Natural Gas Controls and Decontrol

Natural gas is now the only major energy source in the United States subject to extensive Federal price controls Since gas supplies about one quarter of our total energy usage, including heating more than half the homes in this country, the debate over removing controls is unavoidably contentious yet important for our long-run energy prospects Basically, the controls hold down gas prices for certain customers, while placing restrictions on usage by others Unfortunately, this approach does not guarantee that demand will always stay in line with supply. Although major gas shortages have been avoided in recent years, it is not clear how long current market conditions can continue This makes it important to consider the possible consequences of decontrolling natural gas in the near future, as opposed to leaving current legislation unchanged

Current law

The controls on natural gas have two main parts First, the wellhead price of gas is held down to provide price protection to certain customers However, price ceilings, if lower than the market clearing price, cause shortages because demand for a commodity at the controlled price will exceed the quantity supplied Therefore, the other component of natural gas legislation is demand restrictions. These demand restrictions are intended to ration supply and thereby bridge the gap between supply and demand for gas.

The current system of gas price controls was established in the Natural Gas Policy Act of 1978 (NGPA). This act sets wellhead price ceilings for a number of different categories of natural gas, generally allowing higher prices for gas from newer sources and lower prices for older production sites. New sources of gas, those put into production since 1977, account for roughly 40 percent of current United States output. This gas from new sources qualified for ceiling prices averaging around $2 60 per thousand cubic feet (mcf) as of March 1981, well above the $1 70 per mcf average wellhead price for all United States production at that time Gas from older sources qualified for a lower range of ceiling prices. A small amount of gas from categories with high production costs (mainly very deep wells) is decontrolled and as of March 1981 sold at wellhead prices ranging from $3 to well over $7.[1]

The NGPA allows for gradual lifting and partial elimination of these wellhead price ceilings All the ceilings are allowed to rise along with inflation Newly discovered gas, as well as gas from small "stripper" wells, is allowed an additional upward annual price adjustment of 4 percent. On January 1, 1985 price ceilings on gas from most new sources will be eliminated.[2] Moreover, price ceilings will also be removed

[1] Estimated production for new, old, and high-cost gas sources, and price ceilings for new and old categories are from the United States Department of Energy, Energy Information Administration, Analysis Report 0289, *The Natural Gas Market under the Natural Gas Policy Act* (June 1981), pages 2 and 10 Prices for high-cost gas are from Foster Associates, Inc , *Foster Bulletin on Deregulated Gas*, No 5 (Washington, D C March 1981) The average wellhead price for all natural gas is from the United States Department of Energy, Energy Information Administration, *Monthly Energy Review* (July 1981), page 85

[2] Gas from certain shallower new production wells, however, must wait until mid-1987

from much of the old gas that is sold under intrastate contracts. The paucity of data on the relative amounts of current production in each category, as well as the uncertainty about how rapidly the production mix of old and new gas will change, makes it impossible to estimate precisely how much gas will be decontrolled in 1985. A reasonable guess, however, is that between one half and two thirds of all domestic production will be decontrolled at that time. Even by 1990, however, a substantial fraction may still be subject to price controls under the NGPA.[3]

There are several types of demand restrictions on natural gas. Under the Powerplant and Industrial Fuel Use Act of 1978 (FUA), the amount of gas (and oil) electric utilities may burn in existing power plants is limited, and construction of new large industrial boilers and power plants fired by gas (or oil) is prohibited where coal is a feasible alternative. In addition, the NGPA "incremental pricing" rules require that interstate pipelines charge gas costs exceeding a base level to industrial customers This pricing policy further discourages industrial use while allowing more of the benefit of wellhead price controls to be passed on to residential customers, electric utilities, and other users. The NGPA also prescribes that industry be given less priority than residential and certain other users in the event that curtailments of natural gas should become necessary. Besides these Federal restrictions on demand by industry and electric utilities, new residential hookups may be limited at the local level, often by state public utility commissions

These restrictions on demand essentially make up a set of allocational rules which guarantees the best gas availability to existing residential customers and the worst access to large industrial users, with electric utilities, potential new residential customers, and others somewhere in between the two extremes. The large industrial users' access is directly restricted, they bear a disproportionate share of wellhead costs in the prices they pay, and their supplies are particularly vulnerable to curtailment. Existing residential customers can basically use as much gas as they choose at controlled prices Access by electric utilities and potential new residential customers in practice depends on regulatory discretion, which in turn is influenced by current market conditions.

Market conditions

During the mid-1970s many industrial users and electric utilities were affected by natural gas curtailments, particularly during cold weather.[4] In addition, there were many restrictions on new residential hookups. Since Federal price controls prior to 1978 applied only to gas flowing through interstate pipelines, the shortages were borne by interstate customers. Had there been effective price controls on intrastate gas also, the shortages would have been more widespread because the intrastate market would have contributed to the overall excess demand for gas.

Since 1978, when current legislation went into effect, major curtailments have been avoided and gas is more available to new customers. To understand why market conditions improved requires a longer run perspective, however Natural gas production, distribution, and consumption require a considerable amount of physical capital Therefore, supply and demand adjust to changing circumstances gradually. Just as discovery and development operations for gas supplies can take years, homeowners and factory managers may wait for furnaces and boilers to wear out before replacing them with equipment that uses a different, cheaper type of fuel. Thus, the current state of the natural gas market reflects the cumulative impact of a number of years of changing incentives, regulations, and other factors.

