Innovation in Manufacturing and Energy

6th TransTech Energy Business Development Conference

Canonsburg, PA

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Energy Domination

- Competitiveness by energy productivity
- Domestic jobs
- Energy domination is a foundation for economic growth & jobs
- Today’s low prices present opportunities to improve and innovate

Security
- Energy resilience
- Stable, diverse energy supply

Environment
- Clean Air
- Clean Water

Energy Domination: Oil and Gas

Economy
Energy Dominance = Manufacturing Dominance

Technology Innovation through Early Stage R&D in Advanced Manufacturing and Energy is a Foundation for Economic Growth and Jobs in the US

$2T Manufacturing GDP
12.4M Manufacturing Direct Employment Jobs
0.8 / 1.0 – Indirect / Direct Jobs - All Manufacturing
2.2 / 1.0 – Indirect / Direct Jobs - Advanced Sub-Sectors

24 QBTU (25% of National Total) – Manufacturing
2/3 Manufacturing Energy is in Intensive Sectors
Focus on manufacturing-specific R&D challenges

- Only office suited to manufacturing-specific R&D challenges.
- Funded approximately $250M in R&D in FY17.
- Majority of work is through partnerships.
Energy Intensive Industries - Today

Primary Metals
1608 TBTU

Petroleum Refining
6137 TBTU

Chemicals
4995 TBTU

Wood Pulp & Paper
2109 TBTU

Glass & Cement
716 TBTU

Food Processing
1162 TBTU

Other Manufacturing
~1600 TBTU
AMO Technical Focus Areas (2017 MYPP / DRAFT)
How will Manufacturing, Economy and Security of the Nation depend on Information, Computation, Actuation and Communication Technologies in the 21st Century?
Smart Manufacturing Technologies to Improve Energy Efficiency – Intelligent Efficiency

- NSF - Smart Manufacturing is about **Data → Information → Knowledge → Wisdom**” (DIKW).
- ACEEE 1 - The **integration** of all facets of **manufacturing** through the use of information and communication technologies
- ACEEE 2 – **Intelligent Efficiency** is the system level energy efficiency made possible by the use of **information and communications technologies** and data analytics

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- ACEEE 2 – Ethan Rogers (ACEEE), Better Buildings Summit, Smart Manufacturing Session, May 16, 2017
Benefits of Intelligent Efficiency

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Clean Energy Smart Manufacturing Innovation Institute (CESMII)

- Announced June 15, 2016
- Almost 200 industry, university, and other partners
- 5 regional centers headquartered at UCLA

Mission: Radically accelerate development and adoption of advanced sensors, controls, platforms, and models for real-time process management in manufacturing.
Clean Energy Smart Manufacturing Innovation Institute (CESMII)

Institute Goals

• 50% reduction in cost and time to deploy SM in existing processes in 5 years
• 50% improvement in energy productivity within 10 years
• 15% improvement in energy efficiency in first-of-a-kind demonstrations at manufacturing plants or of major processes within 5 years
• Significant industry adoption of SM technology within 5 years.

Focus on Real-Time For Energy Management
Project Prime: Tulane University
Project Partners: Advanced Polymer Monitoring Technologies, Inc. (APMT); Louisiana State University

Technology: Continuous, online monitoring of polymerization reactions using advanced sensor technology.

Technology Update:
- Successfully demonstrated what is believed to be the world’s first manual active control of polymerization reaction at lab-scale.
- Pilot reactor designed, built, and installed ahead of schedule.
- Tulane and APMT filed a joint, non-provisional patent application based on the ACOMP/CI platform.

Academic researchers will develop the basic control and automation technology using the laboratory scale Automatic Continuous Online Monitoring of Polymerization reactions/Control Interface (ACOMP/CI) system (left). The technology will be validated using the pilot scale ACOMP/CI (right). Photos courtesy of Tulane University.
What does Success Look Like?

Energy Technologies Invented Here...

...And Productively Manufactured Here!
Thank You