

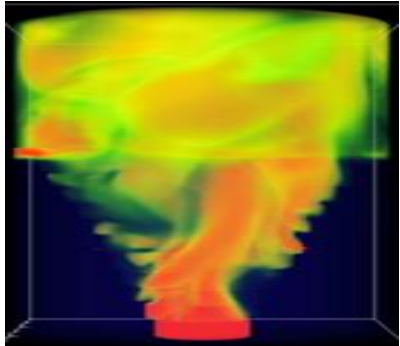
NETL, Strategic Partnerships, and the Regional Workforce Initiative (RWFI)

James M. Ferguson, Manager, State & Local Partnerships

March 2018



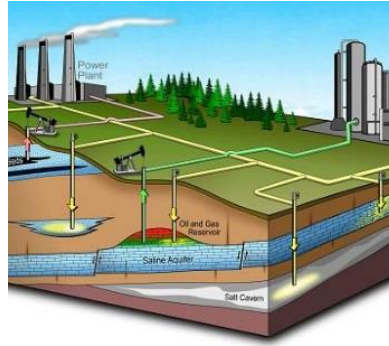
Core Competencies & Areas of Research



Computational
Science &
Engineering



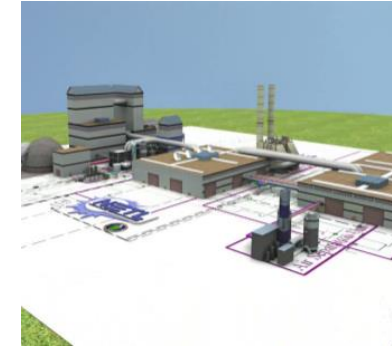
Materials Engineering
& Manufacturing



Geological &
Environmental
Systems



Energy Conversion
Engineering



Systems Engineering
& Analysis



Program Execution
& Integration



Carbon
Storage



Carbon
Capture



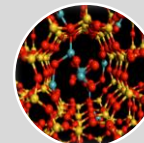
Sensors &
Controls



Advanced
Materials



Advanced
Computing



Advanced Energy
Systems



Water
Management



Rare Earth
Elements



Enhanced
Resource Production



Environmentally
Prudent Development



Methane
Hydrates



Offshore



Natural Gas
Infrastructure



Unconventional



Delivering Public Value

SECURE & REVITALIZE

the Energy Infrastructure

- Develop, implement, and manage public-private partnerships focused on infrastructure enhancements
- Assess, analyze, and resolve infrastructure needs and challenges



REINVIGORATE

Jobs & Manufacturing

- Improve manufacturing competitiveness
- Implement workforce development programs (e.g., *Energy and Manufacturing Workforce Development*)

REALIZE Full Value of

Domestic Energy Resource

- Analysis to inform energy policy
- Technical solutions to enable full resource utilization (e.g., *Stranded Methane*)