One of the most important changes affecting the natural gas market over the past decade has been the steep rise in average wellhead prices (Chart 1). Between 1955 and 1970 the average wellhead gas price rose only slightly more rapidly than the general price level However, between 1970 and 1978, the average wellhead price quintupled, rising at a 23 percent annual rate This rise was only partly due to increases in the uncontrolled intrastate market. The Federal Power Commission also allowed interstate prices to increase rapidly, in delayed response to the developing shortages.

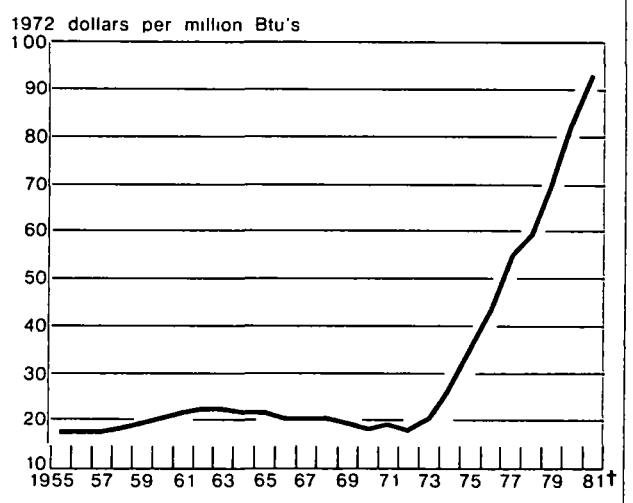
The sharp price run-up at the wellhead during the 1970s was accompanied by a marked increase in drilling activity (Chart 2). New gas well completions, which were flat on balance during 1955-70, rose over 16 percent per year between 1970 and 1978. Despite this vigorous increase in drilling, the gas supply situation deteriorated. After 1968, discoveries of gas were no

[3] According to an analysis prepared for the Federal Energy Regulatory Commission, in 1985 gas still subject to price ceilings will make up between 44 percent and 36 percent of total United States consumption (including a small fraction of imports), the range reflecting varying assumptions about regulatory enforcement and market conditions See ICF, Incorporated, *A Preliminary Analysis of the "Gas Cushion"* (Washington D C November 1979) The same study projects the 1990 proportion as varying between 34 percent and 28 percent More recent data seem generally consistent with these aggregate projections, although the distribution across finer categories is somewhat different See *The Natural Gas Market under the Natural Gas Policy Act,* page 10 For a similar finding, see Foster Associates, Inc , *Foster Report,* No 1293 (December 31, 1980), pages 13-14

[4] For example, see A F. Bass, "Curtailments of Natural Gas Service", *Monthly Energy Review* (January 1976), pages 2-13

Chart 1

Real Wellhead Price of Natural Gas*



* Adjusted for inflation by GNP implicit price deflator

† Estimate based on first six months of 1981

Sources American Gas Association, United States Department of Commerce, and United States Department of Energy

longer greater than production, with the result that reserves fell throughout the 1970s Gas production declined only modestly, however, because the higher wellhead prices encouraged more intensive utilization of existing reserves Moreover, the rate of decline in reserves began to taper off later in the decade because, with more drilling, gas discoveries began to increase again, narrowing the gap between production and additions to reserves

The moderate decline in gas production during the 1970s resulted in a corresponding fall in the total amount of gas available for United States consumption In addition to domestic production, the United States imports about 5 percent of its gas, primarily from Canada and Mexico Both price and quantity supplied are determined by the Canadian and Mexican governments, and contracts are also subject to the approval of the Economic Regulatory Administration. Since imports have accounted for a fairly stable portion of all gas available to United States users, aggregate consumption trends have closely followed domestic production (Chart 3)

The price of gas to end users in the 1970s reflected the sharp increase in wellhead prices The cost of transportation and distribution of gas to customers also accounts for a sizable fraction of the total delivered price, however, and these costs rose less than wellhead prices As a result, while the prices paid by end users rose much faster than the general price level during the 1970s, the rates of price increase were not so rapid as at the wellhead For residential customers, the wellhead price accounted for only about one fifth of the total delivered price in 1970 and still made up only a third in 1978 Thus, the rate of increase in delivered residential gas prices averaged only 11 percent per year during 1970-78, although this still outpaced the 6 percent average yearly rise in the gross national product (GNP) price deflator over the period For industrial users and utilities, transportation and distribution costs make up a smaller proportion of total delivered prices Prices to these users rose 22 percent per year in 1970-78, nearly as rapidly as at the wellhead

Since the price of gas to end users rose faster than the general price level, gas users' incentive to conserve increased The average gas usage per residential gas customer fell during the 1970s despite an increase in the fraction of these customers using gas for heating [5]

On the other hand, in 1974 the price of oil rose much more than gas (Chart 4), raising the incentive for energy users to use gas rather than oil as a main fuel supply Widespread switching from oil to gas, however, was not feasible given the limited aggregate amount of gas available By the mid-1970s, in nearly half of all gas utility franchise areas there were restrictions on new residential hookups [6] As a result, the number of homes converting from oil to gas declined, and despite more home building the growth of the total number of residential gas customers also slowed (Chart 5) Gas availability was an even greater problem for industrial and electric utility customers, who bore the brunt of the curtailments in the mid-1970s. Moreover, during the years following the 1974 oil price jump, the price of gas came back closer to its historical relationship with oil prices for these customers. By 1978 the number of industrial and electric utility gas customers was actually lower than at the start of the decade

