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Council on
Competitiveness

American Energy & Manufacturing
Competitiveness Partnership

Dialogue 3 Primer

August 13, 2013

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) Partnership¹; 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. Assistant Secretary of the EERE David Danielson will lead the discussion, alongside Council President & CEO Deborah L. Wince-Smith, and GE Senior Vice President, Chief Technology Officer, Director of the GE Global Research Center, and dialogue host, Dr. Mark Little.

The AEMC Partnership will convene a fourth regional dialogue this year hosted by Applied Materials Chairman and CEO, Michael Splinter—who also serves as the Council's Vice Chair—and Applied Materials CTO, 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, Energy and Manufacturing Competitiveness Summit on December 12, 2013.

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

Dialogue 3 Primer

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The American Energy and Manufacturing Competitiveness (AEMC) Partnership

The AEMC Partnership is a three-year effort by the Council on Competitiveness (Council) and the U.S. Department of Energy Office of Energy Efficiency and Renewable Energy (EERE) to bring together national leaders to address a rapidly shifting national and global energy and manufacturing landscape. In a series of progressive dialogues over Spring-Fall 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 Initiative², 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.

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.

² 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*.³ 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

³ Both of these documents are available at <http://www.compete.org/about-us/initiatives/aemcp/>.

AEMC Partnership: Dialogue Series

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 Mark Little, Senior Vice President and Chief Technology Officer of GE and Director of the GE Global Research center 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 homing in on potential PPP models. 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 Michael Splinter, Chief Executive Officer of Applied Materials, and Omkaram Nalamasu, Chief Technology Officer of Applied Materials, 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 Summit on December 12, 2013, in Washington, DC. Future dialogues to evaluate proposed PPP models 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



Dr. David T. Danielson, U.S. Department of Energy Office of Energy Efficiency and Renewable Energy; The Honorable Deborah L. Wince-Smith, Council on Competitiveness; Jason Miller, National Economic Council; Libby Wayman, U.S. Department of Energy Office of Energy Efficiency and Renewable Energy; and Chad Evans, Council on Competitiveness.

The inaugural dialogue convened and engaged over 100 senior leaders from industry, government, academia, labor, and the national laboratory system. Co-hosted by Deborah L. Wince Smith, President & CEO of the Council, and David T. Danielson, Assistant Secretary of EERE, 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.

Participants in the inaugural dialogue included: Mr. Jason Miller, Special Assistant to the President for Manufacturing Policy; Dr. Pradeep Khosla, Chan-

cellor, University of California-San Diego; Dr. Dan Arvizu, Director of the National Renewable Energy Laboratory; Dr. Thom Mason, Director of Oak Ridge National Laboratory; Mr. Sean McGarvey, President, Building and Construction Trades Department of AFL-CIO; Dr. Om Nalamasu, Chief Technology Officer of Applied Materials, Inc.; Dr. J. Michael McQuade, Senior Vice President for Science and Technology at United Technologies Corporation; and, Dr. Monty Alger, Senior Vice President, Research and Development, Myriant.

An important function of the inaugural dialogue was to identify, understand, and discuss the opportunities 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, Council President & CEO Deborah L. 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 Honorable Deborah L. Wince-Smith, Council on Competitiveness; Dr. Pradeep Khosla, University of California, San Diego; and Dr. J. Michael McQuade, United Technologies.

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;
- 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 the Second AEMC Partnership Dialogue

The second AEMC Partnership dialogue convened over 40 leaders from industry, academia, and the national laboratory system. Co-hosted by Deborah L. Wince-Smith, President & CEO of the Council; Dr. David T. Danielson, Assistant Secretary of the U.S. Department of EERE; 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 cata-



Dr. 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.

lytic role in the transformation of Ohio’s glass-centric manufacturing base into the high-tech, high valued-added solar energy cluster that exists today.

“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.”

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

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. Assistant Secretary 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.”

Dr. 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 four 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;



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

- 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.

Third AEMC Partnership Dialogue

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* report, 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 models 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 vetting.

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 models 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 se-

ries of three breakout sessions. Each working group will discuss, evaluate, and score options for one of five PPP models detailed in the following section of the primer.

Working Groups: Breakout Session 1

In this breakout session, each working group will discuss the PPP model 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 model 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 model 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 Model using the provided EERE Core Questions listed below. The answers to the EERE Core Questions will be instrumental in the convergence on two or three PPP models 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 model—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 Questions

To help evaluate each PPP participants should examine how option in light of the following questions:

- 1. High Impact:** Is the PPP addressing a high-impact problem?
- 2. Additionality:** Will the EERE funding make a large difference relative to what the private sector (and other funding entities) is already doing?
- 3. Openness:** Does the PPP focus on the broad problem we are trying to solve and be open to new ideas, new approaches, and new performers?
- 4. Enduring Economic Benefit:** How would EERE funding of such a model result in enduring economic benefit to the United States?
- 5. Proper Role of Government:** Would EERE funding represent a proper high-impact role of government versus something best left to the private sector to do on its own?

