

stored. Today, there are 38 such market centers in operation in the United States and Canada.

Storage and Distribution

When natural gas reaches its destination from a pipeline, it is often stored before it is distributed to the end-user. Storage facilities allow the gas utilities to stockpile gas during warmer weather, in preparation for the surge in demand during the Winter. There are more than 400 underground storage sites in the United States and Canada. These storage sites are of three main types: depleted reservoirs in oil and/or gas fields, aquifers, and salt caverns. Each type of site has its own advantages and disadvantages, but all are able to retain injected gas, and allow that gas to be retrieved when needed.

The last phase of the natural gas system is the distribution of the gas to the end-user, be it a residence, a business, or an industrial facility. This gas is also delivered via pipeline networks, which run from the local gas companies to each customer.

In some cases, it is not feasible to move gas by pipeline. The cost of building a pipeline to move gas produced in Indonesia to market in Europe, for example, is prohibitive. In such cases, the gas is liquefied, which reduces its volume to about one-sixthundredth of its gaseous state. This is expensive, since the temperature must be reduced to below the gas's boiling point of -259°F , and maintained at that level during transport, but the cost is more than offset by the lowered volume per unit of gas.

The Major Natural Gas Transmission Companies

In 1997, fourteen companies controlled more than 85% of the interstate natural gas transmission activity, according to the Energy Information Agency of the U.S. Department of Energy. These 14 companies were: Coastal Corp.; Columbia Energy Group; Consolidated Natural Gas; Duke Energy Corp.; El Paso Energy; Enron Corp; KN Energy Corp.; MDU Resources Group; Northern States Power Co.; PG&E Corp.; Reliant Energy Corp.; Questar Corp.; Sonat Corp.; and the Williams Companies.

Since that time there has been a flurry of merger and acquisition activity in the sector: El Paso Energy bought Sonat, and is in the process of acquiring Coastal Corp.; Dominion Resources bought Consolidated Natural Gas; Duke Energy sold two of its pipeline systems to CMS Energy, which was then bought by NiSource; and Northern States Power and New Century Energy are merging to form Xcel Energy.

Below, we profile the larger of these interstate natural gas transporters.

Duke Energy Charlotte, North Carolina

Duke Energy assumed its current form with the 1997 acquisition by Carolina electric utility Duke Power of Houston-based PanEnergy. Duke Power traces its roots back to the 1899 founding of the Catawba Power Co., which by 1905 had become the Southern Power Co. In 1910, James "Buck" Duke, of the Duke family which formed American Tobacco Co., the W. Duke and Sons tobacco empire and Duke University, became president; in 1913, Duke formed the Southern Public Utility Co. to buy various regional gas, water, and electric utilities. In 1917, Duke established Wateree Electric, which was renamed Duke Power Co. in 1924; by 1935, Duke Power owned all the properties formerly held by Southern. When Buck Duke died in 1925, some 85% of the company's stock was owned by the Duke family, the Doris Duke Trust and Duke Endowment; the family's interest was reduced to 15% after the company was listed on the New York Stock Exchange. In 1997, Duke Power acquired PanEnergy of Houston, and changed its name to Duke Energy.

PanEnergy began in 1929 as Interstate Pipeline Co., which was renamed Panhandle Eastern Pipeline Co. in 1930; in 1931, it completed its first pipeline, which by 1939 ran from the Texas Panhandle to eastern Illinois. In 1951, the company began its second major pipeline system, the Trunkline Gas Co., linking the Gulf Coast to the company's eastern Illinois system. In 1959, Panhandle Eastern bought Anadarko Production Co., an oil and gas exploration firm, and by the end of 1969 the combined Panhandle-Trunkline system supplied natural gas to 12 states and Canada. The company changed its name to Panhandle Eastern Corp. in 1981, and spun off Anadarko in 1986. In 1989, the company bought another Houston-based pipeline company, Texas Eastern Corp., for \$3.2 billion. Texas Eastern was founded in 1947 to operate a pipeline from the Gulf Coast to the Eastern Seaboard.

Duke Energy's board includes, among others: chairman, president, and CEO Richard Priory; First Union director Robert J. Brown; Sprint Corp. chairman William T. Esrey, who is also a director of Exxon Mobil; retired American General insurance chairman Harold Hook, who is also a director of Chase Manhattan Corp.; and Duke Endowment trustee Russell M. Robinson, II.

