3.0. IGCC DEPLOYMENT

With 2004 natural gas prices at levels two to three times above historic averages, the focus of many power plant developers has shifted to coal technologies, which is stimulating interest in IGCC. How much of the new capacity built in the next decade is IGCC will depend on whether IGCC is an economically and financially attractive alternative as capacity decisions are made. For reasons discussed below, a window of opportunity exists for IGCC investments, but they will not materialize unless the technology is viewed as commercially competitive and proven, which is unlikely to happen in the near-term without federal and state policies that stimulate access to low cost capital and competitively priced electricity output.

3.1. Support for IGCC

One reason a window of opportunity exists for IGCC is that a diverse group of interests are generally supportive of finding policy approaches to commercialize the technology in this decade. Often for different reasons, the following groups have an interest in IGCC deployment:

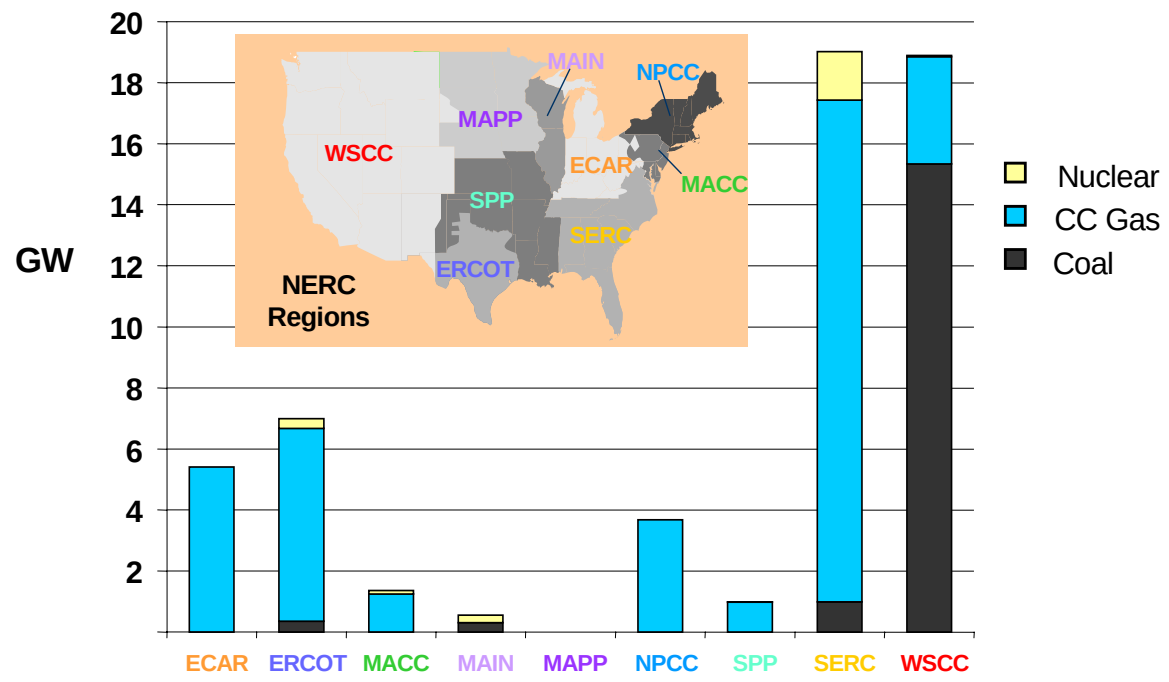
- Electric utilities — have a growing need to develop new base load capacity and are interested in technologies that enable the use of coal in a carbon constrained, high natural gas price environment;
- Utility regulators — are interested in options for new capacity, including advanced coal technologies that reduce costs to ratepayers;
- Coal producers — interested in enhancing market share and reversing the trend away from new coal plants (in part due to environmental concerns) that began in the late 1980s;
- DOE — sees energy supply and national security benefits to using U.S. coal reserves and has invested billions of dollars in the Clean Coal Technology program, which has been a leading force in the development and demonstration of IGCC technology;
- EPA — is supportive of sustainable coal utilization and deployment of technologies that reduce coal plant emissions and water consumption;
- Environmentalists — see IGCC as a potential foundation technology for moving toward CO_2 capture and sequestration to address climate change concerns;
- Industrial natural gas users—are interested in ways to reduce demand pressure on natural gas prices by reducing consumption by electric generators;
- NGCC owners — see IGCC as providing an opportunity to restore value to distressed NGCC assets by refueling to syngas.

