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Wilton E. Scott Institute  
for Energy Innovation



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## **Can National Manufacturing Energy Efficiency Policies Be a Tool to Improve U.S. Competitiveness? What Works and Doesn't Work Today? What Might Work in the Future?**

Summary of an Invitation-Only Roundtable and Workshop Discussion<sup>1</sup>

On January 12, 2018, Carnegie Mellon University's (CMU) Wilton E. Scott Institute for Energy Innovation ([CMU Scott Institute](#)), hosted a two-hour roundtable discussion and follow-on workshop on manufacturing and energy efficiency with its partners. The Institute's partners include Catalyst Connection ([Catalyst Connection](#)), Energy for the Power of 32 ([Energy for the Power of 32](#)), the Tri-State University Energy Alliance (CMU, Case Western Reserve University Great Lakes Research Institute ([Great Lakes Energy Institute](#)), University of Pittsburgh Center for Energy ([UPitt Center for Energy](#)) and West Virginia Energy Institute ([WVU Energy Institute](#))), Innovation Works ([Innovation Works](#)) and the RAND Corporation ([RAND Corporation](#)),

This event brought together over 20 manufacturers, along with policymakers, nongovernmental organizations, universities, community colleges and experts in energy efficiency, manufacturing, innovation, and workforce. The goal of the manufacturing roundtable and the expert workshop was to:

- Describe what activities they have undertaken, or considered, in the arena of manufacturing and energy efficiency; and

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<sup>1</sup> This report summarizes the content, conclusions, and recommendations from a cross-sector, collaborative workshop organized by Carnegie Mellon University. Built on the robust and constructive dialogue of workshop participants, the recommendations put forth in this report merit Consideration. This report represents general agreement achieved during the workshop but does not necessarily reflect the opinions and ideas of each individual participant or the views of their affiliated organizations or Carnegie Mellon University. Focused on summarizing workshop discussions, this report also does not purport to describe all complexities associated with each topic.

- Identify the opportunities and challenges their companies faced in reaching their energy efficiency sales and implementation goals.
- Propose policy actions that might be implemented at the federal level to improve the competitiveness of manufacturing by improving the sector's energy efficiency and consumption of its energy efficient manufactured products.

### ***Opening Remarks***

After a welcome introduction by Professor Jay Whitacre, the director of CMU's Scott Institute for Energy Innovation, Congressman Mike Doyle, US House of Representatives (PA-14), provided a keynote speech outlining the charge to the group. He was followed by Congressman David McKinley, US House of Representatives (WV-1), who provided his perspective on energy issues.

#### ***Congressman Mike Doyle***

Congressman Doyle highlighted the importance of technical innovations in order to combat climate change and to improve American competition in the manufacturing sector. He began his presentation by providing an overview of the status of the manufacturing industry in the US, which is a \$2.1 trillion industry.

Congressman Doyle stated that the manufacturing sector accounted for 65% of total exported goods in the US, and constituted 17.5% of total manufactured goods by GDP, the second largest in the world. Even though the sector added around 200 thousand jobs in 2017, Congressman Doyle emphasized that the US manufacturing sector needs to do more to restore job numbers to pre-recession levels, pointing to the recent loss of 450 jobs due to the closure of five plants in Southwestern Pennsylvania.

Congressman Doyle also highlighted the significance of energy efficiency in the US manufacturing sector. Apart from employing over 2 million people (more than coal, natural gas and the renewable industry combined), the Congressman pointed to the success of energy efficiency pilot projects that have reduced electricity bills by 25%. He then praised the effectiveness of existing programs, such as the US Department of Energy's (DOE) 'Better Plants' program.

The [DOE Better Plants Program](#) has shown remarkable progress in facilitating increased industry investment in energy efficiency measures, through the sharing of best practices among companies. These investments have improved manufacturing energy intensities, which is the amount of energy utilized in producing a given level of output or activity.

However, the Congressman pointed out that further potential energy savings up to 30% from manufacturing efficiency programs could be realized with today's technology.

