American Gas Association

DAVID N. PARKER
President and CEO

January 6, 2003

The Honorable Scott B. Gudes
Deputy Under Secretary for Oceans and Atmosphere
U.S. Department of Commerce
Washington, D.C. 20230

RE: Request for Comments on an Administrative Appeal brought by Millennium Pipeline Company pursuant to the Coastal Zone Management Act

Dear Deputy Under Secretary Gudes:

The American Gas Association (AGA) is seeking to provide comments regarding the Millennium Pipeline Company's appeal of the State of New York's objection to Millennium's Coastal Zone Management Act (CZMA) consistency certification.

On December 1, 2002, AGA released a significant new study, *From the Ground Up: America's Natural Gas Supply*. Based on independent research conducted by the American Gas Foundation for the U.S. Department of Energy, the study covers economic, environmental, and national security issues affecting the nation's energy future. While natural gas supplies are abundant throughout North American and around the world, the study makes clear that demand for this efficient, environmentally friendly fuel is projected to grow by more than 50 percent during the next 20 years. However, without policy changes and infrastructure expansion, the natural gas industry will have difficulty meeting consumer demand and further price volatility will be inevitable.

Chief among the recommendations in the study is that the federal government must take the lead in overcoming the pervasive "not in my backyard" attitude toward energy infrastructure development in this country. The study further recommends that state officials must recognize that economic development and environmental quality for their citizens hinge on increased natural gas supplies. The study states that the primary objection to energy supply projects is the potential environmental impact, yet environmental advocates suggest that the U.S. needs more natural gas, not less, to help environmental quality. In its 2002 study, *Designing a Climate Friendly Energy Policy: Options for the Near Term*, the Pew Center on Climate Change urges increased natural gas production and natural gas infrastructure expansion, much like the Millennium pipeline project, for environmental improvement.

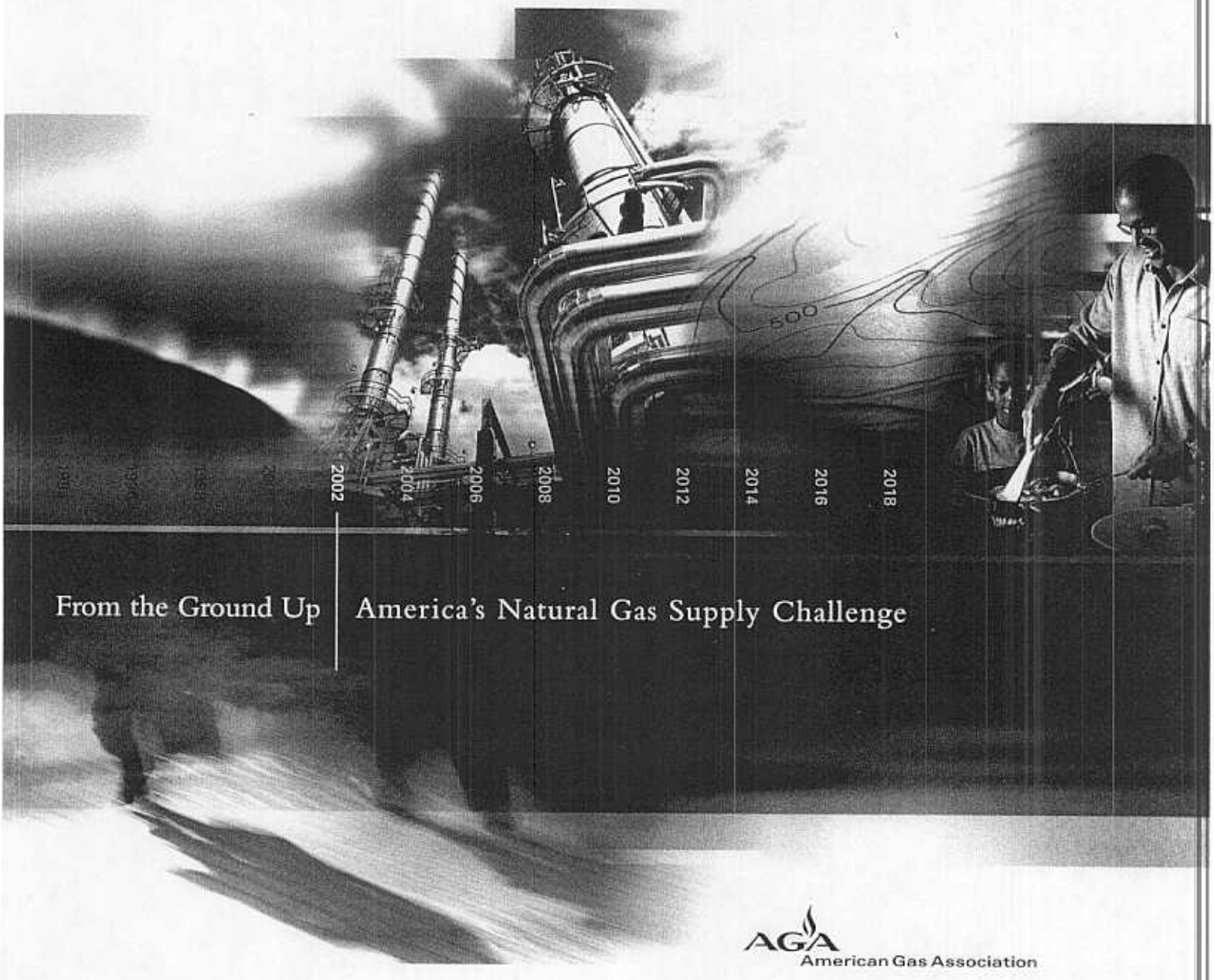
Further, growing dependence on foreign oil puts the nation at risk for disruptions and price spikes. Clearly it is in the national interest to rely more heavily on domestic energy sources, including clean-burning natural gas. The CZMA allows the commerce secretary to find that national security interests outweigh any inconsistency with a state's coastal zone plan. Since a significant number of residences in the New York region are heated with imported home heating oil, prompting Congress to enact an expensive Northeast Home Heating Oil Reserve last year, the national security aspects of replacing fuel oil with North American natural gas must not be understated. Projects such as the Millennium pipeline serve an important national security interest by reducing our dependence on foreign oil.

I ask that your agency submit for the record a copy of the American Gas Association study in its entirety and take into account its findings during your consideration of the Millennium appeal.

Sincerely,

David N. Parker

cc: The Honorable Richard B. Cheney
The Honorable George E. Pataki
The Honorable Donald L. Evans
The Honorable Patrick Wood, III



From the Ground Up | America's Natural Gas Supply Challenge

AGA
American Gas Association

With improvements in technology and new exploration today, we can meet the natural gas energy demands of tomorrow.

Contents

I Foreword

During the winter of 2000-2001, when residential natural gas bills jumped as high as 70 percent, utilities were besieged by anguished customers pleading, "Do something!"

Their distress was not solely because of those price hikes, but also because of the stark contrast between that winter and the stable prices consumers had come to expect in the years preceding 2000-2001. Was this "energy sticker shock" an aberration or a harbinger?

According to *From the Ground Up*, answering that question depends on several factors not generally understood by the public or America's political leaders. To give one example, America's natural gas resource base is abundant, yet countless laws and regulations prohibit the exploration of natural gas in many areas. These prohibitions are mostly based on decades-old environmental concerns that may no longer apply thanks to significant improvements in exploration and drilling technologies. What's more, the fact that environmental concerns slow the development of our most environmentally friendly fuel further testifies to the short sightedness of much of our public energy policy.

In sum, as *From the Ground Up* points out, our nation must make choices regarding energy policy. However, by better understanding how those choices can affect America's economy, national security and environment, we can achieve our twin objectives of reliable, affordable energy that is developed cleanly, safely and sensibly.

This report attempts to explain those choices so that the 65 million American homes, businesses and industries that depend on natural gas can continue to do so. Two years have passed since the winter of 2000-2001 made clear the need for a fresh approach to energy. The nation is waiting.

II Executive Summary

Natural gas — the cleanest fossil fuel — is found in abundance throughout North America and around the world. Natural gas currently meets one-fourth of the United States' energy needs, and demand for this efficient and environmentally friendly fuel is projected to increase significantly during the next 20 years. However, without policy changes and infrastructure expansion, the natural gas industry will have difficulty meeting market demand and further price volatility would be inevitable.

Estimates of the natural gas resource base in the U.S. have increased over time, but continued growth is jeopardized by limitations currently placed on access to this resource base.

The estimated ultimately recoverable gas resource base in the U.S. has increased during the past two decades, in part because new sources of gas such as coalbed methane have become a part of the resource base. Unfortunately, most of the gas resource base off the East and West Coasts of the U.S. and the Eastern Gulf of Mexico is currently closed to any exploration and production activity, and access to large portions of the Rocky Mountains is severely restricted. The potential for resource base growth is constrained as long as these restrictions remain in place.

Geographic expansion of gas exploration and drilling activity has been necessary to sustain past growth, and future migration in both the U.S. and Canada will also be critical.

Drilling activity in the U.S. has moved over time — from onshore Kansas, Oklahoma and Arkansas to offshore Texas and Louisiana and to the Rocky Mountains. Recent production declines in the shallow waters of the Gulf of Mexico have necessitated migration to deeper waters to offset this decline. Without production from areas currently subject to access restrictions, producers will likely not be able to continue to provide increased amounts of natural gas from the lower-48 states to customers for longer than 10 or 15 years. Migration of production activity also is likely in Canada.

II | Executive Summary

U.S. energy demand has increased more than 25 percent since 1973 and significant continued growth is expected. Satisfying this energy demand will continue to affect air, land and water. It is imperative that energy needs be balanced against environmental impacts.

Contributions to the U.S. natural gas supply mix from non-traditional sources — including Alaskan gas and liquefied natural gas (LNG) — have been modest to date, but increases will be necessary to meet growing demand.

Today, roughly 99 percent of the U.S. gas supply comes from traditional land-based and offshore supply areas in the U.S. and Canada. During the next two decades, non-traditional supply sources such as Alaska gas and LNG will likely account for a significantly larger share of the supply mix. Methane hydrates, although offering huge future potential, are unlikely to be a significant contributor during the next 20 years.

Dramatic improvements in exploration and drilling technologies have improved productivity while reducing environmental impacts. While further improvements are expected, they will not be sufficient in terms of meeting growing demand unless coupled with other measures.

A host of technological advances allow producers to identify and extract natural gas deeper, smarter and more efficiently. For example, the drilling success rate for wells deeper than 15,000 feet has improved dramatically. Gas trapped in coal seams, tight sands or shale is no longer out of reach. Yet technology alone cannot indefinitely extend the production life of mature producing areas. New areas and sources of gas will be necessary.

Meeting our nation's ever-increasing demand for energy will have an impact on the environment, regardless of the energy source. The challenge, therefore, is to realistically balance these competing objectives.

Even with dramatic improvements in the efficient use of energy, U.S. energy demand has increased more than 25 percent since 1973 and significant continued growth is expected. Satisfying this energy demand will continue to affect air, land and water. It is imperative that energy needs be balanced against environmental impacts and that this evaluation be complete and up-to-date. Finding and producing natural gas is accomplished through sophisticated technologies and methodologies that are cleaner, more efficient and much more environmentally sound than those used in the 1970s — yet many outdated restrictions on natural gas production are still stuck in a time warp.

