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Wastewater Treatment Equipment Market in the North America Shale Gas Industry

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F R O S T & S U L L I V A N



Market
Engineering

Analysis of the Wastewater Treatment Equipment Market in the North America Shale Gas Industry

Long-term supply of natural gas and high water consumption will stimulate growth

May 2012

Contents

Section	Slide Numbers
Executive Summary	4
Market Overview	9
Total Wastewater Treatment Equipment Market in the Shale Gas Industry	--
• External Challenges: Drivers and Restraints	30
• Forecasts and Trends	41
• Demand Analysis	55
• Market Share and Competitive Analysis	57
• Mega Trends and Industry Convergence Implications	65
Product Segments	69
Regional Breakdown	94
The Last Word	106
Appendix	109

Executive Summary

- The wastewater treatment equipment market in the North American shale gas industry is expected to grow from \$xxx.x million in 2011 to \$xxx.x million by 2018 at a compound annual growth rate (CAGR) of x.x percent.
- The U.S. wastewater treatment equipment market in the shale gas industry is expected to grow from \$xxx.x million in 2011 to \$xxx.x million by 2018 at a CAGR of x.x percent.
- The Canadian wastewater treatment equipment market in the shale gas industry is expected to grow from \$xx.x million in 2011 to \$xx.x million by 2018 at a CAGR of x.x percent.
- Canada is in its birth stage of the market and expects to see much pilot testing of equipment during the next few years, with new shale basins being explored.
- Low natural gas prices have impacted growth of the shale gas market due to abundant supply but poor demand. Drilling and production are to remain steady initially.
- Basins deemed key for growth opportunities are oil and natural gas reserves with the highest profitability. A shift from unprofitable dry gas to liquid rich basins is likely.
- Many technologies being piloted and tested in various shale plays are not proving economically and functionally viable. Modular, multifunctional systems are key to growth.

Key Objectives and Research Scope

Research objectives include:

- Obtain an expert, independent, in-depth assessment of North American wastewater treatment equipment in the shale gas industry and evaluate market attractiveness.
- Identify accelerated growth opportunities and critical success factors, and provide marketing, distribution, and product positioning strategies.
- Evaluate market barriers and challenges for particular technologies (present and future).

Information objectives include:

- Obtain a detailed overview of the North American wastewater treatment equipment market in the shale gas industry, including all market segments with regard to size, CAGR/forecasts, trade/economic data, and pricing.
- Identify major potential water and wastewater treatment customers by market segment in the shale gas industry. Obtain a solid understanding of key customer issues, requirements, consumption patterns, switching factors and unmet needs.

Region Coverage

North America

Product Coverage

Wastewater treatment equipment market in the shale gas industry

Product Segments

Wastewater treatment equipment

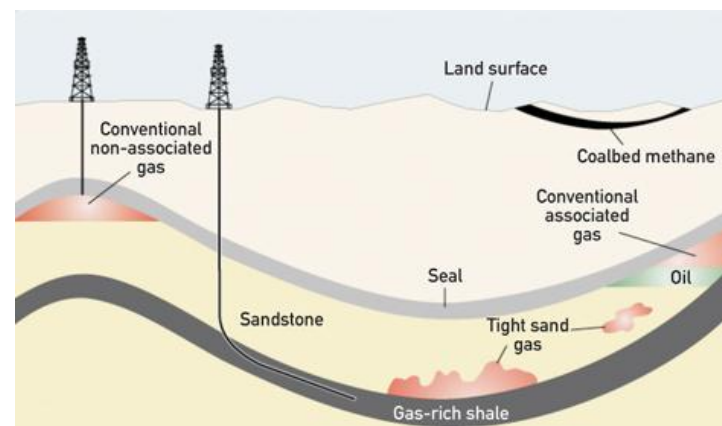
- 1) Thermal distillation/evaporation
- 2) Reverse osmosis systems
- 3) Flocculation and clarifiers
- 4) Ion exchange
- 5) UV, ozone, ultrasound,
- 6) Biocides and inhibitors
- 7) Crystallization and zero-liquid discharge systems
- 8) Media filtration

