

Coal & Biomass to Transportation Fuels in West Virginia

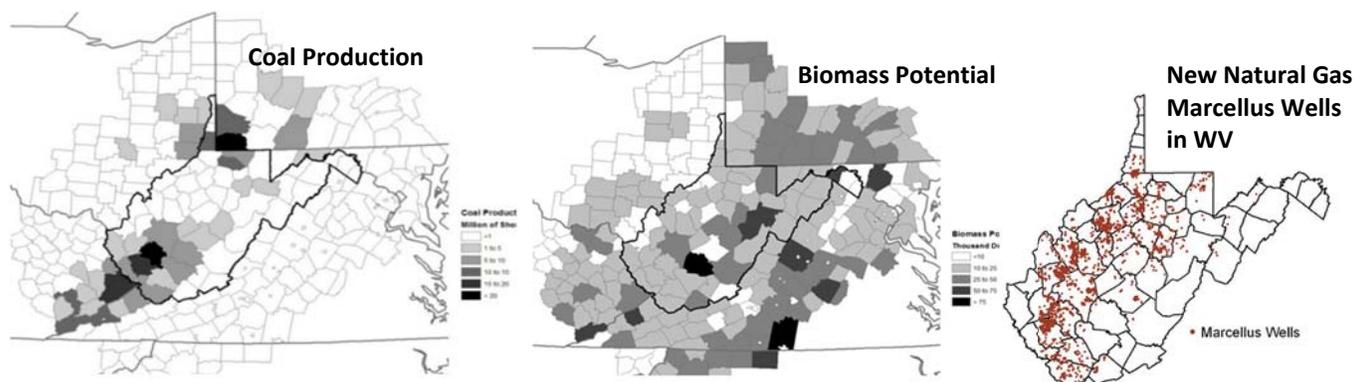
National Energy Technology Laboratory, Strategic Center for Coal

Converting coal to transportation fuels is a well-known process. To do so with a profitable business, further research must be completed that creates revolutionary changes from today's technologies – while emitting significantly less greenhouse gases when compared to equivalent oil refining processes.

The U.S. Department of Energy (DOE) is working to radically change coal conversion technologies by taking advantage of cutting-edge 21st century science, such as:

- Researching advanced materials and manufacturing methods that can reduce reactor costs and improve heat and catalyst management.
- Designing modular reactors suitable for smaller, distributed plants that create high-value, niche products first — setting the stage to compete in larger markets once the technology is proven.
- Developing complex reactor shapes that can manipulate coal on the particulate level, add catalysts and reactants, and separate desirable products – all at the optimal times.
- Applying non-traditional, focused energy sources such as microwaves and plasma to reduce cost and increase yield of valuable products.
- Developing increasingly powerful computer programs to predict particulate movement and changes through the reactors over time to quickly, easily, and less-expensively optimize reactor design.

To create valuable liquid fuels and chemicals from coal, one either adds hydrogen to the coal-derived molecules, or removes carbon. Unfortunately, common processes that create hydrogen for this use also create carbon dioxide (CO₂). The second method, removing carbon early from the conversion process, is now under consideration. The benefit of this method is the reduced carbon intensity of the coal-derived chemicals, which also avoids the need to capture and compress gaseous CO₂ for geologic storage. The climate impacts of utilizing coal can be further reduced by finding methods that combine coal with other materials such as biomass or natural gas.



Appalachia is a region with naturally occurring, abundant resources that could be used to create chemicals including high-quality coal, woody biomass, and low-cost natural gas.

Along these lines, DOE is investigating technologies that: (1) create high-value chemicals and fuel additives; (2) capture carbon in solid form; and (3) use both coal and biomass, aiming for pilot-scale projects by 2020.¹

¹ More information available at:

<http://www.netl.doe.gov/research/coal/energy-systems/fuels/coal-and-biomass-to-liquids/coal-biomass-to-liquids-in-appalachia>