ITM Oxygen technology project holds kickoff meeting

Participants in EPRI’s Industry Technology Demonstration collaborative supporting the development of an innovative ion transport membrane (ITM) technology for oxygen production got a chance to “kick the tires” of the test facility during a project kickoff meeting July 14 in Baltimore, Maryland.

Air Products, under a cooperative program with the U.S. Department of Energy (DOE), is working to advance ITM technology that could significantly increase efficiency and reduce costs for advanced power generation applications.

To capture carbon during power production, integrated gasification–combined-cycle (IGCC) systems, which remove CO₂ from the fuel before it is burned, and oxy-combustion systems, which use high-purity oxygen rather than air for combustion to produce flue gas with high CO₂ concentration, can be used for good efficiency in direct CO₂ capture. Both of these advanced generation processes require large amounts of oxygen, and existing large-scale oxygen separation technologies impose considerable parasitic loads.

The ITM process, which uses a ceramic material under temperature and pressure to ionize and separate oxygen molecules from the air, requires no electric power to operate. That’s one of the reasons why ITM technology could lower the cost of producing oxygen, reduce IGCC plant capital expenses by 7%, and reduce auxiliary power consumption by 6% of gross power production.

At the meeting in Baltimore, several representatives of the companies participating in the EPRI collaborative got a chance to see Air Products’ 5-ton/day (t/d) oxygen pilot plant, called the Subscale Engineering Prototype (SEP), firsthand at a nearby facility. They learned more about how it works, as well as plans for the next steps in the project.

“We’re glad you’re here and for your interest in the ITM technology. We look forward to working with you,” said Ted Foster, Air Products’ Director of Business Development. “Our objective is to help you understand what is happening and how we are going to bring this to commercialization.”

Phil Armstrong, ITM program manager for Air Products, opened the meeting with an “ITM 101” presentation, noting the company has been developing ITM technology since 1988 and already has collected a significant amount of data from the operation of the SEP. The next step in the DOE program is to design, build, and test a 150-t/d unit and integrate it with 5- to 15-megawatt industrial turbomachinery.

“We have the opportunity to do a lot of testing and process integration,” Armstrong said. “There is great promise with a lot of the processes you use already.

“ITM has a lot of ‘knobs to turn.’ There are a lot of things you can do with this technology that you can’t do with cryogenics,” Armstrong explained. “For example, we can adjust the pressure and make as little or as much oxygen as you want. It gives us a lot of flexibility in how much oxygen can be delivered.”
Completion of the 150-t/d intermediate-scale test unit is expected in 2010. EPRI will assist Air Products with the scale-up of the process and equipment and with the integration of ITM technology with advanced coal power systems. These efforts will focus closely on power industry–relevant design cases and on features and specific tests that will help advance the overall ITM program toward successful deployment in the power industry.

EPRI estimates the current U.S. power generation industry share of the oxygen market to be about 4%; if IGCC and oxyfuel combustion technologies are further developed as part of the
industry’s overall low-carbon power strategy, utility oxygen production needs could become the dominating market driver, accounting for more than 60% of the future market, or approximately 2 million t/d of oxygen by 2040.

The ITM project will help the industry understand the potential benefits and applications of the technology. “I’m here to find out about the dollars,” said one participant. “We’re in this to find out how much it will cost and how much we might save.”

“I’m here to see how this can be applied down the road,” said another participant. “We see as lot of potential value to being one of the first ones involved in development of this technology. It can help us make early decisions about where we invest our resources.”

For more information on this project, and how you can participate, contact Rob Steele, rsteele@epri.com, 704.595.2925