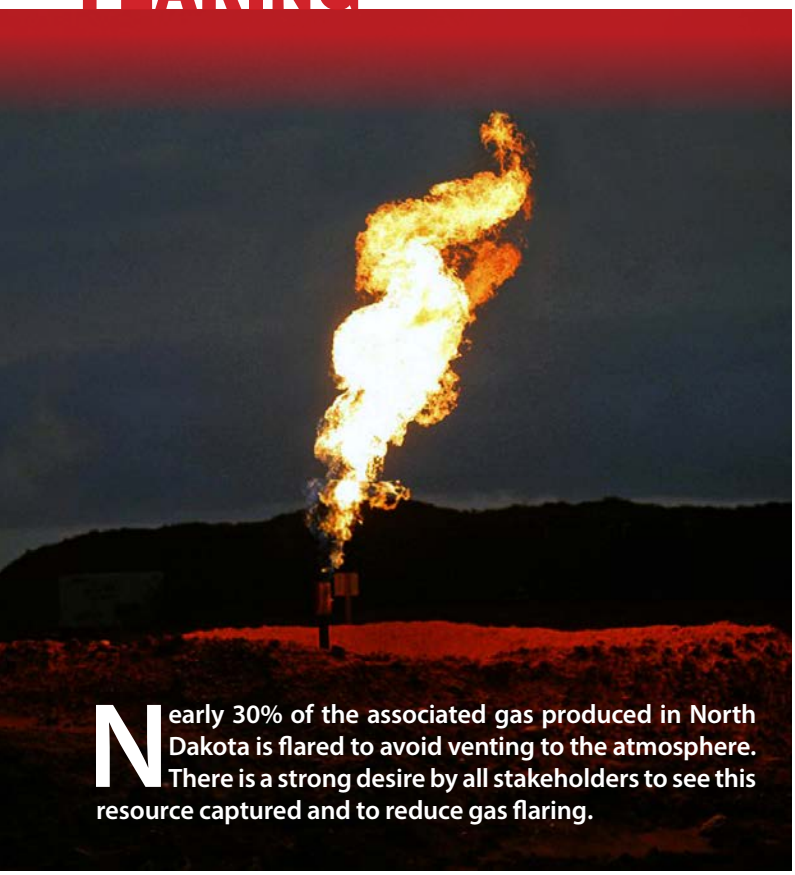
FLARING



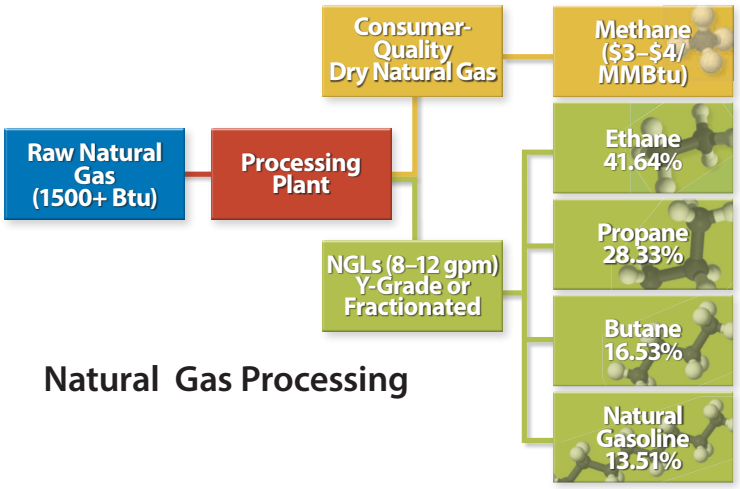
Nearly 30% of the associated gas produced in North Dakota is flared to avoid venting to the atmosphere. There is a strong desire by all stakeholders to see this resource captured and to reduce gas flaring.

What Is Associated Gas?

Crude oil extracted from geologic reservoirs contains a mixture of hydrocarbon molecules. When pumped to the surface, liquid crude oil is separated from hydrocarbon gases at the well site. Oil is stored in tanks until it can be transported from the well site by pipeline or truck. The gaseous fraction or "associated gas" cannot be stored in tanks as easily as liquid hydrocarbons and is typically "gathered" via small, low-pressure pipelines. This associated gas is transported to large gas-processing facilities where the natural gas (methane and some ethane) is separated from the various other gases. The other gases include propane, butane, pentane, and small amounts of hexane and heptane and are called natural gas liquids (NGLs). These can be marketed for further processing in the petrochemical industry.

Why Does Flaring Occur?

Associated gas is flared when oil is produced, but gas-gathering infrastructure (including pipelines, compressor stations, and gas-processing facilities) is insufficient to accommodate the amount of associated gas. This can happen when gas-gathering pipelines



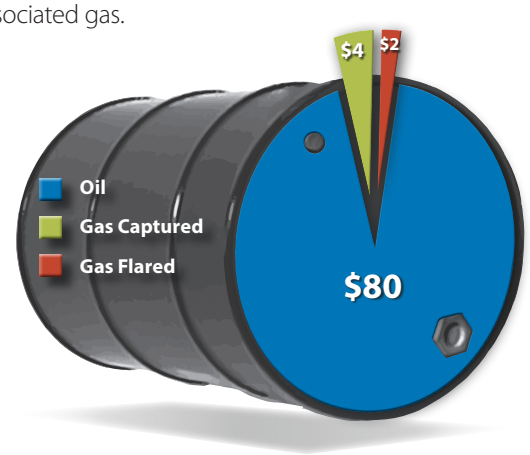
Natural Gas Processing

have not been connected to a well site, when gas-gathering infrastructure has insufficient capacity, or when a process upset temporarily interrupts operation. Under these circumstances, gas separated from produced oil is directed to a flare, to burn unused gas to prevent release to the atmosphere.

