

NETL RWFI: Working with NETL

We hope you will leave the webinar with knowledge about:

- How you and your stakeholders, industries, can engage and interact with NETL
- What the main research priorities of NETL and how they may affect you and your stakeholders
- What are some of the economic, and technoeconomic analysis activities that NETL does and how that may be useful to you and your stakeholders
- What is the Regional Workforce Initiative and how can you engage with the RWFI



U.S. DEPARTMENT OF

Webinar Agenda

NETL RWFI: Working with NETL

- I. Welcome & Introductions From NETL
- I. NETL Overview & How To Work With NETL- Mike Kowak
 - a. DOE National Labs and NETL impact
 - b. Main Research Focuses and potential economic impacts
 - c. Background on Partnerships Group
 - d. Mechanisms for Partnerships
- II. NETL RWFI Overview Anthony Armaly
 - a. NETL RWFI background and mission
- III. Systems Engineering & Analysis Overview Chris Nichols
 - a. SEA Background and Overview
 - b. Examples of econometric data
 - c. How to connect with SEA



NETL Overview

Solutions for Today | Options for Tomorrow



[NETL Presenter's Name] [NETL Presenter's Title/Office]



Mission

Discover, integrate and mature technology solutions to enhance the Nation's energy foundation and protect the environment for future generations

EFFECTIVE RESOURCE DEVELOPMENT

EFFICIENT ENERGY CONVERSION

Environmental Sustainability



Vision

Be the Nation's renowned fossil-energy science and engineering resource, delivering world-class technology solutions today and tomorrow

TECHNOLOGY CONVENER

KNOWLEDGE AND TECHNOLOGY GENERATION CENTER

Responsible Steward



Scientific & Technical Workforce



NETL is...

900+ R&D projects/48 states
1,181 employees
3 labs across U.S.
FY19 budget \$1.03B





NETL Infrastructure

Snapshot



165 laboratories

1.1 million ft² of building space

237 acres of land **112** buildings & structures

\$550 million replacement value





NETL Budget

FY19 Budget \$1.03B

Coal Program

Carbon Capture	\$101M
Carbon Storage	\$ 98M
Adv. Energy Systems	\$130M
Crosscutting	\$ 56M
NETL Coal R&D	\$ 36M
Rare Earth Elements	\$ 18M
STEP	\$ 22M
Transform. Coal Pilots	\$ 25M

Oil & Gas Program

Natural Gas Tech.\$ 51MUnconvent. FE Tech.\$ 46M

FE Program Support

Program Direction\$ 61MNETL Research & Ops.\$ 50MNETL Infrastructure\$ 45M

Non-Fossil Programs

 EERE
 \$150M

 OE
 \$19M

 CESER
 \$65M

Strategic Partnerships Other \$ 52M





NATIONAL

TECHNOLOGY

ENERGY

Core Competencies & Technology Thrusts





Coal Technology Thrusts



	Advanced Energy Systems	 Transformational Power Generation Advanced Combustion, Gasification, Fuel Cells, and Gas Turbines Efficient Energy Conversion Coal Beneficiation 	
	Carbon Capture	 Cost-Effective Capture Systems Minimize Energy Penalty for Capture and Compression Smaller Capture System Footprint 	
Cincon stolage Att	Carbon Storage	 Safe, Effective, Long-Term Storage Monitoring, Verification, Accounting, and Assessment Demonstrate Storage Infrastructure Utilization of Captured Carbon Dioxide 	
	Crosscutting Research & Analysis	 High-Performance Materials Sensors and Controls Simulation-Based Engineering Water Management University Training and Research 	
	STEP (Supercritical CO ₂)	 High-Efficiency Power Cycle Reduced Water Consumption and Air Emissions Reduced Power Cycle Footprint 	
R	Rare Earth Elements	 Efficient Rare Earth Element (REE) Recovery Cost-Competitive Domestic Supply of REEs 	
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Unconventional	Developing technologies to maximize recovery and reduce operational impacts from unconventional oil & gas resources
Offshore	Minimizing the environmental impacts of deepwater and ultra- deepwater oil and natural gas production
Natural Gas Infrastructure	Developing technologies and practices to assess and mitigate emissions from natural gas transmission, distribution, and storage facilities
Methane Hydrates	Improving the characterization of methane hydrates and developing ways to tap their massive energy potential



