costs to participants.

Options

1. *Fee-for-Service:* Partners in the PPP sign a contract with potential members to complete a task or reach a goal for an agreed upon fee. A fee schedule will be outlined by the governing body.
2. *Membership Fee:* Partners pay a fee for a period of time (1 year, 3 years, etc.) to access the expertise and capabilities in the PPP. This could also be structured in tiers where greater interaction in research is gained for higher fees.
3. *Sponsored/Subsidized Membership:* Several people have remarked that access to PPPs has the greatest value for SMEs but they have the most difficult time setting aside funds or time to participate. To better facilitate SME participation, their membership fees or fee-for-service could be subsidized by their affiliated OEMs or by DOE support.
4. *In-Kind Contribution:* In lieu of a membership fee, partners in the PPP can contribute resources—equipment, hardware, software, personnel, etc.—with a value equal to or in excess of the membership fee.

PPP Evaluation Rubric: PPP Concept 4, Breakout Session 2

MEMBERSHIP STRUCTURE			
1: Strongly dislike	2: Dislike	3: No preference	4: Preferred	5: Strongly Preferred		
Option	**Membership Structure**	**Score (1-5)**	**Comments**
1	National Tools & Services		
	Contributions from:		
	SMEs		
	OEMs		
	U.S. Government		
	Non-Profit		
	University/National Laboratories		
2	Innovative Machine Shop		
	Contributions from:		
	SMEs		
	OEMs		
	U.S. Government		
	Non-Profit		
	University/National Laboratories		
3	Region Innovation Enhancements		
	Contributions from:		
	SMEs		
	OEMs		
	U.S. Government		
	Non-Profit		
	University/National Laboratories		

FUNDING			
1: Strongly dislike	2: Dislike	3: No preference	4: Preferred	5: Strongly Preferred		
Option	**Funding**	**Score (1-5)**	**Comments**
1	Fee-for-Service		
2	Membership Fee		
3	Sponsored/Subsidized Membership		
4	In-Kind Contributions		

Breakout Session 3: What benefits would your organization receive by participating in this PPP?

Benefits and Metrics

An effective PPP is one that provides an enticing value proposition to each of the engaged stakeholders. For the purpose of this section, benefits are understood to be the benefits of participation to each stakeholder within the proposed PPP. These benefits may be different depending on the Membership Structure built into the partnership. Thus, it is essential to understand which Membership Structure will provided benefits to the largest number of stakeholders.

This section also prompts participants to begin thinking about success metrics. Today's need to measure success and provide accountability for investments in science and technology is not only a mandate driven by fiscal austerity, but also a necessity in the U.S. innovation-driven economy. Economic competitiveness and, in turn, national prosperity in the United States are more dependent than ever on our ability to leverage the scientific and technological advancements achieved in public and private sector laboratories across the country. As such, it is essential to understand which tools (e.g. PPPs) are most effective at this task—and this cannot be achieved without the proper metrics.

A Metrics Appendix will be distributed along with the Evaluation Rubric for this third breakout session that will include a list of possible metrics divided into three categories: short-term, medium-term and long-term. After providing a description of the value that your organization hopes to obtain from each type of fellowship, please identify the metric or metrics best able to quantify this value. Please note that the Metrics Appendix is not comprehensive; feel free to write in the optimal metric even if it is not provided in the Appendix.

EERE Core Statements

To quantify benefits to the innovation ecosystem that this PPP concept provides, each participant is asked to evaluate this PPP according to the following core statements:

1. This is a high-impact problem.
2. EERE funding will make a large difference relative to what the private sector (and other funding entities) is already doing.
3. This PPP concept focuses on a broad problem we are trying to solve and is open to new ideas, new approaches, and new performers.
4. EERE funding and participation will result in enduring economic benefit to the United States.
5. EERE funding and participation will represent a proper high-impact role of government versus something best left to the private sector to do on its own.

PPP Evaluation Rubric: PPP Concept 4, Breakout Session 3

BENEFITS AND METRICS 1: Strongly dislike 2: Dislike 3: No preference 4: Preferred 5: Strongly Preferred				
Option	**Benefits by Membership Option**	**Score (1-5)**	**Comments**	**Associated Metric(s)**
1	National Tools & Services			
	Benefits to:			
	SMEs			
	OEMs			
	U.S. Government			
	Non-Profit			
	University/National Laboratories			
2	Innovative Machine Shop			
	Benefits to:			
	SMEs			
	OEMs			
	U.S. Government			
	Non-Profit			
	University/National Laboratories			
3	Regional Innovation Enhancements			
	Benefits to:			
	SMEs			
	OEMs			
	U.S. Government			
	Non-Profit			
	University/National Laboratories			

EERE CORE STATEMENTS SD: Strongly Disagree D: Disagree A: Agree SA: Strongly Agree			
Number	**EERE Core Statements**	**Opinion**	**Comments**
1	This is a high impact problem.		
2	EERE funding will make a large difference relative to what the private sector (and other funding entities) is doing.		
3	This PPP concept focuses on a broad problem we are trying to solve and is open to new ideas, new approaches, and new performers.		
4	EERE funding and participation will result in enduring economic benefit to the United States.		
5	EERE funding and participation represent a high-impact role of government versus something the private sector should do on its own.		

PPP Concept 5: Industrial Kickstarter and Manufacturing Marketplace

This PPP will target access to risk-tolerant investment capital—a critical barrier to commercialization of new and unproven products in the marketplace. Over the course of the first two dialogues, attendees recommended the exploration of an industrial "kickstarter" capable of bringing together investors, entrepreneurs and manufacturers to front-fund and crowd-fund promising new technologies. The Industrial Kickstarter would be a web-based portal platform where manufacturers can post product designs before they are physically available. Manufacturers with specific R&D needs could post informal Requests for Information (RFIs) or Requests for Proposals (RFPs) to entrepreneurs and other firms with relevant skills and expertise, while manufacturers with complete, ready-to-scale products could present a funding request for potential investors. Investors would be able to make micro-investments in a specific manufacturing scale-up project in exchange for anything the manufacturer wants to "sell"—from advance products to equity to token products for donation.

To boost visibility, an initial business plan competition would create initial investment from founding partners, committing to fund the winners of a competition, but potentially generating even greater investment in both winners and non-winners through launching a crowd-funding platform.

Justification

Too often, firms—especially SMEs—have successfully prototyped new technologies but are unable to locate resources to bring it to market. The market has failed to provide a bridge to help new technologies cross this valley of death. The absence of a mechanism like a Kickstarter to attract investors, and distribute risk is a ripe opportunity for public sector engagement to enable private investment and capital deployment.

Likewise, many manufacturers face challenges identifying the best resources, skills, and potential contractors to bridge knowledge gaps and resolve development and scaling issues. Many times, the most innovative and cost-effective solution may be sourced from external firms or entrepreneurs, but few trusted portals exist to advertise needs and match them with capabilities. In concert with the Kickstarter crowd-funding platform, a manufacturing marketplace portal for crowd-problem solving would lower this critical barrier.

Breakout Session 1: State and Define the Purpose of the PPP

Target Area

The target area of this PPP is to increase access to capital and problem-solving resources to scale innovative clean technology and energy efficiency products. This PPP would address this area by creating an online platform to facilitate crowd-funding and crowd-problem solving of manufacturing scale-up needs.

Options

1. Clean energy manufacturing technologies, and
2. Efficiency and competitiveness of manufacturing processes.

Governance Structure

The governance structure defines the governing body for the PPP. The governing body chosen would appoint a committee to design and operate the portal and to create mechanisms to select projects, according to mutually agreed upon guidelines.

Options

1. This PPP could be managed by DOE/EERE.
2. This PPP could be initially managed by DOE but operated by a Steering Committee of Founding Members.
4. This could be managed by a contracted organization and governed by an Executive Committee made up of selected representatives from government, the national laboratory system, the university research system, OEMs and SMEs.

PPP Evaluation Rubric: PPP Concept 5, Breakout Session 1

TARGET AREA				
1: Strongly dislike	2: Dislike	3: No preference	4: Preferred	5: Strongly Preferred
Option	**Target Area**		**Score (1-5)**	**Comments**
1	Clean Energy Manufacturing Technologies			
2	Energy Efficient Manufacturing Processes			

GOVERNANCE STRUCTURE				
1: Strongly dislike	2: Dislike	3: No preference	4: Preferred	5: Strongly Preferred
Option	**Governance Structure**		**Score (1-5)**	**Comments**
1	Managed by DOE			
2	Initially managed by DOE, Operated by Steering Committee			
3	Managed by contracted organization, governed by Executive Committee			

Breakout Session 2: What could your organization contribute to this PPP?

Membership Structure

The membership structure defines the workflow of the PPP.

Options

1. *Kickstarter Fee-for-Service Membership:* For this effort, founding partners of the PPP would provide seed funding for an initial business plan competition for specific manufacturing challenges. An Industrial Kickstarter platform would be designed and developed based on input from founding partners. Access to the platform and competition would be via a membership or access fee model. For example, interested investors and manufacturers seeking crowd-sourced solutions pay a fee for a period of time (1 year, 3 years, etc.) to post their project and receive access to the expertise and capabilities in the PPP. This could also be structured in tiers where greater interaction in research is gained for higher fees. SMEs could pay fees for specific activities rather than a longer-term membership fee.
2. *SME Service Membership:* For this option, founding partners of the PPP would select projects from SMEs within their own supply chain for the first round of access to the Industrial Kickstarter platform. Noting that access to PPPs has the greatest value for SMEs but they have the most difficult time setting aside funds or time to participate, the founding partners would subsidize these projects for their supply chain SMEs. For future projects, SME membership fees or fee-for-service could be subsidized by their affiliated OEMs or by DOE support.
3. *Foundational Membership:* Founding partners providing startup capital for the PPP can gain continuous access to the Industrial Kickstarter platform, and would receive a negotiated percentage of investment and return generated by the PPP. This percentage would be linked to the amount of funding provided to the PPP. Funding and founding partners can stay on as board members to oversee operations of the platform, but do not necessarily need to be ongoing partners. Existing and new partners would provide funding for regular business plan competitions for specific manufacturing challenges and would have unrestricted access to the services of the PPP.

Funding

This PPP could ultimately generate income in a manner which will make the program self-sustaining, but will require seed funding.

Options

1. DOE provides initial investment for the PPP; founding partners provide seed funding for the business plan competition.
2. Founding partners, including DOE, contribute the initial investment for the instantiation of the PPP and seed funding for the business plan competition.
3. DOE provides initial investment. Once in full operation, founding partners, including DOE, provide subsidies into the future to cover SME membership and user-fees and defray administrative costs.

4. Founding partners, including DOE, contribute the initial investment. Once in full operation, the platform becomes self-sufficient through user and membership fees, percentage cuts of funded projects, or founding member contributions.

