The World Market for Natural Gas and Gas Flow Measurement

Overviews of Core Study + Modules A through E

Amsterdam, The Netherlands
Photo by Flow Research

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The World Market for Natural Gas and Gas Flow Measurement

A Modular Approach to the Gas Flow Market

Core Study Published: June 2011

The World Market for Natural Gas and Gas Flow Measurement features a core gas flow measurement study, *The World Market for Gas Flow Measurement, 2nd Edition,* and five modules that can be ordered as add-on or standalone reports. Together they provide a comprehensive picture of the gas flow market from multiple perspectives. The study shows where growth is occurring (and where it is not) and where to expect the highest returns. The in-depth research in the modules complements and builds on the detailed results of the core study.

Multiple ways to show you the gas flow market

This modular study has multiple goals:

- Determine worldwide supplier market size for gas flow measurement in 2010 for each technology type
- Forecast market growth through 2015 for all nine flow technologies used in this market
- Identify the industries and applications where gas flow measurement is used and provide shipments by application and industry
- Identify market growth sectors
- Create company and country profiles of the main suppliers into the gas flow measurement market as well as the main gas providers throughout the world, with a special focus on the Mideast
- Analyze products for the main companies selling into the gas flow measurement market
- Provide product description and average selling prices in this market
- Offer strategies to manufacturers for selling into the gas flow measurement market
- Analyze the custody transfer market for natural gas
- Analyze the multiphase flowmeter markets for the oil and gas industry

We believe Flow Research has the perfect qualifications for doing this study. We have been following the gas flow market regularly since we published the first edition of our worldwide gas flow measurement study in September 2004. We provide periodic updates in our *Market Barometer* and *Energy Monitor* publications (www.worldflow.com). We have also done user interviews that show that the interest in gas flow measurement remains at a very high level. You can trust Flow Research to give you data and insights you can use today.

Nigeria LNG Limited booth at Gastech 2011

The World Market for Gas Flow Measurement, 2nd Edition
Core Study

Gas is hotter than ever, and that means gas flow measurement is also on the rise: Gas flow measurement and its associated revenues have grown significantly during the last few years.

Gas, a major source of energy for hundreds of years, is now an even more valued commodity that offers a cleaner and more economical alternative to "liquid gold." New technology is making recovery and delivery of natural gas more feasible than ever before, even from subsea wells. Natural gas reserves in North America and elsewhere are making it possible for Western countries to be less dependent on foreign suppliers. In the U.S., for instance, 87 percent of the natural gas consumed in 2009 was produced domestically.

Oman Gas Company
All photos by Flow Research

In addition to the expansion in demand for natural gas and related energy products, market drivers include significant new capital project growth in large regional economies such as India, China, and the Mideast.

Flow Research believes this is an optimal time to quantify the growth in the gas flow market, and to take another in-depth look at an expanding market. **That is why we began researching this study more than two years ago**.

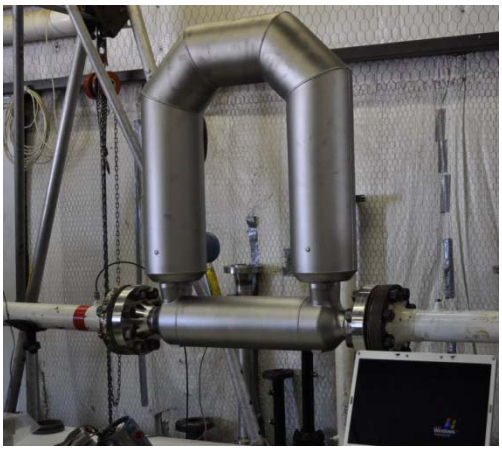
The Core Study, ***The World Market for Gas Flow Measurement, 2nd Edition*** determines the size of the gas flow measurement market in 2010. It shows where growth is occurring (and where it is not) and where to expect the highest returns. The Core Study has multiple goals:

- Determine worldwide market size for gas flow measurement in 2010
- Determine worldwide market shares for the gas flow measurement market in 2010
- Forecast market growth through 2015 for all nine flow technologies used in this market
- Identify market growth sectors
- Create company profiles of the main suppliers into the gas flow measurement market
- Analyze products for the main companies selling into the gas flow measurement market
- Provide product descriptions and average selling prices in this market
- Analyze factors contributing to and limiting growth

The Core Study determines the market size of the gas flow measurement market in 2010, with forecasts to 2015 for each technology type. It also determines worldwide market shares for the gas flow measurement market in 2010.

The study covers the following technologies used in gas flow:

- Coriolis
- Ultrasonic
- Vortex
- Thermal
- Differential Pressure
- Primary Elements
- Positive Displacement
- Turbine
- Variable Area



The study provides the following geographic breakouts for each of the flowmeter technologies:

- Worldwide
- North America
- Europe, including Eastern Europe and FSU
- Mideast/Africa
- Japan
- China
- Rest of Asia
- Latin America

Belinda Burum of Flow Research with a model of FMC's Articulated Tandem Offshore Loader at Gastech 2011 in Amsterdam

Trips to the Mideast and Europe and within U.S. spark the gas flow study and regional modules

There are many ways to do market research: by phone, by fax, by email, through mail surveys, going to conferences, and using secondary sources. These are all valid ways to conduct market research, and Flow Research uses them all. But the most effective way to gather market research data is through onsite, in-person interviews, using a pre-written questionnaire. This is the approach we took to studying the flowmeter market in the Mideast. And that is why we are publishing a special module that focuses on Mideast/Africa. But in reality, it was also the genesis of the whole gas flow measurement project.

Our decision to create a Core Study plus five modules reflects the amount of data we have accumulated on the gas flowmeter market. We thought it was especially important to do Module A on natural gas producers worldwide, along with a regional analysis of the flowmeter market. We decided to do Module B on Mideast/Africa to incorporate the knowledge we gained form in-person interviews in that region. And Module C on custody transfer, Module D on strategies, applications, and industries, and Module E on multiphase are equally critical aspects of the gas flow market.

15 onsite interviews in the Mideast

In 2009, Flow Research made three trips to companies in the Mideast, doing 15 interviews with companies in Saudi Arabia, the United Arab Emirates (UAE), Qatar, and Oman – all major oil and gas producers in the region. These large companies supply energy to vast areas in the Mideast and in some cases to millions of people. They rely on various types of flowmeters for wellhead measurement, for custody transfer, for allocation metering, for flaring, and for many other purposes.

Our extensive interviews with the companies in the Mideast (see the Module B section in this Overview for more information on the interviews) convinced us of the need to not only understand the flowmeter market, but to better understand the companies that buy and use flowmeters, especially those that buy and use them in large quantities. **These are the companies that drive flowmeter market trends by their purchasing decisions. If these end-users prefer flowmeters with certain characteristics, they will order them in large quantities, helping to market trends**. Flowmeter suppliers need to know what these end-users are

What's in this for my company?

- Identify emerging applications
- Pinpoint growth areas
- Understand world and regional markets
- Get to know your competition – what other suppliers manufacture, where, and for whom
- Use the best information to make the best decisions

thinking if they want to meet their needs. And Flow Research has done the face-to-face interviews to find out this critical information.

Next stops: London, Amsterdam, and California

In addition to gathering detailed data on the needs and purchasing decisions of companies in the Mideast, our purpose was also to gather data for a broader worldwide study on gasflow measurement. After completing our interviews in the Mideast, we contacted all known gas flowmeter suppliers worldwide to determine market size and market shares for the nine gas flow technologies.

However, our in-person data gathering didn't stop there. We made several visits to London and Amsterdam, where we interviewed key suppliers and visited a flow calibration facility. We also were able to visit with an engineering and construction firm in Belgium. Europe is a major center for flowmeter suppliers, and a major producer of natural gas.

After visiting Europe, we went to California to visit six of the leading thermal flowmeter suppliers there. In addition to key interviews, we took factory tours that gave us a better understanding of the thermal flowmeter market manufacturers. Thermal flowmeters are almost exclusively used for gas flow measurement.

In 2011, we continued visits related to the gasflow study. In March 2011, we attended the GasTech 2011 show in Amsterdam. This show was attended by oil and natural gas producers from around the world, and featured the new concept of floating liquid natural gas (FLNG). Here we were able to interview natural gas producers such as Shell, ExxonMobil, Chevron, and BP, along with engineering companies such as Fluor. Natural gas vehicles (NGVs) and compressed natural gas (CNG) were featured prominently at this show.

LNG pipe

In May 2011, we attended the Measurement and Control Automation Association (MCAA) Industry Forum, which prominently features key decision makers from both the supplier and end-user communities. Later that month, we attended the annual meeting of the American Gas Association (AGA) in Nashville, Tennessee. This show featured some important and recent papers on ultrasonic and turbine flowmeters, and on custody transfer. Later visits this summer included two trips to Boulder, Colorado where we were able to interview a number of key suppliers of gas flow measurement. Other upcoming trips include a supplier visit to Minneapolis, Minnesota and a visit to the North Sea Flow Workshop in Norway towards the end of October.

