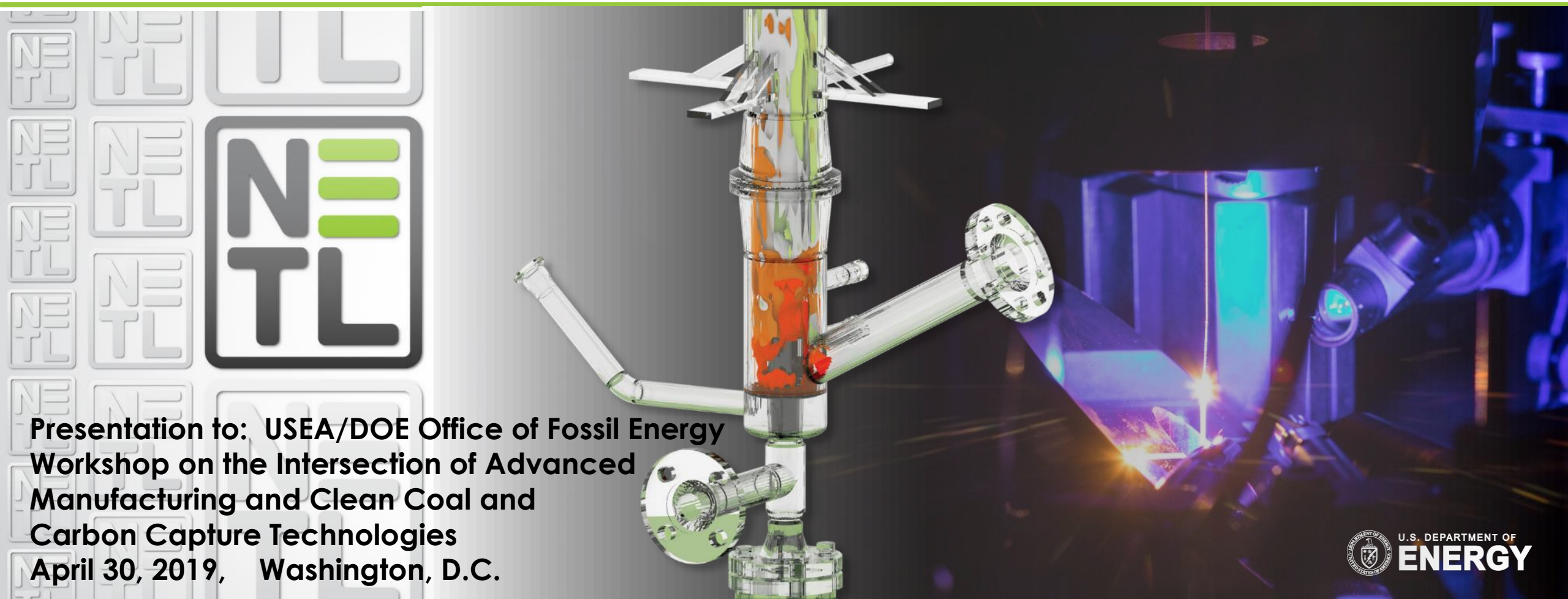
A Vision for Advanced Manufacturing

Solutions for Today | Options for Tomorrow

NATIONAL ENERGY TECHNOLOGY LABORATORY

Brian J. Anderson, Ph.D.
Director



Presentation to: USEA/DOE Office of Fossil Energy Workshop on the Intersection of Advanced Manufacturing and Clean Coal and Carbon Capture Technologies
April 30, 2019, Washington, D.C.

