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A Golden Age for Gas Flow Measurement?



By Dr. Jesse Yoder President, Flow Research, Inc.

During the third week of March 2011, I attended Gastech 2011 in Amsterdam. This is the 25th edition of this important show, which is held annually and features many



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of the largest exploration and production companies in the world. This year's conference, sponsored by Shell, showcased ExxonMobil, Chevron, BP, Saudi Aramco, Adnoc, Petrobras, GazProm and many other oil and gas producers. Some of the engineering companies represented included Fluor, UOP, Framo Engineering and GL Noble. A number of flowmeter companies also exhibited, including KROHNE,

Endress+Hauser, GE, Siemens, ABB, RMG (part of Honeywell) and FMC Technologies.

One of the most important themes of the show was the importance of liquefied natural gas (LNG), and developing different methods for transporting, loading and offloading it. LNG is cooled to a temperature of about 160 degrees C, where it assumes a liquid form. This reduces its volume by about 600 times, and makes it much easier to transport. It is typically compressed onshore at an LNG facility, loaded onto tankers, and transported across the ocean to remote regions of the globe. Once it has reached its destination, it typically goes through a regasification process where it is converted back to natural gas and shipped by pipeline to its ultimate destination.

One new concept soon to be a reality is floating LNG (FLNG), which involves offshore production, storage and offloading of LNG in offshore locations where it is impractical or too expensive to build a pipeline to transfer natural gas onshore. Today, natural gas drilled from an offshore oil and gas well is typically sent by pipeline to an onshore location, where it can be transported to a distribution company. For example, Qatargas operates several platforms offshore from Doha, its capital. Natural gas is sent via pipeline laid underground in the Persian Gulf to Abu Dhabi, where it is received by Dolphin Energy. From here, Dolphin Energy distributes the gas through much of the United Arab Emirates (UAE) and Oman.

With FLNG, gas will be transferred directly from offshore platforms and ships, or from offshore underground gas reservoirs, in locations where it is impractical or too expensive to build a pipeline to transfer to natural gas onshore. Before being transferred onto the ship, the natural gas goes through a liquefication process.

FMC, Framo and other companies are separately developing ways to offload LNG from offshore platforms and ships. Framo is working with a company called Nexans to develop a tandem method for transferring LNG directly from one ship to another even in choppy seas. Using long, flexible Cryodyn pipes, LNG can be transferred in a tandem method from one ship to another. This process has been in development for 13 years, and involves cooperation among five companies: Framo, Nexans, Aker Pusnes, MIB and Seaflex. In a tandem process, the ships are nose-to-stern, rather than side-by-side. The problem with side-to-side transfer of LNG with standard, rigid pipes, is that waves can disrupt the process if the weather is turbulent or unstable.

FMC Technologies has also developed a process for tandem ship-to-ship transfer of LNG. FMC's tandem method also allows the transfer of natural gas to a ship directly from underground natural gas reservoirs. Once on the ship, it is liquefied and transferred to LNG storage tanks.

None of the systems developed by Framo or FMC have yet been deployed. We have learned that both Shell and Petrobras plan to announce the deployment of FLNG ships later this year. However, they have not yet announced which technology they plan to use. While both Shell and Petrobras are very active in offshore operations, Petrobras in particular has been making new oil and gas discoveries off the coast of Brazil. FLNG will give them greater flexibility in transferring the natural gas onshore from locations too remote for laying natural gas pipelines.

Implications for Flowmeter Companies

These developments in LNG transport are important for flowmeter companies because the amount of LNG and natural gas transferred both onshore and offshore - reservoir to ship, ship to ship, and ship to shore - has to be measured. LNG also has to be measured after it arrives onshore and undergoes re-gasification. Of course, natural gas arriving by pipeline from offshore locations also has to be measured once it arrives onshore and is transferred to a pipeline or distribution company.

Even though the price of natural gas has remained relatively stable while the price of oil per barrel has spiked to over \$100 per barrel, many experts predict an increase in natural gas prices over the next several years. They expect oil supplies to diminish and the demand for natural gas to increase as a cleaner-burning alternative to coal and oil, and as a bridge to renewable fuels.

As Khalid Bin Khalifa Al Thani, Qatargas CEO, said in his keynote address, "Though talk of a new golden age [for gas] may be going a little far, it seems to me that exciting times

are ahead for our industry." Exciting times for gas means exciting times for gas flow measurement, and a golden age for gas flow measurement may indeed be upon us.

Jesse Yoder, PhD, is president of Flow Research, Inc. (www.flowresearch.com), a company he founded in 1998. Belinda Burum of Flow Research with FMC's Articulated Tandem Offshore Loader. He has 22 years

of experience as an analyst and writer in process control. Dr. Yoder specializes in flowmeters and other field devices, including pressure, level and temperature products. He has written over

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100 market research studies in industrial automation and process control, and has published numerous journal articles.

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