

Gas and Electricity Interdependence

The Current Situation and Intermediate and Long-Term Solutions

Purpose:

There has been significant coverage in the press recently about the levels of natural gas in storage and the potential for problems this summer and winter. A few months ago, experts were concerned that gas storage was significantly behind historic levels and thus reliability of supply could be at risk. As this is written, in July of 2003, the injections of gas into storage have improved and levels are projected to be sufficient to take us through the summer and into the winter. However, gas prices remain high. Since the availability and price of natural gas directly affects electric markets and electricity prices, and since all consumers are affected by these energy markets, the staff subcommittee has put together this report for the Electricity Committee.

Weather is a major factor affecting both the price and supply of gas and electricity. Although summer and winter weather has been mild to normal the past two years on a national basis, a hotter-than-normal summer or a colder-than-normal winter could potentially trigger both gas and electricity shortages and price volatility on a local, regional, or national basis. Since the availability and price of natural gas directly affects electricity markets and electricity prices and because so much of the electricity generation added in the past decade, and planned to be added in the future, is gas-fired, all consumers across the nation are likely to experience the impacts of energy price and supply volatility twice, on both their gas and electricity bills. Thus, this situation presents an unparalleled national opportunity for state regulators to raise public awareness of energy prices and usage and to provide consumers with the tools to respond to energy markets. This opportunity has been highlighted by the recent announcement by Secretary of Energy Spencer Abraham of the establishment of the Smart Energy Campaign and his related request for participation in the campaign by the nation's governors.

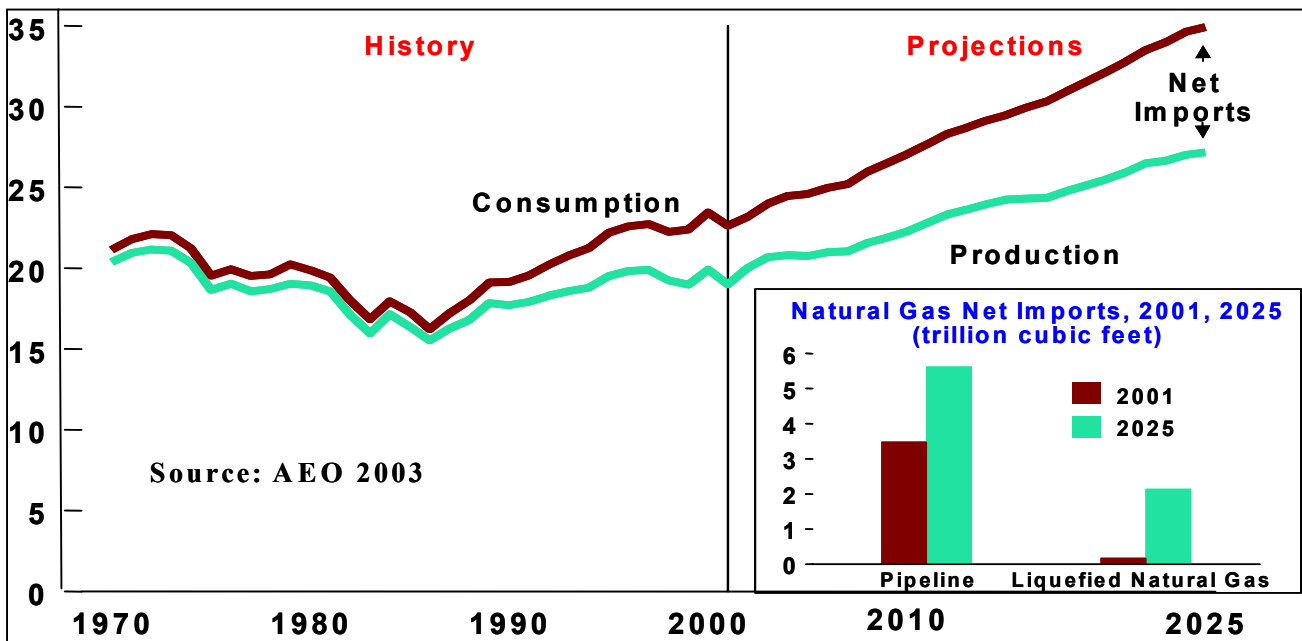
For the past three months, the Staff Subcommittee on Electricity has been conducting conference calls with staff from FERC's Office of Market Oversight and Investigations on this situation. The staff subcommittee has also participated in conference calls with the Staff Subcommittee on Gas, whose membership includes staff from the Energy Information Administration and the Department of Energy. Because of the interrelationship of electricity and gas markets, the staff subcommittee has prepared this report for the Committee on Electricity. The objective of this report is to give the Committee members a brief synopsis of the situation and some tools they can consider using to address this situation. Although attention has been focused on the need for a short-term response to the current gas storage crisis, this situation also calls for long-term solutions that may take five to ten years to produce results. These long-term issues for Committee members to consider are also included as an Appendix to this report.

Background:

Supply and demand in the natural gas markets are currently being driven by a number of complex factors. Since the late 1980's, U.S. gas consumption has been growing faster than production.