PPP Evaluation Rubric: PPP Concept 5, Breakout Session 2

MEMBERSHIP STRUCTURE			
1: Strongly dislike **2: Dislike** **3: No preference** **4: Preferred** **5: Strongly Preferred**			
Option	**Membership Structure**	**Score (1-5)**	**Comments**
1	Kickstarter Fee-for-Service Membership		
	Contributions from:		
	SMEs		
	OEMs		
	U.S. Government		
	Non-Profit		
	University/National Laboratories		
2	SME Service Membership		
	Contributions from:		
	SMEs		
	OEMs		
	U.S. Government		
	Non-Profit		
	University/National Laboratories		
3	Foundational Membership		
	Contributions from:		
	SMEs		
	OEMs		
	U.S. Government		
	Non-Profit		
	University/National Laboratories		

FUNDING			
1: Strongly dislike **2: Dislike** **3: No preference** **4: Preferred** **5: Strongly Preferred**			
Option	**Funding**	**Score (1-5)**	**Comments**
1	DOE initiates; partners seed competition		
2	All partners initiate and seed competition		
3	Partners, including DOE, subsidize operations and SME user fees		
4	Self-sufficient once operational		

Breakout Session 3: What benefits would your organization receive by participating in this PPP?

Benefits and Metrics

An effective PPP is one that provides an enticing value proposition to each of the engaged stakeholders. For the purpose of this section, benefits are understood to be the benefits of participation to each stakeholder within the proposed PPP. These benefits may be different depending on the Membership Structure built into the partnership. Thus, it is essential to understand which Membership Structure will provided benefits to the largest number of stakeholders.

This section also prompts participants to begin thinking about success metrics. Today's need to measure success and provide accountability for investments in science and technology is not only a mandate driven by fiscal austerity, but also a necessity in the U.S. innovation-driven economy. Economic competitiveness and, in turn, national prosperity in the United States are more dependent than ever on our ability to leverage the scientific and technological advancements achieved in public and private sector laboratories across the country. As such, it is essential to understand which tools (e.g. PPPs) are most effective at this task—and this cannot be achieved without the proper metrics.

A Metrics Appendix will be distributed along with the Evaluation Rubric for this third breakout session that will include a list of possible metrics divided into three categories: short-term, medium-term and long-term. After providing a description of the value that your organization hopes to obtain from each type of fellowship, please identify the metric or metrics best able to quantify this value. Please note that the Metrics Appendix is not comprehensive; feel free to write in the optimal metric even if it is not provided in the Appendix.

EERE Core Statements

To quantify benefits to the innovation ecosystem that this PPP concept provides, each participant is asked to evaluate this PPP according to the following core statements:

1. This is a high-impact problem.
2. EERE funding will make a large difference relative to what the private sector (and other funding entities) is already doing.
3. This PPP concept focuses on a broad problem we are trying to solve and is open to new ideas, new approaches, and new performers.
4. EERE funding and participation will result in enduring economic benefit to the United States.
5. EERE funding and participation will represent a proper high-impact role of government versus something best left to the private sector to do on its own.

PPP Evaluation Rubric: PPP Concept 5, Breakout Session 3

BENEFITS AND METRICS

1: Strongly dislike 2: Dislike 3: No preference 4: Preferred 5: Strongly Preferred

Option	Benefits by Membership Option	Score (1-5)	Comments	Associated Metric(s)
1	Kickstarter Fee-for-Service Membership			
	Benefits to:			
	SMEs			
	OEMs			
	U.S. Government			
	Non-Profit			
	University/National Laboratories			
2	SME Service Membership			
	Benefits to:			
	SMEs			
	OEMs			
	U.S. Government			
	Non-Profit			
	University/National Laboratories			
3	Foundational Membership			
	Benefits to:			
	SMEs			
	OEMs			
	U.S. Government			
	Non-Profit			
	University/National Laboratories			

EERE CORE STATEMENTS

SD: Strongly Disagree D: Disagree A: Agree SA: Strongly Agree

Number	EERE Core Statements	Opinion	Comments
1	This is a high impact problem.		
2	EERE funding will make a large difference relative to what the private sector (and other funding entities) is doing.		
3	This PPP concept focuses on a broad problem we are trying to solve and is open to new ideas, new approaches, and new performers.		
4	EERE funding and participation will result in enduring economic benefit to the United States.		
5	EERE funding and participation represent a high-impact role of government versus something the private sector should do on its own.		

PART 1: AEMC PARTNERSHIP DIALOGUE 3 PRIMER

Looking Forward

The third AEMC Partnership Dialogue represents an important shift in the second phase of the AEMC Partnership. In large part, the exploratory nature of the AEMC Partnership is coming to a close. In the first two dialogues, national and regional leaders uncovered and quantified both the challenges and opportunities facing clean energy manufacturing in the United States. Furthermore, these dialogues captured a deep pool of suggestions, insights, and best practices on how to target clean energy manufacturing PPPs and how best to organize and operate such a tool. Taking these stakeholder perspectives and combining them with the AEMC Partnership literature review—*The Power of Partnerships*—and the institutional knowledge held by EERE and the Council, the conversation substantively deepened and narrowed the exploration of the five PPP concepts presented at this dialogue.

The GE Global Research Center will be the platform on which critical intellectual work for the AEMC Partnership will be accomplished. At the end of this third dialogue, the choices of PPP concepts will have been reduced even further, offering the first glimpse of the potential outcome of the AEMC Partnership.

Throughout the AEMC Partnership dialogue series, the dialogue hosts have represented an ideal of the Partnership. Just as the University of Toledo provided the second dialogue with a natural platform for a conversation on driving regional transformation, the GE Global Research Center provides an example of the national and global networks of innovation that the AEMC Partnership is attempting to bolster and interconnect to make U.S. manufacturing infrastructure more dense, more resilient, and more dynamic.

PART 1: AEMC PARTNERSHIP DIALOGUE 3 PRIMER

Appendix: Measuring the Success of Public-Private Partnerships

Short-Term Metrics (within 1 year)

- Four or more founding partners identified or pledged
- 10 or more participating partners identified
- Seed funding identified (more than XX amount) for five (or seven, etc.) years
- Operating cost funding streams identified for the next 3 years
- Five projects identified for participation

Medium-Term Metrics (2-5 years)

- External proposals funded
- Projects completed
- Growth in founding partners
- Growth in participating partners
- Growth in fellowship applications
- Growth in funding stream
- Completion of evaluations by organizations and fellows
- Increased number of patents filed and inventions disclosed
- Increased collaborations between public-private sector

Long-Term Metrics (In 5 years)

- Proposals funded
- Consistent number of founding-level members
- Membership retention
- Increased collaborations between public-private sector
- 20 percent growth on participating members from PPP beginning
- Positive economic development impact
- Increased stability or growth of SME/OEM participation
- Direct and indirect job creation
- New companies established
- Follow-on investments
- Publications/Presentations/Citations
- Invention disclosures/Patent applications

PART 2
Findings from AEMC Partnership Dialogue 3

PART 2: FINDINGS FROM AEMC PARTNERSHIP DIALOGUE 3

Introduction

This third dialogue convened leaders from nearly every sector of the economy who understand the importance of and are committed to enhancing U.S. competitiveness in the clean energy and manufacturing sectors.

The third AEMC Partnership dialogue was co-hosted by the Honorable Deborah L. Wince-Smith, President & Chief Executive Officer of the Council; the Honorable David T. Danielson, Assistant Secretary for Energy Efficiency and Renewable Energy at the U.S. Department of Energy; and Dr. Mark Little, Senior Vice President and Chief Technology Officer of General Electric, and Director of GE Global Research Center at the GE Global Research Center headquarters in Niskayuna, New York. The dialogue engaged over 60 leaders from industry, academia, the national laboratory system, non-profit organizations, and local and federal governments.

The AEMC Partnership aims to convene dialogues in strategic locations across the country. The inaugural AEMC Partnership dialogue, hosted by Mr. James Clifton, Chairman and CEO of Gallup, Inc., was held in Washington, D.C.—gathering stakeholders from across the nation to launch the discussion around energy and manufacturing challenges. The second AEMC Partnership dialogue, hosted by President Lloyd Jacobs of the University of Toledo in Toledo, Ohio, connected to a strong regional collaboration built between industry, universities, and the local and state government to support the development of the solar industry. The Council and EERE selected GE Global Research Center in Niskayuna, NY, as the site for the third AEMC Partnership dialogue because of the rich manufacturing history of the region and its expertise in staying abreast of new developments important to both U.S. and global manufacturing, from semiconductors in the 1990s[1] to solar and hydrogen technologies today. The New York Capitol Region also benefits from: its proximity to all major markets in the northeast, a highly skilled workforce, and many world-renowned academic and research institutions. Additionally, General Electric has participated in many public and private collaborations to address challenges in clean energy and advanced manufacturing over its 130-year tradition of innovation.

Dr. Mark Little, Senior Vice President and Chief Technology Officer, General Electric; the Honorable Paul Tonko, U.S. House of Representatives; 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, Department of Energy

1 Arguably, the growth of the semiconductor research and development and manufacturing industry in New York State began when Dr. Alain Kaloyeros was recruited by Governor Cuomo and the University at Albany in 1988, and increased with the creation of the College Nanoscale Science and Engineering in 2001. Benjamin, Ian. "Nano Tech Valley: The history of CNSE," Saratogian News. Posted June 23, 2013. Available at: http://www.saratogian.com/general-news/20130623/nano-tech-valley-the-history-of-cnse.

Like the National Network for Manufacturing Innovation (NNMI),[2] EV Everywhere Grand Challenge,[3] Better Building Challenge[4] and other public-private partnerships (PPPs) the Office of Energy Efficiency and Renewable Energy (EERE) already champions, the PPP generated by the AEMC Partnership will demonstrate EERE's bias towards action and interest in working with industry to strengthen strategic leverage points in the innovation ecosystem that will foster a renaissance in U.S. manufacturing competitiveness and U.S. competitiveness overall.

The third AEMC Partnership dialogue gathered stakeholders in the innovation ecosystem to discuss and evaluate strategically five PPP concepts capable of driving the overarching goals of the AEMC Partnership. These five concepts follow directly from several key themes developed and culled from the inaugural and second dialogue:

- **Innovation Exchange Fellowship Program:** developing manufacturing leadership—and enhancing knowledge spillover in the innovation ecosystem—by expanding the intersections and points of exchange between the private sector and U.S. national laboratories and research universities through a fellowship program;
- **Leveraging the Innovation Ecosystem:** increasing accessibility to key national laboratory and university resources and provide manufacturers competitive user grants to reduce fees and lower barriers to use existing facilities;
- **Advanced Materials Characterization, Experimentation, and Standardization:** increasing the use and commercialization of existing advanced materials by ensuring new materials function reliably and predictably before integration into new technologies and systems;
- **Facilitating the Transition of Prototypes to Deployable Products:** increasing the graduation of prototypes into commercial markets by improving communication and transparency into the private sector and increasing access to resources; and
- **Industrial Kickstarter and Manufacturing Marketplace:** increasing access to risk-tolerant investment capital by convening investors, entrepreneurs, and manufacturers to front-fund and crowd-fund promising new technologies.

Six topics were discussed for each PPP concept, as outlined in the dialogue primer: target area, governance structure, membership structure, funding, benefits, and metrics. Additionally, participants evaluated each PPP concept against 5 EERE Core Statements:

1. This PPP concept addresses a high impact problem.
2. EERE funding for this PPP concept will make a large difference relative to current private sector efforts.