U.S. DEPARTMENT OF ENERGY

An Innovative Approach to Advanced Manufacturing

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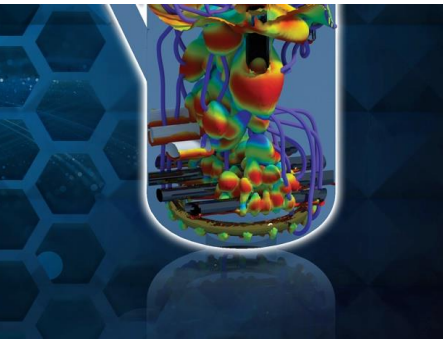
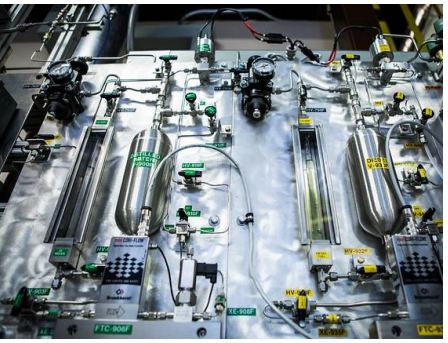
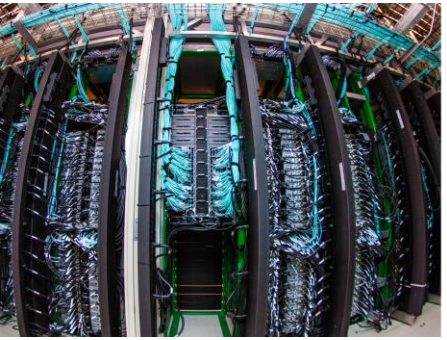