*Enduring
Economic
Prosperity*

ATTAIN Energy Independence

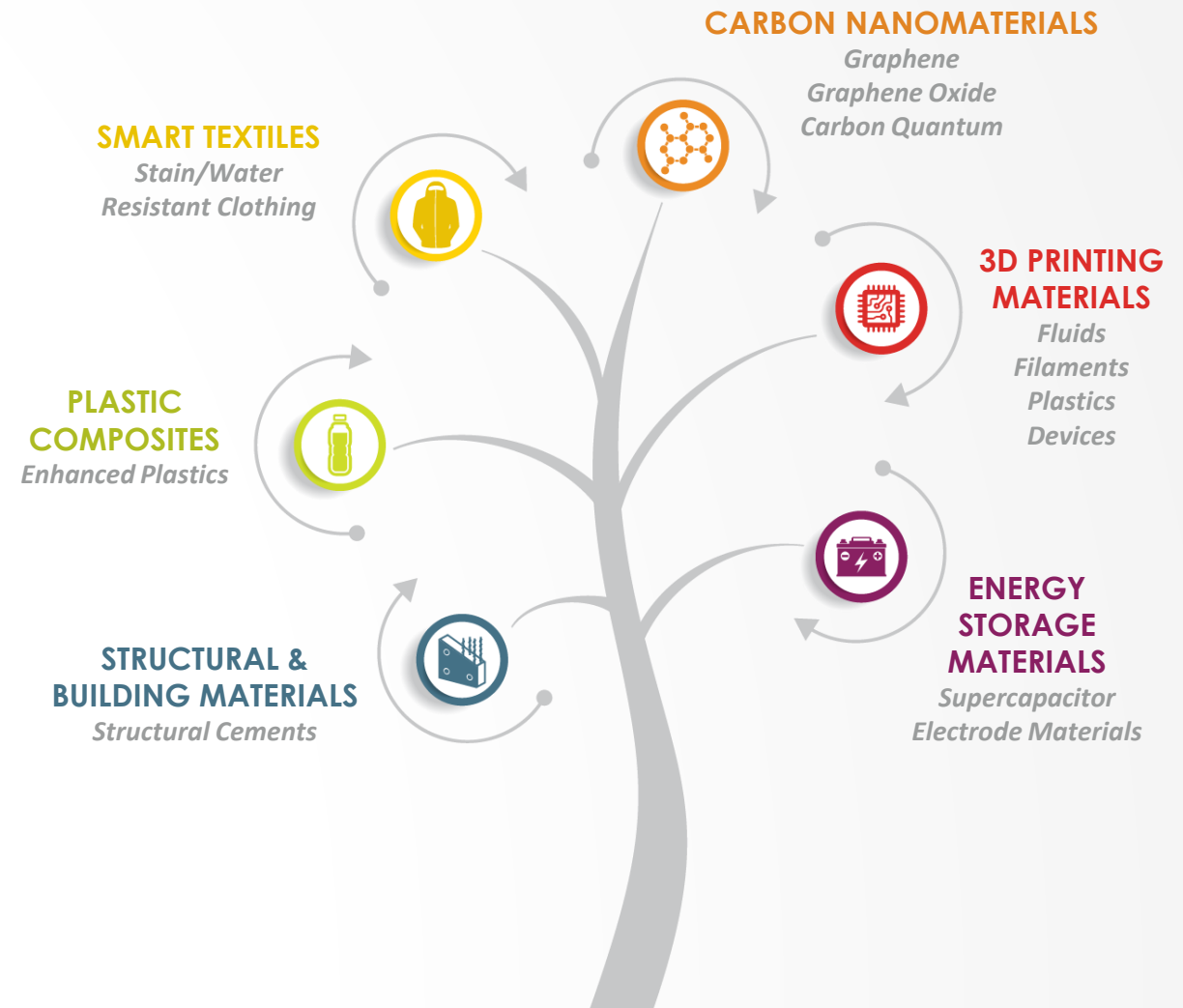
- Support expanded oil, gas, and/or coal exploration and production
- Unlock future resources (e.g., *Methane Hydrates*)

Converting Coal Into High-Value Added Products

Current and Potential Stakeholders for NETL



**Consortium with Leading Coal-Producing States,
Community Colleges, & Economic Development Programs**



Fossil-focus in Advanced Manufacturing



Advanced manufacturing to improve the performance and economics of energy and materials systems