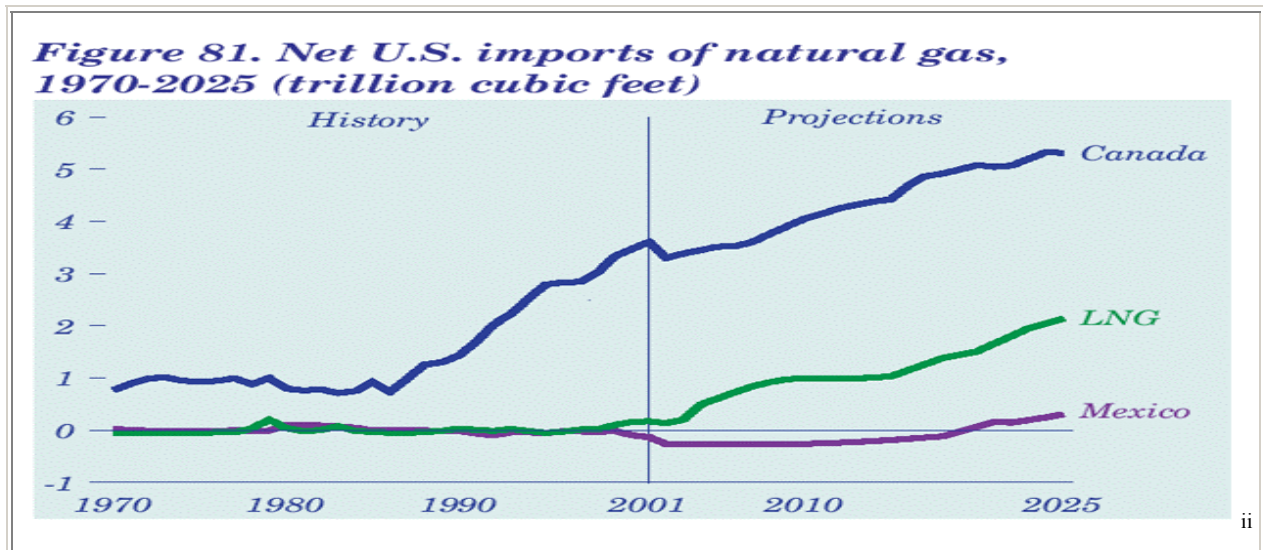
1. Supply

Natural Gas Supply, Consumption, and Imports Are Projected to Expand Through 2025, but domestic consumption is increasing faster than domestic production.¹



(Trillion cubic feet)

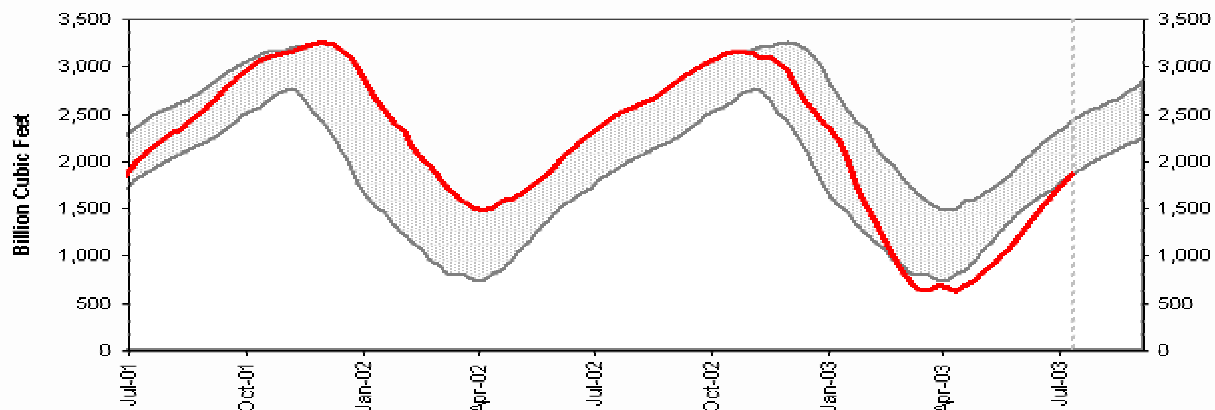
This difference in production and consumption has been made up chiefly from net imports over pipelines from Canada and through imports of liquefied natural gas (LNG).



Currently, domestic production is lagging behind prior years. Domestic production has declined 4% since 2001, even though rig counts are up. The Baker Hughes report shows that there were 932 rigs on line in the U.S. in June, 2003, which is 29 % higher than one year ago.ⁱⁱⁱ However, existing wells are not producing at historic levels and new wells are increasingly deeper and often further offshore. Most of our domestic gas (50%) comes from wells that are less than 3 years old (i.e., less productive wells) and imports from Canada are expected to increase only slightly in 2003-2004 due to production declines in Canadian gas fields. LNG may be important in the future but LNG imports are currently only 1% of total gas supplies (8% of imports).^{iv}

This spring, levels of gas in going into storage raised serious concerns although the current mid-summer storage situation is much improved. At the end of June, U.S. Energy Information Administration (EIA) reported that fills were 16% below the five-year historic average.^v For the week ending July 11, 2003, EIA reported the ninth consecutive storage injection of 90 Bcf or above (93 bcf) raising working gas in storage to 1,866 bcf which is 13.9% below the five-year historic average.^{vi} The storage figures for July 18, 2003, show that gas in storage is now at 1,949 bcf or 12.8% below the five-year average. Storage is just now reaching the band within which analysts predict some degree of confidence, based on the five-year historic average. However, a hotter than normal summer, or a colder than normal winter, could easily change this situation. The bottom line is that gas storage can provide a supply hedge but may not necessarily provide a price hedge as we go forward into the winter months.

