U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Innovations in Manufacturing and Energy

Advanced Manufacturing Policies and Practices

Advanced Energy Conference 2018

March 27th 2018

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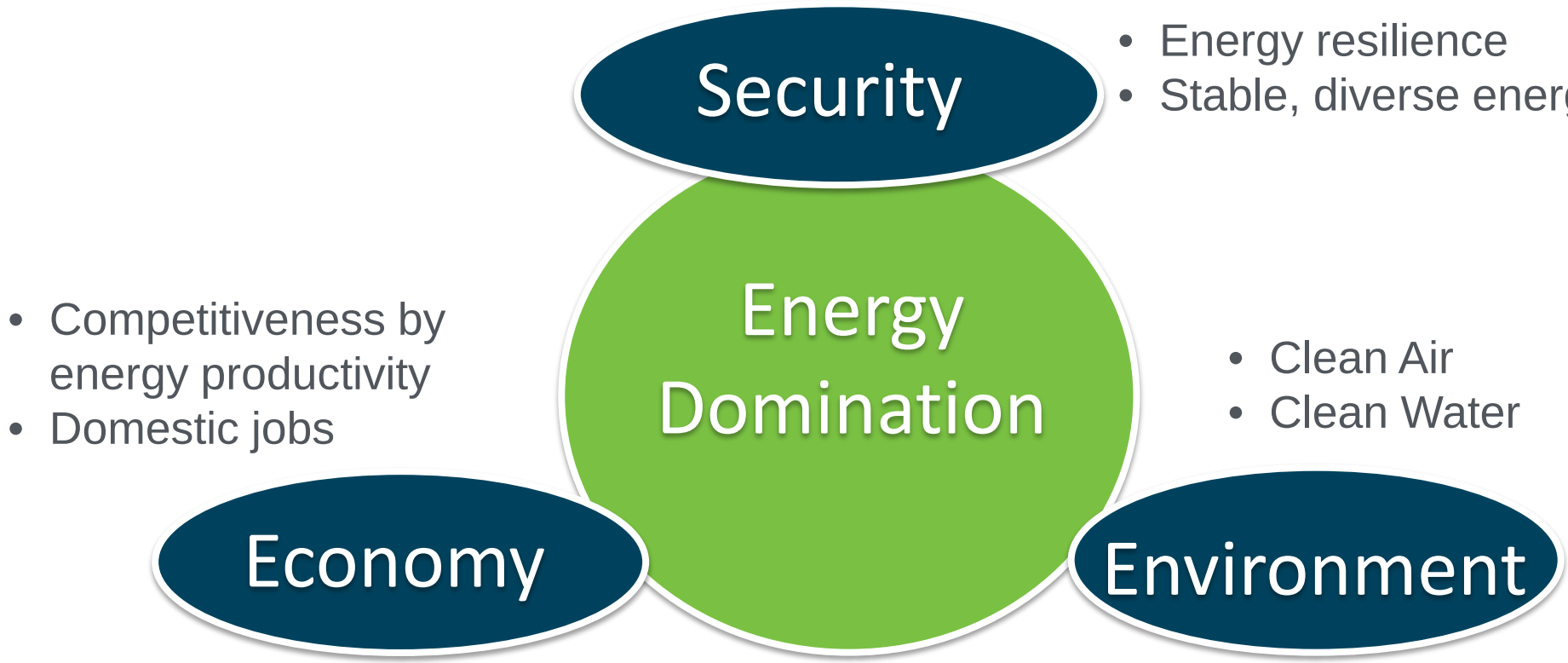
Director