2 National Network for Manufacturing Innovation, proposed by President Obama, will build regional hubs that will accelerate development and adoption of cutting-edge manufacturing technologies for making new, globally competitive products. More information available at: http://manufacturing.gov/nnmi.html.

3 The EV Everywhere Grand Challenge focuses on the U.S. becoming the first nation in the world to produce plug-in electric vehicles that are as affordable for the average American family as today's gasoline-powered vehicles within the next 10 years. More information available at: http://www1.eere.energy.gov/vehiclesandfuels/electric_vehicles/index.html.

4 In the Better Buildings Challenge, leaders of U.S. organizations are committing to reduce the energy used across their building portfolios by 20 percent or more over ten years and transparently showcase the solutions they use and the results they achieve. More information available at: http://energy.gov/better-buildings.

Ms. Jean Redfield, President and Chief Executive Officer, NextEnergy; Mr. Rodney Heiple,, Director, EPS Business Technology, Alcoa, Inc.; and Mr. James Phillips, Chairman and Chief Executive Officer, NanoMech, Inc.

3. This PPP concept focuses on a broad problem that EERE is trying to solve and is open to new ideas, new approaches, and new performers.
4. EERE funding and participation will result in an enduring economic benefit to the United States.
5. EERE funding and participation represent a high-impact role of government rather than a role the private sector should lead itself.

Participants provided valuable suggestions and insights throughout the dialogue on how separate organizations in the innovation ecosystem could work together to increase U.S. competitiveness in clean energy products and increase U.S. competitiveness across the manufacturing sector.

PART 2: FINDINGS FROM AEMC PARTNERSHIP DIALOGUE 3

Fireside Chat

During the Fireside Chat: Learning from Previous Public-Private Partnership experiences session, Dr. Little moderated a conversation between Dr. Alex King, Director of the Critical Materials Institute at Ames Laboratory; Mr. Francis J. Murray, Jr., President & Chief Executive Officer at New York State Energy Research and Development Authority (NYSERDA); and Mr. Nolan Browne, Managing Director of the Fraunhofer Center for Sustainable Energy Systems (Fraunhofer CSE). Panelists discussed their previous involvement in PPPs and highlighted important elements to consider when generating a new PPP.

Public and private sectors, working together, can create energy and excitement among stakeholders when focused on a strategically important topic. Dr. King shared the comparison of key leaders in Japan during the panel session refusing to cede leadership in hybrid vehicle research and production to any other country.[5] This decision focused the hybrid vehicle supply chain to drive innovation and the Japanese government to ensure that research and development will be supported in hybrid vehicle technologies. This decision signals stability in a sector and provides industry and academia the confidence to take risks in developing innovations. By selecting a strategic topic for a PPP, a signal of stability and confidence in that topic is sent to the innovation ecosystem and participants critical to a successful PPP can be identified from their relevant expertise.

Dr. Mark Little, Senior Vice President and Chief Technology Officer, General Electric; Dr. Alex King, Director, Critical Materials Institute, Ames Laboratory; Mr. Francis Murray, Jr., President and Chief Executive Officer, New York State Energy Research and Development Authority; and Mr. Nolan Browne, Managing Director, Fraunhofer Center for Sustainable Energy Systems

An obstacle for creating a PPP is encouraging the participation of critical stakeholders. According to Dr. King, U.S. national laboratories are not consistently encouraged to work with industry. As royalties and licensing fees from transferring technology out to industry created 0.15 percent of the U.S. Department of Energy budget in 2011,[6] Dr. King mentioned that many national laboratories do not work under official or financial metrics that encourage increased collaborations with industry. However, great expertise and innovative ideas are generated from national laboratories and leadership in a PPP must find a way to include national laboratories that provides a benefit to their organizations. Likewise, industry may

5 Think Carbon. "Government policy & the development of hybrid and electric vehicles in Japan." September 19, 2009. Available at: http://thinkcarbon.wordpress.com/2009/09/19/government-policy-the-development-of-hybrid-and-electric-vehicles-in-japan/.

6 In 2010, over $40 million was generated through licensing technology from the national laboratories (Karina Edmonds, *Tapping Our Commercial Potential: Work with the National Labs*. Published on October 12, 2011. Available at: http://energy.gov/articles/tapping-our-commercial-potential-work-national-labs) In comparison, the adjusted base appropriations for the Department of Energy in 2010 was $27.1 billion (U.S. Department of Energy. Fiscal Year 2011

Dr. Glenn Eisman, Chief Technology Officer & Founder, H2Pump; Dr. Mark Peters, Deputy Director, Programs, Argonne National Laboratory; Mr. Edward Reinfurt, Director, Division of Science, Technology, and Innovation, Empire State Development, and Mrs. Traute Lehner, Senior Director, Marketing and Government Affairs, Super Power

believe they have sufficient expertise to meet their market's needs and innovate on their own. However, the participation of both large companies and small and medium-sized enterprises (SMEs) is required to ensure the problems solved in a PPP are relevant to the marketplace. The first mission of a university is to educate students, however, the participation of the university systems in a PPP provides a path for workforce development and another source of innovative thoughts. The participation of critical stakeholders in each of these types of organizations in a PPP will decrease the time-to-market for new products and increase the output of a PPP.

It is clear that partnership participants both contribute and benefit from collaborations. As described by Mr. Murray, NYSERDA works to support economic development by focusing on deployment of energy projects—NYSERDA cannot accomplish its work without partnerships with industry or academic institutions. In effect, partnerships bring business expertise to scientists and scientific innovations to businesses.

A major topic concerning benefits and contributions that affect the success of a PPP is intellectual property (IP) agreements. While Mr. Browne shared that companies working with Fraunhofer, based on their long standing track record of success and confidentiality, have faith there will be no contamination of IP between competitors, Dr. King shared that a large obstacle in creating partnerships is agreeing on IP ownership and protection. Working together while coming from different cultures, these agreements must be clear and demonstrate benefits for all participants.

To overcome obstacles and ensure effective collaboration, Mr. Browne, Dr. King, and Mr. Murray all agreed that communication is necessary. As explained by Dr. King, collaborations in the innovation ecosystem are similar to dancing the tango – having two parties present is a necessary but insufficient condition. Two (or more) parties must be in the same room, with expertise and have an ability and desire to converse and work together. As an example, in building a relationship with the Manufacturers Association of Central New York (MACNY), Mr. Murray sat down with leaders to explain NYSERDA capabilities and better understand MACNY needs. These discussions built trust and fostered increased communication and collaboration in the future. Similarly, NYSERDA created incubators across the state to increase connections between academia and the business community and encourage academics to calibrate their activities with business realities.

PART 2: FINDINGS FROM AEMC PARTNERSHIP DIALOGUE 3

Perspectives from New York Officials

During the Perspectives from New York Officials session the Honorable Paul Tonko, United States Congressman from New York and Mr. Edward Reinfurt, Director of the Division of Science, Technology and Innovation (NYSTAR) at Empire State Development shared their insights on PPPs. This session of the third AEMC Partnership dialogue presented perspectives on utilizing collaborations across the innovation ecosystem to encourage and sustain regional success.

Congressman Tonko shared with dialogue participants that collaboration has been a central theme for regional success dating back to the height of the Oneida Nation in the 18th century[7] and continued with the development of the Erie Canal in 1825, linking Lake Erie to New York City, lowering the cost of transportation and elevating New York City to be the busiest port in America.[8] The New York Capital Region, respecting its long tradition of investment, experimentation, and collaboration, continues the tradition as home to General Electric, GE Global Research, Rensselaer Polytechnic Institute, SUNY College of Nanoscale Science and Engineering, GlobalFoundries, and countless other public and private institutions. These organizations are supported by Empire State Development, where research and collaborations in these organizations are supported with 5 New York State Centers of Excellence, 15 Centers for Advanced Technology, and 10 Regional Technology Development corporations, shared Mr. Reinfurt.

The Honorable Paul Tonko, U.S. House of Representatives.

Mr. Reinfurt noted that aiding the growth of manufacturing, in particular, is an important part of New York State's economic development strategy as 7 of 10 New York regions named advanced manufacturing as a strategic industry sector for their region's future. Congressman Tonko supported this economic development strategy with the statistic that $1.35 is generated through additional economic activity by every $1 spent in manufacturing, amplifying the manufacturing sector's benefits beyond the $1.8 trillion in Gross Domestic Product generated in 2011.[9] Mr. Reinfurt noted that initiatives like the AEMC

7 The Six Nations of the Iroquois, with the addition of the Tuscarora in 1722, collaborated to reduce conflict with distinct territories and functions in New York (Barbara Graymont. *The Iroquois in the American Revolution*. 1972).

8 New York State. Canals: The Eerie Canal: A Brief History. Accessed November 2013. Available at: http://www.canals.ny.gov/history/history.html.

9 Bureau of Economic Analysis, Industry by Industry Total Requirements after Redefinitions (Producer Price Indexes), 2010, Available at: www.bea.gov/iTable/index_industry.cfm

Mr. Edward Reinfurt, Director, Division of Science, Technology, and Innovation, Empire State Development

Partnership, NNMI, New York Battery & Energy Storage Technology (NY-BEST), and New York State High Performance Computing Consortium (HPC2) encourage disparate organizations to combine the expertise from industry and higher education to create a stronger team—making companies more innovative and university campuses more entrepreneurial. Partnerships are therefore extremely beneficial in increasing the overall competitiveness of all parties involved.

PART 2: FINDINGS FROM AEMC PARTNERSHIP DIALOGUE 3

Keynote: Clean Energy Manufacturing
A National Focus Can Unlock a Potential Treasure Chest

The Honorable Shirley Ann Jackson, President, Rensselaer Polytechnic Institute and University Vice-Chair, Council on Competitiveness..

The Honorable Shirley Ann Jackson, President of Rensselaer Polytechnic Institute and University Vice-Chair of the Council, shared her perspectives on the importance of energy security, the correlation between energy with manufacturing to ensuring U.S. security and economic competitiveness, and the need to use partnerships to unleash innovation and entrepreneurship in her keynote, *Clean Energy Manufacturing: A National Focus Can Unlock a Potential Treasure Chest.*

Dr. Jackson highlighted the fact that reliable and affordable energy has enabled modern civilization to protect communities, vanquish disease, and extend human lifespan, along with spreading economic opportunities. At this time, human security, prosperity, and environmental sustainability depend on the United States and the global community addressing energy-related challenges with goodwill and a belief in the future. Several shocks to the energy system have demonstrated the connections between these factors, including the 1973 Arab Oil Embargo, the Great Northeast Blackout of 2003, the 2011 earthquake and tsunami that destroyed nuclear reactors at the Fukushima Daiichi nuclear power station, and Super Storm Sandy in 2012. As Dr. Jackson stated, energy security is the space race of our time.

