Mr. Hargis and Mr. Storm:

Following are comments on the proposed Mesaba 600 MW IGCC plant proposed for Taconite MN.

About a dozen IGCC plants have been cancelled or put on hold during the 4 months. See the attached 3-page article about 9 IGCC plants that have been cancelled or put on hold (Emerging Energy Research, Oct. 5, 2007, "TECO, Nuon Underscore IGCC's Woes.") Since the report was issued, 2 more IGCC's have been cancelled: Colorado and Orlando. I worked long and hard to successfully stop the Colorado IGCC, but it was cancelled bc it is simply NOT economic; and although CO2 can be "captured", the entire process, from capture to compression to transportation to re-pressurization to storage -- is enormously expensive and risky. Why go there, when it's cheaper to go with wind and solar? The Orlando plant is notable because it received $235 million in federal funds, which it must now return.

It's such a shame that our country is run by short-sighted, self-interested people who only know dollars -- and show very little respect for human life.

Facts: coal-fired power produces 40% of all CO2, 33% of all mercury and 66% of acid rain. In some states, EVERY body of water is contaminated with mercury. One in ten (some studies say one in six) women of child-bearing age in the U.S. have so much mercury in their bodies that she is at risk for having a child with serious neurological disorders.

Acid rain is a problem that is only getting bigger.

According to Peabody, coal use soared 30% in the past 5 years (2001-2006), and will increase dramatically over the next couple of decades.

Coal mining wastes are the largest waste stream in the U.S., and coal combustion wastes are second. U.S. coal peaked a few years ago in terms of BTU (heat value) per pound -- meaning that we need to burn more coal for the same amount of heat/electricity.

2/3 of a coal plant's energy is lost as waste heat.

Renewable energy is cost-competitive. Xcel Energy's recently submitted Colorado Resource Plan estimated these capital costs: wind-$1645/kW (with Production Tax Credit); wind-$2,000/kW (no PTC); concentrating solar with 6 hrs thermal storage-$2572; IGCC with 50% capture-$3912/kW; pulverized coal, dry cooled with 50% capture-$3688/kW. Energy efficiency is 1-3 cents/kWh! http://www.xcelenergy.com/XLWEB/CDA/0,3080,1-1-1_41994_45385-42116-2_68_135-0,00.html -(go to Vol. 1, p.1-55).

Thank you.

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emerging energy research

On Point

Clean Power Generation Advisory

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TECO, Nuon Cancellations Underscore IGCC's Woes

Much of the momentum building behind IGCC has waned in 2007 as rising capital costs, stabilizing natural gas prices, and an uncertain carbon policy outlook have undermined IGCC's competitiveness for power generation. Highlighting this trend, two substantial regional utilities—Nuon in the Netherlands, and Tampa Electric in the US—have recently scuttled plans to build second generation IGCC projects. The fact that these companies—which have prior significant IGCC operating experience—have been unable to justify their projects' financial and planning risks highlights IGCC's deteriorating near-term commercial outlook.

BACKGROUND

After two years of deliberation and project evaluation, on 18 September 2007 major Dutch utility Nuon tabled its proposed 1,200 MW IGCC project in Eemshaven, Netherlands. The project would have been a scaled-up version of Nuon's 253 MW IGCC plant—the world's first commercial coal IGCC demonstration project—which Nuon built and has owned and operated since 1994.

On the heels of this announcement, regional Florida utility Tampa Electric (TECO) announced on 4 October 2007 that it is shelving plans to proceed with a 630 MW IGCC project. TECO owns and operates the 250 MW Polk IGCC project in Tampa, one of two coal- and petcoke-fired IGCC plants operating in the US. TECO had been awarded over $130 million in tax credits in 2006 from the US government to build the project, which it now must forfeit.

Both companies remain supportive of IGCC as an attractive, relatively clean option to meet future baseload requirements; but, unless market conditions change, these cancellations are a very clear indication of the widespread challenges facing IGCC over the next two to five years.

