

**UNDERSTANDING
NATURAL GAS PRICE DECONTROL**

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Congressional Budget Office**

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PREFACE

In 1978, the Congress passed the Natural Gas Policy Act (NGPA), which allowed the wellhead price of much of the nation's gas to rise to levels suggested by the then-assumed future price of oil, and to be decontrolled in 1985. The oil price assumptions that underlay the NGPA's gas price paths, however, proved to be substantially lower than the prices that materialized. This and other features of both the NGPA and natural gas markets have made the smooth transition to decontrol imagined in the act unlikely. These effects, coupled with the expiration of NGPA controls in 1985, have led many in the Congress to reconsider the nation's long-term pricing policy for natural gas at the wellhead.

A variety of analyses concerning the natural gas market and the economy, and their reactions to changes in gas prices, have been produced by government agencies, academic researchers, and consumer and industry groups. These analyses often display conflicting results because of their choices of perspective and assumptions. In response to a request from the Subcommittee on Fossil and Synthetic Fuels of the House Committee on Energy and Commerce, the Congressional Budget Office (CBO) has prepared this background report, which provides a conceptual framework for understanding the energy market and economic effects of changes in natural gas pricing policy. This framework allows a comparison of the various analyses of price changes. In keeping with CBO's mandate to provide objective analysis, the report makes no recommendations. A companion paper, Natural Gas Pricing Policies: Implications for the Federal Budget, requested by the Senate Budget Committee, was released in January 1983.

The paper was written by several members of CBO's Natural Resources and Commerce Division. Timothy J. Considine prepared the chapters describing the gas market (Chapter II) and macroeconomic effects of decontrol (Chapter IV). Chapter III, dealing with microeconomics, was written by Michael D. Deich and Everett M. Ehrlich. Chapter V, which analyzes the redistributive effects, was prepared by Philip C. Webre. The report was prepared under the supervision of David L. Bodde and Everett M. Ehrlich. The authors are indebted to Dr. Knut Mork and Dr. Glenn Loury for their comments and criticism, although they are in no way responsible for the report's conclusions. Patricia H. Johnston edited the manuscript. Deborah L. Dove typed the many drafts and Philip Willis prepared the report for publication.

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SUMMARY

In 1978, the Congress passed the Natural Gas Policy Act (NGPA), which allowed gradual increases in the price of natural gas at the wellhead. The legislation sought to raise the price of most gas to the equivalent of the act's projected price of oil by 1985, at which time much of the nation's gas would be decontrolled. But the price of oil has risen well beyond the projections embodied in the NGPA, and the legislation contained no provision for correcting its gas price trends. Furthermore, contract provisions peculiar to the gas industry have led to further inflexibility in the gas market. Thus, the smooth transition once envisioned by the framers of the act may not occur. This circumstance is at the heart of several problems created by the NGPA, and has led many to reconsider the issue of natural gas pricing, particularly revised pricing schedules and contract provisions or outright decontrol.

Any policy involving gas pricing may redistribute, whether intentionally or not, tens of billions of dollars. The potential significance of any such policy change has led to a range of analyses that often reach conflicting conclusions and recommendations. Much of the difference among these studies lies in the choice of a perspective for analyzing the effects of gas pricing policy, the choice of assumptions concerning the features of the gas market, or the assumed response of the economy to higher gas prices.

In order to assist the Congress in comparing these analytic viewpoints, this paper attempts to organize these various perspectives, assumptions, and features into a single unified framework against which competing analyses can be measured. Its aim is to raise the questions that any analysis of gas decontrol must address in order to be credible. This framework considers the effects of natural gas wellhead pricing policy changes as they occur in three different but simultaneous contexts:

- o The economic adjustments in the natural gas markets;
- o The effects on the entire economy as households and firms adjust to higher natural gas prices; and
- o The effects on the distribution of income among individuals, regions and economic sectors.

Although these three contexts can be separated, the changes they describe all occur simultaneously. Thus, the framework presented here seeks to unify these three interrelated types of effects. How these effects will be resolved will depend on the answers to several questions:

- o What is the price of oil during gas decontrol?
- o What is the content of natural gas contracts between producers and pipelines?
- o How do households, nonenergy firms, and gas producers react to new gas prices?