Key Issues Addressed in The World Market for Natural Gas and Gas Flow Measurement

The core study and its modules address the following key issues:

- What is the technological state of the market today?
- Which applications are growing – and which are not?
- What regions of the world hold the greatest growth prospects – and why?
- Are there new competing technologies to the traditional devices – and what are they?
- What is the current breakdown in use between insertion and inline device types?
- Are there new gas flow measurement standards that must be understood?
- What industries represent the greatest growth potential – and why?
- What are the features that end-users are looking for in gas flow measurement?

CEESI flow calibration facility, Garner, Iowa
Photo by Flow Research

The World Market for Oil and Oil Flow Measurement

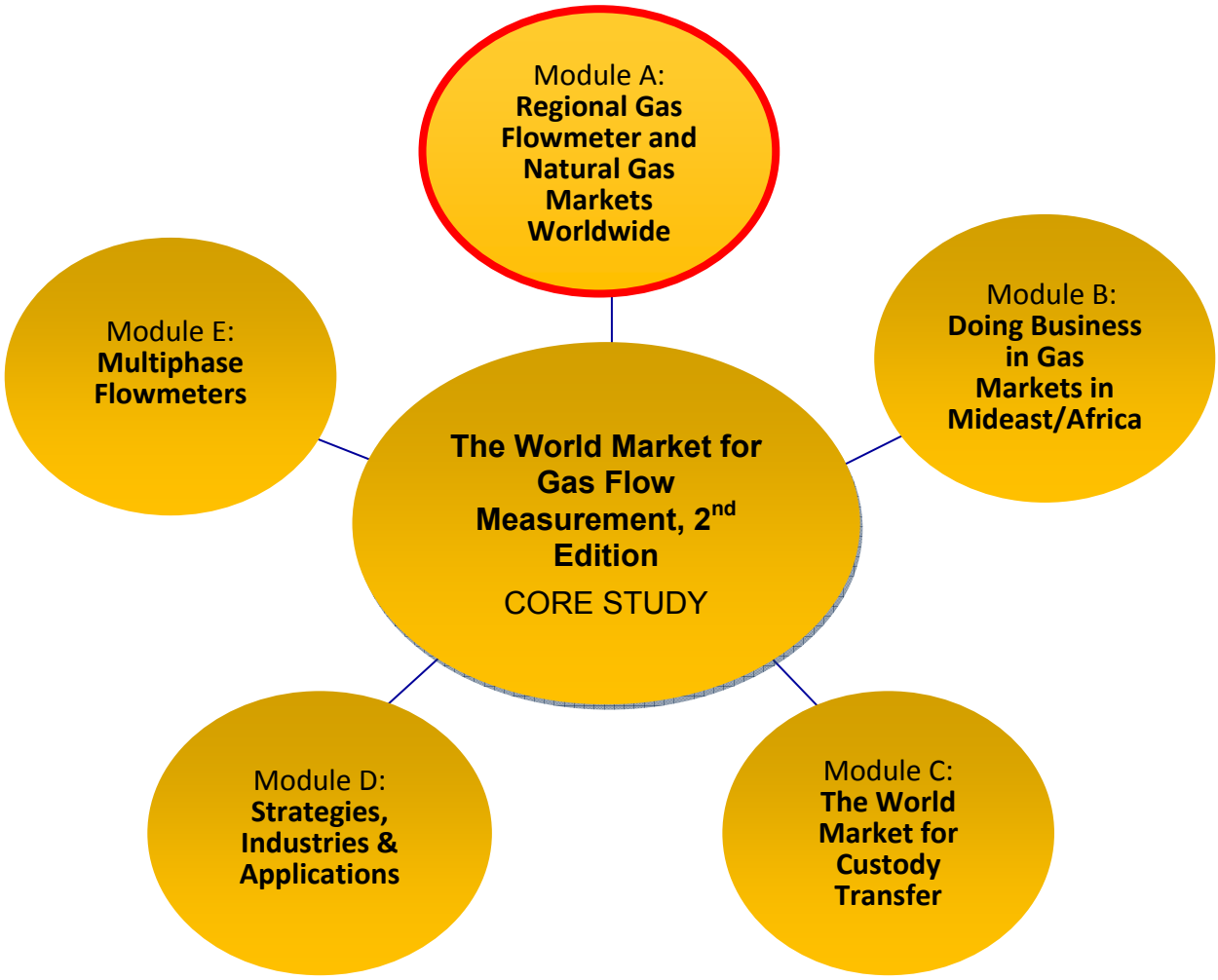
Upcoming in Q2 & Q3 2012

Founding Sponsorships

We are offering the opportunity for companies to become Founding Sponsors of this study. Benefits of being a Founding Sponsor include being able to participate in determining study scope and direction, being sent regular updates on study progress, and receiving a favorable discount pricing package. The Founding Sponsor program is explained for your consideration later in this document.

In the meantime, please review the segmentation and let us know if there is any additional segmentation you would like to see, or if you would like to propose changes to the existing segmentation. Thank you in advance for your input, and we hope to hear from you!

Module A
Analysis of the Regional Gas Flowmeter and Natural Gas Markets



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Module A

An Analysis of the Regional Gas Flowmeter and Natural Gas Markets

Even we didn't know how exciting and comprehensive this study would become when we started researching the gas market two years ago following trips to the Mideast. Nor did we realize how hot the natural gas market itself would become, especially in some regions. Or how hot some of the regions would become!

But now we know. And you can too.

Flow Research is proud to offer you an in-depth look at the natural gas markets around the world, including flowmeter usage in those regions and countries, plus analysis of what all of it means to control and instrumentation suppliers who sell into the gas industry.

We think you'll be amazed at the wealth of information we've pulled together for you – all in one package, at your fingertips.

Module A: An Analysis of the Regional Gas Flowmeter and Natural Gas Markets is packed with 854 pages of information on flowmeter usage and gas measurement around the world:

- Worldwide, regional, and country-by-country data on flowmeters and gas markets
- Detailed information on 7 regions, 26 countries, and 17 gas suppliers, plus data on all countries participating in the natural gas market
- Flowmeter growth factors, flowmeter market size and forecasts
- Projects, pipelines, consumption, reserves, imports, and exports

Our goal is to help you understand – in terms of regions and countries – where natural gas is located and how it is used. We want to put you ahead of the curve in the natural gas market so you can enhance your instrumentation sales and marketing efforts around the world.

Facts mean power

Did you know:

- Algeria is the 4th-largest gas supplier to the EU after Russia, Norway, and the Netherlands
- Europe is the largest producer of natural gas of any region in the world
- China produces almost as much natural gas as it consumes, and natural gas usage is increasing rapidly
- Latin America has vast gas resources and is producing more than it consumes as a region

Facts like these – and we've got plenty more for you – mean better decisions down the road and money in your company's coffer.

If you had a staff person working for months, you'd have a hard time collecting all that information and presenting it all in one, cohesive place.

We'll tell you:

- How much produced natural gas being exported and imported, and from where to where
- How much natural gas is being consumed, and where
- Which countries and regions are the top reserve holders, consumers, producers, importers
- Whether gas comes into and out of certain countries by pipeline or by LNG
- Which flowmeter types are being used where
- Which gas flowmeter markets are the fastest growing
- Regional trends underlying growth in the various flowmeter technologies

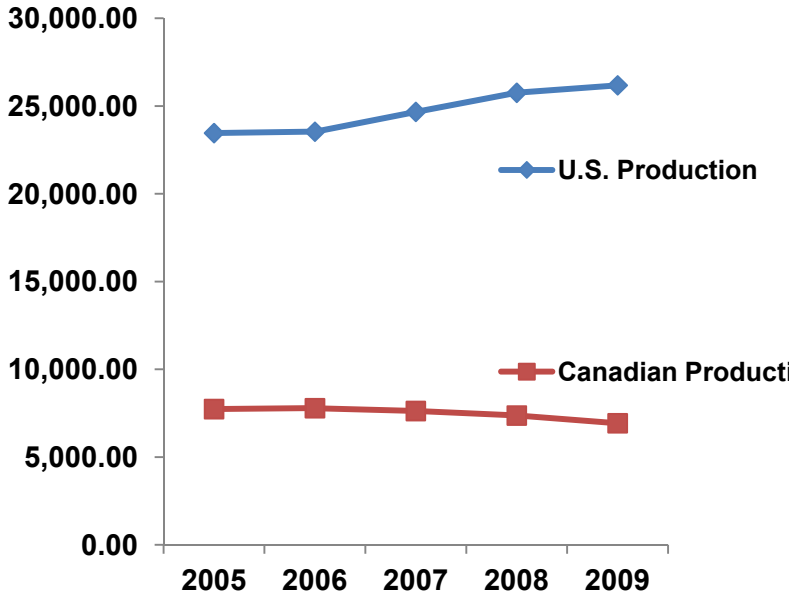
The World Market for Natural Gas and Gas Flow Measurement

Module A follows our core study, **The World Market for Gas Flow Measurement, 2nd Edition,** which examines gas flowmeters at the worldwide level, but does not drill down into regional and country breakouts or cover the natural gas market itself.