With the Energy Star reform ([Energy Star Reform Act of 2017](#)), the Public Utility Regulatory Policies Act (PURPA) reform ([PURPA Modernization Act of 2017](#)) and the DOE reauthorization bill on the docket in Congress, Congressman Doyle urged the gathering to share their ideas and concerns so that they can be addressed in future congressional committee meetings.

### ***Congressman David McKinley***

Congressman David McKinley began his speech by thanking Congressman Doyle for being a staunch ally for energy in Congress. As one of two licensed engineers in Congress, he expressed his concerns about how Congress has traditionally stuck to 'nibble around issues' and not consider the bigger picture. While acknowledging the benefits of energy efficiency efforts, the Congressman pointed out that energy efficiency has a funny 'stigma' in Washington, and the term tends to be used interchangeably with conservation.

The Congressman emphasized the importance of investing in R&D programs to bolster energy efficiency in super and ultra-supercritical boilers, which have the potential to reduce nearly 2.5% of US CO<sub>2</sub> emissions. He also emphasized the need to transition from the conventional Rankine cycle to the promising Allam cycle that captures carbon emissions while generating electricity. An experimental 50 MW facility in Texas is nearing completion and will be initiating testing this year.

Congressman McKinley highlighted the need for policymakers to focus on larger issues when it comes to energy efficiency. An expanded mindset is needed, for example, if the US wants to follow Japan in experimenting with wireless electric transmission, the technology that Congressman McKinley described as "efficiency personified."

### ***Roundtable and Workshop Discussion***

The goal of the roundtable and workshop discussions were to answer three major focus questions:

1. What federal policies might encourage greater investment in energy efficiency technologies in the manufacturing sector?

2. What federal policies might connect firms that manufacture energy-efficient products in a region with the utilization of those products in the same region for societal benefit?
3. What role might new technologies, services and the new Hazelwood complex play throughout?

Over 20 manufacturers described what their organizations did, and expressed their expert views and concerns with achieving energy efficiency in the industrial and manufacturing sectors. Following the roundtable discussions, participants reconvened to discuss potential solutions to energy issues that the group could pass on to members of Congress. The following discussions were moderated by Joseph S. Hezir, Professor of the Practice at the Scott Institute, and former CFO of the US Department of Energy. Questions were posed to the participants on the topics that were brought forward by the manufacturers, and the discussions that transpired aimed to inform constructive solutions that could be passed on to policymakers.

During these discussions, the participants brought forth several policies that they identified as essential in ensuring the competitiveness of the American manufacturing industry. These action points have been summarized in the following table according to some common themes that emerged during the meeting.

***Illustrative policy options identified by workshop/roundtable participants***

<b>Policy Topics</b>	<b>Illustrative Policy Options</b>
Workforce development	Invest in workforce apprenticeship programs, short-term task-oriented training programs and explore new educational approaches that are consistent with freelance "gig" employment opportunities.
Combined Heat and Power (CHP)	Explore new business models such as third-party involvement in CHP project development, financing and operations.
	Consider additional financial incentives to improve ROI of proposed CHP projects.
	Establish more equitable "win-win" arrangements among manufacturers, utilities and CHP providers

	(e.g., reduced grid congestion, surcharges for backup power when CHP is not available).
Resiliency of electricity supply	Encourage utilities to maintain a stable and reliable supply of electricity for manufacturing such as a diversified supply portfolio.
Economic hurdles and need for modernization	Promote efforts to upgrade electrical equipment in dated industrial and manufacturing infrastructure, building on the tax cut legislation and the proposed national infrastructure initiative.
	Encourage the development of alternative financing mechanism such as the expansion of C-PACE to manufacturing energy efficiency investments.
De-risking of technology and innovation	Encourage R&D partnerships among users and manufacturers of energy efficient goods and services, national laboratories, universities and investors.
	Establish "real world" testing options to enable manufacturing partnerships to de-risk new and innovative technologies prior to deployment.

Delving deeper into these common themes, the roundtable and workshop participants discussed and identified common concerns and solutions that they encountered in their respective fields.