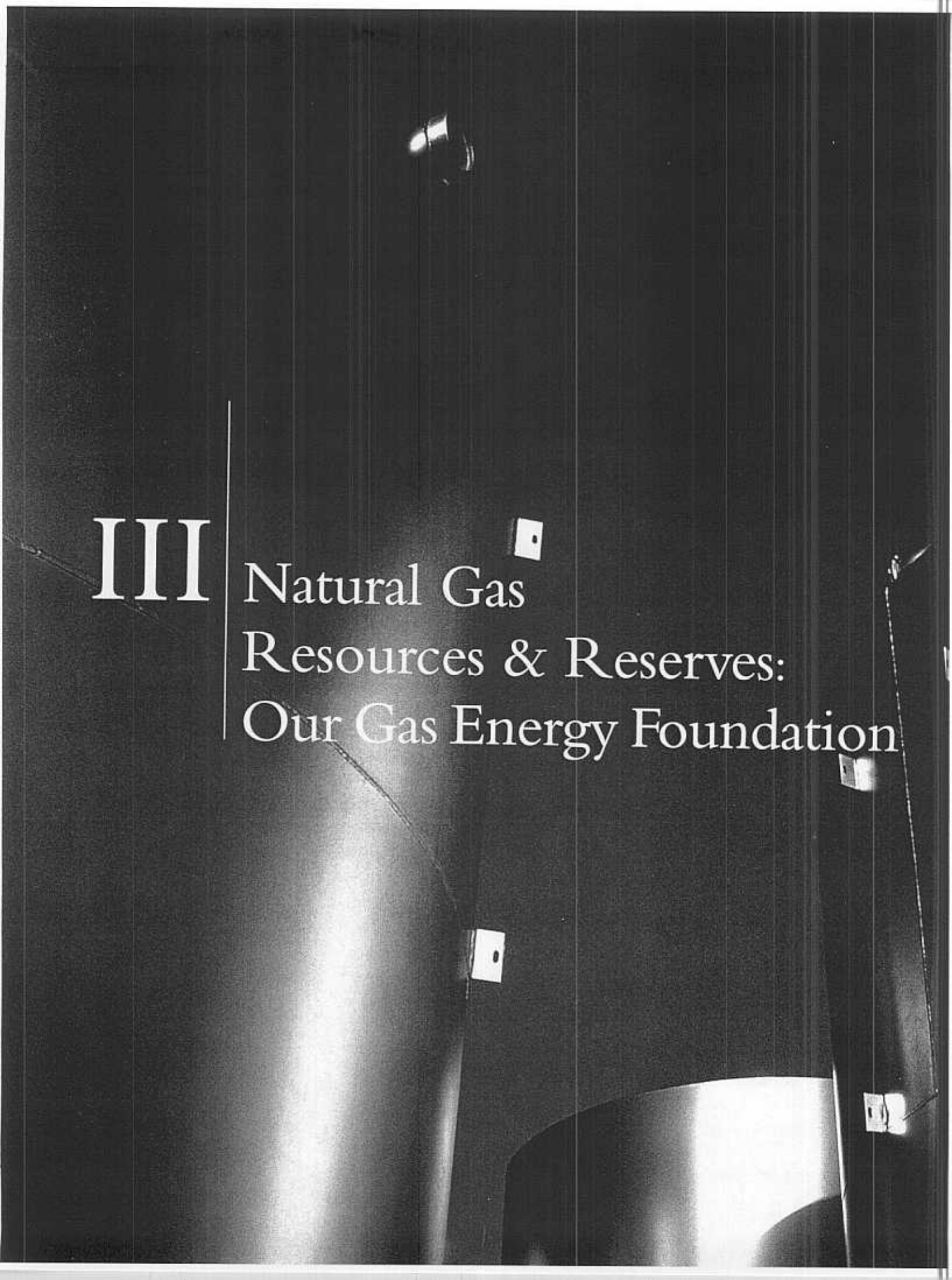
Natural gas consumers enjoyed stable prices from the mid-1980s to 2000, with prices that actually fell when adjusted for inflation. But the

balance between supply and demand has been extremely tight since then, creating a "tightrope" effect in which even small changes in weather, economic activity or world energy trends have resulted in wholesale natural gas price fluctuations. In the 1980s and '90s, when the wholesale (wellhead) price of traditional natural gas sources was around $2 per million Btu, natural gas from deep waters and Alaska, as well as LNG, may not have been price competitive. However, most analysts suggest that these sources are competitive when gas is in a $3.00 to $4.00 price environment. Increased volumes of natural gas from a wider mix of sources will be vital to meeting consumer demand and to ensuring that natural gas remains affordable.

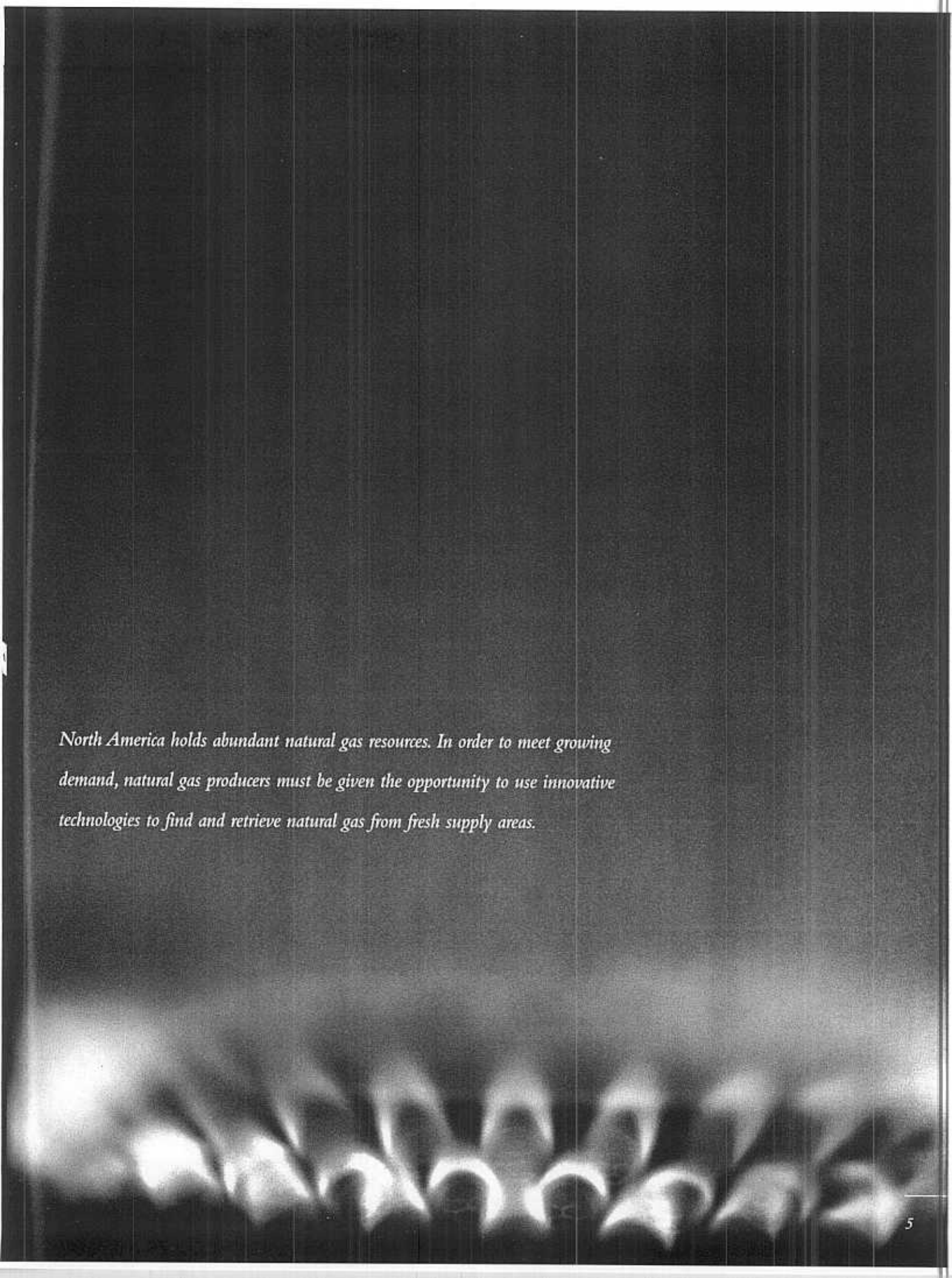
Conclusions

Increasing natural gas supplies will help boost economic development and promote environmental protection, while ensuring more stable prices for natural gas customers. However, without policy changes and expansion of production, pipeline and local delivery infrastructure for natural gas, the natural gas industry will have difficulty meeting the projected 50 percent increase in market demand, and further price volatility will be inevitable. In order to avoid the economic and environmental harm that this volatility would cause, the American Gas Association recommends the following:

- Current restrictions on access to new sources of natural gas supply must be re-evaluated in light of technological improvements that have made natural gas exploration and production more environmentally sensitive.
- Renewable forms of energy should play a greater role in meeting U.S. energy needs, but government officials and customers must realize that all forms of energy have some environmental impacts.
- Federal and state officials must take the lead in overcoming the pervasive "not in my backyard" attitude toward energy infrastructure development.
- The U.S. government should work closely with Canadian and Mexican officials to address the challenges of supplying North America with competitively priced natural gas in an environmentally sound manner.



III Natural Gas Resources & Reserves: Our Gas Energy Foundation



North America holds abundant natural gas resources. In order to meet growing demand, natural gas producers must be given the opportunity to use innovative technologies to find and retrieve natural gas from fresh supply areas.

III Natural Gas Resources and Reserves:

The North American natural gas resource base is vast, diverse and dynamic.
That said, the challenge is whether current estimates of the gas resource base can keep pace with cycles in gas production and consumption. The answer is "yes;" to date, the North America resource base has kept pace.

Current estimates of the remaining U.S. and Canada gas resource potential are substantially higher than they were 20 years ago — even though more than 200 trillion cubic feet of natural gas has been consumed in the U.S. since then.
In 1980, the Potential Gas Committee (PGC) of the Colorado School of Mines estimated the ultimately recoverable gas resource base in the United States at 1,708 trillion cubic feet (tcf). That estimate included proved reserves, potential resources and cumulative production to date. Twenty years later, at year-end 2000, PGC estimated that the ultimately recoverable gas resource was actually 30 percent larger, at 2,208 tcf.

This growth can be attributed to improvements in exploration and production technology and market forces that have spurred geologists to look harder for gas resources. In some cases, technology helps recover more of what is known. In other instances, technology makes it possible to develop a new source of gas, such as natural gas from coal seams or production from areas located under thousands of feet of water.

Coalbed methane has additional potential as a U.S. and Western Canada resource prospect.
Large quantities of methane (natural gas) can be a byproduct of coal formation, but can also be produced from coal under the right conditions. Technologies for treating coal seams, particularly deep, unlikely-to-be-mined coals, and efficiently producing the captured gas, were pioneered during the 1980s and implemented in the 1990s. Today in the U.S., nine percent of domestic gas reserves can be attributed to coalbed methane.

