

# Global Shale Gas Technologies and Markets

<https://marketpublishers.com/r/G259BA77F19EN.html>

Date: February 2011

Pages: 172

Price: US\$ 4,950.00 (Single User License)

ID: G259BA77F19EN

## Abstracts

**ProdUnit Price (Global Site License):** US\$ 7,425.00

Shale gas has the potential to dramatically impact global energy markets. It is assuming an increasingly significant role in global natural gas markets as nations around the world continue to seek lower-carbon fuels while ensuring energy security and economic development. Demand for natural gas is expected to continue to increase and will account for nearly 24% of global energy supplies by 2020. While demand for gas is increasing, supplies from conventional sources are depleting. This dynamic is driving the gas industry to unconventional sources, notably shale.

The confluence of growing demand and breakthrough technological advancements has made investments in shale plays attractive in recent years. Advancements in directional drilling and hydraulic fracturing technologies have enabled the achievement of high rates of gas production from deep, low permeability gas shale formations. These breakthroughs have facilitated access to some of the largest undeveloped gas resources in the world.

These technologies have been widely adopted in North America, resulting in dramatic increases in the production of shale gas. North American gas shales already produce over 9 billion cubic feet per day and are projected to continue to grow rapidly. Shale gas as a percentage of total North American gas production has increased from virtually nothing in 2000 to 13% in 2009; enabling the United States to eclipse Russia as the world's leading producer of natural gas.

The success of shale gas production in North America, and particularly in the US, has accelerated the exploration of shale gas resources in other regions of the world. In 2009, the International Energy Agency estimated that global recoverable resources of shale gas exceed 6,350 trillion cubic feet (Tcf). In Europe, significant gas shale

resources have been identified in Poland, Sweden, and Austria. A number of gas shale basins have also been identified in Australia, China, India, and Southern African nations.

Several factors point to dramatic growth and great expectations for the market for shale gas. However, the exploration and extraction of shale gas resources remains a relatively new and developing field. Certain challenges remain to be overcome and debate continues on the estimates of the scale of recoverable resources, the economics of shale gas production, and the environmental impact of shale gas extraction processes.

***Global Shale Gas Technologies and Markets*** includes a broad review of the global market for shale gas. The report presents the characteristics of currently identified global shale gas resources and key technologies leveraged in the production of shale gas. Environmental considerations and the regulatory landscape are discussed. Additionally, details of major US shale play investments are provided along with discussion of the potential economic impact of shale development and US sub-sector employment trends. Key market participants are profiled. The report provides historic and forecast global shale production 2006 to 2020. Market drivers including global energy demand, gas demand, supply, and price trends and market inhibitors are reviewed in detail.

## **Report Methodology**

The information in ***Global Shale Gas Technologies and Markets*** is based on primary and secondary research. Primary research entailed gathering information from firms and individuals involved in development, marketing, distribution and sales of shale and natural gas, utilities, analysts and consultants to the energy industry to obtain insight into the technologies and market factors shaping the industry. Secondary research entailed data gathering from relevant sources, including government and industry publications, company literature, and corporate annual reports.

## Contents

### CHAPTER 1: EXECUTIVE SUMMARY

Report Summary

Shale Gas Market Size, Demand Drivers, and Inhibitors

Figure 1-1: US and Global Shale Gas Production Volume, 2006 to 2010 (in Bcf)

Figure 1-2: Projected Global Shale Gas Production Volume, 2011 to 2020 (in Bcf)

Shale Gas Technology and Development

Figure 1-3: Schematic of Natural Gas Sources and Wells

Market Participants

Figure 1-4: Upstream Gas Industry Structure

Table 1-1: List of Companies Profiled

Employment in US Shale Gas

Figure 1-5: Projected US Shale Gas Upstream Employment, 2010-2020 (in thousands)

Report Scope

Report Format

Report Methodology

Abbreviations and Definitions

Table 1-2: Abbreviations Utilized In Report

## **CHAPTER 2: SHALE GAS TECHNOLOGY & DEVELOPMENT**

Overview

Geology and Geography of Shale Gas Resources

Figure 2-1: Conventional and Unconventional Gas Resources

Geology of Shale Gas Resources

Figure 2-2: Shale Outcrop

Chemical Composition of Shale Gas

Table 2-1: Typical Composition of US Shale Gas (Mole %)

Table 2-2: Composition of Shale Gas from US Shale Plays (Percent Mole)

