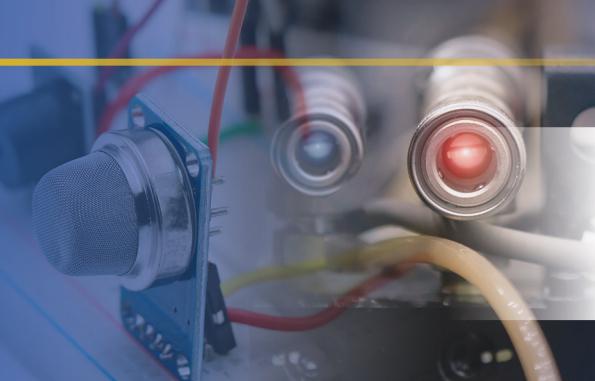




UNIVERSITY OF
PITTSBURGH
INFRASTRUCTURE
SENSING

COLLABORATION WORKSHOP



Case for a Sensing Collaboration

Michael Holland, Ph.D.

Vice Chancellor for Science Policy and Research Strategies, University of Pittsburgh

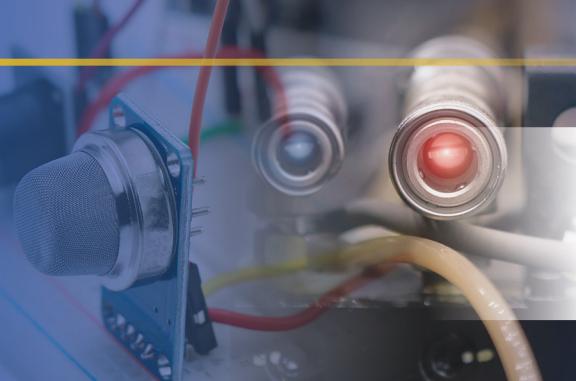
Bryan D. Morreale, Ph.D.

Associate Laboratory Director for Research and Innovation Center, NETL



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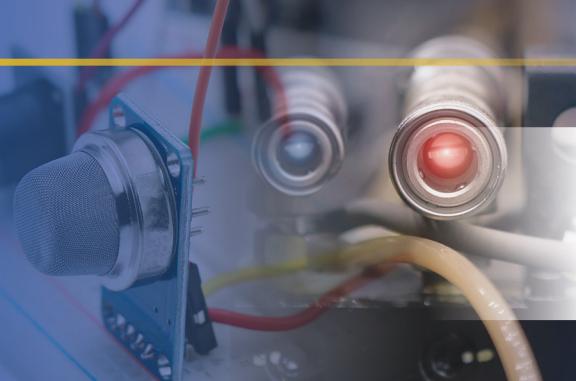


Mike Holland is the Vice Chancellor for Science Policy and Research Strategies. He manages the Pitt Momentum Funds, runs Big Proposal Bootcamp, and works with faculty on developing large, team-based proposals. Prior to coming to Pitt, Mike served as Executive Director of NYU's Center for Urban Science and Progress. Before that he worked in science policy positions in Washington, DC at the Department of Energy, the White House Office of Management & Budget, the Office of Science & Technology Policy and the US House of Representative's Committee on Science. He's also chairman of the board of directors for the Coleridge Initiative, a non-profit data science company spun out of NYU. Mike earned his Ph.D. in analytical chemistry from the University of North Carolina at Chapel Hill.



UNIVERSITY OF
PITTSBURGH
INFRASTRUCTURE
SENSING

COLLABORATION WORKSHOP



NATIONAL
ENERGY
TECHNOLOGY
LABORATORY

Bryan D. Morreale, Ph.D.

Associate Laboratory Director for Research and Innovation Center, NETL



Bryan Morreale is the Associate Laboratory Director for NETL's Research & Innovation Center. Within this capacity, Dr. Morreale has the privilege of leading a diverse and dynamic workforce of several hundred scientists and engineers tackling some of the nation's most pressing energy challenges associated with effective energy production, efficient energy conversion and environmental sustainability.