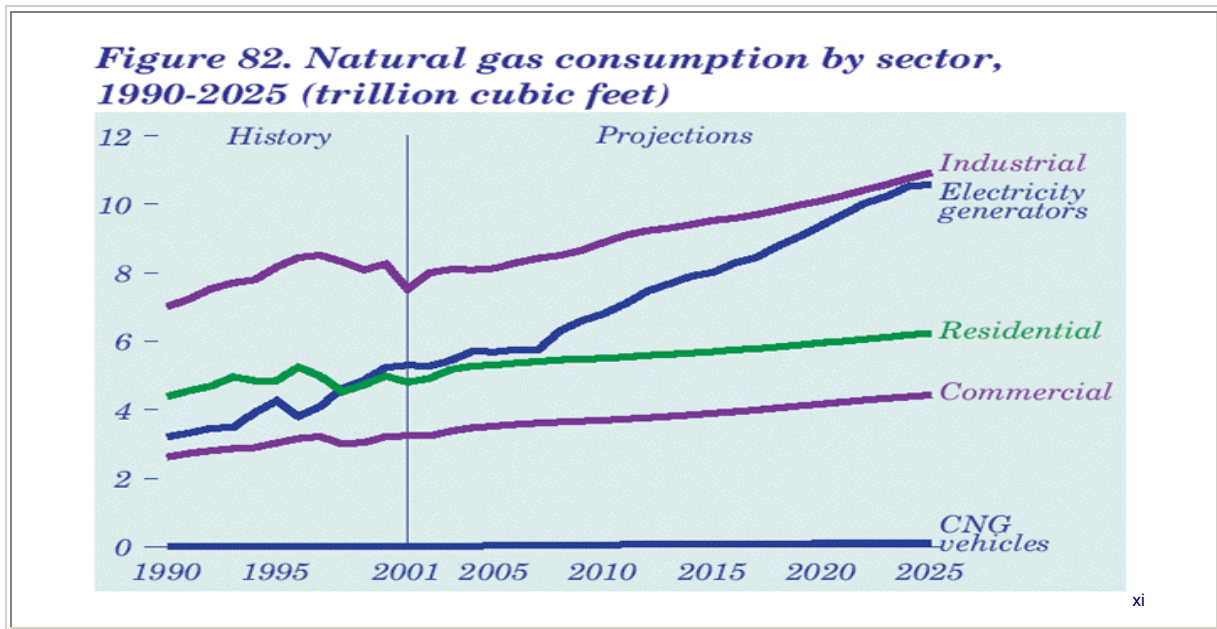
Working Gas in Underground Storage Compared with 5-Year Range^{vii}



2. Demand

EIA expects demand for gas to remain flat in 2003 and increase up to 1% in 2004, while electricity demand is expected to increase by 1.3% in both 2003 and 2004.^{viii} Demand for gas is increasingly being driven by gas used in electric generation. According to EIA, demand by electricity

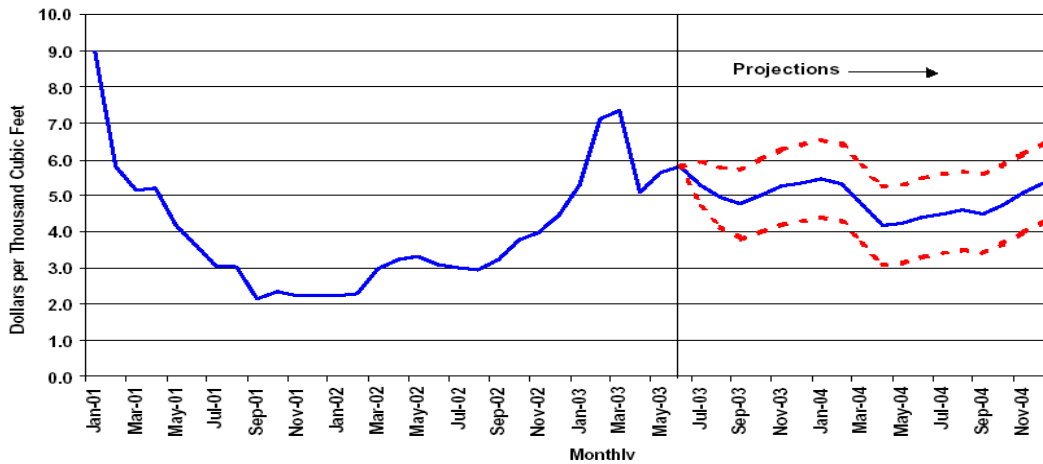
generators is expected to account for 33 percent of total end-use natural gas consumption in 2025.^{ix} EIA also projects that demand for electricity will increase by 2.6% from its 2002 levels to 2004.^x