1. Workforce issues

There was a general agreement among the participants that there is a shortage of talent with the skill set needed to propagate manufacturing energy efficiency. However, there was a wide range of ideas on how to resolve this problem.

Some manufacturers pointed to strengthening the support for more apprenticeship programs that provide on-the-job training and employment to apprentices. Companies identified the need for capital investment in training as a hurdle that small- and medium-sized businesses need to overcome. Another manufacturer pointed out that apprenticeship programs are a "1,000-year-old model for training," and in today's world, not many companies have that mindset. Instead, a freelancer model that captures the

essence of today's 'shared-economy' was suggested, as this would be a more effective solution where a workforce solution is curated to the demand for newer skills in the industry.

Participants also pointed to a disconnect between the required skills and the capabilities of graduates from universities and community colleges. The manufacturers discussed the importance of a well functioning system that would focus on providing the appropriate skills for students in universities and community colleges. One of the proposed measures was the sponsorship of individual modules by manufacturers in these educational institutions. Another policy measure discussed that would reaffirm the importance of career and technical education was the Perkins Reauthorization ([Perkins Reauthorization Bill](#)).

## 2. Combined Heat and Power (CHP)

Combined Heat and Power is the concurrent production of electricity, or mechanical power, and useful thermal energy, from a single source of energy. Manufacturers noted that the low natural gas prices have led to lower electricity prices on the grid, diminishing the returns for CHP projects. Manufacturers also pointed to many operational issues arising from CHP implementation such as additional maintenance of multiple technology systems and specialized training of the operating staff. Some noted that renewable electricity projects benefit from long-term power purchase agreements (a financial agreement mechanism that has played a huge role in the solar industry, [Solar Power Purchase Agreements](#)), and suggested that a similar policy mechanism could facilitate additional CHP projects.

## 3. Resiliency of electricity supply

The roundtable participants discussed various issues related to electricity supply including pricing, power quality (grid's ability to supply a clean and reliable power supply) and behind-the-meter distributed generation. Manufacturers contended that the reliability of the nation's electricity supply plays a crucial role in consolidating the competitiveness of the manufacturing sector.

Some manufacturers identified fuel prices and the diversity of fuel sources as an important factor in ensuring the reliability of the grid. For example, the discussions pointed out that over a third of the nuclear plants may prematurely shutdown in the next five years, leaving the grid exposed to natural gas price volatility. Some participants identified the possibility of new mandates for electricity storage as a "driver for innovation," and called for new tax incentives similar to the renewable electricity

production/investment tax credits ([Renewable Electricity Production Tax Credit](#)) to encourage increased deployment, and to improve the reliability of the electricity supply.

4. Economic hurdles and need for modernization—access to capital, and alternatives to payback period as a principle metric for investment options

One theme that emerged during the discussion among the participants was access to capital for financing energy efficiency projects. Several options that were suggested during the meeting included using third-party lenders who considered sustainability in their mission statements, and supporting clean energy financing programs such as the Commercial Property Assessed Clean Energy programs ([C-PACE](#)).

A new benefit noted in the discussion was the new tax code ([Tax Cuts and Jobs Act 2017](#)). The Act changed the depreciation schedule in the Maximum Accelerated Cost Recovery System, so that companies can now expense 100% of their capital investment in the first year, making such investments more attractive. One participant did a back-of-the-envelope calculation to illustrate the combined effects of the provisions in the new tax act. He found that, for a solar energy project acquisition, it would lead to an ROI of over 6% and a net present value of over 27%. He also noted however, that this benefit would be offset by the new tariff of up to 30% on solar cells and modules imported from certain countries ([Imported Solar Cells and Modules](#)).

The discussions then focused on the issue of payback periods in manufacturing energy efficiency projects. The participants noted that a shorter payback period is the primary metric governing investments in energy efficiency projects, but indicated that other factors should also be considered. For example, participants identified enhanced resilience and improved power quality as two factors that also should be considered in the payback assessment but are difficult to quantify. Another manufacturer pointed out that there may be information barriers that make it more challenging to assess the potential benefits of energy efficiency investments. He stated that manufacturers are more likely to implement additional energy efficiency projects if such barriers can be eliminated. Availability of financial incentives also could play a key role in encouraging manufacturers to consider energy efficiency options that they might not do otherwise.

