



U.S. DEPARTMENT of ENERGY

Hydrocarbons and
Geothermal Energy Office

OFFICE OF COAL

America's need for affordable, reliable, and secure energy is growing as super intelligence, advanced manufacturing, and other industries increase demand for electricity. The [U.S. Energy Information Administration](#) projects this demand could grow as much as 50 percent by 2050. The U.S. Department of Energy's (DOE) Hydrocarbons and Geothermal Energy Office (HGEO) is working to meet that demand by making more effective use of America's abundant domestic energy resources, strengthening existing infrastructure, and advancing new technologies.

As part of that mission, HGEO's Office of Coal works with the National Energy Technology Laboratory (NETL), other DOE national laboratories, industry, universities, and partners to **stabilize, optimize, and grow America's coal industry.**

Research & Development Priorities

The Office of Coal focuses on four objectives:

1. **Modernize and extend the life of existing coal mines and coal-based power plants** through advanced technologies and infrastructure improvements.
2. **Improve efficiency across the coal value chain**, including extraction, processing, conversion, and power generation.
3. **Grow coal-based power generation and product manufacturing** by advancing technologies for reliable electricity and high-value coal-derived products.



4. **Expand opportunities for U.S. coal exports** by addressing technical and infrastructure barriers and strengthening access to global markets.

Innovation Across the Value Chain

The **Mining & Processing Division** develops technologies to modernize coal extraction and processing, improve safety and productivity, extend mine life, and access resources previously considered uneconomic or difficult to recover.

Super Intelligence, Robotics & Automation • Digital Twins • Advanced Coal Processing • Enhanced Coalbed Methane Recovery • Underground Gasification • Export-Enabling Technologies

The **Conversion & Products Division** advances new uses for coal and coal-derived feedstocks, expanding opportunities beyond traditional power generation and strengthening domestic manufacturing and supply chains.

High-Value Carbon Materials • Graphite & Carbon Fibers • Coal-Derived Fuels & Chemicals • Waste-to-Products • Gasification

The **Power & Capture Division** develops technologies to modernize America's existing coal power fleet, improve efficiency and operational

flexibility, and create value from power plant waste streams.

Coal Plant Modernization • High-Efficiency Power Systems • Flexible Operations • Waste Stream Conversion • Carbon Dioxide-Enhanced Oil Recovery

From Research to Real-World Impact

More Than \$1 Billion Investment Announced

In FY26, HGEO announced more than \$1.1 billion in federal funding for coal plants and infrastructure, including projects to modernize existing generation, recommission viable facilities, add generating capacity, and strengthen export infrastructure.

More Value From American Coal

HGEO and NETL are advancing technologies that can create graphite, critical minerals, carbon materials, construction materials, fuels, and chemicals from coal and coal-related resources, opening new markets while strengthening domestic industrial supply chains.

Coal Center of Excellence

Based at NETL's Morgantown, West Virginia campus, the Coal Center of Excellence connects industry and other stakeholders with DOE expertise, facilities, and technical capabilities to solve real-world challenges and move

technologies toward deployment. The Center has already supported more than 68 industry engagements.

Powering Arizona

HGEO is advancing investments and partnerships in Arizona to modernize reliable power generation, accelerate mining innovation, and strengthen pathways for American coal to reach global markets. From the Apache Generating Station in Cochise County to mining research and technology testing near Tucson and cross-border rail connections at Nogales, Arizona demonstrates how innovation and infrastructure can strengthen America's coal and mining value chain.

Apache: Modernizing Reliable Generation

The Steam Turbine 3 Modernization Project will restore and upgrade a 195 MW coal-fired unit at Arizona Electric Power Cooperative's Apache Generating Station. The project will improve performance, efficiency, and operational availability while reducing forced outages and long-term maintenance costs, helping provide dependable, dispatchable power to rural communities across the Southwest.

PROJECT AT A GLANCE

195 MW (gross)

Enough generating capacity to power approximately 100,000 homes

\$21 MILLION

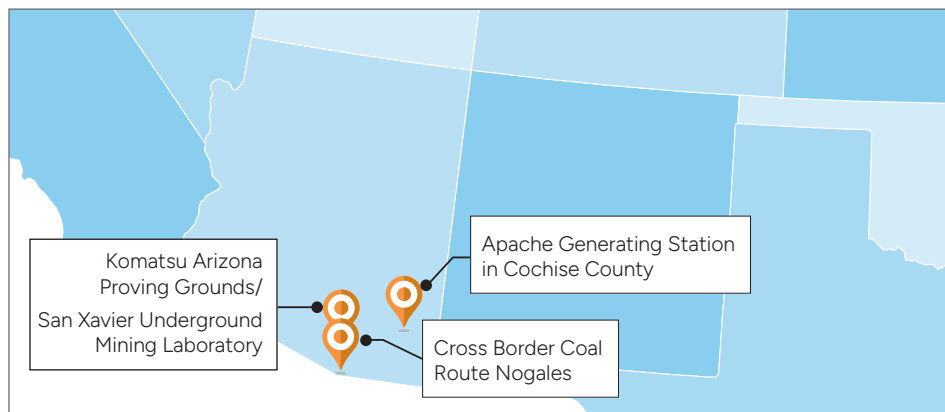
Federal investment announced

\$60.6 MILLION

Total project value

Advancing Mining Innovation

DOE is working to accelerate the development and deployment of super intelligence, automation, robotics, advanced sensors, and other technologies that can make mining safer and more productive. Near Tucson, the Komatsu



Arizona Proving Grounds provides a controlled environment for testing mining technologies before real-world deployment. The University of Arizona's San Xavier Underground Mining Laboratory, through DOE's Office of Critical Minerals and Energy Innovation (CMEI) and [Mine of the Future](#) initiative, gives students and researchers access to a working underground environment for research, testing, and hands-on training.

PROJECT AT A GLANCE

90 ACRES

San Xavier research facility

250 FEET

Maximum mine depth

4 LEVELS

For underground research and training

Connecting American Coal to Global Markets

Arizona also provides an emerging pathway for American coal exports. Recent test shipments moved coal from Wyoming's Powder River Basin by rail through Nogales, Arizona, where Union Pacific interchanged with Mexican railroad Ferromex for delivery to the Port of Guaymas, Mexico, and onward to international markets. Multiple trains have completed the cross-border route, demonstrating another potential pathway for American coal producers to reach customers in the Asia Pacific.

Innovation From Mine to Market

Together, these efforts illustrate HGEO's work across the coal value chain: **modernizing existing power infrastructure, accelerating mining technology and workforce development, and strengthening connections between American resources and global markets.** DOE is also working with the Department of Labor's Mine Safety and Health Administration (MSHA) to accelerate deployment of super intelligence, automation, advanced sensors, and other emerging mining technologies that can improve **worker safety, productivity, and operational performance.**

Work With Us

HGEO works directly with industry, universities, national laboratories, and other partners to identify barriers, apply DOE's technical capabilities, and move promising technologies from research through demonstration and toward commercial deployment.

Learn more: energy.gov/hgeo/office-coal

Contact: coal@hq.doe.gov ■



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For more information, visit:
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