> *We have [driven innovation on a grand scale] many times before, including the space race that succeeded in putting a man on the moon. Energy security is, indeed, the space race of our time. We can accomplish something equally startling today, with infinite innovations contributing to a single outcome: abundant, affordable clean energy that safeguards the natural world, as it powers our economy and radically improves human lives. But it will take a sense of national purpose.*
>
> **The Honorable Shirley Ann Jackson**
> President, Rensselaer Polytechnic Institute and University Vice-Chair, Council on Competitiveness

Dr. Jackson provided requirements for the United States to bolster energy security and the economy. To remain resilient in times of energy crisis, Dr. Jackson recommended the United States create redundancy of supply and diversity of energy sources in addition to investing in smart energy infrastructure. More broadly, Dr. Jackson advised the United States to commit to more intelligent methods of deploying energy. Decision makers should reconsider incumbent energy technologies using full lifecycle cost analyses of energy sources, systems, and devices. Instead, a priority should be placed on matching efficient, cost-effective technologies with sustainable and reliable energy sources.

Dr. Jackson identified clean energy products as a growth market in a global economy struggling to recover from the 2008 economic downturn. De-

veloping markets continue to invest in renewable power and fuels, and established markets like Japan and Germany are looking for alternatives to nuclear power. While some indicators show the United States lags in the deployment of clean energy products as mentioned in the inaugural AEMC Partnership dialogue,[10] other indicators show the United States leads in clean energy technology innovation and production. For example, the United States has a demonstrated trade advantage in clean energy products over China in 2011.[11] To cement U.S. leadership in the production of clean energy products and in manufacturing overall, Dr. Jackson suggested a 3-pronged approach: make use of advanced manufacturing tools, develop efficiency gains in motor driven systems, and innovate power electronics to process higher voltages at higher temperatures while dissipating less energy.

Recognizing the need to ensure U.S. energy security for the future, Dr. Jackson indicated that partnerships across the innovation ecosystem will allow the United States to stimulate progress and drive leadership. To maximize benefits, Dr. Jackson argued stakeholders should structure partnerships to encourage a fertile environment for innovation and target market failures that inhibit the commercialization of promising technologies. Public-private partnerships should, therefore, support product and process innovations whose development is beyond the capacity of an individual company or those whose benefits accrue to a broad array of companies.

Mr. Michael Newell, Chief Executive Officer, Ener-G-Rotors; Mr. John Mizroch, Senior Fellow, Council on Competitiveness; Dr. William Banholzer, former Chief Technology Officer, The Dow Chemical Company; Dr. Phillip Yu, Director for Corporate Science & Technology, PPG Industries, Inc.; and Mr. Steven Derezinski, Chief Executive Officer, INFINIUM, Inc.

Dr. Jackson's keynote instilled a need for participants to generate a PPP concept that will address energy and manufacturing innovations able to strengthen U.S. security and economic competitiveness that affected discussions throughout the day.

10 Council on Competitiveness. *Launch: The Post-Report for the Inaugural American Energy and Manufacturing Competitiveness Partnership Dialogue*. 2013. Available at: http://www.compete.org/publications/

11 The Pew Charitable Trusts. *Advantage America: New Report Reveals U.S. Clean Energy Trade Surplus with China in 2011*. March 6, 2013. Available at: http://www.pewtrusts.org/news_room_detail.aspx?id=85899457085

PART 2: FINDINGS FROM AEMC PARTNERSHIP DIALOGUE 3

Perspectives from Industry: Participating in Public-Private Partnerships

In the Perspectives from Industry: Participating in Public-Private Partnerships session, participants shared the insights and perspectives on industry participation in PPPs. Moderated by Dr. Mark Little, kick-off discussants Dr. Kenan Sahin, Founder & President, TIAX LLC; Dr. William Provine, Director, Science & Technology, External Affairs, DuPont; and Dr. Andrew Marsh, President & Chief Executive Officer, Plug Power discussed their experiences in PPPs from differing backgrounds.

Successful U.S. companies have participated in PPPs to develop further expertise and increase access to resources external to their organizations. According to Dr. Marsh, Plug Power would not exist without its partnerships with large companies and the government. A federal grant from the 2009 Recovery Act allowed Plug Power to lower the risk for consumers of their fuel cell technology by discounting products. Because of that support, Plug Power became the world leader in fuel cells in mobile applications. Similarly, Dr. Provine shared that DuPont was able to build a cellulosic ethanol plant in Iowa by developing expertise through several partnerships. DuPont partnered with Iowa State University to better understand corn stover as an ethanol plant feedstock. During the research and development of an integrated bio-refinery, DuPont worked with the Department of Energy's Office of Biomass, National Renewable Energy Laboratory and Michigan State University. To scale-up the technology at a demonstration facility in Vonore, Tennessee, DuPont worked with the University of Tennessee, the state of Tennessee, and Genera. Without partnerships, these clean energy technologies may not have matured into commercial products and processes.

Dr. Kenan Sahin, Founder & President, TIAX LLC; Dr. William Provine, Director, Science & Technology, External Affairs, DuPont; and Mr. Andrew Marsh, President & Chief Executive Officer, Plug Power

> *"In 2009, during the worst of the economic crisis, the Recovery Act allowed our customers to receive about $15 million in funding to try our equipment…Without that partnership, Plug Power would no longer exist."*
>
> **Dr. Andrew Marsh**
> Chief Executive Officer, Plug Power

From experiences such as these, these industry leaders expressed several insights for the government and industry to use in creating a relevant PPP with the ability to increase U.S. competitiveness of clean energy products and the manufacturing sector overall. Dr. Marsh articulated that successful start-up companies are engaged in sales from the first business day of the company—likewise, PPP leadership should engage interested industry early when starting a PPP. Because of this early engagement, a PPP can be enhanced by what the customer needs and additional value can be built into the system. As

an example, when creating a PPP that fosters the scale-up production process, PPP leadership could invite people who can integrate different areas of expertise into a project and manufacturing experts to participate early, shared Dr. Provine. A PPP should also work to strengthen interconnectivity between different organizations in the ecosystem. For example, industry, academia, research institutions, and government cultures vary widely and a PPP should work to communicate clearly with each type of stakeholder regarding expectations and technical achievability of a technology.

> *"Organizations have an embedded hierarchy of objectives and mechanisms. To achieve success in collaborations, it is important to understand, respect and work with these mechanisms."*
>
> **Dr. Kenan Sahin**
> Founder & President, TIAX LLC

A public-private partnership can accelerate the development of technologies for the commercial market. As Dr. Provine mentioned, a key benefit of PPPs is the convening of complementary pieces. Government funding has already acted as a stimulus to create partnerships from funding opportunities and requests for information such as those related to the NNMI. A suggestion for another beneficial PPP concept from Dr. Sahin was that PPPs consider advocating the release of a company's non-producing or low-producing patents. This could incentivize entrepreneurship within a PPP. Consistent with comments from dialogue participants from this and previous AEMC Partnership dialogues, a major inhibitor of partnerships is the creation of legal agreements acceptable to different organizations with different goals and metrics for success. Dialogue participants from industry requested the creation of a system to create some consistency in perspectives, legal structures, and expectations when entering into a partnership.

By carefully structuring a PPP and engaging interested parties with its development, as the AEMC Partnership is accomplishing through its 2013 dialogue series, the benefits in collaborating across the innovation ecosystem will be maximized and the best and brightest minds can be focused on increasing U.S. competitiveness in developing and deploying clean energy technologies and increasing U.S. competitiveness in the manufacturing sector overall by increasing energy productivity.

PART 2: FINDINGS FROM AEMC PARTNERSHIP DIALOGUE 3

Evaluation of the Five Public-Private Partnership Concepts

The third AEMC Partnership dialogue consisted of plenary sessions and three working group sessions to collect detailed perspectives and insights from each participant on one of five presented PPP concepts. Participants were strategically selected for working groups to represent different stakeholders in the innovation ecosystem and participate in a well-balanced discussion. Each working group discussed the target area, governance structure, membership structure, contributions, and funding of one assigned PPP concept. Following the working group sessions, participants returned to a plenary session where a representative from each working group presented findings and participants shared their insights on all presented PPP concepts.

Dr. Robert Ivester, Acting Director, Advanced Manufacturing Office, Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy; Dr. Todd Wetzel, Technology Leader–Thermal Systems, General Electric Global Research; and Mr. Peter Christensen, Manager, Technology Commercialization, Pacific Northwest National Laboratory.

PPP Concept 1: Innovation Exchange Fellowship Program

In the first Public-Private Partnership concept: Innovation Exchange Fellowship Program working group, Dr. Todd Wetzel, Technology Leader of Thermal Systems at GE Global Research, moderated the conversation around increasing communication across the innovation ecosystem through the creation of a fellowship program. Three respondents in this working group, Mr. Peter Christensen, Manager of Technology Commercialization at Pacific Northwest National Laboratory; Ms. Traute "Trudy" Lehner, Senior Director for Marketing and Government Affairs of Super Power; and Mr. Michael Russo, Director of U.S. Government Relations and Regulatory Affairs, GlobalFoundries, opened conversations in three consecutive sessions during the dialogue. Additionally, Mr. Michael Bush, Policy Director at the Council on Competitiveness and Dr. Robert Ivester, Acting Director of the Advanced Manufacturing Office, Office of Energy Efficiency and Renewable Energy at the U.S. Department of Energy acted as facilitators.

In the discussion, participants supported the PPP concept due to its ability to drive communication between different organizations in the innovation ecosystem through personnel exchange. According to Mr. Gavin McIntyre, Chief Scientist at Ecovative Design, engaging a partner in the proposed method is similar to relationships that have allowed Ecovative Design to build more efficiencies and profits into their business—taking advantage of modeling and simulation and measurement technologies they would not otherwise be able to afford. This PPP concept works to improve communication similar to internal programs at GE to send employees to national laboratories, shared Dr. Wetzel. Some mechanisms that do this include the Intergovernmental Person-

nel Act (IPA) and the Industrial Fellows Program at Los Alamos National Laboratory. These programs facilitate knowledge spillover—discussed further in Facilitating Knowledge Spillover luncheon panel later in the report.

During the discussion, several participants noted the need for organizations to accept IP agreements prior to engaging in fellowship exchanges. While some participants suggested the Department generate a template IP agreement for organizations to agree, IP agreements and resources used in any collaboration depend on each project and organizations involved—instead of becoming more simplistic, a generic agreement may become too restrictive, shared Mr. Craig Dory, Director of Business Development at the Center for Automation Technologies and Systems, Rensselaer Polytechnic Institute.

Participants in the third AEMC Partnership dialogue evaluated the Innovative Exchange Fellowship Program PPP concept using the 5 EERE Core Statements and agreed that a fellowship program addresses a high impact problem of communication and relationships building between different organizations—though it could potentially have more impact in conjunction with one of the other four proposed PPP concepts. Participants agreed that EERE funding is expected to make a large difference, especially in encouraging SME participation. According to participants, funding would make a particularly large difference because this PPP could be low cost relative to the other four proposed PPPs. Participants viewed this PPP concept as addressing a broad problem, accessible to all interested participants and open to new ideas, approaches, and performers—as this PPP concept supports technology agnostic communications throughout all organizations in the innovation ecosystem.

Participants stated that the PPP concept, because of EERE funding and participation, could result in enduring economic benefit to the United States if enacted in a large, widespread program. EERE funding and participation represents a high-impact role for the federal government to play in this PPP concept because this interaction is largely not occurring on its own, especially in engaging SMEs.