Exhibit 1: TECO & Nuon Overview and Involvement with IGCC

		NUON	TECO
Company Overview	**Business**	Generation, transmission, distribution of power and gas	Generation, transmission, distribution of power and gas
	Turnover	€5.6 billion	$3.5 billion
	Core Markets	Netherlands	Florida, US
Existing IGCC Experience	**Project**	**Buggenum**	**Polk – Unit 1**
	Capacity	253 MW	250 MW
	Year of Start-up	1994	1996
	Company Involvement	Build, own, operate	Own and operate
IGCC Project Cancelled in 2007	**Project**	**Magnum**	**Polk – Unit 6**
	Date Previously Expected to Start-up	2013	2013
	Capacity	1,200 MW	630 MW
	Project Comments	Intended to co-fire significant quantities of biomass	Awarded $130 million in US federal tax credits

Source: Companies, Emerging Energy Research

ANALYSIS

TECO latest setback for IGCC in the US. While the US remains the hottest global IGCC development market, with over 17,000 MW actively in planning, the last year has seen significant numbers of IGCC projects shelved or stalled as developers, IPPs, and utilities have

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been unable to justify IGCC investments in the context of spiraling capital costs, lack of satisfactory technology performance guarantees, unavailability of lump sum turnkey contracts, and an uncertain carbon policy environment (see **Exhibit 2**).

Exhibit 2: Prominent US IGCC Projects Cancelled or Facing Challenges in 2007

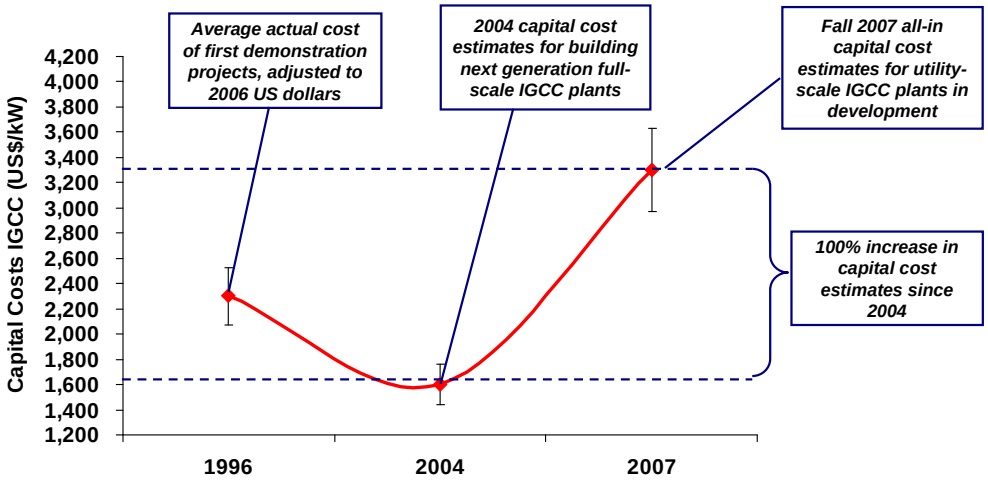
Developer	US State	Status	Reasons for Stalling
NRG	Connecticut	Canceled	Could not meet RFP timeline for delivery
TECO	Florida	Canceled	State carbon policy uncertainty, rising costs
Tondu Corp	Texas	Canceled	Rising costs, limited technology guarantees
Bowie Power	Arizona	Canceled	Delayed local planning process, environmental opposition
Buffalo Energy Partners	Wyoming	Canceled	Transmission constraints, rising costs, limited available technology guarantees and unsuccessful bid for funding
Mesaba	Minnesota	On hold	Increased costs have caused regulators to force renegotiation of costs
Madison Power	Illinois	On hold	Construction of a nearby supercritical coal plant has hindered power demand and tied up transmission and coal transport infrastructure
Tenaska, ERORA	Illinois	On hold	Local opposition to IGCC without carbon capture hampering regulatory proceedings
NRG	New York	On hold	Must find cost reductions to maintain state-awarded financial support

Source: Emerging Energy Research

Of the many companies that announced IGCC projects in the past few years, TECO seemed one of the best positioned to navigate the significant commercial challenges. The company has been able to leverage 10 years of improving operational experience at its existing plant, a close working relationship with key technology suppliers, and a successful bid in 2006 for over $130 million in tax incentives from the US federal government.

However, with costs escalating—estimated at a 30% to 50% increase since the beginning of 2006, and as much as a 100% increase since 2004—TECO could not justify the risk return profile of the project, even considering its financial support (see **Exhibit 3**).

Exhibit 3: IGCC Capital Cost Increases, 1990s–2007



Source: Emerging Energy Research

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Adding to TECO's decision to cancel the project was the mounting uncertainty over carbon policy, both at the state and federal level. Earlier in the year, Florida Governor Charlie Crist signed legislation to establish a target to reduce the state's greenhouse gas emissions from 1990 levels by 80% in 2050. In response, TECO stepped up the consideration of capturing and sequestering CO_2 from the plant, but the high associated costs, technology uncertainty, and liability risks made relying on CCS unfeasible for meeting potential future carbon restrictions. Still, with a need for 600 MW of baseload capacity forecasted in 2013, TECO is re-evaluating other generation options, which it will decide upon in 2008.