Prior to his current role, Dr. Morreale has held numerous positions within NETL providing strategic, managerial, and technical leadership, including the Senior Technical Advisor to the Laboratory Director and the Director of the Molecular Science Division.

During Dr. Morreale's professional career, he has contributed to over 100 publications and presentations in areas including hydrogen separation, membrane reactors, carbon capture, natural gas utilization and fluid properties at extreme and conditions.

In addition, Dr. Morreale has been invested in numerous other activities, including academic roles at the University of Pittsburgh and Carnegie Mellon University, organizational roles for The Minerals, Metals and Materials Society and American Institute of Chemical Engineers, an Energy Ambassador for the National Academy, and a member of the Materials Genome Initiative's Strategic Planning Committee.

Driving Innovation & Delivering Solutions

Strategic Partnerships

Bryan D. Morreale, Ph.D.

Associate Laboratory Director



U Pitt – NETL Infrastructure Sensing Collaboration Workshop

August, 2022



U.S. DEPARTMENT OF
ENERGY

NATIONAL ENERGY
TECHNOLOGY
LABORATORY
NETL

Carbon Reduction Perspectives



Administration Goals

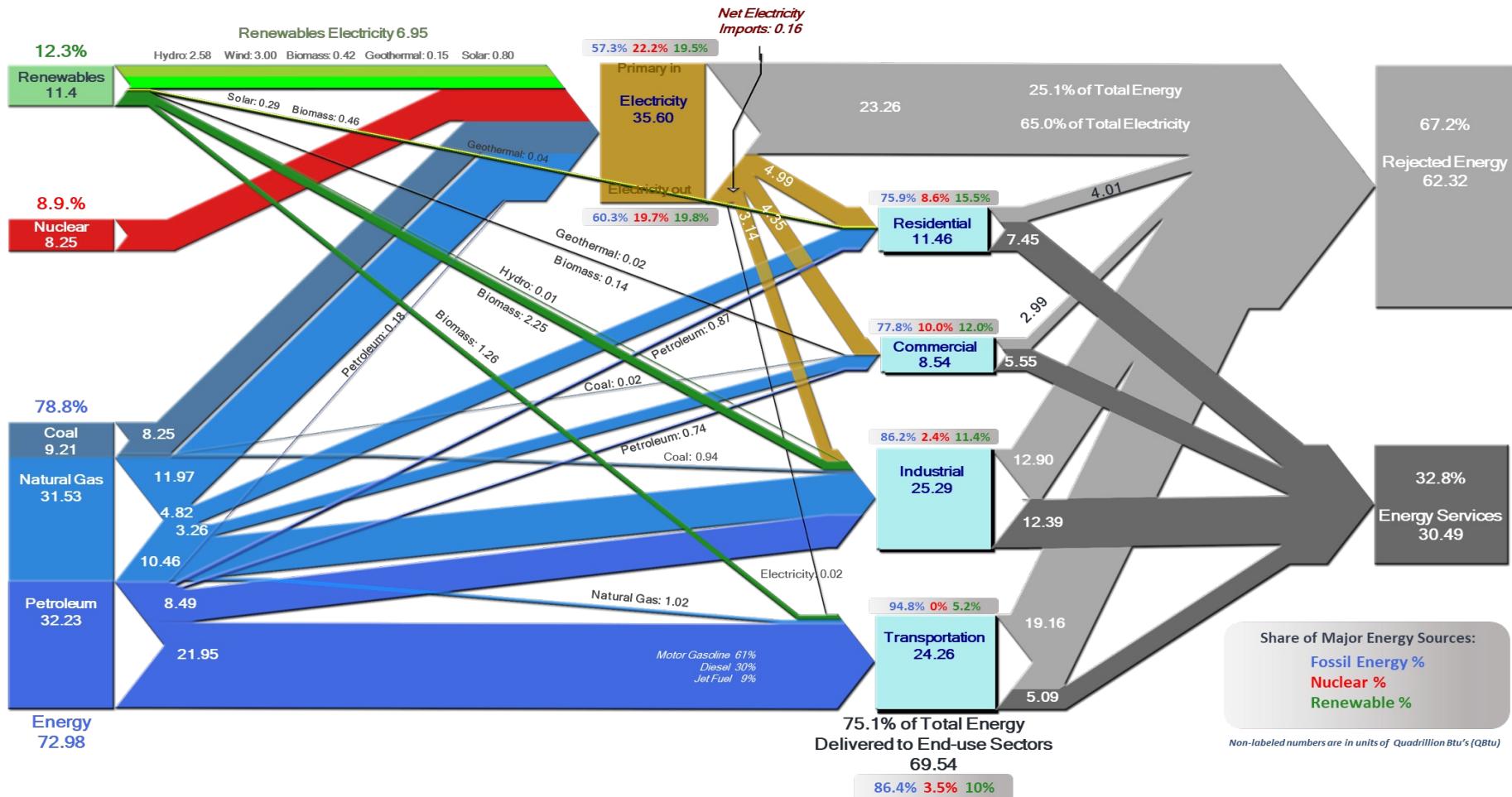
- 50% reduction in U.S. GHG pollution by 2030
- Carbon-neutral power sector by 2035
- Carbon-neutral economy by 2050