This broad base of potentially supportive groups can prove beneficial for developers seeking to build IGCC (particularly if environmental groups and utility regulators have a favorable view of the technology) and form the basis for adoption of federal initiatives to support a 3Party Covenant or other incentive program to promote near-term deployment.

3.2. Need for Base Load Capacity

Another factor creating opportunities for IGCC investment is the growing need for baseload capacity additions over the next decade. During the period 2005 to 2015, the Energy Information Administration (EIA) projects the addition of 57 giga-watts of new coal, nuclear and combined cycle gas generating capacity to serve electricity demand, which is equivalent to about 100 new 550 MW power plants (average of 10 per year). Figure 3-1 illustrates EIA's projected geographic dispersion of this capacity by North American Electric Reliability Council (NERC) region and by fuel type. Illustrated in Figure 3-1 is that two-thirds of the capacity is projected to be added in the Southeast and Western U.S. and that two-thirds of the new capacity across the country is projected to be combined cycle natural gas generation. The EIA forecast projects 17 giga-watts of new coal capacity (or about 30 new 550 MW coal plants) over the period, 90% of which are projected to be built in western states.

Figure 3-1. EIA 2005-2015 Coal, Nuclear, and NGCC Capacity Additions



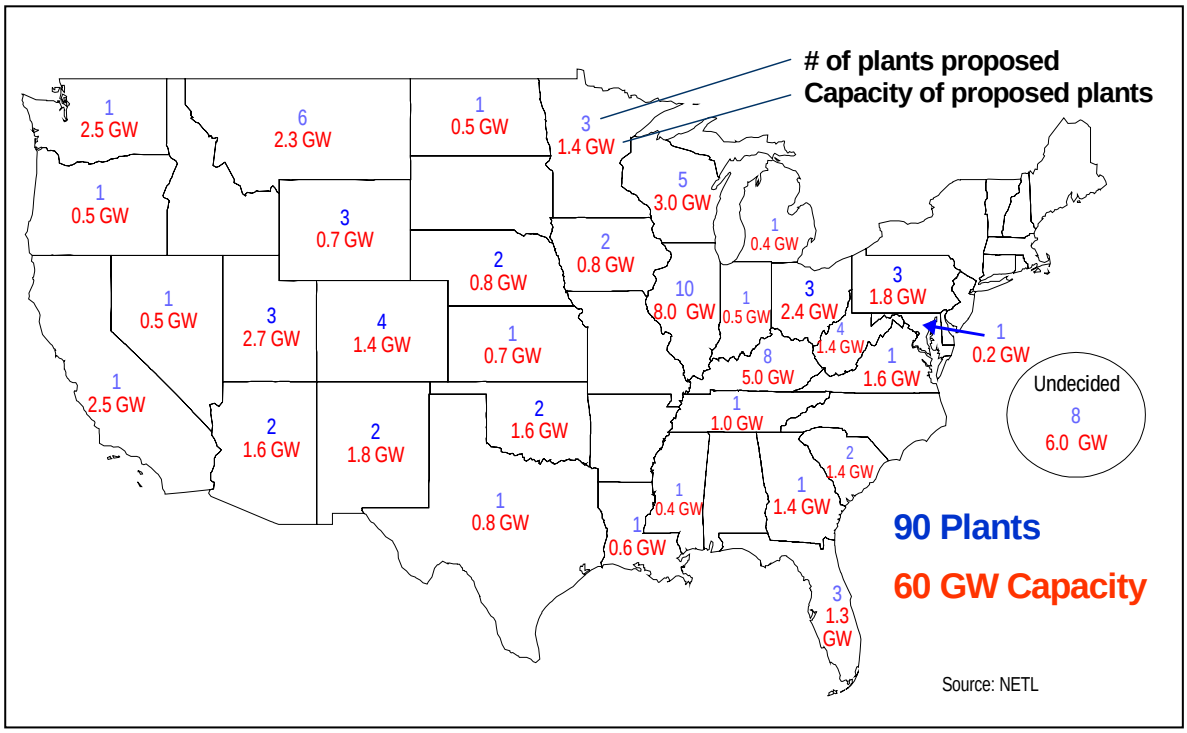
Source: EIA, Annual Energy Outlook 2004, Supplemental Regional Data, Table 75.

