

# US Shale Gas Industry Analysis

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## Abstracts

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Shale gas has emerged as one of the sought after investments areas in the energy sector, especially in the US. Combined with the technical advances that have helped access huge and previously inaccessible natural gas reserves and the production capability in the industry, there has been increased interest in the US shale gas industry, both on the production and exploration side. The first commercial shale gas well was drilled in the US in 1821 in the Devonian Fredonia Shale formation in Fredonia, New York. The scope, potential and importance of shale gas production was however overshadowed by the much larger volumes produced from conventional gas reservoirs. The Barnett field in the Dallas Fort Worth area of Texas has been historically the major shale gas producing area of the US. This area saw significant drilling activity in the late 1990s and has grown to be one of the largest natural gas fields in the US. This area had a production of 1.83 TCF in 2010, accounting for more than a third of all shale gas production in the US. The Barnett field has a productive use of about 5,000 square miles.

The technical expertise and information gained from over a decade of production from developing the Barnett Shale play in Texas has been immense. This has played a major role in improving the efficiency of shale gas development around the country. The Marcellus Shale in the eastern United States has also been an important one and other well locations that are suitable and have potential for economical gas production is being identified. This has been achieved by using surface, subsurface geology techniques and seismic techniques to generate maps of the subsurface.

Combined with the technical advances that have helped access huge and previously inaccessible natural gas reserves and the production capability in the industry, there has been increased interest in the US shale gas industry, both on the production and

exploration side. In recent months and years we have seen many multibillion dollar shale gas development deals over the past year. American and global companies have shown an interest in the industry that is seen to have much potential. Between 2008 and 2012, the country saw investments of about US\$ 130 Billion in tight oil and shale gas projects and about a fifth of these came from abroad through joint ventures.

The prospects for shale gas production are significant and hold much promise but there are considerable aspects of uncertainty with respect to the size and economics of this resource. While there are many large shale formations, some formations such as the Marcellus are so large that it has been possible to do extensive production testing on only a limited portion of the entire formation. Moreover most of the shale gas wells drillings have been recent and this gives rise to apprehensions and considerable uncertainty regarding their long term productivity. Though there have been achievements with regard to development of well drilling and completion technology there is uncertainty in the future course of development of technology that would enable the country to substantially increase well productivity and reduce production costs.

### **“US Shale Gas Industry Analysis” Report Highlight:**

US Shale Gas Industry Overview

Shale Gas Exploration, Technical and Technology Aspects

US Shale Gas Reserve Analysis: Technical & Recoverable Reserves

Investments in Shale Gas Exploration & Production

US Shale Gas Sector Dynamics

Shale Boom to Drive LNG Export Projects

## Contents

### **1. US SHALE GAS INDUSTRY OVERVIEW**

### **2. SHALE GAS SECTOR - EXPLORATION, TECHNICAL AND TECHNOLOGY ASPECTS**

- 2.1 Value chain analysis
- 2.2 Exploration
- 2.3 Drilling and Development
- 2.4 Production & Processing
- 2.5 Distribution

### **3. US SHALE GAS RESERVE ANALYSIS**

- 3.1 Technical & Recoverable Reserves
- 3.2 By Location
  - 3.2.1 Antrim Shale, Michigan
  - 3.2.2 Barnett Shale, Texas
  - 3.2.3 Caney Shale, Oklahoma
  - 3.2.4 Conesauga Shale, Alabama
  - 3.2.5 Fayetteville Shale, Arkansas
  - 3.2.6 Floyd Shale, Alabama
  - 3.2.7 Gothic Shale, Colorado
  - 3.2.8 Haynesville Shale, Louisiana
  - 3.2.9 Collingwood-Utica Shale, Michigan
  - 3.2.10 New Albany Shale, Illinois Basin
  - 3.2.11 Pearsall Shale, Texas
  - 3.2.12 Devonian Shales, Appalachian Basin
  - 3.2.13 Utica Shale, New York and Ohio
  - 3.2.14 Woodford Shale, Oklahoma

### **4. INVESTMENTS IN SHALE GAS EXPLORATION & PRODUCTION**

### **5. US SHALE GAS PRODUCTION ANALYSIS**

### **6. US SHALE GAS SECTOR DYNAMICS**

- 6.1 Favorable Parameters

6.2 Challenges to be Resolved

6.3 Growth Opportunities

## **7. US SHALE GAS DEVELOPMENT FUTURE OUTLOOK**

## **8. SHALE BOOM TO DRIVE LNG EXPORT PROJECTS**

## **9. US SHALE GAS REGULATORY ASPECTS**

9.1 Government Support

9.2 Policy & regulations

9.3 Institutions

## **10. COMPETITIVE LANDSCAPE**

10.1 Anadarko Petroleum Corporation

10.2 BHP Billiton

10.3 Chesapeake Energy Corporation

10.4 CONSOL Energy Inc

10.5 Devon Energy Corporation

10.6 Encana Corporation

10.7 Exxon Mobil Corporation

10.8 Marathon Oil

10.9 Noble Energy

10.10 Southwestern Energy Company

## List Of Figures

### LIST OF FIGURES

Figure 2-1: Lifecycle Phases of Wellhead

Figure 3-1: US - Shale Gas Reserves Comparison With Top 10 Global Shale Gas Reserves

