



ACCOMPLISHMENTS

Q4 FY23



U.S. DEPARTMENT OF
ENERGY

NETL ACCOMPLISHMENTS

Quarter 4 – Fiscal Year 2023

[NETL's Transformer Watchman Won R&D 100 Award](#)

An innovative sensor technology, developed by NETL and its partners at the University of Pittsburgh and the Pittsburgh-based company Sensible Photonics Inc. that can protect the nation's energy infrastructure, help save lives, and save the economy billions of dollars by preventing electric service downtime has scored a 2023 R&D 100 Award in the topic area of IT/Electrical. By earning the prestigious R&D 100 Award, the new technology, called the Transformer Watchman, is recognized as one of the top 100 revolutionary technologies of the past year.



[NETL Geo-data Helped Prioritize Energy Communities in America](#)

With insights from custom mapping and data science analyses, NETL is helping prioritize energy communities and spotlight opportunities for economic improvement and environmental justice in a changing energy landscape. The release and sharing of these data and maps provide critical information for U.S. communities, allowing them to evaluate funding opportunities, tax credits, and opportunities for clean energy transitions.

[NETL-Supported Project Addressed Boiler Impingement With High-Performance Computing](#)

With NETL support, through the Lab's University Training and Research program, researchers at the University of California, Riverside, used advanced computing models that harness machine learning to efficiently reduce impingement in boilers — an innovation that can ensure longer and more efficient service life for power plants and even potentially extend the lives of helicopter rotor blades or aircraft engine components.

[Deep Learning Tool To Ensure Safe Carbon Storage Developed in NETL-Sponsored Project](#)

Zanskar Geothermal and Minerals Inc., with NETL support, concluded a project that developed a deep learning tool for subsurface monitoring that could help ensure safe storage of carbon dioxide at geologic sites, which is critical for meeting the nation's decarbonization goals. Before making major investments, carbon storage site operators are looking for assurances from the scientific community that their operations will be safe. By monitoring the subsurface with sensors, researchers can detect changes underground and help inform such assurances.

[NETL Released Updated Version of CO₂_T_COM Transport Cost Model](#)

NETL released an updated version of its popular open-source tool that helps industry decision makers, planners, and researchers calculate the cost of transporting carbon dioxide (CO₂) by pipeline from where it is captured to where it can be stored underground or converted into useful products. The tool, supported by the DOE Office of Fossil Energy and Carbon Management (FECM), known as the FECM/NETL CO₂ Transport Cost Model (CO₂_T_COM), is an Excel-based tool that estimates revenues and capital, operating, and financing costs for transporting liquid phase CO₂ by pipeline.



[NETL-Supported Technology Transformed Coal and Coal-Wastes Into Nanomaterial That Is 200 Times Stronger Than Steel](#)

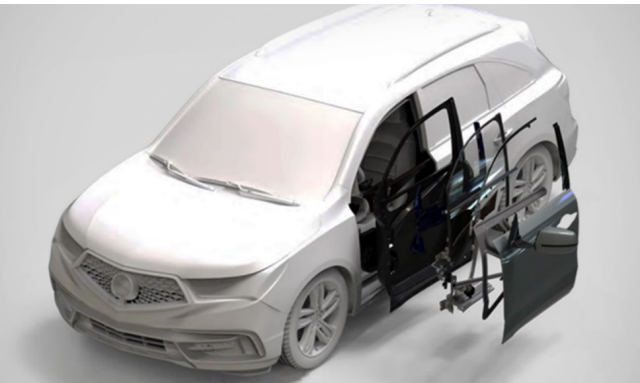
An innovative technology called flash joule heating that transforms carbon-rich materials including coal and coal-wastes into high-quality graphene for use in a wide range of products is closer to reality as a result of NETL support. Universal Matter, an international research and development company with research facilities in Houston, Texas, received support from NETL through a cooperative agreement.

[NETL Team Demonstrated Composite Coating To Enhance Fiber Optic Sensor Technology for Detecting Carbon Dioxide and Methane](#)

An NETL and University of Pittsburgh research team demonstrated how the use of plasmonic nanomaterials and porous polymer composite coating in optical fiber sensing technologies can detect energy-relevant gases, such as carbon dioxide and methane. The technology can help ensure safer, quicker, and more secure underground storage and pipeline monitoring. The results appeared in a paper published in *Advanced Materials*, one of the world's most prestigious multidisciplinary research journals that straddles materials science, innovative technologies, and real-world applications.

[NETL Researchers on List of Best Scientists in the World](#)

Four NETL researchers were recognized by Research.com, an international ranking organization, as being among the best scientists in the world in the fields of chemistry, earth science, and engineering and technology. NETL's Dan Sorescu, Ranjani Siriwardane, Ray Boswell and Mehrdad Massoudi appear in the second edition of Research.com's rankings. The list of best scientists was compiled using data derived from a wide range of data sources including publications and citation metrics.



[Lightweight Car Door Developed With NETL Oversight To Boost Fuel Efficiency](#)

Using carbon fiber, thermoplastic resin and state-of-the-art computer design techniques, a team of researchers led by Clemson University, in cooperation with NETL, developed a lightweight vehicle door that boosts fuel efficiency while still meeting federal safety requirements. The project team reduced the weight of a steel door by 32% and then subjected the door to a battery of tests to ensure it complied with Federal Motor Vehicle Safety Standards and safety requirements set by Honda, another project partner.

