



IGCC in Waiting



HUGE PROJECT UNVEILED IN ALBERTA

BY LEE BUCHSBAUM

» **CALL IT** A large, natural gas-fired generating plant with the potential of becoming an integrated-gasification, combined-cycle (IGCC) unit.

ENMAX, one of the largest power suppliers in western Canada, has announced an agreement with consultants Hatch/Sargent & Lundy to complete the preliminary engineering phase for a 1,200-megawatt power plant costing between \$1.5 billion and \$1.9 billion.

The subject of much industry speculation, ENMAX was quick to point out that the plant would not necessarily begin its generating life as a coal-gasification or true-IGCC plant, but instead is being developed as a large, natural gas-fed facility. However, taking advantage of both emerging technologies and the fact that Alberta has such large coal reserves, the plant is being designed to burn either coal-derived syngas or commercially available natural gas.

"One of the points that we've been trying to clarify is that we aren't using IGCC technology to start with," said Gary Holden, president and CEO of ENMAX. "We're encouraging coal suppliers here in Alberta to provide us with syngas. Our long-term vision, as we have this luxury of so much local coal and enormous amounts of gas resources, is that gasified coal will itself become a commodity. We're setting up this plant to be either a gas or coal gas-fed." And while ENMAX has entered into negotiations with Alberta coal producers, the company's main focus is to get the plant permitted, built and running by late 2010.

What's also key to the plant is its siting within the city limits of

Calgary and away from the coal fields. Of critical import to both stakeholders and ENMAX is that the facility itself will not require any new transmission lines as the gas, whether derived from coal or not, will be pipelined to the plant. Moreover, by being closer to the load, the plant will have significantly lower line losses caused by long distance transmissions. "It's much easier to bury pipelines," continued Holden, "than to construct new power lines." Even though Calgary's higher elevations may carry a slight altitude penalty, "it's nothing fatal for the project as we're getting a huge benefit of line-loss reductions of up to 200 megawatts to 400 megawatts as a result," he said.

Holden envisions that this plant will actually be the first of several using similar flexible gas-fed technologies. "The subsequently built operations, also sited closer to load, will retain the line-loss reductions that we're trying to achieve while also permitting an underground infrastructure," he said.

While central to its design, development of the project does not hinge on whichever form of gas feedstock it uses. "It may be that there will be gasified coal ready for us as we come on line," said Holden, "but if it's a year or two behind, that's fine too. If you think about it from a utility's point of view, I'm not interested in IGCC plants in particular; I'm interested in reliable power. If I can get the benefits of coal gas and have nat gas as a complete backup, then I've made a better decision," he said.

"Everybody's talking about building gas plants," said Richard Lauckhart, vice president of Global Energy Advisers, the consulting arm of Global Energy Decisions, but the difficulty of natural gas is that North American supplies are diminishing as demand is increasing and, meanwhile, alternatives such as liquid natural gas are becoming more expensive to import. "Buying gasified coal makes sense," continued Lauckhart, "but where do you get it from? Building a plant that can burn both syn and nat gas, to try to hedge the other risks, makes a lot of sense, but gasified coal has its own risks as well. While CO₂ sequestration is certainly a possibility, it's a huge question within the industry as to whether this is possible in large volumes," he said.

Holden and ENMAX believe that over time, gasified coal will become a saleable commodity with certain firms sending pipeline-quality syngas into the pipeline infrastructure, much in the same way as North Dakota's Basin Electric has been doing for years. "In the long run," Holden said, "following the oil-and-gas industry model, we'll see the emergence of coal-gas midstreamers that sit on the pipeline and effectively work towards the replacement of nat gas in our marketplace."

But coal-gasification plants are expensive to build, and who's going to do it on spec, wonders Lauckhart. "Where will they get their financing? It's a little bit dangerous to build a gas plant with the belief

Continued on page 10



Gary Holden

PHOTO COURTESY OF ENMAX.