Figure 3-2: US - Share in Global Shale Gas Reserves

Figure 3-3: US - Proven Shale Gas Reserves, 2007-2012 (Trillion Cubic Feet)

Figure 3-4: US - Shale Gas Reserves By Region (%)

Figure 3-5: Antrim Shale Play - Average General Properties

Figure 3-6: Barnett Shale Play - Average General Properties

Figure 4-1: Investment in Chemical Industry Arising from Shale Gas, 2010-2020 (US\$ Billion)

Figure 5-1: US - Natural Gas Production (Trillion Cubic Feet), 2007-2013

Figure 5-2: US - Natural Gas Producing Wells, 2008-2013

Figure 5-3: US - Shale Gas Production (Trillion Cubic Feet), 2007-2012

Figure 5-4: Shale Gas Share of Natural Gas Production (%), 2007-2012

Figure 5-5: US – Share of Natural Gas in Total Energy Consumption, 2013

Figure 5-6: US - Natural Gas Consumption by Sector, 2013

Figure 7-1: US - Shale Gas Production Estimates (Trillion Cubic feet), 2012 & 2040

Figure 7-2: US - Chemical Industry Output Driven by Shale Gas Induced Competitiveness, 2012-2020 (US\$ Billion)

Figure 8-1: US - Natural Gas Export (Trillion Cubic Feet), 2008-2013

## About

There has been considerable interest in the US shale gas sector, both in terms of its production and reserves. The U.S. Energy Information Administration's (EIA) National Energy Modeling System (NEMS) and energy projections are the main source of information on this topic. EIA began representing shale gas resource development and production in the mid-1990s. However greater interest and attention has been focused on reserves in the past 5-10 years once the level of shale gas and its likely impact was ascertained deeming it a "game changer" for the U.S. natural gas market.

Between 2006 and 2010 we have seen heightened activity in the space in the form of forays into new shale plays that has seen dry shale gas production in the United States rise from xx Trillion Cubic Feet in 2006 to xx Trillion Cubic Feet, (representing about xx% of total U.S. dry natural gas production) in 2010. The more interesting part was that at the end of 2009, US had about xx Trillion Cubic Feet of wet shale gas reserves forming about xx% of overall U.S. natural gas reserves.

Thus it became important to develop an assessment of the technically recoverable shale gas and shale oil resource so that the country had a better understanding of the potential U.S. domestic shale gas and shale oil resources.

It is estimated that shale gas and shale oil resources exist in the undeveloped portions of xx shale plays. Between 2011 and 2013, the number of basins with recoverable shale reserves increased from xx to xx while the number of formations containing shale gas nearly doubled in the same time period, from 69 to xx. In about two years, the estimates of potential shale gas reserves in the US grew by almost 50% to indicate xx Trillion Cubic Feet of proved and unproven non-shale technically recoverable natural gas resources.

The entry of Mitchell Energy and Development Corporation into large-scale shale gas production brought about much interest in make deep shale gas production during the 1980s and 1990s and there was greater acknowledgment of the commercial reality in the Barnett Shale in North-Central Texas. The success of Mitchell Energy and Development brought other companies into the field and with production in the Barnett Shale touching nearly 0.5 Trillion Cubic Feet of natural gas per year in 2005, other plays such as Fayetteville Shale in Arkansas, Haynesville, Marcellus, Woodford, Eagle Ford, and others became more widely accessed.

In the US the Northeast, Gulf Coast, and Southwest regions are the most widely explored shales with about xx% of the total quantity of technically recoverable shale gas resources being located in these regions, as indicated in the 2012 Annual Energy Outlook for the country. Of this the NE accounts for xx%, the Gulf coast for xx%, and the southeast for xx% of the total.

US has been dependent on imports for its energy needs for a long period now, even going back about 75 years. Global, regional and local events such as recessions, economic stagnation, regional conflicts and high inflation have adversely affected the energy supply lines and prices in this time frame. However, one recent event or breakthrough in technology that has stimulated the energy scenario in the country has been the shale revolution which has also been a shot in the arm for other sectors of the economy. It has been a combination of factors such as technological advances, high oil and gas prices that have enabled the country to achieve a degree of stability and sufficiency in its gas resources.

The spurt in production of domestic energy resources has benefited the US by reducing dependence on imported energy and diversifying the economy. Application of fracturing techniques to stimulate oil and gas production began to grow rapidly in the 1950s, although experimentation dates back to the 19th century. The US initiative to explore shale gas sources started in the mid-1970s through a partnership of private operators, the U.S. Department of Energy (DOE) and the Gas Research Institute (GRI) for the commercial production of natural gas from Devonian (Huron) shale in the eastern United States.

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