Dialogue participants were interested in supporting and engaging in this proposed PPP, although a few participants, including Dr. Wetzel, Ms. Lehner, and Dr. Sahin felt the exchange fellowship program could have a greater impact if operated as part of one of the other four proposed PPP concepts presented at this dialogue or other R&D programs operated by EERE. This PPP concept lays the foundation to advance both AEMC Partnerships goals of increasing the U.S. competitiveness of clean energy products and increasing U.S. manufacturing competitiveness by increasing energy productivity in the future by providing an avenue for organizations to increase communication and collaboration, and apply government funded resources in projects that develop competitive clean energy products and projects that increase energy productivity.

Perspectives from the Working Group on Topics for the Innovation Exchange Fellowship Program PPP

Target Area: Participants supported the development of the Innovation Exchange Fellowship PPP that focuses on clean energy manufacturing technologies and materials. While participants believed that focusing on energy efficiency products could result in benefits, they agreed the PPP concept focused on clean energy technologies is appropriate for a broad range of companies and projects and makes use of capabilities at research institutions.

Governance Structure: In the session, participants felt that this PPP could be managed by the Department of Energy or a contracted organization with oversight from an executive committee—populated with people from each stakeholder group including applied industry experience and SMEs. While the Department of Energy is an important stakeholder, participants believed that direct management by the Department offered insight into the national laboratories, but might limit the speed or flexibility of the PPP to engage private sector capabilities or offer additional services.

Membership Structure: Working group participants agreed the Innovation Exchange Fellowship Program PPP concept should incorporate junior, senior, and exchange fellows in the membership structure, exchanging personnel between all kinds of organizations. Participants suggested that exchange fellows could have a particular appeal to organizations on a short-term basis, especially for organizations not prepared to lose an employee for a long period of time.

Dr. Kenan E. Sahin, Founder & Chief Executive Officer, TIAX LLC; Mrs. Traute F. Lehner, Senior Director for Marketing and Government Affairs, SuperPower; Mr. Gavin McIntyre, Chief Scientist, Ecovative Design; and Mr. Michael Russo, Director of U.S. Government Relations and Regulatory Affairs, GLOBALFOUNDRIES.

Funding: Working group participants supported this PPP concept because of its potential for execution at little to no cost. Participants agreed that the administration or the overhead of the proposed PPP should be funded by government grants, while salaries and expenses could be paid for by an individual's parent organization or through Department of Energy sponsorship.

Benefits: Working group participants mentioned that this PPP concept has the ability to produce long lasting benefits by building relationships and increasing communication across the innovation ecosystem. This PPP allows industry, university, and national laboratory employees to learn about different cultures and perspectives in their hosting organization and make matches between needs in industry and capabilities in research institutions. By engaging in this proposed PPP over time, national laboratories and universities will have increased utilization of equipment, create another avenue for technology transfer, collect industry perspectives, and contribute to a U.S. company's success. The federal government, by supporting this PPP, would continue its mission of supporting U.S. competitiveness in the global marketplace through increased access to unparalleled expertise and resources funded by the government at universities and national laboratories, and—once the innovations develop into products on the market—job creation.

Metrics: To ensure continued support for the proposed PPP, working groups suggested several metrics that could be used to demonstrate progress and success. Leaders of the PPP could keep track of the number of fellows placed through the PPP, the number of companies engaged in PPP activities, and workers trained in developing technologies. National laboratories and universities could measure additional relationships built with industry and number of technologies transferred to industry, and universities could use an additional metric in tracking the number of graduates placed in industry.

PPP Concept 2: Leveraging the Innovation Ecosystem

The second Public-Private Partnership concept was Leveraging the Innovation Ecosystem. The following working group prompted conversations during the sessions by sharing their perspectives: Mr. Michael VenDerwerken, Business Development Operations Leader at GE Global Research moderated the conversation around increasing U.S. competitiveness by facilitating increased industry access to existing resources in the innovation ecosystem. Three respondents, Dr. Phillip Yu, Director of Corporate Science & Technology at PPG Industries, Inc.; Mr. James "Jim" Phillips, Chairman and Chief Executive Officer at NanoMech, Inc.; and Ms. Jean Redfield, President and Chief Executive Officer at NextEnergy initiated the conversation around the six topics during these sessions. Dr. Lynn Daniels, Technical Advisor to the Assistant Secretary, Office of Energy Efficiency and Renewable Energy at the U.S. Department of Energy and Dr. Clara Smith, Senior Policy Director at the Council on Competitiveness facilitated the conversation.

In the discussion, participants agreed that increased access to expertise and resources in the innovation ecosystem would increase U.S. competitiveness. According to Dr. Yu and Mr. David Hauber, Vice President of Engineering at Automated Dynamics, companies currently access and fund collaborations with research institutions—but collaborations could be strengthened and amplified. Participants were particularly interested in the creation of streamlined methods for small and large companies, which could be used when approaching a national laboratory or university. These methods could be matched with resources—including but not limited to the creation of an online database of available resources. During the conversation, Ms. Redfield also suggested the PPP leadership work to define discrete IP treatments for research organizations to self-identify IP agreement policies transparently to interested companies.

Dr. William Provine, Director, Science & Technology, External Affairs, DuPont; Ms. Jean Redfield, President & Chief Executive Officer, NextEnergy; and Dr. Lynn Daniels, Technical Adviser to the Assistant Secretary, Office of Energy Efficiency and Renewable Energy, Department of Energy.

Participants in the working group agreed that to maximize engagement in this PPP concept, national laboratories and universities must measure their own success with metrics that support collaborations with industry. According to Dr. King, many national laboratories like Ames National Laboratory are graded on several different criteria—none of which directly rewards collaborations with industry. Dr. King and Dr. Suresh Baskaran, Chief Science and Technology Officer, Energy and Environment Directorate, Pacific Northwest National Laboratory, supported this PPP

concept as a method to entice deeper and more comprehensive collaborations between research institutions and industry.

Participants in the third AEMC Partnership dialogue evaluated the Leveraging the Innovation Ecosystem PPP concept using the 5 EERE Core Statements and agreed that facilitating access to expertise and resources in the innovation ecosystem addresses a high impact problem, that will lower risk in developing technologies. Participants also agreed that EERE funding is expected to make a large difference, especially when considering that this PPP concept will require less funding than PPP concept 3: *Advanced Materials Characterization, Experimentation and Standardization*; PPP concept 4: *Facilitating the Transition from Prototypes to Deployable Products*, or PPP concept 5: *Industrial Kickstarter and Manufacturing Marketplace* to begin achieving success.

Participants viewed this PPP concept as addressing a broad problem, accessible to all interested participants and open to new ideas, approaches, and performers—because this is a problem experienced by many in industry and at research institutions. Participants concurred that EERE funding and participation in this PPP concept would result in enduring economic benefit to the United States by increasing the access for a broad network of U.S. clean energy technology innovators to existing resources and supporting the development of long term relationships to innovate and mature clean energy technologies and suppliers. EERE funding and participation represents a high-impact role for the federal government to play because this PPP is most effective when applied across the country and with the breadth, organization, and convening power of the Department and EERE.

Dialogue participants were interested in supporting and engaging in this proposed PPP. By creating clear and consistent methods to access resources and expertise in research institutions, this PPP concept decreases the cost for technology development and increases collaborations throughout the innovation ecosystem. Through these benefits, this PPP concept was viewed as capable of advancing both AEMC Partnership goals of increasing the U.S. competitiveness of clean energy products and increasing U.S. manufacturing competitiveness by increasing energy productivity in the longer term.

Perspectives from the Working Group on Topics of the Leveraging the Innovation Ecosystem PPP

Target Area: Participants supported this PPP concept targeted at the development of clean energy manufacturing technology and materials, though many participants believed the PPP concept would also be successful without focusing on a particular type of technology. While participants agreed that increasing energy efficiency in manufacturing processes was an important topic, processes are more likely to contain corporate confidential information, which would reduce industry participation. Clean energy manufacturing product development, on the other hand, involves greater risk which would entice broad industry participation in the PPP and makes use of the government's role in mitigating risk.

Governance Structure: In the session, participants agreed that this PPP should be run by a selected executive committee, which in turn manages a contracted organization. This structure allows the executive committee to deal with funding and IP concerns and retain oversight over the contracted organization. While the Department of Energy is an important stakeholder and should participate in an executive committee, participants believed that direct management by the Department might be less efficient.

Membership Structure: Working group participants believed this PPP concept should build a publicly accessible database of expertise and resources available across the innovation ecosystem, match needs in industry to resources in research institutions, and create transparent methods to access these resources at varying levels of membership. Different levels of membership should allow for proprietary, non-proprietary, and collaborative research and user-facility services. This structure could include a subsidized or voucher level that allows SMEs to access resources at a lower cost for an approved project.

Dr. Suresh Baskaran, Chief Science and Technology Officer, Pacific Northwest National Laboratory, and Dr. Alex King, Director, Critical Materials Institute, Ames Laboratory.

Funding: Participants said that activities not covered by PPP membership agreements should be funded by the Department of Energy and state and federal government grants, founding member contributions, membership contributions and fees-for-service. Working group participants agreed the Department of Energy and EERE should contribute funding to support the instantiation and administration of the PPP including the creation of a publicly accessible online database that allows people to access information on innovation ecosystem resources for little or no cost. Members of the PPP will pay fees to fund activities as specified by their membership level, while collaborations between SMEs and research institutions may be sponsored using vouchers from existing programs like the Small Business Innovation Research (SBIR) or the Small Business Technol-

ogy Transfer (STTR) programs. Smaller fees may be paid by non-profits, universities, and laboratories to advertise technical expertise, equipment, or other resources available, and PPP participants may pay fees to access matchmaking, certification, or testing services available outside activities funded by the membership fees.

Benefits: Working group participants mentioned that this PPP concept has the ability to produce great benefits by facilitating connections throughout the innovation ecosystem. This PPP concept provides SMEs and large companies access to equipment and expertise that may have been too complicated or expensive to access previously. By engaging in this proposed PPP, national laboratories and universities will increase the utilization of equipment in a shorter time period than by engaging in PPP concept 1: *Innovation Exchange Fellowships* and with a broader range of technologies than engaging in PPP concept 3: *Advanced Materials Experimentation, Characterization and Standardization*, PPP concept 4: *Facilitating the Transition from Prototype to Deployable Product* or PPP concept 5: *Industrial Kickstarter and Manufacturing Marketplace*. Additionally, this PPP concept creates another avenue for technology transfer and contributes to the success of U.S. economy—though in a longer time frame than PPP concepts 3, 4 or 5. The federal government, by supporting this PPP, would continue its mission of supporting U.S. competitiveness in the global marketplace through increased access to unparalleled expertise and resources funded by the government at universities and national laboratories.

Metrics: Working group participants suggested several metrics that could be used to demonstrate the progress and success of this PPP concept, as well as a member's return on investment. Leaders of the PPP could keep track of the number of matches made, the number of companies accessing the resource database or engaging in PPP activities, and additional funding secured to support the PPP. National laboratories and universities could measure additional relationships built with industry and universities could use an additional metric such as tracking the number of graduates placed in industry.