Subscribe Online to *EnergyBiz*



Don't let aging assets short-circuit your reliability

Reliability is a growing concern in the power industry. With good reason. According to the North American Electric Reliability Corporation (NERC), the industry will potentially miss all of its regional minimum reliability targets between now and 2015. Enterprise Management Solutions, the management consulting division of Black & Veatch, can help. With a broad range of services from strategic and financial planning to market services and risk mitigation. A proven “full lifecycle” approach to asset management. Even supporting technology initiatives to move ideas into action. Let us put our more than 90 years of knowledge and experience to work for you. Go to www.bv.com/consult, or call 913-458-3440. If you want reliability, count on Enterprise Management Solutions.

- > Reliability Strategy
- > NERC Standards Compliance
- > Asset Management
- > Integrated Resource Planning
- > Transmission Planning
- > Cost Recovery



BLACK & VEATCH
Building a world of difference®

Frontiers of Coal Generation

TAMPA ELECTRIC'S IGCC SUCCESS

BY MARK HORNICK

IGCC IS NOT a new invention. Tampa Electric has more than 10 years of experience with the technology. Many believe IGCC will play a growing role in generating electricity from coal in years to come; therefore, our experience with integrated gasification combined cycle, or IGCC, is significant to the future of the power industry.

Our Polk Power Station Unit No. 1 was built with partial funding from the U.S. Department of Energy's Clean Coal Technology Program. This 250-megawatt-net unit is a commercial expansion of the technology used at the cool-water demonstration plant. The Polk 1 power block uses a General Electric combustion turbine with a heat-recovery steam generator and steam turbine. The combined cycle operates using either syngas or distillate oil as a fuel. Syngas is produced from a single, slurry-fed, oxygen-blown gasifier using technology originally developed by Texaco and now owned by General Electric.

IGCC is no longer an experimental technology. Early commercial-scale units such as Polk 1 have been in service for more than a decade, and the lessons learned from these plants are being incorporated into the next generation of units. Engineering, procurement and construction contracts for IGCC plants are now available from alliances of world-class equipment suppliers and engineering firms. Gasification technology is not "beyond the capabilities" of typical utility organizations any more than wet-limestone flue-gas desulfurization, selective catalytic reduction or other technologies that have become commonplace.

Polk 1 operates as a fully commercial unit and is an integral part of Tampa Electric's generating fleet. Using low-cost coal and pet coke as the primary fuels, and operating at high efficiency, Polk 1 is the first unit dispatched on the Tampa Electric system. With its extremely low emissions, Polk 1 has been rated as the cleanest coal-fired unit in North America.

As was expected from a relatively new technology and with a scale-up of the previous demonstration-plant size, Polk 1 experienced some challenges in early operations, and Tampa Electric's team has worked through them. Gas-to-gas heat exchangers proved troublesome and were removed. Process water piping systems experienced more rapid corrosion and erosion than expected and were reconfigured with different materials. The combustion turbine has operated well on syngas but has experienced problems with a turbine cooling-slot crack and a compressor failure caused by casing creep. These combustion-turbine issues stemmed from early design deficiencies and were not related to IGCC operation.

The gasifier has operated well on a variety of coals and coal blends

Tampa Electric

Customers: 650,000 in West Central Florida

Generation: 4,400 megawatts

with pet coke, and it has been tested with biomass as a co-feed. The oxygen-blown, slurry-fed technology is particularly well suited for bituminous coals and can accommodate pet coke at up to 100 percent of the feed. In the IGCC process, sulfur and other impurities are removed from the high-pressure syngas prior to firing in the combustion turbine. This removal results in extremely low emissions. Some mercury is removed in the existing syngas cleanup process and, with the addition of a small, activated-carbon bed, greater than 90 percent removal is easily achieved. Because IGCC uses a combined cycle for power generation, it uses only two-thirds the water that a steam-cycle unit uses.