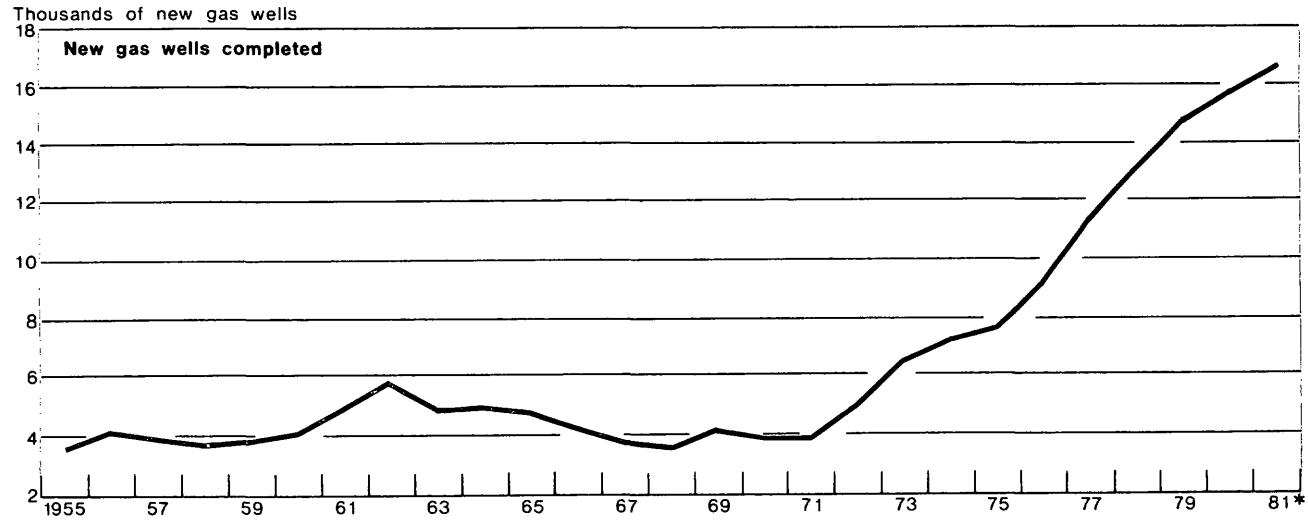
In short, during the 1970s the price of gas to final customers rose but not enough to allocate the over-

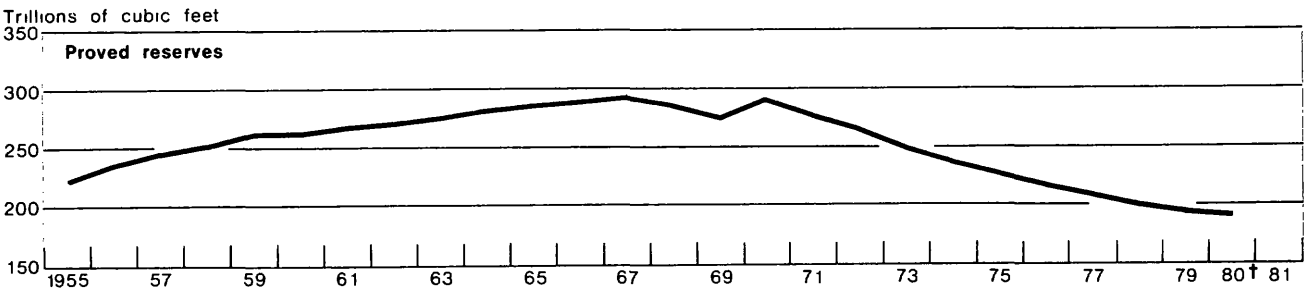
[5] In part, the decline in gas usage per residential customer reflected a shift toward more home building in warmer areas, but the decline also occurred within regions See American Gas Association, *Gas Facts 1979 Data*, pages 70, 76, 136, 137

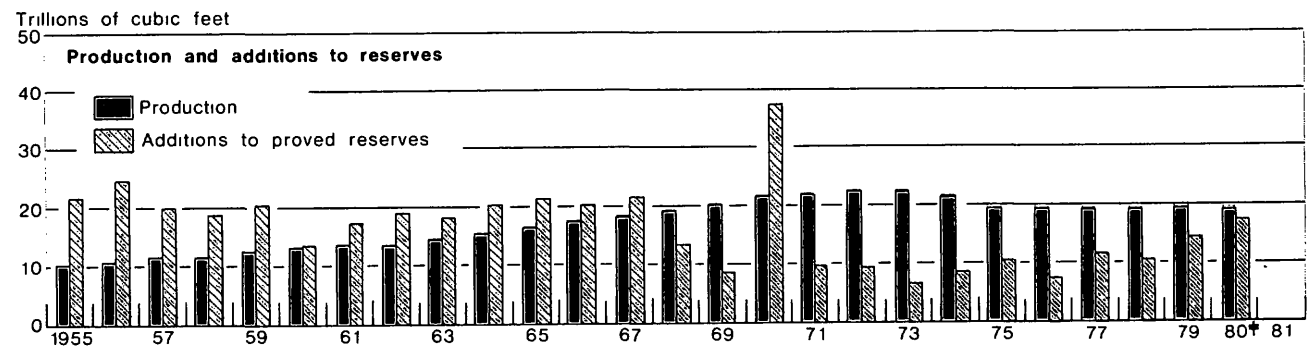
[6] American Gas Association, "An Analysis of Oil-to-Gas Conversion Trends in the Residential Gas Spaceheating Market", *Energy Analysis* (September 18, 1980)

