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# Energy Applications Drive Flowmeter Technology Improvement

**A**s the demand for energy worldwide continues to rise due to population growth and development in major population centers, such as China and India, energy-based flow measurement grows more and more important. And while renewable energy sources figure to gain popularity and prominence going forward, oil & gas remain the key drivers of the energy market today. Custody-transfer measurement of natural gas, for example, is a flow application that is attracting a lot of attention at the moment.

A typical example of custody transfer in flow measurement occurs when a natural gas production company sells natural gas to a utility or gas distribution company. The point of transfer is at a metering station that includes highly accurate flowmeters and an appropriate amount of upstream and downstream piping. Other equipment may include flow computers, analytical equipment, and pressure and temperature transmitters.

## Differential-Pressure Flowmeters

Differential-pressure (DP) flowmeters were the first to be studied and approved for custody transfer of natural gas. The American Gas Association (AGA, [www.aga.org](http://www.aga.org)) began researching this topic in the late 1920s. AGA issued Report AGA-1 in 1930—a predecessor to AGA-3. AGA-1 dealt with the use of DP flowmeters with orifice plates for custody-transfer applications. AGA-3 was first issued in 1955 and reissued in 1992. It also dealt with the use of DP flowmeters for custody-transfer applications.

## Turbine Flowmeters

Turbine Flowmeters were the second type of flowmeter approved for use in custody transfer of natural gas. The AGA published its AGA-7 Report on the use of turbine flowmeters for custody transfer of natural gas in 1981. AGA-7 was reissued in 1986. Turbine meters have greater rangeability than DP flowmeters.

## Ultrasonic Flowmeters

The move to standardize the use of ultrasonic flowmeters for custody transfer began in Europe in the mid-1990s. In 1995, a group called Groupe Europeen de Recherche GaziSres (GERG, [www.gerg.info](http://www.gerg.info)) published Technical Monograph 8, which laid out the criteria for using ultrasonic flowmeters for custody transfer. This publication laid the groundwork for AGA-9, published subsequently in 1998.

Ultrasonic flowmeters have virtually no pressure drop, are highly accurate (in multipath form) and are available in large line sizes. Though it took some time for this standard to be widely accepted, it has created a surge in the use of ultrasonic flowmeters for custody transfer, especially for natural gas pipeline applications.

## Coriolis Flowmeters

The AGA published AGA-11 in 2003, a report on the use of Coriolis flowmeters for custody-transfer applications. Coriolis flowmeters have limited use in custody transfer for natural gas. They do best in sizes 2 inches and less. For years, only Rheonik offered Coriolis meters in line sizes above 6 inches. Now three more suppliers are offering Coriolis meters in line sizes from 8 inches to 14 inches. Many pipes for custody transfer of natural gas are in the 20-inch to 42-inch range, so turbine and ultrasonic meters still dominate there.

## Liquefied Natural Gas (LNG)

Liquefied Natural Gas (LNG) is created by turning natural gas into liquid form at cryogenic temperatures. As LNG, natural gas can be more easily transported in a more compact form. Countries that cannot easily be reached by pipeline or cannot produce enough natural gas for their own use rely on LNG. This is especially true of Asia-Pacific countries, including China, Japan, Malaysia, Indonesia, Southeast Asia, and India. Australia is a major producer and exporter of LNG.

## Considering Oil Flow

People sometimes speak as if there is only one type of oil, but in reality there are over 160 different types of oil traded around the world. Two of the most important types are West Texas Intermediate (WTI) and Brent crude oil. WTI is from the United States, and is refined in the Midwest and Gulf Coast regions. Brent is a mixture of 15 oils from the North Sea region. Oil is graded as “light” or “heavy” according to the American Petroleum Institute’s gravity index. Oil is graded as “sweet” or “sour” based on its sulfur content. The most desirable oil is “light, sweet crude.”

With oil resources worldwide growing more and more scarce and more and more expensive, custody-transfer measurement in this area will continue to be critical. Flowmeters well positioned for the custody transfer of oil include Coriolis, ultrasonic, DP flowmeters with primary elements, positive displacement, and turbine.

## Looking Toward the Future

With oil supplies flat to declining and demand increasing, oil prices will stay high and continue to rise in the long term. Hence companies will continue to be willing to pay high prices to measure oil flow accurately and reliably. Natural gas, on the other hand, will serve as a long-term bridge to renewable energy. As a result, natural gas flow measurement will be increasingly important in the near-to-mid term. LNG is also a bright spot in the future of gas and gas flow measurement. Demand for LNG will increase in Asia-Pacific and other regions, as abundant sources of natural gas find their way to energy-hungry international markets. **FC**

*Jesse Yoder is a guest “Viewpoint” columnist for this issue. Matt Migliore will return to this page in January 2013. Best wishes for a happy and healthy holiday season and a prosperous and productive new year.*