5. De-risking of technology and innovation

This discussion focused on finding ways to take advantage of innovation opportunities such as technology transfer, testing and R&D partnerships. For example, there may be opportunities for improving manufacturing energy efficiency through the application of the Internet of Things ([IoT in manufacturing](#)) but further testing and demonstrations are

needed. This was identified as a potential opportunity for R&D partnerships among industries, national laboratories and universities. Policy mechanisms such as R&D tax credits can play a pivotal role in encouraging such partnerships.

Manufacturers also raised a concern regarding the risks associated with taking down an existing manufacturing line in order to install and start up new and innovative equipment. The availability of testing facilities could facilitate the de-risking of the deployment process. Hazelwood Green was cited as a potential site for testing such facilities ([Hazelwood Green-CMU](#)).

### ***Next Steps***

Joseph Hezir and Deborah Stine, both professors of the practice at CMU's Scott Institute, concluded the discussion by welcoming any additional comments and ideas from the roundtable and workshop participants. In particular, they requested that manufacturers forward any case examples that would illustrate the opportunities, challenges and potential policies.

Next, the Scott Institute will identify potential policy options and analyze those options. That analysis will be presented to members of Congress for their consideration for possible action or further deliberation. The goal is for all these activities to be concluded in the Spring of 2018.

For further questions about this project, contact Dr. Deborah Stine, Associate Director for Policy Outreach at the Wilton E. Scott Institute for Energy Innovation, and Professor of Engineering and Public Policy at Carnegie Mellon University at [dstine@andrew.cmu.edu](mailto:dstine@andrew.cmu.edu).



## Attendee List

<i>Policymakers</i>	
Congressman Mike Doyle U.S House of Representatives (PA-14)	Congressman David McKinley U.S House of Representatives (WV-1)
Chris Bowman Senior Legislative Assistant Congressman Doyle Staff	
<i>Manufacturers</i>	
Arthur Pang Government Affairs Representative PPG	Clifford Blashford Vice President NRG Energy Center Pittsburgh LLC
Currie Crookston Head, Innovation Management Covestro	David F. Landis Vice President EPIC Metals Corporation
David Hunter Account Executive Stephen Gould	Jack Adams Director, Government Affairs Calgon Carbon Corporation
Jaison Staab	Joelle Salerno

Business Development Manager WGL Energy	Government Affairs Director Western PA National Electric Contractors Association
John Seryak Chief Executive Officer Ohio Manufacturers Association	Judy Wojanis President Wojanis Supply Company
Larry Myers Sales Team Leader, Northeast, Energy and Sustainability Services Schneider Electric	Lauren S. McAndrews Vice President, Environmental Affairs and Sustainability Allegheny Technologies Incorporated
Matthew Maroon Co-Founder and CEO Watt-Learn	Matthew Mitsch Vice President and General Manager Wabtec, Locomotive Division
Michael Padgett Vice President, Energy and Carbon Strategy Alcoa	Petra Mitchell President and CEO Catalyst Connection
Robin Cunningham Senior Specialist, Green Products WGL Energy	Ron Gdovic CEO WindStax Energy
Ryan Spies Sustainability and Energy Manager Saint-Gobain	Wayne Dudding President AM21 Technologies, LLC
<i>Governmental Organizations</i>	
Eli Levine Program Manager, Better Plants and TIR Programs U.S Department of Energy	Kirk Gerdes Chief of Staff, S&T Strategic Planning and Programs US DOE National Energy Technology Laboratory
<i>Non-Governmental Organizations</i>	
Brandon Mendoza Government Affairs Manager	Carly Dobbins-Bucklad Senior Policy Analyst