Industrial Perspective

- Sustainability is a top priority

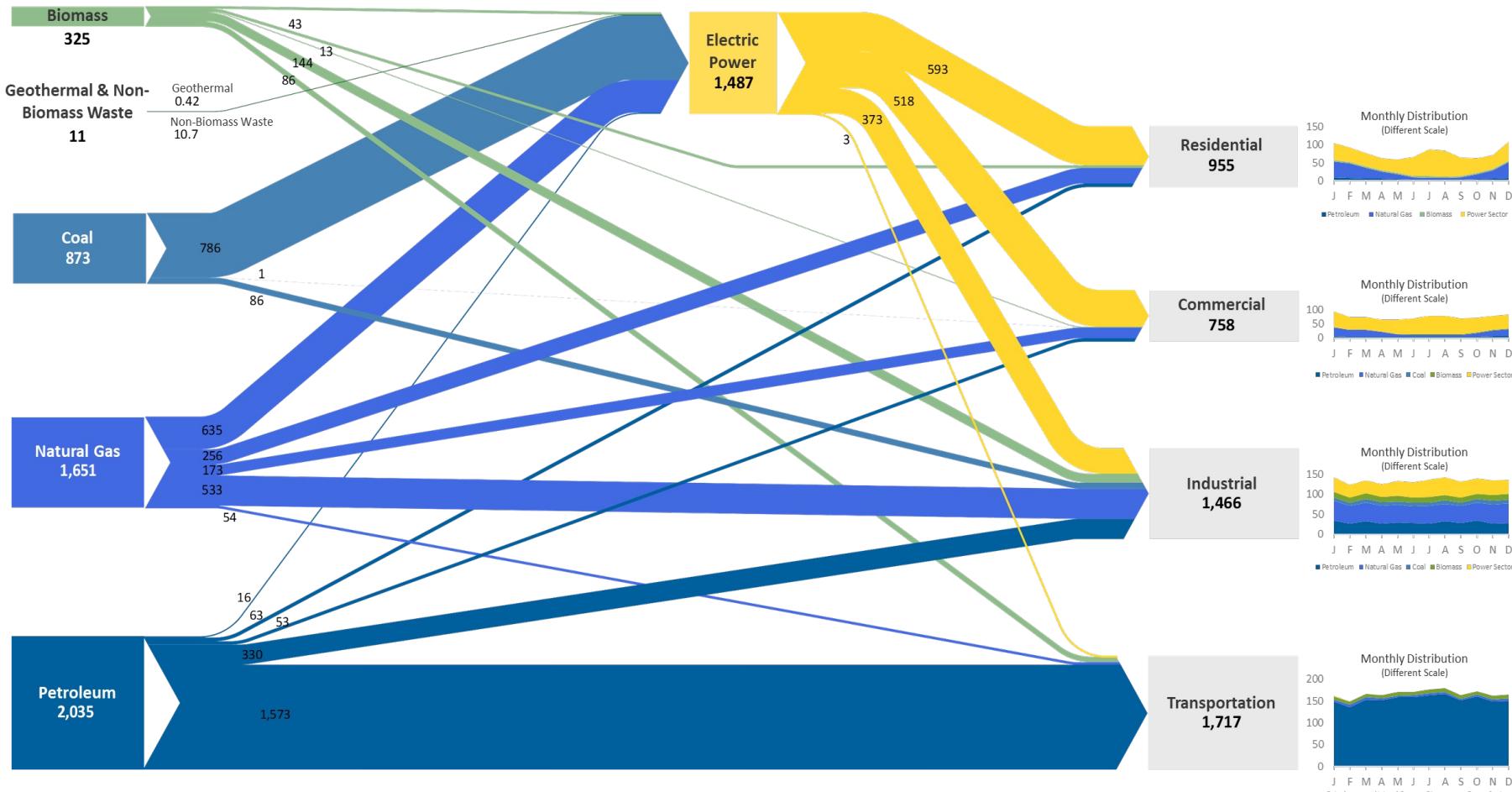
2020 Estimated U.S. Energy Consumption

93 Quadrillion BTUs



2020 Estimated U.S. CO₂ Emissions

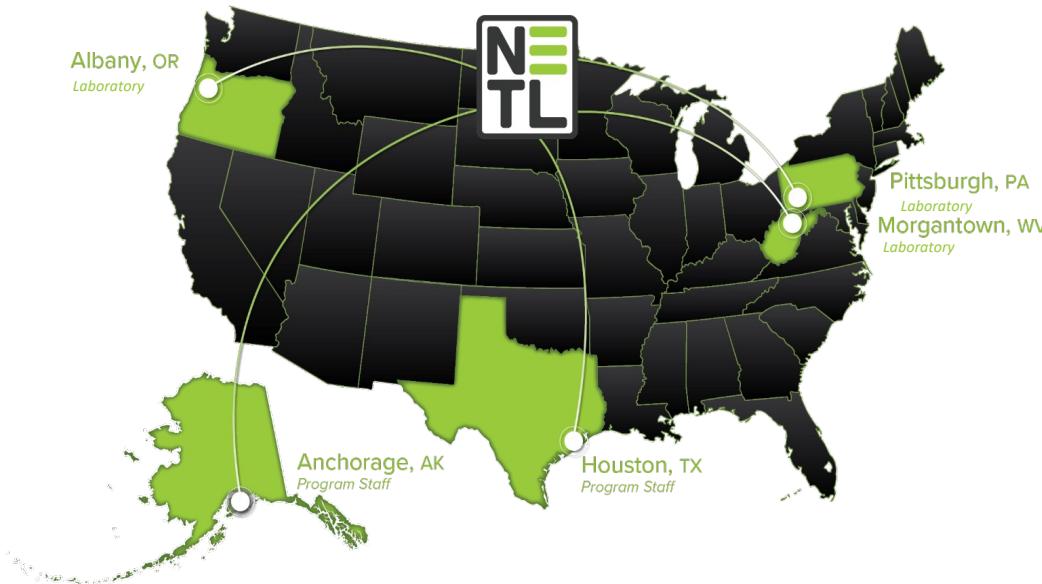
4,896 Million Metric Tons



Driving Innovation, Delivering Solutions



National Energy Technology Laboratory (NETL) is **one of 17** U.S. Department of Energy (DOE) national laboratories; producing technological solutions to America's energy challenges.