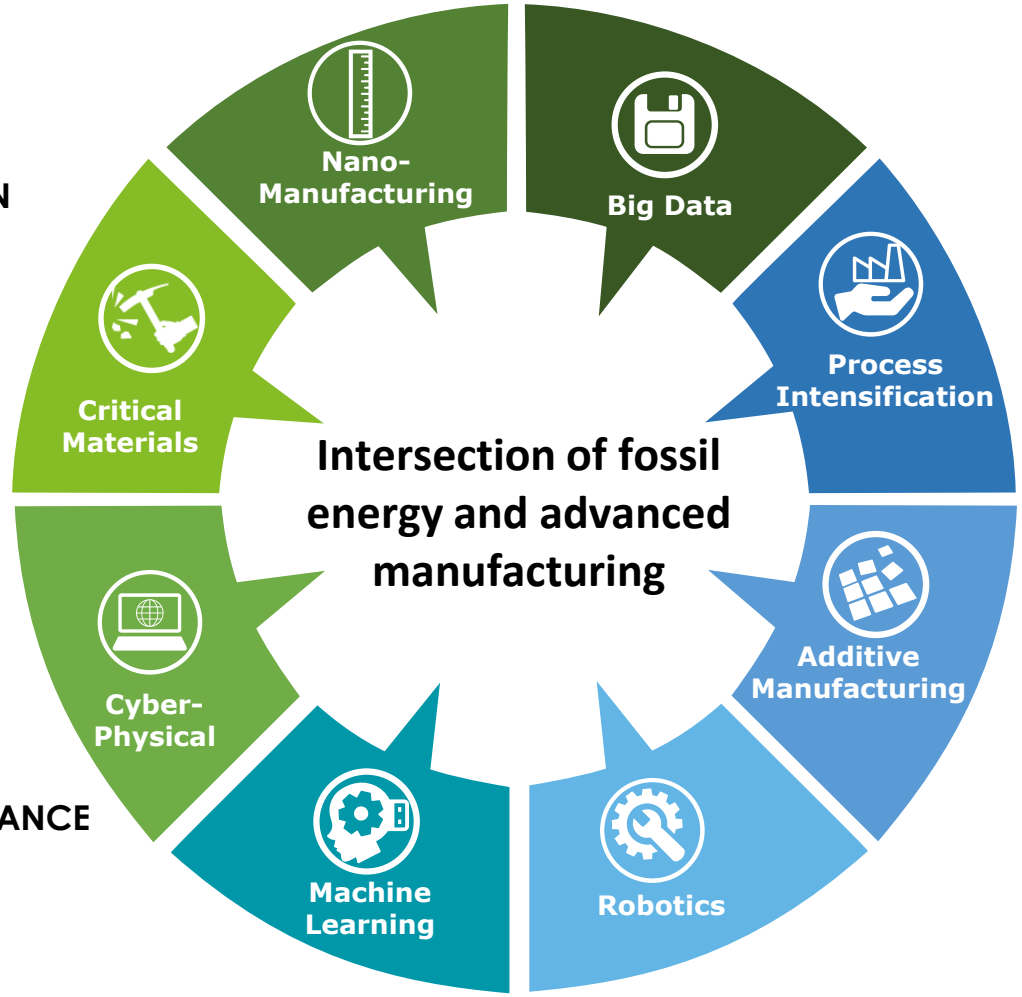
PROCESS INTENSIFICATION



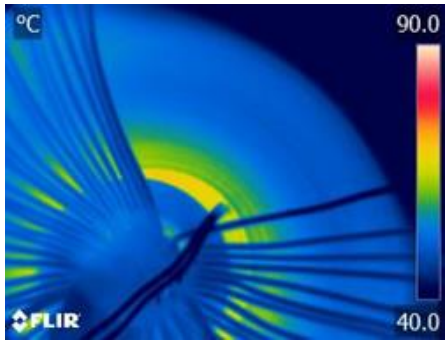
ENERGY CONVERSION TECHNOLOGIES



HIGH PERFORMANCE COMPUTING, SIMULATION, & MODELING

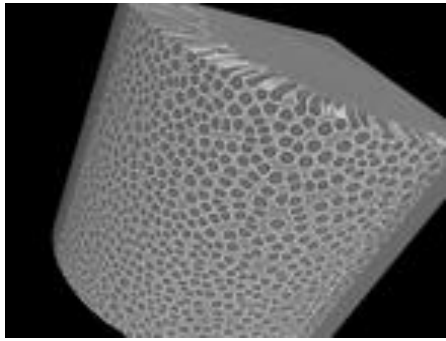


ADVANCED POWER ELECTRONICS



NEXT GENERATION MATERIALS FOR HARSH ENVIRONMENTS

FUNCTIONAL MATERIALS



Accelerating Advanced Manufacturing Vision

NETL's Role

Innovate

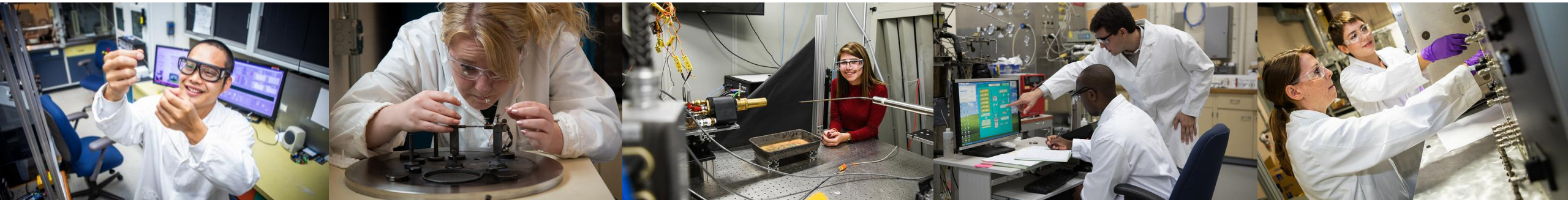
- Innovating, maturing, and deploying technologies
- Designing new standards and research procedures
- Advancing technologies to market readiness

Convene

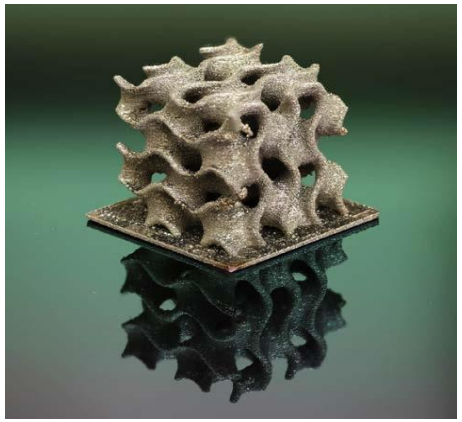
- Bringing complementary organizations together – industry, academia, government, NGO
- Connecting technology with workforce development needs

Implement

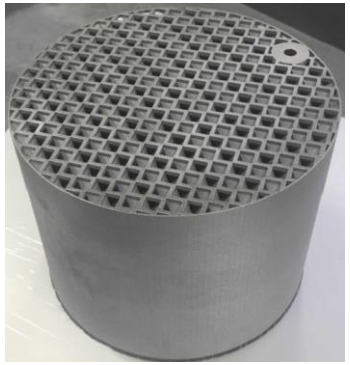
- Systematic decision-making techniques
- Addressing market and policy drivers
- Technology systems integration