EERE, OE and CESER Technology Thrusts



Energy Efficiency & Renewable Energy (EERE)



Vehicles



Solid State Lighting



Geothermal

Office of Electricity (OE)



Grid R&D



Energy Storage

Cybersecurity, Energy Security, and Emergency Response (CESER)



Energy Security & Restoration



Cybersecurity

Helping to Implement DOE & Gov't Programs for 25+ years

- Department of Defense
- Environmental Management
- Legacy Management
- Dept. of Homeland Security

Technical, Administrative, Project Management Support

- Documented Procedures and Policies
- Disciplined Process w/Tracking

Implementation Mechanisms

- Technical Advice/Consulting
- Acquisition (contracts)
- Financial Assistance(can only be awarded by Federal personnel)



Technology Development Pathway

An Active Portfolio from Concept to Market Readiness



 NATIONAL

ENERGY TECHNOLOGY

ABORATORY

Award Winning Laboratory



NETL's scientists have earned 51 R&D 100 Awards over the past 20 years



2016-17 AWARD WINNERS

National Risk Assessment Partnership (NRAP) Carbon Capture Simulation Initiative (CCSI) Toolset Computationally Optimized Heat Treatment of Metal Alloys

HVAC Load Reduction Technology for Commercial Buildings

LEGACY OF SCIENCE AND TECHNOLOGY EXCELLENCE



How to Work with NETL



The Toolbox

2019



Cooperative Research and Development Agreements

- Joint R&D performed by NETL and participant researchers
- CRADA-developed IP and data are addressed
- Participants offered the right of first refusal to an exclusive license for NETL or jointly developed IP
- Cost sharing between NETL and CRADA participant is essential
- Small businesses are given preferential consideration









CFA



Contributed Funds Agreements

- 100% funded by the participant
- For a specific scope of work to be completed by NETL
- DOE owns any resulting IP





MOU/MOA

Memorandums of Understanding/Agreement



- State the areas of cooperation or the terms of a partnering relationship
- Not considered binding contracts
- Cannot be used to obligate, commit, or transfer funds
- Implementation of specific tasks/projects must be accomplished through a legally binding instrument such as a CRADA, contract, or other appropriate agreement







- AKA confidentiality agreements
- Used when NETL and/or another party wish to exchange information that is either considered potentially patentable by NETL or proprietary by the other party
- Unilateral or bi-lateral, depending on the circumstances
- NETL is bound to maintain information received in the course of business confidential by the Trade Secrets Acts (18 USC Sec. 1905). However, NETL will enter into an NDA that reiterates this protection
- NETL only executes its own NDAs





Non-Analysis Agreements

NAAs protect NETL patented technology that is shared with another party for a pre-negotiated purpose, such as testing or further research. The other party agrees not to analyze the technology to determine composition, use the technology for commercial purposes, or transfer the technology to another party.







Licenses



Licenses transfer NETL- owned intellectual property (IP) from the government to the private sector. NETL looks for licensing partners with a plan for technology development and marketing, with a high probability for technology commercialization and sharing IP benefits with the public.





SBIR & STTR Programs



Small Business Innovation Research & Small Business Technology Transfer

- Gov't programs that award funding
- Competitions among small businesses only
- Small businesses keep the rights to any technology developed
- Encouraged to commercialize the technology

- Phase I feasibility of innovative concepts - \$150,000 for about 9 months
- Phase II the principal R&D effort
 - up to \$1,000,000 over a twoyear period
- Phase III non-Federal capital used to pursue commercial applications



FOA

Funding Opportunity Announcements

- A notice of a federal grant funding opportunity
- NETL uses FedConnect and or Grants.gov and FedBizOpps to post announcements related to the energy sector, receive proposals and applications, and disseminate award information
- Proposals will be accepted only through FedConnect or Grants.gov









Funding Assistance Awards

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FAs support specific research activities conducted outside of NETL, resulting in cooperative agreements or grants. FAs may be unsolicited or the result of the competitive FOA process.