Our Gas Energy Foundation

Current resource estimates for many frontier areas appear to be very conservative.
Geologists tend to underestimate the size of new natural gas fields. The simple act of exploring for natural gas in promising areas can, and often does, result in new discoveries over and above previous estimates. (*See Canadian discussion in next chapter*)

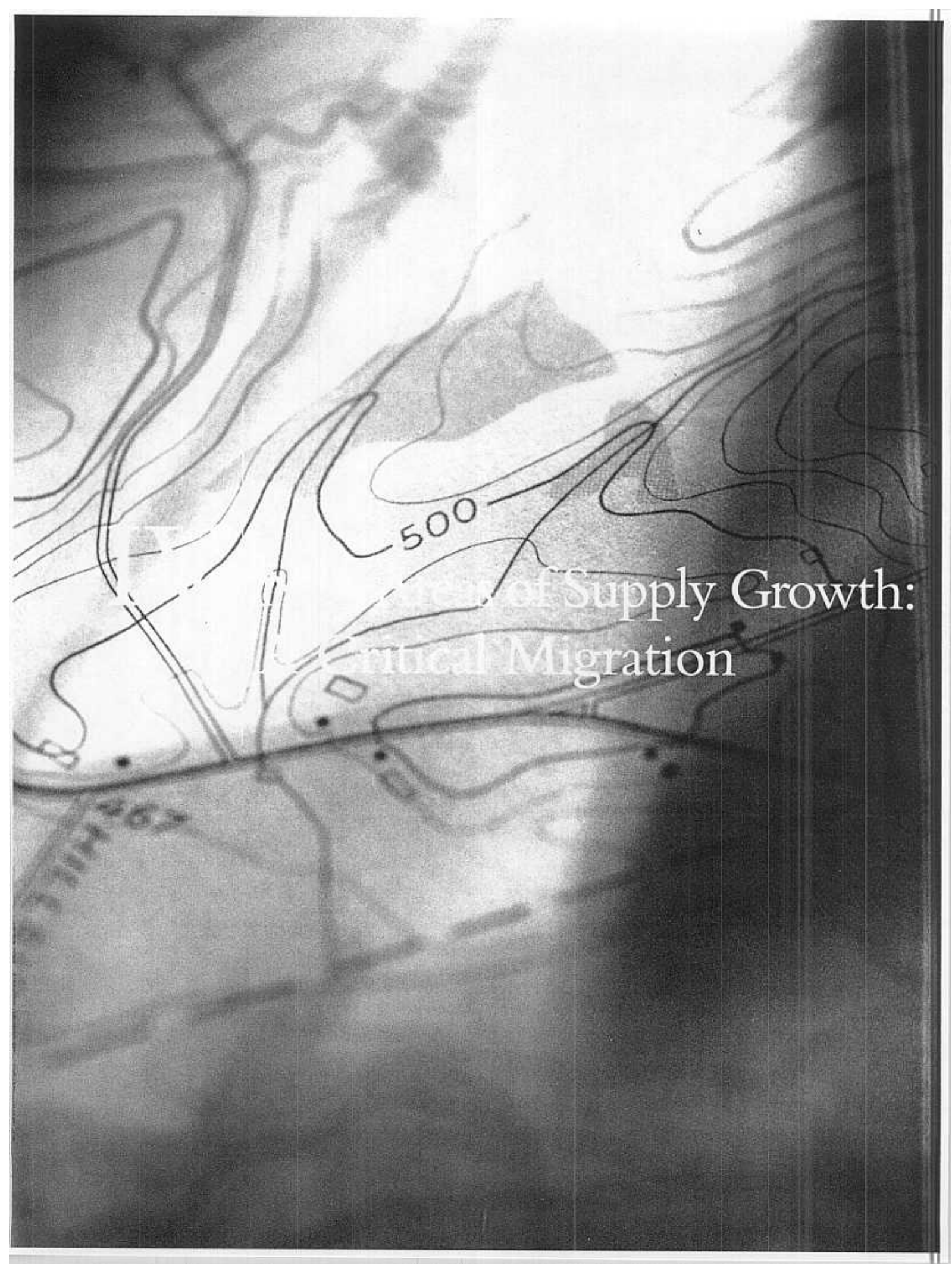
A significant portion of the domestic gas resource is restricted from exploration and production activity.
Offshore regions of the U.S., including the Atlantic, Eastern Gulf of Mexico and Pacific, are entirely closed to natural gas exploration and production. In addition, federal and other agencies, particularly in the Rocky Mountains, restrict the development of gas resources through limited land access or added costs due to land use policies.

In order to meet the growing demand, natural gas producers must be given the opportunity to use innovative technologies to find and retrieve natural gas from fresh supply areas. Given the long lead times associated with natural gas production (permitting, obtaining equipment, lining up skilled labor, expanding pipelines, etc.) critical issues and subsequent decisions regarding land access must be addressed ***now***.

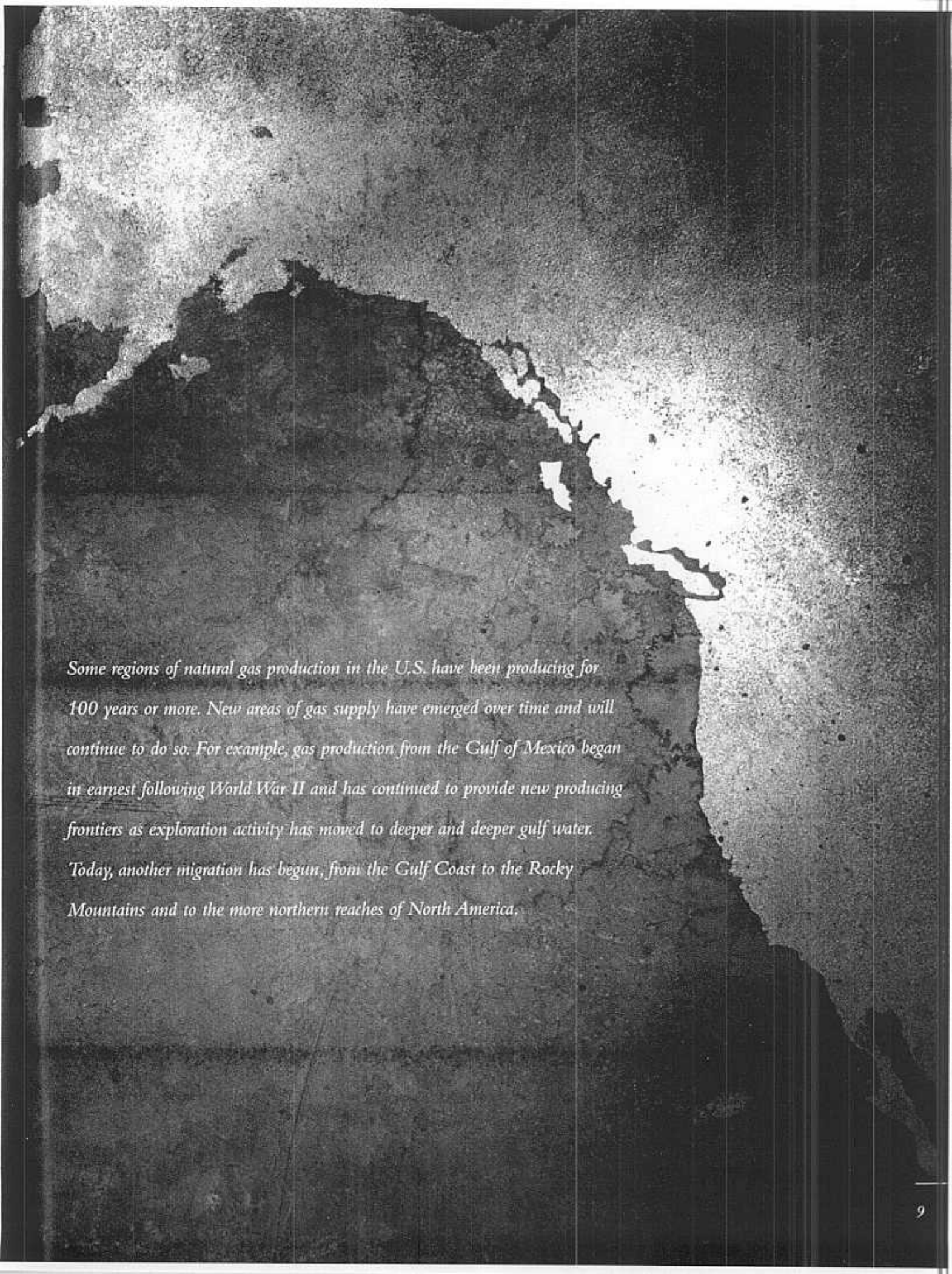
Lower-48 Natural Gas Resources Subject to Access Restrictions

Source: National Petroleum Council

Much of the nation's natural gas resource base resides on federal lands or in federal waters, yet a large portion of it is not open for either assessment or development.



Factors of Supply Growth: Technical Migration



Some regions of natural gas production in the U.S. have been producing for 100 years or more. New areas of gas supply have emerged over time and will continue to do so. For example, gas production from the Gulf of Mexico began in earnest following World War II and has continued to provide new producing frontiers as exploration activity has moved to deeper and deeper gulf water. Today, another migration has begun, from the Gulf Coast to the Rocky Mountains and to the more northern reaches of North America.

New Areas of Supply Growth: A Critical

The time is now for relatively unexplored regions of the lower-48 to be made available for exploratory work in order to determine their natural gas potential

Gas production in the U.S. and Canada has been sustained, and even grown over time, as new discoveries have moved from region to region. Continued migration is absolutely critical.

Although the lower-48 and Western Canada have been heavily explored, large regions such as the Atlantic offshore, the Mackenzie Delta-Beaufort Sea and the Eastern Gulf of Mexico are still considered frontier. In addition, gas sources developed in one area, such as coalbed methane in the American West, may be considered frontier in another area, as is the case with coal seam gas in Western Canada. For gas supply to grow in the U.S., technology barriers, economic conditions, regulatory restrictions, as well as other impediments to initiating gas production, must be overcome.

Rocky Mountain basins, South Texas, North Texas/Louisiana, and the smaller producing areas (in aggregate) scattered across the lower-48 from California to the Appalachian Basin are good prospects for increased production.

It is often the case that where gas has been discovered before — it is found again. Such discoveries can be made when areas between existing fields are explored or when drilling is taken deeper. Constant change in drilling and exploratory technology, or economic conditions, often provides the

Migration

momentum for new gas discoveries in existing fields or extensions to existing productive areas.

Significant increases in production from deepwater in the Gulf of Mexico will be needed to offset declining production in Gulf waters closer to the coast.
The Gulf of Mexico is a critical producing region in the U.S. Production has been declining in many wells in shallow Gulf waters, which may prompt producers to drill deeper in the sediments and to seek technologies that will reduce the costs and risks associated with bringing gas to market. As a result, a significant share of the expected growth in deepwater Gulf of Mexico gas production may be needed to offset these declines.

Without prudent removal of some current restrictions on U.S. natural gas production, producers will likely not be able to continue to provide increased amounts of natural gas from the lower-48 states to customers for longer than 10 or 15 years.
This would most likely expose the 65 million homes, businesses, industries and electric-power generation plants that use natural gas to unnecessary levels of price volatility – thus harming the U.S. economy and threatening Americans' standard of living.

Time and time again producers have been willing to assume the economic risk of gas exploration, if the areas are available to be explored. The time is now to make relatively unexplored regions of the lower-48 available for exploratory work to determine their natural gas potential. This certainty is vital to helping companies raise the extensive capital needed to recover the remaining natural gas from existing reservoirs, and to expand production of traditional and non-traditional forms of natural gas.

Canadian gas production can grow in the future, but that growth is likely to rely mostly on production outside Western Canada and on successful development of coalbed methane reserves within Western Canada.
In many ways, development of new gas resources in Canada reflects the challenges of discovery in the U.S. Basins in Western Canada, particularly in the provinces of Alberta and British Columbia, have been extensively drilled, although not for as long a time as some producing regions in the U.S. More drilling will need to be targeted in Eastern Canada (offshore) and in the less explored northern tier of the Yukon, Northwest Territories and the Arctic Islands if Canadian production is to grow.

IV New Areas of Supply Growth: A Critical

The recent diversification of Canadian exploration and production activity, particularly offshore Eastern Canada, has been very successful.

Without question, there are lessons to be learned from recent gas drilling in Canada, particularly offshore from Newfoundland and Nova Scotia. While there is a moratorium on U.S. production offshore in the Atlantic, discoveries and subsequent development of gas from the Sable Island prospect area now serve markets in Eastern Canada and in New England, and they do so safely and reliably.

Beginning with the Hibernia oil discoveries over 25 years ago, the trail of gas exploration in Eastern Canada has moved steadily south to the point where it has reached nearly to the U.S./Canada border. It is quite possible that geological formations more than 100 miles out to sea are similar from Eastern Canada into New England, and south to the mid-Atlantic region of the U.S. Significant natural gas resources could be found here to help supply clean energy for homes, businesses, industries and electric-power generation plants. Whether it is ever explored depends on the state of the current moratoria.

TRADITIONAL SOURCES

Table 1 **Sources of Estimated U.S. Traditional Gas Supply 2005-2020[1]**

in trillion cubic feet (**tcf**)

year	2001	2005	2010	2020
Lower-48	19.3	20.8-21.3	21.0-22.2	19.7-24.7
Canada (to U.S.)	3.6	3.9	4.0-4.7	4.5-7.0

Source: *Meeting the Gas Supply Challenge for the Next 20 Years – Lower-48 and Canada*, a study conducted for the U.S. Department of Energy by the American Gas Foundation (April 2002).