3. Prices

Gas futures are currently trading between \$4 and \$6 dollars. DOE has done some scenario analysis on gas price impacts. The DOE worst case scenario shows that for every 1% fall in gas production this year we could expect to see a 5-10% increase in gas prices. And a severe weather scenario (hot summer/cold winter) could bring us \$9 gas prices by the end of the winter. DOE has also done some projections on what impact this will have on consumers. Under this worst case scenario, EIA projections for the Midwest, for example, show an average residential gas bill of \$919 dollars for 2003, an increase of 19% over last year.^{xii} According to EIA, “natural gas prices are expected to decline from their peak levels of this past winter. However, they are not projected to return to levels of early 2002. Natural gas prices are expected to average \$5.34 per Mcf in 2003, followed by \$4.99 in 2004. The 2003 price would establish a new record high, beating the 20-year old record of \$4.28 (constant 2002 dollars) set in 1983. The 2003 and 2004 prices would mark the first time since then that prices exceeded \$4 in 2 consecutive years (prices measured in 2002 dollars). The EIA price estimates provided in the following graph, along with the indicated confidence interval, are for monthly average prices. Short-term (daily or weekly) fluctuations might swing beyond the indicated bounds.”^{xiii}

**Figure 9. Natural Gas Spot Prices
(Base Case and 95% Confidence Interval*)**



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Conclusion:

The impact of the interdependence of gas and electricity markets is an important structural component in today's economy. There are many factors that are, and will, affect the gas and electricity markets over the coming year. These factors include the rate of exploration for natural gas, the productivity of new wells, options to expand domestic exploration, the impact of hurricanes on gas pipeline operations, the need for additional pipeline capacity, the difficulty of access to capital for energy infrastructure projects, the level of natural gas imports from Canada and Mexico, LNG imports, weather patterns across the U.S., rainfall in the hydro-dependent areas of the West, and the level of economic expansion both here and abroad. The demand for gas is increasingly being driven by the demand for electricity, as many regions have become more dependent upon gas-fired generation to produce electricity. The supply of gas is not increasing as fast as demand. Thus gas prices, except for year 2000 levels, are higher than they have been. Electric prices will be affected by this rise in gas price. In many areas of the country today, gas-fired generators set the clearing price for electricity in wholesale markets. Consumers undoubtedly will feel the impact of these higher prices. Commissions should thus consider the following options in light of these circumstances.

Short and Intermediate Term Energy Crisis Solutions for Consumers

State regulators have the unique opportunity and responsibility in the current natural gas crisis to provide consumers with tools to address their energy usage and their energy bills not just today, but for the foreseeable future. All classes of consumers are facing and will continue to face higher prices for both natural gas and electricity, and bringing additional gas supplies online will take time. Key to addressing this situation is raising consumer awareness of energy usage, efficiency, and response to energy markets and of the interdependence of gas and electricity supply and prices.

A. Educational campaign

Consumers need to know how energy markets are affecting their bills and what steps they can take to keep their bills affordable. The nature of any gas storage or other energy crisis calls for an immediate unprecedented effort by state regulators. Planning and timing are critical in this effort. State regulators should be prepared to undertake this effort as soon as possible but no later than early fall, and to repeat this effort before every summer and winter peak season. State regulators should develop a short-term plan to address consumer needs in the current crisis over the next 12 to 18 months and should use that plan as the basis for a long-term plan to continue addressing these needs over the next 5 to 10 years as energy supply and price conditions warrant. These plans should address both energy price and supply issues because the two are intertwined. These plans should be implemented regardless of whether increased wholesale energy prices have been passed through to consumers in retail rates or have already been reflected in retail choice energy contract prices so that consumers have the tools to begin addressing energy affordability and usage now.

Although dissemination of information to the public has had mixed results in the past, the magnitude of increased energy costs and the potential for even greater increases in the near term creates the need for a concerted regulatory effort. Two basic issues state regulators must consider are: 1) what message to deliver to consumers; and 2) how to deliver the message effectively in order to reach the maximum number of consumers. State regulators may also want to work with the utilities they regulate and other interested stakeholder groups to disseminate this information to consumers. Although many state commissions already provide a wealth of information to consumers, a review of current efforts is warranted in the current situation. Coordination of this educational effort with other states within a region is encouraged, where appropriate.

The National Regulatory Research Institute completed a survey of state public information officers on state responses to the gas supply crisis. A goal of the survey is to help PIOs coordinate a

communications response with their respective commissions. Results of the survey are posted on NRRI's home page at www.nrri.ohio-state.edu.

B. Educational Content

1. Energy prices. State regulators should explain how and when wholesale gas and electricity prices translate into changes in retail consumer bills in their individual states and the basics of how gas and electricity wholesale markets work. They should also explain the relationship between gas prices and electricity prices, vis-à-vis the bulk of new electricity generation being gas-fired. State regulators should also provide information to consumers on how to access gas and electricity prices.

2. Energy consumption. State regulators should explain the basics of energy conservation, energy efficiency, and demand response and should outline any programs currently available in their individual states. Emphasis should be placed on helping consumers help themselves by understanding how and when they can effectively respond to price signals in energy markets, especially during peak load conditions in both summer and winter. Because states vary widely in how they pass through energy costs to consumers, states should tailor this message to fit their circumstances.

3. Energy payment assistance. State regulators should explain budget billing or similar programs available through local distribution companies and energy service providers that shift payment for high usage months to a year-round average. State regulators should also provide information about LIHEAP and state and local programs available to assist eligible consumers with energy bill payments.