Our companion module, **Module B: A Strategic Approach to Doing Business in the Gas Flowmeter and Natural Gas Markets in Mideast/Africa**, takes an even closer look at 16 countries in the Mideast/Africa region, with regional and country-by-country data on flowmeter usage and the gas markets there.

Modules C, D, and E cover the worldwide market for custody transfer; strategies, industries, and applications; and multiphase flowmeters.

Gross Natural Gas Production (Billion Cubic Feet) in North America



Key topics addressed in Module A

Natural gas markets by worldwide, region, and country:

- The amount of dry natural gas being produced, exported, imported, and consumed by country, region, and worldwide from 2005 to 2009 (the last year data was available for all countries)
- Natural gas reserves from 2005 to 2009 (the last year data was available for all countries)

Gas flowmeter data by type and region:

- The gas flowmeter market by region and country, including current market size and yearly forecasts through 2015
- Trends in gas flow measurement

Gas market by region and country: analysis and data on production, reserves, imports, exports, consumption, leading companies, LNG strategies, major pipelines, projects, strengths, and weaknesses

Major producers of natural gas in the various regions: company history, organization, and business interests, including pipelines and field reserves, projects, partnerships, and affiliations

Gas technology overview, including definitions and terminology.

Gas Flowmeter Market

Module A covers the market size and forecast through 2015 for the ***nine flow technologies*** used in the gas industry in ***seven regions***:

- Coriolis
- Ultrasonic
- Vortex
- Thermal
- Differential Pressure
- Primary Elements
- Positive Displacement
- Turbine
- Variable Area

- North America
- Europe
- Mideast/Africa
- Japan
- China
- Rest of Asia
- Latin America

The flowmeter data in this study provides a guide to which gas flowmeter markets are the fastest growing and which flowmeter types are being used in which region. In fact, the flowmeter data is broader than natural gas measurement, including industrial gases, greenhouse gases, and other gases.

The Nuts and Bolts of Module A

This module consists of four opening chapters, Executive Summary and Worldwide Oveview. The seven regional chapters that follow include data on a the gas producing countries in the region and profile 26 leading countries and 17 important gas companies in those regions. These chapters present information on the gas market and gas flowmeter data by the overall region as well as by the leading countries in that region.

Book One: Executive Summary and Worldwide View

Chapter One: Executive Summary includes an overview of the gas market by region.

Chapter Two: Scope and Method

Chapter Three: Overview of Gasflow includes a discussion of production and exploration, flow measurement in natural gas pipelines, and a natural gas glossary.

Chapter Four: Worldwide View includes overview data and worldwide analysis by region of the gas flowmeter market and the natural gas market, including technically recoverable shale gas resources.

The overall structure for **Chapters Five** through **Eleven** is as follows:

I. Natural Gas Data (by region, including all countries participating in the natural gas market)

II. The Gas Flowmeter Market (by region)
- Growth Factors
- Market Size and Forecasts for Flowmeters

III. Gas Market (by country)
- Country Overviews of leading countries in the region
- Country Natural Gas Data of leading countries
- Country Natural Gas Producers (profiles of leading producers)

The natural gas data, gas flowmeter market, and gas market information in **Chapters Five** through **Eleven** focus on the following regions, countries, and companies:

Book Two: The Americas

Chapter Five: North America

- United States: Chevron, ConocoPhillips, ExxonMobil
- Canada

Chapter Eleven: Latin America

- Mexico: Petroleas Mexicanos (PEMEX)
- Caribbean (Trinidad and Tobago)

Adventures interviewing companies in the Mideast

"Things are different in the Mideast than in the US. The oil and gas facilities and the manufacturing plants are guarded by the military and it is not so easy to get inside. In one case, near Abu Dhabi, our passes had not been sent down to the guard station, so they told us to 'Get lost.' Then we were followed by a military jeep while we circled around, waiting for our passes. Finally, we saw our passes arrive. Once we were inside, though, the people we very nice. Fortunately, I had a local company in Abu Dhabi setting up the appointments and taking me around."

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

- South America
  - Argentina
  - Brazil: Petróleo Brasileiro S.A. (Petrobras)
  - Colombia
  - Ecuador
  - Peru
  - Venezuela: Petróleos de Venezuela S.A. (PDVSA)

Book Three: Europe and Mideast/Africa

Chapter Six: Europe

- France
- Netherlands: Royal Dutch Shell
- Norway: Statoil
- Russia: Gazprom
- United Kingdom: BP

Chapter Seven: Mideast/Africa

- Iran: National Iranian Oil Company (NIOC)
- Saudi Arabia: Saudi Aramco
- Algeria: Sonatrach

Book Four: Asia

Chapter Eight: Japan

Chapter Nine: China

- China National Petroleum Corporation
- PetroChina

Chapter Ten: Rest of Asia

- Australia
- India
- Indonesia: Pertamina
- Malaysia: Petronas
- South Korea
- Thailand

You need this study if you . . .

- Are involved in gas flow measurement
- Sell into the natural gas market
- Provide instrumentation or control products for natural gas production, transportation, or distribution
- Want to understand where to devote your marketing and sales efforts around the globe

How it all began

The whole idea for this study started with three visits I made to the Mideast in the second half of 2009. My goal there was to interview oil and natural gas producers to understand what types of flowmeters they were using, what flowmeter types they were planning to buy, and what projects were upcoming.

I completed 15 interviews in Saudi Arabia, the UAE, Oman, and Qatar. During these interviews I realized how important it is to understand the natural gas producers in order to really grasp the gas flowmeter market. These are the companies that set the trends with their buying decisions and their massive projects.

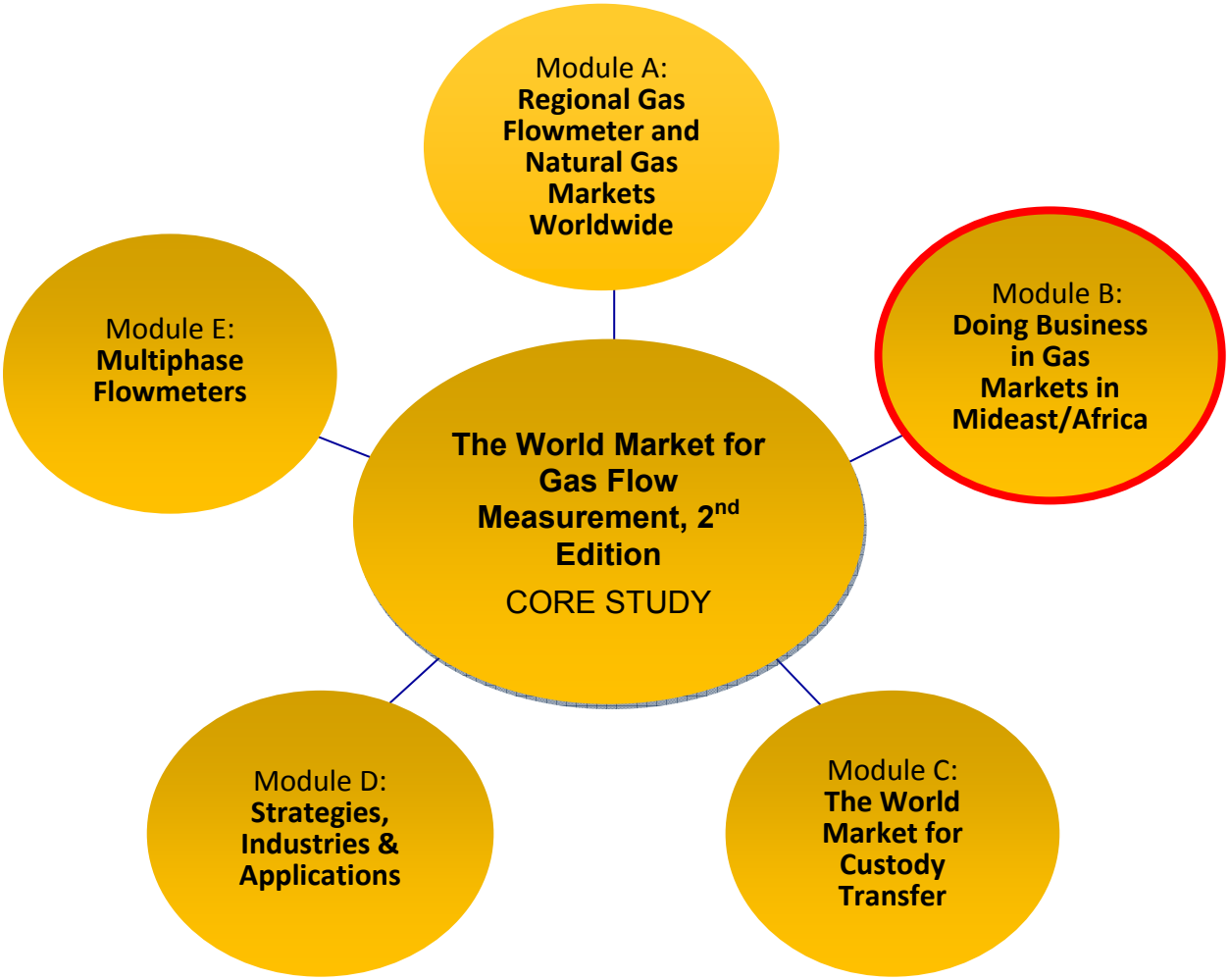
Generalize this insight to the whole world, and you have Module A. Module B focuses specifically on Mideast/Africa and shares business strategies I learned from my trip.