PPP Concept 3: Advanced Materials Characterization, Experimentation, and Standardization

In the third Public-Private Partnership concept: *Advanced Materials Characterization, Experimentation and Standardization* working group, Dr. Steven Duclos, Chief Scientist and Leader of Material Systems and Nanotechnology Advanced Technology Program, GE Global Research moderated the conversation with three respondents, Mr. Jeffrey "Jeff" Ballew, Director of Strategic Marketing for Honeywell Fluorine Products; Mr. F. Michael Tucker, President and Chief Executive Officer, Center for Economic Growth; and Mr. D. Scott Seaton, Vice President, Engineering R&D at SRI International. Mr. Chad Evans, Executive Vice President at the Council on Competitiveness, and Ms. Kelly Visconti, Technology Manager, Advanced Manufacturing Office, U.S. Department of Energy facilitated the conversation centered on increasing the introduction of advanced materials into manufactured products.

In the discussion, participants agreed that characterizing, qualifying, and creating standards for advanced materials are real and important challenges facing industry. According to the participants, the lack of cost-effective methods to characterize, qualify, and create standards for advanced materials in the energy space represents a market failure—likely due to the fact that these processes are not defined as the responsibility for any one stakeholder in the innovation ecosystem. Materials characterization, qualification, and creation of standards are, however, of interest to many stakeholders in several situations. For example, the following areas would benefit from this PPP: materials for additive manufacturing where the field is sufficiently vast to make the qualification process too difficult for one company to tackle alone; when the cost and risk of introducing new materials is prohibitively high in markets like aerospace or defense; and when the organization making a material is not the same entity that could integrate the material into a product.

Mr. F. Michael Tucker, President & Chief Executive Officer, Center for Economic Growth; Mr. Francis J. Murray, Jr., President & Chief Executive Officer, New York State Energy Research and Development Authority; and the Honorable David T. Danielson, Assistant Secretary for Energy Efficiency and Renewable Energy, Department of Energy.

Participants in the third AEMC Partnership dialogue evaluated this PPP concept using the 5 EERE Core Statements and strongly agreed that this PPP concept addresses a high impact problem—more so than the four other PPP concepts. Participants agreed that EERE funding is expected to make a large difference in the area of clean energy and manufacturing sectors and many were eager to engage. Participants viewed this PPP concept as addressing a broad problem engineered to be accessible to all interested participants and open to new ideas, approaches, and performers. Participants agreed that the PPP concept, because of EERE funding and participation would result in endur-

ing economic benefit to the United States and that EERE funding and participation represents a high-impact role for the federal government to play, especially in convening disparate organizations and facilitating their collaboration.

Participants from large and small companies, national laboratories, and universities were interested in engaging in this PPP. Potential first topics described by working group participants included materials used in additive manufacturing, ceramics, other crystal materials, and wide-band gap materials. By accelerating the use of advanced materials in the innovation ecosystem by defining resources available, aggregation of this data, and providing possibly subsidized access to equipment, this PPP concept was viewed as advancing both AEMC Partnerships goals of increasing the U.S. competitiveness of clean energy products and increasing U.S. manufacturing competitiveness by increasing energy productivity.[12]

12 A clear benefit was also mentioned in connecting material data information to the president's materials modeling and simulation initiative (Materials Genome Initiative).

Perspectives from the Working Group on Topics of the Advanced Materials Characterization, Experimentation, and Standardization PPP

Target Area: Participants supported the development of an advanced materials focused PPP that tackles important problems in the field—problems that organizations are willing to pay to find a solution. Of the three options given to participants: reducing the processing time for advanced materials in current technologies, qualifying advanced materials for applications in current technologies, and reducing the energy intensity and production cost of existing advanced materials, participants felt that focusing on qualifying and preparing advanced materials for qualification broadly and better served the innovation ecosystem. Further, participants said that the PPP concept with this focus would likely have fewer IP concerns.

Governance Structure: In the session, participants agreed that this PPP should be managed by a contracted organization with oversight from an executive committee and/or a technical advisory board—populated with people familiar with the field and the work in each stakeholder group—including SMEs. While the Department of Energy is an important stakeholder, participants believed the Department may not be able to make decisions in a timeframe needed to stay abreast of developments in business. Working group participants supported the Department participating in an executive committee or board providing oversight for the PPP.

Membership Structure: Working group participants believed this PPP should exist semi-virtually—accessible to anyone of interest—and tied into existing physical resources available at brick-and-mortar facilities such as universities, national laboratories, and industry research laboratories. Of the three membership structure options presented, participants were less interested in creating a Materials Advisory Consortium or creating an Energy Materials Prize than creating a Facility. Participants suggested an effective PPP around this focus would catalogue expertise, equipment, and technical support for different materials and connect companies to these resources and capabilities in existing institutions across the nation. Through these connections, materials innovators could access a dense network of organizations interested in advanced materials, learn about good ideas and create innovations in other fields through cross-pollination. Through interactions with materials experts and interested organizations, PPP leaders could identify gaps in materials science to be addressed in the future. The PPP could also advertise promising materials and, in turn, attract venture capital investment.

Funding: Participants said that the PPP should be funded by government grants and membership fees and supported by in-kind contributions from industry, universities, and national laboratories. Working group participants agreed the Department of Energy and EERE should contribute funding to support this PPP concept, but as a minority participant, possibly at 33 percent where the Department's funding would support the aggregation of information and creation of connections throughout the innovation ecosystem. Founding partners would fund a larger portion of the

proposed PPP and therefore retain voting rights and decision-making power to decide the focus area and path of the PPP. Other stakeholders such as nonprofits, universities, and laboratories may pay smaller fees to be included in the PPP to advertise technical expertise, equipment, or other resources available for particular materials.

Benefits: Participants mentioned that this PPP concept has the ability to produce great benefits by increasing the speed to market of products using new advanced materials by reducing risk by facilitating material qualification, producing products at lower cost and higher efficiency/efficacy and by increasing interactions with different players in the field. Incorporating modeling and simulation into the scope of the PPP would further increase the benefits by building confidence in advanced materials properties under different conditions therefore increasing the speed of advanced materials introduction into products.

Benefits were also determined for individual stakeholder groups. Particular to SMEs, this PPP concept provides access to equipment that may have been too complicated or expensive previously. This access to equipment and the dense network could also act as an entry point for an SME into the supply chain of an OEM. For large companies and OEMs, this PPP concept leverages funding from many sources to increase the acceptance of an advanced material selected by the executive committee; creates connections to new materials, products, and SMEs; increases the knowledge of and access to equipment at external organizations; and provides a method to advertise their expertise and resources for use. By engaging in this proposed PPP, national laboratories and universities will have increased utilization of equipment specific to materials characterization, create another avenue for technology transfer especially in the increased use of developed advanced materials, and access materials challenges relevant to industry. The federal government, by supporting this PPP, would continue its mission of supporting U.S. competitiveness in the global marketplace through technology innovation, access to unparalleled resources funded by the government at universities and national laboratories, and—once materials innovations develop into products to be sold—job creation.

Metrics: To ensure continued support for the proposed PPP, working groups suggested several different metrics that could be used to demonstrate its progress and success and a member's return on investment. PPP participants from all stakeholder groups could keep track of the number of appointments they make, where an increased number demonstrates increased connections throughout the innovation ecosystem. Increased market-share, increased number of new contracts or partnerships, and increased productivity could also quantify the success of a PPP. National laboratories and universities could measure the number of technologies transferred to industry, and universities could use an additional metric such as tracking the number of graduates placed in industry.

PPP Concept 4: Facilitating the Transition of Prototypes to Deployable Products

In the fourth Public-Private Partnership concept: Facilitating the Transition of Prototypes to Deployable Products working group, Mr. Arthur "Chip" Cotton, Program Manager Energy Research and Development, GE Global Research moderated the conversation with three respondents, Dr. Matthew "Matt" Evans, Senior Manager for Advanced Technology in Corporate Engineering & Technology, Lockheed Martin Corporation; Mr. Michael Newell, Chief Executive Officer, Ener-G-Rotors; and Dr. Craig Blue, Energy Materials Program Director, Oak Ridge National Laboratory. Mr. Zachary Schafer, Senior Policy Director, Council on Competitiveness and Ms. Jetta Wong, Deputy Director for CEMI, Office of Energy Efficiency and Renewable Energy at the U.S. Department of Energy facilitated a conversation focused on increasing the number of innovative clean energy technologies entering the commercial market by lowering development costs and increasing access to funding.

In the discussion, participants agreed that facilitating a low-cost approach to commercialization will speed the release of products into the marketplace and increase idea generation overall. According to Mr. Newell, beyond a need to secure funding, SMEs creating technology innovations are concerned with integrating their product into the market, which can be facilitated by access to experts as proposed in this PPP concept and involving customers or end-users in the design for manufacturability process early. OEMs experiencing technology hurdles could also benefit by detailing certain needed specifications for a product through this PPP, similar to sponsored mini-grand challenges framed for organizations who can help overcome a hurdle, described by Mr. Cotton.

Mr. Nolan Browne, Managing Director, Fraunhofer Center for Sustainable Energy Systems; Mr. Andrew Garman, Founder and Managing Partner, New Venture Partners LLC; Dr. Matthew Evans, Senior Manager, Advanced Technology, Corporate Entrepreneur & Technology, Lockheed Martin Corporation; and Mr. Michael Newell, Chief Executive Officer, Ener-G-Rotors.

Participants in the third AEMC Partnership dialogue evaluated the Facilitating the Transition from Prototype to Deployable Product PPP concept using the 5 EERE Core Statements and agreed that helping technologies get through the second valley of death addresses a high impact problem, but with high associated risks. Participants agreed that EERE funding is expected to make a large difference, especially when used to access expertise in business, manufacturing, marketing, and other fields. Participants viewed this PPP concept as addressing a broad problem, accessible to all interested participants and open to new ideas, approaches, and performers—especially if the PPP is more than an online portal or information technology solution.

Participants agreed that the PPP concept, because of EERE funding and participation would result in enduring economic benefit to the United States by creating a supportive network to innovate and mature clean energy technologies and suppliers. EERE funding and participation represents a high-impact role for the federal government to play because this PPP would be most effective on a national level with the breadth, organization, and independence of the Department and EERE and in utilizing EERE's convening power to gather disparate organizations with interests in maturing clean energy technologies.

Participants from SMEs and technology innovating backgrounds including Ms. Arianna Kalian, Senior Vice President for Operations at ClearEdge Power, were particularly interested in supporting and engaging in this PPP, although representatives from other organizations in the working group saw less benefit from participation in the PPP. By increasing funding to clean energy technology innovators to access expertise and resources, this PPP concept decreases the time and cost for a clean energy technology to cross the second valley of death—and was viewed as advancing both AEMC Partnerships goals of increasing the U.S. competitiveness of clean energy products and increasing U.S. manufacturing competitiveness by increasing energy productivity in a shorter time frame than PPP concept 1: *Innovation Exchange Fellowship* or PPP concept 2: *Leveraging the Innovation Ecosystem*.

Perspectives from the Working Group on Topics of the Facilitating the Transition of Prototypes to Deployable Products PPP

Target Area: Participants supported the development of a PPP that focuses on facilitating the process of transitioning from a prototype to a deployable and profitable technology without focusing on a particular type of technology. When asked to make a choice, participants believed that increasing the production of clean energy products would be crucial for the future of U.S. manufacturing and energy efficiency products could reduce the energy needs of the manufacturing sector in a impactful way. However, participants agreed the PPP could also be strategically designed to target the scaling process without choosing clean energy or energy efficiency products.