Chart 2

Trends in United States Natural Gas Supply







*Estimate based on the first eight months of 1981

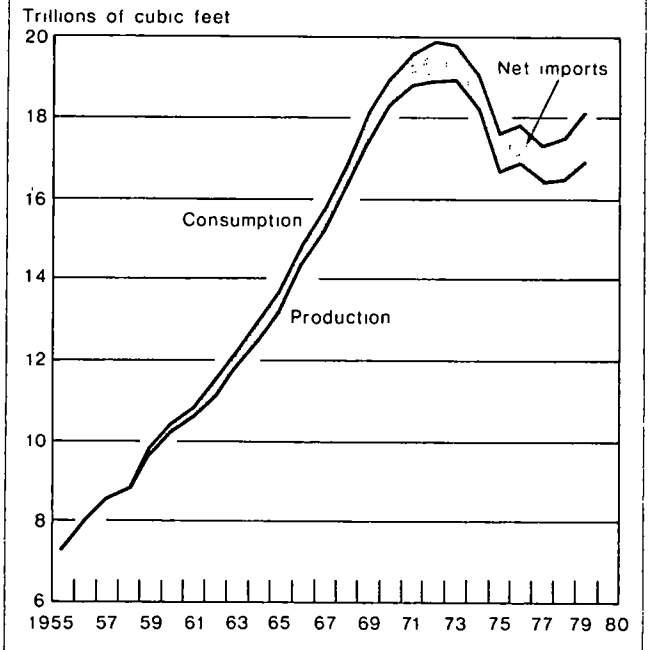
†Estimate based on United States Department of Energy change in proved reserves and American Gas Association level of proved reserves

‡Estimate based on United States Department of Energy production figure and change in proved reserves

Sources American Gas Association and United States Department of Energy

Chart 3

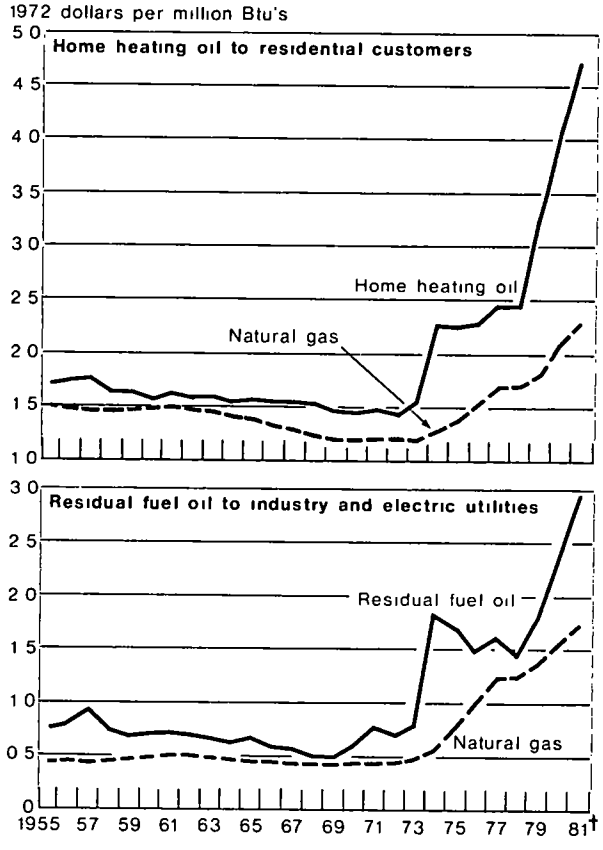
United States Natural Gas Production and Consumption



Source American Gas Association

Chart 4

Real Price of Natural Gas*



*Adjusted for inflation by GNP implicit price deflator

†Observation for 1981 is an estimate based on second quarter 1981 data

Sources American Gas Association and United States Department of Commerce

all supply among all potential customers Therefore, while some conservation apparently occurred among gas users, usage restrictions and curtailments stymied any general trend toward switching to gas from costlier oil In addition, for industrial and electric utility gas customers, the price of gas had just about caught up with oil by 1978. On balance, total residential gas consumption remained roughly flat during the 1970s (Chart 6), while industrial and electric utility consumption declined

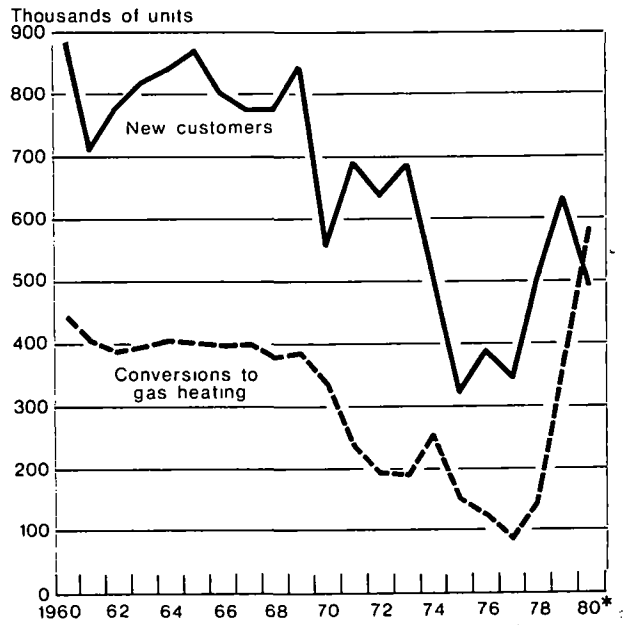
In more recent years, since current legislation passed in 1978, the shortage atmosphere in the natural gas market has been largely absent The widespread restrictions on new residential hookups that prevailed during the mid-1970s virtually disappeared by 1980, and major curtailments have been avoided. While the FUA restricts gas usage by industry, many exemptions have been granted to electric utilities, allowing their consumption to rise in recent years[7] In addition, natural gas inventories in underground storage, which were run down sharply in the shortage year 1976, recovered between 1977 and 1979 and have held about level each year since then.