Carbon dioxide capture from coal-derived syngas is a commercially proven process that has been used for decades in gasification plants around the world. This technology can be applied to IGCC plants as well. The cost of carbon capture and sequestration added to IGCC will be significant, but it is expected to be much lower than for other fossil-fuel systems, and it uses proven technology.

Tampa Electric will expand its use of IGCC technology with the addition of the 630-megawatt Polk Unit No. 6, scheduled to enter service in 2013. This will be a dual-train unit – two gasifiers, two combustion turbines and one steam turbine – that will have greater fuel flexibility, increased reliability and even lower emissions than Polk 1. Polk 6 will be designed for the addition of carbon capture and removal equipment in the future to enable it to comply with potential carbon dioxide regulations.

The recent increases in material and labor costs are a challenge for IGCC units and other capital-intensive technologies, such as nuclear and pulverized-coal units. Original-equipment manufacturers, engineering and construction firms and owner/operators must work closely together to manage these costs. The benefits of low fuel costs through the use of coal and pet coke can more than offset the high initial cost of these units over time.

IGCC technology is an excellent choice for baseload power generation. It allows for the efficient use of low-cost solid fuels with the lowest possible emissions and has proven technology for carbon dioxide capture to ensure viability in a carbon-constrained future.

Mark Hornick is general manager of Tampa Electric's Polk power plant.



Mark Hornick
PHOTO COURTESY
OF TAMPA ELECTRIC.



Continued from page 8

that, 'If we get in trouble, we'll just buy some gasified coal.' That's not possible today," he said.

Holden counters by pointing out that ENMAX intends on establishing long-term supply contracts with whichever provider emerges. In fact, he believes, it would be to Alberta's and the industry's long-term benefit to establish such a sector. Accordingly, the Canadian government and other power companies are still working out the details of several tiers of incentives to create what would essentially become a new industry. "The Albertan Provincial government definitely see the need for finding a way to use our tremendous coal resources," Holden said. "Burning it in supercritical plants is

relatively inefficient and produces more CO₂. If we could burn at twice the efficiency, then we're building cheaper plants and producing less greenhouse gasses."

Internally, Alberta is going through significant economic expansion, led by a "booming" energy sector. This resulting rise in power demand, coupled with increasing concerns about inchoate environmental regulations, is driving the project. "The tide," according to Hans Daniels, director of Coal Advisory Services with Global Energy Decisions, "is shifting towards strengthening existing CO₂ regulations. Since most coal plants have lifetimes of 50 or more years, building one now in a time of uncertain legislation is risky. High emissions costs could render your plant either obsolete or too expensive in terms of CO₂ penalties, and you

have to consider what CO₂ legislation may exist 10 or 20 years down the road," Daniels said.

Lauckhart added: "ENMAX is doing the rational thing. Alberta needs more power right away. Their only real risk is the price and/or availability of nat gas with a syngas back-up. If they have to open the door to syngas, that's a problem if gas of the quantity they need for the price they can afford isn't available."

While there is some skepticism about the proposed plant, it's important to consider the deregulated environment in which ENMAX operates. "They are one of the largest municipal authorities in Canada," said Dave Todd of *SNL Power Week Canada*. "They are incredibly entrepreneurial with interests all across Canada. And they have been investing smartly in new technologies as well," he said.

ENMAX's Holden explained, "We're the largest energy retailer here in Alberta. We don't own coal reserves, or have a stable of super-critical coal plants. That frees us to be more innovative. The key thing is, from our perspective, many power projects get stalled or defeated because they are overly complicated. Our approach is to choose technology that is very simple and then add on the complication as they become available and economic. With this project, we maintain the ability to take on more complex developments such as burning coal gas, cogeneration and CO₂ sequestration, after the plant is in place."

NewsFLASH

CLEAN COAL

South Carolina electric cooperatives are donating \$5 million to spur research into energy efficiency and ways to cut carbon emissions from coal-fired generating units.

The grant will be used to establish a research center at the University of South Carolina, according to a report in the *Florence Morning News*.

www.energycentral.com