THE NATURAL GAS MARKET

The natural gas market is an integrated system that contains a sequence of steps, including production of the gas resource for sale to long-distance transmission (pipeline) companies; sales from transmission companies to local distribution companies; and sales from local distributors to end users. Decisions at each of these steps are affected directly and indirectly by federal and state natural gas regulatory policies. The deregulation envisioned under the NGPA, and under all similar recent proposals, applies only at the wellhead. All downstream activities appear likely to remain subject to regulatory control.

Wellhead gas prices have been controlled at the federal level since 1954 but originally were applied only to interstate gas (gas produced in one state and sold in another) and not to intrastate gas (gas produced and sold within one state). The problems raised by this partial regulation scheme led the Congress to pass the NGPA in 1978. The NGPA set different prices for various categories of interstate and intrastate gas. In addition, prices of some categories were completely deregulated, while others were permitted to increase at the rate of inflation plus a real growth premium.

Gas at the wellhead is sold to interstate transmission companies that purchase, sell, and transport gas across state lines. Their allowed profits are regulated by the Federal Energy Regulatory Commission (FERC) and are based on the value of their capital assets and not on operations. The price pipeline companies can charge is set by the purchase price they pay for gas plus their allowed rates of return. Their profits are spread over a base volume of gas, determined annually by FERC. If this base volume is sold, the total allowed rate of return is realized. This regulatory policy tends to limit the incentive for transmission companies to engage in competitive bidding for gas supplies. Pipeline companies do not have an unchecked

ability to pass on costs--higher rates associated with increased costs could lead to reductions in natural gas demand below the base volume determined by FERC. But this load loss would lead FERC to revise downward the volume of gas over which the pipeline can earn its allowed rate of return. Thus, this incentive to minimize costs is considerably weaker than the incentives faced by firms in conventional competitive industries.

Gas transmission companies sell to local distribution companies. These distribution companies purchase gas at a single price that is an average of old, low-cost gas and high-cost gas from new sources. To the extent that large volumes of low-cost gas are available, distributors and ultimately users are shielded from the higher incremental costs of new gas. Hence, pipeline companies can sell gas whose wellhead price is above the price for which it will ultimately be sold.

State public utility commissions (PUCs) determine the rates that different classes of final customers pay for natural gas. Historically, these schedules have been characterized by declining prices for incremental amounts of gas reflecting economies of scale in the gas industry. But increasing costs for new gas in recent years have made such pricing policies inefficient. In addition, PUCs establish priorities for curtailments in the event of supply shortfalls. The curtailment policy serves to allocate natural gas when controls hold prices below their market levels.

EFFECTS OF DECONTROL ON THE NATURAL GAS MARKET

Control of prices restricts the ability of the competitive marketplace to realize the economic benefits--or "efficiency gains"--that result from improving the allocation of resources. Any analysis of the benefits of decontrolling the wellhead price of natural gas, therefore, centers around the notion of efficiency gains. Simply put, the decontrol of natural gas at the wellhead could lead to production of gas whose value to the user is greater than its cost to produce. This difference between use-value and cost is an efficiency gain.

Efficiency gains could be realized as new production occurred in response to the higher decontrolled price, allowing new gas users to buy gas and to substitute this newly available decontrolled gas for the more expensive alternatives currently in use. In general, the decontrol of gas would allow a more efficient production, distribution, and utilization of gas, and therefore, a potential increase in economic activity.

This increase in economic activity would be obtained, however, at the cost of a redistribution of income. The income transfer would occur as

consumers paid, and producers received, the decontrolled price for gas production that would have taken place even at the controlled price. Thus, for those already consuming gas, consumption of other goods, or savings would be decreased. Higher gas prices, therefore, would reduce the real income of these consumers, and, in turn, the incomes of those who produce the other goods they consume.

Analytic Subjects

The economic adjustments to higher natural gas prices in a competitive market raise two major analytic subjects. First, any analysis must depict the response of gas producers and consumers to price changes. These reactions will determine the efficiency gains associated with gas decontrol. Since uncertainty exists about the probable response of gas users and gas producers to higher prices, supply and demand relationships must be measured and their derivation is central to the outcome of any analysis.

Second, the effects of wellhead price decontrol are not instantaneous. The major consideration is the speed and sequence with which these effects will take place. The balance between supply and demand in a decontrolled market will ultimately occur, but prices may fluctuate during the transition. This adds to the uncertainty surrounding the timing and magnitude of demand and supply responses, and the realization of efficiency gains. Thus, any analysis of decontrol effects must address the way in which the gas market will reach its new equilibrium.

