Natural Gas TODAY

For Municipal Gas Systems

Inside This Issue…

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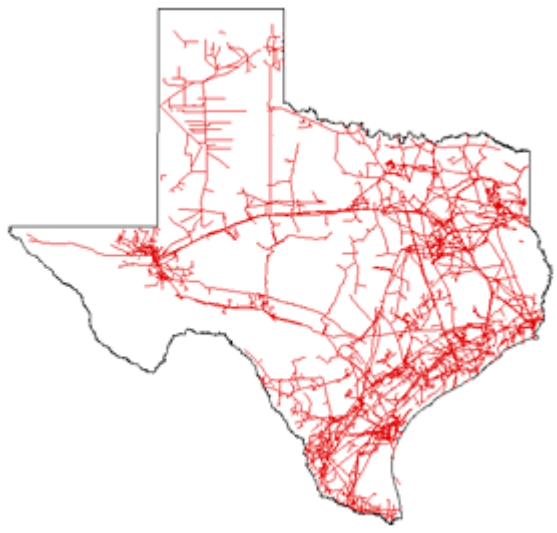
About U.S. Natural Gas Pipelines—Transporting Natural Gas

Part 2 of 7

Courtesy of the Energy Information Administration

Texas has more intrastate natural gas pipeline miles (over 43,000) than any other state.



Intrastate natural gas pipelines operate within State borders and link natural gas producers to local markets and to the interstate pipeline network. Approximately 29 percent of the total miles of natural gas pipeline in the U.S. are intrastate pipelines.

Although an intrastate pipeline system is defined as one that operates totally within a State, an intrastate pipeline company may have operations in more than one State. As long as these operations are separate, that is, they do not physically interconnect, they are considered intrastate, and are not jurisdictional to the Federal Energy Regulatory Commission (FERC). More than 90 intrastate natural gas pipelines operate in the lower-48 States.

Selected State Highlights —

- **Texas**:
  - Texas is the top ranked natural gas consuming State.
  - Intrastate pipelines in Texas account for 43,000 of the 57,000 miles of natural gas pipelines in the State.
  - The largest intrastate pipelines in Texas are Enterprise Texas Pipeline Company (7,500 miles) and the Atmos Pipeline-Texas Company (6,200 miles).
  - The intrastate network in Texas has experienced significant growth over the past several years as a result of increased demand for pipeline capacity caused by the rapid development and expansion of natural gas production in the Barnett Shale Formation.
  - New pipelines have been built, and expansions to existing ones undertaken, to meet increased demand.
- **California**:
  - California is ranked the second largest natural gas consuming State.
  - Intrastate transportation and distribution are dominated by California Gas Transmission Co. (PG&E) (3,477 miles), Southern California Gas (SoCal) Company (1,887 miles), and the San Diego Gas and Electric Company.
  - SoCal and PG&E are two of the largest distribution companies in the entire United States.
- **Wyoming, Colorado, and Utah**:
  - Development of new, large-diameter intrastate gathering pipelines is proceeding at a fast pace in this area, as proved reserves of coalbed methane, tight sands, and conventional natural gas supplies are being developed.
  - During the past several years, at least 7 large-capacity pipeline header systems have been built in Wyoming to transport natural gas from local gathering systems.
  - In western Colorado and eastern Utah, several new gathering systems have been developed to feed gas into the interstate pipeline network.
  - The Overland Trails Transmission Company and the Rocky Mountain Natural Gas Company are the principal intrastate pipelines in this area, and provide some of the primary links between expanding natural gas production fields in the area and the interstate pipeline network.

In some instances, an intrastate natural gas pipeline may also be classified as a “Hinshaw” pipeline. Although such pipelines reserve all of their supplies from interstate pipeline sources, and therefore fall within FERC’s regulatory overview, they have been exempted from its jurisdiction because the gas they deliver is consumed totally within the state in

Continued on page 4A.

2012 Summer Outlook Shows Natural Gas Breaking New Ground

Consumers to benefit from supply, storage and prices as production sets new records.

Courtesy of Natural Gas Supply Association

A newly released 2012 Summer Outlook by the Natural Gas Supply Association indicates that record-setting U.S. natural gas production and storage are expected to benefit all consumers of natural gas this summer, from large consumers, such as electric power plants and industrial facilities, to smaller businesses and households.