1 The ranges estimated here are not aggregated to totals because the complex gas supply relationships in North America do not necessarily imply that low-range conditions mean low-range volumes for all sources at the same time, or that all supply sources can be maximized at the same time.

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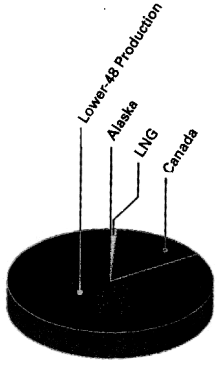
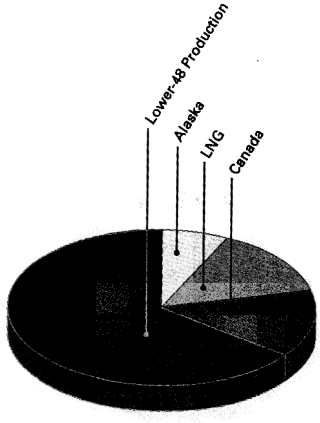


2001

22 trillion cubic feet
(total U.S. natural gas consumption)

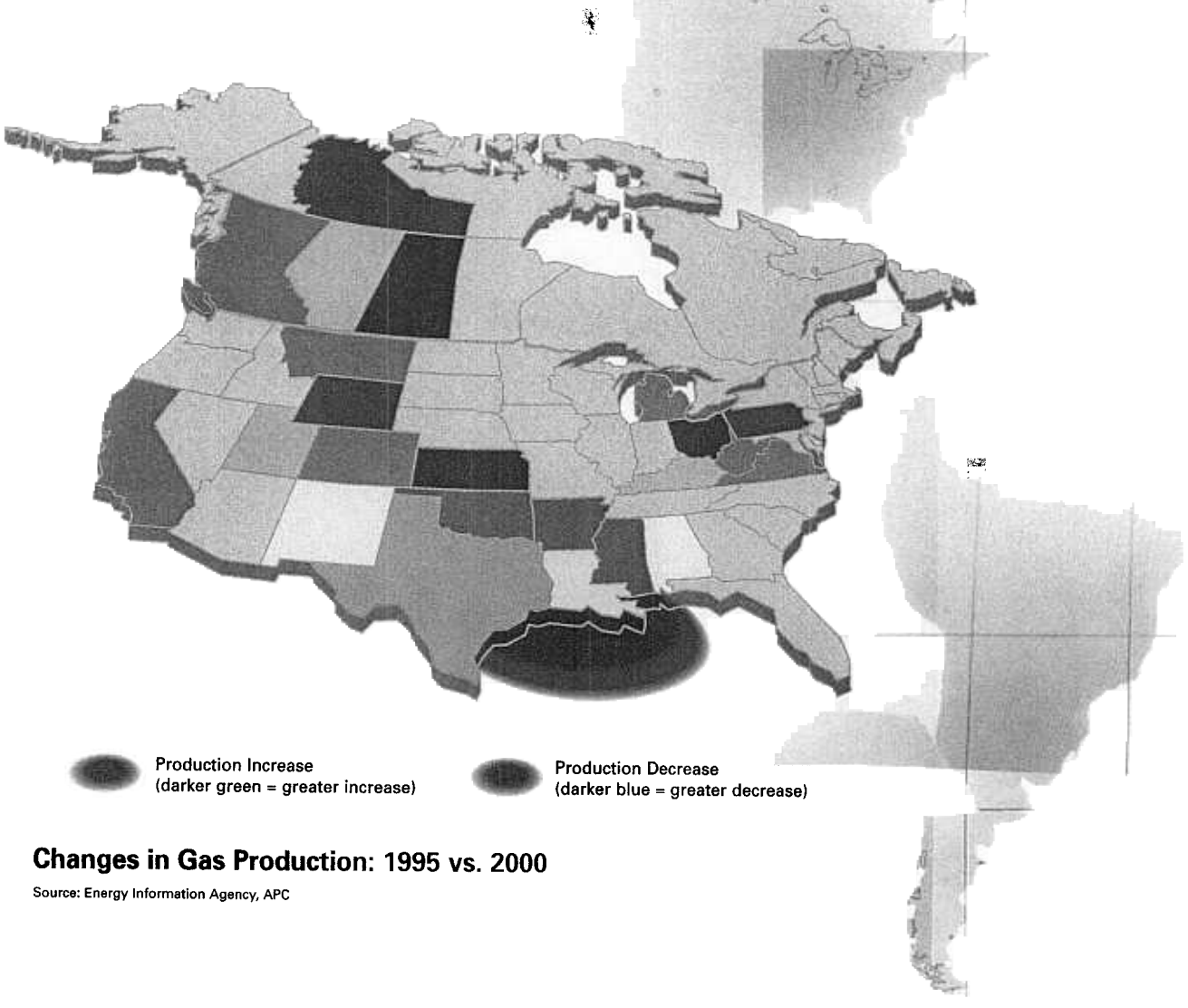


2020

33 trillion cubic feet
(projected U.S. natural gas consumption)

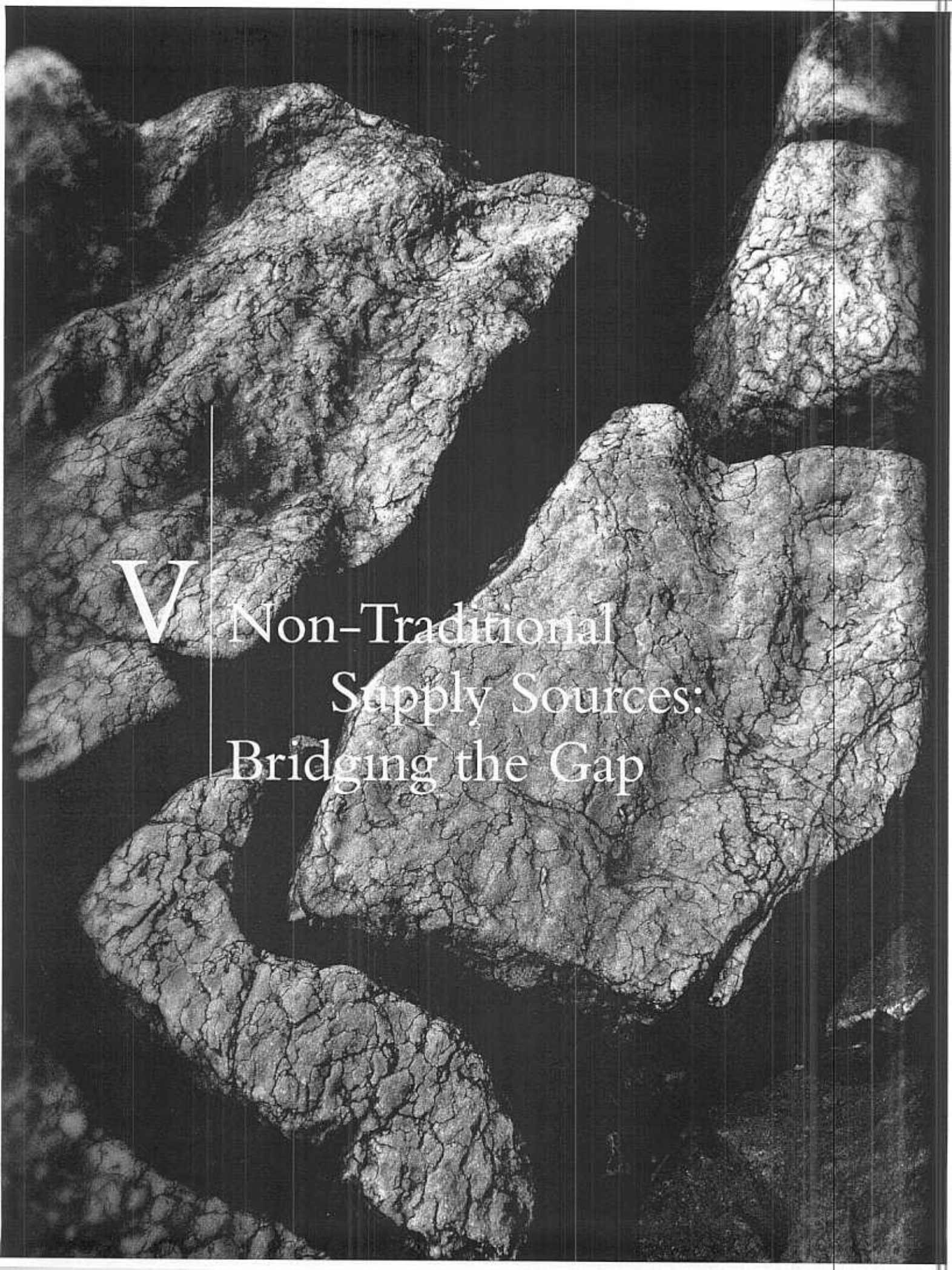
As U.S. Natural Gas Demand Grows, Sources of Supply Must Expand

Source: *Meeting the Gas Supply Challenge for the Next 20 Years – Lower-48 and Canada, and Non-Traditional Sources*, studies conducted for the U.S. Department of Energy by the American Gas Foundation (2002).

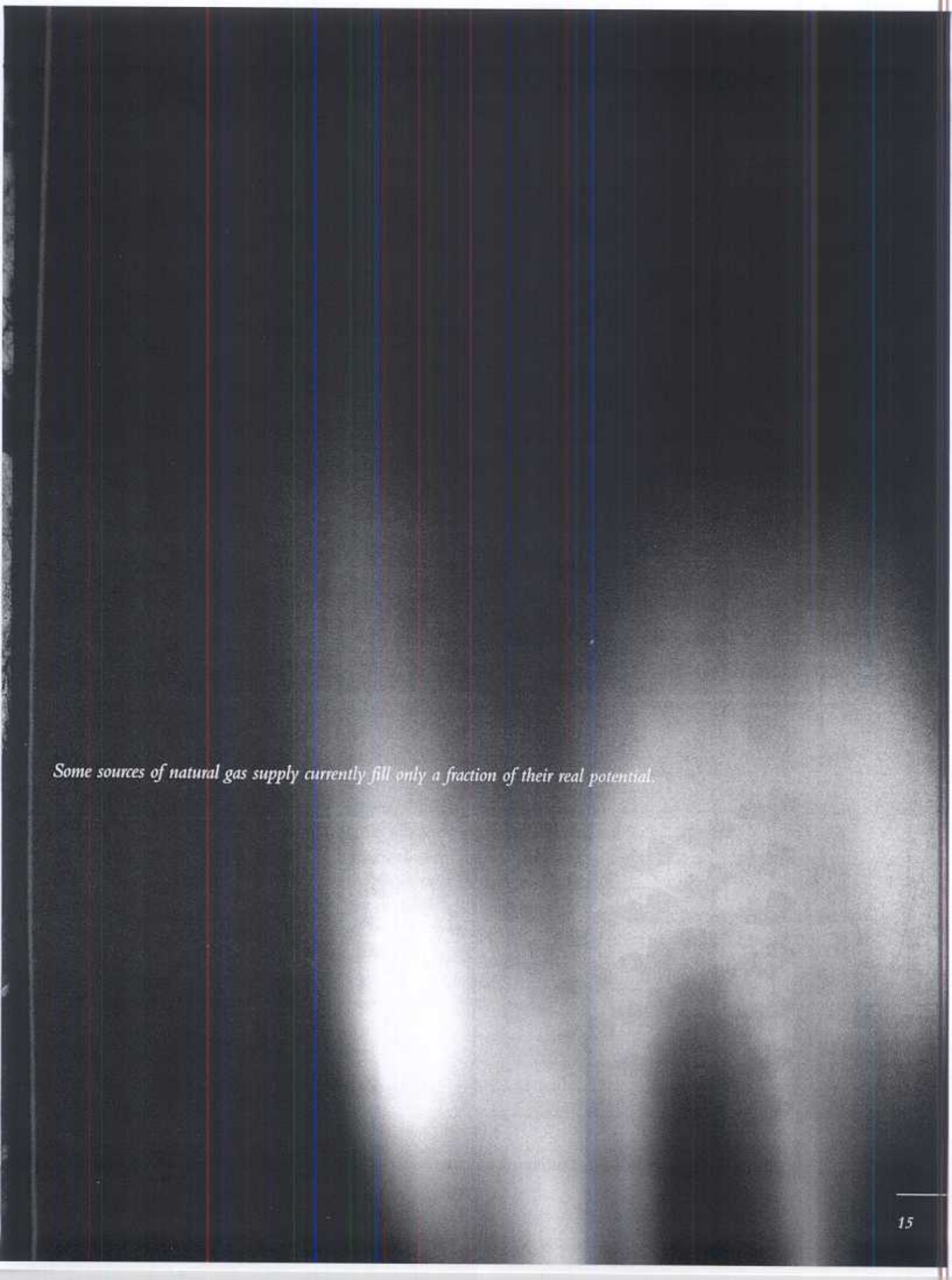


Changes in Gas Production: 1995 vs. 2000

Source: Energy Information Agency, APC



V Non-Traditional Supply Sources: Bridging the Gap



Some sources of natural gas supply currently fill only a fraction of their real potential.

