



## PEG BOARD MEMBERS

James T. Sprouse, Jr. (York)

M. Brian Hall, III (York)

Jason P. Stewart (Chester)

Linda H. Short (Chester)

Rocky A. Hudson (Lancaster)

David Knight (Lancaster)

## OFFICERS

James T. Sprouse, Jr.  
President & Chairman

Jason P. Stewart, PE  
Vice President & Vice Chairman

Rocky A. Hudson  
Secretary/Treasurer

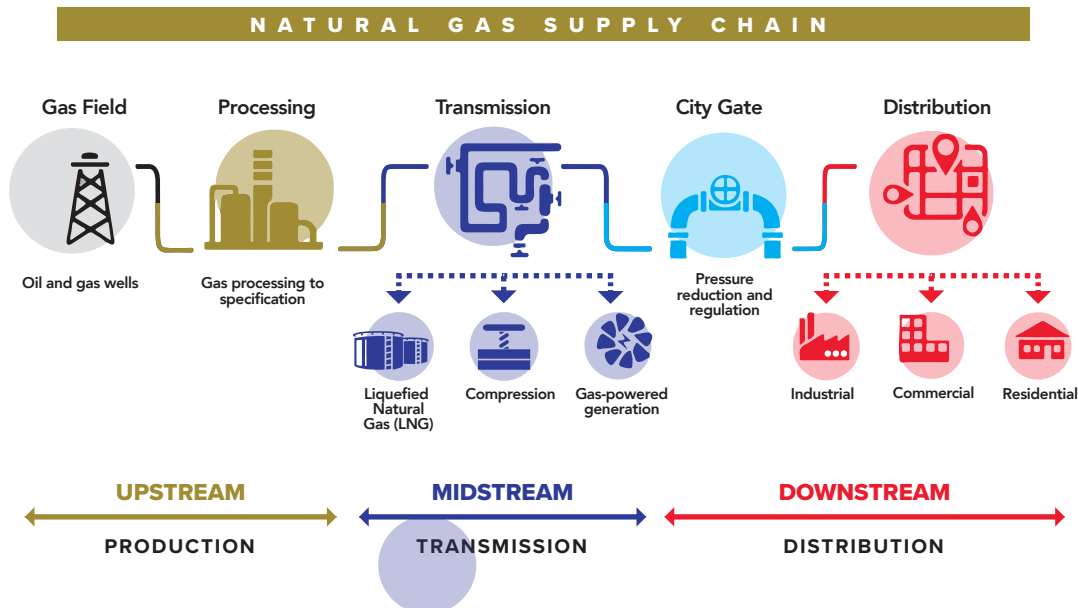
Jeffrey L. Deason, CPA, CFE  
Chief Financial Officer

## EXECUTIVE DIRECTOR

Michael E. Enoch

# Transporting Natural Gas

**T**ransporting natural gas from the wellhead to the final customer involves several physical transfers of custody and multiple processing steps. In this edition of the Patriots Press we go step-by-step through the supply side of the natural gas commodity. Each and every day we must match up the natural gas supply with the natural gas pipeline capacity to provide our customers with **clean, dependable natural gas**.



# How Do We Get Natural Gas to Our Customers



## Exploration/Production

The technique of locating natural gas and petroleum deposits has changed considerably in the last 20 years. In the early days of the industry, the only way of locating underground petroleum and natural gas deposits was to search for surface evidence of these underground formations. The biggest breakthrough in petroleum and natural gas exploration came through the use of basic seismology. Two of the biggest breakthroughs include 3-D Seismic Imaging and 4-D Seismic Imaging.

Natural gas wells can be drilled vertically and horizontally into natural gas formations. In conventional natural gas deposits, the natural gas generally flows easily up through wells to the surface. In the United States and in a few other countries, natural gas is produced from shale and other types of sedimentary rock formations by forcing water, chemicals, and sand down a well under high pressure. This process is called hydraulic fracturing or fracking. Fracking breaks up the formation, releases the natural gas from the rock, and allows the natural gas to flow to wells, and up to the surface.

## Gas Processing Plant & Gathering Systems

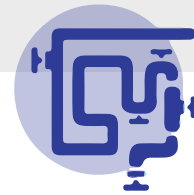


Natural gas, as it exists underground, is not exactly the same as the natural gas that comes through the pipelines to our homes and businesses. Major transportation pipelines impose restrictions on the make-up of the natural gas that is allowed into the pipeline. That means that before natural gas can be transported it must be purified. Natural gas processing consists of separating all of the various hydrocarbons and fluids (ethane, propane, butane, iso-butane, pentanes and natural gasoline) from the raw natural gas, to produce what is known as 'pipeline quality' dry natural gas.

A gathering system is usually a low pressure network of gas lines from wells that will aggregate into larger gas lines. This system may need one or more field compressors to move the gas to the processing plant, pipeline or injection point.