Special Gas Market Features

There are several unique features of the natural gas market that are important to consider in measuring the economic effects of natural gas decontrol and in evaluating various policy proposals that are intended to ensure a smooth transition to decontrol. These features will influence gas prices and, therefore, the size and timing of any efficiency gains and income transfers resulting from natural gas decontrol.

The Nature of Gas Contracts

Many gas contracts between producers and pipeline companies have provisions that tie the price of gas either to the highest price paid elsewhere for gas or to the price of distillate oil or other petroleum products. Thus, upon decontrol, some gas may rise to the price of distillate oil or higher and, because of contract provisions, this price could spread to other contracts.

Substantial amounts of gas may rise, therefore, to prices that cannot be sustained by the pipelines, although they would be forced to pay for unmarketable gas because of the existence of "take-or-pay" provisions. The long-term nature of many contracts compounds the problem. Any analysis of decontrol must address the content of gas contracts in order to assess the likelihood that gas prices will be locked into unsustainable levels.

Average Cost Pricing Policies. Pipelines sell their gas for a price that is the average of all the prices the pipelines pay for gas (plus their allowed rate of return). Since some pipelines have substantial supplies of low-cost gas under old contracts, they may be able to pay more than the long-run equilibrium price for additional supplies. This is commonly known as "the fly-up problem," and whether or not it will occur extensively with decontrol is uncertain. The fly-up problem may also create regional economic imbalances. If the endowment of low-cost gas is, in fact, unevenly distributed among regions, as it most likely is, then regions with this endowment may have a greater ability to compete for new gas supplies than would their counterparts. Thus, the distribution of old, low-cost gas is an important analytic consideration. Also in question is whether a skewed distribution of low-cost gas supplies would lead some pipelines to fail.

Vertical Integration. Some pipelines own their own gas reserves, creating the potential for circumventing regulatory controls by charging a "transfer price" that allows monopolistic profits to be transferred from the regulated sector to the nonregulated sector. In these instances, pipelines potentially can behave like unrestrained monopolists by reducing output to the levels at which they can earn the greatest profits. This problem is exacerbated if such pipelines also have endowments of low-cost gas. Decontrol analyses should address the patterns of pipeline ownership of gas production.

Gas Supply Allocation Policies. Existing gas supplies have traditionally been allocated not by price but by regulation or historic pattern. Access to gas has been restricted (by disrupting supplies to commercial and industrial users and forbidding new hook ups) in order to suppress the excess demand for gas induced by below-market prices. Decontrol would eliminate the need for this type of rationing. Thus, any analysis of gas decontrol must estimate the extent to which the demand for gas has been artificially restrained.

EFFECTS OF DECONTROL ON THE ECONOMY

Natural gas decontrol could create price and income effects capable of substantially influencing macroeconomic activity. An important factor is

the adjustment of the nation's economy to the income effects--the transfer of income from gas consumers to gas producers and consumers' ensuing loss of purchasing power for other goods and services. These income changes could affect the composition of consumption and the level of employment and output. In addition, increased natural gas prices under decontrol will change relative prices throughout the economy, which could have inflationary consequences.

The macroeconomic impact of natural gas decontrol is the result of several competing factors. The level and rate of increase in natural gas prices will largely determine the inflationary effects of decontrol and the changes in relative prices that influence consumption and production decisions. In the short run, higher natural gas prices will reduce consumer discretionary income and, therefore, reduce the level of expenditures consumers can maintain for nonenergy goods. These reductions in consumption expenditures will limit the ability of nonenergy producers to employ workers, purchase energy and materials, and pay returns on capital investments.

While this income effect will lower expansion of overall output and employment, households and industry will adjust over time to the changed relative prices of natural gas and other goods and services. These adjustments will provide long-term economic benefits. Furthermore, gas producers will recirculate income by respending increased revenues on new investment projects and additional workers. These changes will allow the economy to produce more output with fewer inputs and, therefore, raise national income by realizing potential efficiency gains. Thus, price and income effects work against one another. The adjustment of the economy to natural gas price decontrol will be determined, therefore, by the relative sizes and speeds of these two effects.