Mr. Bernard Lupien, Vice President for Sales, TIAX LLC, and Mr. Michael Ulsh, Fuel Cell Manufacturing Project Lead, National Renewable Energy Laboratory.

Governance Structure: In the session, participants agreed that this PPP should be managed by a contracted organization with oversight from an executive committee and/or a technical advisory board—populated with people from each stakeholder group including the Department of Energy and SMEs to create consistency of leadership and broad perspectives. While the Department of Energy is an important stakeholder, participants believed that direct management by the Department might limit the ability of the PPP to engage private sector capabilities or offer additional services.

Membership Structure: Of the three membership structure options presented in the dialogue Primer—National Tools and Services, Innovative Machine Shop, or Regional Innovation Enhancements—working group participants believed this PPP concept should incorporate the National Tools and Services membership option in a semi-virtual overarching partnership and tie into existing facilities like the suggested Innovative Machine Shops across the country. Participants were less interested in having the PPP focus on Regional Innovation Enhancements or exist solely as an online database of information.

The selected membership structure for the PPP concept builds a consortium of technology innovators, manufacturers, funding sources, end buyers, and experts; catalogues and verifies the quality of the experts and resources available to support technology manufacturing; and provides experts to interact with individual technology innovators. In this interaction, a PPP employee would work to understand a technology innovator's needs and provide connections to and possibly subsidies for "Tiger Teams." These Tiger Teams are made up of true experts in business, manufacturing, marketing and other fields in existing institutions across the nation and who are aware of resources throughout the innovation ecosystem, such as the suggested Innovative Machine Shops.

Funding: The PPP should be funded by government grants, founding member contributions, and fees-for-service and further supported by in-kind contributions from industry, universities, and national laboratories. Working group participants agreed the Department of Energy and EERE should contribute funding to support the administration of the PPP and the creation of a marketplace that allows people to access information on innovation ecosystem resources for little or no cost. Founding partners would fund a larger portion of the proposed PPP and therefore retain voting rights and decision-making power to decide the focus area and path of the PPP. Other stakeholders such as non-profits, universities, and laboratories may pay smaller fees to the PPP to advertise technical expertise, equipment, or other

resources available. Individuals or companies not directly engaged in the PPP may pay fees-for-service to access matchmaking, certification, or testing services.

Benefits: Working group participants mentioned that this PPP concept has the ability to produce great benefits by increasing the likelihood an innovative technology will progress from a prototype to a commercial product by increasing access to funding or by increasing access to expertise and resources, thereby lowering the cost of the development and manufacturing process. Participants agreed that this PPP was most likely to have the greatest positive impact on SMEs.

Benefits were also determined for individual stakeholder groups. This PPP concept provides SMEs access to equipment and expertise that may have been too complicated or expensive previously. This access to equipment and the dense network could also act as an entry point for an SME into the supply chain of an OEM and possibly provides funding to mature an innovative technology. For large companies and OEMs, this PPP concept allows large companies to define areas for technologies to be supported; leverages funding from many sources to mature selected technologies; creates connections to new areas for investment, products, and SMEs; has the potential to improve supply chains; increases the knowledge of and access to equipment at external organizations; and provides a method to advertise their expertise and resources for use. By engaging in this proposed PPP, national laboratories and universities will increase utilization of available equipment, create another avenue for technology transfer, and contribute to a U.S. company's success in a shorter time frame than PPP concept 1: *Innovation Exchange Fellowships* or PPP concept 2: *Leveraging the Innovation Ecosystem*. The federal government, by supporting this PPP, would continue its mission of supporting U.S. competitiveness in the global marketplace through technology innovation by directly engaging in the maturation of innovative clean energy technologies, increase access to unparalleled expertise and resources funded by the government at universities and national laboratories, and—once the clean energy technologies develop into products on the market—job creation.

Metrics: To ensure continued support for the proposed PPP, working groups suggested several metrics that could be used to demonstrate its progress and success and a member's return on investment. Leaders of the PPP could keep track of the number of technologies helped by the PPP, number of matches made and the number of companies engaged in PPP activities. PPP leadership could also track additional funding secured to support the PPP and workers trained in developing technologies. OEMs could track the number of new companies or capabilities integrated into their supply chain to quantify the success of a PPP. National laboratories and universities could measure the number of technologies transferred to industry and additional relationships built with industry, and universities could use an additional metric such as tracking the number of graduates placed in industry.

PPP Concept 5: Industrial Kickstarter and Manufacturing Marketplace

In the fifth Public-Private Partnership concept: *Industrial Kickstarter and Manufacturing Marketplace* working group, Dr. Luana Iorio, Technology Leader for Manufacturing Technologies, GE Global Research moderated the conversation with three respondents, Mr. Thomas Halbouty, Vice President, Chief Information Officer, and Chief Technology Officer of Pioneer Natural Resources Company; Dr. Patrick Looney, Chairman of Sustainable Energy Technologies Department, Brookhaven National Laboratory; and Mr. Frank Wolak, Vice President, FuelCell Energy, Inc. Ms. Elizabeth Wayman, Director of the Clean Energy Manufacturing Initiative, Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy facilitated the conversation centered on providing information on available resources and creating a new source of funding to help energy technologies cross the second valley of death.

In the discussion, participants agreed that supporting clean energy technologies through the second valley of death by providing access to private capital through an online crowd-funding platform similar to www.kickstarter.com and access to expertise through a Manufacturing Marketplace would be impactful. This would be particularly helpful since venture capital for energy projects has been dwindling. This private capital could be contributed in sufficiently small amounts to remove investor concern for return on investment and allow innovators to retain their IP. As suggested by a participant, projects that receive crowd-funding through the online platform should also receive mentorship or consulting expertise. This mentorship provides credibility for technology innovators and lowers investment risk as a project progresses from design through mass manufacturing. A dialogue participant mentioned that energy technologies require low-risk and large investments to complete liability testing and build pilot plants and demonstration plants. These complications are an added layer of complexity from the art-focused www.kickstarter.com. The government could play a crucial role in this PPP concept by supporting projects through the liability testing once they have been scrutinized and supported through the crowd-funding platform.

Participants in the third AEMC Partnership dialogue evaluated the Industrial Kickstarter and Manufacturing Marketplace PPP concept using the 5 EERE Core Statements and agreed that helping technologies traverse the second valley of death using a modern solution addresses a high impact problem, although preferred PPP concept 4: *Facilitating the Transition from Prototypes to Deployable Products* as a method to achieve the same goal. Participants agreed that EERE funding is expected to make a large difference, especially if it is amplifying the contributions from others in the crowd-funding platform and increasing access to expertise in business, manufacturing, marketing, and other fields. Participants viewed this PPP concept as addressing a broad problem, accessible to all interested participants and open to new ideas, approaches, and performers—especially through a publicly accessible online platform. Participants agreed that the PPP concept, because of EERE funding and participation would result in enduring economic benefit to the United States, especially if it is run as a self-sufficient busi-

ness. EERE funding and participation represents a high-impact role for the federal government to play through both its convening power and ability to amplify the funding to support the manufacturing of clean energy technologies.

Participants from the working group supported this PPP concept, even with uncertainties that a crowd-funding model could collect sufficient investments to make a difference for energy technologies. This PPP concept provides funding to clean energy technology innovators—and was viewed as capable of advancing both AEMC Partnerships goals of increasing the U.S. competitiveness of clean energy products and increasing U.S. manufacturing competitiveness by increasing energy productivity.

Ms. Elizabeth Wayman, Director, Clean Energy Manufacturing Initiative, Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy.

Perspectives from the Working Group on Topics of the Industrial Kickstarter and Manufacturing Marketplace PPP

Target Area: Participants supported the development of a PPP that focuses on supporting energy efficient manufacturing. While targeting clean energy manufacturing technologies could create new market segments, participants agreed that these technologies are too risky for this PPP. By supporting energy efficient manufacturing, this PPP concept has a shorter return on investment and has the potential to help a larger group of stakeholders.

Governance Structure: Participants agreed that this PPP should be managed by a contracted organization with experience in managing an online platform and in working with industry. The contracted organization would have oversight from an executive committee—with representation from major industries and the Department of Energy. This executive committee would decide the future direction of the PPP and specific topics nominated to publish on the online platform.

Membership Structure: Working group participants believed this PPP concept should incorporate representatives from small and large industries, national laboratories, universities, regional, state, and federal governments, and the venture capital community and follow the model launched by www.kickstarter.com, an online platform that crowd-funds art projects. Projects that meet a certain criteria would be posted on an online platform to solicit money or other in-kind contributions from individuals or organizations to move a technology across the second valley of death.

Funding: Participants said that the online platform, central to this PPP concept, should initially be funded by government grants, industry, and the venture capital community. Working group participants agreed the Department of Energy and EERE should contribute funding to support the administration of the PPP and the creation of a marketplace that allows people to access information on innovation ecosystem resources for little or no cost. Contributors from the online platform would fund projects and access to expertise for projects, which, once it has reached a threshold, the government could match or amplify as another source of funding. Other stakeholders such as non-profits, universities, and laboratories may pay smaller fees to be included in the PPP concept's Manufacturing Marketplace to advertise technical expertise, equipment, or other resources available. Once instantiated, participants agreed that this PPP concept should aim to become self-sufficient from crowd-funding or fee-for-service activities.

Benefits: Working group participants mentioned that this PPP concept might produce benefits by increasing access to funds and expertise capable of supporting a clean energy technology through the second valley of death. This PPP concept provides SMEs access to equipment and expertise that may have been too complicated or expensive previously, visibility to a wide range of potential investors, and could provide funding to mature an innovative technology. For large companies and OEMs, this PPP concept allows large companies to define areas for technologies to be supported; leverages funding from many sources to mature selected technologies; and increases the knowledge of and access to equipment at external organizations. By engaging in this proposed PPP's Manufacturing Marketplace,

national laboratories and universities may increase utilization of equipment through the Manufacturing Marketplace, and have access to another avenue for technology transfer through the Industrial Kickstarter. The federal government, by supporting this PPP, would continue its mission of supporting U.S. competitiveness in the global marketplace through technology innovation by supporting the crowd-funding for maturing prototypes into deployable products in the Industrial Kickstarter, increase access to unparalleled expertise and resources funded by the government at universities and national laboratories through the Manufacturing Marketplace, and—once the innovations develop into products on the market—job creation. These benefits would also be achieved in a shorter time frame using this PPP concept than using PPP concept 1: *Innovation Exchange Fellowships* or PPP concept 2: *Leveraging the Innovation Ecosystem*.

Metrics: To ensure continued support for the proposed PPP, working groups suggested several metrics that could be used to demonstrate its progress and success. Leaders of the PPP could keep track of the number of technologies funded through the crowd-funding online platform and the number of matches made through the Manufacturing Marketplace. PPP leadership could also track additional funding secured to support the PPP and workers trained in developing technologies. National laboratories and universities could measure the number of technologies transferred to industry and additional relationships built with industry.