Nuon shifts project to CCGT, seeks sequestration demonstration. Also siting the considerably increased costs of late, Nuon has decided to build a 1,200 MW CCGT plant, while delaying the decision to proceed with IGCC by two years. This new project will be located in the Groningen region, approximately 160 miles north of its existing Buggenum IGCC facility.

Nuon is perhaps the world's biggest utility proponent of IGCC, having operated and continually invested in its 253 MW Buggenum IGCC project. Unique to Nuon's IGCC experience has been the steady increase of biomass co-firing at Buggenum, which has enabled the company to access significant Dutch-specific renewable energy subsidies.

Nuon's original intention was to build a 1,200 MW multi-fuel project at Groningen, with 60% of the output derived from co-gasification of biomass and coal and the remaining 40% derived from natural gas. This configuration would have allowed increased flexibility to provide coal-derived baseload power generation, while leveraging biomass and natural gas to moderate climate emissions and adjust for peak load requirements.

However, given the significant cost barriers for the IGCC component, Nuon has changed course, shifting the 1,200 MW to all natural gas with plans to re-evaluate integrating a gasification element with the new power blocks in 2009, depending on how gas prices and carbon legislation evolve.

Carbon sequestration will also be a key consideration for Nuon regarding proceeding with its gasification plant. To foster its understanding of the costs and challenges, Nuon is initiating a pilot-scale capture and sequestration trial at its Buggenum plant, which it hopes will help determine the viability of this option to address future European climate change regulations.

IGCC's outlook could sour further in the short-term. The key factors dampening IGCC's short-term outlook—technology uncertainty, high commodity prices, a tight EPC labor market, and a lack of meaningful carbon policies—seem unlikely to shift significantly in the next 12 months. Considering IGCC's three- to four-year construction cycle, the technology can expect to experience barriers for meeting baseload generation capacity until 2012.

For IGCC plant suppliers such as Mitsubishi, GE, and Siemens, this is unlikely to pose a significant concern as efforts remain focused on standardizing plant designs, integrating newly acquired technologies, and building a select few initial full-scale demonstration projects to define and improve IGCC's operating parameters for future roll-out beyond 2012.

However, with conventional coal combustion stalled virtually everywhere in the developed world due to climate change concerns, and nuclear projects facing very long lead times, utilities in Europe and North America seem certain to continue relying on a combination of CCGT and renewables to plug capacity needs for the next few years. Moreover, as baseload capacity shortfalls mount and concerns of overexposure to natural gas rise, utilities can be expected to pressure carbon policy makers to move forward with legislation to lessen the substantial uncertainty facing the industry.

ADDITIONAL EER RESOURCES

Babcock & Brown Explores IGCC to Balance Wind in Texas. On Point, 30 August 2007
EOR Demand Brightens CCS Prospects in North America. On Point, 15 August 2007.
Carbon Sequestration Challenges Drive Downstream Strategies. Market Brief, 8 August 2007.
Global Power Industry Targets Carbon Capture. Market Brief, 31 July 2007.
Goldman Sachs Stokes IGCC Growth. On Point, 13 April 2007.
IGCC Prospects in US Power Generation. Market Brief, 13 February 2007.

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S&P Viewpoint

Turning Coal Into Liquid Gold: Alchemy? No, Polygeneration

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Turning Coal Into Liquid Gold: Alchemy? No, Polygeneration

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Transforming coal into a variety of superclean, value-added energy products may sound like the result of some futuristic technology. But even though most people outside the energy business have never heard of "polygeneration," the process of taking coal and turning it into synthetic natural gas, gasoline, diesel and jet fuel, and many other refined products was actually developed in Germany after World War I and has been in use in South Africa since the 1970s.

Now, amid today's concern about climate change, some participants in the energy debate in the U.S. are looking at coal-to-liquids (CTL) and coal-to-gas (CTG) technologies as potential solutions for bridging the gap between long-term environmental objectives and real-world economic and political considerations. Polygeneration technology proponents say CTL and CTG could create a wide variety of cleaner energy sources using abundant domestic coal supplies as a feedstock while still relying on existing railway and natural gas pipeline infrastructure. Polygeneration could also decouple strategic industries from their dependence on increasingly volatile imported oil.