PPP Model 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 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.

Model Evaluation Rubric: PPP Model 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 Industrial 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 lab, 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 lab capabilities available to the host organizations.

Options

1. *Senior Fellowship:* Long-term, senior-level scientists from national labs 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 labs 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 lab capabilities that would benefit their host.
3. *Exchange Fellows:* Exchanging scientists and researchers from the private industry to the national lab. 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 labs 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.
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.

Model Evaluation Rubric: PPP Model 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 Labs			
2	Junior Fellowship			
	Contributions from:			
	SMEs			
	OEMs			
	U.S. Government			
	Non-Profit			
	University/National Labs			
3	Exchange Fellowship			
	Contributions from:			
	SMEs			
	OEMs			
	U.S. Government			
	Non-Profit			
	University/National Labs			
4	Sponsorship Fellowship			
	Contributions from:			
	SMEs			
	OEMs			
	U.S. Government			
	Non-Profit			
	University/National Labs			
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			

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 provide 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 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 Questions

To quantify benefits to the innovation ecosystem that this PPP model provides, each model must satisfy the following core drivers:

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.

Model Evaluation Rubric: PPP Model 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 Labs				
2	Junior Fellowship				
	Benefits to:				
	SMEs				
	OEMs				
	U.S. Government				
	Non-Profit				
	University/National Labs				
3	Exchange Fellowship				
	Benefits to:				
	SMEs				
	OEMs				
	U.S. Government				
	Non-Profit				
	University/National Labs				
4	Sponsorship Fellowship				
	Benefits to:				
	SMEs				
	OEMs				
	U.S. Government				
	Non-Profit				
	University/National Labs				

EERE CORE QUESTIONS					
	SD: Strongly Disagree	D: Disagree	A: Agree	SA: Strongly Agree	
Number	EERE Core Questions			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 Model 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 confusing and difficult to access. 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 United States' 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.

Model Evaluation Rubric: PPP Model 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 Industrial Fellows program) for how to better leverage university and DOE's national laboratory 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, 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 lab.
 - Tier 2: (~50K) Directly support development of tools (or fund personnel to run an internal program) to translate national lab capabilities or drive suppliers to use the capabilities, by proactively connecting them to relevant lab POCs, or combinations of the above.
 - Tier 3: (~200K) House X Industrial Fellows, or exchange X Fellows between your company and a national lab, or combinations of the above.
 - Tier 4: (~500K) Sponsor Y suppliers to use the products of the PPP and fund their time on lab equipment, or combinations of the above.
 - Tier 5: (~1000K) Support the tool or products, House X Fellows, and sponsor Y 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 lab 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 lab 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) FOA that required applicants to identify a technologist who has never worked with the labs and partner them with a lab for an R&D project. DOE could work with the national labs 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 labs.
4. DOE provides vouchers or grants to work with the national labs 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.

Model Evaluation Rubric: PPP Model 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 Labs			
2	Tiers			
	Contributions from:			
	SMEs			
	OEMs			
	U.S. Government			
	Non-Profit			
	University/National Labs			
3	Innovative Suppliers			
	Contributions from:			
	SMEs			
	OEMs			
	U.S. Government			
	Non-Profit			
	University/National Labs			
4	Vouchers			
	Contributions from:			
	SMEs			
	OEMs			
	U.S. Government			
	Non-Profit			
	University/National Labs			
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 provide 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 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 Questions

To quantify benefits to the innovation ecosystem that this PPP model provides, each model must satisfy the following core drivers:

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.

Model Evaluation Rubric: PPP Model 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 Labs				
2	Tiers				
	Benefits to:				
	SMEs				
	OEMs				
	U.S. Government				
	Non-Profit				
	University/National Labs				
3	Innovative Suppliers				
	Benefits to:				
	SMEs				
	OEMs				
	U.S. Government				
	Non-Profit				
	University/National Labs				
4	Vouchers				
	Benefits to:				
	SMEs				
	OEMs				
	U.S. Government				
	Non-Profit				
	University/National Labs				

EERE CORE QUESTIONS				
	SD: Strongly Disagree	D: Disagree	A: Agree	SA: Strongly Agree
Number	EERE Core Questions	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 Model 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.

