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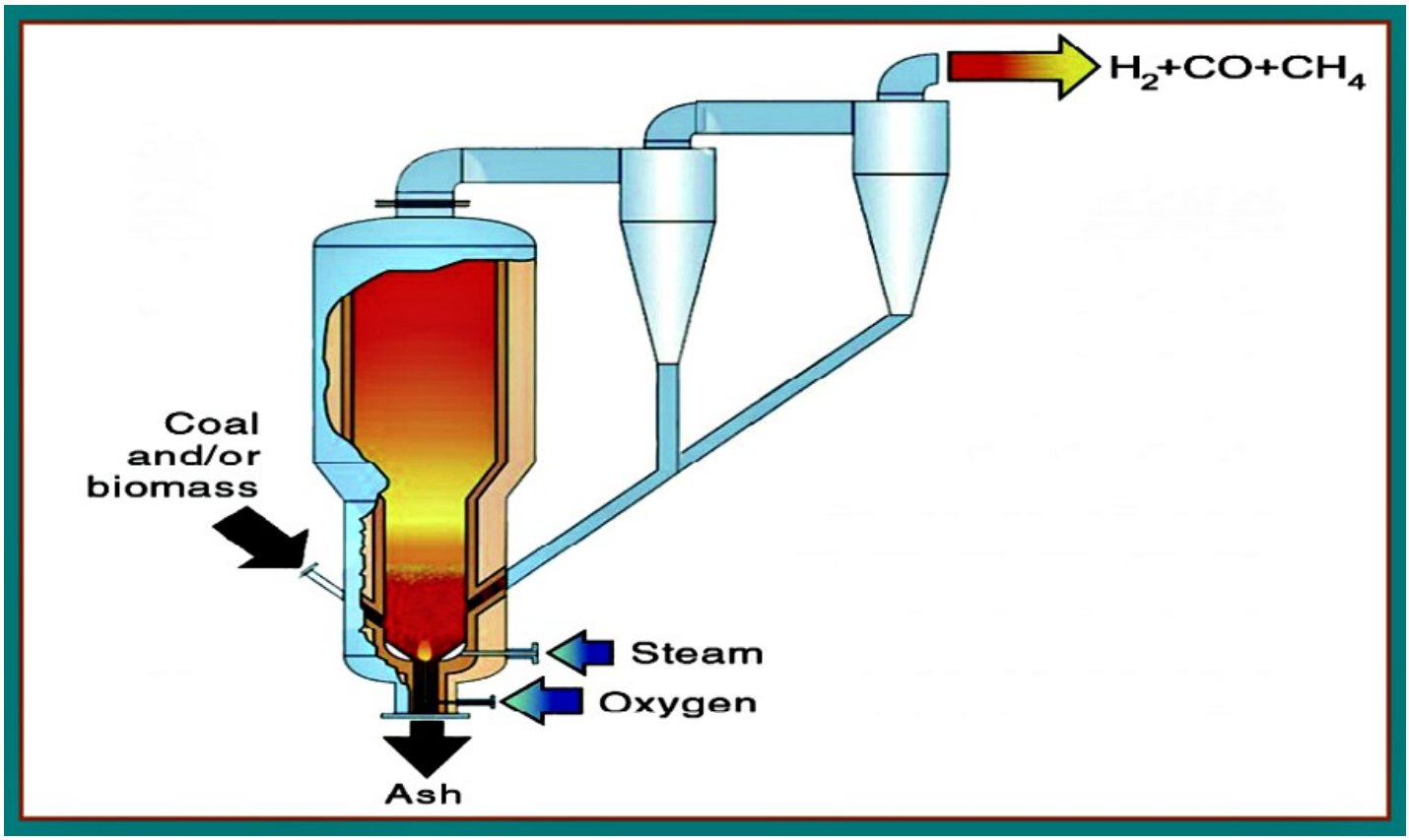
SES Spots Emerging Markets for Lower-Cost IGCC; Opportunities Abound

By Jack Peckham. Published October 16, 2014



Huge cost overruns in recent integrated-gasification combined-cycle (IGCC) projects—along with plunging natural-gas prices—have soured many on IGCC, synthetic natural gas and coal/petcoke gasification-to-chemicals projects in North America.

