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**National Coal Council Approves Report for U.S. Secretary of Energy:
“Coal in a New Carbon Age:
Powering a Wave of Innovation in Advanced Products & Manufacturing”**

WASHINGTON, D.C. – Members of the National Coal Council (NCC) have approved a new report which recognizes that the U.S. is about to embark on a New Age of Carbon that will usher in significant opportunities for coal beyond conventional markets. The report was completed at the request of U.S. Secretary of Energy Rick Perry.

The report – *“Coal in a New Carbon Age: Powering a Wave of Innovation in Advanced Products & Manufacturing”* – concludes that coal offers significant potential beyond its current uses as a feedstock to fuel power plants or to produce coke used in making steel. Advancing new markets for coal can enhance U.S. national defense security, bolster the nation’s energy and mineral security, enhance our nation’s environmental objectives and contribute to America’s economic prosperity.

To capitalize on these Carbon Age opportunities, the NCC recommends three principal strategic objectives be pursued by the U.S. Department of Energy (DOE) to accelerate U.S. manufacturing of coal-derived products. The NCC recommends DOE:

- Establish a focused research and development program on coal-to-products
- Accelerate research-to-commercial deployment in coal-to-products market sectors
- Incentivize private sector investment in coal-to-products production and manufacturing sectors

The report details actionable items for each of these recommendations.

<https://www.nationalcoalcoalcouncil.org/page-NCC-Studies.html>

“Existing and future markets for U.S. coal in this emerging Carbon Age present our nation with compelling opportunities both in advanced materials and advanced forms of manufacturing,” said Randall Atkins, Chair of the NCC report and Chairman and CEO of Ramaco Coal. “Remarkably, the analysis undertaken in this report indicates that volume utilization of domestic U.S. coal resources for coal-to-products applications has the potential to be on the same order of magnitude as applications for coal power generation.”

The NCC's report assesses market-scale opportunities to enhance the use of U.S. coal in various coal-to-products markets. The technologies and market sectors addressed in the report include coal beneficiation; coal-to-liquids, including fuels and chemicals; coal-to-carbon products, such as activated carbon, carbon fibers, graphite, graphene, carbon foam and carbon black; rare earth elements; building and construction products; as well as life science, medical, bio-tech and agricultural uses.

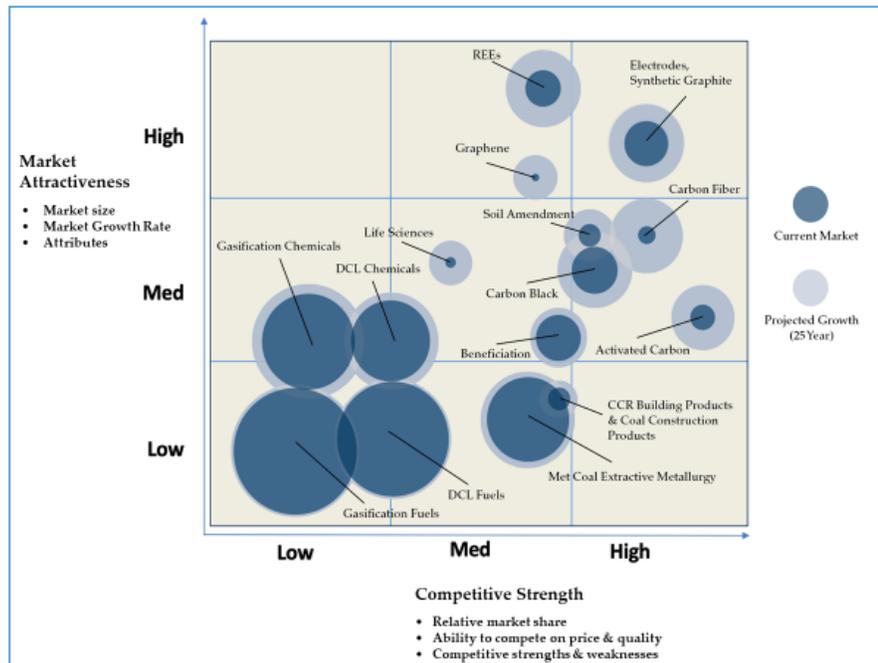
Coal-to-products markets can create economic and social benefits in the form of new mining and manufacturing jobs, especially in regions of the country impacted by the downturn in coal production and coal power generation. These markets also support and enhance our nation's environmental objectives through the unique performance characteristics of some carbon-based materials.

"Advanced uses of carbon from coal can also lead to cleaner energy, cleaner water and cleaner air," noted NCC CEO Janet Gellici. "The environmental benefits of durable, light-weight and high-strength carbon products provide more incentives to advance the commercialization of these technologies."

To gauge the attractiveness and competitiveness of these coal-to-products markets, the report includes an assessment that prioritizes opportunities for development and commercialization using a nine-block analysis. The resultant outlook details pathways in three primary categories:

- **TRADITIONAL – Low Market Attractiveness-Low Competitive Strength**
This sector is characterized by high commodity volumes, technically and technologically proven, requiring high capital expenditures and providing marginal economic opportunity in the U.S. due to competition from other resources. Products in this category include bulk chemicals and fuels.
- **CORE – Medium Market Attractiveness-High Competitive Strength**
This sector is characterized by moderate industrial-scale volumes, technically proven, requiring moderate capital expenditures and providing a sizeable opportunity in the U.S. Specialized products in this category include extractive metallurgy, coal beneficiation, activated carbon, carbon black and coal-derived building products.

- PERFORMANCE – High Market Attractiveness-High Competitive Strength**
 This sector is characterized by specialty volumes of high-performance materials utilizing coal’s inherent and unique chemistry advantages, optimistically poised for rapid commercialization from small-scale modular to larger industrial scale. Products in this category include rare earth elements, carbon fiber, synthetic graphite and electrodes, graphene, soil amendments and life-science biosensors.



“An expanding opportunity for coal exists as a mineral asset that can be more productively used beyond its conventional applications,” said NCC Chair Danny Gray, Executive Vice President with Charah Solutions. “The nation’s abundant coal resources are well suited to securely support the U.S. as it enters the New Carbon Age, powered by innovations in both advanced products and advanced manufacturing.”

The NCC was chartered in 1984 under the Federal Advisory Committee Act (FACA) to advise, inform and make recommendations to the U.S. Secretary of Energy on matters related to coal and the coal industry. Council members are appointed by the U.S. Secretary of Energy and serve in a voluntary capacity. A list of Council members and copies of the more than 35 reports prepared at the request of the U.S. Secretary of Energy since the Council’s inception are available on the NCC website –

www.NationalCoalCouncil.org.

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