The NGSA 2012 Summer Outlook analysis examined publicly available data on individual factors that influence supply and demand, and projected their combined potential effect on natural gas prices for the coming summer. It also identified emerging trends to watch,

R. Skip Horvath, president and CEO of NGSA, said, “This summer we are witnessing the dawn of a new era for natural gas producers and consumers, with natural gas breaking new ground in many different ways. Not only is natural gas enabling new, expanded and re-opened industrial facilities, we’re producing and storing record amounts of natural gas and generating increased amounts of electricity. This is good news for households, the environment and American business.”

NGSA’s 2012 Summer Outlook said record-breaking natural gas production is contributing to a manufacturing renaissance as industries use the competitive advantage offered by ample supply and low natural gas prices in the U.S. to build, re-open and expand fertilizer, petro-chemical and steel facilities. NGSA listed 11 major industrial projects completed or expected to be completed by 2012 and an additional 12 projects to be built by 2017, including a natural gas-to-liquids facility.

NGSA forecasted that electric utilities will use 17 percent more natural gas (3.9Bcf/day) this summer than last summer because of fuel-switching due to current low natural gas prices. NGSA said electric utilities will double the amount of switching from coal to natural gas-fired power plants compared to last summer, accounting for 6.1 Bcf/day of natural gas compared to last summer’s 2.9 Bcf/day. This would make 2012 the fourth consecutive summer of coal-to-gas switching and the largest amount of switching yet.

Continued on page 3A

EXTENDED-RANGE FORECAST OF ATLANTIC SEASONAL HURRICANE ACTIVITY AND LANDFALL STRIKE PROBABILITY FOR 2012

By Philip J. Klotzbach and William M. Gray

Information obtained through May 2012 indicates that the 2012 Atlantic hurricane season will have slightly less activity than the average 1950-2000 season. We estimate that 2012 will have about 5 hurricanes (average is 5.9), 13 named storms (average is 9.6), 50 named storm days (average is 49.1), 18 hurricane days (average is 24.5), 2 major (Category 3-4-5) hurricanes (average is 2.3) and 4 major hurricane days (average is 5.0).The probability of U.S. major hurricane landfall is estimated to be about 90 percent of the long-period average. We expect Atlantic basin Net Tropical Cyclone (NTC) activity in 2012 to be approximately 90 percent of the long-term average. We have increased our numbers slightly from our early April forecast, due largely to our uncertainty as to whether El Nino conditions may be issued prior to the next forecast update on August 3 if conditions warrant.
This forecast is based on a new extended-range early June statistical prediction scheme that utilizes 29 years of past data. Analog predictors are also utilized. Overall conditions are expected to lead to a slightly below-average hurricane season.

ATLANTIC BASIN SEASONAL HURRICANE FORECAST FOR 2012

Forecast Parameter and 1981-2012 Median (in parentheses)	Issue Date 4 April 2012	Issue Date 1 June 2012
Named Storms (NS) (12.0)	10	13*
Named Storm Days (NSD) (60.1)	40	50
Hurricanes (H) (6.5)	4	5
Hurricane Days (HD) (21.3)	16	18
Major Hurricanes (MH) (2.0)	2	2
Major Hurricane Days (MHD) (3.9)	3	4
Accumulated Cyclone Energy (ACE) (92)	70	80
Net Tropical Cyclone Activity (NTC) (103%)	75	90

PROBABILITIES FOR AT LEAST ONE MAJOR (CATEGORY 3-4-5) HURRICANE LANDFALL ON EACH OF THE FOLLOWING UNITED STATES COASTAL AREAS:

1. Entire U.S. coastline - 48% (average for last century is 52%)
2. U.S. East Coast Including Peninsula Florida - 28% (average for last century is 31%)
3. Gulf Coast from the Florida Panhandle westward to Brownsville - 28% (average for last century is 30%)

PROBABILITY FOR AT LEAST ONE MAJOR (CATEGORY 3-4-5) HURRICANE TRACKING INTO THE CARIBBEAN (10-20°N, 60-88°W)

1. 39% (average for last century is 42%)

Special Note

*Our early June forecast includes Tropical Storms Alberto and Beryl which formed prior to 1 June. Our prediction for the remainder of the season is for eleven additional post-1 June named storms.
Pre-1 June activity has very little bearing on the rest of the hurricane season. The only two seasons on record with two named storms prior to 1 June were 1887 and 1908. While 1887 was a very active season, 1908 had average levels of activity. The last season with a U.S. landfall prior to 1 June was 1976, which was a relatively quiet season.