Expand materials and advanced manufacturing to extreme operational environments

Develop carbon-based source materials

Synthesize inter-disciplinary approaches to manufacturing

Appalachian Coal Country: Major Stakeholders



Initiating & Enhancing Collaborative Partnerships

INDUSTRY PARTNERSHIPS



ACADEMIC PARTNERSHIPS



GOVERNMENTAL PARTNERSHIPS



NONGOVERNMENT PARTNERSHIPS

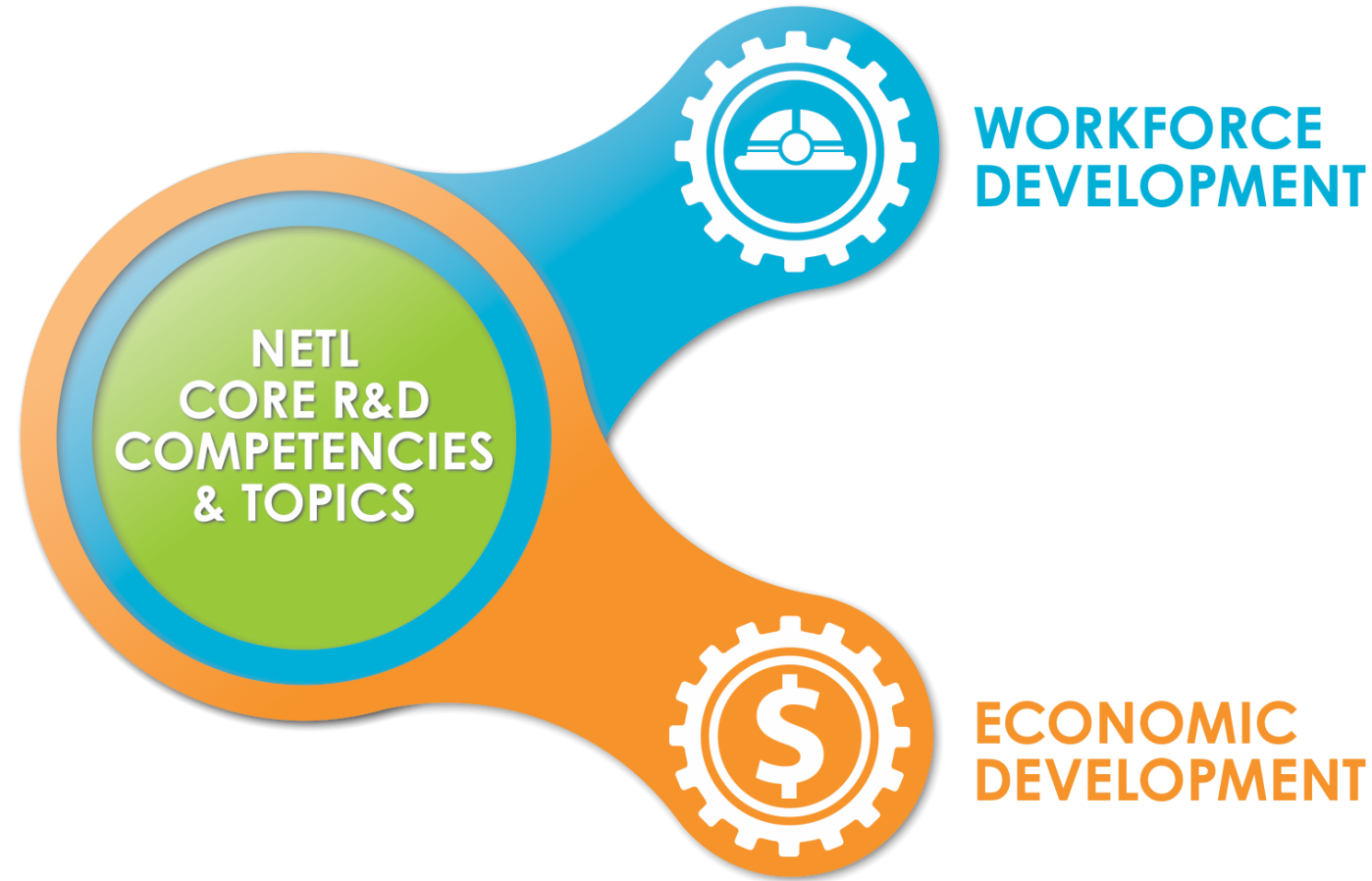


The NETL Regional Workforce Initiative Mission



The NETL Regional Workforce Initiative (RWFI) creates a platform for:

- communication and collaboration with stakeholders and partners
- connect public investment in energy and advanced manufacturing NETL R&D to national and regional economic development, education, and jobs.
- coordinating across economic development and workforce initiatives with NETL, and its federal agency partners, and national labs



Connect with NETL



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FOAs: Sean Plasynski
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NETL Systems and Engineering Analysis (SEA)



DDAA Annual Summit

Chris Nichols

Analyst, Systems Engineering and Analysis



Solutions for Today | Options for Tomorrow



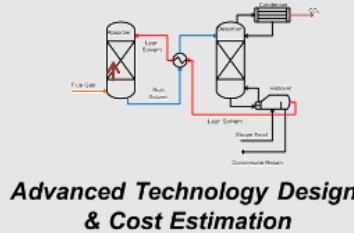
Systems Engineering & Analysis (SEA)

Teams and Scope

Energy Process Analysis

Energy Process Design, Analysis, and Cost Estimation

- Plant-level modeling, performance assessment
- Cost estimation for plant-level systems
- General plant-level technology evaluation and support