Commercializing this technology on a large scale, however, has its challenges. Standard & Poor's Ratings Services believes lenders will need to consider several critical items for any proposed debt financing of CTL and CTG projects.

Ratings Implications

We don't expect to assign credit ratings to many CTG or CTL projects in the near future, given the significant additional development that will be required to obtain regulatory approvals, negotiate sales (or "offtake") agreements, and improve initial cost estimates. Nonetheless, we do expect that CTG will likely be at the forefront of polygeneration development in the U.S. because it's a relatively more certain technology. CTL plants with true polygeneration capability are probably still several years away from seeking broader access to credit markets. Initial projects in these areas will not likely have investment-grade characteristics during construction and the initial years of commercial operation. But after such plants establish a reasonable commercial operating record, investment-grade ratings could be possible if long-term, price-certain contracts with creditworthy counterparties (or government entities) are in place.

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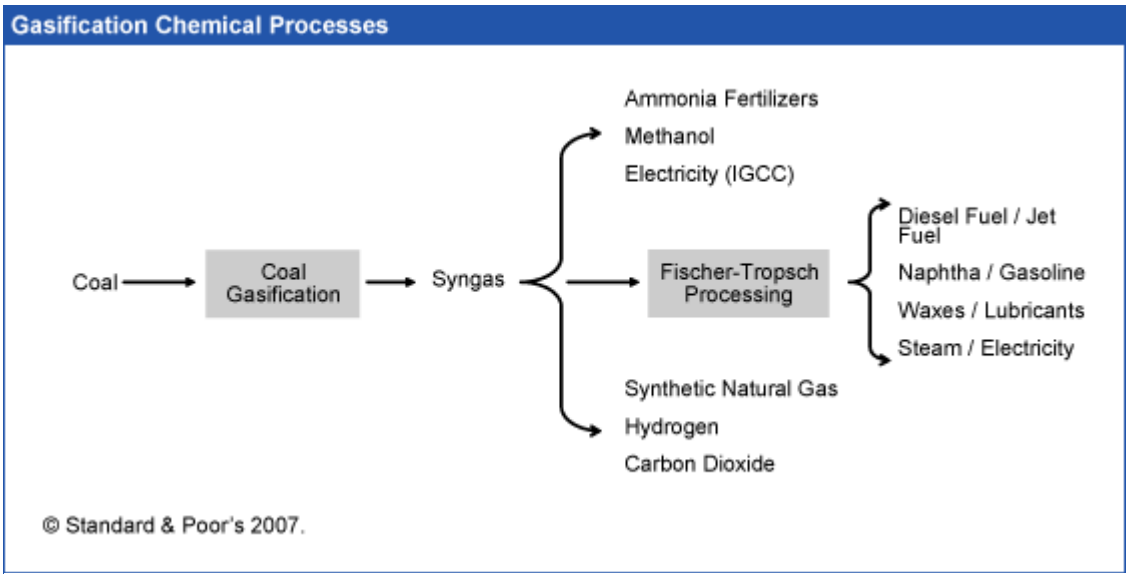
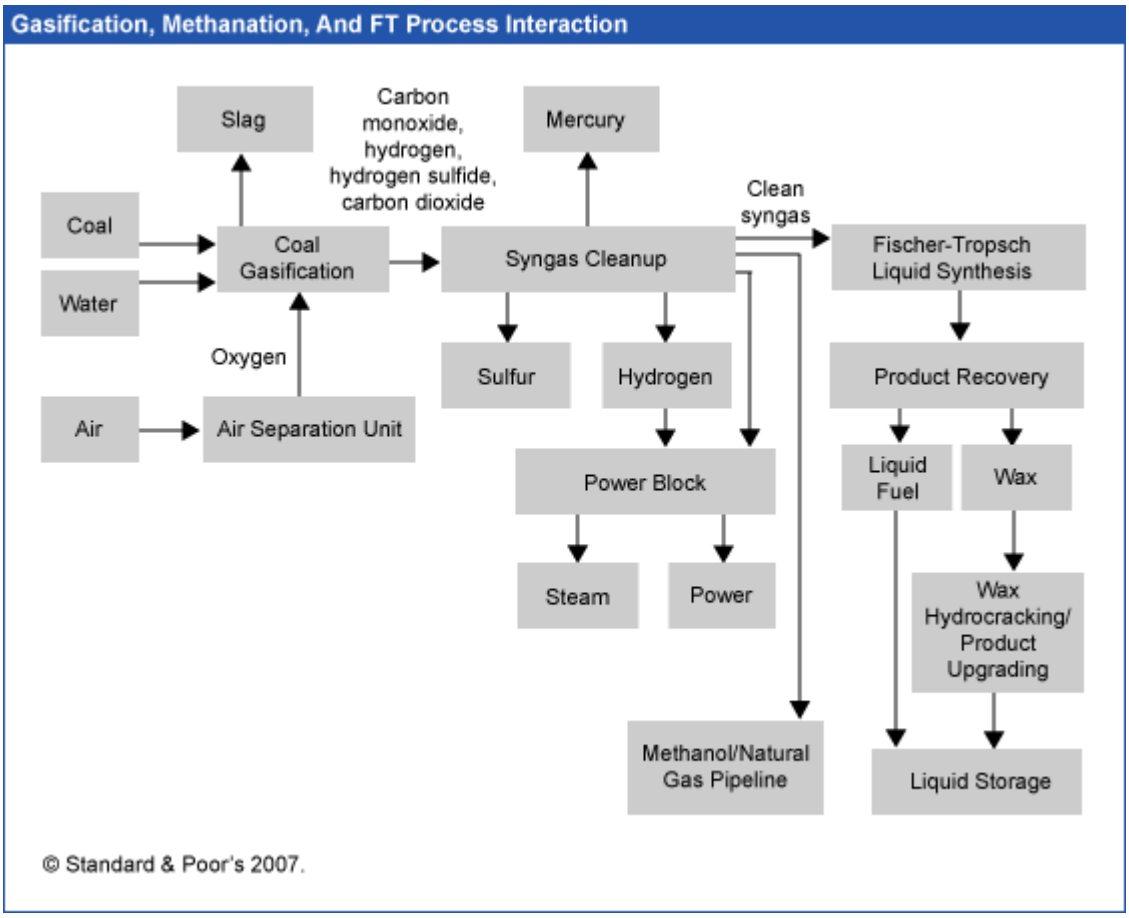
How Polygeneration Works