Refuse Companies Nationwide Switching to Trucks Fueled by CNG

Courtesy of Nicor Gas

There are nearly 180,000 refuse trucks operating in the U.S., burning approximately 1.2 billion gallons of diesel fuel per year, and releasing almost 27 billion pounds of greenhouse gases (CO_2).
Every gallon of diesel fuel burned emits more than 22 pounds of CO_2. In addition to contributing to global climate change, diesel-fueled trash trucks pose a health threat to city populations from both harmful emissions and engine noise. These problems can be reduced or eliminated by switching to trucks fueled by compressed natural gas (CNG):

* Particulate matter is reduced by 67% to 94%
* Nitrogen oxides (NOx) are reduced by 32% to 73%
* Non-methane hydrocarbons are reduced by 69% to 83%
* Carbon emissions are reduced by 20%
*Noise in decibels is decreased by 50% (behind), 90% (inside), and 98% (beside)
* Water pollution in the form of organics is eliminated

In the United States, there are at least 4,000 refuse trucks in operation that run on CNG or liquefied natural gas (LNG) . California leads the way with the help of the South Coast Air Quality Management District, who mandated the switch to all CNG refuse trucks by 2020. Culver City, California was one of the first municipalities to replace CNG refuse trucks with new CNG vehicles. Other states have similar mandates, including Texas, New York, Georgia, and Florida.

Other Benefits

Though the price for a natural gas truck is $30,000 to $50,000 higher than a diesel truck, the higher cost is offset by both lower fuel costs and maintenance costs (fewer oil changes, no particulate filters, less carbon buildup). In one case, fewer oil changes resulted in savings of $400 to $800 per truck annually. Other advantages include a healthier environment for drivers (no diesel emissions or fumes) and trucks are more reliable than those that run on diesel.
Natural gas prices range from $1.50 to $2 per gallon equivalent, while diesel fuel is typically over $3 per gallon. According to the January 2012 Clean Cities Alternative Fuel Price Report, the average price for diesel and CNG was $3.86 and $2.13, respectively. The U.S. Energy Information Administration predicts, as of March 6, 2012, the average retail price of on-highway diesel fuel for March through December 2012 is $3.92 per gallon, and the average for 2013 is $4.11 per gallon. One company saves about $1,000 a month in fuel costs per truck over diesel. There are also economic incentives available for natural gas use.

Continued on page 3A

2012 Summer Outlook Shows Natural Gas Breaking Ground

Continued from page 1A

Assessing the five key published factors that comprise the Outlook– weather, economy, customer demand, storage and production—NGSA's 2012 Summer Outlook said that, when combined, the five key factors will likely place overall downward pressure on natural gas prices this summer compared to the summer of 2011 when the average Henry Hub price was $4.15 per MMBtu. NGSA's analysis of individual factors showed:

Weather—Milder summer weather is expected to place downward pressure on prices compared to last summer. The trade group noted that the summer of 2011 was 13 percent warmer than the 30-year average. In contrast, the firm Energy Ventures Analysis predicts summer 2012 weather that is 2 percent cooler than the 30-year average and 13 percent cooler than last summer.

Demand– Demand is the only factor expected to place upward pressure on prices this summer. Customer demand for natural gas is expected to increase by 8 percent overall, compared to last summer. Demand from the electric sector is projected to increase by 17 percent because of price-sensitive generators switching to natural gas. Industrial demand is expected to grow about 1 percent this summer compared to last summer.

Storage– Storage started the 2012 injection season at a record of nearly 2,500 Bcf, considerably fuller than the almost 1,600 Bcf in storage at the beginning of 2011's injection season. Although weekly storage injections are expected to be smaller summer-over-summer, NGSA still projects that storage will reach a record 4.150 Bcf by the end of the injection season, placing downward pressure on prices compared to summer of 2011.

Production– Robust production is expected to exert downward pressure on prices. The Outlook forecasted overall production at 65.8 Bcf/day this summer, compared to last summer's average daily production of 63.2 Bcf/day. Although the rig count for natural gas currently hovers around 600 compared to last summer's count of 893, production is being supported by drilling for oil and valuable liquids often found with associated natural gas.