Energy Systems Analysis

Resource Availability and Cost Modeling

- CO₂ storage (saline and EOR)
- Fossil fuel extraction
- Rare earth elements
- General subsurface technology evaluation and support

Grid modeling and analysis

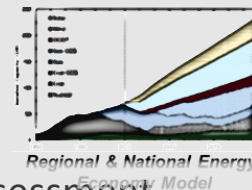
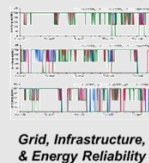
Environmental Life Cycle Analysis



Energy Markets Analysis

Energy Economy Modeling and Impact Assessment

- Enhanced fossil energy representation
- Multi-model scenario/policy analysis
- Infrastructure, energy-water



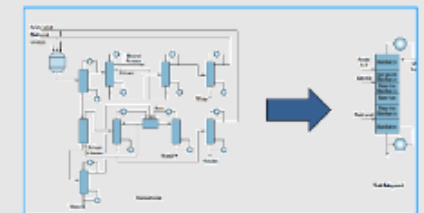
- Economic impact assessment
- General regulatory, market and financial expertise

Process Systems Engineering Research

- Process synthesis, design, optimization, intensification
- Steady state and dynamic process model development
- Uncertainty quantification
- Advanced process control

Design, optimization, and modeling framework to be expanded to all SEA “systems”

Advanced Energy Systems through Process Systems Engineering



Assessing Program Portfolio Impacts:

Coal Program Example

Baseline Data & Model Development

Set R&D Goals and Evaluate Progress

Project deployment of Technologies

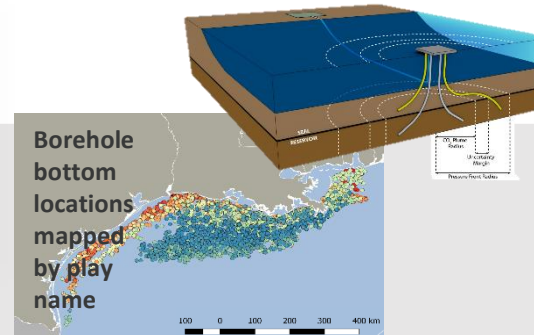
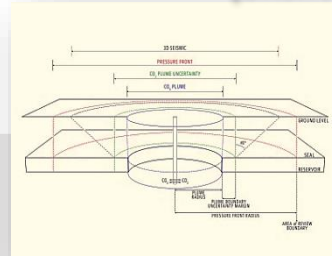
Estimate Potential Benefits of RD&D



NETL Cost and Performance Baseline for Fossil Energy Plants

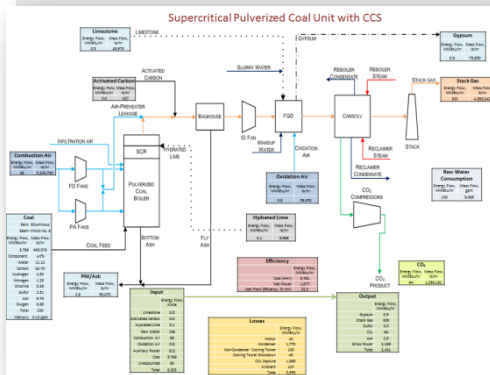
- Detailed, transparent account of plant information
- Key resource for government, academia and industry

NETL CO₂ Saline Storage Cost Model (onshore and offshore)