- NETL has **five locations**
- Only National Lab **dedicated carbon research**
- Only GOGO DOE Lab
- **One of three applied** national labs
- Flexible **Intellectual Property**

MISSION

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

Demonstrated Successes



NETL's Multidisciplinary Approaches Crosscut Industry to Solve Problems

Strategic Partnerships Projects/Work for Others



Boston Scientific Coronary Stent



Microwave-Assisted Process
Intensification for Natural Gas Conversion
(NETL, WVU, Shell, PNNL)

Intellectual Property



Patented Sorbents



Erosion Resistant
Nanocoating Technology



CogniTek
Management Systems

Start-Up Companies



*Manufacturers' Representative
Serving The Power Utility Industry*



Pyrochem Catalyst Company
Specialty Catalysts



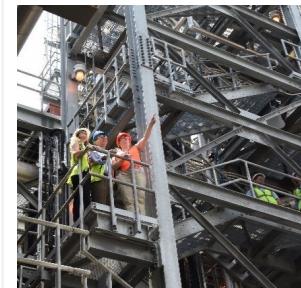
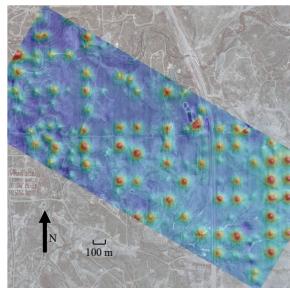
Arc Position Sensing
Technology



NETL's Research & Innovation Center



EFFECTIVE RESOURCE DEVELOPMENT • EFFICIENT ENERGY CONVERSION • ENVIRONMENTAL SUSTAINABILITY



COMPUTATIONAL
SCIENCE &
ENGINEERING

MATERIALS
ENGINEERING
& MANUFACTURING

GEOLOGICAL &
ENVIRONMENTAL
SYSTEMS

ENERGY
CONVERSION
ENGINEERING

STRATEGIC SYSTEMS
ANALYSIS &
ENGINEERING

PROGRAM
EXECUTION &
INTEGRATION

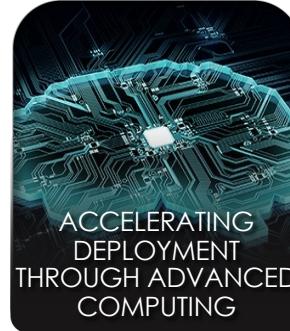
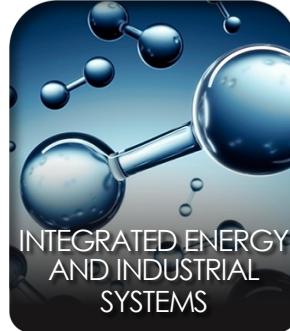
National Lab

DOE Field &
Program Office

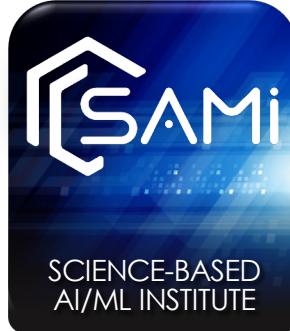
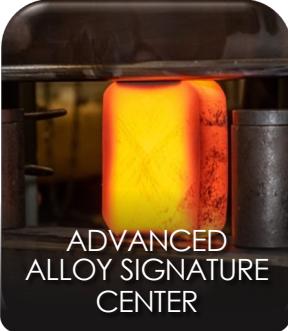
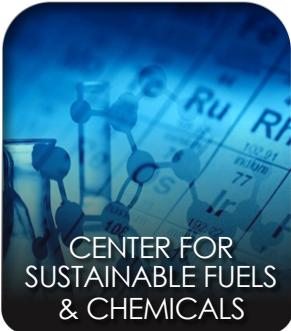
NETL Initiatives



STRATEGIC INITIATIVES



KEY LAB INITIATIVES



Support Energy Efficiency, Safety, Resilience, and Sustainability

- ✓ Monitor systems and conditions
- ✓ Improve performance & efficiency
- ✓ Enhance reliability & safety
- Temp, acoustics, chemical, gas, corrosion
- Composite nano-materials, thin films & fiber optics, sensor devices development