4. Retail choice programs. In states with retail choice for natural gas or electricity, state regulators should provide information to consumers on alternative types of contracts available for energy services with emphasis on how different choices allow consumers to manage energy risk. Although state commissions provided this information to consumers when retail choice began and may still be providing it, the message bears repeating in the current situation.

5. Supply shortages. States regulators should reassure the public that plans are in place in case of either electricity or natural gas shortages. Consumers need to know what steps will be taken by energy providers if a shortage situation arises so that they can be prepared to take appropriate steps.

C. Possible Communications Paths

1. Public hearings. State regulators should consider convening hearings to address the impacts of any gas or other energy supply crisis on availability and affordability, including its impact on electricity generation. Several state commissions have already held these hearings and could serve as resources for other states to tap.

2. Press Releases and Media. State regulators should prepare press releases addressing the above-listed issues. Press releases should begin as soon as possible, but no later than early fall for this winter heating season, and should be repeated prior to each summer and winter season. States regulators should consider using television, radio, and newspapers to disseminate this energy information to consumers.

3. Community outreach. State regulators should work with civic and business leaders to ascertain the best method for disseminating energy information within communities. Special emphasis should be placed on providing information to agencies and organizations working with low-income and fixed-income consumers, as well as those consumers with health issues.

4. Other policy makers. State regulators should coordinate their plans to inform the public with those of other national, regional, state, and local officials as appropriate.

5. Bill stuffers. State regulators should work with energy providers to design appropriate energy information to include in monthly bill stuffers so that consumers receive consistent messages.

6. Website enhancements. State commission websites offer a tool for informing consumers of imminent peak and emergency conditions and for providing consumers access to energy information they can use to manage their energy usage and their bills. State regulators should enhance their current websites to include information on energy prices, energy conservation and management, payment assistance and options, and emergency management plans. Some suggestions for information to post on state commission home pages include: 1) wholesale natural gas and electricity prices; 2) daily peak load information for electricity providers during summer and winter months; and 3) warnings or alerts of electricity or gas provider system peak conditions, including requests for consumers to shift demand off the peak hours or to take specific conservation measures. State commission websites should also include specific steps consumers can take to conserve or better manage energy usage. State commission websites should provide an easily accessible package of information on the above topics, including using links to other websites with information on these topics.

7. Public service announcements. State regulators should develop plans for using all appropriate media to issue alerts as necessary during electricity and gas peak usage times and emergency conditions. These plans should include trigger events for issuing such announcements and coordination with all appropriate federal, regional, state, and local agencies and energy providers. These plans should also include specific steps for consumers to take to curb or shift their energy usage.

8. Internal coordination. State regulators should establish internal communications to ensure that all their staff dealing with the public has access to accurate and timely information concerning electricity and gas supply and price conditions in their state and region.

9. Encourage Utility public announcement of significant price changes. Encourage utilities to provide press releases when bill rates are expected to change by more than some threshold percentage. Such announcements inform customers of higher prices before they see it on their bill, and it is too late for them to adjust their consumption.

D. Energy conservation and efficiency

Energy conservation is an important tool for consumers to use to respond to the current gas crisis. It not only helps them lower their bills, but also helps curb the demand for both electricity and natural gas during peak load periods. So consumers benefit three times: once, in reducing their own consumption and, thus, bills immediately and also permanently reducing consumption; twice in reducing energy providers' need to operate or purchase peak energy resources at higher marginal costs; and a third time in reducing the pressure placed on the need for additional natural gas supplies for end-use and for gas-fired electric generation. On the electricity side, consumers decreasing electricity usage can decrease dependence on gas-fired generation in both summer and winter. On the natural gas side, consumers decreasing gas usage can directly decrease fuel needs in the winter, as well as contribute to better management of storage and pipeline capacity needs.

Although many conservation ideas have been around since the 1970s, current and anticipated energy prices have revived interest in the need to conserve. For residential consumers, many home improvement alternatives exist, such as weatherization, insulation, lighting, window upgrades, more efficient appliances, more efficient heating and cooling systems and periodic maintenance on these systems, and the easiest action of all -- adjusting the thermostat. These same alternatives apply to commercial and industrial customers. Additionally, commercial and industrial customers with heavy

reliance on either electricity or gas for their business processes can conserve energy by switching to more efficient motors and other equipment. Many states have also upgraded building codes for residential and commercial construction to enhance energy efficiency. Many states also offer tax breaks for some energy conservation and efficiency items.

While many of the items listed above require planning ahead and investment, energy conservation can also be a tool for averting the need to curtail load. State regulators should develop specific tasks easy for consumers to implement to immediately reduce their energy usage. Such items include adjusting the thermostat and turning off non-essential lights, appliances, and equipment.

Previously, many utilities offered assistance to consumers with implementing these measures through rebates, bill credits, or financial assistance, but many of these programs have been discontinued or lapsed due to lack of participation. State regulators should review the status of these programs to determine whether they should be revived or refined to address the current situation or whether new programs should be implemented. An alternative to consider is to allow qualified third-party entities to offer these programs to consumers. Cost recovery for conservation and efficiency programs has always been a complicated issue because state regulators are asking energy providers to help their consumers buy less. However, the current situation calls for rethinking this issue as appropriate in each state. For both electricity and gas, energy conservation and efficiency can be viewed as a supply-side tool that decreases the need for new resources or for existing resources at the margin.