Mr. Francis J. Murray, Jr., President & Chief Executive Officer, New York State Energy Research and Development Authority; Dr. Prabhakar Singh, Director, Center for Clean Energy Engineering and UTC Endowed Chair Professor in Fuel Cell Technology, Department of Materials Science and Engineering, University of Connecticut, and the Honorable David T. Danielson, Assistant Secretary for Energy Efficiency and Renewable Energy, U.S. Department of Energy

PART 2: FINDINGS FROM AEMC PARTNERSHIP DIALOGUE 3

Overarching Perspectives of the Presented PPP Concepts

All five public-private partnership concepts were supported for the benefits they could unleash in the innovation ecosystem, during the concluding plenary session where dialogue participants used the EERE Core Questions to evaluate all 5 PPP concepts. The results of the evaluation, shown in Figure 1, (1 = Strongly Disagree, 4 = Strongly Agree) indicate two PPP concepts received widespread support from stakeholders present: A*dvanced Materials Characterization, Experimentation and Standardization* (PPP Concept 3) and *Facilitating the Transition from Prototypes to Deployable Products* (PPP Concept 4). The other PPP concepts received support and participants agreed that portions could be combined to make the two selected PPP concepts stronger.

These two concepts can be considered as two methods that better *Leverage the Innovation Ecosystem* (PPP Concept 2). These two concepts could also be strengthened by incorporating activities including an *Innovation Exchange Fellowship* (PPP Concept 1) or creating an online platform to post projects and share information on available resources like an Industrial Kickstarter. By identifying these two specific PPP concepts as ripe for engagement by the public and private sectors, the AEMC Partnership has identified two gaps that affect the manufacturing and energy sectors for further discussion at the fourth AEMC Partnership dialogue to be co-hosted by Mr. Michael Splinter, Chairman of the Board at Applied Materials, Inc. in Santa Clara, California on October 17, 2013. Collaborating to address one or both of these gaps in the near term will bolster dramatically U.S. energy, manufacturing, and economic competitiveness over the next 20, 30, 40 years and beyond.

Figure 1. Results of PPP Concepts Evaluations During the Third AEMC Partnership Dialogue

(1 = Strongly Disagree, 4 = Strongly Agree)

EERE Core Questions	PPP Concept 1 Innovation Exchange Fellowship	PPP Concept 2 Leveraging the U.S. Innovation Ecosystem	PPP Concept 3 Advanced Materials Characterizations	PPP Concept 4 Transition Prototypes to Deployable Products	PPP Concept 5 Industrial Kickstarter and Manufacturing Marketplace
High Impact	2.8	2.9	3.5	3.4	2.8
Additionality	2.6	2.8	3.2	3.1	2.7
Openness	2.9	2.9	3.3	3.2	2.9
Enduring Economic Benefit	2.5	2.9	3.3	3.3	2.7
Proper Role of Government	2.7	2.9	3.2	3.1	2.7
Would Participate	2.9	2.8	3.4	3.0	2.6

PART 2: FINDINGS FROM AEMC PARTNERSHIP DIALOGUE 3

Discussion: Facilitating Knowledge Spillover

Knowledge Spillover is noted as an important and self-propagating effect that strengthens successful clusters and collaborations and attracts growth and investment in the Power of Partnerships.[13] In the Facilitating Knowledge Spillover discussion, Ms. Wayman moderated a conversation between Dr. William Banholzer, former Chief Technology Officer, New Business Development, and Executive Vice President of The Dow Chemical Company and Dr. Mark Peters, Deputy Laboratory Director for Programs at Argonne National Laboratory. As discussed in previous AEMC Partnership dialogues, national laboratories and academia can be utilized to provide new ideas and expertise in specific areas, while industry provides on-the-ground knowledge of problems that need solutions, expertise in commercializing products, and funds to contribute to relevant research.

By building relationships between these disparate organizations, synergistic benefits can be achieved. Involving national laboratories and academia in manufacturing provides data and feedback on what the market is actually looking for, accelerates the innovation cycle, and funnels the brightest minds into problems affecting the U.S. economy. Dr. Banholzer mentioned that manufacturing industries strive to make a profit every time a product is sold on the market—requiring constant innovation. Therefore, staying abreast of manufacturing allows quick access to new problems to solve and ensures research remains relevant to industry. Industry also benefits from this interaction. Of importance to the manufacturing and marketing of energy technologies is technology validation and reliability—the national laboratories have expertise in both validation and reliability that could be of use to manufacturing industries, honed from years of supporting the nuclear security complex.

Dr. Steven Duclos, Chief Scientist and Leader, Material Systems and Nanotechnology Advanced Technology Program, GE Global Research; Dr. Joseph Suriano, Technology Leader-Engineered Materials, Chemistry & Physics, GE Global Research, and Dr. William Banholzer, former Chief Technology Officer, New Business Development, and Executive Vice President of The Dow Chemical Company

During the discussion, Dr. Danielson mentioned that "spill" sometimes has a bad connotation—industry may not choose to share their problems with national laboratories for fear of losing competitive advantage if the public learns of challenges or if confidential corporate information is not protected. Dr. Peters and Dr. Banholzer mentioned that IP agreements should be put in place to create a foundation of trust. Additionally, in the building of a relationship, both types of organizations may begin with simplified or smaller collaborations where a potential "spill" does not create a devastating effect. In time, with trust and better communication, trustworthy relationships are built and the extended benefits of knowledge spillover enrich the entire innovation ecosystem.

13 Council on Competitiveness. *The Power of Partnerships*. 2013. Available at: http://www.compete.org/publications/detail/2473/the-power-of-partnerships/.

PART 2: FINDINGS FROM AEMC PARTNERSHIP DIALOGUE 3

The Path Forward

Going forward, the AEMC Partnership will focus on further detailing two of the proposed partnerships into collaborations that increase U.S. competitiveness in developing innovative clean energy products and increase manufacturing competitiveness overall.

As seen in Figure 2, these two PPP concepts have the potential to link all stakeholders in the U.S. innovation ecosystem, to create a dense network.

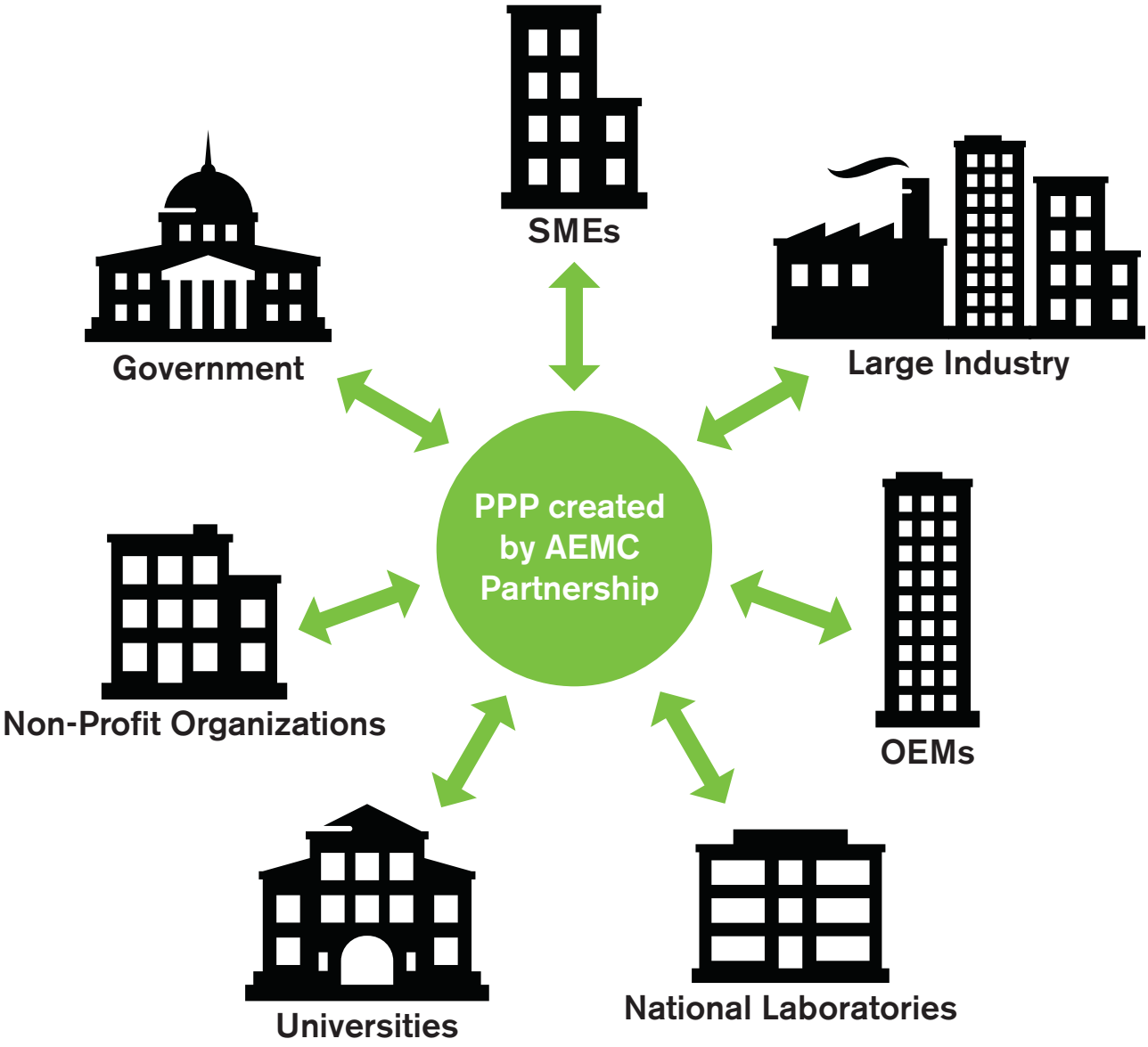
With stakeholder input to ensure effective leverage points are targeted and pivotal partners are included, these public-private partnerships can spur the development of the most advanced clean energy technologies, increase U.S. manufacturing competitiveness and stimulate economic growth across the board.

"We are a nation of collaboration. We have tribes within this nation—tribes of universities, national laboratories, numerous tribes in industry, and our government—federal and state. Through these discussions, we can find ways to collaborate, work together, to do something big and important for our nation."

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

Figure 2. Leveraging the Innovation Ecosystem

Creating a PPP with input from stakeholders across the innovation ecosystem through the AEMC Partnership will increase communication and, in turn, U.S. competitiveness.



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 & 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 and Renewable Energy, U.S. Department of Energy; Ms. Jetta Wong, Deputy Director, Clean Energy Manufacturing Initiative, Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy, and Dr. Mark M. Little, Senior Vice President and Chief Technology Officer, General Electric.

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The Council on Competitiveness is the only group of corporate CEOs, university presidents and labor leaders committed to ensuring the future prosperity of all Americans and enhanced U.S. competitiveness in the global economy through the creation of high-value economic activity in the United States.

Council on Competitiveness
1500 K Street, NW, Suite 850
Washington, D.C. 20005
T 202 682 4292
F 202 682 5150
www.compete.org

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1500 K Street, NW, Suite 850
Washington, D.C. 20005
T 202 682 4292
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