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

Module B

A Strategic Approach to Doing Business in Mideast/Africa

Overview



Publication Date: November 2011

www.MidEastNatGas.com

Module B

A Strategic Approach to Doing Business in Mideast/Africa

Flow Research is proud to present a new study on natural gas producers in Mideast/Africa. ***Module B: A Strategic Approach to Doing Business in Mideast/Africa***, is one in a series of studies, ***The World Market for Natural Gas and Gas Flow Measurement***, which examines the gas flowmeter market, suppliers, producers, applications, industries, custody transfer, and multiphase flowmeters. Module B is oriented towards instrumentation companies that want to increase their sales to the Mideast.

This module is based on extensive research – including onsite interviews with 15 natural gas producers in the United Arab Emirates (UAE), Saudi Arabia, Qatar, and Oman – to better understand gas flow measurement trends in this region. We asked companies what kinds of flowmeters they are using and what their expectations are for the future. The result provides a very clear picture of flowmeter usage in the Mideast. The module includes:

- Flowmeter usage in the Mideast and Africa
- Natural gas production, imports, exports, consumption, and reserves by country
- Relationships among the companies
- Flowmeter usage and expectations for the future
- Strategies for marketing to producers
- Country summaries and company profiles of the largest producers

Rationale for Study

Gas flow measurement applications and their associated revenues have grown significantly during the last few years. A major driver of this growth worldwide has been the expansion in demand for natural gas and related energy products. There has also been significant new capital projects growth in the Mideast during this time as well. Given the recent volatility of the major oil and gas countries in the Mideast and Africa, we believe that this is an optimal time to quantify the growth in this market, and to take another in-depth look at an expanding market.

Gas and Flowmeter Data by Regions and Countries

Module B provides significant data on flow meter usage and the gas market. The study highlights gas developments by region, country, and suppliers. An overview chapter features comparison data on the largest suppliers. The study also provides country-by-country data:

- Gross natural gas production
- Proved reserves of natural gas
- Imports of dry natural gas
- Exports of dry natural gas
- Dry natural gas consumption

Module B covers the market size and forecast through 2015 for the nine flow technologies used in the gas industry:

- Coriolis
- Ultrasonic
- Vortex
- Thermal
- Differential Pressure
- Primary Elements
- Positive Displacement
- Turbine
- Variable Area

To the Mideast and back – *three times* – to gather detailed data on the needs and purchasing decisions of major producers

To bring this study to you, Flow Research made three trips to major oil and gas producers in the Mideast in 2009, doing 15 interviews at companies in Saudi Arabia, the United Arab Emirates (UAE), Qatar, and Oman.

Many of the companies we visited have thousands of flowmeters installed, and regularly purchase many new and replacement meters. These are the large companies that supply energy to vast areas in the Mideast and in some cases to millions of people. They rely on different types of flowmeters for wellhead measurement, for custody transfer, for allocation metering, for flaring, and for many other purposes.

On each visit, we used a lengthy questionnaire, and met in some cases with as many as ten people from a single company. Our questionnaire was designed to find out

- What types of flowmeters these companies were using and how many of each type (installed base)
- What types of flowmeters they were purchasing, and what types they would be purchasing in the future.
- Ongoing and future projects that require flowmeters, and what types
- Which flowmeter types were displacing other types
- What types of flowmeters are used for custody transfer
- Which flowmeter types are used for gas applications
- We also asked specifically about ongoing and future projects that would require the use of flowmeters, and what types.

We share this wealth of knowledge with you in Module B.

Our analysts also share regional trends underlying growth in the various technologies.

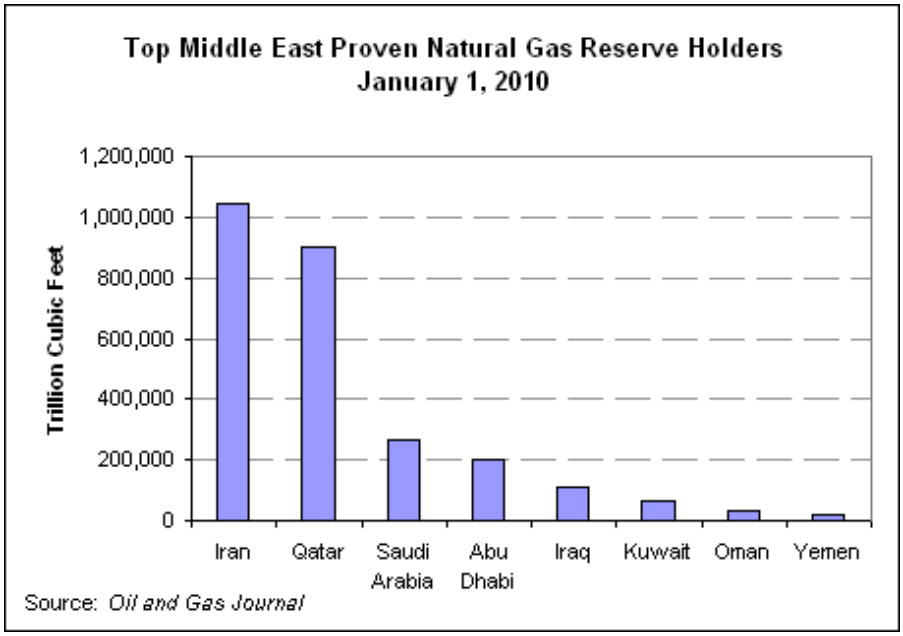
Chapters on the regions contain profiles on major gas-producing countries and companies:

Mideast

- Bahrain
- Iran: National Iranian Oil Company (NIOC)
- Iraq: Republic of Iraq, Ministry of Oil
- Kuwait: Kuwait Petroleum Corporation (KPC)
- Oman
  - Petroleum Development Oman (PDO)
  - Oman Oil Company: Oman Gas Company (OGC)
  - Oman Liquefied Natural Gas (Oman LNG)
- Qatar: Qatar Petroleum
  - Qatargas Operating Company Limited
  - RasGas Company Limited
- Saudi Arabia
  - Saudi Aramco
  - Saudi Basic Industries Corporation (SABIC): Arabian Petrochemical Company Complex (PETROKEMYA), National Industrial Gas Co. (GAS), Ibn Sahr, Saudi Arabia Petrochemical Company (SADAF)
  - Chevron Phillips Chemical Company LLC (CPChem)
- Syria
- Turkey
- United Arab Emirates
  - Abu Dhabi National Oil Company (ADNOC)
    - Abu Dhabi Gas Industries Ltd. (GASCO)
  - Dolphin Energy Limited
- Yemen

Africa

- Algeria: Sonatrach
- Angola
- Egypt: Egyptian Natural Gas Holding Company (EGAS)
- Libya: National Oil Company (NOC)
- Nigeria: Nigerian National Petroleum Corp. (NNPC)