But Houston-based coal-gasification specialist Synthesis Energy Systems (SES) sees an emerging opportunity for potentially scores of smaller-scale, lower-cost, “less-integrated” IGCC distributed-power projects in countries outside of North America or Europe.

The opportunities look especially bright in countries having abundant, cheap, low-grade coal reserves, but lacking cheap and abundant natural gas—and also lacking grid power for huge portions of their populations, as SES CEO Robert Rigdon and SES vice president Carrie Lalou explained in an exclusive October 8 interview with Hart Energy's DownstreamBusiness.com (DB.com).

According to the company, such "distributed-generation" IGCC projects could tap its "U-Gas," fluidized-bed gasification technology—licensed from Gas Technology Institute—which is touted as relatively more tolerant of low-rank, high-ash coals.

What's more, such smaller-scale, "distributed generation" IGCC plants could be engineered and built relatively fast—perhaps in a couple of years—in stark contrast to the many-years-long odyssey required for engineering, permitting, financing, public hearings, "green" lawsuits and construction delays typical of recent IGCC projects in North America.

SES contrasts its fluidized-bed gasification scheme to IGCC projects that employ entrained-flow gasifiers, the latter of which normally require more expensive, higher-rank coals and petcoke, rather than the cheaper, higher-ash, poorer quality coals suitable for SES's system.

The recent IGCC projects in North America also have tended to pursue maximum integration and maximum thermal efficiency— with higher capital costs resulting.

However, employment of cheaper, non-U.S. construction labor, along with cheaper (non-U.S.) manufacturing, "less-integrated" technology, future project experience, greater modularization and plant replication could lead to dramatically lower-cost IGCC plant construction, SES argues.

What's more, when natural gas prices inevitably rebound, then it's even possible to imagine a renaissance for lower-cost IGCC projects in North America— perhaps as early as the coming decade, according to the company.

Rigdon and Lalou pointed to a recent agreement between SES and General Electric (GE) to pursue a novel, lower-cost, smaller-scale "distributed generation" form of IGCC, initially targeting nations such as China, Pakistan and India—and potentially, nations in largely power-starved Africa.

SES and GE first publicly mentioned this novel scheme in a press announcement earlier this year (see DB.com on 01/28/2014 (http://www.downstreambusiness.com/item/SES-Inks-Letter-Intent-Pakistan-Gasification-Power-Project_n70180)) regarding a proposed smaller-scale IGCC project with Karachi Electric in Pakistan.

The initial project would tap the SES "U-Gas" coal-gasification technology, plus two GE "LM2500+G4" aeroderivative-gas turbines, plus a heat-recovery steam generator (HRSG), and finally a single-steam turbine.

This project would produce from 90 megawatts (MW) to 200 MW of power, depending on the number of gas turbines employed.

But according to Rigdon and Lalou, this scheme—or something quite similar—could be employed for numerous "distributed-power" concepts of between 80 MW and 100 MW (in combined cycle) or perhaps from 34 MW to 68 MW (simple-cycle, one or two gas turbines only).

One key reason for drastically lower cost with this smaller-scale IGCC scheme: lower-cost equipment manufacture in China (and possibly India), along with much cheaper labor costs for plant construction, versus the hefty labor and

manufacturing costs in Europe and North America.

Another key cost-cutting factor would be the relatively less-complex, less-integrated IGCC scheme proposed by SES. Higher-complexity IGCC integration (between air-separation units and gas turbines, for instance) and the relatively high cost of carbon-dioxide (CO_2) capture—as is now seen essential for new coal-fired plants in North America or Europe—isn't today required in many "emerging market" countries.

Instead, the main goal in these countries is just hooking-up huge portions of the population "off the grid" or paying high prices for diesel generator-set power, Rigdon and Lalou explained.