Common Characteristics of Economically Viable Shale Gas Resources

Geography of Shale Gas Resources

Figure 2-3: Global Distribution of Shale Gas Resources (in trillion cubic feet)

Figure 2-4: Location of US Shale Gas Basins

Shale Gas Resource Development Process and Technologies

Figure 2-5: Shale Gas Development Process

Exploration

2-D Reflection Seismology

Figure 2-6: Visualization of Reflection Seismology (2-D) Process

3-D Seismic Imaging

Figure 2-7: Advanced 3-D Seismic Image

4-D Seismic Imaging

Exploratory Wells

Mineral Licensing and Leasing

Government-Owned Mineral Rights

Privately Owned Mineral Rights

Split Estate

Mineral Rights Access Has Shaped the US Shale Gas Industry

Well Permitting

Table 2-3: Regulatory Agencies in Shale Gas States

Well Pad Construction

Figure 2-8: Horizontal Multi-Well Schematic

Figure 2-9: Schematic of Typical Well Pad

Well Drilling

Vertical Drilling

Figure 2-10: Schematic of Rotary Drill

Horizontal Drilling

Figure 2-11: Schematic of Vertical and Horizontal Wells

Conventional Steerable Motors

Rotary Steerable Systems

Well Logging

Mud Logging

Wireline Logging

Logging While Drilling

Well Casing

Well Completion and Stimulation

Completion Activities

Hydraulic Fracturing

Figure 2-12: Hydraulic Fracturing

Plug and Perf Multi-Stage Fracturing

Open Hole Multi-Stage Fracturing

Slickwater Fracturing

Fracturing Fluid Additives

Table 2-4: Types and Purposes of Hydraulic Fracturing Fluid Additives

Foam Fracturing

Conclusion

## **CHAPTER 3: INDUSTRY EMPLOYMENT**

Overview

US Oil and Gas Industry Employment

Oil and Gas Industry Structure

## Figure 3-1: Upstream Gas Industry Structure

### Occupations in Upstream Oil and Gas

Table 3-1: US Oil and Gas Extraction Employment by Occupation (in thousands)

Table 3-2: US Oil and Gas Drilling and Support Employment by Occupation (in thousands)

### Historical Upstream Oil and Gas Employment

Figure 3-2: US Upstream Oil and Gas Employment, 2006-2010 (in thousands)

Figure 3-3: US Oil & Gas Upstream Employment and Crude Oil Prices, 2003-2010 (in thousands and in \$/barrel)

### Projected Upstream Oil and Gas Employment

Figure 3-4: US Upstream Oil and Gas Employment, 2011-2020 (in thousands)

### Employment Outlook Presents Industry Challenge

### Employment in the US Shale Plays

### Projected US Shale Gas Employment

Figure 3-5: US Oil and Gas Production Forecast, 2010-2020 (in MMbbl and MMboe)

Figure 3-6: Projected US Shale Gas Upstream Employment, 2010-2020 (in thousands)

### Occupations in Shale Gas Development

Table 3-3: Occupations in Shale Gas Development Process

### Indirect and Induced Employment Resulting from US Shale Gas Development

## **CHAPTER 4: MARKET SIZING**

### Overview

#### Historic Global Shale Gas Production

Figure 4-1: US and Global Shale Gas Production Volume, 2006 to 2010 (in Bcf)

Figure 4-2: Global Wellhead Production Value of Shale Gas, 2006 to 2010 (in US\$ Billion)

Figure 4-3: Global Shale Gas Production by Shale Play (in Percent)

#### Shale Gas Production in the United States

Figure 4-4: US Producing and Prospective Shale Basins, Lower 48 States

#### Barnett Shale

Table 4-1: Select Characteristics, Barnett Shale

Table 4-2: Top Ten Operators in the Barnett Shale Newark East Field, 2010 (Mcf gas production)

#### Fayetteville Shale

Table 4-3: Select Characteristics, Fayetteville Shale

Table 4-4: Top Ten Operators in the Fayetteville Shale, 2010 (Bcf gas sold)

#### Haynesville Shale

Table 4-5: Select Characteristics, Haynesville Shale

Table 4-6: Top Ten Operators in the Haynesville Shale, 2010 (Number active producing wells)