Polygeneration refers to using coal as the primary feedstock to produce a wide range of energy resources that include synthetic natural gas, methanol, diesel fuel, naptha, steam, and electricity. These projects are also referred to as "independent fuel producers," as opposed to "independent power producers." For the purposes of this article, we will discuss primarily the challenges and opportunities for this technology to convert coal to either natural gas or fuel liquids, such as naptha or diesel, although a polygeneration facility can make many other refined products.

Chart 1 illustrates the general chemical processes through which coal is first gasified and then further altered to create a synthetic fuel. In turn, that synthetic fuel can be converted to electricity using integrated gasification combined-cycle (IGCC) technology, directly synthesized into pipeline-quality synthetic natural gas (SNG) through a methanation process, or further refined through additional chemical reactions like the Fischer-Tropsch (FT) process to create higher value-added products such as gasoline.



To understand the financial risks and economic benefits of CTG and CTL, it's imperative to understand the coal gasification and FT synthesis components of a polygeneration project. Chart 2 provides a closer look at how the gasification, methanation, and FT processes interact. It's based on technical schematics that industry experts expect will be used in commercial-scale CTL or CTG projects currently under development.



The initial coal-gasification process CTG or CTL projects use is identical to the technology currently under development for IGCC units. Oxygen, coal, and water are combined during gasification in a controlled chemical reaction to create a combination of carbon monoxide and hydrogen called crude syngas. Byproducts from the process include hydrogen sulfide, carbon dioxide (CO_2), and slag (i.e., mineral residue from the coal). These must be removed from the syngas before it's suitable for industrial application or power generation.

The first step in the syngas cleanup process is extracting residual mercury compounds through a commercially demonstrated vapor-phase process. Results at an Eastman Gasification Service Co. coal-gasification facility suggest that this technology is effective at removing upward of 94% of the gasified coal's mercury content. Next, a solvent is introduced to the syngas that results in the physical or chemical absorption of sulfur and CO_2. Currently, three different technologies exist for this "acid gas removal" procedure, each of which is distinguished by its choice of chemical catalyst, operating temperature, and absorption capability. Two primary technologies (Selexol™ and Rectisol™) appear to have the widest industry acceptance as syngas cleansing technologies, and each has the ability to eliminate more than 99% of residual sulfur and from 50% to over 90% of the carbon in the original coal feedstock. As with the mercury removal, acid gas removal has shown to be highly reliable based on operating experience at a large number of petrochemical units worldwide.

