NETL’s Research & Development – Innovating Energy Technology Solutions

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Legacy Management

Environmental Custodianship

Domestic Supply

Spanning the subsurface to atmosphere, engineered & natural systems
NETL’s mission is to discover, integrate, and mature technology solutions to enhance the Nation’s energy foundation and protect the environment for future generations.
<table>
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<th>NETL’s Core Competencies</th>
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<td><strong>Computational Science &amp; Engineering</strong></td>
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<td><strong>High-Performance Computing</strong></td>
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<td><strong>Data Analytics</strong></td>
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<td><strong>Materials Engineering &amp; Manufacturing</strong></td>
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<td><strong>Structural &amp; Functional Design, Synthesis &amp; Performance</strong></td>
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<td><strong>Geological &amp; Environmental Systems</strong></td>
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<td><strong>Air, Water &amp; Geology</strong></td>
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<td><strong>Predicting &amp; understanding engineered-natural systems</strong></td>
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<td><strong>Energy Conversion Engineering</strong></td>
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<td><strong>Component &amp; Device Design &amp; Validation</strong></td>
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<td><strong>System Engineering &amp; Analysis</strong></td>
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<td><strong>Process &amp; System Optimization, Validation &amp; Economics</strong></td>
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<td><strong>Program Execution &amp; Integration</strong></td>
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<td><strong>Strategic Planning</strong></td>
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<td><strong>Project Management</strong></td>
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“All of the Above” Energy Future

- Carbon Capture & Storage
- Safe & Responsible Domestic Oil & Gas Production
- Advancing Clean Energy
- Advancing Energy Efficiency
- Developing Clean Fuels
Why “all of the above” energy R&D matters

EIA Forecasts:
- Demand for energy is growing globally
- Renewable production is growing fastest
- Coal use will plateau
- Natural gas surpasses coal by 2030
- Oil maintains its lead
- Fossil fuels continue to supply >3/4’s of world energy use by 2040

Field R&D Technologies

- Focused on evaluating, monitoring, and predicting engineered-natural systems
- Technology transfer & testing in commercial settings

**Wells**
- Wellbore integrity
- Legacy wells

**Resource & Risk Evaluation**
- Impact assessments
- Predictive tools to reduce uncertainty

**Fracturing**
- Field monitoring (μ-seismicity, tracers)
- Predictive modeling (max. fracture extent)

**Water**
- Biogeochemistry
- Surface monitoring
- Use & Reuse

https://edx.netl.doe.gov/ucr
Field R&D Technologies

- Focused on evaluating, monitoring, and predicting engineered-natural systems
- Technology transfer & testing in commercial settings
Laboratory Studies

- Materials fabrication
- Characterization
- Simulating “field” conditions
- Developing new materials, sensors & coatings
- Generating data for models & analyses
Developing Innovative Tools & Approaches -

- Modeling
- Data Science
- Big Data
- Supercomputing
- & Analytics

to support decision making

National Risk Assessment Partnership (NRAP)

NRAP science-based prediction for engineered–natural systems

Quantifying uncertainty and characterizing subsurface resources

Predicting & assessing induced seismicity risks

Rose et al, 2017

Justman et al, 2016

Computational & Analytical Efforts
Computational & Analytical Efforts

Developing Innovative Tools & Approaches -

- Modeling
- Data Science
- Big Data
- Supercomputing
- & Analytics to support decision making

Big Data & Geospatial Analysis characterizing energy infrastructure to improve monitoring & prevent incidents

Regional Trends in Data

Optimize Sensor & Material Development & Deployment

Identify Technology Needs
STEM in action
STEM - Mickey Leland Energy Fellowships

https://orise.orau.gov/mlef/default.html

Mickey Leland Energy Fellowship (MLEF) Program

For more than 20 years, the Mickey Leland Energy Fellowship (MLEF) Program has provided students with fellowship opportunities to gain hands-on research experience with the Department of Energy’s (DOE) Office of Fossil Energy. The MLEF program was created in 1995 with the goal of improving opportunities for under-represented students in the science, technology, engineering, and mathematics (STEM) fields; however, all eligible candidates are encouraged to apply.

Check back this fall to apply for the Mickey Leland Energy Fellowship Program!
STEM - ORISE Fellowships

https://www.orau.gov/netl/
Partnerships & Licensing Options

https://www.netl.doe.gov/business/tech-transfer/partnerships-and-licensing