Considering the current trend away from natural gas and towards interest in new coal generation (see Section 4.12 below), it is likely that this forecast overstates the role of natural gas combined cycle and understates the role of coal for new capacity needs over the next ten years. Nonetheless, even 17 giga-watts of new coal capacity represents a significant increase and opportunity for IGCC deployment. If IGCC investments are viewed as commercially competitive with PC technology, they can account for a significant share of this new capacity and establish the commercial viability of IGCC technology in the near term. If IGCC technology does not achieve significant market share over the next 10 years, the technology will have missed an important chance for near-term deployment and its impressive environmental benefits will be pushed well off into the future.

3.3. Coal Power Development

A new appreciation for the volatility and unpredictability of natural gas prices began to emerge in 2000 and has accelerated interest in the development of new coal-fired generating capacity. According to the Department of Energy, as of February 2004, 94 new coal plants had been proposed in the U.S., representing 61 giga-watts of new coal capacity and $63 billion of potential investment. Figure 3-2 illustrates the number of proposed plants and total giga-watts of proposed capacity by state. The amount of new coal capacity currently being proposed is three times the total new coal capacity projected to be added by EIA by 2015. While it is unclear how much of this proposed new capacity

Figure 3-2. Proposed New Coal Power Plants as of February 2004



will actually be built, the data indicate a strong interest in coal power plants and suggest that if the economics and risks of IGCC are viewed as acceptable, and attractive financing is available, there will be commercial interest in IGCC deployment.

This conclusion is supported by the fact that several companies have announced plans to develop IGCC projects (although it is unlikely any of the projects will actually be built without 3Party Covenant or other government financial assistance). Excelsior Energy is working to develop a 450 MW IGCC plant in Minnesota (Mesaba Energy Project), Global Energy is working to develop a 540 MW IGCC plant in Kentucky (Kentucky Pioneer), and Clean Coal Power Resources has announced its intention to build a 2,400 MW facility in Illinois.

3.4. NGCC Re-Fueling Opportunity

A major opportunity for IGCC deployment has arisen from the impact of high natural gas prices on existing natural gas combined cycle facilities. The high prices, combined with soft electricity markets, have made many natural gas combined cycle generating plants uneconomic. Many of these facilities are now being sold, written-off, mothballed, or repossessed by banks.

For example, in May, 2004 Duke Energy announced the sale of 5,325 MW of merchant natural gas generating capacity for $475 million, or $89 per kilowatt, which is less than one-fifth of original cost. In a related matter, Duke Energy announced in January, 2004 that it was taking a $3 billion write off from 2003 earnings, in large part because of the decline in value of its natural gas generation fleet in the Southeast U.S.[121] Furthermore, a study by SAIC for DOE/NETL indicates that as of April 2004 as much as 33,000 MW of distressed merchant gas capacity was for sale.[122] The study also indicates that a number of natural gas plants have been mothballed (including a 1,100 MW NGCC plant in Hays County, Texas) and that as many as 50 GE7FA natural gas turbines are currently sitting in warehouses because the projects for which they were purchased have not gone forward.[123] Many natural gas-fired power plants are also being repossessed by lending institutions, including Citibank (4,150 MW), Societe Generale (5,550 MW) and BnP Paribas (3,400 MW).[124]

The devaluation and market availability of underutilized natural gas generation assets presents an important opportunity for early and cost-effective coal gasification refueling. The combined cycle power block associated with a NGCC power plant is essentially the same as the combined cycle power block needed for an IGCC facility. To convert an existing natural gas turbine to use synthesis gas from a coal gasifier is estimated to cost

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[121] See http://www.dukeenergy.com/news/releases/2004/jan/2004010701.asp
[122] NETL, "Potential for NGCC Plant Conversion to a Coal-Based IGCC Plant - - A Preliminary Study," May 2004.
[123] Id.
[124] Id.

only $5 million for a typical 350 MW plant, or roughly $15/kW.[125] This cost could be more than made up for by large savings associated with using a distressed NGCC facility to provide the combined cycle power block for the IGCC plant. For example, if a distressed NGCC facility is used for an IGCC refueling at 75% of its original cost ($375/kW, assuming $500/kW as the original cost) then even with the retrofit cost there is a savings of over $100/kW versus building a new power block.