The 2012 Summer Outlook report cautioned that natural disasters or big weather surprises, changing fuel switching economics, manufacturing exceeding expectations or production change resulting from changes in liquids prices are "wild cards" that could affect the summer outlook.

Refuse Companies Nationwide Switching to Trucks Fueled by CNG

Continued from page 2A

Natural gas can be purchased with long-term supply contracts, insulating large fleets from market fuel price volatility and ensuring more consistent operating costs. Natural gas is also taxed at a lower rate than diesel in many states.

There is a wide range of natural gas trucks to choose from since all major refuse truck manufacturers now offer natural gas. Engine technology continues to improve with performance regarding low-end torque equal to or better than diesel. A new 400-hp engine under development has 1,450 ft-lbs of torque that requires a single fuel source and can run on either CNG or LNG. CNG tanks have also been introduced that maximize on-board storage capacity for greater driving range.

Energy Quiz

1. At what temperature in degrees Fahrenheit is liquefied natural gas (LNG) transported?
   A. Absolute zero
   B. –260 degrees F (162.2 degrees C)
   C. 32 degrees F (0 degrees C)
   D. 98 degrees F (37 degrees C)

2. What year was the Natural Gas Act passed?
   A. 1920
   B. 1933
   C. 1938
   D. 1965

3. Which of these is NOT one of the top four oil-producing states in the U.S.?
   A. Texas
   B. Alaska
   C. Pennsylvania
   D. Oklahoma

4. What year was the Federal power Act passed?
   A. 1895
   B. 1920
   C. 1952
   D. 1975

5. Which fuel is used most for generating electricity in the world?
   A. Oil
   B. Coal
   C. Nuclear
   D. Natural Gas

6. What percentage of the United States' natural gas comes from liquefied natural gas (LNG)?
   A. 1%
   B. 2%
   C. 5%
   D. 10%