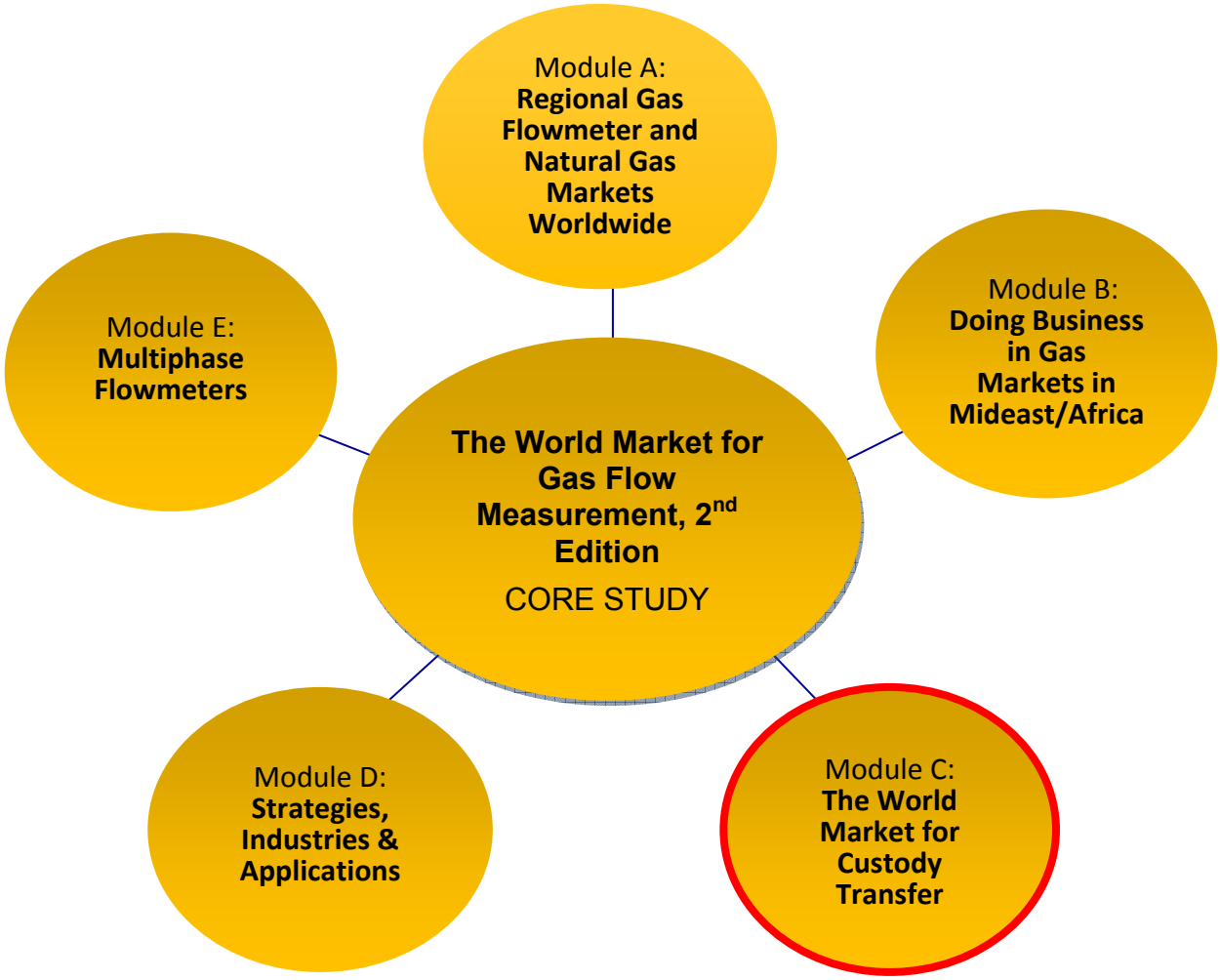


Key topics addressed in Module B

- Natural gas production, imports, exports, consumption, and reserves by country & region
- Flowmeter data by type and region
- Company and country/regional profiles of the large producers
- Relationships among the companies
- Strategies for marketing to producers
- Trends in flow measurement relative to these large companies

Module C

The World Market for Custody Transfer of Natural Gas



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Module C:
The World Market for Custody Transfer of Natural Gas

Flow Research is proud to present a new study on the worldwide custody transfer of natural gas, ***The World Market for Custody Transfer of Natural Gas.*** This study is Module C in a series of studies, ***The World Market for Natural Gas and Gas Flow Measurement,*** which examine the gas flowmeter market, suppliers, producers, applications, industries, custody transfer, and multiphase flowmeters. Module C has achieved multiple purposes:

- Determines worldwide market size and market shares for custody transfer of natural gas in 2010
- Forecasts market growth for all types of custody transfer flowmeters through 2015
- Identifies the industries and applications where custody transfer flowmeters are used, as well as market growth sectors
- Analyzes products for the main companies selling into the custody transfer flowmeter market
- Provides strategies to manufacturers for selling into this flowmeter market
- Profiles the main suppliers of custody transfer flowmeters

Rationale for Study

Flow Research published the 3rd edition of our worldwide study of all flowmeter types in October 2010. We have been reporting on all fourteen flowmeter technologies for more than a decade in our comprehensive studies, in consultation with a wide spectrum of flowmeter manufacturers, by way of our two quarterly publications (*Market Barometer* and *Energy Monitor*), and through our regular contributions to industry journals such as *Flow Control* and *Processing* magazines. We are entirely focused on the business of industrial process flow, pressure, temperature, analytical instrumentation.

Consumption of Natural Gas Rising Fast

The demand for natural gas is increasing substantially. According to the US Department of Energy's Energy Information Administration (EIA), consumption of natural gas is expected to grow significantly through 2016. Custody transfer is obviously one of the most integral steps in the supplier to consumer process chain. Natural gas changes hands, or ownership, at a number of points between the producer and the end-user. These transfers occur at custody transfer points, and are tightly regulated by standards groups such as the American Gas Association (AGA). Other geographic regions have their own regulatory bodies. There are several flowmeter technologies in this market: some are well-established, whereas others are emerging.

New-technology flowmeters such as Coriolis and ultrasonic offer increased reliability, reduced pressure drop, and high accuracy. At the same time, suppliers are making improvements to the traditional technology meters, improving their performance. Turbine flowmeters are being made with stronger bearings, offering longer life. And improvements in pressure transmitters mean greater stability and accuracy when they are used to make pressure or flow measurements.

Optimal time to quantify the custody transfer flowmeter market

We believe that this is an optimal time to quantify the existing size and future growth in the custody transfer flowmeter market, and to take an in-depth look at the new technologies, manufacturers, and applications in what promises to be one of the fastest growing markets in the worldwide flowmeter industry.

Module C contains market data on Coriolis, DP, turbine, and ultrasonic flowmeters for custody transfer of natural gas, compares their use, and projects the growth in these technologies through 2015. What's included:

- Market data on Coriolis, ultrasonic, turbine, and differential pressure (DP) flowmeters used for custody transfer applications
- Market shares worldwide and by geographic region for each flowmeter type
- Shipments by geographic region, industry and application

Company Profiles

Complete company profiles on the leading custody transfer flowmeter suppliers are included. The following is a partial list of the companies to be profiled in this study:

- ABB
- Canalta Controls
- Elster-Instromet
- Emerson Process Management (Daniel, Micro Motion, Rosemount)
- Endress+Hauser
- Honeywell
- FMC Technologies
- KROHNE
- Sick
- Siemens
- The Measurement Company

- Comparison of flowmeter types used in custody transfer
- Flowmeter growth projections through 2015
- Strategies for selling into this market

In conducting this study, we contacted all known manufacturers of custody transfer flowmeters worldwide. Flow Research has already identified recent entrants into this growing market and plans to report detailed information about each company. In so doing, we plan to assemble a comprehensive picture of the total custody transfer flowmeter market.

We asked suppliers to provide detailed information about geographic segmentation, industries sold into, types of flowmeters sold, and many other product segments. As a result, the study will identify where growth is occurring in the market, as well as the underlying factors for that growth. Our already completed end-user survey provides additional perspectives on this market.

Publication Date

This study was published in July 2011. It is part of two clusters of studies on oil and gas measurement. The oil studies are described on page six.