After most impurities are removed, syngas may be processed in a methanation plant to create synthetic natural gas or methanol. Synthetic gas created through these techniques is of high quality and meets purity standards for interstate pipelines. Alternatively, the syngas can be synthesized into refined chemicals and diesel fuels using FT processes. FT synthesis involves subjecting the syngas to a high-pressure environment, adding a catalyst such as iron or cobalt,

and modifying the reaction temperature to either directly produce a liquid fuel or produce an intermediate-stage wax hydrocarbon that's further catalyzed (or "cracked") into an end product.

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What Are The Benefits Of CTG And CTL?

There are three main benefits for CTG and CTL--fewer carbon emissions, more fuel diversity, and better energy security for the U.S.

Low carbon emissions

CTG and CTL proponents cite a number of environmental, economic, and strategic benefits from large-scale commercialization of these technologies. Environmentally, the syngas cleaning process automatically transforms about 50% to 70% of the coal's total carbon content into CO_2 that's ready for compression and sequestration. To the extent that hydrogen would form the ultimate end product of a CTG plant, additional carbon capture of up to 90% is possible.

Although CTL and CTG plants' environmental benefits are reasonably attainable with available technology, it's important to note carbon-capture benefits aren't automatic. They depend on an additional investment in compression and sequestration infrastructure that's outside the scope of gasification and FT technologies themselves. A recent Massachusetts Institute of Technology (MIT) study suggests that without a method of compressing and storing a polygeneration plant's CO_2 byproducts, FT processing can actually increase CO_2 emissions by 150% compared with directly refining petroleum-based fuel products.(1) The MIT study further suggests that CO_2 emissions from the gasified coal would be up to 175% higher for SNG created without carbon capture versus regular natural gas. The higher emissions are due to the relative inefficiency of gasification and FT technology, which requires more coal to be processed and increases the absolute amount of carbon byproduct. Fortunately, because the CO_2 created through gasification and FT synthesis is a relatively pure byproduct, industry experts estimate that the incremental cost of carbon-capture technology is almost one-third less than for the closely related IGCC technology.(2)

Fuel diversification

Beyond purely environmental considerations, economic interest in CTL is growing in the airline and transportation sectors, both of which have suffered from increasing oil and natural gas price volatility in recent years. Naptha, gasoline, and diesel fuel created from FT processes have the potential to provide transportation companies with a fuel source less correlated to global oil price volatility. Furthermore, these industries may be able to better hedge their exposure to changing fuel costs through longer term supply contracts with CTL refiners when these producers' operational characteristics become better understood.

Improved national energy security

Finally, many participants in the coal and defense industries think CTL and CTG technologies can have strategic and political benefits for U.S. energy security. The Energy Information Administration (EIA) estimates that net imports of liquid fuels in 2005 accounted for about 60% of total domestic consumption.(3) Furthermore, imports should remain at these levels through 2030, as increasing domestic oil production isn't likely to significantly offset projected consumption growth. Some worry that reliance on global markets to meet most of U.S. energy needs exposes the economy to supply disruptions from politically unstable regions. Even absent geopolitical turmoil, some observers predict an inevitable slowdown of U.S. economic growth as increasing oil demand from emerging economies like China, India, and Brazil causes future commodity prices to rise.

CTL and CTG supporters suggest that the U.S. can curtail its import dependence by as much as 5% annually by exploiting domestic coal reserves, which in 2006 were estimated to be about 267

billion short tons.(4) This suggests a 240-year domestic reserve life at 2006 consumption rates. The addition of coal-based technologies provides a much larger array of domestic resources on which to base economic growth. Also, the location of U.S. coal reserves--across 26 different states--would diversify fuel production away from the Gulf Coast, with its weather-related supply interruptions and limited domestic refining capacity.

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Key Risks For Polygeneration

Although CTL and CTG projects are probably several years and a few pilot projects away from finding wide acceptance in the financial markets, project sponsors and potential lenders will need to consider a number of risks and credit issues in the near term when evaluating the risk profile and commercial viability of any investment opportunities. Standard & Poor's believes lenders should consider several key items as the dialogue surrounding this technology continues to expand.

