



The Promise of IGCC

INNOVATIONS IN EXTRACTING POWER FROM COAL

By James E. Rogers

AS ONE OF the leading coal consumers in the United States, Cinergy Corp. understands the importance of utilizing coal well into the future. We burn approximately 25 to 30 million tons per year to generate electricity — and we're not alone. Coal is a reliable and lower-cost energy source that is the fuel of choice for more than 50 percent of our nation's electric power generation. Like other coal-burning utilities in North America, Cinergy faces a major challenge. How do we utilize this vast natural resource — and its 250-year reserves — to affordably meet our customers' growing energy demands while meeting increasingly stringent environmental regulations?

As we discuss in our 2004 annual report, which is devoted to global warming, all of the signs are pointing to the reality that we will live in a carbon-constrained world in the future. Although we don't know exactly when and how, we believe it's inevitable that carbon dioxide (CO₂) and other greenhouse gases will be regulated in the future. What we do know is we must continue to make long-term investment decisions to ensure affordable and reliable supplies of power for customers while reducing the environmental impact. From now through 2009, for example, we will invest approximately \$1.8 billion to reduce nitrogen oxides (NOX), sulfur dioxide (SO₂), mercury and fine particulates at our existing coal plants.

In the Midwest, including our service territories in Indiana, Kentucky and Ohio, the steadily growing demand for power means we will need additional baseload generation capacity early in the next decade. As we consider the types of generation we will invest in, we must research a variety of things — not the least of which is fuel cost. Tight demand for energy fuels worldwide has resulted in rising oil prices and volatile natural gas prices. As a result, the focus is again on coal as the most reliable, low-cost energy fuel available.

Traditional pulverized coal plants currently make up the bulk of our generation base. These plants have been the real workhorses of our generation mix and are an important part of our ability to serve the growing energy demands of customers. With new environmental rules regulating coal emissions, we believe it's time to apply our experience and expertise to the next generation of cleaner coal plants.

In fact, with the final Clean Air Interstate Rule and Clean Air Mercury Rule just released in March, there is still some uncertainty regarding the timing and amount of emission reductions required — as various groups have already vowed to challenge these new rules in court. To keep consumer costs as low as possible while achieving significant emission reductions as soon as possible, it makes even more sense for us to work toward the commercialization and investment in the cleanest coal technology possible.

In this "back-to-the-future" scenario, we believe that state-of-the-art coal gasification technology is the answer. First pioneered in the late 1700s, coal gasification is a process for converting coal to a combustible gas. Town gas from the gasification of coal was one of the major sources of heating and lighting in both the United States and Europe for much of the 19th and early 20th centuries. The gas contains about 80 percent of the energy in the coal; another 15 percent of the useful energy can be recovered as steam. Coal gasification has been demonstrated for power generation since the 1980s. Currently, there are at least 12 sites worldwide with commercial integrated gasification combined cycle (IGCC) power plants.

Innovation in coal technology is not new to Cinergy. In partnership with the U.S. Department of Energy, we were among the first to participate in building a coal gasification demonstration plant in the mid-1990s in western Indiana.

Last fall, our Indiana electric utility, Cinergy/PSI, announced a joint effort with GE Energy and Bechtel Corp. to complete a feasibility study for building a full-scale, commercial IGCC plant. This would be the first plant of its kind announced under the new GE-Bechtel alliance. The purpose of the feasibility study is to determine whether or not a 500- to 600-megawatt IGCC plant can be built on a selected site at a cost and schedule that's competitive with other available technologies. We believe it can.

Using a variety of fuels besides coal, such as petroleum coke, various oil products, and biomass fuels, IGCC technology uses a coal gasification system to convert carbon-containing fuels into a synthesis gas (syngas) and produce steam. The hot syngas is processed to remove sulfur compounds, mercury and particulate matter before it is used



to fuel a combustion turbine generator. The heat in the exhaust gases from the combustion turbine is recovered to generate additional steam. This steam, along with that from the syngas process, then spins a steam turbine generator. In a typical IGCC plant, about two-thirds of the power comes from the gas turbine.

IGCC plants have the potential to offer considerable environmental and operational benefits. For example, they use approximately 30 percent less water and produce 50 percent less solids to be beneficially reused or disposed of compared to a traditional pulverized coal plant. They also may provide a less expensive way to reduce mercury emissions and capture and sequester carbon.

IGCC plants cost approximately 20 percent more to construct than conventional pulverized coal plants. We believe commercialization of this technology, bringing down capital and construction costs, is critical to its success. Our completed study this fall will provide a more detailed estimate of the cost and performance components of the design. We anticipate that federal, state and local financial support will be needed to make this project a reality, and are working to develop public and government support for a preliminary project execution plan.

Some have questioned why we would want to take the lead in building the first commercial 500- to 600-megawatt IGCC plant. Why not sit back and wait for others to take what could be perceived as an additional risk in starting up this innovation?

We can't sit back and just wait for others to make decisions about baseload generation tomorrow that we need to make today. It takes at least six years to plan, site and permit a conventional baseload coal power plant. We believe we have an advantage in our ability to balance significant technical resources with our vision of the future. Furthermore, we believe that being a pioneer in the early stages of commercial development of this technology will give us an economic and competitive advantage.

As with our other firsts mentioned above, the more experience we gain, the more we will be able to make future investments more inexpensively. Sitting back and waiting is simply not an option, especially when we are making billion-dollar decisions that impact how our customers and shareholders will be served for the next 50 years.

James E. Rogers is chairman, president and CEO of Cinergy Corp.

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Researcher, writer, analyst and consultant, Warren B. Causey has worked with technology for more than 25 years and in utilities for more than a decade. One of the most respected experts in energy, Causey recently joined the Energy Central team.