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Company Forges New Path in Coal-to-Gas Hunt

By John A. Sullivan
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One of the most abundant energy sources on the planet is coal. But, it is also in the cross hairs of everyone from greens to D.C. politicians because of the greenhouse gases it emits when burned.

Enter Bixby Energy Systems. In a recent interview with *Natural Gas Week*, Chief Executive Bob Walker said the company has found a game-changing way to gasify coal, using a method that creates a fuel much more like natural gas than the usual synthetic natural gas created by conventional means.

"Not a syngas, but a gas that is 80 percent to 90 percent natural gas," he said.

By contrast, syngas extracted from coal using conventional processes has about 40% of the energy density of naturally occurring supply.

"Coal is the number one fossil fuel in the world," Walker said. "It's not going to go away. It's going to be with us for a long time, so we figured we better find a cleaner method of using it."

Walker said for Ramsey, Minnesota-based Bixby Energy, the question was "since burning the coal creates the emissions, how can we extract the energy from the coal without burning it."

The answer led to the Bixby Process, in which coal undergoes "flash gasification" by being placed in a vacuum and heated to 1,400 degrees Fahrenheit.

"It kind of pops like popcorn," Walker said. The volatile matter, making up about 30% to 50% of the coal, goes from a solid to a liquid to a gas in a fraction of a second.

The process leaves two byproducts, an energy-rich gas and semi-activated carbon, which is commonly used in water- filtration systems.

Most gasification processes produce an ash residue that has no commercial applications, Walker said, adding that the Bixby Process does not consume water, which is becoming a critical issue in many states facing severe shortages.

"There are more than 300 technologies out there and all of them are burning or partially burning the coal, which requires oxygen — which creates a syngas with a very low BTU," he said. The Bixby Process produces a high quality gas stream that can be up to 90% methane with other gases including propane.

Some other benefits of the Bixby Process:

- No nitrous oxide or sulfur dioxide emissions are released;
- Byproducts, such as arsenic, sulfur and mercury are not released and remain within the semi-activated carbon;
- No carbon dioxide or carbon monoxide is created; and
- The resulting gas can now be compressed and sent to a power plant where it will burn up to 65% cleaner than the coal it was made from.

“We are not in the energy-making business,” he said, “but rather, the energy conversion business.”

The company is also developing a process to create light sweet crude oil by combining its carbon byproduct with hydrogen.

Though not a household name in the US, Bixby Energy has gotten the attention of officials in coal-rich China, where coal gasification projects are ramping up to help blunt rising LNG imports (p13). China has already taken delivery of one of the compact systems, with four more scheduled for delivery either by the end of the year or before the end of January.

“They could become energy independent,” he said, before adding that there are 70 nations that have large coal supplies and would be perfect hosts for the company’s technology. Another country that is interested is Ukraine, which Walker explained, “doesn’t want to always have to rely on Russia for its natural gas.”

The technology is compact, easy to set up and even easier to maintain. One unit is 10 feet wide by 15 feet long and 60 feet tall and uses about 192 tons of coal per day. The base units could be developed for about $25 million, but that cost is expected to go down as the company’s manufacturing centers get up and running.

Walker said that if every coal-fired power plant in the US — about 300,000 MW — first ran the coal through the Bixby Process, it would cut CO2 emissions by up to 60%, which exceeds the reduced emission standards set by the Kyoto Accords.

Walker said Bixby Energy is not resting on this one technology, but is already involved in cooperation with an algae R&D company that is developing a technology to help produce algae-based fuels. The plant would take the emissions now produced from the burned natural gas and direct them into an algae processing tank and make hydrogen.

“It would have zero emissions and be the perfect symbiotic presence,” Walker said. “Of course, we aren’t there yet, but it is a possible future for us.”

Technology pioneered by Bixby Energy and other companies will be the way for today’s energy industry to move into the future, Walker said.

“We are never going to get away from coal. But we do need to clean it up,” Walker said. “Our technology makes coal a very practical fuel and it does away with the environmental concerns. It is the right technology at the right time.”