In part, this change in market conditions represents the lagged, cumulative impact of events during the earlier years of the 1970s. The effect on drilling of the sharp wellhead price increases halted the downtrend in gas production, and output has remained flat since 1976. The gas market has continued to feel the cumulating effect on user demand of the price increases which began earlier. In addition, the constraints on gas usage during the 1970s encouraged many potential customers to commit themselves to

[7] Betsy O'Brien, *Electric Utility Demand for Natural Gas*, Working Paper, Energy Information Administration (April 1981)

Chart 5

Changes in Residential Gas Service

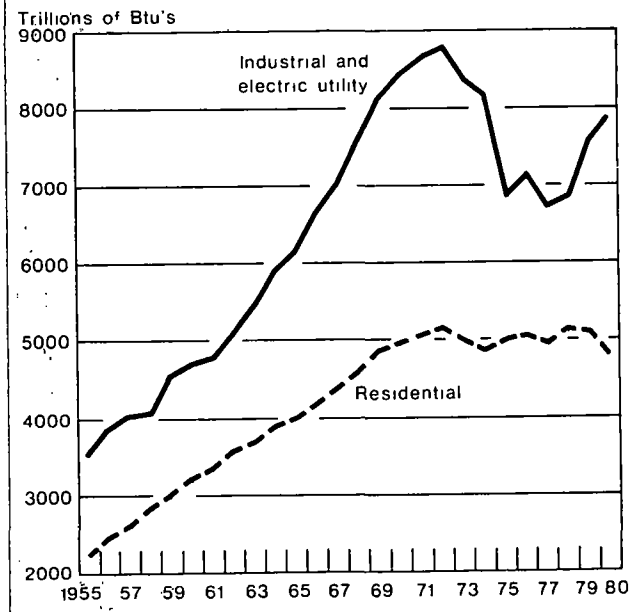


*In 1980, conversions to gas heating exceeded new gas customers, a category which includes those using gas for purposes other than space heating
Also see footnote 10 in the text

Source American Gas Association

Chart 6

Residential, Industrial, and Electric Utility Consumption of Natural Gas



Source American Gas Association

other sources of energy While residential gas hookups were rationed, the use of electricity for home heating rose dramatically Industry and electric utilities also were encouraged to turn to other sources While industry's petroleum consumption continued to grow during the 1970s, utilities greatly expanded coal and nuclear capacity [8]

In addition, since 1978 industrial output has remained virtually flat on balance Moreover, home building has been depressed in recent years, reducing the pool of potential new gas customers. This slack in aggregate demand has combined with the cumulative effects from price increases and demand restrictions of earlier years to narrow the gap between supply and demand for gas, at least temporarily.

[8] For evidence on switching away from gas by industrial, commercial, and electric utility customers, see James W McCarrick, Jr , "Reduction in Natural Gas Requirements due to Fuel Switching", *Monthly Energy Review* (December 1979)

Market prospects

The huge oil price run-up since 1978, however, has again greatly increased the relative attractiveness of gas, compared with oil The NGPA links wellhead price ceilings for the various production categories to the general price level. While shifts in the mix of production toward higher price categories have allowed sharp average gas wellhead price increases to continue since 1978, oil prices have risen much faster, making gas comparatively cheap by historical standards Between 1955 and 1972, for example, the price of gas to residential users averaged between 80 and 90 percent of the energy-equivalent price of home heating oil After falling off sharply in 1974, this gas-to-oil residential price ratio recovered to about 70 percent in 1978 but by mid-1981 was about 50 percent. The ratio of gas-to-residual fuel oil prices for industry and electric utilities historically varied more, generally ranging between 75 and 100 percent In 1974 the gas-to-oil price ratio for these users plunged sharply but was again near complete parity by 1978 Since then the ratio of gas-to-oil energy prices for industry and electric utilities fell back again, to about 60 percent in mid-1981.

Although the oil price increases since 1978 have not yet coincided with a need for increased restrictions on gas demand, it is far from certain that this can continue indefinitely. Although gas prices would continue to increase rapidly under continued controls, relative to oil the price of gas in the next few years is still likely to remain low compared with the past. For example, if it is assumed that oil prices will stay constant in real terms, then by the end of 1984 residential gas customers would be paying prices about 60 percent as high as home heating oil prices on an energy-equivalent basis. Industrial and electric utility gas prices would be equivalent to about 70 percent of the cost of residual fuel oil.[9] While it is not clear exactly what the appropriate gas-to-oil price ratio would be without controls, these projections are certainly low by historical standards, again raising the question of whether or not current market conditions can continue.

One sign that people are beginning to respond to the large current gas-to-oil price differential is that in 1980 the number of residences converting to gas heat rose dramatically (Chart 5).[10] Another early indication of the effect of the higher relative oil price is that, on the supply side, the rate of growth of gas drilling slowed considerably in 1981 despite continuing wellhead price increases, as more resources were allocated to the tremendous boom in oil drilling.[11] Particularly if home building and industrial activity revive in the near future, the demand for gas may again start to outrun supply at regulated prices In this case, increasingly stringent usage restrictions would again be required if more disruptive curtailments are to be avoided.