#### Woodford Shale



Table 4-7: Select Characteristics, Woodford Shale

Table 4-8: Operators in the Woodford Shale, 2010

Antrim Shale

Table 4-9: Select Characteristics, Antrim Shale

Marcellus Shale

Table 4-10: Select Characteristics, Marcellus Shale

Shale Gas Production in Canada

Table 4-11: Canada Estimated Original Gas in Place by Shale Basin (in trillion cubic feet)

Table 4-12: Representative Listing of Companies Active in Shale Gas Exploration in Canada

Shale Gas Exploration in Europe

Poland

Table 4-13: Representative Listing of Shale Gas Exploration Concessions Awarded in Poland

Shale Gas Exploration in Asia

China

India

Forecast Global Shale Gas Production

Figure 4-5: Projected Global Shale Gas Production Volume, 2011 to 2020 (in Bcf)

Figure 4-6: Global Shale Gas Production by Country, 2020 (in Percent)

Figure 4-7: Projected Global Shale Gas Value of Wellhead Production, 2011 to 2020 (In US\$ Billion)

Market Demand Drivers

Growth in Global Energy Consumption

Figure 4-8: World Marketed Energy Consumption by Economic Region, 2005 to 2020 (in quadrillion Btu)

Growth in Global Natural Gas Demand

Figure 4-9: World Electricity Generation by Fuel Type, 2005, 2015 (Percent of Total)

Figure 4-10: World Marketed Energy Consumption by Economic Region, 2005, 2010, 2015, 2020 (in quadrillion Btu)

Decline in OECD Conventional Natural Gas Supplies

Figure 4-11: OECD Conventional Natural Gas Production, 2008 to 2020 (Tcf)

Advances in Shale Gas Technologies

Advances in Shale Gas Exploration Technologies

Advances in Directional Drilling of Shale Wells

Advances in Shale Fracturing Technologies

Figure 4-12: US Shale Gas Production, 2000 to 2010 (Tcf)

Abundance of Global Shale Gas Resources

Figure 4-13: Global Distribution of Shale Gas Resources (in trillion cubic feet)

Market Demand Inhibitors

Low Natural Gas Prices Can Impede Shale Growth

Figure 4-14: Natural Gas Henry Hub Spot Price, 2000 to 2010 (\$ per Million Btu)

Environmental Issues and Regulatory Response

Water Impacts of Shale Gas Development

Risk of Water Contamination From Drilling Operations

Risk of Water Contamination From Hydraulic Fracturing Processes

Depletion of Local Water Resources

Air Quality Impacts of Shale Gas Developments

Land Impacts of Shale Gas Development

Evolving Regulatory Response

Barriers to Entry

## **CHAPTER 5: PARTICIPANT PROFILES**

Overview

Table 5-1: List of Companies Profiled

Exploration and Production Industry Trends

Oilfield Services Industry Trends

Baker Hughes, Incorporated

Table 5-2: Baker Hughes, Incorporated Profile

Corporate Overview

Product Portfolio

### Table 5-3: Baker Hughes, Incorporated Product Portfolio

Performance

Figure 5-1: Baker Hughes, Incorporated Revenues and Net Income, 2006-2010e  
(in \$ B)

BP Plc

### Table 5-4: BP Profile

Corporate Background

Product Portfolio

Table 5-5: BP Hydrocarbon Proved Reserves Portfolio (MMboe)

Table 5-6: BP Shale Gas Properties North America

Performance

Figure 5-2: BP Revenues and Net Income, 2006-2010e (in \$ B)

Calfrac Well Services, Ltd.

Table 5-7: Calfrac Well Services, Ltd. Profile

Corporate Overview

Product Portfolio

Table 5-8: Calfrac Well Services, Ltd. Product Portfolio

Performance

Figure 5-3: Calfrac Well Services, Ltd Revenues and Net Income, 2006-2010e  
(in \$ M)

Canyon Services Group, Incorporated

## Table 5-9: Canyon Services Group, Incorporated Profile

Corporate Overview

Product Portfolio

## Table 5-10: Canyon Services Group, Inc. Product Portfolio

Performance

Figure 5-4: Canyon Services Group, Inc. Revenues and Net Income, 2006-2010e (in \$ M)

## Chesapeake Energy Corporation

### Table 5-11: Chesapeake Energy Corporation Profile

Corporate Overview

Product Portfolio

### Table 5-12: Chesapeake Energy Corporation Product Portfolio

### Table 5-13: Chesapeake Energy Corporation Product Portfolio by Operating Area

Performance

Figure 5-5: Chesapeake Energy Corporation Revenues and Net Income, 2006-2010e (in \$ B)

