Our goal is to raise the level of awareness around the natural gas supply chain among key stakeholders in order to facilitate positive working relationships and more informed decision making.

We understand that effective legislation and regulation can support the responsible development of our nation’s energy resources, when crafted appropriately.

We’ve built redundancy and resiliency into our supply chain in order to prevent incidents and ensure that if events occur, they produce the least possible impact.
• **THREAT:** Natural or man-made occurrence, individual, entity, or action that has or indicates the potential to harm life, information, operations, the environment, and/or property.

• **REDUNDANCY:** The duplication of critical components or functions of a system with the intention of increasing reliability of the system, typically as a backup or fail-safe.

• **RESILIENCY:** The ability to resist, absorb, recover from, or successfully adapt to adversity or a change in conditions.
• Redundancy within the US natural gas supply chain enables critical components to continue to operate in case of disruptions to the system. Examples include:
  o Over 500 natural gas processing plants
  o Over 305,000 miles of natural gas pipeline
  o Over 30 major market hubs
  o Over 400 storage facilities

• The US natural gas supply chain is inherently resilient as a result of its design, which incorporates rapid response capabilities with automatic response triggers.

• The redundancy of components and the resiliency of the system design inhibit traditional chokepoints in the natural gas supply chain.
UNDERSTANDING THE COMPONENTS

PROCESSING PLANT

PIPELINE

REGASIFICATION

STORAGE

FRACTIONATOR

LIQUEFACTION

LIQUEFIED NATURAL GAS SHIPPING

HUB

HUB
PROCESSING PLANT

Overview

Processing plants clean raw natural gas by separating impurities and the various hydrocarbons and fluids from pure natural gas, producing what is known as ‘pipeline quality’ dry natural gas, also known as methane. A fully operational processing plant delivers pipeline quality dry natural gas that can be used as fuel by residential, commercial, and industrial consumers.

STATISTICS

- Over 500 natural gas processing plants in the United States
- Over 16,000 billion cubic feet of natural gas processed in 2012
- Almost 800 million barrels of liquid natural gas extracted in 2012
- Natural gas heats 51% of US homes

KEY TAKEAWAY

We now have a 100-year supply of clean-burning natural gas that we didn't know about just a few years ago. The first-ever natural gas jobs study* found that the natural gas industry supported nearly 3 million jobs and added nearly $385 billion to the national economy in 2008.

*Source: http://www.anga.us/media/content/F7BE35D7-F47C-5BB9-DA1CB373BF8DB3C/files/ihs%20global%20insight%20anga%20u.s.%20economic%20impact%20study.pdf
Overview

The US natural gas pipeline network is a highly integrated transmission and distribution grid that can transport natural gas to and from nearly any location in the contiguous United States. Pipelines can be characterized as interstate or intrastate. Interstate pipelines are long-distance, high-capacity pipelines that transport natural gas throughout the nation. Intrastate pipelines link natural gas producers to local markets as well as the interstate pipeline system.

Statistics

- Over 305,000 miles of natural gas pipeline in the United States
- Over 95% of natural gas used in the United States moves from well to market entirely via pipeline
- Over 11,000 delivery points, 5,000 receipt points, and 1,400 interconnection points that provide for the transfer of natural gas

Key takeaway

Natural gas meets 24% of US energy demand.
Regasification is the process of transforming liquefied natural gas (LNG) into a gaseous state through vaporization, preparing it for use. This process occurs at regasification plants, where the temperature of LNG is increased, typically through seawater vaporizers, transforming it into gas.

**Statistics**

- There are more than 10 regasification terminals in the United States, with an additional eight proposed sites.
- In 2011, the United States imported almost 350 billion cubic feet of LNG.

**Key Takeaway**

Imports of natural gas have decreased more than 50% since 2007 due to the discovery of the shale gas formations along the Northeast’s Appalachian Basin, the deep water of the Gulf of Mexico, and the vast potential of the Arctic and other offshore resources.
Natural gas is stored in three principal types of large underground storage systems: depleted natural gas reservoirs, aquifers, and salt caverns. More than 80% of natural gas storage capability consists of depleted reservoirs, which are relatively easy to convert to storage facilities after use and are typically located near consumption centers and existing pipeline systems. Natural gas can also be stored as liquefied natural gas (LNG), which reduces its volume to 1/600\textsuperscript{th} of the volume of natural gas, making it more efficient and practical to store and transport.

**STATISTICS**
- Over 400 storage facilities in the United States
- Total storage capacity of over 9,000 billion cubic feet

**KEY TAKEAWAY**
Today, many storage facilities operate on an open access basis, especially those sites affiliated with natural gas market centers. Open access allows storage to be used other than as backup inventory or a supplemental seasonal supply source. For example, marketers may move gas into and out of storage as changes in price levels present arbitrage opportunities.
Natural gas hubs are locations where natural gas is priced and traded throughout the country. These ‘market hubs’ are located at the intersection of major pipeline systems. The principal hub within the United States is the Henry Hub in Louisiana.

STATISTICS
- Over 30 major market hubs in the United States
- Almost 25,000 billion cubic feet of marketed production in 2011

KEY TAKEAWAY
Average natural gas spot prices at most major trading points increased 40-60% during the first half of 2013, compared to the same period in 2012, as demand for natural gas outpaced increases in supply.*

*Source: http://www.eia.gov/todayinenergy/detail.cfm?id=12191
The fractionation process is the breaking down of natural gas liquids (NGLs) into their base components in order to be useful, and occurs at a fractionator facility. Common base components of NGLs include ethane, propane, pentane and butane. Fractionation occurs in stages, separating each base component from the stream of mixed NGLs, one-by-one.

Overview

STATISTICS
- Of the more than 16,500 billion cubic feet of natural gas processed in 2011, almost 800 million barrels of liquids were extracted
- US natural gas plant liquids proved reserves rose from 8,557 million barrels in 2009 to 9,809 million barrels in 2010 – an increase of 15%

KEY TAKEAWAY
The sustained lower price environment for natural gas relative to oil has encouraged operators to shift drilling and development programs toward "liquids-rich" areas within shale gas plays that offer a higher yield of NGLs and crude oil.
Liquefaction is the physical conversion of a gas into a liquid state. Liquefaction occurs at normal atmospheric pressure by supercooling the natural gas to -260°F, creating liquefied natural gas (LNG). Prior to liquefaction, certain unwanted components, such as dust, acid gases, helium, water, and heavy hydrocarbons, are removed as they can cause difficulty downstream.

**Overview**

LNG exports will drive additional US natural gas production, which will support the creation of thousands of additional jobs. An IHS Global Insight report* on the economic impacts of shale gas estimates that for every 1 billion cubic feet per day of shale gas production, approximately 32,000 jobs are supported throughout the economy.

LIQUEFIED NATURAL GAS SHIPPING

Overview

Liquefied natural gas (LNG) shipping provides a low-cost, safe, and environmentally responsible method to move large volumes of product long distances. LNG is transported in specially-built tanks on double-hulled ships. LNG carriers are among the safest in the shipping industry, having made more than 100,000 voyages without major incident.

STATISTICS

- In liquid state, the volume of natural gas shrinks by approximately 600 times, creating easier storage and transport for marine shipments
- As of 2011, there were over 350 ships engaged in the deep sea movement of LNG

KEY TAKEAWAY

Marine shipping is the most economical mode of commercial freight transportation, due to the enormous capacity of tankers and barges. The industry allows the United States to take advantage of its 25,000-mile waterway system and adds $5 billion a year to the US economy.
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For more information on the visual depiction of this supply chain model, please contact:

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