Technology risk

In the 1920s, German scientists pioneered the FT process that lies at the heart of the polygeneration concept to bridge the gap between that country's inability to finance petroleum imports and the need to rebuild its economy after World War I. The Nazis later expanded FT technology to achieve energy independence during World War II, when total synthetic fuel production peaked at 124,000 barrels per day (bpd) across 25 plants.(5) Second-generation development of FT technology occurred in the 1970s and 1980s at Sasol, a South African company that has to date developed the world's only fully operational CTL plants. Although privately owned Sasol has not publicly disclosed any operating statistics or technological specifics of its Sasol II and Sasol III plants, their long-term operating performance has been sufficiently reliable to provide between 30% and 40% of South Africa's fuel requirements over the past 20 years.(6) Likewise, the methanation process used to convert syngas into synthetic natural gas is a commercially proven technology widely used in the chemical industry.

As previously mentioned, Eastman Gasification has successfully demonstrated that CTG units can be reliably operated for 20 years. Since 1984, Eastman's CTG facility has posted an average forced outage rate of less than 2% and has had single unit reliability of up to 90%. Even higher reliability has been achieved by using redundant gasifier units during planned and unplanned maintenance. Moreover, most planned CTL/CTG facilities will use five or six small gasifiers. This results in gasifier availability of more than 90% and is an important distinguishing factor from IGCC, where the plants are usually designed to have two large gasifiers, with resultant lower overall reliability. A solid operating track record for the gasification components is good news for potential lenders to these projects because the gasifiers contribute an estimated 25% to 30% of the hard project costs of CTL and CTG facilities.

Integration risk

The relatively long history of polygeneration's component processes suggests that pure technology risk may be less of an issue for new projects. Scale-up risk, however, is likely to be a significant concern for CTL and CTG facilities. Currently, the Sasol plants in South Africa produce 80,000 barrels of diesel fuels per day. The company's familiarity with the technology and extensive experience have enabled this level of output. In the U.S., no local operators or project developers have direct experience with CTL units, so demonstration projects under development are much smaller than Sasol's units and can produce only 5,000 to 10,000 bpd. Most project sponsors agree that commercial-scale plants would require 30,000 to 40,000 bpd output to remain economical.

Sasol doesn't make operating data for FT liquefaction reliability publicly available, and therefore reliability represents a more significant technical risk for CTL lenders than for CTG facilities that

don't employ the FT. In most project financings, integration risk is typically addressed through engineering, procurement, and construction (EPC) contracts that provide cost certainty to lenders. These are backstopped by substantial performance guarantees that ensure that the plant's design achieves a minimum operating level.

Based on discussions with project developers, Standard & Poor's believes that traditional turnkey, EPC-style contracts will not be available for CTL projects, given that FT units' operating performance isn't well understood outside of Sasol. Engineering firms like General Electric and Eastman may be able to provide performance guarantees on gasification units they supply, but these guarantees are unlikely to apply to FT liquefaction units. And they're likely to have liquidated damage provisions less than the 20% to 30% of total contract cost that's normally associated with investment-grade projects. Furthermore, FT providers in the U.S. are smaller, more entrepreneurial companies whose balance sheets do not support significant performance guarantees for their technologies. CTG units also appear unlikely to attract turnkey EPC contracts given the lack of a single vendor owning all available technologies.

Notably, although integration risk is one of the main concerns for lenders, it may be more manageable in a CTG or CTL plant compared with IGCC because the production process is fairly linear, with fewer feedback loops for steam, gas, and other process elements. Reliability issues in an IGCC facility often result from these integrations aimed at improving process efficiency. However, this advantage will ultimately need to be tested under operating conditions.

Capital cost versus commodity exposure

Obtaining good cost estimates for a CTG or CTL project is difficult. Project sponsors indicate that a polygeneration plant's operating cost structure will be very site-specific and could vary considerably due to differences in plant configuration, access to coal supplies, and local infrastructure. Industry participants Standard & Poor's interviewed estimate that to build a viable commercial-scale CTL facility it would need to be able to produce 30,000 to 60,000 bpd, with construction costs of about $100,000 to $120,000 per barrel (in 2007 dollars). Preliminary cost estimates are about one-half as much for a CTG facility with a 30 billion to 50 billion cubic feet per year output capability. This puts the range for CTL hard capital costs between $3 billion and $3.6 billion, and from about $1.5 billion to $1.8 billion for a CTG plant. Recovering these large amounts will require lenders and equity sponsors to have a long-term view toward the project's success, as well as some price certainty surrounding the plant's output.