THE DISTRIBUTIONAL EFFECTS OF DECONTROL

There are four dimensions to the distributional consequences associated with natural gas price decontrol. The first involves the functional distribution of income, defined as the shares of wages, profits and interest of national income received by various economic sectors and individuals. The second feature reflects shifts in the industrial composition of aggregate economic activity. Both of these factors will result from the macroeconomic adjustments to decontrol described above. The third dimension concerns shifts in the regional composition of employment, income, and output. These compositional shifts can be inferred from the sectoral shifts that will closely parallel the geographic distribution of economic activities. The last distributional dimension is the distribution of

income across income classes. If the demand for natural gas is more price inelastic among low-income individuals than among higher-income persons, then decontrol will skew this income distribution. Analysis must address these issues in order to capture the distributional effects of gas pricing changes. These effects themselves are rooted in the micro- and macro-economics of gas pricing policy.

CHAPTER I. INTRODUCTION

In 1978, the Congress passed the Natural Gas Policy Act (NGPA), which established gradual increases in the wellhead price ceilings for natural gas. The legislation tied these ceilings to a projected "heat equivalent" price of oil in 1985, at which time much of the nation's gas would be decontrolled. Oil prices have risen dramatically since 1978, however, so that they now far exceed the projections for 1985 used in NGPA.^{1/} Thus, the smooth transition to decontrolled prices envisioned by the framers of the act will not occur. This circumstance, combined with other potential problems raised by the NGPA, has led many to reconsider gas pricing policy, particularly whether or not a revised pricing schedule, or outright decontrol, is in order. Among the possible policy changes that could be made, this report focuses on the effects of decontrolling wellhead gas prices. The report also discusses two special characteristics of the natural gas market that will influence the economic effects of decontrol: the regulation of gas sales from pipelines to local distribution companies and from those companies to gas users, and some provisions of natural gas contracts between producers and pipelines.

The decision about the treatment of natural gas pricing should be based on an analytic foundation that correctly describes the economic advantages and disadvantages of alternative pricing policies. Significant changes in gas pricing policies would have a sizable impact on the economy. To put the matter in perspective, complete decontrol could increase the wellhead price of natural gas by \$1.00 per million cubic feet (a plausible, and to some analysts, likely outcome). This would result in a redirection of income flows that would be half as large as the projected \$37.7 billion tax reduction in fiscal year 1982 under the Economic Recovery Tax Act of 1981.^{2/} Furthermore, gas price increases would alter relative prices throughout the economy and lead to additional effects on real spending and

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1. The NGPA uses an oil price of \$15.00 per barrel (in 1978 dollars) as a target for prices of "new" gas in 1985. With current projections of inflation, this real price translates into roughly \$24 dollars per barrel in nominal 1985 dollars.
 2. Congressional Joint Committee on Taxation, General Explanation of the Economic Recovery Tax Act of 1981, December 31, 1981, p. 380.

production activities. Thus, gas decontrol could have economic effects as significant as those of a major fiscal policy initiative.

The potential economic effects of changing natural gas pricing policy have prompted a range of analyses that often contain conflicting conclusions and recommendations. Much of the variation among these studies lies in the choice of a perspective from which to examine the economic adjustment to higher gas prices. On which effects should the analysis focus? How should macroeconomic adjustments be considered? What assumptions should be made about supply and demand responses, income flows, and employment effects? Additional differences arise from features not commonly found in other markets, such as long-term supply contracts, average cost pricing, and state and local regulation of gas sales. These features call for modifications of the standard economic analyses that are applied to the general problem of market adjustment and price decontrol. This background paper attempts to organize these different perspectives, assumptions, and unique features into a unified framework against which the various analyses of natural gas price decontrol can be compared.

Chapter II describes the evolution of the U.S. natural gas market and its principal stages: exploration, production, transmission, and distribution. Each of these stages involves different economic actors and has varying levels of government regulation or intervention. Chapters III, IV, and V describe the three major perspectives that can be used to describe the economic adjustment to natural gas price decontrol and demonstrate their interrelatedness. Chapter III approaches the problem from the perspective of the natural gas market, including supply and demand responses and the specific features surrounding gas provision. Chapter IV describes the possible macroeconomic responses to higher gas prices, focusing on the income flows and relative price changes that accompany the demand and supply responses described in Chapter III. The macroeconomic chapter discusses the effects on the gross national product, inflation, and employment associated with changes in gas prices, and also suggests how these effects are distributed within the economy to various regions, income, classes, and industries. These distributional influences are presented in Chapter V.