

ADVANCED COAL PROCESSING



Coal-based Graphene Quantum Dots made from Domestic Coal Have Potential for Use in Applications such as LEDs, Solar Cells, Quantum Computing, and Medical Imaging.

NETL

NATIONAL ENERGY TECHNOLOGY LABORATORY

PROGRAM OVERVIEW

The Advanced Coal Processing Program is focused on both enhancing the value of coal as a feedstock and developing new high-value products derived from coal. Research includes testing of laboratory- and pilot-scale technologies to produce upgraded coal feedstocks and additional revenue-producing products such as carbon fiber, battery and electrode materials, 3D printing materials, and carbon nanomaterials. This work will also revisit and expand existing coal property databases to assist research efforts and inform potential consumers in both domestic and global markets.

Advanced Coal Processing technologies create cost-competitive, upgraded coal feedstocks that increase the value of existing coal assets as power plant fuels, address technical barriers that limit exports of domestic coal, and create additional revenues from non-traditional coal-based carbon products.

The Advanced Coal Processing Program has three primary research and development (R&D) areas:

- Coal to Carbon Products
- Feedstock Upgrading
- Coal Properties Database

COAL TO CARBON PRODUCTS

To extract the full economic value from our nation's coal resources, transformational research is being conducted to enable the production of cost-competitive, high-value carbon fibers and nanomaterials for use in non-traditional products such as structural materials, 3D printing materials, energy storage and electrode materials, and carbon composites. Revolutionary technologies that enable additional revenues from non-traditional coal-based carbon products will also enhance the economics of coal in both mining operations and as a higher-value fuel for existing and advanced coal plants.

FEEDSTOCK UPGRADING

Advances in coal upgrading technology are focused on enhancing the value of our domestic coal as fuel for the nation's existing power plants. Research to enhance coal's value as a power plant fuel is developing new coal dewatering, fine coal processing, and dry processes to upgrade lower-rank reserves technologies. These technologies, in concert with advances in automation, sensors, and controls, will create cost-competitive, upgraded coal feedstocks that increase the value of existing coal assets as power plant fuels by contributing to lower emissions, improved reliability, reduced capital and operating costs, and improved plant efficiency.

COAL PROPERTIES DATABASE

To make U.S. coals more attractive to our nation's trading partners, the program is addressing technical barriers that currently limit exports by enhancing the information available on our domestic coal's characteristics. Existing U.S. coal data bases are being revisited, expanded, and made easily and publicly accessible to enable coal suppliers and power plant operators to estimate the economic impacts of coal properties and compositions on the efficiency, reliability, and emissions

of both existing and new power generation facilities. The expanded data base of U.S. coals will also satisfy coal data needs of present and future coal users, as well as researchers of high-value products that can be made from coal.

ADVANCED COAL PROCESSING TECHNOLOGIES WILL EXTRACT THE FULL ECONOMIC VALUE FROM OUR NATION'S COAL RESOURCES BY:

- Reducing costs, reducing waste, and improving the environmental performance of coal for power generation.
- Developing process options for broadening the slate of products produced from a coal mine.
- Enhancing the value of domestic coals as fuels for existing power plants.
- Making U.S. coal more attractive for export.

Goals and Milestones

- Initiate testing of laboratory- and pilot-scale technologies that use coal to produce an upgraded coal fuel and value-added byproducts to determine: (1) how the technologies can improve the value chain for coal production in the United States, (2) the technology gaps that must be overcome and (3) the major products that could be produced from the technologies with an estimate of the technical and economic performance targets required for commercialization of the technology and impact on coal production.
- Complete domestic and international market and engineering system studies for upgraded coal for power and coal-to-carbon products to determine the impact on coal production of advanced technologies and new products.
- Develop a new, readily accessible, machine-readable, and easy to use database of U.S. coal information so that coal suppliers and users can estimate the impact of coal properties and composition on the performance (e.g., efficiency and reliability) and emissions of power generation facilities, and to satisfy the coal data needs for the present and future coal researchers and consumers of other high-value potential products that can be made from coal.

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