Advanced Manufacturing Office

www.manufacturing.energy.gov

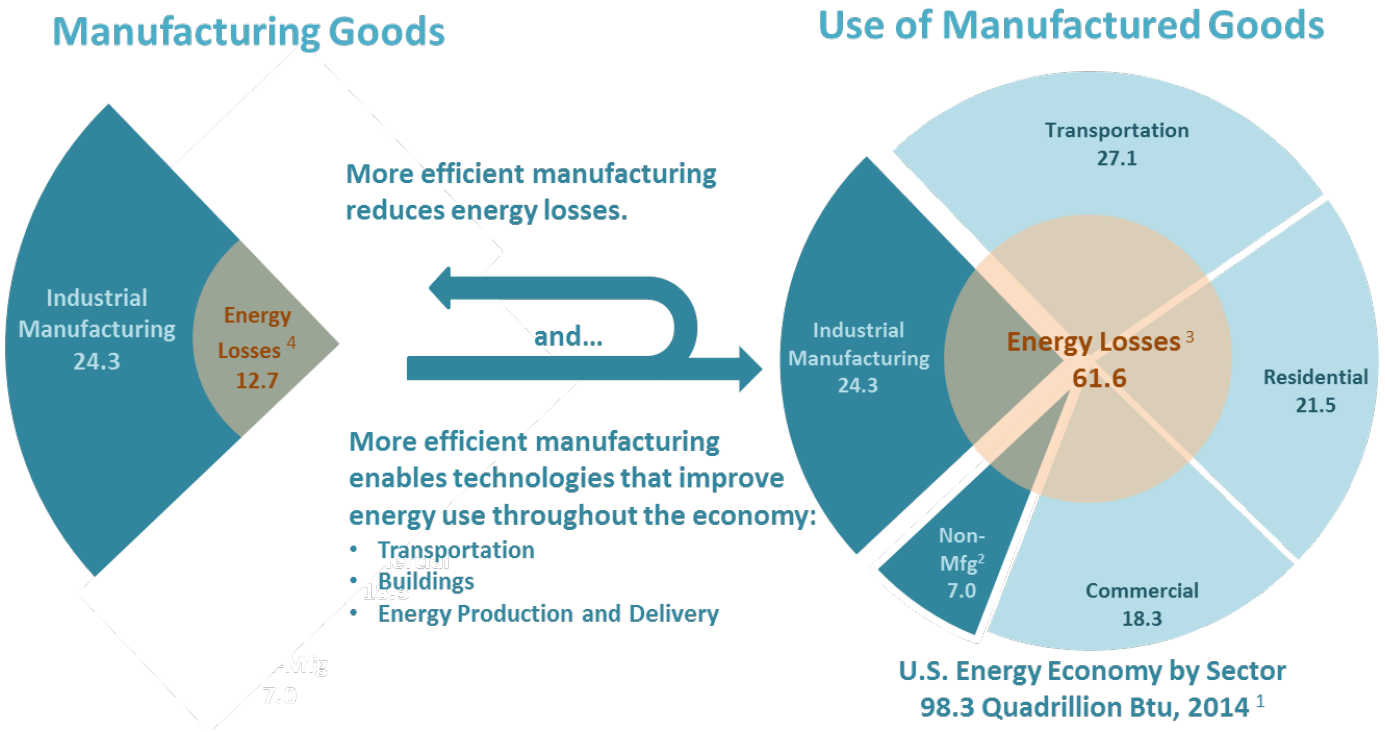
Ensuring U.S. Energy Dominance



- 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

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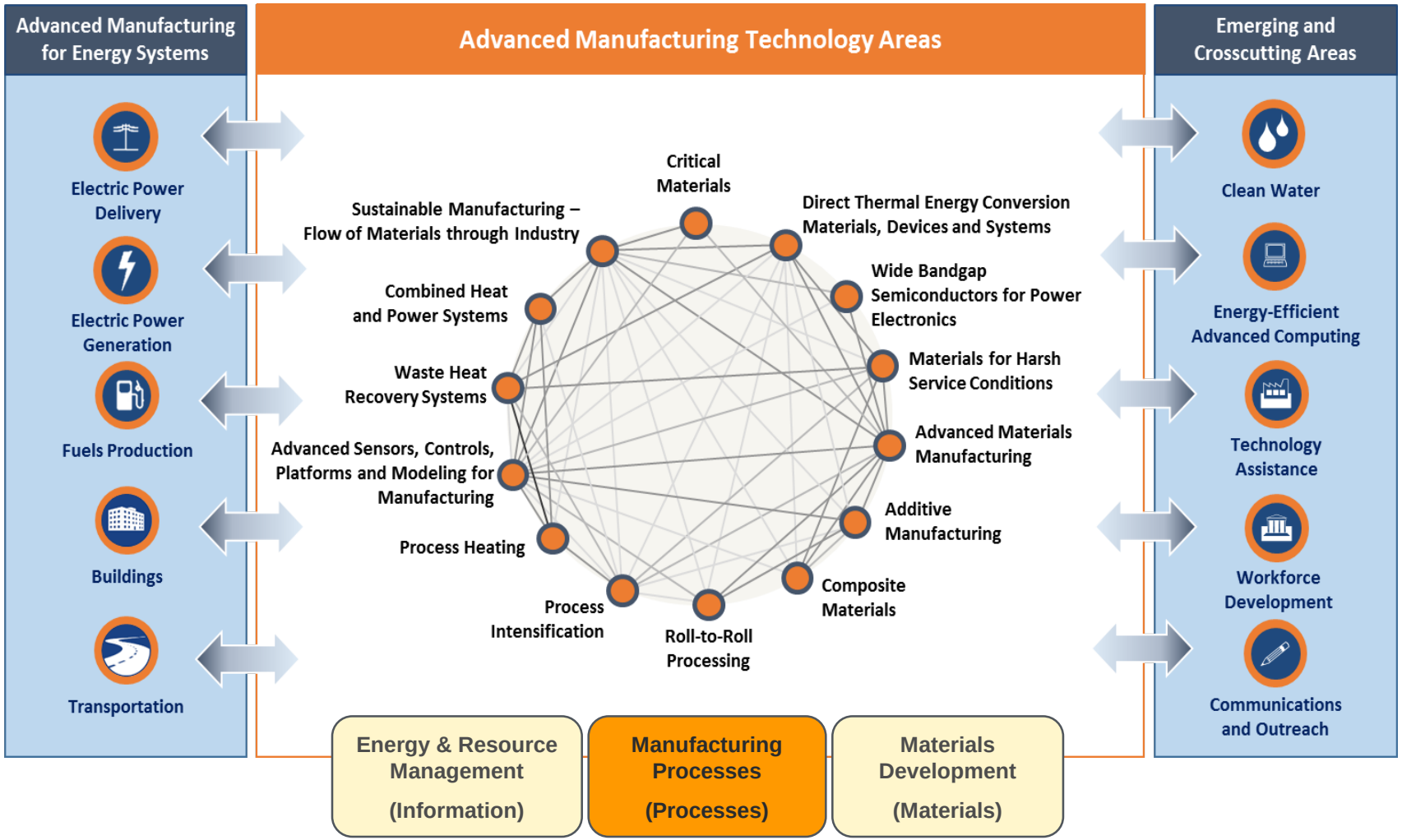
QTR and Multiyear Program Plan (draft) Technologies



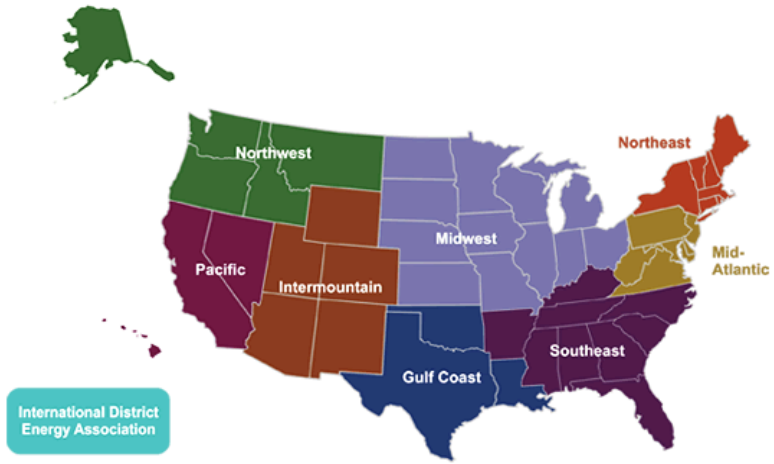
Research & Development Framework

Technical Partnerships

Technical Partnership Programs

Efficient On-Site Energy

CHP Technical Assistance Partnerships



Better Plants
U.S. DEPARTMENT OF ENERGY

Simplot
Bringing Earth's Resources to Life

SAINT-GOBAIN
NISSAN
legrand®

ALCOA

Energy-Saving Partnership

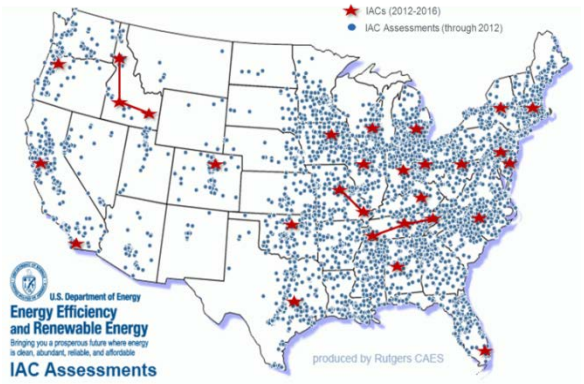
Better Buildings, Better Plants,
Industrial Strategic Energy Management