V Non-Traditional Supply Sources: Bridging

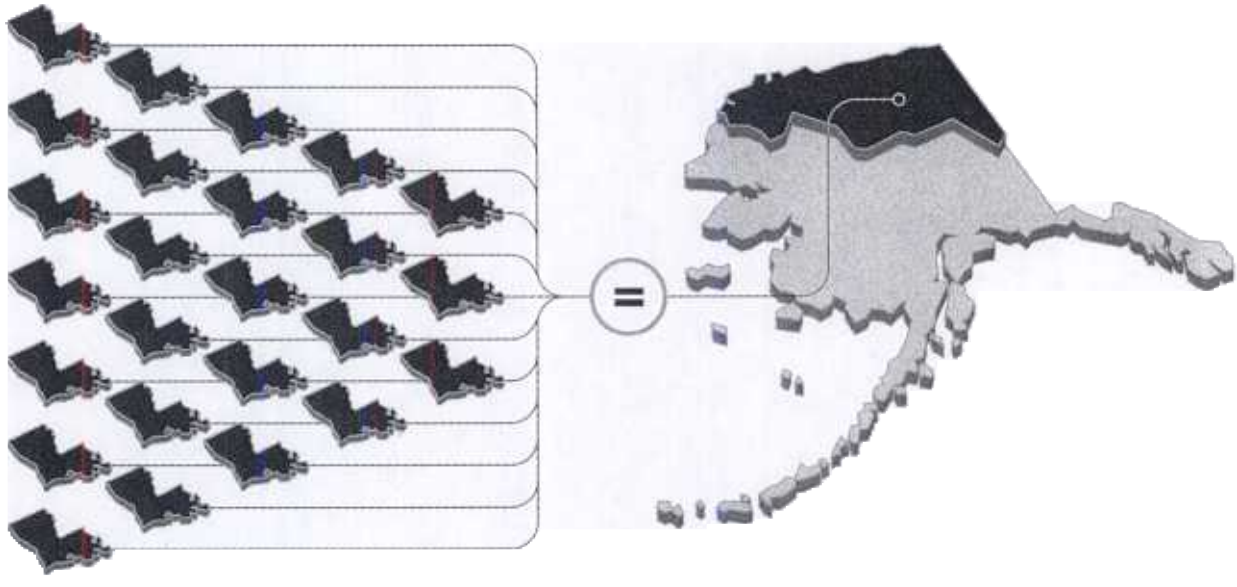
Non-traditional sources will play a growing role in lower-48 gas supply, and after 2010 may provide the lion's share of the expected growth.

Today, 99 percent of the gas used in America originates in North America. It is highly doubtful that the projected 50 percent increase in U.S. natural gas demand during the next 20 years can continue to be met entirely by traditional U.S. and Canadian production.

It is likely that non-traditional supply sources — namely, liquefied natural gas (LNG) and natural gas originating from Alaska — will become more significant players in serving lower-48 markets. The extent to which this occurs will depend on overcoming economic factors and impediments to siting facilities. It will also depend on the gap that develops between domestic production capability and growing gas demand.

Proved gas reserves on the North Slope of Alaska alone are equivalent to 25 years of production from onshore Louisiana — and they are expected to grow.

At the wellhead, Alaska is the third largest gas producing state in the United States. Since 1995, wellhead gas production has averaged 9.4 billion cubic feet per day, which is exceeded only by Louisiana and Texas. However, 86 percent of this production is ***re-injected*** in order to improve oil recovery on the North Slope and because there is no natural gas pipeline to deliver this energy to the lower-48 states.



25 years of production from onshore **Louisiana** is **equivalent** to proved gas reserves on the **North Slope of Alaska** alone.

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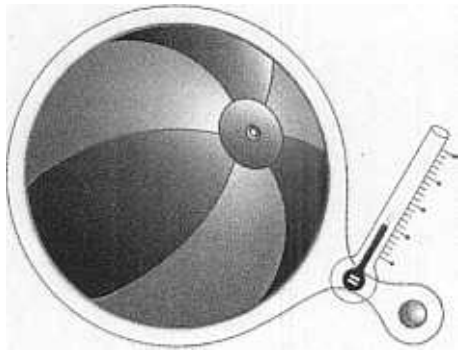
The 35 tcf of gas reserves identified with Prudhoe oil reserves is only the tip of the resource potential in Alaska. The Potential Gas Committee (consisting of more than 170 volunteer members from the natural gas industry, government agencies and academic institutions) estimates Alaska's total natural gas resource base to be 250 tcf — enough to support all of the United States' current natural gas needs ***by itself*** for more than a decade. This resource will be developed only if a transportation system to the lower-48 is constructed.

Four principal options are available for moving North Alaska gas to market. They include two gas pipelines to connect North Alaska gas to the North American gas transmission grid in Western Canada. A third option is a gas pipeline to South Alaska, where the gas would be liquefied for transport by ship to Pacific gas markets in North America or North Asia. The final option is to convert Alaskan natural gas to liquid form via gas-to-liquids (GTL) technology.

Gas pipelines that already have been proposed would add 4-6 bcf per day (about 10 percent of the current daily market) of new gas to the lower-48 transportation grid. If economically feasible, a staged process, by which initial volumes of 2.5 bcf per day could be expanded as needed, might help the lower-48 market transition in absorbing the new gas supplies.

Liquefied natural gas (LNG) technology, as demonstrated widely throughout the world, is safe, reliable and economic, but to date has had a limited role in the U.S. market. LNG currently provides less than one percent of U.S. gas supply; in contrast, all of the natural gas used in Japan is imported as LNG. The U.S. share of LNG use is expected to grow. LNG is traded world-wide thanks to its ability to connect gas reserves stranded from pipeline access to markets hungry for the clean, competitively priced fuel. The process of liquefying methane (by chilling it to -260° Fahrenheit) reduces the volume of the gas 600 times, which makes transport by ship economic. The gas is then stored and vaporized at a receiving terminal before being injected into the pipeline grid. Currently there are proposals to vaporize LNG at sites located offshore rather than onshore, which may help move some U.S. LNG projects forward.



CHILLED COMPRESSION:

Liquefied natural gas (LNG)

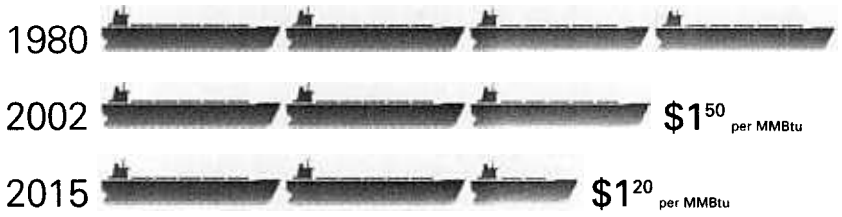
The cryogenic process of liquefying methane reduces the volume of the gas 600 times. That's like shrinking the volume of a 17" beach ball down to a ping pong ball. This makes transport by ship economic.

V | Non-Traditional Supply S

Further declines of 10-20 percent over the next decade are possible, helping to position LNG as a growing portion of the U.S. natural gas supply.

LNG Overhead Costs Have Dropped 25% Since 1980

(Includes costs of liquefication, shipping and regasification for liquid natural gas)



The expansion of existing LNG facilities and construction of new facilities in the U.S. offer a significant mid-term option for increasing gas supplies.

The United States has four LNG receiving terminals, located in Everett, Massachusetts; Cove Point Maryland; Elba Island, Georgia; and Lake Charles, Louisiana. Current utilization of the facilities is less than 25 percent of their original combined design capacity.

Until 1995, Algeria supplied almost all of the United States' LNG. Since then, LNG suppliers have diversified so that today more than 50 percent of LNG supplied to the U.S. comes from Atlantic sources such as Trinidad, Tobago and Nigeria. Existing facilities could receive over 800 bcf annually if fully operational. In addition, existing terminals could be expanded to meet growing demand for natural gas.

The flow of natural gas between the U.S. and Mexico will depend on the future growth in Mexican gas supply and consumption.

Because Mexican gas consumption is expected to grow substantially in the future, primarily due to electricity generation requirements, U.S.-Mexico trade may also increase. The direction and size of that flow, however, will depend on the future growth in Mexican gas supply (domestic or LNG imports) as well as demand. Unless a world-scale gas field, play, or basin beyond current Mexican government expectations is discovered, this rapid growth in Mexican gas demand will need growing gas deliveries from outside of Mexico.

For the next few years, exports of natural gas from the U.S. could help Mexico meet its energy needs. But with the opening of new LNG terminals in Mexico after 2005, Mexican demand

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for U.S. gas supply may tail off. Therefore, the recent surge in net U.S. gas exports to Mexico should last through much of the decade, but after 2010, net U.S. gas exports are likely to end.

Methane trapped as "hydrates" in ice formations could fuel the world for centuries. The challenge is unlocking it.

Scientists estimate that the amount of methane in hydrates beneath ocean floors and the Arctic tundra is greater than all other known sources of natural gas — possibly 5,000 times more than the world's known conventional gas resources, according to the U.S. Department of Energy. While estimates of methane hydrates in North America are huge — 320,000 tcf in the United States and perhaps as high as 30,000 tcf in Canada — most of this hydrate resource today faces severe economic or institutional barriers.

The current hydrate situation may be analogous to coalbed methane 25 years ago. While research and technology helped reduce coalbed methane investment and operation costs, the most critical advance was substantially increasing production, which brought down capital and operating expenses and made coalbed methane more price competitive. DOE has taken the lead in studying the properties and production potential of this immense source of natural gas.