E. Demand management

All consumers contribute to peak demand conditions for both electricity and gas. While conservation efforts result in the elimination of demand for electricity and natural gas, equally important are programs encouraging the shifting of demand off the peak to alleviate the need to run or purchase power from the most expensive marginal electric generation units and the need to purchase additional spot gas at high marginal prices. A change in electricity demand has a greater than proportional impact on market prices. Studies have shown that although much of the demand for electricity is inelastic (not very responsive to price), a non-trivial portion (mainly industrial interruptible) can be very price sensitive, so that higher prices can materially affect demand quickly by reducing it. That reduction in demand will, in turn, feed back into the market and reduce price. Demand management is also an important tool in emergency situations. Consideration should be given to updating or implementing programs for peak/off-peak pricing, real-time metering, back-up generation or combined heat and power units, peak

load reduction, and shifting peak load to off-peak times. The key to success for these programs is to make consumer participation as easy and beneficial as possible. State regulators should consider appropriate incentives for these programs in order to maximize response. Consumer response to demand management programs is the key tool to both short-term alleviation of energy supply crises and long-term alleviation of the need for additional peak energy resources. As with conservation, state regulators should develop a list of demand management measures that can be implemented in the short-run to prevent or forestall the need for curtailment, including shifting use of appliances or equipment to off-peak hours. The New England Demand Response Initiative, a collaboration of regional stakeholders, state commissions, and FERC, DOE, and EPA, has recently completed a report on this topic.^{xv}

F. Distributed generation

Consumers of all sizes may benefit from the installation of distributed generation units to provide all or part of their own energy needs. These units offer consumers a way to save on their own energy bills over time, offset by the capital investment required and enhanced by sales of excess power. State regulators should implement interconnection policies to speed up this process. (See NARUC Model Distributed Generation Interconnection Procedures and Agreement.) Distributed generation using renewable resources, waste heat, or combined heat and power can diminish or alleviate the need for natural gas and electricity resources by permanently shifting load off system, by reshaping load, or by providing additional energy resources to the electricity system which are not as dependent on gas for fuel.

G. Price information

State regulators should insure that wholesale and retail price information is available and accessible to consumers. This includes not only the traditional provision of sample bill information for current retail gas and electricity rate schedules, but also wholesale gas and electricity price information. Further, state regulators should provide consumers with information on how and when wholesale prices get translated into retail rates for consumers so that consumers can understand that these prices will eventually be reflected in their retail rates and can adjust their energy consumption accordingly. Although consumers may not immediately see the impact of wholesale energy prices on their bills, state regulators should emphasize the benefits of heeding these price signals. Forewarned is forearmed. Information should also be provided about the impact of natural gas prices on wholesale electricity prices.

State regulators can provide wholesale energy price information for regional trading hubs on their

websites or provide links to news services that do so. They may also consider enlisting local media to make these prices available to the public. State regulators should identify the trading hubs most influential on electricity and gas prices in their region and state and should explain the significance of these trading hubs to consumers.

H. Electricity and gas cost recovery mechanisms

State regulators may want to consider the timing and frequency of passing through energy costs to retail rates, noting that pass-throughs often have a longstanding history of how they are implemented. Consideration should be given to balancing consumer needs for rate stability and affordability with provider needs for financial recovery. State regulators should review the goals of energy provider purchases and determine the balance to be struck between cost minimization and cost stabilization that is appropriate for each state. Although pass-throughs offer no incentive for energy providers because they do not make money on these costs, state regulators should consider incentive measures that would encourage better management and maximization of electricity and gas transmission capacity, for example, to the benefit of both consumers and energy providers.

I. Risk management for consumers

In states with retail choice for electricity or gas, consumers may have options for choosing fixed or variable rate contracts and, thus, may be able to manage their own price risk to some extent. State regulators should provide information about the trade-offs between different types of contracts for energy service. The ability to enter a fixed-price contract will lead to price stability for consumers, but not necessarily price minimization. Other terms and conditions of energy service besides price also play an important part in consumer decisions, including the length of time the contract will be in effect. In states without retail choice, state regulators should examine available service choices, if any, under existing tariffs and inform consumers of these options. Regardless of retail choice, state regulators may want to consider whether additional energy service options should be offered to consumers. These options may vary widely for each customer class.

J. Budget billing

Although these programs for averaging consumer energy bills on a year-round basis have been in existence for many years, they take on new meaning in the current circumstances. Emphasis should be placed on the fact that these programs do not allow consumers to avoid paying their energy bills, but levelize payments on a year-round basis, which will help consumers better budget for their energy costs.

State regulators need to review these programs offered by electricity and gas service providers to insure that information concerning the availability of these programs is being communicated to consumers, consumers can easily sign up, and the terms and conditions of these programs are up-to-date and easily understandable.

K. LIHEAP and private assistance programs

LIHEAP and private assistance programs give eligible consumers a tool for dealing with the immediate issue of not being able to pay their energy bills when they are highest. Although state regulators are not directly involved in the administration of these programs, they should provide information to consumers on how to access these programs, particularly in light of the expectation that more eligible consumers will seek assistance with rising energy bills. Emphasis should be placed on the fact that these programs are limited in funding and duration.