If indeed a significant backlog of unsatisfied demand accumulates, then the full effects of this would become apparent at the time of scheduled partial decontrol in January 1985. With over half of all wellhead prices suddenly free to rise, gas prices could be rapidly bid up by end users trying to increase or maintain their shares of the supply.

There is little reason to think that after partial decontrol the remaining wellhead price controls would effectively limit the price increases to final users Even with pipelines buying some gas at low prices, the prices that could be charged to end users would be essentially determined by market factors, such as the price of oil The fact that pipelines are generally required to practice "rolled-in", or average cost, pricing would not effectively hold down prices for customers If the averaging of decontrolled and controlled gas costs resulted in an end-user price below what would clear the market, pipelines would seek additional gas to meet demand. In the process, the price of decontrolled gas could be bid up by competing pipelines to the point where the average cost to end users cleared the market. Under partial decontrol, therefore, the main effect of average cost pricing would be to pass the benefits of price controls back to producers of decontrolled gas, rather than letting the pipelines or end users receive it

In short, even if current legislation continues, gas customers would not be assured of protection from high prices after the start of 1985. From the end user's perspective, therefore, the foremost issue is whether controls should be lifted sooner. Earlier decontrol would allow prices to rise more rapidly prior to 1985, but this would keep shortages from developing Potential new gas customers would be more assured of access to new hookups, and the probability of disruptive curtailments of service to existing customers would be greatly reduced. Moreover, beginning the transition to decontrol sooner, when the gap between supply and demand is still relatively small, means that a sharper price increase later may be avoided.

Whether natural gas prices are decontrolled in 1985 or earlier, a potential barrier to smooth transition between a controlled and decontrolled natural gas market is the existence of escalator clauses attached to many gas contracts. In general, these clauses specify that at the time of decontrol gas producers will be paid a price equivalent to oil, or the highest price for comparable gas then being paid.[12] Depending on the amount of unsatisfied demand at the time of decontrol, such rapid price increases could go beyond market-clearing levels. Gas prices that are too high would cause a glut on the market until contracts could be renegotiated. Therefore, these contractual barriers to proper price adjustment would need to be remedied in conjunction with decontrol.

[9] The projected gas-oil price ratios to end users are calculated by adding current real wellhead-to-end-user price mark-ups to projected late-1984 real wellhead prices and comparing these with current real oil prices

[10] Since many of the conversions to gas space heating occurred among homeowners who were already using gas for cooking or water heating, the number of conversions in 1980 actually exceeded the total number of new gas customers, which was held down by weak home-building activity

[11] Between 1978 and 1980, the rate of oil well completions rose over 50 percent, and oil well completions in the first half of 1981 were 40 percent higher than in the first half of 1980 By comparison, gas well completions were up 20 percent between 1978 and 1980, and rose 6 percent between the first half of 1980 and first half of 1981

[12] Some decontrolled high-cost gas already is being sold at prices linked to the price of No 2 fuel oil See *Foster Bulletin on Deregulated Gas*, No 5 (March 1981)

In addition to the questions about when and how rapidly the price of gas to end users should be allowed to adjust to market-clearing levels, there are several other issues to consider in comparing current legislation with more complete decontrol. Partial decontrol would involve a very different distribution of wellhead prices than complete decontrol. This in turn would have implications for how gas is distributed geographically and for how much and how efficiently gas is produced

Under partial decontrol, pipelines with more cheap, price-controlled gas can bid more aggressively to secure additional supplies. For these pipelines, even very costly marginal supplies can be rolled in with the cheap gas and sold to end users at an average cost competitive with alternative fuels. This bidding edge which pipelines with cheap gas would hold represents a potentially important problem with the partial decontrol scheme. The reason is that most of the gas which will remain price controlled after 1985 is committed to interstate pipelines. These pipelines will be able to bid very high prices for decontrolled gas and still continue to supply their customers at prices competitive with other fuels. The intrastate pipelines, on the other hand, will have relatively little cheap, price-controlled gas to average in. In some cases, customers in gas-producing states would have either to pay very high prices for gas or to switch to other fuels, diverting gas supplies away from local markets and into the interstate pipelines. In other cases, the bidding advantage afforded by the cheap gas would not be large relative to the high cost of transporting gas great distances from its source. But even for the latter case more gas would be transported interstate than would occur if the ceilings on all gas were lifted. In either case, the partial decontrol scheme would result in an artificial distortion of the geographic distribution of gas supplies, adding spurious transportation costs to this energy source.

The partial decontrol scheme would also result in inefficient production priorities for gas, but whether this would lead to higher or lower output is unclear. With the partial decontrol scheme, the prices of certain categories of older gas are kept low, and this will add the extra bidding power to push up prices for newer, decontrolled gas. Since the output of gas from older sources may be less sensitive to price than new supplies, holding down the old price and raising the new could conceivably increase total production. Even if total production were higher, that same level of output could have been attained at a lower cost in terms of total manpower and equipment used. Due to its higher price, producers would be willing to use more drilling resources to recover each cubic foot of newer gas and correspondingly less resources to recover each cubic foot of older gas. Production of some older gas that would be cheaper to recover would be foregone, yet much effort and cost would go into extracting gas in higher priced categories Overall, the average resources used per unit of gas produced would be lower if all gas of the same quality were priced the same

In the long run, the gas production industry may be able to attract as much extra personnel and equipment as it chooses to pay for. In this long time frame, inefficient gas production priorities would mean an unnecessarily large proportion of the whole economy's resources are devoted to that industry. In the short run, however, there may be bottlenecks in expanding the resources devoted to gas production. In this case, the inefficient priorities would retard total gas output. In recent years this has become a relevant problem as limited drilling resources have been devoted to producing high-priced oil and narrow decontrolled categories of high-cost gas. Meanwhile, gas that could be recovered with proportionately less of the scarce resources goes unexploited because of price controls It is unclear to what extent the current constraint on drilling resources will persist into 1985. If this were still a major factor, however, it would damp any positive effect on total gas production that the price tilt toward newer gas sources might have otherwise generated.

