

Chapter 2

Introduction

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The passage of the Fuel Use Act in 1977, which sharply limited the allowed uses of natural gas in the industrial and electric utility sectors, took place in an atmosphere of extreme pessimism about future gas supplies. An Electric Power Research Institute report published in that year stated that:

Today almost every important supply indicator points ominously to the fact that the Nation's ability to meet present and future demands for natural gas may be deteriorating rapidly and will continue to do so unless aggressive and innovative measures to rectify the situation are implemented immediately.¹

These pessimistic predictions were based partly on short-term problems—periodic curtailments that caused considerable hardship to industry and occasionally even to public facilities and to the commercial sector. They were also based, however, on disturbing long-term trends, such as a declining finding rate for new gasfields and, starting in the late 1960's, the ominous and apparently unstoppable decline of proved reserves (fig. 2).

Since 1977, the national perception of future natural gas availability has changed, for several reasons, to one of relative optimism. First, short-term supply is now in a state of surplus; a large gas "bubble," or surplus deliverability, estimated to be as high as 2 trillion cubic feet (TCF) per year,² has been caused by a combination of energy conservation, recession-induced reductions in industrial activity, and industrial fuel-switching from gas to oil because of declining oil prices and increased gas prices. At the same time, reserve additions have apparently rebounded from the depressed levels of the 1970's to over 20 TCF in 1981.³ Also, the U.S. Geological Survey (USGS)

and the Potential Gas Committee (PGC) have each recently confirmed their earlier estimates of the remaining recoverable resources in the Lower 48 States:⁴ the latest USGS estimate implies that about 770 TCF of gas remain as of January 1983, while the PGC estimate implies an even more optimistic 910 TCF.⁵ These estimates, which do not include gas that could be recovered with completely new technologies and/or substantially higher prices, both exceed the amount of gas that the United States has already produced during the entire history of its gas use.

As a result of these optimistic signs, much of the natural gas industry believes that gas demand has replaced supply as a critical issue, and some industry organizations are even claiming that supply from all sources could be sufficient to allow a substantial expansion of U.S. gas consumption in the next few decades.⁶ Also, Congress is reexamining the legislation governing the U.S. natural gas market.

In reaction to this changing outlook for U.S. natural gas supply, the House Committee on Energy and Commerce and its Subcommittee on Fossil and Synthetic Fuels, supported by the Subcommittee on Energy Research and Development of the Senate Committee on Energy and Natural Resources, asked OTA to conduct a study of domestic (Lower 48 States) natural gas availability over the next few decades. The overall study will examine both conventional and unconventional sources of natural gas (the unconventional sources include coal-bed methane, tight sands, Devonian shale, and geopressurized aquifers), review current estimates of resource bases and production

¹R. C. Llano, et al., *A Comparative State-of-the-Art Assessment of Gas Supply Modeling*, EPRI report EA-201, February 1977

²Oil Finds of 108 Billion bbl Seen in '80's, "Oil & Gas Journal," Sept. 27, 1982, p. 140.

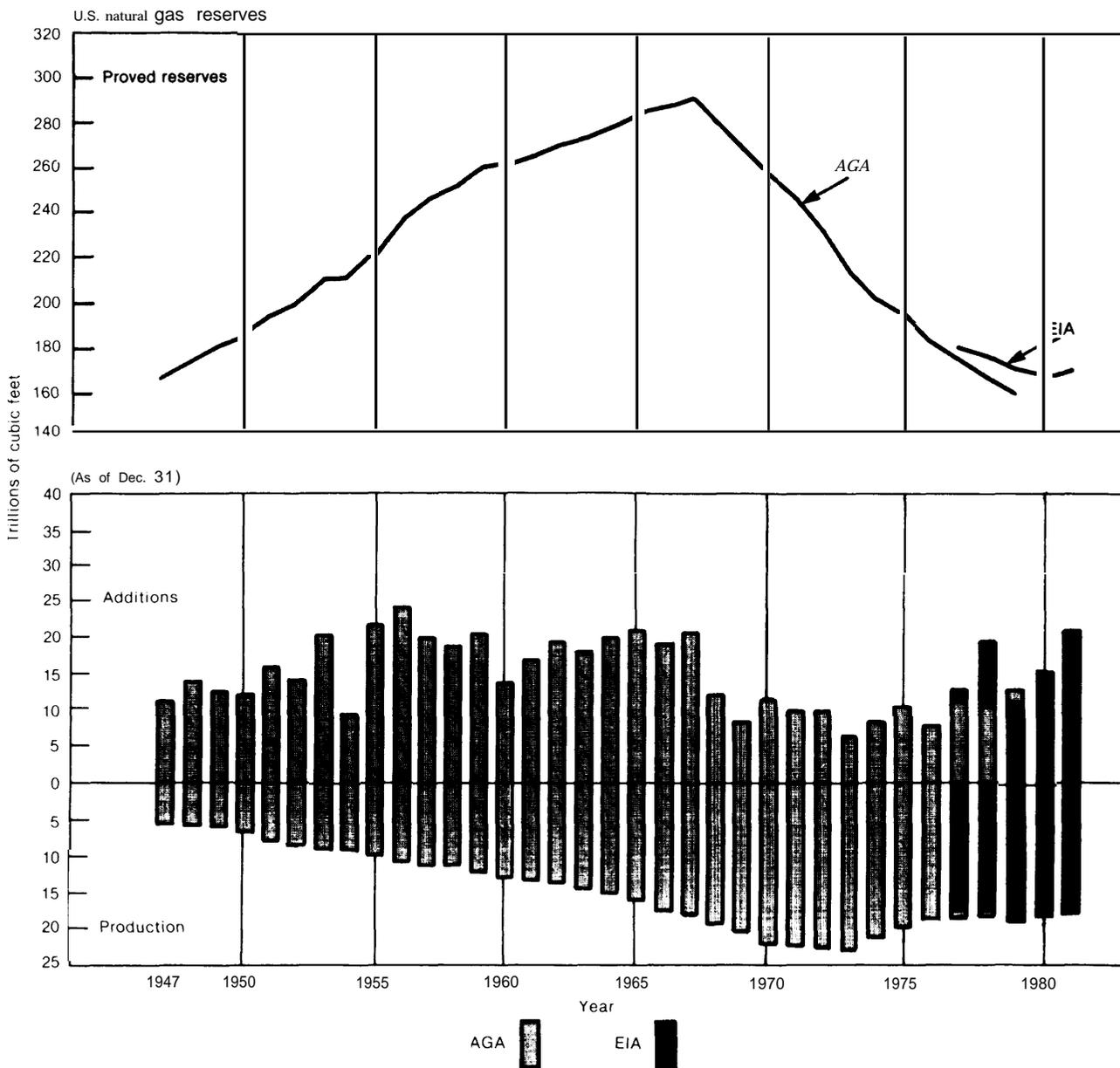
³Executive summary and selected summary tables from "U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves," 1981 Annual Report, prepublication draft, Aug 30, 1982, Energy Information Administration (EIA), U.S. Department of Energy. Because the EIA data series appears to differ somewhat from the earlier American Gas Association data (EIA began in 1977), the interpretation of the recent higher reserve additions is somewhat controversial