Pittsburgh Chamber of Commerce	Allegheny Conference
Catherine Augustine Director RAND Corporation	Gabriella Gonzalez Senior Sociologist RAND Corporation
Jeff McDaniel Innovation Works - Energy	Ken Zapinski Senior Vice President Allegheny Conference
Kris Osterwood Technical and Policy Director Green Building Alliance	Krysia Kubiak Director, State Regulatory Strategy and Government Affairs Duquesne Light Company
Michael Sowko International Brotherhood of Electrical Workers (IBEW)	Pat Getty President Benedum Foundation
<i>Universities and Community Colleges</i>	
Anna Siefken Associate Director, Innovation and Strategic Partnerships CMU Scott Institute for Energy Innovation	Ashwin Kumar Balaji Research Intern CMU Scott Institute for Energy Innovation
David Vorp Associate Dean for Research, School of Engineering University of Pittsburgh	Deborah Stine Associate Director for Policy Outreach CMU Scott Institute for Energy Innovation
Debbie Tekavec Director - Federal Relations Carnegie Mellon University	Denise Bechdel Energy and Environment Team Lead Pennsylvania State University
Grant Goodrich Director, Great Lakes Energy Institute Case Western Reserve University	Jay Whitacre Director CMU Scott Institute for Energy Innovation
Joseph Hezir	Katrina Kelly

<p>Professor of Practice  CMU Scott Institute for Energy Innovation</p>	<p>Manager, Strategy and Business  Development  Pitt Center for Energy</p>
<p>Kristen Kruszewski  Program Manager  CMU Manufacturing Futures Initiative</p>	<p>Mary Ditmore  Director for Federal Research Relations  West Virginia University</p>
<p>Patrick Gerity  Independent Consultant  Westmoreland Community College</p>	<p>Reggie Overton  Director, Workforce Development  Community College of Allegheny County</p>
<p>Robin Shoop  Director, Robotics Academy  Carnegie Mellon University</p>	<p>Sandra DeVincent Wolf  Director, Research partnerships, College  of Engineering  Carnegie Mellon University</p>
<p>Scott Klara  Consultant, Strategic Initiatives, Swanson  School of Engineering  University of Pittsburgh</p>	

## **Agenda**

- 9:00 am Welcome  
Professor Jay Whitacre, Director, CMU's Wilton E. Scott Institute for Energy Innovation
- 9:05 am Charge to Roundtable  
Congressman Mike Doyle (and other members of Congress to be invited)
- 9:15 am Manufacturing Company Listening Session (2 minutes per person)  
Representatives from the manufacturing industry introduce themselves, and identify the opportunities and challenges that their companies face in reaching their energy efficiency sales and implementation goals.
- 10:00 am Manufacturing Process Discussion  
See discussion questions in table above. Each discussion will begin with a brief 5-minute overview of the current data and policies.
- 11:00 am Break
- 11:15 am Manufactured Product Discussion
- 12:15 pm Lunch
- 12:45 pm Distributional Effects Discussion
- 1:45 pm Innovation Discussion
- 2:45 pm Break
- 3:00 pm Next Steps for Implementation Discussion  
How does the group prioritize the proposed policies based on their effectiveness, economic efficiency, equity and ease of political acceptability? What might be the next step for implementation of the proposed policies, as prioritized?

3:45 pm Final Thoughts from Roundtable Participants

4:00 pm Adjourn

### **Congressman Doyle Remarks**

Thank you, Jay, for the introduction.

And I'd like to thank everyone here for attending this important discussion today.

We have manufacturers, energy companies, utilities, labor, representatives from the Department of Energy, community colleges and universities, energy researchers and business groups all here in one room.

I appreciate you coming out for this event.

First, I'd like to thank Carnegie Mellon's Scott Institute for Energy Innovation for organizing, and hosting this event. They've got a top-notch team, and I look forward to continuing our discussions and work on this issue.

I want to highlight how excited I am to see CMU continue their work on manufacturing R&D with the announcement about the Hazlewood Green site.

I've been extremely supportive of the work they're doing with the Advanced Robotics for Manufacturing Institute, and the Manufacturing Futures Initiative. Carnegie Mellon always seems to work with an eye toward the future – and these are fine examples of just that.