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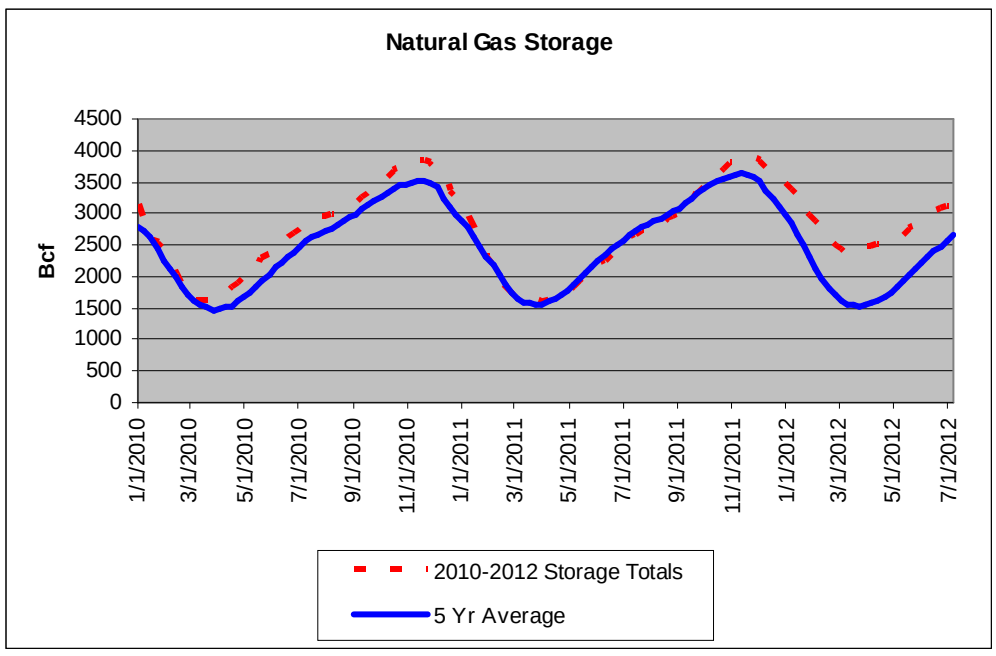
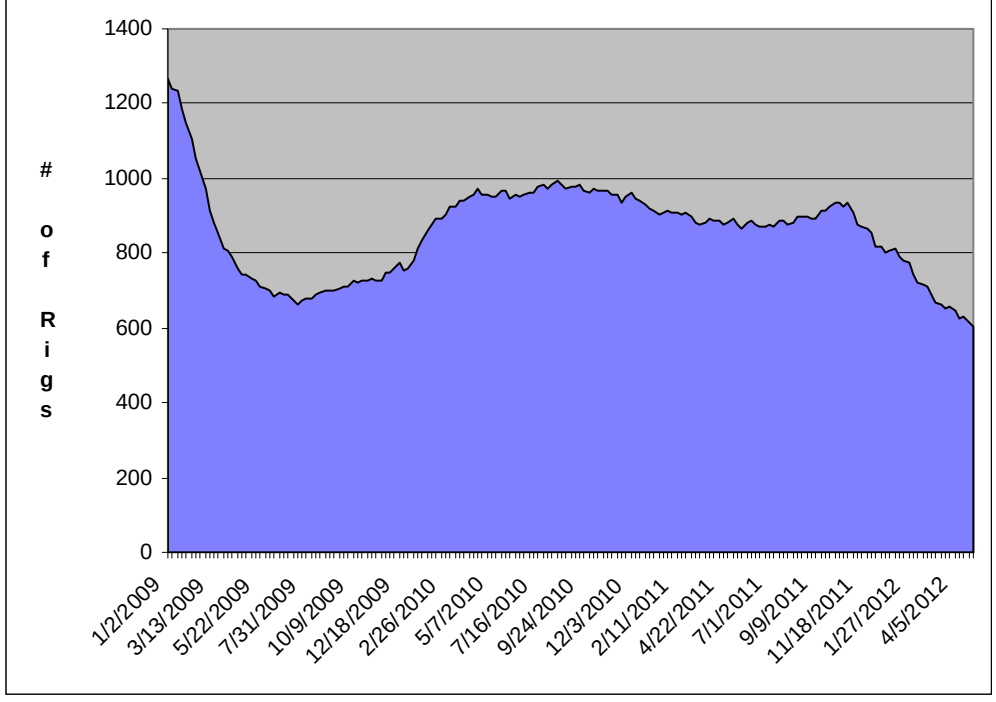
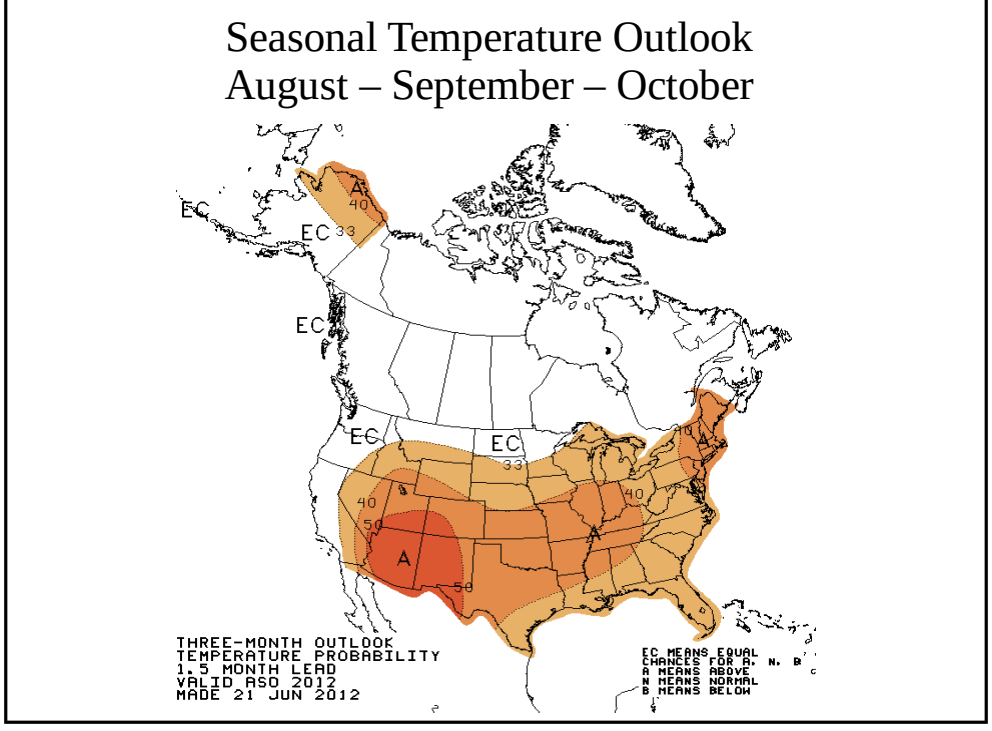
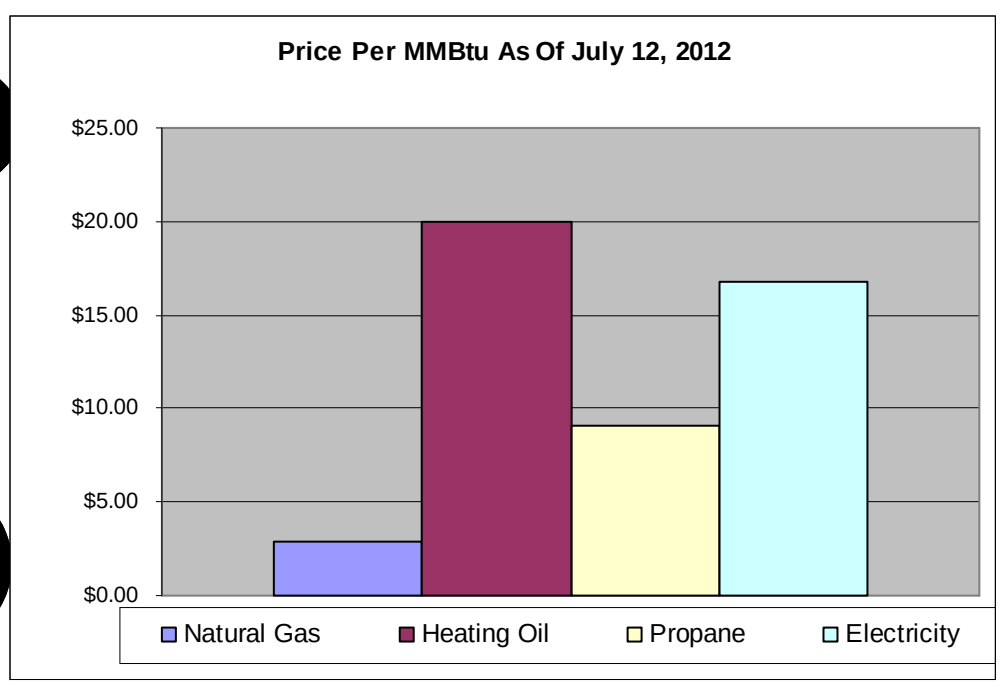
Snapshots