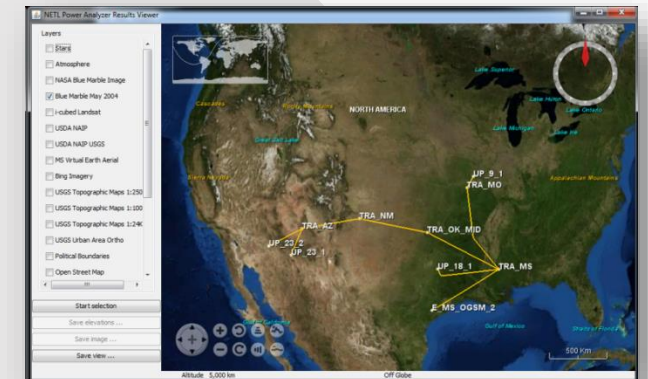
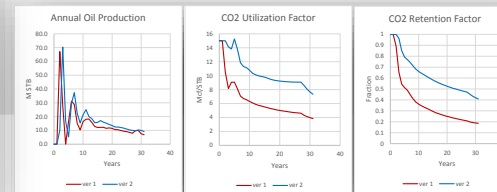
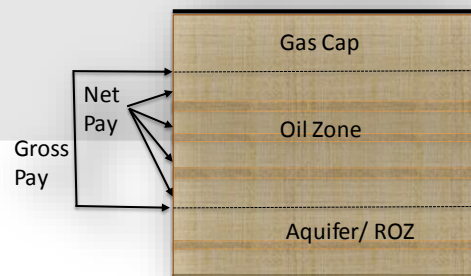
NETL CO₂ Capture, Transport, Storage and Utilization - National Energy Modeling System (CTUS-NEMS)

- Adopted by EIA; used in AEO's 2014/15/16
- Facilitates and encourages EPSA interactions

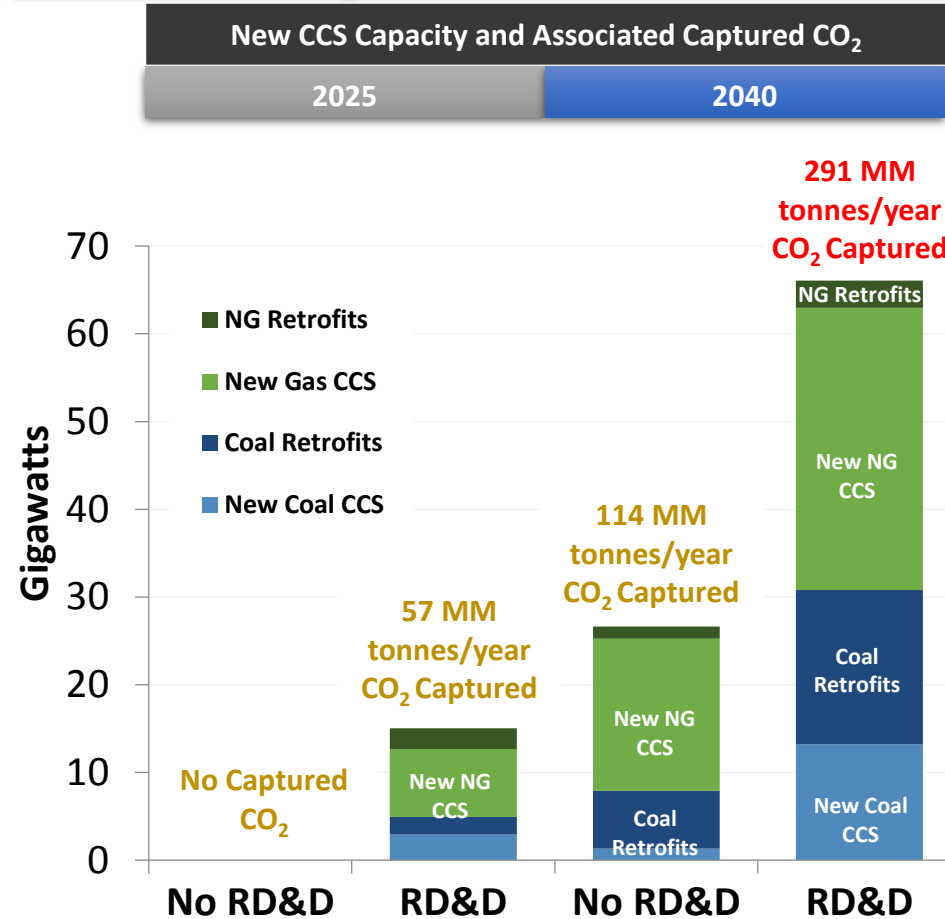


NETL CO₂ Prophet Model

Oil Bearing Formation



Assessing Program Portfolio Impacts:



U.S. Benefits of the Program, Cumulative through 2040	
Benefit Area	Metric
Economic Growth	Total Electricity Expenditure Savings
	Employment
	Income
	Gross Domestic Product (GDP)
Environmental Sustainability	CO ₂ Captured at Coal and Gas CCS Facilities
Energy Security	Additional Domestic Oil Production via EOR