Advanced Manufacturing for Carbon Capture Technologies



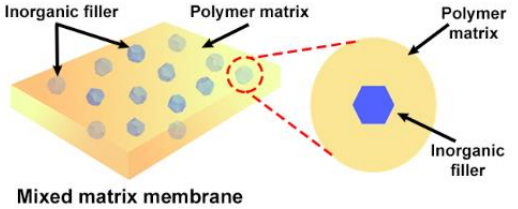
LLNL will design and fabricate high-efficiency reactors for advanced sorbents, solvents, and membranes



ORNL prints intensified devices with heat exchanger integrated into pack

ION ENGINEERING

ION uses 3D Printing to develop internal absorber mass transfer and heat exchange



Using HPC, NETL predicted properties for over a million possible mixed matrix membranes

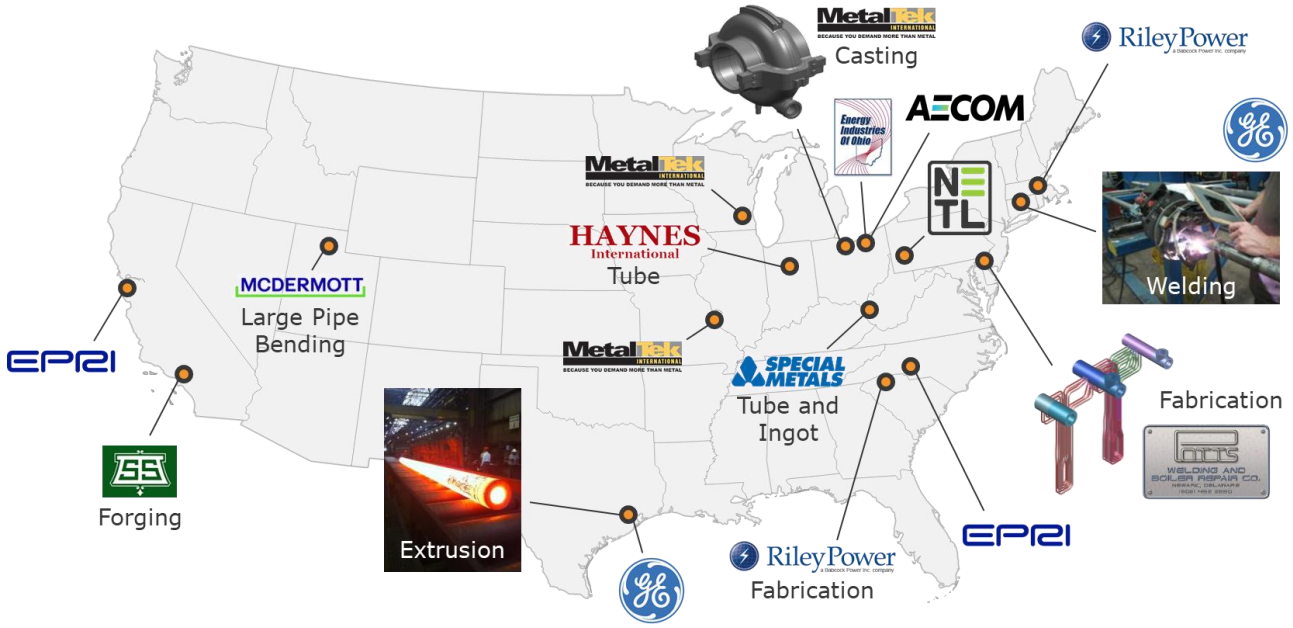
- Intensify thermodynamic operations
- Improve process performance
- Reduce equipment size
- Lowers capital and operating costs

Advanced Ultra-supercritical Technology

Component Demonstration

A-USC ComTest Project will lead to:

- Accelerated development of domestic supply chain for advanced materials and components
- Higher efficiency for new and existing fossil fuel plants
- Lower emissions (NO_x, SO_x, CO_2)
- Minimized risk for utilities desiring to build A-USC plants
- Design of world's first integrated A-USC steam turbine at 760°C
- Validation of technology applicable to multiple fossil, nuclear, and renewable power generation options



Thank You

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Brian Anderson
Director