Proposed Segmentation

The segmentation for this study is as follows:

Geographic Segmentation

- North America (United States and Canada)
- Europe (including Central Europe and Former Soviet Union)
- Mideast/Africa
- Japan
- China
- Asia without Japan/China
- Latin America (Mexico, Central America, and South America)

Flow Technologies by Type

- Coriolis
- Ultrasonic
- Turbine
- Differential Pressure (DP)
- Primary Elements

Flowmeters by Sales Channel

- Direct Sales
- Independent Representatives
- Distributors
- E-Business

Flowmeters by Customer Type

- End-Users
- OEMs
- Systems Integrators
- Engineers/Consultants

Strategies for Success

- Discussion of market forces at work
- Technical developments
- Strategic action perspectives
- Forming alliances to enhance product offerings

Also included:

- Average pricing data
- Obstacles to growth
- Reasons behind custody transfer metering success
- Quantified growth rates worldwide and by region

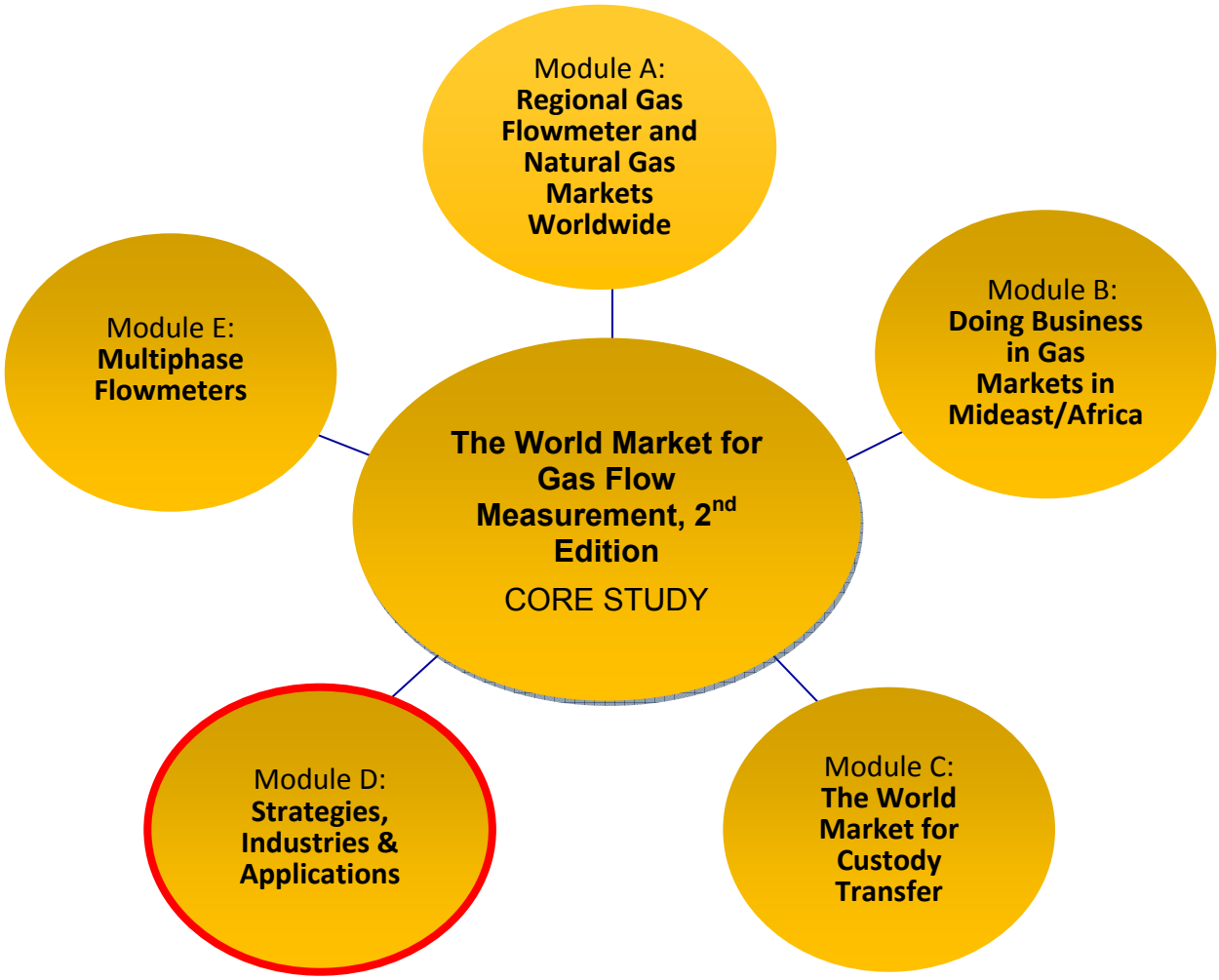
Market Size by Geographic Region

This study provides market size by the following geographic regions:

- Worldwide
- North America (United States and Canada)
- Europe (including Central Europe and Former Soviet Union)
- Mideast/Africa
- Japan
- China
- Rest of Asia
- Latin America (Mexico, Central America, and South America)

Module D
Strategies, Industries, & Applications

Overview



Date Published: July 2011

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Module D
Strategies, Industries, & Applications

Flow Research is proud to present a new study on natural gas producers worldwide. ***Module D, Strategies, Industries, & Applications***, is one study in a series of studies, ***The World Market for Natural Gas and Gas Flow Measurement***, which examines the gas flowmeter market**,** suppliers, producers, applications, industries, custody transfer, and multiphase flowmeters. This module provides strategies for companies already in the flowmeter market as well as for those considering joining. Module D has achieved multiple purposes:

- Provide a world view of the market and identify future growth areas
- Discuss recent political developments and how they may affect market forces in the near future
- Report on product lines and shipments worldwide for Coriolis, ultrasonic, vortex, thermal, differential pressure, primary elements, positive displacement, turbine, and variable area flowmeters
- Discuss distribution channels and customer types
- Provide forecasted growth rates by both application and industry
- Provide realistic strategies for success for those entering or already in the flowmeter market

Rationale for Study

Gas flow measurement applications and their associated revenues have grown significantly during the last few years. A major driver of this growth worldwide has been the expansion in demand for natural gas and related energy products. There has also been significant new capital projects growth in large regional economies such as India, China, and the Mideast during this time as well. Given the recent volatility of the major oil and gas countries in the Mideast and Africa, we believe that this is an optimal time to quantify the growth in this market, and to take another in-depth look at an expanding market.

Key topics addressed in Module D

- Tactical and strategic recommendations for suppliers in each market segment
- Discussion of market forces at work
- Best areas for future growth
- Strategic action perspectives
- Real world success stories

Module D provides shipments by application and industry for Coriolis, ultrasonic, vortex, thermal, differential pressure, primary elements, positive displacement, turbine, and variable area flowmeters, as well as essential information on:

- Application areas
- Sales by distribution channel
- Gas measurement sales by customer type
- Tactical and strategic recommendations for suppliers in each market

Breakouts by industry and application
For each technology, the module provides shipments by industry and application for the following geographic breakouts:

- Worldwide
- North America
- Europe (including Central Europe and the FSU)
- Mideast/Africa
- Japan
- China
- Rest of Asia
- Latin America

Data includes dollars and percentages of shipments by flowmeter type in 2010 and forecasted for 2015 in the following industries:

- Oil & Gas
- Refining
- Chemical
- Food & Beverage
- Pharmaceutical
- Pulp & Paper
- Metals & Mining
- Power
- Water/Wastewater
- District Energy
- Other

Application areas:

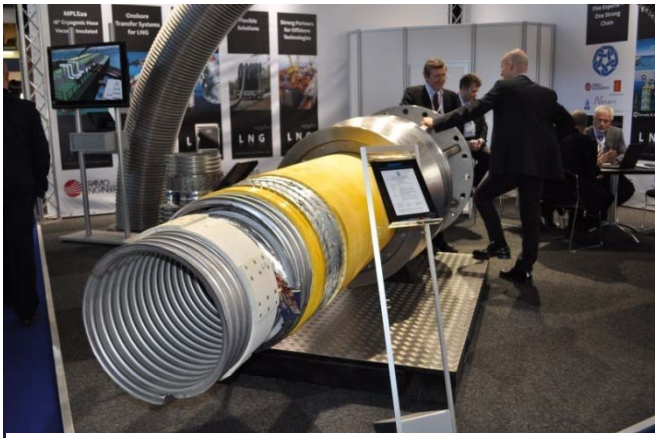
- Custody transfer of natural gas
- Non-custody transfer of natural gas
- Process gas measurement
- Liquefied natural gas (LNG)
- Compressed natural gas (CNG)
- Utility applications
- Stack and flare gas
- Other

Also included:
Sales by distribution channel:

- Direct Sales
- Independent Representatives
- Distributors
- E-Business

Gas measurement sales by customer type:

- End-users
- OEMs
- Systems integrators
- Engineering and consulting firms



Pipe for LNG transfer
Photo by Flow Research

Applications by Gas Flowmeter Type

This study segments applications differently for each type of gas flowmeter. The following are the applications included for each type of flowmeter.

