From the Pittsburgh Business Times:
https://www.bizjournals.com/pittsburgh/news/2020/11/19/coals-next-act-consol-new-products.html

What's next for coal?

Nov 19, 2020, 7:54am EST

After Jimmy Brock took over the reins of Consol Energy Inc. in late 2017, he made a point to devote a portion of his first earnings call to the future. He talked about a new vision for coal that looked beyond what had made coal — and Consol — king for most of the past 150 years.

CONSOL

The Bailey Preparation Plant in Graysville

"One of the four priorities we had was to invest in innovation and technology and revenue that could come into the company outside of coal-fired generation," said Brock, CEO of the Canonsburg-based coal producer, whose underground mining complex beneath Greene and Washington counties is the largest in the country.

Fast-forward three years and that vision looks increasingly like good business sense for Consol, which like the rest of the coal industry has been buffeted by the twin shocks of competition from natural gas and the economic decline due to the Covid-19 pandemic. While it has been challenging, Consol has not only kept up its business, but also continued to move ahead toward a future that not only includes mining coal for power generation, but also using coal in ways that move far beyond traditional uses, including creating new products such as carbon foam or topsoil.

"We're trying to connect all of the dots and really think about the overall value chain, starting with the mine and ending with the end-use applications, even the byproduct from the end-use application,

and make that whole process as sustainable and value creating as possible," said Dan Connell, SVP of product strategy at Consol.

That has meant thinking differently — at times very differently — about coal. Traditionally Consol, one of the unquestioned leaders in the industry when it comes to investing in technology and innovation, has focused its R&D efforts on cleaning up the emissions of its coal-burning power plants as the industry faced increased pressure, environmental and financial, on coal-fired power plants to clean up or close.

But now it's taking these efforts a step further, with Consol becoming one of only two companies — the other being Kentucky-based coal producer Ramaco Resources Inc. — to make significant investments in developing ways to use coal to create new products.

"Other than that, there aren't that many coal producers that are investing in this space, in large part because they're focused on tonnage," said Brian Anderson, director of the National Energy Technology Laboratory (NETL). "This is not a tonnage play in terms of being able to invest and the research to convert carbon to products. Not many of the coal producers today have the cash flow to invest in the research on the downstream side."

Consol, one of the largest companies in its industry, has prevailed partly because of its size. Ever since the split of its natural gas business into CNX Resources Corp. — and before — it has built up a business that has the blue-chip customers of power companies that aren't likely to move off coal anytime soon.

But at the same time, Consol and others are facing pressure to find other sources of revenue, and the coal-as-a-product initiative has gotten traction from academics and the federal government.

While it's working on several initiatives, there are two in particular that are likely to have the biggest impact on the bottom line: A partnership with a New York firm to convert waste coal into usable products and an investment in a West Virginia manufacturer that uses coal to produce high-performance carbon foam.

For Brock, Consol's investment in coal products is measured and a fraction of the cost of building or acquiring a mine or reserves.

They are, he said, not bank-breaking, but could be a home run for Consol if they pan out.

"We're not doing that to replace the scale of coal," Brock said. "It won't do that. But it could put diversity into it, and it could create high-margin projects."

West Virginia investment: A future in building materials

One of the most tangible investments Consol has made this year has been in Cfoam LLC, a Triadelphia, West Virginia-based manufacturer of carbon foam products. In early January, Consol paid $3.5 million to own 25% of Cfoam, with the rest owned by an Australian company.

Carbon foam is a relatively new product, developed by Cfoam, that uses coal as its building block. Through its proprietary process, coal is turned into foam within 48 hours using high heat and then, over the next 11 days, is put under high pressure to carbonize it into blocks or other forms for the aerospace, industrial and military markets. Coal carbon foam could eventually be commonly used as low-cost but high-performance walls, fire resistant panels and asphalt, among other uses.

Brock sees big potential in Cfoam. The market it's targeting in the future is worth $15 billion annually. If it gets underway the way Consol and Cfoam would like, then coal from the Pennsylvania Mining Complex would not only go to power plants, but also as the raw material for carbon foam.

