

ASME TurboExpo 2008

POWER FOR
LAND, SEA & AIR

I think we would all agree: A good show, but a challenging venue. The theme, as published, was Power for Land, Sea & Air, later amended to "Clean Gas Turbine Technologies for Land, Sea & Air." This refined focus is no doubt a reflection of the times and more than suggestive of today's technology challenges.

In the past, "clean" meant NO_x, SO_x, Mercury and unburned hydrocarbons. Today it means these criteria pollutants plus CO₂. Much of the 2008 conference focused on climate change and CO₂ in one form or another.

There were a quite a few panel sessions and papers focused on cycle innovation. I thought that the side-by-side presentations comparing the various wet, dry and hybrid cycles by Andrea De Pascale, University of Bologna (GT2008-51275 & 51277), were particularly good. A considerable amount of data were presented in two companion papers that are well worth a read.

Justin Zachary, Senior Principal Engineer at Bechtel Power, provided an excellent overview of the impact CO₂ capture and sequestration has on turbomachinery design (GT2008-50642). This paper covers the various capture technologies and the associated equipment design trade-offs. The paper is a good primer on the topic by one of the industry's leaders.

Stephanie Hoffmann, GE Global Research, presented a very interesting paper featuring advanced gas turbine cycles with pre-combustion CO₂ capture (GT2008-51027). In this cycle, high-pressure syngas is produced from natural gas using an air-blown POX reformer. CO₂ is removed from the shifted syngas prior to combustion using either CO₂-absorbing solvents or a CO₂ membrane. The remaining CO₂-lean syngas mixture is burned in a gas turbine. The paper describes an advanced cycle power plant reaching the performance targets of 50% net cycle efficiency with 80% CO₂ capture, and \$30/t of CO₂ avoided.

The other major issue that appeared frequently was hydrogen and hydrogen blend combustion, including syngas in various forms. Unfortunately, most of these sessions overlapped those focused on CO₂ and I was not able to attend.

Clearly, concerns over global warming dominated the conference topics, and CO₂ capture and sequestration is considered by most to be an emerging reality. For all its accomplishments, however, it seems to me that we, the gas turbine community, have defined our role too narrowly and are presuming the outcome.

I only attended three presentations where I thought the authors captured the essence of this issue and two of those were by Mitsubishi. Mitsubishi presented what it called a "3E Society".

- Energy security
- Environmental protection
- Sustainable economic growth

I do not know if the 3E Society is an MHI theme or whether this is part of national ethos. It certainly suggests some form of national commitment which would come as no surprise, given Japan's historical dependency on imported energy.

Robert Beck, Executive Director for the National Coal Council, was the only other speaker that identified climate change within the context of energy security. All of the other presentations that I attended focused on the single issue of climate change.

This is not a single issue and none of us would accept climate change initiatives without energy security. The 3E society does capture the essence of what needs to become a more balanced perspective.

I have expressed concern that Combined Cycle Gas Turbine (CCGT) power plants being able to obtain permits without CO₂ capture provides the illusion of action. Of course, certain segments of our industry do not want to include capture on CCGT units because such a requirement would eliminate their significant competitive advantage. The exhaust stream concentration is 4% for a CCGT vs. 15% for a pulverized coal-fired power plant, resulting in substantially large equipment to handle the volume.

The June 08 average spot price for natural gas at Henry Hub was \$12.77/MMBtu. In comparison, PRB coal finished the month at \$13/short ton, and off its \$20/ton high. At 8,800 Btu/lb, PRB fuel cost would be \$0.75 - \$1.15/MMBtu. Illinois Basin finished the month of June at a high of \$65 for a fuel cost of \$2.82/MMBtu. This did beg the question, "Is 60% LHV efficiency good enough?"

I still find the current pre-occupation with the "price at the pump" on the evening news reflects poorly on our society, but if there is good news in it, such intensive coverage has served to focus public interest and attention on energy and energy issues.

What we need to do is to channel this newfound awareness into a more balanced discussion of the real issues. One-dimensional discussions such as climate change make for great "wedge issues" and political talking points, but almost by definition, they get in the way of balanced discussion and result in lopsided policy. The Japanese have it right in focusing on their "3E Society." ■

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