Utilizing gas upstream of traditional gathering/processing systems is difficult because of the distributed and transient nature of flared gas. The location of flares changes as new wells are drilled and gathering pipelines installed. Additionally, gas production rates can drop as much as 65% over the first year of production. This dramatic change makes selecting appropriately scaled equipment difficult.

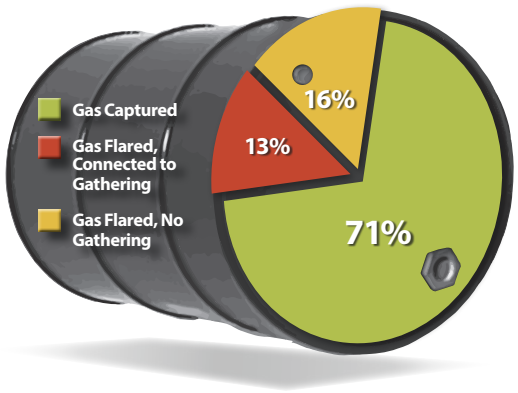
The Bakken is first and foremost an oil play. Associated gas, although valuable, is secondary in value and quantity to oil. A produced barrel of oil in North Dakota contains approximately $80 of oil and $6 of gas. Although the amount and value of gas are lower than oil's, the presence of valuable NGLs creates an incentive to gather and process the associated gas.

Value of Products from One Produced Barrel



In North Dakota, 29% of associated gas produced is flared (as of March 2013). Analysis conducted by the North Dakota Pipeline Authority suggests that nearly one-half of the flared gas is a result of capacity constraints within existing gathering systems. The remainder is flared at wells without pipelines. The flaring rate is down from a peak of 36% in September 2011 and is expected to continue to decrease as more infrastructure is installed. Nearly $4 billion has been spent to expand associated gas-related infrastructure in North Dakota, increasing gas-processing capacity 389% from 2006 to 2012. Today, North Dakota has sufficient gas-processing plant capacity to meet the nearly 900,000 Mcfd of gas production. Additionally, planned expansion will exceed expected gas production over the next several years.

Gas Production, Captured and Flared



There is a desire by all parties to see all associated gas captured and marketed: maximizing profits ensuring efficient use and minimizing environmental impacts. As the Bakken play matures, it is expected that nearly all produced gas will be captured.

How Is Flaring Regulated?

The North Dakota Industrial Commission Oil and Gas Division implements and enforces oil- and gas-related regulations. Typically, state law allows oil production to occur at varying rates during the first several months of operations to determine production rates. Gas can be flared while data are collected to assess the viability and determine gas-gathering capacity requirements. After 12 months of production, the well must be capped, connected to a gas-gathering system, equipped with a value-added process, granted an exemption from the Industrial Commission Oil and Gas Division or must pay taxes and royalties on the flared gas (Section 38-08-06.4 of the North Dakota Century Code, http://northdakotapipelines.com/natgasfacts/).

What Is Being Done to Reduce Flaring in North Dakota?

Rapid Infrastructure Buildout by Industry. As activities in the Bakken continue transitioning from single well pads to in-fill drilling (in which additional wells are drilled at already-producing well sites), gathering infrastructure should be more readily available and reduce the necessity for flaring.

New Technology Investigations. The Energy & Environmental Research Center (EERC) conducted an assessment of alternative gas uses upstream of traditional gas-processing plants. The study investigated using associated gas for power production, transportation fuel, and chemical production, as well as analyzed small-scale gas processing to recover NGLs. Although intriguing, the economic viability of these alternatives was complicated by the distributed and transient nature of flared gas, requiring innovative approaches to effective implementation.

Another project completed by the EERC demonstrated the use of wellhead gas as a fuel for the diesel generators powering drilling rigs. Results from the project indicated that 1.8 billion cubic feet of gas could be used annually to power 200 drilling rigs in North Dakota, saving over $72 million in fuel cost.

Currently, the EERC, Continental Resources, Whiting Petroleum, Marathon Oil, and others are working collaboratively to further improve the efficiency of wellsite operations, including gas use and flaring.

What Should the Public Know about Bakken Flaring?

Of all gas produced, 29% is flared. Nearly 50% of that gas is from wells already connected to gas-gathering networks.

Utilizing gas upstream of traditional gathering/processing systems is difficult because of the distributed and transient nature of flared gas.

The Bakken is first and foremost an oil play. Associated gas, although valuable, is secondary in value and quantity to oil.

North Dakota and oil producers are involved in concerted efforts to reduce the amount of flared gas.

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