In general, CTL pilot plants are likely to produce either naptha or diesel fuel as their primary product. Naptha is preferred due to the significant pricing premium it commands on the open market as a higher value-added refined product. In addition to the market conditions for the final end product, the competitiveness of a CTL refined product will depend on prevailing oil prices, the facility's operating and financing costs, and the period of time that both equity- and debtholders should reasonably expect to recover capital costs. Therefore, estimates concerning the price at which CTL projects will become economical vary widely and are extremely sensitive to the operating and financing assumptions specific to the project. In general, project sponsors and academic research estimate that CTL products are likely to become competitive on a production cost basis when oil prices are around $55 to $65 per barrel, whereas CTG plants are likely to become competitive with natural gas at prices between $6.50 and $8.00 per thousand cubic feet.

Given commodity prices' volatility in recent years, it's possible that CTL and CTG projects could become more cost-competitive, but lenders to these projects would need significant protection from downturns in the commodity cycle over the 20- to 25-year cost recovery period that appears reasonable for these types of investments. This suggests that CTG or CTL projects without long-term, price-certain offtake contracts, or government tax incentives or price protection are likely to be untenable, at least initially.

Regulation and government support

It seems almost certain that a lot of governmental support will be required to commercialize CTL projects in the U.S., given the high capital costs involved, technology risks, and oil price uncertainties. Standard & Poor's believes that without some federal or state government commitment to commercial-scale pilot projects, the financial risks related to CTL projects are simply too large for traditional fixed-income investors to bear. For example, Sasol would have been unable to successfully complete its South African facilities without loan guarantees and price supports from the South African government. Furthermore, federal, state, and local agencies are well situated to take many of the longer-term risks that the financial community is unable to accept. We believe this is appropriate given that many of the environmental and strategic benefits (i.e., cleaner air, improved energy security, and increased fuel diversification to support strategic industries) are too broad to easily assign costs and benefits to specific groups. The Department of Defense is a much sought-after potential customer for liquid fuels from CTL projects.

CTG projects differ from CTL in two important ways that somewhat lessens the former's reliance on government support. First, methanation technology is better understood than FT. Second, rather than depending on the federal government for fixed-price guarantees, CTG projects maybe able to enter into long-term, fixed-price contracts with creditworthy utilities that would purchase natural gas for their gas-fired power plants. However, state regulatory support that allows investor-owned utilities to pass "out-of-market" costs along to consumers without regulatory disallowances or extensive prudence reviews would remain necessary for these projects to achieve higher ratings.

Such support could take a variety of forms. However, it's important that the support directly addresses the most important issues to potential lenders, such as ensuring a long-term offtake, contributing to price certainty, or protecting against financial losses due to technical failure. Examples of governmental support that would improve a polygeneration facility's credit profile are:

- Federal and local municipalities or agencies could serve as the primary long-term offtaker for CTL or CTG products, or agree to act as a "buyer of last resort" if market prices don't support sales to private market participants.
- Federal loan guarantees could be provided to projects to lower capital costs for investors, though we expect that they're likely to be insufficient in their current form and would require modification. Currently, for many programs, the government guarantees only 80% of the loan amount, effectively leaving the debt rated at the project's intrinsic credit quality.
- Governments could provide a minimum price support if global commodity prices fall below predetermined thresholds that render CTG or CTL products uneconomical.
- Federal and local tax incentives could increase capital returns to investors and lower the cost of capital for project sponsors.

Although polygeneration may appear to be modern-day alchemy, the base technology has been with us for almost 80 years, and now may hold the key to achieving important advances in lessening the effects of climate change. The benefits that polygeneration provides with respect to energy independence and fuel diversity make future CTG and CTL projects likely beneficiaries of both public and private market support for environmentally friendly energy alternatives. Ultimately, however, risk allocation between these constituents will determine how much capital markets can do to support these investments.

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Notes

(1) Massachusetts Institute of Technology. "Coal Based Electricity Generation," The Future of Coal: Opportunities for a Carbon-Contrained World," Massachusettes Institute of Technology (2007).

(2) Ibid.

(3) Table A.11 – Liquid Fuels Supply and Disposition – Reference Case, Annual Energy Outlook 2007, Energy Information Administration (February 2007).

(4) "Coal Reserves Information Sheet," Energy Information Administration (November 2006): http://www.eia.doe.gov/neic/infosheets/coalreserves.html.

(5)"Fischer-Tropsch History." Coal Gasification & Fisher-Tropsch: CCTR Basic Facts File #1. Indiana Center for Coal Technology Research (July 2006).

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