New-Technology Flowmeter Applications

Coriolis

- Custody Transfer of Natural Gas (CTNG)
- Custody Transfer of Industrial Gases
- Compressed Natural Gas (CNG)
- Other

Ultrasonic

- Custody Transfer of Natural Gas (CTNG)
- Process Gas Measurement
- Flare/Stack Gas
- Other

Vortex

- Gas
- Liquid
- Steam

Thermal

- Continuous Emissions Monitoring (CEM)
- Flare Gas/Flue Gas
- Landfill Gas Recovery
- Biogas Recovery
- Biomass Fermentation and Recovery
- Coal Mine Methane Recovery
- Boiler Inlet
- Wastewater Treatment
- Compressed Air
- Natural Gas Submetering

Traditional Tech Flowmeter Applications

Differential Pressure (DP) Transmitters and Primary Elements

- Liquid
- Gas
- Steam
- Air

Positive Displacement

- Utility/Billing
- Other

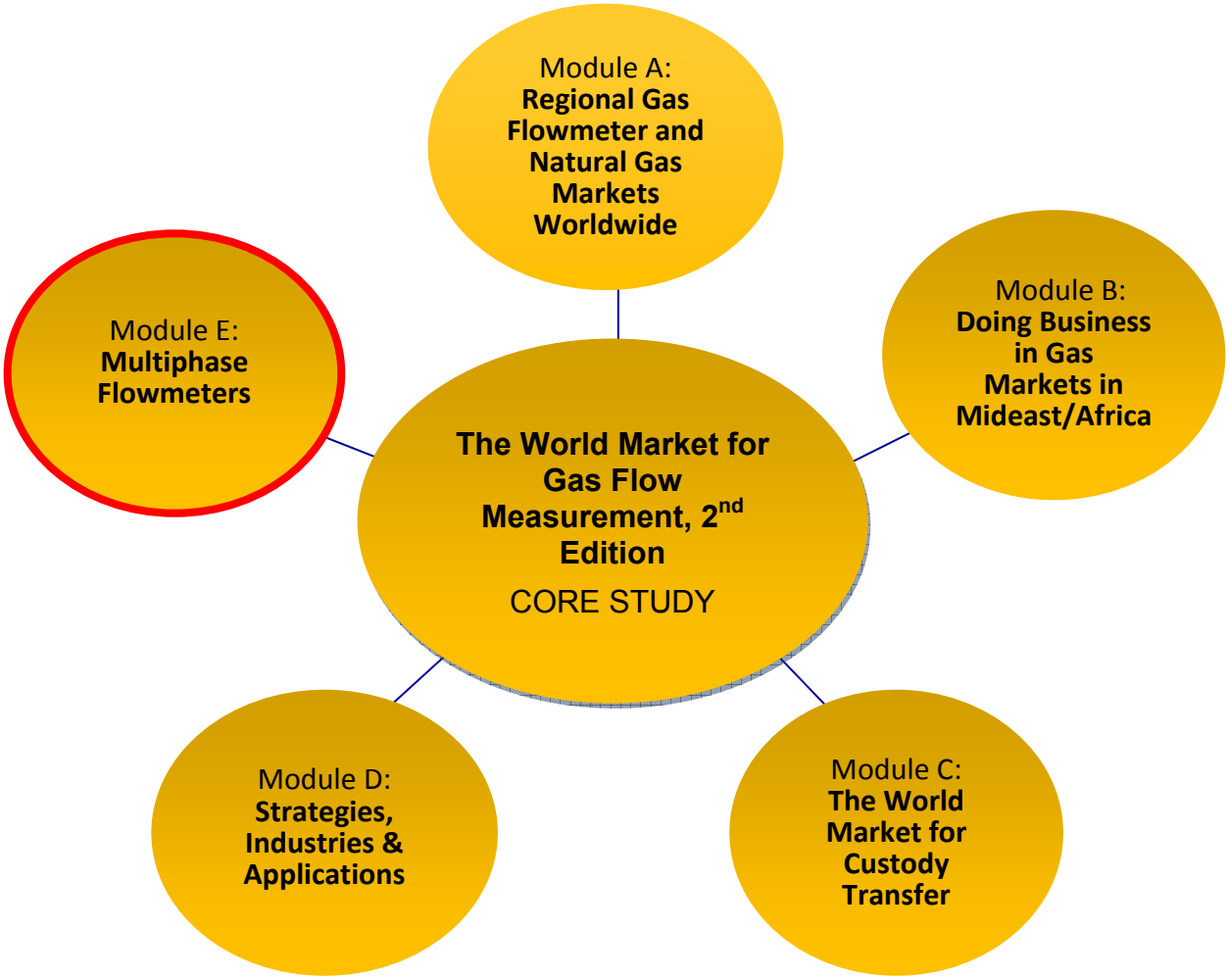
Turbine

- Custody Transfer (gas)
- Utility/Billing
- Other

Module E

The World Market for Multiphase Flowmeters

Overview



Publication Date: March 2012

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Module E:
The World Market for Multiphase Flowmeters

Flow Research has nearly completed a new study on the worldwide multiphase flowmeter market. The primary goal is to determine the size of this flowmeter market in 2010. Forecasts through 2015 will be included. The study, ***The World Market for Multiphase Flowmeters*** Module E in a series of studies, ***The World Market for Natural Gas and Gas Flow Measurement***.

Flow Research photo of oil field pump jack near Houston, TX

The study has multiple purposes:

- To determine worldwide market size and market shares for multiphase flowmeters in 2011
- To forecast market growth for all types of multiphase flowmeters through 2016
- To identify the industries and applications where multiphase flowmeters are used, and to identify market growth sectors
- To provide a product analysis for the main companies selling into the multiphase flowmeter market
- To provide strategies to manufacturers for selling into the multiphase flowmeter market
- To provide company profiles of the main suppliers of multiphase flowmeters.

Rationale for Study

Flow Research published the 3rd edition of our worldwide study of all flowmeter types in October 2010. We have been reporting on all fourteen flowmeter technologies for more than decade in our comprehensive studies, in consultation with a wide spectrum of flowmeter manufacturers, by way of our two quarterly publications (*Market Barometer* and *Energy Monitor*), and through our regular contributions to industry journals such as *Flow Control* and *Processing* magazines. We are entirely focused on the business of industrial process flow, pressure, temperature, and analytical instrumentation.

Our focus on flow has recently been on the emerging development of multiphase flowmeter technologies. Developments here are of particular value in the oil & gas industry, an industry that we routinely report on as part of our world view of measurement applications.

Economic and Flow Management Benefits of Real Time Data

Users are discovering the economic and flow management benefits of technologies that provide real time data on oil and gas flows. Increasingly, the complex demands of managing oil and gas reservoir assets require more sophisticated tools so that producers may improve operating margins in the highly competitive energy market.

Today's exploration and production environment is filled with potential investment, environmental, and personnel risks as new methods are employed to extract valuable energy resources in areas previously not utilized. At the same time, traditional flow measurement ideals such as non-restrictive measurement points, high reliability of accuracy and repeatability, and lengthy life cycles are still in play. multiphase metering instrumentation offers reservoir managers the confidence to more effectively and more safely operate topside, offshore, and subsea wells.

We believe that this is an optimal time to quantify the existing size and future growth in this market, and to take an in-depth look at the new technologies, manufacturers, and applications in what promises to be one of the fastest growing markets in the worldwide flowmeter industry.

In conducting this study, we contacted all known manufacturers of multiphase flowmeters worldwide. Flow Research has already identified recent entrants into this growing market and is reporting detailed information about each company. In so doing, we have assembled a comprehensive picture of the total multiphase flowmeter market.

We asked suppliers to provide detailed information about geographic segmentation, industries sold into, types of multiphase flowmeters sold, and many other product segments. As a result, the study identifies where growth is occurring in the market, as well as the underlying factors for that growth. Our already completed end-user survey provides additional perspectives on this market.

Key issues to be addressed in this study

This study addresses the following key issues in the multiphase flowmeter market:

- Factors causing the market to grow
- Growth in the use of multiphase flowmeters
- The future of multiphase in custody transfer applications
- The use of multiphase flowmeters in oil and gas applications
- The increased number of suppliers in the multiphase flowmeter market
- Line sizes for multiphase flowmeter applications
- The importance of electromagnetic radiation technology and its future in this market
- New product and technology developments
- Growth strategies for multiphase flowmeter suppliers

Operating Principle

Multiphase flowmeters are generally found to have highest utility in the oil and gas industry. This value is largely based on their ability to simultaneously measure the proportional content of oil, water, and gas streaming at the wellhead. There are multiple technologies presently employed by manufacturers to satisfy this application, and have explored all of them. This instrumentation is presently very costly on a per unit basis, but much in demand. Manufacturers are concentrating their efforts to develop new phase measurement techniques at lower costs to end-users.

Publication Date

The publication date of this study is March 2012. It is part of two clusters of studies on oil and gas measurement that are described elsewhere in this document.