Table 2 **Estimated U.S. Non-Traditional Gas Supply 2001-2020[2]**

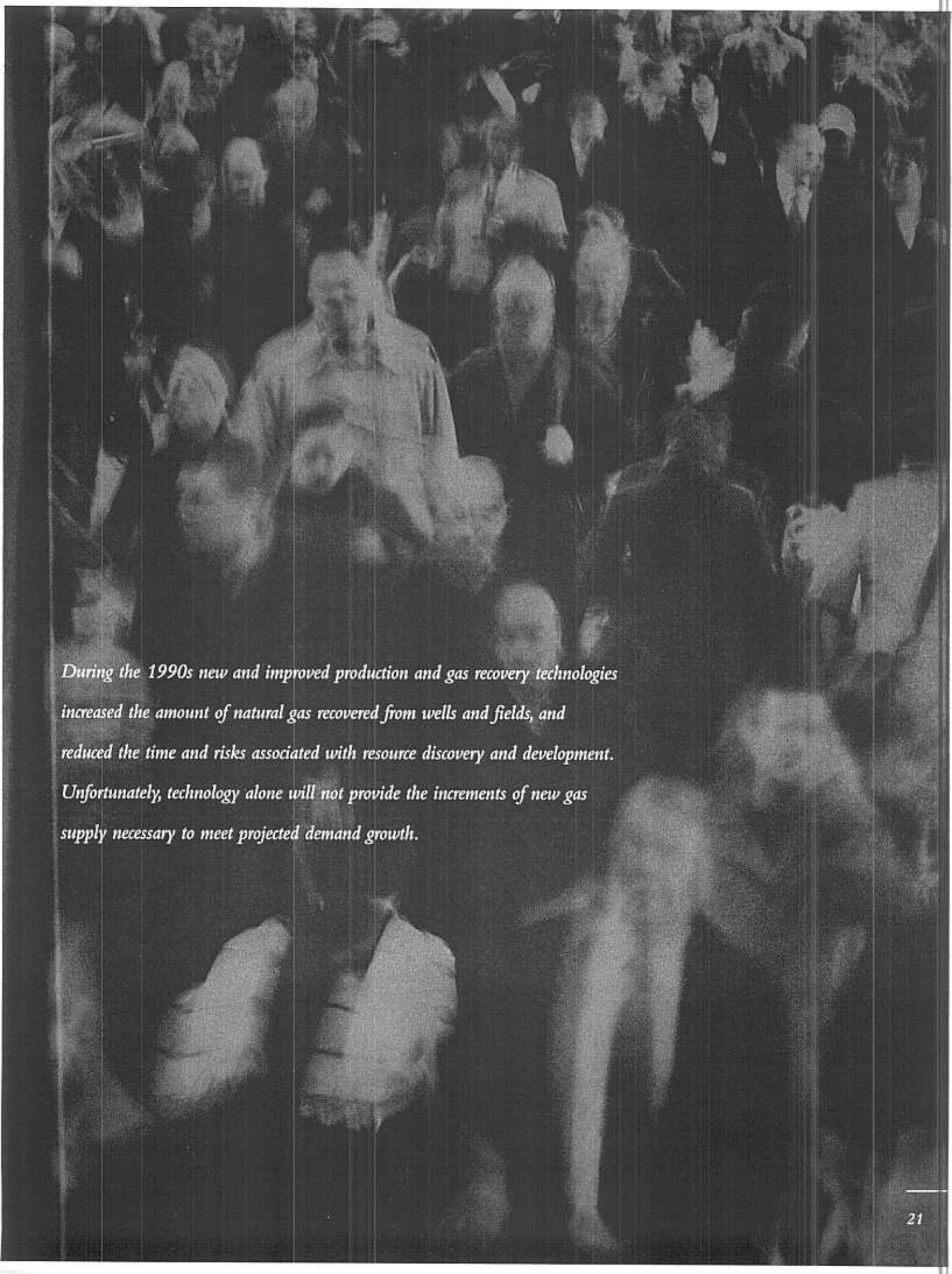
NON-TRADITIONAL SOURCES

	in trillion cubic feet (tcf)			
year	2001	2005	2010	2020
Alaska	.46	.45	.45-1.1	1.7-2.1
LNG	.24	.75	2.2-3.0	4.7-7.0
Mexico	(.13)	(.37-.48)	(.08-.25)	•
Gas Hydrates	•	•	•	•

Source: *Meeting the Gas Supply Challenge for the Next 20 Years – Non-Traditional Gas Sources* (not released as of December 2002), completed for the U.S. Department of Energy by the American Gas Foundation.

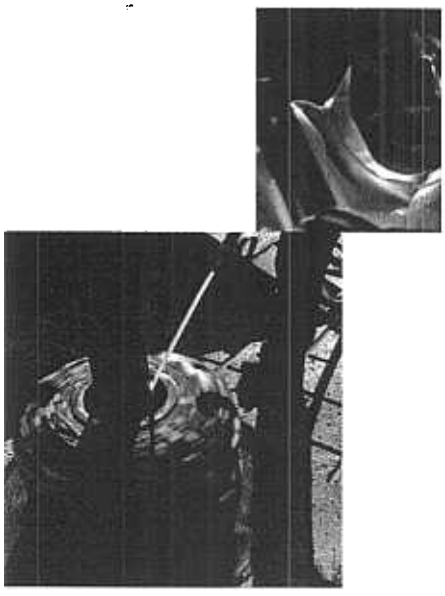
2 The ranges estimated here are not aggregated to totals because the complex gas supply relationships in North America do not necessarily imply that low-range conditions mean low-range volumes for all sources at the same time, or that all supply sources can be maximized at the same time.

VI Expanding Technology: Necessary but not Sufficient



During the 1990s new and improved production and gas recovery technologies increased the amount of natural gas recovered from wells and fields, and reduced the time and risks associated with resource discovery and development. Unfortunately, technology alone will not provide the increments of new gas supply necessary to meet projected demand growth.

VI Expanding Technology: Necessary but



It is the combination of responsible development of the entire natural gas resource base in North America and the application of key technologies that will solve the long-term gas supply puzzle.

Technology developments have reduced both the costs and uncertainties of gas exploration. New technology has also improved recovery from both conventional and unconventional resources. These advances have allowed industry to expand exploration in deeper sediments, maintain production in existing fields, and made the production of unconventional resources economically attractive.

Success rates have improved for all drill depth intervals — even wells below 10,000 feet — and deeper sediments that hold the best prospects for new large discoveries are now accessible. Drilling success rates at all depth intervals improved consistently in the 1990s, substantially reducing the level of capital needed to develop new gas fields. However, the most dramatic improvements are for wells deeper than 10,000 feet. As a result of these improvements, the potentially rich deeper sediments, which hold the best prospects for large discoveries, now pose less of a risk to drill than did shallow drilling targets 20 years ago.

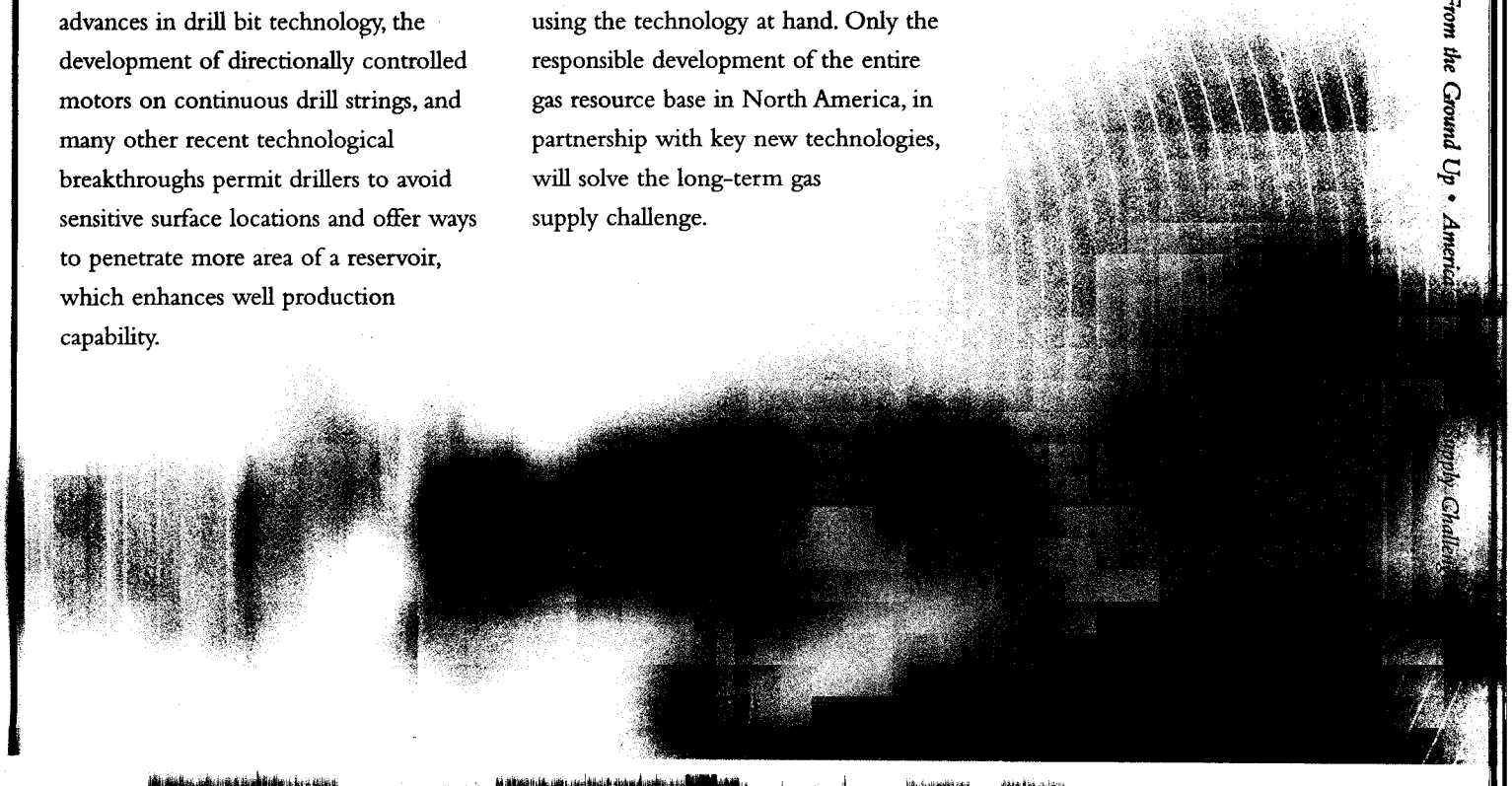
ot Sufficient

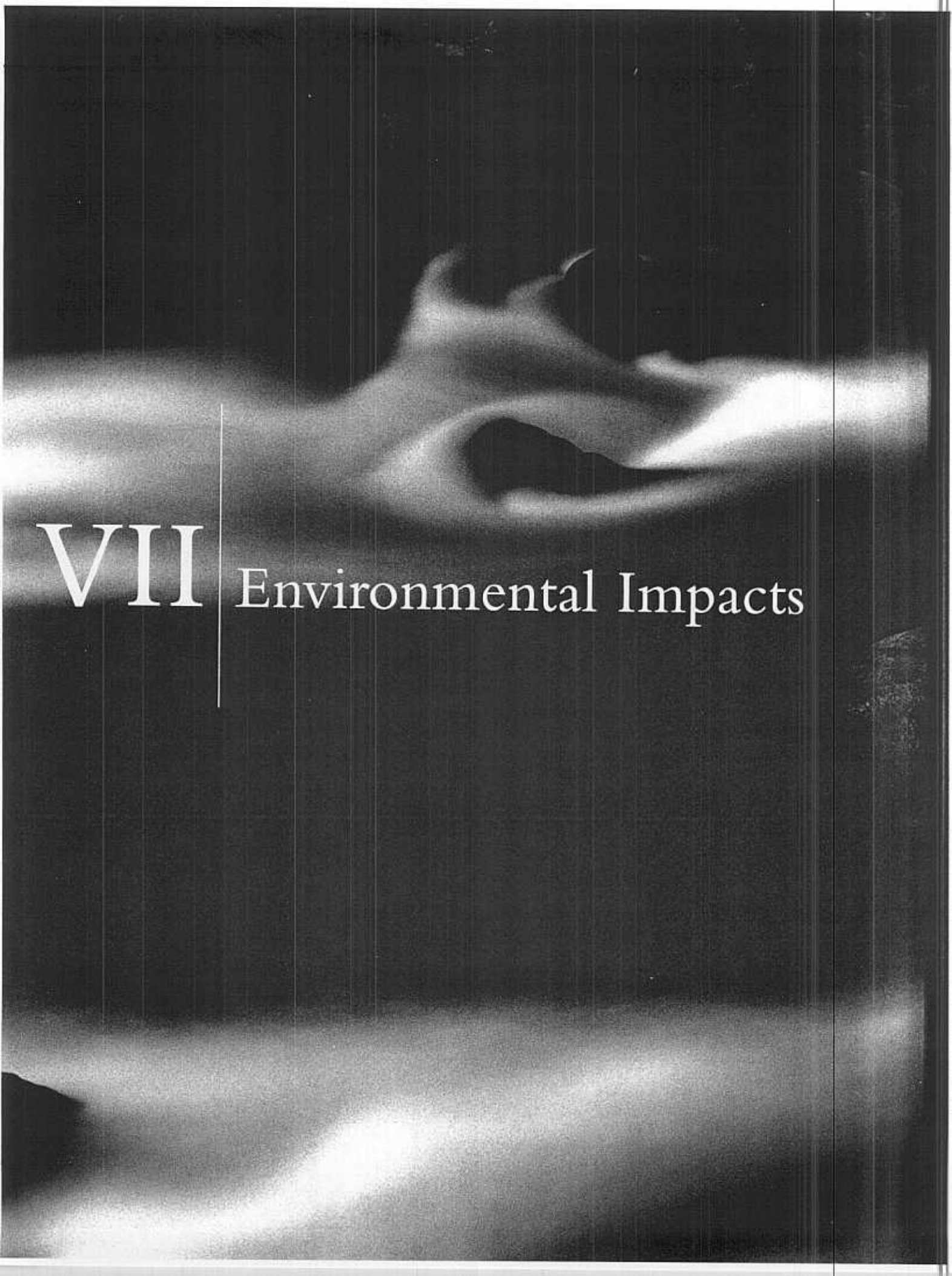
In 1988, 59 percent of wells in the 10,000-15,000 foot range yielded natural gas; today, those wells have an 86 percent success rate. Similarly, wells deeper than 15,000 feet had an average success rate of 53 percent in 1988, and now produce natural gas successfully 82 percent of the time.