“  
NATURAL GAS HAS TWO  
SETS OF COMMODITIES.  
THE SUPPLY OF NATURAL GAS  
AND THE CAPACITY IN THE  
PIPELINES.  
”

## The Interstate Transmission System



From the process plant and gathering system, the natural gas moves into the transmission natural gas pipeline system, which is composed of high-strength, large diameter steel pipes. These transmission pipelines are similar to the interstate highway system as they move large amounts of natural gas thousands of miles from the producing regions to main customer consumption areas. They are designed and constructed to safely handle higher pressure than what is ever actually reached in the system. Some major interstate pipelines are "looped," meaning there are two or more lines running parallel to each other in the same right of way. This provides maximum capacity during periods of peak demand and makes efficient use of right-of-ways.

Line pipe is covered with a specialized coating to ensure that it does not corrode once placed in the ground. The purpose of the coating is to protect the pipe from moisture, which causes corrosion and rusting. There are a number of different coating techniques. Pipes are often protected with what is known as a fusion bond epoxy, which gives the pipe a noticeable light blue/ green color. In addition, cathodic protection is required; which is a method of circulating an electric current through the pipe and soil to ward off corrosion and rusting.

## Natural gas can also be stored for times of peak demand

Demand for natural gas fluctuates daily and seasonally, especially in the cold of winter, while production and pipeline imports are relatively constant in the short term. Storage of natural gas during periods of low demand helps ensure that sufficient supplies of natural gas are available during periods of high demand. Natural gas may be stored in large volumes in underground facilities.







## Compressor Stations

Natural gas is highly pressurized as it travels through an interstate pipeline. To ensure that the volume of natural gas flowing through any one pipeline remains pressurized and can be delivered, compression of this natural gas is required along most pipeline routes. This is accomplished by compressor stations. The natural gas enters the compressor station, where it is compressed by either a turbine, motor, or engine and exits at higher pressure and higher volume.

In addition to compressing natural gas, compressor stations typically contain some type of liquid separator, much like the ones used to dehydrate natural gas during its processing. The liquid separators at compressor stations ensure that the natural gas in the pipeline is as pure as possible, and acts as a filter for the gas prior to compression.

## Valves

Interstate pipelines include a great number of valves along their entire length. These valves work like gateways that are normally open to allow the free flow of natural gas, or can be closed to stop the flow of gas along a certain section of pipe.

“

MOST CUSTOMERS DON'T REALIZE THE EFFORT, TIME AND COORDINATION THAT GO INTO SUPPLYING CLEAN, RELIABLE NATURAL GAS ENERGY ON A DAILY BASIS.

”



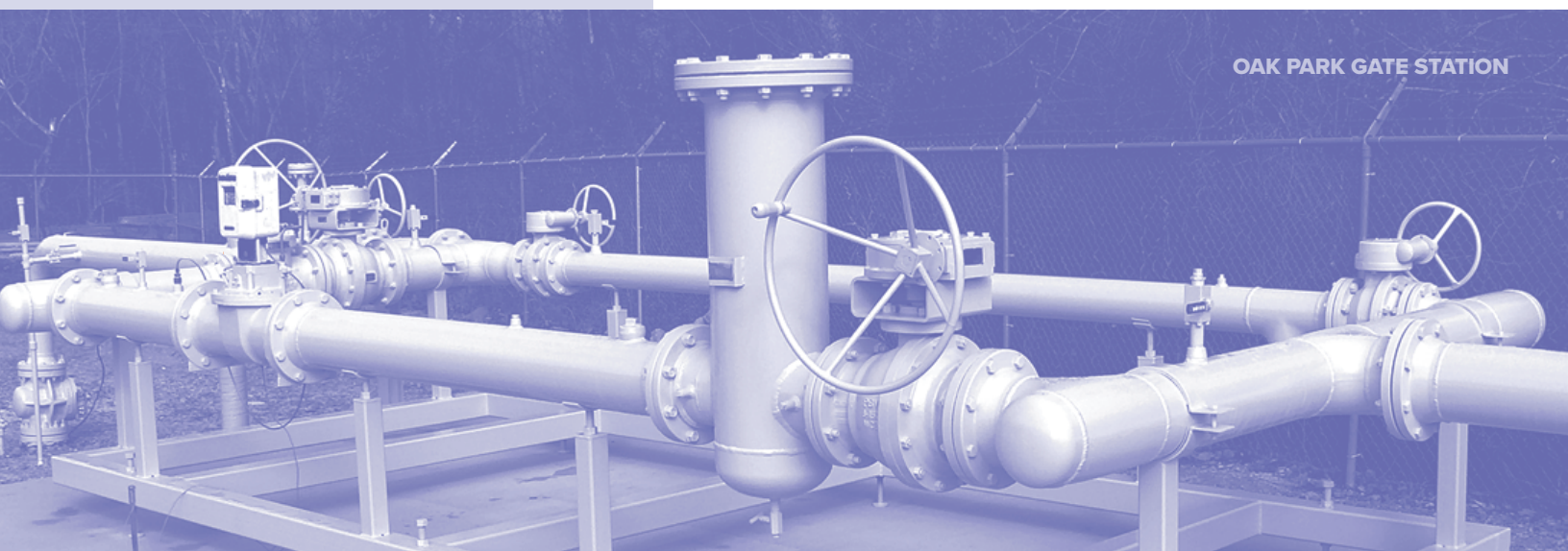
## Metering Stations

In addition to compressing natural gas to push it through the pipe, metering stations are placed periodically along interstate natural gas pipelines. These stations allow pipeline companies to monitor the natural gas flowing in their pipes. Essentially, these metering stations measure the flow of gas along the pipeline, and allow pipeline companies to track natural gas as it flows along the pipeline.