The scheduled partial decontrol scheme also may hold down current gas exploration and development activity because of the expectation of future higher prices. Especially with drilling resources limited, producers have an extra incentive to drill more for oil and high-cost decontrolled gas now and leave other gas development until after prices are decontrolled. Earlier, complete decontrol would shift more resources back toward gas exploration and development, where the payoff in terms of domestic energy production might well prove to be higher.

Price adjustment and windfall tax

If wellhead prices are decontrolled, producer revenues are likely to be substantially higher than under current legislation. How much income this would transfer to producers depends on how much and how rapidly the price of gas would rise and on how much of any extra revenue is paid in taxes. A windfall tax on gas similar to the one on crude oil, for example, would raise the Government's share.

A reasonable assumption is that after decontrol gas wellhead prices would adjust to a level that would put the price of gas delivered to electric utilities and large industrial users near the energy-equivalent price of

residual fuel oil. These large users can often switch easily between gas and residual oil, depending on which is a cheaper source of energy. In contrast, homeowners typically require a change of equipment to switch between gas and home heating oil, and this takes more time.[13]

How rapidly gas prices would adjust to this parity with residual oil is somewhat uncertain, however. Escalator clauses in contracts with producers could actually push wellhead prices up more rapidly than market forces by themselves would justify, and if pipeline companies attempted to pass on these inflated prices, a market glut could result Assuming this problem with escalator clauses can be avoided, however, there is still the issue of how rapidly the market-clearing price would adjust Certainly it could not rise immediately to exact parity with oil because this would generate greater conservation and production while at the same time removing the incentive for switching out of oil. It is not entirely implausible, however, that the price of gas could rise quickly to just under the residual fuel oil price, assuming enough capacity could be immediately switched from oil to gas to absorb any slack in demand generated elsewhere in the market by the price rise. Any backlog of potential residential or other gas customers seeking service at the time of decontrol would also add to the upward pressure on prices

In practice, however, the adjustment process could turn out to be somewhat slower for several reasons. For one thing, many utilities have already been able to raise their gas usage substantially under exemptions to the FUA, reducing their leeway for increasing demand How actively large industrial users could bid up gas prices would depend on how stringently the FUA restrictions were enforced, if that legislation were not changed. In addition, the state of demand for the output of utilities and industry could influence how actively they would seek gas. Even the weather could be important A mild winter diverts gas from residential heating uses, while a cool summer reduces peak-load electricity demand, which is often met by gas-fired capacity. It also could take time simply to renegotiate existing contracts, some of which do not provide for price increases Given the uncertainty about the future course of prices, buyers might decide to approach large price-hike agreements with caution.

How rapidly prices adjust has a large impact on the size of the revenue flows to gas producers in the near future. A comparison of two cases illustrates the point. Suppose that all wellhead price ceilings were lifted at the start of 1983 and that oil prices remain constant in real terms at 1981 levels In addition, the inherent time lags in gas development make is reasonable to assume that any near-term response of production to price change would be small enough to ignore for the purpose of this illustration For case one, assume that the process of adjustment to virtual parity between gas and residual oil energy prices were completed in two years Under this gradual price adjustment scenario, the impact of decontrol on producer revenues before taxes would be about $4 billion in fiscal 1983 and $21 billion in fiscal 1984. Alternatively, consider a second case in which the extreme assumption is made that gas prices immediately jump to near parity with residual oil at the time of decontrol in 1983. In this case of instantaneous price adjustment, the impact of decontrol on producer revenues before taxes would be $33 billion in fiscal 1983 and $40 billion in fiscal 1984.[14]

A windfall tax on the extra producer income could be used to raise Federal revenues. If the windfall tax is assumed to be similar to the one on crude oil, the net impact on Federal revenues can be calculated for either of the price adjustment scenarios outlined above. For case one, in which prices adjust more gradually, the net impact of decontrol and a windfall tax would be to raise Federal revenues by about $1 billion in fiscal year 1983 and $7 billion in fiscal 1984. In case two, in which prices adjust instantaneously, the impact on Federal revenues would be $12 billion in fiscal year 1983 and $12 billion in fiscal 1984.[15] After 1984, the effects on Federal revenues would probably diminish, depending on how the windfall tax is constructed.