[NETL Released Hydrogen Safety Review Report](#)

The Hydrogen Safety Review for Gas Turbines, SOFC, and High Temperature Hydrogen Production report was developed to review and summarize the unique safety challenges involved with the production, transportation and storage of hydrogen in support of safe, widespread and large-scale production and utilization of hydrogen as a carbon-free energy storage medium.

[NETL Produced a More Robust Pipeline Steel by Alloying with Small Amounts of the Rare Earth Element, Cerium](#)

NETL researchers produced a more robust pipeline material for transporting hydrogen and captured carbon dioxide by adding the rare earth element cerium to create a tougher steel alloy. The accomplishment simultaneously addresses two important DOE priorities: development of infrastructure needed for decarbonization and improvement of the critical minerals supply chain.



[NETL Developed Coating Technology To Protect Pipelines From Corrosion and Improve Safety and Reliability](#)

An invention reported by researchers from NETL can help protect against corrosion in natural gas, hydrogen, and carbon dioxide pipelines. Pipeline corrosion can cause catastrophic failure events such as explosions and emissions of environmentally damaging substances like methane. The innovation is a new self-healing cold spray coating for internal pipeline corrosion protection.

[NETL and Partners Developed Novel Embedded Sensors for Subsurface Wellbore Integrity](#)

NETL and its partners performed an integrated research and development effort to create a suite of complementary, multi-functional embedded sensor technologies for real-time subsurface monitoring of wellbore integrity, with emphasis on pH and corrosion monitoring of wellbore structural components including cement and casing steels. The technology can help realize effective geologic carbon storage, hydrogen storage and geothermal projects and reduce the wellbore integrity risks.

NETL and Project Partners Developed Next Level of Freight Efficiency With the International SuperTruck II

Working in partnership with NETL, two SuperTrucks were developed. Illinois-based Navistar Inc. and their subsidiary International Truck developed the [Navistar SuperTruck II](#), which incorporates several improvements resulting in increased operational efficiency, lower costs and decreased fuel consumption. Daimler Truck North America LLC (DTNA) debuted the [Freightliner SuperTruck II](#), which achieved reduced carbon emissions while improving the truck's real-world operational efficiency. Co-funded by the DOE Office of Energy Efficiency and Renewable Energy Vehicle Technologies Office and managed by NETL, the goal of the SuperTruck program is to deploy more energy-efficient on-road freight transportation. SuperTruck II was built as a hybrid vehicle featuring a combustion engine and high-voltage accessories and technologies, making it easier for future development into fully electric vehicles.



[NETL Developed Framework for Assessing the Feasibility of Recovering Rare Earth Elements From Unconventional Sources](#)

NETL created a framework to assess the economic viability of recovering rare earth elements from unconventional feedstocks like coal and coal waste — an advance that is part of NETL efforts to unlock new domestic sources of critical minerals that can ease the nation's dependence on foreign sources for the minerals. The success was the subject of an article in the prestigious science journal Nature Sustainability.

[With NETL Support, U.S. Company Developed Technology That Uses Coal Waste in Lithium-Ion Batteries](#)

An award-winning technology, developed by an American company with support from NETL, uses coal waste as an anode material in lithium-ion batteries — an innovation that researchers believe is an eco-friendly way to help the U.S. reduce reliance on foreign countries for critical materials that are needed to support the growing demand for batteries used in battery electric vehicles, energy storage, and other products.

[NETL's Geo-Data Science Research Helped Pinpoint Unconventional Rare Earth Element Deposits](#)

NETL released several tools and publications to help stakeholders accelerate next-generation, clean-energy technologies by tapping into a domestic supply of rare earth elements (REEs) and critical minerals (CMs). Five new peer-reviewed, data-driven products represent a valuable set of systematic and validated resources for finding and characterizing unconventional CMs and can help stakeholders see where REEs might be found, how much of the minerals might be present and determine what form the minerals will take

[NETL Innovation Efficiently Converted CO₂ Into Acetate for Use in a Variety of Popular Products](#)

NETL researchers developed a biocatalyst with 99% efficiency that can convert carbon dioxide, a waste product of fossil energy industries that warms the planet and causes climate change, into acetate — an ingredient used in many products like cleaning supplies, textiles, and as a potential feedstock for biofuels. The NETL biocatalyst has a unique adaptability to feedstocks and resistance to contamination challenges, making it a promising target for large-scale deployment.

[NETL's Hema Siriwardane Honored by Academy of Geo-Professionals](#)

For his experiences and contributions in geological sciences, NETL's Hema Siriwardane, Ph.D., was recently inducted as Diplomate of Geotechnical Engineering in the Academy of Geo-Professionals. Siriwardane aspires to use his experience in geological sciences to realize success in geological carbon storage projects. Being inducted as a Diplomate of Geo-Professionals recognizes geotechnical engineers who have attained advanced expertise and experience, advanced education, and a specialized body of knowledge in geotechnical engineering.



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