## Gate Stations

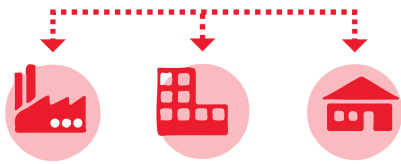
When the natural gas in a transmission pipeline reaches a local gas utility, it normally passes through a gate station. Utilities frequently have gate stations receiving gas at many different locations and possibly from different pipelines. Gate stations serve three purposes. First, they reduce the pressure in the line from transmission levels to distribution levels. Then an odorant, the distinctive sour scent associated with natural gas, is added so that consumers can smell even small quantities of gas. Finally, the gate station measures the flow rate of the gas to determine the amount being received by the local utility so a bill can be generated.





## The Distribution System

From the gate station, natural gas moves into distribution lines or "mains" that range in various sizes in diameter. The gas utility must ensure that the gas reaches each customer with sufficient flow rate and pressure to fuel equipment and appliances. They also ensure that the pressures stay below the maximum pressure for the monitored sections within the system. Within each distribution system, there are sections that operate at different pressures, with regulators controlling the pressure. As gas flows through the system, regulators control the flow from higher to lower pressures.

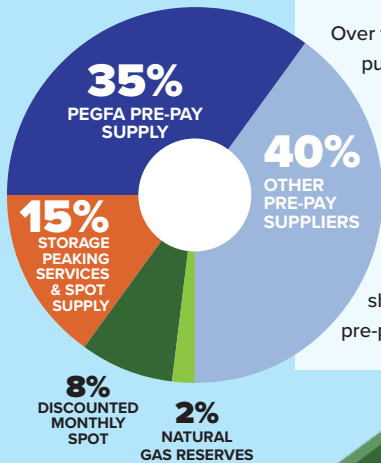


## Moving Natural Gas into the Home

Natural gas runs from the main into a home or business through a service line. Typically, the natural gas utility is responsible for maintaining and operating gas pipeline and facilities up to the residential gas meter. All equipment and gas supply lines downstream of the residential meter are the responsibility of the customer. When the gas reaches a customer's meter, it passes through another pressure regulator to reduce its pressure by either 1/4 pound or in some homes, 2 pounds. The delivery pressure is determined by the type of meter, house piping and gas load size. When a water heater, gas furnace, gas dryer or stove is turned on, the gas pressure is slightly higher than the air pressure, so the gas flows out of the burner and ignites in its familiar clean, blue flame.

# The Natural Gas Journey

FROM WELLHEAD TO BURNER TIP



### FIRST WE SHOP

Over the last 12-months we purchased 100% of our natural gas domestically from a variety of sources. We utilize a portfolio approach to our purchases. We purchased natural gas under a number of short-term and long-term pre-pay arrangements.

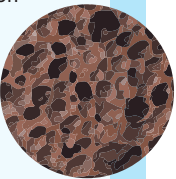


### THEN WE SHIP

Natural gas comes to the Authority's service area through a vast network of underground interstate pipelines. These pipelines have huge compressor stations with many engines that keep the natural gas moving to keep up with the demand. Once in SC the natural gas is delivered to PEG's transmission lines and ultimately to the Gas Authorities. We have capacity contracts on each of the interstate pipelines to transport our natural gas.

### IT WAITS IN STORAGE

PEG owns storage space on the interstate pipeline network. We store natural gas by injecting it into natural gas porous rock formations and at a LNG (Liquefied Natural Gas) facility strategically located on the interstate pipeline system. We utilize these assets to supplement our firm capacity during extremely cold weather events.



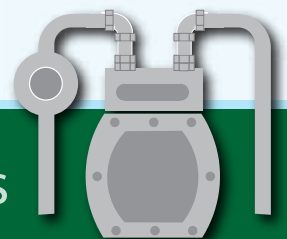
### PASSING THROUGH

Before natural gas arrives at your home, it passes through a city gate. The gas is measured for billing purposes, pressure is reduced, and an odorant is added that smells like rotten eggs for safety purposes.



### NICE TO MEET YOUR METER

Distribution lines carry natural gas to the service line that is connected to the meter. The meter (cash register) measures how much gas is used and feeds the natural gas line that enters your home.



PatriotsPress