While the revenues of gas producers and of the Federal government would be raised by decontrol, consumers would pay more. The price of gas to residential customers in either of the two decontrolled price adjustment scenarios would be roughly 30 percent higher by the end of 1984 than under continued controls[16] The difference would be that in case one

[13] While parity between gas and residual fuel oil seems the most likely outcome for the near future, in the very long run when equipment and technology can be adapted it is less clear what sort of oil-gas parity would exist For example, if gas eventually became commonly used as automobile fuel, it could approach price parity with gasoline instead of residual fuel oil

[14] For an explanation of how these figures were derived, see the accompanying article by Capra and Beek in this *Quarterly Review*

[15] For details, see the accompanying article by Capra and Beek

[16] The wellhead price in 1981 dollars is projected to be $2 70 per mmbtu with controls and $1 50 per mmbtu higher than that without controls (see the Capra-Beek article) In July 1981 the average residential gas price exceeded the average wellhead price by $2 79 per mmbtu —*Monthly Energy Review* (November 1981), page 85 Assuming this wellhead-to-residential mark-up stays constant in real terms, the $1 50 per mmbtu wellhead price impact of decontrol, if passed through penny for penny, would represent a 27 percent increase over the residential controlled price

the residential price would adjust more gradually, increasing in real inflation-adjusted terms about 13 percent each year more rapidly in 1983-84 than under continued controls. In case two, the price to consumers would jump more initially and then level off in real terms. After 1984, the path of prices under scheduled partial decontrol would quickly begin to catch up with the hypothetical alternative path under complete decontrol of wellhead prices.

Effect of decontrol on oil imports

Higher gas prices would encourage more energy-saving measures by homeowners and businesses which use the fuel The gas conserved, in addition to any extra gas production induced by decontrol, would be available to fill the energy requirements of current oil users who have more limited access to gas. In particular, industry and electric utilities with the ability to switch between oil and gas easily would be able to reduce oil consumption (assuming the gas usage restrictions of the FUA do not inhibit this).

The main impact on oil use of early, complete decontrol versus continued current legislation would come before 1985. After the start of 1985, scheduled partial decontrol would no longer be very effective in holding down prices to users. Moreover, it is not entirely clear whether partial decontrol would have a greater or smaller impact on gas production than complete decontrol Prior to 1985, higher decontrolled gas prices would induce a gradual lessening of oil imports relative to what would occur under continued controls, but this difference would begin to shrink in 1985. The question of how great the impact on oil imports would be is related to the issue of how rapidly prices would adjust at the time of decontrol. The more rapidly large customers could absorb additional gas, the faster the price would rise and the greater the near-term conservation and production responses would be elsewhere in the economy.

Although the short time frame limits what sorts of energy-saving adjustments would be attributable to price decontrol, a modest impact on usage is still to be expected Available statistical studies suggest it is reasonable to assume that each 10 percent rise in real energy prices will induce conservation of gas equivalent to about 2 percent of current consumption in the short run, increasing to perhaps 5 percent in the longer run, when more adjustments are feasible.[17] Based on this assumption, early-1983 decontrol with adjustment to residual fuel parity in two years (case one) would be consistent with enough gas conservation to reduce oil imports by about half a million barrels daily by late 1984.[18] This excludes any positive impact on production, however, which also would add to the total reduction. Alternatively, the extreme assumption of instantaneous price adjustment (case two) is consistent with a still greater drop in oil imports by late 1984, reflecting the larger initial impact of prices on conservation and production. While these are not intended to be precise estimates, they do indicate that decontrolling gas prices and usage could have a measurable impact on oil imports within a few years.

Conclusion

Between now and 1985, the natural gas market is likely to tighten, especially if oil prices stay high and the economy grows vigorously again. The transition between a controlled and a decontrolled natural gas market would be smoother if it took place before any substantial backlog of unsatisfied demand accumulated In 1985 the partial decontrol already scheduled to occur would offer customers little continuing protection against higher prices and, in that sense at least, would be almost indistinguishable from dropping controls altogether at that time. In a way, therefore, the debate surrounding gas decontrol largely centers on the question of timing Should consumers accept decontrol sooner to avoid the distinct possibility of recurring shortages and sharper price hikes later? Also important to consider is that artificially holding down gas prices before 1985 would discourage energy conservation and production, and thus earlier decontrol would help reduce oil imports. Moreover, even after 1985 the distortions to wellhead prices under

[17] For example, see Douglas Bohi, *Analyzing Demand Behavior, a Study of Energy Elasticities* (Baltimore, Maryland Johns Hopkins University Press, 1981), Chapter 4

[18] To compute the effect of higher prices on gas conservation, assume that the demand for gas is linked to price through the following formula, which assumes all other factors affecting demand are held constant

$$\%\triangle C_t = -0.2\%\triangle P_t + 0.6\%\triangle C_{t-1}$$

where $\%\triangle C_t$ is the percentage change in gas consumption at the end of year t, and $\%\triangle P_t$ is the percentage change in the average price of gas for year t as a whole If decontrol starts in 1983, so that there is no impact on consumption in 1982 (*i e*, $\%\triangle C_{82} = 0$), then the above equation can be written as

$$\%\triangle C_{84} = -0.2\%\triangle P_{84} - 0.12\%\triangle P_{83}$$

Based on 1980 data, the 1984 wellhead to end-user mark-up is projected to average around $1 80 per mmbtu in 1981 dollars for all users Given the other assumptions (outlined in footnote 15), the percentage impact on consumption at the end of 1984 can be calculated under the alternative price adjustment scenarios (percentages based on midpoints)

Price scenario	*Case one*	*Case two*
$\%\triangle P_{83}$ . . .	8 2	37 6
$\%\triangle P_{84}$ . . .	22 8	31 1
$\%\triangle C_{84}$	5 5	10 7

Assuming a base of 20 quadrillion btu's, these convert to a conservation equivalent of 483,000 barrels of residual fuel oil daily for case one and 935,000 barrels per day in case two

current legislation not only would encourage inefficient production priorities but also could cause disruptive reallocations of gas supplies in some areas. Although it would mean higher prices now for current customers, speeding the elimination of price controls and usage restrictions on gas would promote more efficient use of this energy resource and avoid a possibly more difficult transition later.

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