Techniques such as horizontal drilling have exposed promising sections of gas reservoirs to production, while also reducing environmental impacts in sensitive areas.
For example, natural gas can be extracted from 4-6 miles underground from a single platform without significant harm to wildlife, land and waters above. Many technology advances impact more than one aspect of gas exploration and development activities. For example, advances in drill bit technology, the development of directionally controlled motors on continuous drill strings, and many other recent technological breakthroughs permit drillers to avoid sensitive surface locations and offer ways to penetrate more area of a reservoir, which enhances well production capability.

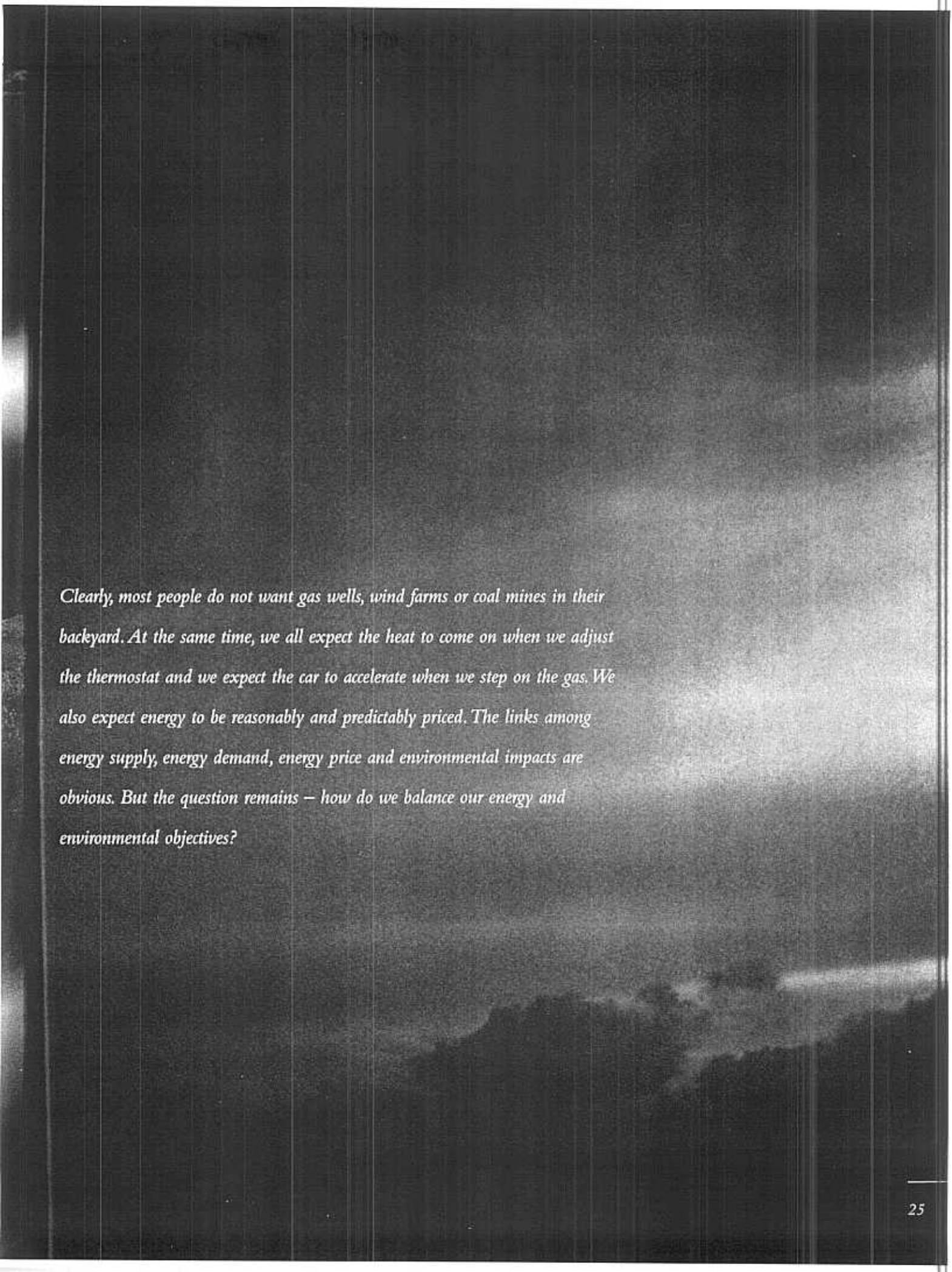
Technology advances have allowed large-scale development of unconventional gas sources (e.g. coalbed methane, tight sands, shale) since the late 1980s.
New well completion techniques now allow commercial volumes of gas to be produced from not only traditional gas reservoirs, but also from coal seams and from rocks that have less robust porosity and permeability characteristics than more traditional reservoirs.

Improved technology alone will not be enough to meet increasing gas demand.
To adequately meet future requirements for gas supply, producers must be allowed to go to new areas (less mature drilling basins) and be given the opportunity to prove the existence of new supply sources using the technology at hand. Only the responsible development of the entire gas resource base in North America, in partnership with key new technologies, will solve the long-term gas supply challenge.





VII Environmental Impacts



Clearly, most people do not want gas wells, wind farms or coal mines in their backyard. At the same time, we all expect the heat to come on when we adjust the thermostat and we expect the car to accelerate when we step on the gas. We also expect energy to be reasonably and predictably priced. The links among energy supply, energy demand, energy price and environmental impacts are obvious. But the question remains – how do we balance our energy and environmental objectives?

VII Environmental Impacts

Consider that a single typical natural gas well – a metal pipe, valve and meter structure 4 to 6 feet tall – can produce the energy equivalent of 12 utility size wind turbines, each with a height of over 400 feet and blade span of some 300 feet.

Satisfying our increasing energy needs will have an impact on our natural resources regardless of the energy source.

The demand for energy continues to increase in the U.S. — up 26 percent since 1973. While energy-consuming equipment is becoming more efficient, as the population increases and energy-using products proliferate, we consume greater quantities of energy. Although environmental quality consistently scores highly in public opinion polls, consumers are choosing less efficient vehicles and larger homes. Satisfying the demand for energy has an impact on our air, land and water resources irrespective of the type of energy used.

Even promising forms of renewable energy, such as wind turbines, have an impact on our environment. They require significant space, many see them as an eyesore, they can be noisy and they are potentially lethal to birds. Consider that a single typical natural gas well — a metal pipe, valve and meter structure 4 to 6 feet tall — can produce the energy equivalent of 12 utility size wind turbines, each with a height of over 400 feet and blade span of some 300 feet. The point is, no energy source is totally pristine and the perceived relative environmental impacts of various sources may be flawed.

The chemical composition of natural gas, coupled with a highly efficient system for its production, delivery and use, makes gas a uniquely attractive fuel from an environmental standpoint.

Natural gas is a very clean energy source. Increased use of natural gas addresses a number of environmental challenges, including greenhouse gas emissions (with less carbon dioxide emissions than coal or oil), smog (less nitrogen oxides) and acid rain (less sulfur dioxide). Further, natural gas leaves no ash or sludge when combusted, nor does it impair visibility.

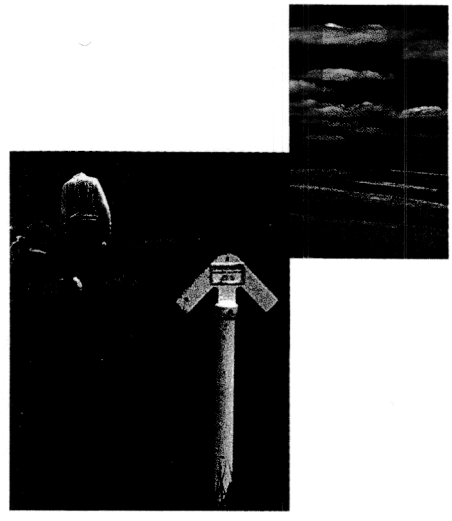
Technological improvements continue to reduce the environmental impact of producing and using gas.

Technologies such as 3D seismology and horizontal drilling evolved from efforts to produce gas more efficiently and more economically. However, these kinds of technologies also allow gas production with less environmental impact, meaning that the exploration and production practices available today are far superior from an environmental standpoint than those of 30 years ago when, primarily for environmental reasons, so many gas-prone areas were placed off limits to drilling.

We need more natural gas, not less, to help improve environmental quality.

An increasingly common response to proposed energy supply projects — regardless of the form of energy considered — is to try to block them. Whether the project is an underground gas pipeline, a generating plant or a wind turbine, the popular refrain is "not in my backyard," and the primary objection is the potential environmental impact. For the foreseeable future, as renewable forms of energy provide a larger share of U.S. energy needs, we must also take steps to increase use of natural gas.

This will require new infrastructure. Gas wells, pipelines and LNG terminals will all be required. Fortunately, this new infrastructure will be even more compatible with environmental quality than that of the past. From underwater production platforms to offshore LNG terminals, environmentally responsible technologies are available and should be promoted. Doing so can improve rather than impede environmental progress. This point was recognized by the Pew Center on Global Climate Change in its 2002 work *Designing a Climate Friendly Energy Policy: Options for the Near Term*, which urges increased natural gas production and natural gas infrastructure expansion for environmental improvement.



VIII Economics of Developing Gas Supply

Residential consumers paid about $6.70 per million Btu (MMBtu) for natural gas in 1999; little different than the $6.12 per MMBtu they paid 15 years earlier. In fact, when adjusted for inflation they paid less in 1999. But in 2001, residential gas prices averaged about $9.60 per MMBtu and significant price volatility has been experienced in gas markets over the past few years. Meeting a growing gas demand and maintaining reasonable prices will challenge the industry.

Continued growth in the traditional gas resource base will benefit consumers, but this growth cannot be met without natural gas exploration and production in areas that are currently "off-limits."

As stated, our traditional natural gas resource potential has expanded despite continued production. Based on trends in North American gas resource estimates over the past 20 years, and the expectation of continued advances in technology, the ultimately recoverable resource could increase by another 300 to 600 trillion cubic feet over the next 20 years in the U.S., and by 100 to 300 tcf in Canada. If this is the case, growth from the current 22 tcf consumption to an annual market of 30 tcf or more would not place significant sustained upward pressure on gas prices.

But if activity is limited to only areas that are currently producing gas, growth in the resource base will slow or decline. As a result, America's homes, businesses, industries and power generating facilities will likely experience higher natural gas prices.

Increasing our supply options will put downward pressure on prices, but most significant options will take several years to reach fruition.