El Paso Energy Houston, Texas

El Paso traces its roots to 1928, when Houston attorney Paul Kayser started the company as El Paso Natural Gas and obtained the rights to sell gas to El Paso, Texas. The company built a pipeline from gas fields in New Mexico to El Paso, then expanded those pipelines westward to Arizona and eventually

California. In 1983, El Paso Natural gas was bought by Burlington Northern, which spun it off into an independent company in 1992. In 1996, El Paso joined the ranks of the major natural gas transmission companies with the \$4 billion purchase of Houston-based Tenneco Energy, giving it the only coast-to-coast natural gas pipeline. In 1998, the company changed its name to El Paso Energy and moved its headquarters from El Paso to Houston. In 1999, El Paso bought Sonat Inc., the parent of Southern Natural Gas, creating, with 40,600 miles of pipeline, the largest natural gas pipeline system in North America. In January 2000, El Paso reached an agreement to buy Coastal Corp. for \$16 billion, giving it another 17,300 miles of pipeline. After the merger, El Paso Energy will transport more natural gas than any other company in the United States, will be the second-largest gatherer of natural gas in the country, and will be the third-largest U.S. producer of natural gas, after BP Amoco and Exxon Mobil. El Paso also has a merchant energy business, selling deregulated gas and electricity and energy derivatives.

Tenneco was founded as Tennessee Natural Gas in 1940, and grew into a conglomerate involved in auto parts, shipbuilding, farm machinery, packaging, life insurance, chemicals, minerals, real estate, and banking, in addition to petrochemicals. It was a significant member of the Houston establishment, by the mid-1980s sharing directors with the King Ranch, George Bush's Zapata Corp., investment bank Smith Barney Harris Upham, and with an international advisory board including Crédit Suisse chairman Ranier Gut, Volvo's Pehr Gyllenhammer, and Commander of the British Empire David W. Livingstone.

El Paso's board of directors includes, among others: William A. Wise, its president and chief executive officer, who also sits of the board of Battle Mountain Gold, a spin-off of the Bush-linked Pennzoil; former Sonat chairman Ronald L. Kuehn, Jr.; former U.S. Senator Malcolm Wallop (R-Wyo.); Vanderbilt University chancellor Joe B. Wyatt; retired Texas Commerce Bancshares chairman Ben Love, a director of Burlington Northern Santa Fe Corp.; Juan Carlos Braniff, the deputy chief executive officer of service banking at the Mexico City-based bank, Bancomer; and former University of Texas president and Tenneco director Peter Flawn. After the acquisition of Coastal is completed, the El Paso board will change, to consist of seven directors from El Paso and five from Coastal.

Coastal Corp. Houston, Texas

Coastal was formed as a small natural-gas gathering business in 1951 in Corpus Christi, Texas, by Oscar Wyatt, gathering and distributing gas from South Texas fields. In 1962, it bought Sinclair Oil's Corpus Christi refinery and pipeline

network, and provided gas to Texas cities and industries through its Lo-Vaca Gathering subsidiaries. During the rigged energy crisis of the early 1970s, Lo-Vaca was found to have hoarded gas and price-gouged its customers, and in 1977, regulators ordered it to refund \$1.6 billion to its customers. To finance the refund, Coastal spun off Lo-Vaca as Valero Energy. During the late 1960s and 1970s, Coastal made a series of small acquisitions, and in the mid-1980s launched a successful hostile takeover for American Natural Resources, whose ANR pipeline is the largest portion of Coastal's network today. In 1987, Coastal gave Libya an interest in its Hamburg, Germany refinery in exchange for a discount on Libyan oil, but in 1991 the U.S. government forbade American citizens from working for the venture. Wyatt also made a deal with Iraq, which was subsequently hurt by the sanctions against Iraq after its invasion of Kuwait. In 1993, Coastal completed the construction of the 156-mile Empire State Pipeline, which runs from Niagara Falls to Syracuse, New York, in which Coastal holds a 50% interest. Wyatt retired in 1997, turning the chairmanship over to David Arledge, the same year that a New York grand jury indicted a Coastal subsidiary and two employees on charges of overbilling the city by about \$1 million for heating oil. In 1997, Coastal also bought an 11% interest in the Alliance pipeline project, built to transport natural gas from western Canada to eastern Canada and the U.S. Midwest.

Coastal currently handles about 13% of all natural gas consumed in the United States, and owns the nation's second-largest natural gas storage capacity. It also sells gas on the unregulated market, mines coal in the eastern United States, and operates power plants in the United States, Bangladesh, China, the Dominican Republic, El Salvador, Nicaragua, Pakistan, and Panama.

Coastal's board includes: Oscar Wyatt; David Arledge; former Shearson Lehman Brothers director Jerome Katzin; Houston City Attorney Anthony Hall; Houston attorney Thomas R. McDade; and a number of company employees, including James Cordes, a director of bank holding company Comerica.

Enron Corp. Houston, Texas

Enron is best-known these days as the world's largest energy trader and a leader in the energy derivatives market, but it started life as a natural gas company. The modern Enron arose from the 1985 acquisition of Houston Natural Gas by InterNorth of Omaha. InterNorth began in 1930 as Northern Natural Gas, a Nebraska-based pipeline company. By 1950, it had doubled in size, and in 1960 it began processing and transporting natural gas liquids. In 1980, it changed its name to InterNorth, and three years later bought Belco Petroleum.