Market Overview—Definitions

- For this research, wastewater treatment equipment in the shale gas industry is defined as being used in the treatment of industrial processes such as hydraulic fracturing and horizontal drilling that produce flowback and produced water.
- This study examines equipment used in the shale gas industry within U.S. and Canadian basins. Key shale basins include Barnett, Marcellus, Fayetteville, Antrim, Haynesville, Woodford, Eagle Ford Shale, and Bakken Shale in the United States. Canada has Horn River, Montney, Colorado Group, Utica, and Horton Bluff Shale.
- Equipment covered in this study for wastewater treatment include: distillation and evaporators, reverse osmosis (RO), media filtration—microfiltration (MF); flocculation and clarifiers; ion exchange; disinfection (UV, ozone, ultrasound and biocides/inhibitors); crystallization; and zero-liquid discharge systems (ZLD).
- The analysis includes revenue generated from design and implementation capital costs of equipment. This includes rental and leasing costs. This excludes annual operational costs, peripheral equipment (such as valves, pumps, monitoring systems), consultancy fees, centralized facility construction costs, and replacement parts not part of the initial equipment sale or associated costs.
- The market values of the separate treatment equipment include solutions used in North America by design and engineering firms, original equipment manufacturers (OEMs), and service companies.
- The market analysis examines growth of wastewater treatment equipment during the forecast period and is measured across the number of projects and solutions provided, rather than unit shipments.

Market Overview—Definitions (continued)

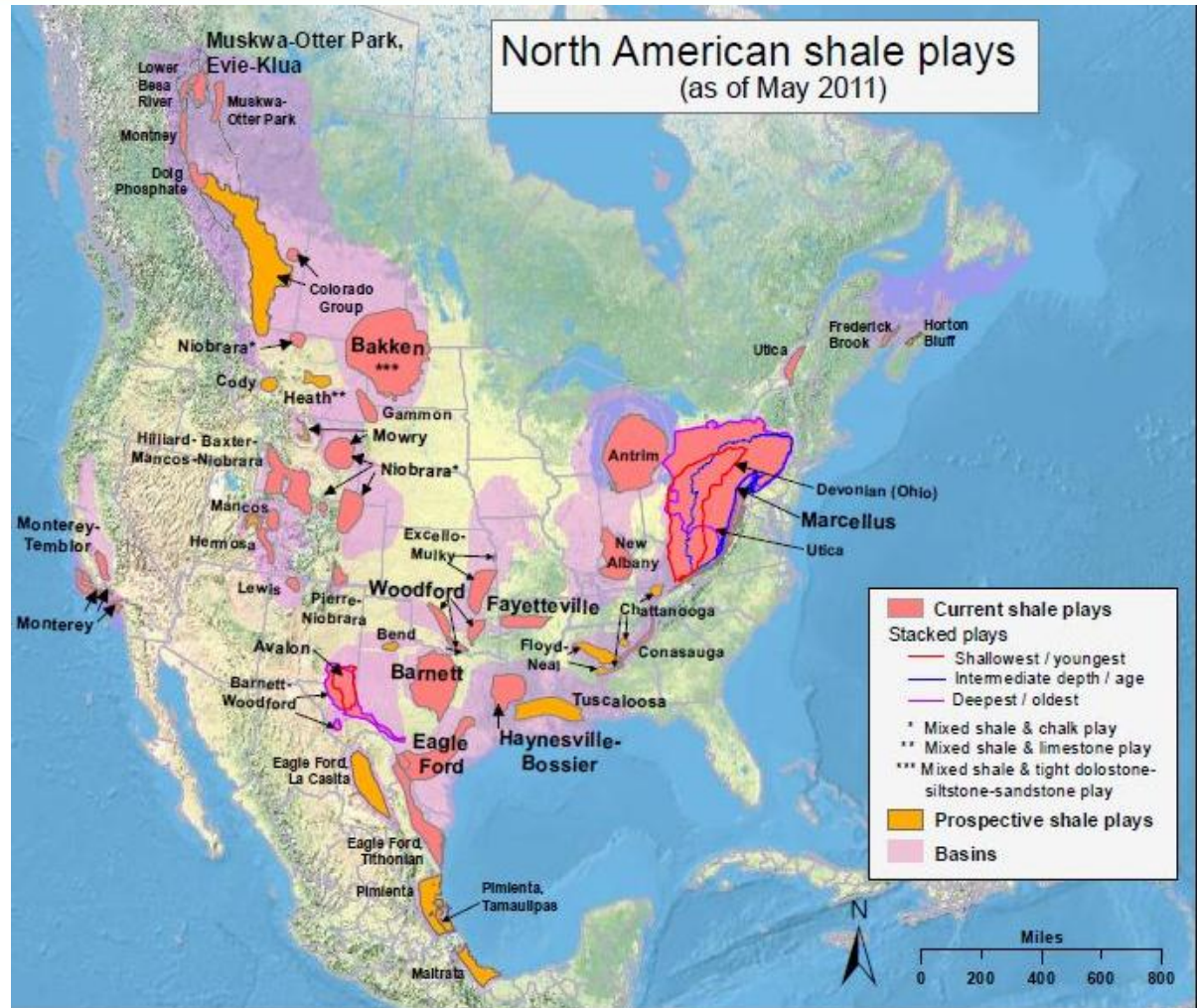
- The shale gas industry is an emerging market driven by the abundant supply of unconventional natural gas. The main types of gas are coal bed methane, tight sands, and shale.
- Two technology processes exist for unconventional gas. The first is horizontal drilling—drilling a vertical well to a desired depth, then drilling laterally to access shale rock. The second is hydraulic fracturing—an injection of a fluid (water, sand, and chemicals) under high pressure to create fractures in the rock.
- Shale gas extraction uses large volumes of water during hydraulic fracturing—as much as x million to x million gallons per well. As a result, this produces large volumes of wastewater containing total dissolved solids (TDS), heavy metals, radionuclides, and in some instances microbial bacteria.
- Between xx percent and xx percent of the wastewater produced from hydraulic fracturing returns to the surface as flowback and produced water. Parts of Canada and United States dispose of wastewater deep below the surface by using deep injection wells.
- The main shale basins being tracked in the United States and Canada have the largest capacity and production output. These will be the most profitable.
- Meanwhile, new shale basins being found have not yet succumbed to long-term productivity tests with reliable data.