⁴B. M. Miller, et al., *Geological Estimates of Undiscovered Recoverable Oil and Gas Resources in the United States* USGS Circular 725, 1975; and Potential Gas Committee, *Potential Supply of Natural Gas in the United States (as of December 31, 1980)* (Golden, Colo.: Potential Gas Agency, Colorado School of Mines, May 1981)

⁵G. L. Dolton, et al., *Estimates of Undiscovered Recoverable Conventional Resources of Oil and Gas in the United States*, Geological Survey Circular 860, 11481 and Potential Gas Agency News Release - February 26, 1983.

⁶For example, see *The Gas Energy Supply Outlook 1980-2000* American Gas Association, January 1982

Figure 2.— Natural Gas Production: Additions to Reserves, and Total Reserves of the Lower 48 States



SOURCE American Gas Association, *The Gas Energy Supply Outlook 1980-2000* January 1982

potentials, and examine key technical issues that will affect the future development of those sources.

This technical memorandum presents OTA's evaluation of the prospects for future supplies of

conventional natural gas. * It focuses first on an assessment of the conventional gas resource base, and second, on an evaluation of production po-

*This material will form one section of OTA's final report on U.S. Natural Gas Availability. The memorandum is being released early in view of the current congressional debate on natural gas.

tential for the mid to long term—10 to 20 years and beyond. The size of the resource will obviously play a critical role in long-term supply and an important but less widely understood role in the midterm supply.

The memorandum is oriented primarily towards examining the role played by *technical* uncertainties in estimating future gas availability. Specifically, the memorandum examines the recoverable resource base and future gas production potential under the following conditions:

- *Demand for gas is high*, implying that explorers and producers do not curtail their activities because of fear that their gas will not be marketable. The current gas “bubble” is assumed to end shortly and not to reoccur, and drilling rates are assumed to rebound to levels achieved before the recent slump. Consequently, “pessimistic” scenarios examined in this study reflect only pessimism about technical prospects for gas discovery and production and do not reflect the possibility that low gas demand may drive down discovery rates and production.
- *Average wellhead prices do not change grossly from today’s levels*, implying primarily that gas sources that today are unequivocally outside of the “economically recoverable” range are excluded from OTA’s resource estimates and projections of future production potential.
- New technologies that are not readily foreseeable extensions of existing technologies are not considered in the analyses.

This orientation clearly requires that the estimates of resources and production potential presented in the report be interpreted carefully. For example, OTA’s assumptions about price and technology are likely to yield conservative estimates of gas resources and production poten-

tial. Historically, the recoverable resource bases for essentially all nonrenewable resources have expanded as prices rose and new recovery technologies were developed (see ch. 4, “Resource Base Concepts”). This has certainly been the case for the gas resource base in the past, and will undoubtedly also be the case in the future. However, the extent and timing of future expansion of gas resources is extremely difficult to predict.

In addition, as noted, a continuation of low gas demand would tend to change future production potential relative to that projected only on the basis of the *technical* potential. A lack of markets will discourage exploration, new pipeline development, and other determinants of future production potential, although simultaneously it will slow the drawing down of existing proved reserves, the “ready inventory” for future production.

The remainder of the memorandum is organized in the following fashion:

- *Chapter 3: Natural Gas Basics* presents a brief review of basic natural gas terminology and concepts.
- *Chapter 4: The Natural Gas Resource Base* reviews resource assessment methodologies, describes and critiques several specific gas resource assessments, evaluates a number of critical resource issues, and presents OTA’s conclusions about the magnitude of the remaining resource base.
- *Chapter 5: Gas Production Potential* describes four approaches used by OTA to evaluate the gas production potential to the year 2000, and presents OTA’s conclusions about this potential.
- *Chapter 6: Other Gas Sources—Summary* briefly reviews the prospects for additional sources of supply to the Lower 48 States—liquefied gas imports and pipeline imports from Alaska, Canada, and Mexico.