## Devon Energy Corporation

### Table 5-14: Devon Energy Corporation Profile

Corporate Overview

Product Portfolio

## Table 5-15: Devon Energy Corporation Product Portfolio

Performance

Figure 5-6: Devon Energy Corporation Revenues and Net Income, 2006-2010e (in \$ B)

ExxonMobil/XTO Energy, Incorporated

## Table 5-16: ExxonMobil/XTO Energy Profile

Corporate Overview

Product Portfolio

Table 5-17: XTO Energy, Inc. (subsidiary of ExxonMobil) Shale Gas Properties and Reserves (Mcf)

Performance

Figure 5-7: ExxonMobil Revenues and Net Income, 2006-2010e (in \$ B)

Halliburton Company

## Table 5-18: Halliburton Company Profile

Corporate Overview

Product Portfolio

## Table 5-19: Halliburton Company Product Portfolio

Performance

Figure 5-8: Halliburton Company Revenues and Net Income, 2006-2010e (in \$ B)

Quicksilver Resources, Incorporated

## Table 5-20: Quicksilver Resources, Incorporated Profile

Corporate Overview

Product Portfolio

## Table 5-21: Quicksilver Resources, Incorporated Product Portfolio

Table 5-22: Quicksilver Resources, Incorporated Product Portfolio by Operating Area

Performance

Figure 5-9: Quicksilver Resources Revenues and Net Income, 2006-2010e (in \$ M)

## San Leon Energy Plc

### Table 5-23: San Leon Energy Plc Profile

Corporate Overview

Product Portfolio

Table 5-24: San Leon Energy Plc License Portfolio by Country

## Schlumberger, Ltd

### Table 5-25: Schlumberger, Ltd. Profile

Corporate Overview

Product Portfolio

Table 5-26: Schlumberger, Ltd. Product Portfolio

Performance

Figure 5-10: Schlumberger, Ltd Revenues and Net Income, 2006-2010e (in \$ B)

## Southwestern Energy Company

### Table 5-27: Southwestern Energy Company Profile

#### Corporate Overview

#### Product Portfolio

### Table 5-28: Southwestern Energy Company Product Portfolio by Operating Area

#### Performance

### Figure 5-11: Southwestern Energy Company Revenues and Net Income, 2006-2010e (in \$ B)

## Talisman Energy Incorporated

### Table 5-29: Talisman Energy Incorporated Profile

#### Corporate Overview

#### Product Portfolio

### Table 5-30: Talisman Energy Net Productive Wells by Operating Area (# wells)

### Table 5-31: Talisman Energy Shale Portfolio by Operating Area

#### Performance

### Figure 5-12: Talisman Energy Incorporated Revenues and Net Income, 2006-2010e (in C\$ B)

## Trican Well Services, Ltd.

### Table 5-32: Trican Well Services, Ltd. Profile

#### Corporate Overview



Product Portfolio

Table 5-33: Trican Well Services, Ltd. Product Portfolio

Performance

Figure 5-13: Trican Well Service, Ltd. Revenues and Net Income, 2006-2010e  
(in \$ M)

Ultra Petroleum Corporation

Table 5-34: Ultra Petroleum Corporation Profile

Corporate Overview

Product Portfolio

Performance

Figure 5-14: Ultra Petroleum Corporation Revenues and Net Income,  
2006-2010e (in \$ B)

## I would like to order

Product name: Global Shale Gas Technologies and Markets

Product link: <https://marketpublishers.com/r/G259BA77F19EN.html>

Price: US\$ 4,950.00 (Single User License / Electronic Delivery)

If you want to order Corporate License or Hard Copy, please, contact our Customer Service:

[info@marketpublishers.com](mailto:info@marketpublishers.com)

## Payment

To pay by Credit Card (Visa, MasterCard, American Express, PayPal), please, click button on product page <https://marketpublishers.com/r/G259BA77F19EN.html>

To pay by Wire Transfer, please, fill in your contact details in the form below:

First name:  
Last name:  
Email:  
Company:  
Address:  
City:  
Zip code:  
Country:  
Tel:  
Fax:  
Your message:

**\*\*All fields are required**

Customer signature \_\_\_\_\_

Please, note that by ordering from marketpublishers.com you are agreeing to our Terms & Conditions at <https://marketpublishers.com/docs/terms.html>

To place an order via fax simply print this form, fill in the information below and fax the completed form to +44 20 7900 3970