Source: Image courtesy of U.S. Energy Information Administration (EIA) and U.S. Geological Survey,

Market Overview—North American Wastewater Treatment in the Shale Gas Industry

- The Marcellus shale in the Northeast is to be drilled for many years as a major source of natural gas. The New Albany shale in Illinois, Barnett shale in the Fort Worth Basin, Woodford shale in Oklahoma, and Haynesville shale in Louisiana have strong supplies of natural gas as well.
- The Mancos and Hermosa shales in Utah, Lewis in New Mexico, and Mowry in Wyoming are emerging. Eagle Ford shale is a new play in South Texas and Mexico, holding crude oil and natural gas. Bakken shale is mainly an oil shale in the Williston Basin of North Dakota.
- Canada has the Montney Formation, Utica, Horton Bluff, Horn River basin, and Colorado Group.



Source: Image courtesy of US EIA 2011, National Energy Board of Canada, Frost & Sullivan analysis.

Market Overview—Definitions (continued)

Key U.S. Basin Types

Marcellus Shale

Located in West Virginia, Pennsylvania, New York, Ohio, and Maryland, this is the second-largest natural gas field in the world, covering xx,xxx square miles. To protect groundwater resources, the wells are encased with numerous layers of steel and concrete—one of many environmental regulations being implemented stringently for water consumption and wastewater disposal.

Barnett Shale

Barnett Shale stretches across about xx counties in North Central Texas, covering about x,xxx square miles. The major portion of development is beneath Johnson and Tarrant counties, and Western Dallas. Horizontal drilling has enabled production companies to tap more than X.X trillion cubic feet (TCF) in gas reserves and is expected to produce an additional XX TCF of resources.

Woodford Shale

Located in Southwest Oklahoma in the Arkoma and Anadarko basins., more than X,XXX wells have been drilled. Estimates show the Woodford Shale to hold in excess of 4 TCF. Key areas for drilling include McIntosh County, Hughes, and Pittsburgh counties. In the short term, the likely possibility of reduced production in the Woodford Shale is as a result of low natural gas prices.

Haynesville Shale

Located in Northwest Louisiana and more recently in Northeast Texas (Bossier shale), it has been the focus of modern shale gas activity since 2007. Recent economic activity has slowed down the production and capacity of natural gas. Operations and production have slowed down considerably as companies shift to more liquid-rich basins.