I'd also like to thank Case Western's Great Lakes Energy Institute, Catalyst Connection, Innovation Works, Rand Corporation, University of Pittsburgh's Center for Energy, West Virginia University's Energy Institute and Power of 32 for partnering with CMU on today's roundtable.

And of course, I'd like to thank my good friend and colleague, David McKinley, on the Energy and Commerce Committee, joining us here today.

I've had the privilege of working with David on many issues, and I can assure you that he has been a leader on energy efficiency in Congress for many years.

It helps that he has extensive experience as a civil engineer.

That's an uncommon background for a Member of Congress, and you can really see it on display when it comes to his knowledge of energy efficiency

It is a benefit to us all that he's able to join us today.

Carnegie Mellon is a leader in many fields of research, and throughout my time in Congress I've been incredibly proud of the work it's done and students the University has produced.

This includes incredible breakthroughs in computer science, robotics, transportation and energy, among dozens of fields, and the countless start-ups they've spun off.

Today, we're focusing on the critical field of energy efficiency in manufacturing.

This issue lies at the intersection of many pressing challenges, and aligns with many of my priorities in Congress –

- preserving and rebuilding manufacturing as an important part of our economy in an increasingly global market;
- combating climate change through technological innovation;
- improving American manufacturing competitiveness through with technological advancements; and
- keeping good, family-supporting jobs here in our city and region.

Working on these issues is both critical to improving conditions on those fronts and pertinent to many discussions we're currently having in Congress and at our Committee.

Manufacturing accounts for approximately 12% of US GDP, which is a 2.1 trillion dollar industry in the United States. It also accounts for a year – 65% of our exports, and one-in-six private sector jobs.

The US produces the second largest share of the world's manufactured goods as measured by GDP, at 17.5%. This is, just behind China, who has us beat by about four points.

Now, many point to 2017 as a good year for American manufacturing – industry says gains in orders and production made it the strongest year for factories since 2004.

The manufacturing sector added nearly 200,000 jobs last year.

But, as reported recently in the Tribune-Review, at least 5 plants closed in Southwestern PA this past year.

About 450 folks lost their jobs in our area. And if you look across seven counties in Western PA, that number is over 3,500. And, more closures in the area are expected in 2018.

Manufacturing was hit hard during the recession – we lost about 18% of our manufacturing jobs, nationwide, within a three year period.

Wit's since bounced back some, but we've only recovered about half the jobs we lost since 2007.

Manufacturing employment is still down 10% from ten years ago – and it's been fairly stagnant the past two years.

And from the peak of US manufacturing – the summer of 1979 – manufacturing jobs are still down more than 35%.

It's clear this industry is critical to our region and country, and we need to do more to strengthen it.

The energy efficiency industry is also vital to the economy here in Pennsylvania.

It employs more people than coal, natural gas, and renewable energy combined – in fact, it's almost more than double their combined total.

A recent industry report from 2016 – I guess everyone is still digesting numbers from 2017 as we're just a few weeks into the new year – found nearly 2 million people worked in energy efficiency in the U.S and 70 % of those are employed by a company with ten employees or less.

So where do the two intersect?

For one – investing in efficiency upgrades can make manufacturers more competitiveness. Pilot projects have shown these upgrades can save manufacturers the same amount of money on their electric bills as if the utility knocked 3 cents off each kilowatt hour. For context, that would be about 25% off the current rate. Industrial



efficiency is significantly less expensive than generating the same amount of power from traditional sources, anywhere from one-third to one-half the cost.

Many companies have realized this.

Consequently, commercial and industrial customers account for 55% of total energy savings achieved through energy-efficiency programs, and industrial efficiency programs can be twice as cost effective as programs targeting the residential sector.

Analysts believe the industrial sector has already improved its energy intensity from 2008 to 2014 by 4% - it's producing more goods with less energy – and the technology available **today** could reduce energy consumption in the manufacturing industry by about 30%

Existing federal programs like DOE Better Plants program have made a critical start in this area.