Yet another factor favoring SES's proposed "less-integrated" IGCC scheme would be the employment of relatively a lower-cost amine system for syngas acid gas removal (AGR), instead of the costlier (but relatively more thorough) Selexol or Rectisol AGR technologies, Rigdon added.

It's conceivable that countries adopting these first proposed "distributed-power" IGCC plants eventually might adopt CO_2 limits in future decades. Having gasification-based power would help ease that adoption, since gasification yields a relatively pure stream of CO_2, unlike conventional pulverized coal-power plants, he added.

"Billions of people in Asia and Africa have to have power and clean water and agricultural products, and they're going to do it" in large part by using coal-based energy, Rigdon told DB.com.

"If we don't bring advanced coal-conversion technology, then they'll do it with old [and less-efficient] technology," he added.

SES started investigating the possibility of broad adoption of the SES gasification technology in power applications “about four years ago” by “looking at the lessons from IGCC,” he said.

This investigation focused upon “making syngas for power at a scale needed in areas of the world trying to grow.” This led to the conclusion that many areas of the world “need [between] 50-MW [and] 200-MW projects in multiple locations” as a form of distributed power, unlike the conventional diesel gen-set distributed-power schemes.

“We weren’t sure it could be done, but with our engineering work, we surprised ourselves. That also got GE’s interest. It isn’t typical IGCC, but it is gasification with combined-cycle.

“I’ll mention this in my speech at GTC [the Gasification Technologies Council 2014 annual meeting in Washington, D.C., in late October].

“I could say we can build these plants at ‘X’ cost, but no one will believe me until we actually do it,” especially since the two most recent U.S. IGCC projects (Duke-Indiana “Edwardsport” and Mississippi Power “Kemper”) went way over budget.

While SES’s initial focus will be on smaller-scale, distributed-power IGCC, “we believe it’s a pathway to larger scale” in future years, he added.

The recent U.S. utility company projects building IGCC plants “need the highest reliability and BACT [best available control technology] emissions,” SES vice president Lalou added.

“Our [distributed-power] projects have completely different project drivers. No one is asking us about CO_2 capture or efficiency. Instead, it’s ‘how cheap and fast can you get it on-line?’ ”

Governments in many “emerging-market” countries “are under tremendous pressure to get the lights on” in areas off the grid, she explained.

With the “less-integrated” IGCC approach, “massive amounts of costs roll out of a plant,” Rigdon added. “If we can build the first plant at $2,000 or $2,500 [per kilowatt-hour capacity], then the next one [via replication] will be cheaper, and there are hundreds of opportunities to build plants like this.”

What’s more, the various modules for such plants could be built via existing supply-chains in China, he added.

The type of gas turbines chosen for the SES-GE IGCC scheme are aeroderivative types that can tolerate coal-derived syngas, Lalou further explained.

“Not all gas turbines are suitable for syngas,” she said. “So we worked with GE to find a turbine that can work with syngas. We understand their requirements. And we didn’t want anything new, just off-the-shelf” turbine technology, she added.

GE’s LM-2500 aeroderivative turbines have the further advantage of quick start-and-stop, unlike typical IGCC gas turbines, she added. “That’s great for these distributed-power locations. And these turbines are used all over the world—there’s a huge base of customers for these machines.

“But these customers have never had access to syngas before. Instead they’re using natural gas or diesel.”

Now, the new SES-GE “less-integrated” IGCC package could be employed “where you lack gas or pay a high diesel price, and where you have cheap, low-grade coal that can’t even be used in coal boilers, but can be used in our gasifiers,” she added.

While the SES-GE distributed-power scheme would be cheaper than some proposed alternatives, “we’re not in the five to 10-MW gen-set market,” Lalou explained. “Our gasifier could scale-down, but the economies-of-scale don’t look good.”

On the other hand, a conventional pulverized coal (PC)-power plant of less than 100 MW “gets really expensive and has efficiency problems” compared to the SES-GE scheme, and the SES scheme further has the advantage of “using the cheapest coals out there,” unlike PC plants.

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