Unsolicited Proposals

- An application for support of an idea, method, or approach
- Submitted by an individual, business, or organization
- Based solely on the proposer's initiative rather than in response to a DOE solicitation
- Funding of unsolicited proposals is considered a noncompetitive action







IP

Intellectual Property



- Gov't cannot create
 copyrights, but can own
- License patent applications or patents
- Exclusive, partially exclusive, or non-exclusive







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THANK YOU FOR LISTENING! Questions?

VISIT US AT: www.NETL.DOE.gov





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NETL Regional Workforce Initiative (NETL RWFI)



A Focus on Energy and Advanced Manufacturing Regional Workforce Readiness and Development



NETL Regional Workforce Initiative Missi

A Platform For:

- Communication and collaboration with regional/national stakeholders and partners, DOE and other federal agency partners
- Connecting public investment in energy and advanced manufacturing NETL R&D to national and regional economic development, education, and jobs
- Discussing energy and manufacturing regional and national workforce skills gaps generally and specifically to NETL's core R&D



How We Engage:

- Monthly E-Note Email Bulletin
- On Campus Engagements
- Webinars and Webcasts
- NETL RWFI Website
- Participation and representation at regional and national energy and manufacturing workforce meetings and groups





Responsive to Administration Priorities



RWFI aligns to the Administration's efforts to connect R&D investment to economic growth, job growth, and development of a skilled technical workforce.

- OMB Memorandum to Agency Heads on FY 2020 Administration Research Development Budget Priorities
- EO-Establishing the President's Council for the American Worker
- EO-Establishing Apprenticeships in America
- EO-Strengthening the Cybersecurity of Federal Networks and Critical Infrastructure



RWFI Outreach, Meetings, Webinars, and Workshops

NATIONAL ENERGY TECHNOLOGY LABORATORY

Consistent, meaningful, outcome driven, engagement





RWFI Opportunities for FY 2019



- Continued outreach to regional stakeholders, such as the Appalachian Regional Commission (ARC)
- Planning for RWFI webinars on:
 - Economic Development
 - Energy Technology 101 (March 28th 2019)
 - Energy workforce
- Potential on-campus events:
 - The future of work in the national and regional fossil energy sector
 - Energy and advanced manufacturing industry workforce roundtable





Connecting you to other Federal Agencies



The federal portfolio including funding and investments in economic development are broad and housed in many different departments and agencies

Examples include:

- Department of Energy STEM and Workforce Activities
- National Science Foundation Advanced Training Education Program
- Department of Labor Apprenticeship Program

NETL RWFI provides a platform for collaborative efforts and communication across these federal agency partners and regional stakeholders.









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Systems Engineering and Analysis Overview and Energy Market Modeling

Solutions for Today | Options for Tomorrow

NETL RWFI Economic Development Webinar Feb 8 2019





Core Competencies & Areas of Research





Systems Engineering & Analysis (SEA)



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



Advanced Technology Design & Cost Estimation

Energy Systems Analysis

Resource Availability and Cost Modeling

- CO₂ storage (saline and EOR)
- Fossil fuel extraction
- Rare earth elements

LCV

 General subsurface technology evaluation and support
 <u>Grid modeling and analysis</u>

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:









* Now known as Liquid Fuel Market Module





Summary Results, All Years



Category	Impact of NETL RD&D
Cumulative employment	4.1 million job years
Cumulative total income	\$202 billion
Cumulative GDP	\$304 billion
Total electricity expenditure savings	\$49 billion (undiscounted)
Additional domestic oil production via EOR (billion barrels)	2.0

• Both the largest employment and income impacts are in the Construction Sector (Sector 9)



National Sector Results – All Years Total



Employment (thousand jobs)



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I have seen the future and it is very much like the present, only longer. --Kehlog Albran

