Innovations in Manufacturing and Energy

Advanced Manufacturing Policies and Practices

Advanced Energy Conference 2018

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Ensuring U.S. Energy Dominance

• Energy domination is a foundation for economic growth & jobs
• Today’s low prices present opportunities to improve and innovate
Energy Dominance = Manufacturing Dominance

Manufacturing represents $2 trillion in U.S. GDP and 12.4 million Direct Employment Jobs, as well as 25% of U.S. energy consumption.

Technology Innovation through Early Stage R&D in Advanced Manufacturing and Energy is a Foundation for Economic Growth and Jobs in the US.
QTR and Multiyear Program Plan (draft) Technologies

Advanced Manufacturing Technology Areas

- Sustainable Manufacturing - Flow of Materials through Industry
- Combined Heat and Power Systems
- Waste Heat Recovery Systems
- Advanced Sensors, Controls, Platforms and Modeling for Manufacturing
- Process Heating
- Process Intensification
- Roll-to-Roll Processing
- Composite Materials
- Direct Thermal Energy Conversion Materials, Devices and Systems
- Wide Bandgap Semiconductors for Power Electronics
- Materials for Harsh Service Conditions
- Advanced Materials Manufacturing
- Additive Manufacturing
- Critical Materials
- Energy & Resource Management (Information)
- Manufacturing Processes (Processes)
- Materials Development (Materials)

Emerging and Crosscutting Areas

- Clean Water
- Energy-Efficient Advanced Computing
- Technology Assistance
- Workforce Development
- Communications and Outreach

Advanced Manufacturing for Energy Systems

- Electric Power Delivery
- Electric Power Generation
- Fuels Production
- Buildings
- Transportation
Research & Development Framework

Focus on Early Stage Applied Research and Development

Technology Areas with Knowledge Gaps Applicable to Manufacturing and Energy

Merit-based R&D at National Laboratories, Universities, Companies (for profit and not for profit) and Consortia

Partner with Private Sector to Identify Technical Knowledge Gaps and Transfer Learning for Subsequent Adoption
Technical Partnerships
Technical Partnership Programs

**Efficient On-Site Energy**
CHP Technical Assistance Partnerships

**Energy-Saving Partnership**
Better Buildings, Better Plants, Industrial Strategic Energy Management

**Student Training & Energy Assessments**
University-based Industrial Assessment Centers
R&D Projects
R&D Projects: Manufacturing Processes

Ultrafast, femtosecond pulse lasers (right) will eliminate machining defects in fuel injectors. 
*Image courtesy of Raydiance.*

Protective coating materials for high-performance membranes, for pulp and paper industry. 
*Image courtesy of Teledyne*

A water-stable protected lithium electrode. 
*Courtesy of PolyPlus*
Brings the many benefits of high-performance computing to US Industry

- Accelerate innovation
- Lower energy costs
- Reduce testing cycles
- Reduce waste/reduce rejected parts
- Quality processes and Pre-qualify
- Optimize design
- Shorten the time to market
The HPC4Mfg program has a diverse portfolio

- Completed 4 rounds of awards
  - $15M in total funding
  - 47 public-private projects
  - Participation from 7 National Labs
  - Other DOE offices involved

- Round 5 solicitation (Winter 2018) now open
  - $3M total available for awards
  - Overcoming impactful manufacturing process challenges
  - Reducing energy consumption through improved clean energy technology design
R&D Projects: Lab-Embedded Entrepreneurship Programs

1. Cyclotron Road @ Lawrence Berkeley
   - Launched mid-2014
   - Partnership with Activation Energy, Sept 2016
   - Cohort 4 selections ready to announce

2. Chain Reaction Innovations @ Argonne
   - Launched mid-2016
   - Partnership with Polsky/Purdue
   - Cohort 2 selections ready to announce

3. Innovation Crossroads @ Oak Ridge
   - Launched mid-2016
   - Partnership with LaunchTN
   - Cohort 2 selections ready to announce
R&D Consortia
AMO Consortia:

- Critical and Rare Earth materials
- Wide band gap semiconductors
- Carbon fiber composites
- Smart Manufacturing
- Process Intensification
- Remanufacturing and Reprocessing
- (Soon) Clean Water Production
Objective: Develop a set of technologies that bring significant reduction in equipment size, process complexity, cost or risk reduction that will result in...

- 2x Improved energy efficiency
- 20% Improved energy productivity
- 50% Decreased deployment cost
What does Success Look Like?

Energy Technologies Invented Here...

...And Productively Manufactured Here!
Thank You