Model Evaluation Rubric: PPP Model 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 ideas, 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 lab 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 prize 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 expertise donation 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.

Model Evaluation Rubric: PPP Model 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 Labs				
2	Materials Advisory Consortium				
	Contributions from:				
	SMEs				
	OEMs				
	U.S. Government				
	Non-Profit				
	University/National Labs				
3	Energy Materials Prize				
	Contributions from:				
	SMEs				
	OEMs				
	U.S. Government				
	Non-Profit				
	University/National Labs				
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 provide 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 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 Questions

To quantify benefits to the innovation ecosystem that this PPP model provides, each model must satisfy the following core drivers:

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.

Model Evaluation Rubric: PPP Model 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 Labs			
2	Materials Advisory Committee			
	Benefits to:			
	SMEs			
	OEMs			
	U.S. Government			
	Non-Profit			
	University/National Labs			
3	Energy Materials Prize			
	Benefits to:			
	SMEs			
	OEMs			
	U.S. Government			
	Non-Profit			
	University/National Labs			
EERE CORE QUESTIONS				
SD: Strongly Disagree	D: Disagree	A: Agree	SA: Strongly Agree	
Number	EERE Core Questions	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 Model 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 into 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 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 domestic innovation ecosystem.

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.

Model Evaluation Rubric: PPP Model 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 to increase the production of clean energy products					
2	Technologies to increase energy efficiency in manufacturing					
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.

Model Evaluation Rubric: PPP Model 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 Labs			
2	Innovative Machine Shop			
	Contributions from:			
	SMEs			
	OEMs			
	U.S. Government			
	Non-Profit			
	University/National Labs			
3	Region Innovation Enhancements			
	Contributions from:			
	SMEs			
	OEMs			
	U.S. Government			
	Non-Profit			
	University/National Labs			
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 provide benefits to the largest number of stakeholders.

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EERE Core Questions

To quantify benefits to the innovation ecosystem that this PPP model provides, each model must satisfy the following core drivers:

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.

Model Evaluation Rubric: PPP Model 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 Labs				
2	Innovative Machine Shop				
	Benefits to:				
	SMEs				
	OEMs				
	U.S. Government				
	Non-Profit				
	University/National Labs				
3	Regional Innovation Enhancements				
	Benefits to:				
	SMEs				
	OEMs				
	U.S. Government				
	Non-Profit				
	University/National Labs				
EERE CORE QUESTIONS					
	SD: Strongly Disagree	D: Disagree	A: Agree	SA: Strongly Agree	
Number	EERE Core Questions			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 Model 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 RFIs or 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 much 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.

Model Evaluation Rubric: PPP Model 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 model, founding partners of the PPP would select projects from SMEs within their own supply chain for the first round. 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 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.

Model Evaluation Rubric: PPP Model 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			
	Contributions from:			
	SMEs			
	OEMs			
	U.S. Government			
	Non-Profit			
	University/National Labs			
2	SME Service Membership			
	Contributions from:			
	SMEs			
	OEMs			
	U.S. Government			
	Non-Profit			
	University/National Labs			
3	Foundational Membership			
	Contributions from:			
	SMEs			
	OEMs			
	U.S. Government			
	Non-Profit			
	University/National Labs			
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?

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Model Evaluation Rubric: PPP Model 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			
	Benefits to:			
	SMEs			
	OEMs			
	U.S. Government			
	Non-Profit			
	University/National Labs			
2	Subsidized Service Membership			
	Benefits to:			
	SMEs			
	OEMs			
	U.S. Government			
	Non-Profit			
	University/National Labs			
3	Foundational Membership			
	Benefits to:			
	SMEs			
	OEMs			
	U.S. Government			
	Non-Profit			
	University/National Labs			

EERE CORE QUESTIONS				
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Looking Forward

The third AEMC Dialogue represents an important shift in the second phase of the AEMC Partnership. In large part, the exploratory nature of the Partnership is coming to a close. In the first two dialogues, national and regional leaders have uncovered and quantified both the challenges and opportunities facing clean energy manufacturing in the United States. Furthermore, these dialogues have 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 on Competitiveness, the conversation has been substantively deepened and narrowed to the exploration of the five PPP model 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 models will have been reduced even further, offering the first glimpse of the potential outcome of the 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 Partnership is attempting to bolster and interconnect to make the United States' manufacturing infrastructure more dense, more resilient, and more dynamic.

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) 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
- Direct and indirect job creation
- New companies established
- Follow-on investments
- Publications/Presentations/Citations
- Invention disclosures/Patent applications



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