3M

Schneider Electric
BRIGGS&STRATTON
Cummins
Johnson Controls

Student Training & Energy Assessments

University-based Industrial Assessment Centers



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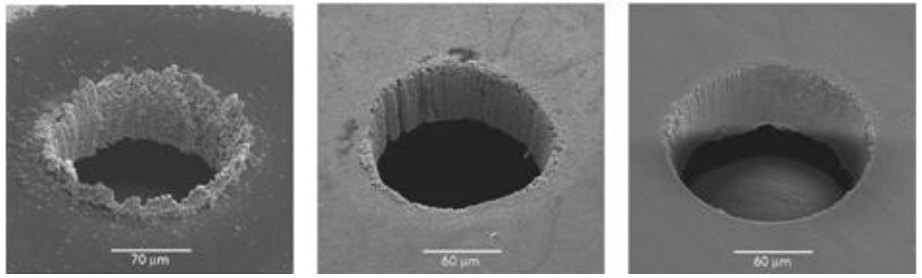
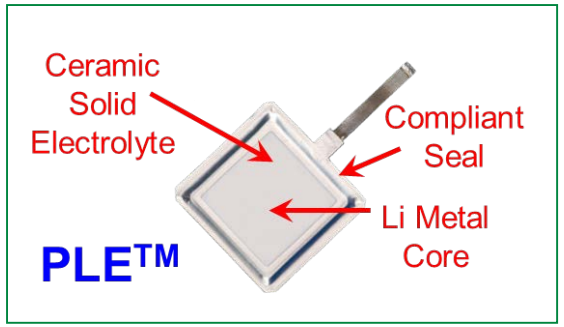
R&D Projects