In contrast to the late 1980s and 1990s when there was "surplus deliverability" in terms of U.S. gas supplies, there is little slack in the gas market today. Actual production is very close to full production capability. The industry no longer has the ability to simply produce more in periods when demand jumps. This is why spikes in demand since 2000 have pushed prices sharply upward. This tight supply/demand balance is likely to be with us for several years, and until it is eased, variables such as weather and economic activity that affect demand will tend to push prices upward.

Increasing supply, from new areas onshore and offshore in the U.S. to LNG and Alaskan gas, will help reduce pressure on gas prices. However, bringing new sources into the supply mix is not an overnight option. Exploring for and producing gas in new areas, or licensing and building LNG facilities, are endeavors that take several years to complete, and the construction of an Alaskan gas pipeline would take 7 or 8 years. Every year that these kinds of projects are delayed ultimately pushes back the consumer relief that they could provide.

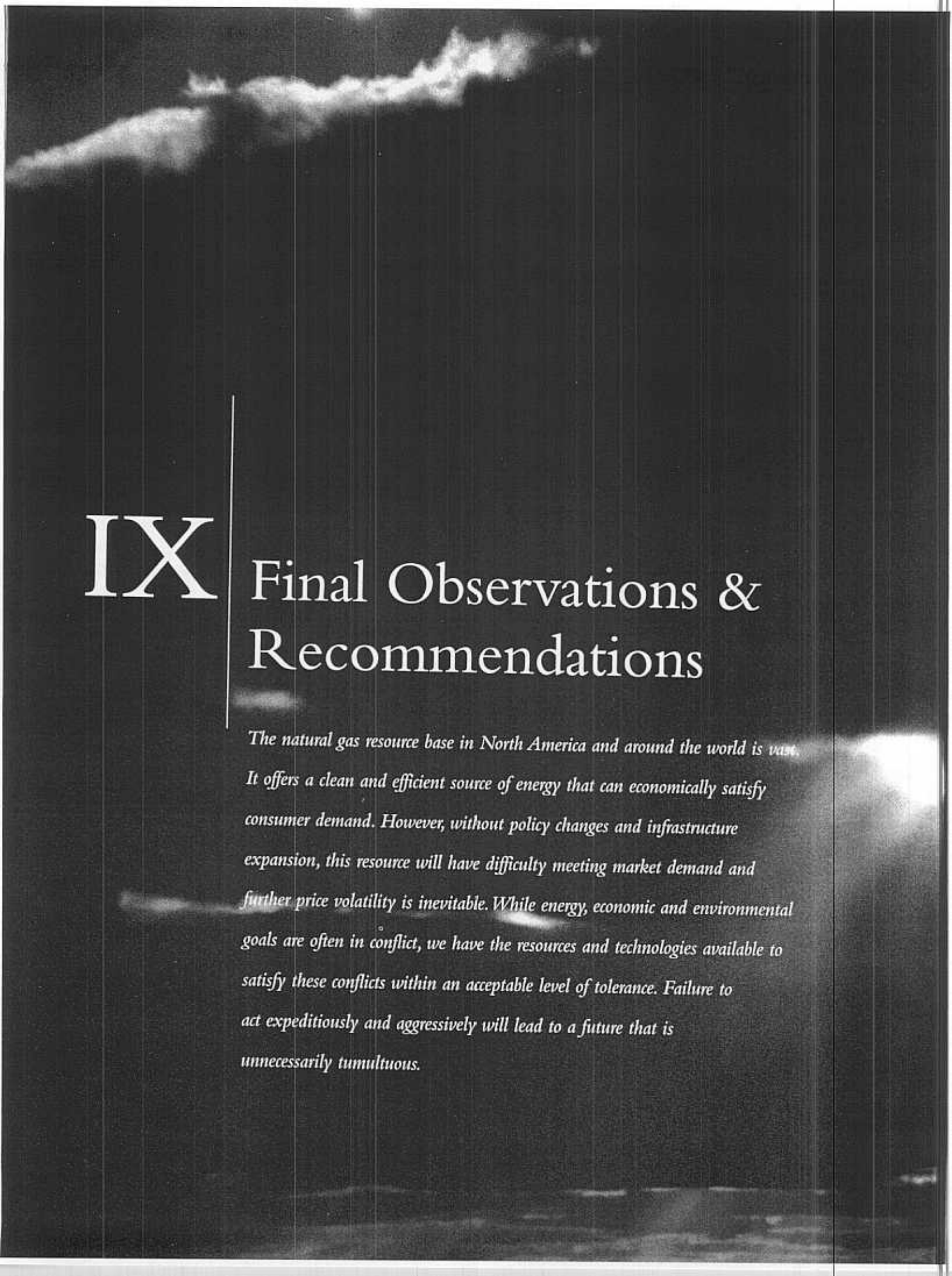
The costs associated with some non-traditional gas sources have fallen over time and further declines are likely.

Capital-intensive gas supply sources such as Alaskan gas and LNG must overcome significant economic hurdles in order to enter the market. For example, the construction of an Alaskan gas pipeline will require an investment of $15 to $20 billion, although once initiated the costs of these sources tend to be fairly stable and they may well decline. For example, the costs of liquefaction, shipping and regasification for LNG have fallen by 25 percent since the late 1980s — from $2.00 per MMBtu to $1.50 per MMBtu. Further declines of 10 to 20 percent over the next decade are possible.
(*See chart on pg. 18*)

These non-traditional sources of supply may become the price-setters in the U.S. natural gas market.

Aggressive actions to increase natural gas supplies will benefit consumers, although some increase in average prices is to be expected.

The supply actions discussed above — increased exploration and production in deep waters and a greater dependence on non-traditional supply sources such as Alaskan gas and LNG — will benefit consumers. However, these sources were not competitive in the $2.00 per MMBtu price environment of the 1990s, so some increase in prices will be required to bring these sources on line. Most analysts believe that Alaskan gas and LNG competitive such increases will be in the $3.00 to $4.00 per MMBtu range — far less than the $10.00 per MMBtu range experienced during the winter price spike of 2000-2001 when such alternative sources were not available.



IX Final Observations & Recommendations

The natural gas resource base in North America and around the world is vast. It offers a clean and efficient source of energy that can economically satisfy consumer demand. However, without policy changes and infrastructure expansion, this resource will have difficulty meeting market demand and further price volatility is inevitable. While energy, economic and environmental goals are often in conflict, we have the resources and technologies available to satisfy these conflicts within an acceptable level of tolerance. Failure to act expeditiously and aggressively will lead to a future that is unnecessarily tumultuous.

Resource Access

Responsible, cost effective development of natural gas resources must be objectively weighed against current and future alternatives — now. Restrictions on access to supply must be re-evaluated in light of technology improvements.

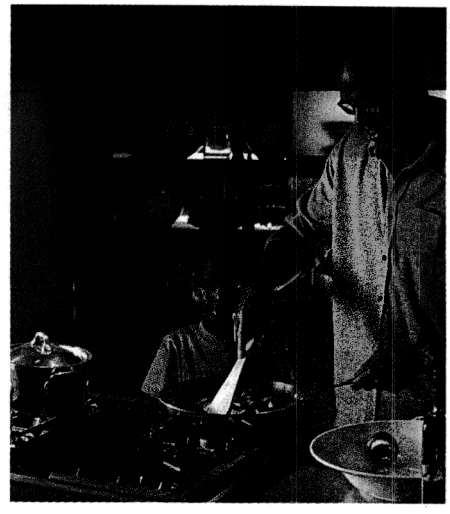
Whether the issue is coalbed methane production, an entirely new supply area, building a new pipeline or other supply related challenge, access to promising gas-rich sediments cannot be continually taken off the table.

The federal government must take the lead in overcoming the logjam created by a pervasive "not in my backyard" attitude toward energy infrastructure development in this country. State officials must also recognize that economic development and environmental quality for their citizens hinge on increased natural gas supplies.

A comprehensive grassroots approach to informing the American public of the foreseeable energy supply alternatives and the need to move forward today for the benefit of tomorrow must be established.

The U.S. government should closely and cooperatively work with the Canadian and Mexican governments to mutually solve the North American challenges of supplying competitively priced gas, in an environmentally sound manner, to a growing market.

Certainly, technologies and practices can be shared and promoted. For example, offshore development in Eastern Canada has been very successful, while similar geological formations in the U.S. Atlantic are off-limits to producers. Also, development of the coalbed methane resource in the U.S. offers the potential for technology transfer to the vast coalbed methane resources in Canada. At the very least, projects to move gas from Alaska to the lower-48 will require cooperative foresight by both countries in order to efficiently and economically develop stranded gas supplies.



Technology

Aggressive federal support of technology programs that pursue drilling, sensing, transportation and end-uses clearly benefits all consumers.

The combination of responsible development of the entire natural gas resource base in North America and the application of key technologies will solve the long-term gas supply puzzle. Homes, businesses, schools, factories and other natural gas customers should be pleased that they are using natural gas more efficiently than ever before.

IX Final Observations & Reco

Environmental Quality

Every form of energy has some environmental impact. Having zero tolerance for any environmental impact means no sustainable energy future.

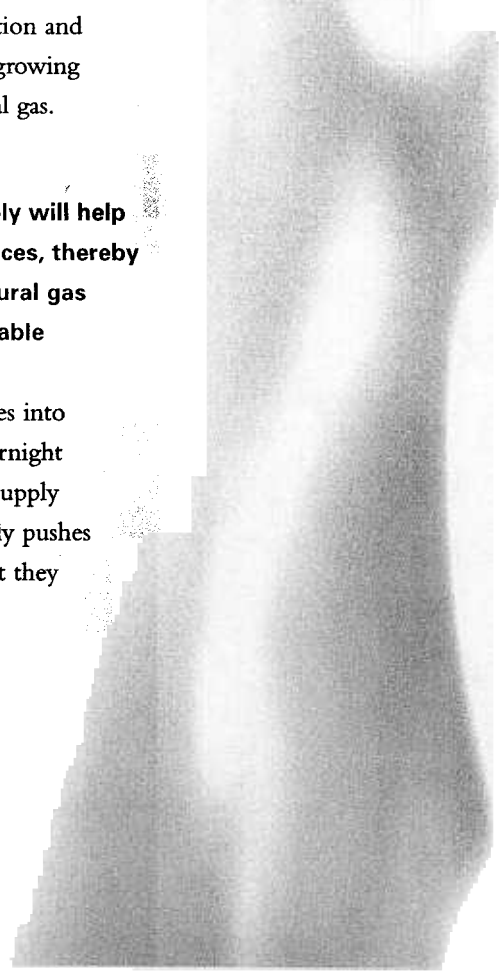
Environmental advocates recognize natural gas as the cleanest fossil fuel, and tend to support policies designed to increase the use of natural gas, such as for electric power generation. Those who promote such increased use must also support increased production and use by using the best available technology. A comprehensive review of federal and state energy and environmental policies is vital in light of improved exploration and production technology, and growing consumer demand for natural gas.

Economic Reality

Increasing sources of supply will help reduce pressure on gas prices, thereby helping to ensure that natural gas remains a popular and reliable energy value.

Because bringing new sources into the supply mix is not an overnight proposition, every year that supply projects are delayed ultimately pushes back the consumer relief that they could provide.

Meeting growing gas demand and maintaining reasonable prices will challenge the natural gas industry. Prices will be affected by both the degree to which traditional supply sources are made available to the market and by the extent to which non-traditional sources emerge in the market. In addition, while long-term supply relief issues are being addressed, state utility commissions should simultaneously work with local gas utilities to develop programs that mitigate the impacts of price volatility in the interim. The benefits of these programs should flow to the consumer, as well as to the sponsoring utility.



The American Gas Association expects that *From the Ground Up: America's Natural Gas Supply Challenge* will motivate policy-makers, natural gas customers, environmental advocates and energy-industry participants to support prudent changes in policies and practices designed to help ensure a reliable, affordable supply of natural gas for decades to come. America's economic growth, national security, quality of life and environmental protection all depend on it.

December 2002