"If the world continues to grow as it is in population, and wood becomes a scarce building product, if we could get these carbon foams to where they could be construction materials, that would be a game changer," Brock said. "That could take a significant amount of tonnage."

But for Cfoam to reach its potential, it has to move from what is now specialty manufacturing in a 13-day process to something much faster.

Rudy Olson, Cfoam's general manager, said it's crucial for the company to take its process to the next level that can be scaled up.

"Taking a large volume (of coal) to 400 psi is not a trivial thing, and it's also a batch process," he said. "In the coal industry, everything is done in huge volumes. In order to match that, we believe our process has to be continuous. But in order to do that, we can't do it in autoclave."

Cfoam and Consol are working on that right now and have applied for a U.S. Department of Energy development grant to help it along.

New York partnership: Coal-fired power plant of the future

At the Bailey Mine Complex, Consol has another opportunity in the works.

In 2018, Consol formed a partnership with New York-based Omnis Bailey LLC to create a plant that would take waste coal and turn it back into a product that can first be blended with its regular coal and, years down the road, could be used as the fuel source for a clean-burning coal-fired power plant that Consol hopes to develop.

Omnis' technology removes from the table one of the dirtiest and most expensive legacies of the coal industry: Waste coal and coal ash, what's left behind from processing. While the traditional approach has been to pile it in slurry ponds or dig deep and put it into impoundments, Onmis' solution helps eliminate this waste stream while also saving coal producers big bucks in the reclamation bonding that they need to offer for the state environmental regulators for future cleanup.

"For 150 years, we've been taking coal out of the ground and burning it, not truly understanding that it wasn't coal, it was carbon ore, and if you separate out different products and sell them to different markets, you remove the dirt from coal (and create sellable products)," said Charles Gassenheimer, CEO of Omnis Bailey. "But more importantly, you eliminate the environmental hazardous waste stream that for 150 years has been put into these slurry ponds and impoundments in the U.S. and around the world. ... These are hundreds of millions of dollars for Consol. For the industry, it's billions of dollars."

After a pilot plant was successful several years ago at the Bailey Preparation Plant in Greene County, Omnis and Consol decided to go ahead with building a plant in stages. The first of eight planned

modules of the $18 million plant will be completed by the end of this year, Gassenheimer said, with the remaining seven modules completed by the end of next year. Omnis will be able to process 300,000 tons of coal waste a year.

Omnis and Consol will end up with two products from the processing of waste coal, a clean-energy product that is pure carbon and an agricultural product that Gassenheimer said can be used as topsoil to help reclaim tired farmlands. The topsoil is a whole new market for the coal industry, and the clean energy product, which for the time being will be blended with the other coal that's being produced at the Bailey mining complex, could in the future be used for clean-energy plants that could be built over the next several years.

Plans for this new type of plant are underway. Consol was one of four Coal First projects announced Oct. 28 to receive a prospective grant of $15 million from the U.S. Department of Energy for work on the design of a pressurized fluidized bed combustion plant that would use the clean-energy product from the waste coal from the Omnis Bailey plant and create a near-net-zero carbon footprint coal-fired power plant.

It would be the coal-fired power plant of the future if it's built, according to the DOE's Assistant Secretary for Fossil Fuel Security Steve Winberg, a Pittsburgh native overseeing the DOE's Coal First program.

There's no guarantee that the overall technology will be cost-effective to ultimately build, but DOE and Consol are optimistic.

"What we're hoping for is to catalyze new technologies that will come in very short order," Energy Secretary Dan Brouillette said. "When we look at the Coal First program, we see a future for coal. Coal may be losing its battle from time to time in the marketplace with natural gas, given the prices. But the value of this resource hasn't been diminished at all."

The National Energy Technology Laboratory, the regionally based research and innovation arm of the U.S. Department of Energy that is deeply involved in the development of new uses for coal among other energy sources, is also working on the Coal First program.

Anderson, NETL's director, said each step that adds a new use or market for coal adds that many more manufacturing jobs and potentially saves mining jobs in Pennsylvania and West Virginia.

"We're really tapping into many of the unique properties of carbon materials that come from coal, what's turning out to be one of the most valuable and best routes to carbon materials from coal," Anderson said.

Paul J. Gough
Reporter
Pittsburgh Business Times