The September 2017 DOE snapshot found the program in use by approximately 190 companies who, through efficiency improvements, saved \$4.2 billion and improved their energy intensity by over three percent.

The technical partnerships and, R&D projects, and consortia housed in the Department of Energy's Advanced Manufacturing Office play another critical role in advancing energy efficiency in manufacturing.

But I, like many, feel there's more to be done.

That's why this discussion is so timely.

For example, we're considering Energy Star reform legislation in the Energy and Commerce Committee that, in my opinion, would harm the program.

It's not as focused on the manufacturing side as the home appliance or electronics side – but represents a potential opportunity for us to make changes to the program. I'd like to know:

How do companies and homeowners currently use the program?

How about the appliance manufacturers – what are their thoughts?

On a different front, our committee has held hearings about amending the Public Utility Regulatory Policies Act.

That could either benefit or harm the deployment of Combined Heat and Power systems – a critical tool in increasing grid resilience and benefiting manufacturers.

We've had a year-long series of hearings on energy markets.

As one of our country's largest consumers of energy, I want to showcase the impact market reforms could have on this sector, especially in our region.

I want to highlight and promote tools – like energy efficiency in manufacturing – we can use to save manufacturers money while improving our grid and climate in this ongoing debate.

I also want to mention that additionally, we just began a new hearing series on reauthorizing the Department of Energy, including the Better Buildings Division and the Advanced Manufacturing Office.

In fact, I had the opportunity to highlight **this** event to Deputy Secretary of Energy Dan Brouillette at a hearing earlier this week.

I asked him what he thought the Department's priorities for the Advanced Manufacturing Office would be in the context of DOE reauthorization – and he said he'd be very interested in working with my office on revising the program.

So if you've got suggestions, **let's hear them**, and we can try and incorporate the on-the-ground feedback into the DoE reauthorization bill.

And, lastly, I would do a disservice to my colleague if I didn't mention his bill, the Energy Savings and Industrial Competitiveness Act, which he introduced with another good friend of mine, Representative Welch.

I don't want to speak for him – but I can tell you that his bill reflects a comprehensive view of energy efficiency, and it includes many provisions relevant to manufacturing and our discussion today.

I am a proud cosponsor and strong supporter, and cosponsor, of this legislation and have voted for its provisions in our committee. I hope he'll share his thoughts on it with you shortly.

I think David's bill this is a great start – and – but this is such an important industry, with many buttons to push or levers to pull – I want to work on other complementary or related bills as well.

But good policymaking doesn't exist in a vacuum.

I want to hear what works, and what doesn't, and – what would be helpful.

Whether it's tweaks to federal programs, new R&D dollars, workforce development programs, financing mechanisms or electricity market reforms – it's all on the table for me.

What would you think, for example, of an infrastructure bank-style financing system expressly for manufacturers making energy efficiency upgrades?

How about tax incentives or some type of energy savings performance contract government-backed loans specifically geared for manufacturers?

Would it help if energy efficiency improvements at industrial sites counted toward meeting regulatory requirements or other federal program criteria?

How can we promote the adoption of Internet of Things technology in manufacturing -  
?

Do we need new federal programs, or instructions and recommendations to utilities, or additional R&D?

What is necessary to increase the number of CHP systems in our state – where only a tiny fraction of the potential sites are utilized?

David and I have worked extensively on Carbon Capture, Utilization and Sequestration (CCUS) technologies.

Industrial sources are viewed as a great opportunity for CCUS – what is required to increase their deployment?

It's clear there are workforce development issues – does this require a new federal program, greater cooperation between a range of federal agencies, or amending the Workforce Innovation and Opportunity Act?

These are just some of the questions I've been thinking about.

They're not meant to limit the discussion.

I mention them only to show how willing we are to work on these issues, and just how open to different approaches I am.

I view this event today as an opportunity for policymakers to hear from a wide range of stakeholders and experts about how you interact with current federal policies and programs:

What's working, what isn't, and what we can do to bolster this critical industry.

I hope you'll be forthcoming.

Thank you.

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