Proposed Segmentation

The segmentation for this study is as follows:

Geographic Segmentation

*This study provides **market size, market forecasts** and **company market share** data in multiple categories for the following geographic regions:*

- North America (United States and Canada)
- Europe (including Central Europe and Former Soviet Union)
- Mideast/Africa
- Japan
- China
- Asia without Japan/China
- Latin America (Mexico, Central America, and South America)

Flowmeters by Use of Radiation Type

- Gamma ray
- None
- Other

Flowmeters by Type of Radioactive Material

- Americium
- Barium
- Cesium
- Other

Multiphase Flowmeter Usage by Application Site

- Topside (land-based)
- Offshore
- Subsea

Multiphase Flowmeters by Measurement Configuration

- Before a separation rig or separator
- After a separation rig or separator
- Without the use of a separator rig or separator

Multiphase Flowmeters by Use with Other Instrumentation

- Water cut meters
- Pressure transmitters
- Temperature transmitters
- Other instrumentation

Multiphase Flowmeters by Application

- Fiscal monitoring
- Allocation monitoring
- Reservoir monitoring
- Other applications

Flowmeters by Sales Channel

- Direct Sales
- Independent Representatives
- Distributors
- E-Business

Flowmeters by Customer Type

This flowmeter market is segmented according to the following customer types:

- End-Users
- OEMs
- Systems Integrators
- Engineers/Consultants

Company Profiles

Complete company profiles on the leading multiphase flowmeter suppliers are included. The following is a partial list of the companies profiled in this study:

- Agar Corporation
- Framo Engineering
- Jiskoot (Cameron Measurement Systems)
- Multiphase Meters
- Neftemer
- Phase Dynamics
- Roxar (Emerson Process Management)
- Schlumberger
- Solartron ISA
- Weatherford

Strategies for Success

- Discussion of market forces at work
- Technical developments
- Strategic action perspectives
- Forming alliances to enhance product offerings

+ Average pricing data + Obstacles to growth + Reasons behind multiphase metering success + Quantified growth rates worldwide and by region

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Blaise Pascal

The Flow Research *Founding Sponsor Program*

To produce studies that most closely match our clients' needs, Flow Research instituted the Founding Sponsor Program. This program enables companies who wish to participate at a high level in a study's research to influence its scope and segmentation. In addition, Founding Sponsors receive regular updates from Flow Research on study progress, and receive a significant discount on the regular price of the study.

Procedure: Early in the planning phase of a study, Founding Sponsors receive a proposal that includes the proposed segmentation. Founding Sponsors can propose additional segmentation, and can also suggest changes to the proposed segmentation. While the decision to adopt particular segmentation ultimately lies with Flow Research, and is based on input from all contributors, we will do our best to accommodate the specific needs of each of our clients.

During the research phase of a study, Flow Research will issue regular reports that provide updates on the progress of the research. These reports will be sent to Founding Sponsors, who are then invited to provide any additional input or comments into the study.

Being a Founding Sponsor requires making an early commitment to purchase the study. However, in return, Founding Sponsors receive a significant discount off the regular price of the study. Payment can be made either in one amount at the beginning of the study, or split into two, with the second payment due upon delivery of the study.

For additional details, or to find out how the Founding Sponsor program applies to any particular study, please contact Flow Research. We look forward to working with you!

If you have any questions about the Founding Sponsor program, please contact Norm Weeks at +1 781 245-3200, or norm@flowresearch.com.

Background of Studies

Flow Research has followed the flowmeter, pressure, and temperature markets for more than ten years. During this time, we have completed multiple studies on the many flowmeter technologies, pressure transmitters, and temperature sensors and transmitters in use today. Our study on differential pressure (DP) transmitters and primary elements revealed for the first time the actual size of the worldwide DP flowmeter market, including primary elements.

In 2004, Flow Research published a market study on the worldwide gas flow measurement market called *The World Market for Gas Flow Measurement* (www.gasflows.com). This included all flow technologies used to measure gas flow. In 2008, we published a comprehensive study of the worldwide ultrasonic flowmeter market that identified the market for custody transfer of natural gas. This study was called *The World Market for Ultrasonic Flowmeters, 3rd Edition* (www.flowultrasonic.com). And in 2010, we updated all of our worldwide flowmeter numbers as part of our global study covering all types of flowmeters, *The World Market for Flowmeters, 3rd Edition* (www.floweverything.com), published in October 2010.

Flow Research has been researching the gas flow measurement market for the purposes of doing this group of studies for the past two years. The research included onsite interviews with natural gas suppliers in the Mideast. The purpose of the interviews, which were conducted in UAE, Saudi Arabia, Qatar, and Oman between September and November 2009, was to identify trends in natural gas flow measurement and to better understand growth in the natural gas market in the Mideast, Europe, and worldwide. This research has formed a background for Modules A and B. With the Mideast in turmoil today, both Modules A and B are very timely.

Our ongoing cycle of regularly scheduled editions to individual flowmeter types have focused on both the flowmeter technologies and markets – including both new-technology and traditional technology flowmeters – as well as temperature sensors and temperature transmitters on a regional and worldwide basis. We understand how and why flowmeters perform critical tasks within nearly all instrumentation industries and markets, whether North America or beyond.

We believe Flow Research has the perfect qualifications for doing this study. We have been following the gas flow market regularly since we published the first edition of our worldwide gas flow measurement study in September 2004. Our quarterly publications, *Market Barometer* and *Energy Monitor*, serve as regular updates to our knowledge base of the entire range of instrumentation technologies used within the worldwide process control instrumentation market.

We have also done user interviews that show that the interest in gas flow measurement remains at a very high level. You can trust Flow Research to give you data and insights you can use today.

Background

Dr. Jesse Yoder is President of Flow Research Inc., a company he founded in 1998. Dr. Yoder has 24 years of experience as a writer and analyst in process control and instrumentation. Since 1990, he has written more than 110 market research studies, most of them about flow and instrumentation. Recent and scheduled Flow Research studies include the following:

Volume I	The World Market for Coriolis Flowmeters, 4th Edition (Q2 2012)**
Volume II	The World Market for Magnetic Flowmeters, 5th Edition (Q3 2012)
Volume III	The World Market for Ultrasonic Flowmeters, 4th Edition (Q1/Q2 2012)**
Volume IV	The World Market for Vortex Flowmeters, 3rd Edition (July 2010)
Volume V	The World Market for DP Flowmeters and Primary Elements (January 2007)
Volume V-A	The World Market for DP Flow Transmitters (September 2007)
Volume V-B	The World Market for Primary Elements (September 2007)
Volume VI	Worldwide Survey of Flowmeter Users, 2nd Edition (January 2006)
Volume VII	The World Market for Positive Displacement Flowmeters, 2nd Ed (February 2012)
Volume VIII	The World Market for Turbine Flowmeters, 2nd Ed (January 2012) *New*
Volume IX	The World Market for Pressure Transmitters, 3rd Edition (August 2011)
Volume X	The World Market for Flowmeters, 4th Edition (Q2 2012)
Volume XI	The World Market for Gas Flow Measurement, 2nd Edition (Q3/Q4 2011) *New*
Volume XII	The World Market for Steam Flow Measurement (March 2008)
Volume XIII	The World Market for Mass Flow Controllers (July 2008)
Volume XIV	The World Market for Thermal Flowmeters (October 2009)
Volume XV	The World Market for Liquid Analytical Instruments (Feb. 2011) *New*

***Studies in progress* These studies are described at http://www.flowresearch.com/flow.htm

Dr. Yoder has also written more than 170 articles on flow and instrumentation for trade journals. Links to many of these can be found at www.flowarticles.com.

Belinda Burum, Vice President and Editor, has worked in high tech for 16 years as a writer and marketing communications manager. She joined the company in 2002, and has since then worked on many projects. In addition to her work on market studies, Belinda serves as editor of the *Market Barometer* and the *Energy Monitor* (www.worldflow.com).

Norm Weeks, Senior Market Analyst, joined Flow Research in November 2004 after a 24-year stint with Verizon. At Verizon, Norm specialized in creating innovative customer solutions, product management, and product marketing. He is now a market analyst for Flow Research who specializes in custom projects, and regularly contributes articles and editorial assistance to our *Market Barometer* and *Energy Monitor* publications.

Leslie Buchanan serves as our client specialist, and is responsible for keeping our expanding database current. **Christina Glaser**, who has many years of programming experience, has redesigned and is maintaining our many websites, and also contributes editorial content to our publications. Our highly efficient support staff includes **Nicole Riordan** and **Jessica Weldy**, who help keep the steady stream of data coming your way!

The World Market for Natural Gas and Gas Flow Measurement

Overviews of Core Study + Modules A through E

Rotana Beach, Abu Dhabi
Photo by Flow Research

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Why Flow Research?

- We specialize in flowmeter markets and technologies.
- We have researched all flowmeter types.
- We have interviewed gas flow end-users onsite in many countries.
- We have more than ten years of historical data on the gas flow measurement market.
- We follow the flowmeter and energy markets on a quarterly basis through our *Market Barometer* and *Energy Monitor* publications

We create change in flow