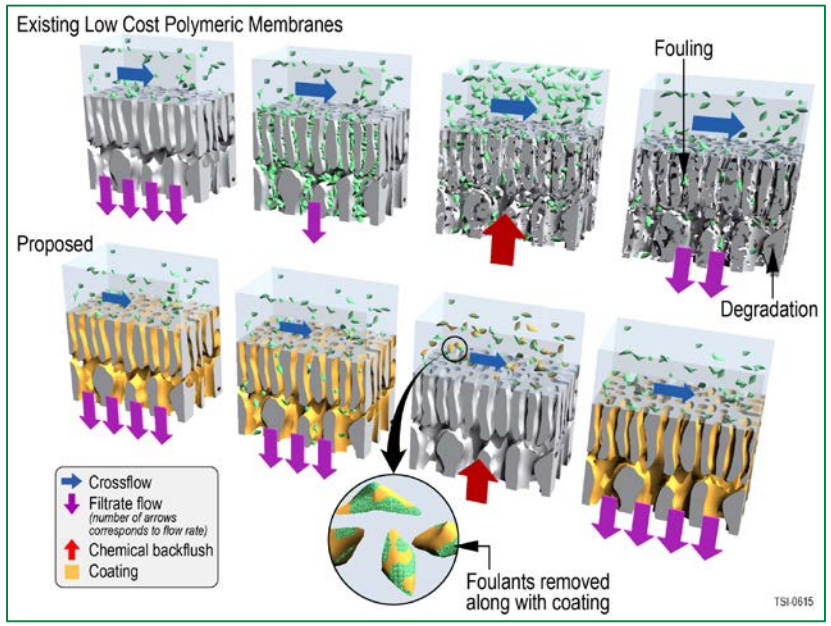
R&D Projects: Manufacturing Processes



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



A water-stable protected lithium electrode.
Courtesy of PolyPlus



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

R&D Projects: HPC4Mfg program

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

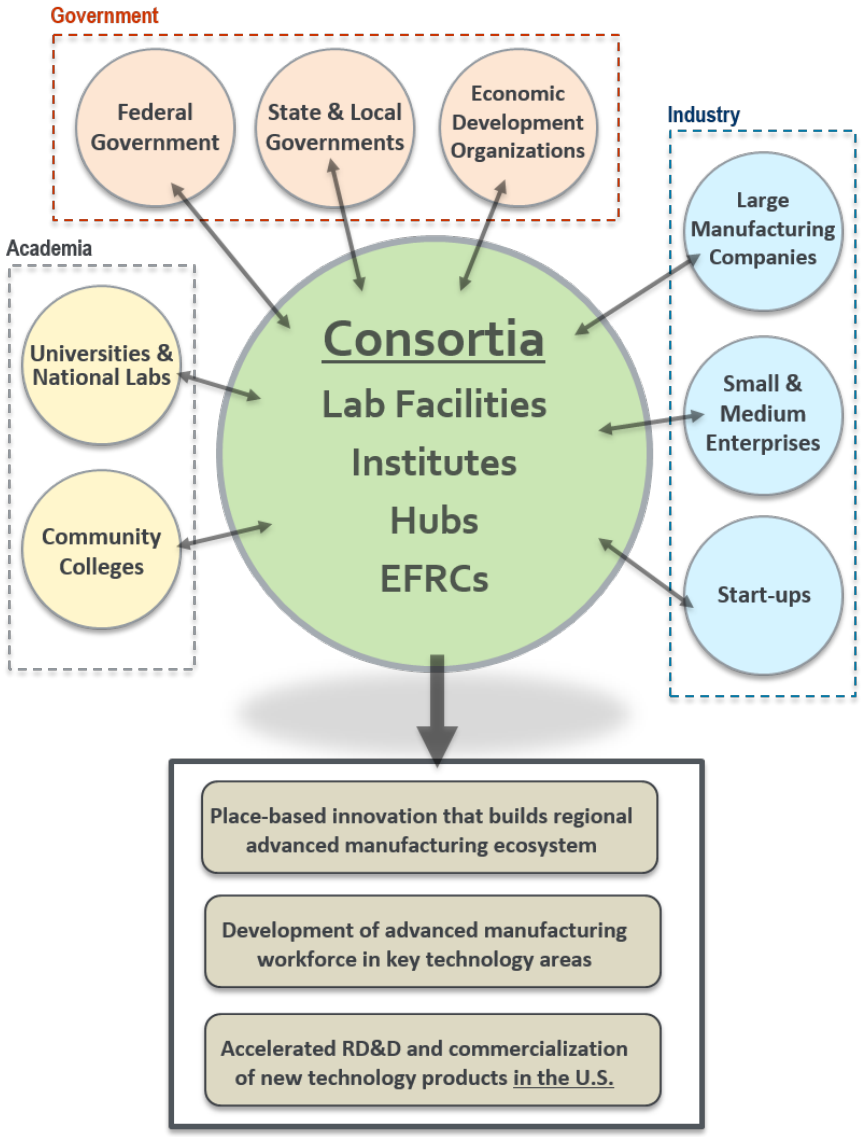
3. **Innovation Crossroads @ Oak Ridge**
   - Launched mid-2016
   - Partnership with LaunchTN
   - Cohort 2 selections ready to announce

R&D Consortia

Consortia Model

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

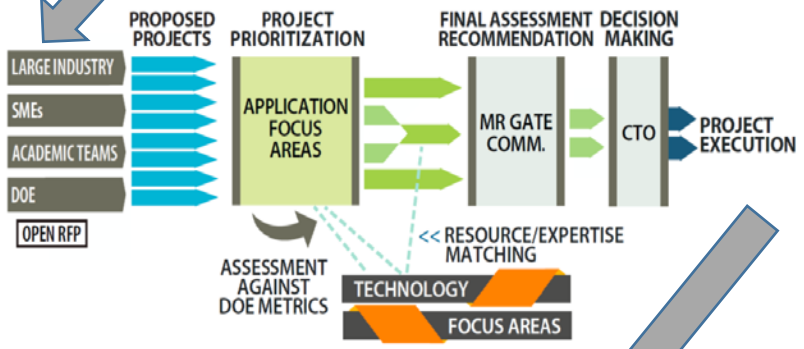


DOE Institute #4 – Modular Chemical Process Intensification

Objective: Develop a set of technologies that bring significant reduction in equipment size, process complexity, cost or risk reduction that will result in…

Test Bed Challenges

- Modeling/Simulation/ Optimization & Control for Existing PI Processes
- Low Energy Separations for Existing Processes
- Material & Chemistry Intensification for Existing Processes
- Module Manufacturing for PI and MCPI
- Modular Decentralized Scale Out Processing



- 2x Improved energy efficiency - 20% Improved energy productivity

- 50% Decreased deployment cost

- Technology Solutions
- Standards/ Design Tools/ Design Specs Available
- Work Force Trained

Capital Investment/ Commercial Deployment

IMPACT

800,000 Jobs Created

1100 TBtu Energy

82 MT CO_2

1900 Trained/Yr

Design Tools

>120 Industry Partners

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What does Success Look Like?

Energy Technologies Invented Here…

…And Productively Manufactured Here!

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Thank You