Furthermore, refueling to IGCC means taking a depressed asset facing large-scale write-offs that is operating at only a fraction of its capacity and repositioning it to operate as an economical base load coal facility that operates at a high (80-90%) capacity factor. If this type of refueling were done under the 3Party Covenant, the owner also receives a regulated 11.5 percent after-tax return for the new value of the repositioned asset. The refueling potential is creating a new category of enthusiastic, potential IGCC developers. With 3Party Covenant financing, the cost of energy from the resulting plant is well below the cost of energy from a new PC plant (see Section 5.6 below).

Not all NGCC power plants are suited for IGCC refueling. SAIC's preliminary analysis for DOE estimates that as much as 12,000 MW (enough for about 20 550 MW IGCC facilities) of existing NGCC facilities may be suitable for IGCC conversion. This estimate is based on plants larger than 250 MW that appear to have coal available by railroad.[126]

3.5. IGCC Deployment Hurdles

Despite the potential benefits and commercial interest in IGCC, investments to design and build commercial IGCC power plants in the U.S. have not materialized due to financing, cost, and risk concerns. A 2004 survey by DOE indicates that the three leading risk factors perceived by industry to be associated with IGCC investments are high capital costs, excessive down time, and difficulty with financing.[127]

Most estimates suggest that the capital costs associated with a new IGCC power plant are about 20 percent higher than the cost of a new PC plant, and IGCC costs are less certain. Furthermore, unlike pulverized coal boilers, IGCC technology is not perceived to have sufficient experience and to have operating risks that are not clearly understood. The operating performance of IGCC has only been demonstrated at a handful of facilities, which have reached 80 percent availabilities, but not the 90 percent and higher availability preferred for modern commercial base load coal generation.[128]

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[125] Id.
[126] Id.
[127] See David Berg & Andrew Patterson, "IGCC Risk Framework Study," DOE Policy Office, Presentation to Gasification Technology Council, May 20, 2004.
[128] As discussed in Section 2.4 below, the incorporation of redundant gasification capacity should enable IGCC facilities to readily achieve this level of availability.

The financing hurdle is compounded by the deteriorated creditworthiness of the electric utility industry today. A November 2003 report by Standards and Poors stated that:

> "the average credit rating for the electric utility sector is now firmly in the 'BBB' category, down from the 'A' category three years ago. Furthermore, prospects for credit quality remain challenging, as indicated by rating outlooks, 40 percent of which are negative."[129]

Lower credit ratings make if more difficult and costly for power developers to raise money for large, capital-intensive coal projects (whether PC or IGCC) costing in the range of a billion dollars. Companies under credit rating pressure are less likely to take on new recourse debt, or support power purchase agreements with long-term capacity commitments. Add the uncertainty of a relatively new generating technology such as IGCC, and financing becomes a serious constraint to deployment. Financing difficulties are an important explanation of why so few new PC plants have been constructed in the past 12 years in the face of an NGCC boom of 175,000 MW and why no commercial IGCC plants have gone forward.

A 2003 decision by the Wisconsin Public Service Commission to approve a WEPCO proposal to build two PC power plants, but reject the company's proposed IGCC facility, illustrates a fundamental chicken and egg problem facing IGCC technology. In Wisconsin, the commission determined that "IGCC technology, while promising, is still expensive and requires more maturation. For these reasons, the application to construct the IGCC unit is denied."[130] In order for IGCC technology to become commercially mature and economic it needs to be deployed, but in order for it to be deployed it needs to be perceived as mature and economic. Helping to resolve this dilemma through commercial deployment of a small fleet of IGCC power plants is the objective of the 3Party Covenant financing program. As described below, the 3Party Covenant addresses the primary IGCC risk factors industry experts have identified as inhibiting commercial investment.

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[129] Ronald M Baron, *"U.S. Power and Energy Credit Outlook Not Promising; Few Bright Spots,"* Standard & Poors, Nov. 11, 2003.

[130] Wisconsin Electric Power Co., 228 PUR4th 444, 2003 WL 22663829 at 26 (Wisc. P.S.C. Nov. 10, 2003).