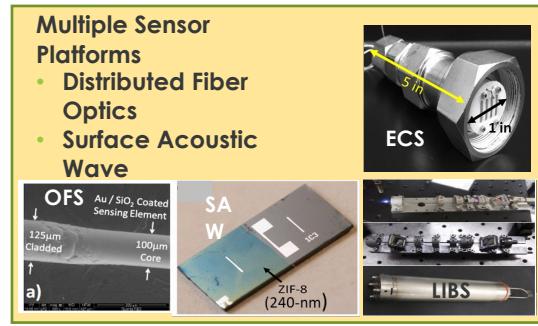
ENERGY DELIVERY & STORAGE



Pipelines: Monitor corrosion, gas leaks, T, acoustics to predict/prevent failures. NG, H₂, CO₂

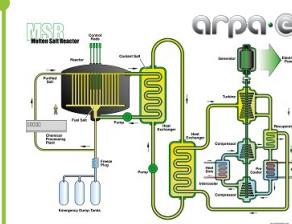
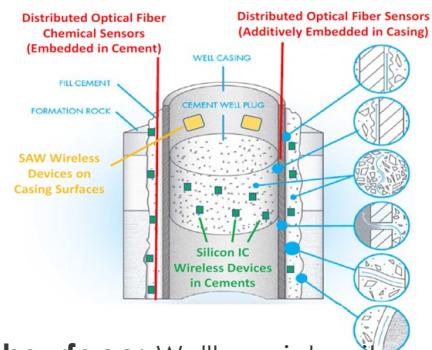


Grid: Transformer, powerline failure prediction, fault detection, state awareness



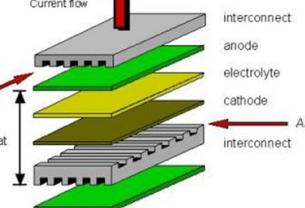
GENERATION

Turbines: Real-time fuel composition and combustion temperature for improved service life and efficiency



Nuclear: Core monitoring and molten salt temperatures for reactor fuel efficiency & reactor safety

SOFCs: Fuel concentration & temperature gradients for improved lifetime and efficiency



NETL's Sensor Development



No More
Lead Pipes



High-Speed
Internet Access



Better Roads
and Bridges



Investments in
Public Transit



Upgrade Airports
and Ports



Investment in
Passenger Rail



Network of Electric
Vehicle Chargers



Upgrade Power
Infrastructure

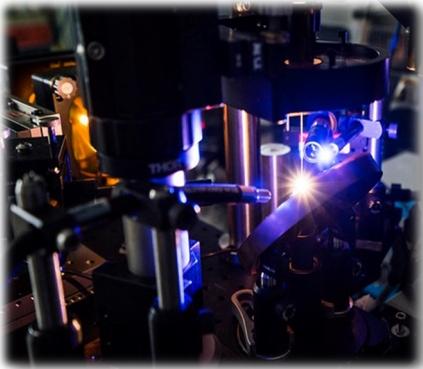


Resilient
Infrastructure

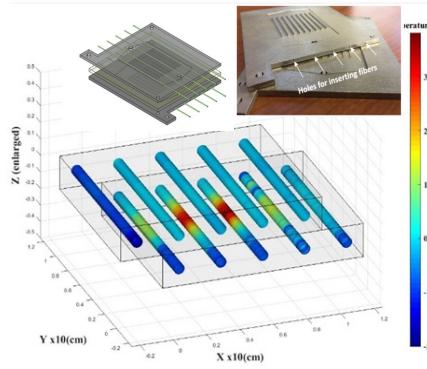


Investment in
Environmental
Remediation

Materials Development



Sensor Manufacturing



Evaluation at Real Conditions



Custom Sensor Development Reactors

Thank You!

VISIT US AT: www.NETL.DOE.gov



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@NationalEnergyTechnologyLaboratory

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