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GARY DENNISON - IMGA Sales Manager
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More unhappy with your natural gas prices?

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Natural Gas Pipelines

Continued from page 1A

which they operate.

Network Configuration and System Design
Overview

A principal requirement of the natural gas transmission system is that it be capable of meeting the peak demand of its shippers who have contracts for firm service.
To meet this requirement, the facilities developed by the natural gas transmission industry are a combination of transmission pipelines to bring the gas to the market areas and of underground natural gas storage sites and liquefied natural gas (LNG) peaking facilities located in the market areas.

Sizes of Transmission Lines and Integrated Storage Sites

The design of natural gas transmission pipelines and integrated storage sites represents a balance of the most efficient and economical mix of delivery techniques given the operational requirements facing the pipeline company, the number and types of transportation customers, and available access to supplies from production areas or from underground storage.
Many natural gas pipeline systems are configured principally for the long-distance transmission of natural gas from production regions to market areas. These long-distance systems are often referred to as trunklines.
At the other extreme are the grid systems, which generally operate in and serve major market areas. Many of the grid systems can be categorized as regional distribution systems. For the most part, they receive their supplies of natural gas from the major trunklines or directly from local production areas. The grid systems transport natural gas to local distribution companies and large-volume consumers.

Design Criteria and Pipeline Size

The design process includes the development of cost estimates for various possible combinations of pipe size, compression equipment, and inter-station distances to find the optimal combination that minimizes the transportation cost, given the desired flexibility and expandability goals.