L. Disconnection policies

State regulators should review current policies for consumer disconnection for non-payment of energy bills during the summer and winter peak seasons, giving consideration to balancing consumer health and safety with the financial capabilities of energy service providers. Special attention should be given to methods for identifying consumers with serious health needs. The expectation is that higher energy prices will present new challenges to disconnection policies. In conjunction with this review, state regulators should re-examine current policies regarding reconnection of service, including payment terms for past due energy bills.

M. Curtailment plans

Plans for the order of load curtailment for electricity and gas service providers have been on file with state commissions for decades. Because they have rarely if ever been used, curtailment plans should be reviewed as part of the current effort because they may be out of date due to deregulation, changes in customer constituency, and changes in terms and conditions of energy service to large customers. State regulators may want to review the circumstances that trigger curtailment plans to make sure they fit today's circumstances. Information on these plans should be made available to all consumers with an emphasis on large customers whom are most likely to be affected by curtailment. Although curtailment is a measure of last resort used in emergency situations where energy supply shortages exist, best efforts to implement all of the strategies discussed in this paper may still not avert the need to invoke curtailment plans due to extreme weather conditions or failures in the supply and/or delivery systems for

energy. Thus, state regulators should establish a communications strategy for determining when to move from encouraging consumers to use conservation and demand management response to full-blown curtailment. This strategy may be local, state-wide, or regional in nature, depending on individual state circumstances.

N. Risk management for LDCs – including storage, financial derivatives, longer-term contracts

Utilities have an obligation to serve the natural gas requirements of their regulated customers. They must acquire sufficient commodity and reserve enough pipeline capacity to transport the commodity. Since commodity is extracted at a fairly stable rate and consumer demands are variable, storage must be acquired to manage the variability (mainly due to weather considerations) of commodity demand.

In January, 1993, the wellhead price of natural gas became fully deregulated. As a result, only market forces regulate the commodity price of natural gas. While pipelines used to perform the natural gas merchant function, local distribution companies (LDCs) or other shippers (marketers, large industrials, etc.) now are responsible for their own purchase of the commodity. FERC Orders 636 and 637 reorganized the wholesale markets in the 1990's, much as FERC is trying to revamp electric wholesale markets with its Standard Market Design proposal.

Natural gas is one of the most volatile traded commodities. The volatility is seen day-to-day and month-to-month, and occasionally on a year-to-year basis. After the winter of 2000-01, with its extreme commodity price spikes and undesirable effects on customer bills, many LDCs placed renewed emphasis on risk management of commodity purchasing activities.

Consumer natural gas bills are volatile for two basic reasons, price and volume. To manage consumer bill volatility, effective portfolio management must be practiced. To do so, there are physical and financial tools available to hedge (manage) both price and volumetric volatility. After the winter of 2000-01, many LDCs heightened the importance of risk management. Having a portfolio management process that deals well with volatility in the short run does not infer that longer-term volatility has been dealt with effectively, however.

1. Price Hedges

Physical: Though storage may be acquired for operational reasons, it often fulfills a secondary [physical] price hedge role. Fixed price contracts for gas are another example of a physical hedge that can be used

under certain appropriate circumstances.

Financial: There are a variety of financial price hedges available and they include both futures contracts and options. In order to be considered hedges, such tools must be used to mitigate price volatility, and not be used for speculative purposes.

2. Volumetric

There are heating-degree-day based hedges available for areas surrounding approved weather stations.

These same tools can be used by electricity LDCs. State regulators should insure that the electric LDCs under their jurisdiction have risk management plans in place using some or all of the above tools.

Appendix: Potential Long-Term Solutions

1. **Liquefied Natural Gas (LNG) facility development**

Though the United States does have several LNG terminals, there are too few to keep up with increasing commodity needs. There has been, by historic standards, a relatively high cost to liquefying natural gas and shipping it by tanker. Previously low commodity costs have discouraged additional LNG terminal and/or tanker construction. With technology advances as well as cost reductions, LNG is now competitive at \$3-3.5/mmBtu. LNG terminals and tankers present various potential environmental and safety issues that may need to be resolved before new terminals can be sited. There are construction lead times of 2-3 years before they can be brought on-stream, however.

2. **Balancing of environmental and drilling interests on federal and shelf land**

Significant amounts of unexploited natural gas exist in U.S. controlled territory, both on federal lands in the West and off our coasts. Concerns about environmental impacts have resulted in postponement, curtailment, or denial of exploration and exploitation of these gas reserves/resources. There needs to be a way of measuring and mitigating environmental risks and balancing these risks against the rewards of natural gas development, but this is not taking place now.

3. **Drilling technology**

Drilling technology has seen significant improvement over the years. New drilling technologies are superior from the perspectives of both cost effectiveness and environmental friendliness. However, most natural gas drilling in the United States is done by small firms, which often have relatively limited capital. As a result, they may be using drilling equipment and technology that is less than state of the art and perhaps inferior from the perspectives of cost and/or the environment. There may be a continuing role for government support of advanced research and development (likely through the Gas Technology Institute).

