Q&A: Ramaco Reassesses the Value of Coal

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Randall Atkins is the chief executive of US coal producer Ramaco Resources. In this interview, edited for length and clarity, Atkins discusses the potential for alternative uses for coal as a feedstock that could lower the cost of products like carbon fiber and resin and the macroeconomic benefits to the coal industry of diversifying coal's uses.

Can you discuss Ramaco Resources' vision for coal beyond power generation?

We have been working on this for about five years, so it is not an overnight sensation.

The idea was very simple. There is an alternative use for thermal coal that makes more sense than selling it to a utility to burn. Coal was used 100 years ago as an essential feedstock to do chemical work and production. In other parts of the world it is still used that way today, but not here. So, we are trying to come up with some uses that make economic sense.

We want to use large volumes of thermal coal in some process that would produce a profitable carbon product.

What is the benefit of using coal to produce carbon-based products?

A ton of coal has the same percentage of carbon as a ton of petroleum, but you have a vastly lower cost.

There is a huge disparity in the price of a ton of coal and the equivalent amount of petroleum. By using coal as a feedstock, you can essentially get the same carbon usage while dramatically lowering costs.

A lot has happened in the last 2-5 years. There has been an acceleration in developing new types of advanced products and manufacturing. We wanted to be at the front of the curve and provide an intersection of those two ideas to see where things might be heading with coal. That led us to the four uses that we have targeted: fibers, building products, resins and medical technologies. We are working on a product in each one of those areas.

And there may well be other uses that come in to play as more research is done. I think there is going to be a lot more attention given to this for a couple of reasons. First is that you have a much more favorable political environment. Second, I think there is a growing realization that you can find yourself with a lot of stranded assets in thermal coal if you do not know how to deploy them for some use other than burning.

Is Ramaco developing these processes and methodologies independently or is there a collaborative effort being undertaken?

We are working with labs and universities all over the country. This research is getting attention at the highest level of the Department of Energy to spur development. As a matter of fact, there is an appropriations bill that focuses on this research.

What we wanted to do as a first mover is capture as much of the intellectual high ground as we could. That is why we have such huge coal reserves that can be used for feedstock. The first thing we are building is the research campus, some of which will be devoted to 3D printing and graphene production.

Can you discuss long-term plans to ramp up into a profitable industry?

As we develop some of the larger scale uses like carbon fibers and building products, we hope to build manufacturing facilities alongside our research facilities where we can use coal as a mine-mouth feedstock.

We would literally convey the coal right out of the mine in to the plant which would mean huge savings. If you look at the Powder River basin (PRB), coal costs $12-$15/short ton at the mine. By the time you put it on a rail and move it around, there are additional costs. What we are trying to do is capture that logistical disadvantage and turn it in to our advantage. We think that the potential value chain is tremendous.

You have mentioned that coal is too valuable to burn. Can you explain the possibilities for monetizing coal outside of energy generation?

The Brook coal mine has coal priced at $12/st right now. A liter of resin can sell for $99. Making resin from the coal is almost 10 times more profitable than burning that same ton of coal. Even more poignant is the fact that it may not take more than a few grammes of coal to produce that liter of resin.

I once visited a research lab in Pittsburgh where a researcher came and handed me a liter of what I thought was dark water. He told me that he had just taken 3g of coal and used it to make a liter of graphene. The liter had a street value of $50,000. In contrast, the 3g of coal have a street value of about a penny.

It seems to take much less coal to create a lot of the products that you are talking about. What would this mean for reviving the coal industry? How would you make turning away from energy generation to manufacturing and production attractive? Is there enough of a market to turn around the coal industry?

We have tried to go high and go low in terms of volume usage.

The high-level usage products would be things like carbon fiber and structural composites - building products. One potential product would be the roof shingles that you put on your house. Those are made from a product called asphaltene, which is at the low end of the barrel in a petroleum refinery. We can make that same asphaltene from coal at a lower cost compared to making it from petroleum. The potential for use in building products could be well north of 100mn st (90.7mn metric tonnes) of coal a year.

Materials like carbon fiber do not really have much absorption into the market because of its cost. But, carbon fiber is another material that we think can absorb large quantities of coal because of its potential in construction. You can make rebar from carbon fiber from coal which is lighter, stronger and more flexible than steel and it does not rust. You can also use carbon fibers to wrap existing infrastructure to extend its structural life and for repair. There is more opportunity than we have time or money to pursue.

How will demand for different types of coal shift as this industry develops?

We are focused on PRB coal because we have a large greenfield reserve in that basin. This will allow us to have the resource, research and manufacturing all in the same place. Having said that, a lot of interest in the Appalachias is for metallurgical coal, which is a higher value resource that is being used to make steel.

Our goal here is to find a way to use other thermal coals to make a product too. What we are doing here will have applicability, not just in the Powder River basin, but for all thermal coals. And some of the products that we are developing may have more applicability with met coal than with thermal.

Can you talk about what metallurgical coal could be used for versus coals from the Powder River and Illinois basins?

The government is keen to investigate how the US can generate rare earth minerals from coal because of the concern that China has most, if not all, of the rare earth minerals.

There is some exploration going on now in terms of the use of coals, including met coal, as a source of rare earth minerals. There are some places where those resources are more concentrated in the overburden and other places where it is more concentrated in the underburden of a coal seam. That is a perfect example of coal use that can be applicable to both thermal and met coal.

Do you have a timeframe for the commercial production of coal-based products? How fast do you think that this industry is going to evolve?

I think it is going to happen sooner than you think.

We are breaking ground on our first facility this month in Wyoming. This will house our 3D printing operation, which we have already started. And we will probably put in a graphene operation as soon as that facility is constructed next spring. We will be coming out of the gate quickly, but ramping up to larger scale products will probably require additional investment in other types of equipment to create the processing facilities.

I think that using carbon-based products will happen at different times in different markets. Some markets will absorb the products more quickly than others. For example, using carbon fiber for cars or airplanes will require a lot of safety testing. But there are other things that you can get out the door pretty quickly, like construction materials.

You have said that this can be a high-volume industry. Do you think that miners are going to get to go back to work as producers and others try to meet the needs of this new industry?

I believe in a period of time that is more in a short-to-medium term as opposed to the medium-to-long term – a rising tide will carry all boats.

I think you will find that producers will be able to economically and profitably mine coal for alternative uses that are not profitable for thermal utility use. As I have said, coal is too valuable to burn.

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