With four partners, it built the Northern Border Pipeline to connect Canadian gas fields with U.S. markets. Houston Natural Gas (HNG) began in 1925 as a South Texas gas distributor, and started developing oil and gas properties in the 1950s. In 1956, it bought the Houston Pipeline Co., and in 1963, bought Valley Gas production. HNG sold its original distribution properties to Entex in 1976. In 1984, in the process of fighting off a hostile takeover bid by Coastal, HNG brought in former Exxon executive Kenneth Lay as CEO; Lay refocused HNG on natural gas and acquired Transwestern Pipeline and Florida Gas Transmission.

In 1985, InterNorth bought Houston Natural Gas for \$2.4 billion, creating the then-largest gas pipeline network in the United States. Lay became the CEO of the company, which was renamed Enron, and soon thereafter the company relocated its headquarters from Omaha to Houston. In the early 1990s, Enron began its electricity-marketing business, and in 1997 bought its own electric utility, Portland General Electric of Oregon. In 1998, it bought interests in power plants near New York City from Cogen Technologies, and entered the international water business in 1998 with the purchase of Britain's Wessex Water; Wessex was folded into a new Enron subsidiary, Azurix, which the company took public in 1999. While the company is rapidly turning itself into a speculator in the energy business, it still owns 32,000 miles of natural gas pipelines.

Politically, Enron is closely connected to former President George H.W. Bush, and is the biggest contributor to Texas Governor and Republican Presidential candidate George W. Bush, having donated more than \$555,000 to his political career, and to the Morgan and Harriman interests which helped launch Bush's political career. Its board includes former British Secretary of State for Energy Lord Wakeham. The company also has ties to the oligarchic Schlumberger interests, which appear to play a key role in both the steering of energy deregulation in the United States and in the oligarchy's escalating physical-asset grab. The company has used its connections to the former Bush Administration in an unseemly manner to gain business worldwide, including a trip by former President Bush to Kuwait in 1993, accompanied by his sons Neil and Marvin, former White House Chief of Staff and Secretary of State James Baker III, and Gen. Thomas Kelley. Having kicked Iraq out of Kuwait, some have suggested, Bush arrived to collect his reward. Both Baker and Kelley, along with Bush Administration Secretary of Commerce Robert Mosbacher, took "consulting" jobs with Enron shortly after leaving office. Texan Mosbacher had been general counsel to the Bush/Quayle campaign in 1992, and later was the finance chairman of the Republican National Committee.

Baker was a power in his own right. His family law firm, Baker & Botts, had long been one of the most powerful institutional forces in Texas, representing the Harriman and Morgan interests, both of which were fronts for the British royal family and British financial interests.

Among today's Enron directors is John H. Duncan, a former director of the King Ranch, which had its own close ties to the British royal family, and which played a role in the political career of President Bush. John Duncan's brother Charles was Secretary of Energy in the Carter Administration. Charles Duncan was a liaison between Dominique Schlumberger de Menil and President Carter, who jointly formed the Carter-Menil Foundation and Center.

Enron's rise to power was also helped by Bush alumna and former Commodity Futures Trading Commission Chairman Wendy Gramm. Gramm, the wife of rabid de-regulator Sen. Phil Gramm (R-Tex.), paved the way for today's derivatives market during her stint at the CFTC, by administratively exempting many futures transactions from the legal requirement that they be traded only on organized exchanges. The ruling opened the door for the rapid spread of the over-the-counter (OTC) derivatives market. Wendy Gramm is now a director of Enron.

Williams Companies Tulsa, Oklahoma

Williams traces its beginnings to 1908, when brothers Miller and David Williams got into the construction business in Fort Smith, Arkansas; within a few years, the brothers were building cross-country oil and gas pipelines. In 1919, the company moved its headquarters to Tulsa, a regional oil center. In the 1970s, the company changed its name from Williams Brothers to the Williams Companies. In 1966, Williams bought the Great Lakes Pipeline Co., the nation's largest petroleum pipeline, for \$287 million, in the largest cash transaction to that date. In 1982, Williams purchased Northwest Energy Co. In 1992, the company built the Kern River Gas Transmission pipeline as a joint venture with Texaco, and in 1995 it purchased Transco Energy Co., acquiring Transcontinental Gas Pipeline and Texas Gas Transmission, making Williams the then-leading transporter of natural gas in the United States. Williams also got into the telecommunications business; in 1986, it began laying fiber-optic cables in decommissioned pipelines, laying the groundwork for Williams Telecommunications (WilTel), which became the nation's fourth-largest long-distance network. WilTel sold its fiber-optic network in 1995 to LDDS, which later changed its name to WorldCom. Williams also bought an interest in the Alliance pipeline. In 1998, Williams nearly doubled its size with the purchase of MAPCO, a diversified energy company.

The Williams board includes: chairman and CEO Keith E. Bailey; former J.C. Penney chairman William R. Howell, who is also a director of Exxon Mobil and Halliburton, and formerly Bankers Trust; retired Halliburton chairman Thomas Cruikshank, a director of Lehman Brothers; and former Newmont Mining chairman Gordon Parker.