4. **Capital availability issues**

It is no secret that the energy industry, especially those firms with significant exposure to non-regulated operations risks, is having difficulty raising capital. In order to raise capital in such times, legislators and regulators may need to help these firms find ways to reduce risk. Examples of this might be capital recovery guarantee provisions in new investment during this troubled period.

5. **Fuel diversity on the electric generation side -- less dependence on natural gas**

Natural gas has become the electric generation fuel of choice, environmentally speaking. However, natural gas prices are very volatile. Variable operating costs (including fuel) of gas-fired units are significantly more expensive than similar costs of coal and nuclear units. So, for the short-to-medium term, gas-fired units are not competitive. For competitors to be successful in deregulated markets, they need only sell energy at prices slightly below the market clearing prices set increasingly by gas-fired units. Thus, with gas-fired generation becoming a larger and larger slice of the overall generation marketplace, prices of opportunity sales from more and more base load coal and nuclear units will be higher than if they had direct, effective competitors. This argues for assuring a continuing, balanced portfolio--one that has a place for low-fuel cost units, as well.

6. **Electric generation impacts on gas storage**

The adequacy of gas storage for the needs of gas-fired electric generation is an evolving issue that may bear detailed analysis as gas-fired generation grows in importance. Any conflict with historic gas storage usage for LDC heating load may need policy oversight from FERC. However, unless otherwise irreconcilable problems arise, market forces will likely carry the day on any new specialized investment in quick response storage for electric generation.

7. Gas and Electricity Spot Market Price Reporting

Regulators need access to accurate information about trading at gas and electricity hubs. FERC has recently taken steps to improve truth in reporting for both electricity and gas trading. False information and double counting of trades are two issues that must be addressed. Reliability of trading information is important because, ultimately, consumers must be able to have confidence in the price signals being sent by the wholesale market.

8. Pipeline policies

State regulators may want to hold discussions with FERC concerning current pipeline certification policies and processes. In order to get new and additional gas supplies to market, new and expanded pipelines will be needed.

Endnotes.

ⁱ Source: http://www.eia.doe.gov/pub/oil_gas/natural_gas/presentations/2003/ark_pub_ser_comis/ark_pub_ser_comis_files/frame.htm

ⁱⁱ Source: http://www.eia.doe.gov/oiaf/aeo/figure_81.html. Annual Energy Outlook 2003 With Projections to 2025. History: Energy Information Administration (EIA), Annual Energy Review 2001, DOE/EIA-0384(2001) (Washington, DC, November 2002). Projections: Table A13.

ⁱⁱⁱ http://www.bakerhughes.com/investor/rig/rig_int.htm.

^{iv} Guy Caruso, EIA, presentation at National Gas Summit, Washington, D.C., June 26, 2003.

^v EIA, Short-Term Energy Outlook, July, 2003 at 1.

^{vi} EIA, Weekly Gas Storage Report, week ending July 11, 2003.

^{vii} Source: EIA Weekly Natural Gas Storage Report. Notes: A weekly record for March 8, 2002, was linearly interpolated between the derived weekly estimates that end March 1 and the initial estimate from the EIA-912 on March 15. The shaded area indicates the range between the historical minimum and maximum values for the weekly series from 1998 through 2002. Source: Weekly storage values from March 15, 2002, to the present are from Form EIA-912, "Weekly Underground Natural Gas Storage Report." Values for earlier weeks are from the Historical Weekly Storage Estimates Database, with the exception of March 8, 2002.

^{viii} EIA, Short-Term Energy Outlook, July, 2003.

^{ix} EIA, Annual Energy Outlook 2003 with Projections to 2025, Market Trends – Oil and Natural Gas, January 9, 2003.

^x EIA, Short-Term Energy Outlook, July 2003, Table 10a: U.S. Electricity Supply and Demand: Base Case.

^{xi} Source: http://www.eia.doe.gov/oiaf/aeo/figure_82.html. Annual Energy Outlook 2003 With Projections to 2025. History: Electric utilities: Energy Information Administration (EIA), Electric Power Annual 2001, Vol. 1, DOE/EIA-0348(2001)/1 (Washington, DC, August 2001). Nonutilities: EIA, Form EIA-860B, "Annual Electric Generator Report—Nonutility." Other: EIA, State Energy Data Report 2000, DOE/EIA-0214(2000) (Washington, DC, May 2002). Projections: Table A13.

^{xii} Spencer Abraham, Secretary, DOE, presentation at National Gas Summit, Washington, D.C., June 26, 2003.

^{xiii} Energy Information Administration's Outlook On Gas Pricing and Storage, Deliverability Infocast Conference, Boston, Massachusetts June 17, 2003, William Trapmann, EIA presenting, from http://www.eia.doe.gov/pub/oil_gas/natural_gas/presentations/2003/ogpsd_boston/ogpsd_boston_files/frame.htm.

^{xiv} Sources: <http://www.eia.doe.gov/emeu/steo/pub/pdf/jul03.pdf> - from: Natural Gas Week; Projections: Short-Term Energy Outlook. *The confidence intervals show +/- 2 standard errors based on the properties of the model. The ranges do not include the effects of major supply disruptions.

^{xv} The NEDRI Report can be accessed at www.nedri.raabassociates.org.