New trunklines typically are built with a larger diameter pipe than will be needed initially but with compression capacity limited to meeting current needs. Compressors can be added, in either new or existing stations, to increase capacity as growth in load occurs.
A number of factors are involved in calculating how much natural gas a pipeline can carry. However, the most important factors are the diameter of the pipe and its operating pressure.
Standard design codes require that all pipelines passing through populated areas reduce its maximum operating pressures for safety reasons.
It had become common practice to maintain nominal pipe diameter but increase wall thickness where a line had to be derated for its surroundings (change in external stresses due to earth or traffic loads) in order to keep the working pressure rating more constant along the line. Increasing the pipe wall thickness or strength of the pipe will enable the pipe to withstand a greater pressure between operating and design pressure to adhere to safety requirements.

Importance of Underground Storage Integration

Underground storage is an essential component of an efficient and reliable interstate natural gas transmission and distribution network. The size and profile of the transmission system often depends in part on the availability of storage.
Access to underground natural gas storage facilities, particularly those located in consuming areas, permits the mainline transmission pipeline operator to design the portion of its system located upstream of storage facilities to accommodate the level of total shipper firm (reserved) capacity commitments and the pipeline operator's potential storage injection needs, commonly referred to as "baseload" requirements.
The portion of the transmission system located downstream of the storage area (including LNG peaking facilities) is designed to accommodate the maximum peak-period requirements of shippers, local distribution companies, and consumers in the area. It is generally sized to reflect the total peak-day withdrawal (deliverability) level of all storage facilities linked to the system and estimated potential peak period demand requirements.

The daily deliverability from storage can also be factored into the design needs of a new pipeline or the expansion needs of an existing one. Some underground storage facilities are located in production areas at the beginning of the pipeline corridor and, in contrast to storage near consuming markets, can be used to store gas that may not be marketable at the time of production.
For instance, natural gas produced in association with oil production is a function of oil market decisions, which may not coincide with natural gas demand or available pipeline capacity to transport the gas to end-use markets. Another example is the storage of natural gas produced from low-pressure wells, which may be injected into storage during the off-peak season and delivered, at high pressure, to the mainline during the peak season.
These sites can be used by shippers to store short-term incremental supplies that exceed their reserve capacity on the pipeline system and the reverse when supplies fall below reserved capacity, Thus, the pipeline is relieved of additional demands for capacity brought on by temporary swings in the transportation demands of its customers.

Overall Pipeline System Configuration

The overall pipeline system configuration should result in a comparatively lower usage level (load factor) for downstream facilities in the summer season but a much higher, albeit shorter term, usage level during the peak-demand season. The upstream trunkline portion of the system, on the other hand, could operate at a more sustained high load factor throughout the year. (This design minimizing is oftentimes referred to as peak-shaving.)
With underground natural gas storage and LNG peaking facilities configured into a natural gas pipeline system, especially one serving climate-sensitive markets such as the Midwest and Northeast, system operators can minimize the facilities and costs involved in building the "trunkline" portion of their system. Natural gas shippers, on the other hand, could avoid unnecessary costs incurred if they reserved additional firm capacity on an entire transmission system, rather than only a portion that would be used only on a few days during the winter season.
During the nonheating season, for instance when shippers do not need all the contracted capacity to meet their customer's current consumption requirements, natural gas can be transported and injected into storage. By the beginning of the heating season (November 1), inventory levels are generally at their annual peak. Working gas, the portion of natural gas in storage sites available for withdrawal and delivery to markets, is then withdrawn during periods of peak demand.
In addition, the pipeline company can avoid the need to expand transmission capacity from production areas by using existing, or establishing new storage facilities in market areas where there is a strong seasonal variation in demand and where the system may be subjected to operational imbalances.

Energy Quiz

Continued from Page 3A

7. What is CO2?
   A. Colorado squared
   B. Carbon dioxide
   C. Table salt
   D. Natural gas

8. If all of the sun's energy that strikes the earth in one hour could be converted to useful energy, how long would that supply the globe's energy consumption?
   A. 1 day
   B. 1 week
   C. 1 month
   D. 1 year

9. True or False: There is demonstrated evidence that using a cell phone at a gas pump can cause an explosion.
   True
   False

10. What unit of measurement equals the amount of heat required to raise the temperature of one pound of water one degree Fahrenheit?
   A. 1 volt
   B. 1 British thermal unit
   C. 1 amp
   D. watt

Answers for energy quiz.
1. B; 2. C; 3. C; 4. B; 5. B; 6. A; 7. B; 8. D; 9. F; 10. B

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