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Summary

ACEEE proposes both near-term and longer-term policy responses to the looming crisis in natural price and supply. Our testimony first discusses the roots of the current situation, and points out the limits of supply-side solutions. In the near term—within the next two to three years—moderating energy demand is the most realistic and effective approach to balancing natural gas markets.

We document the energy resource contribution energy efficiency has made to the U.S. economy, and define its overall potential for future contributions, including its potential for saving natural gas. We estimate that, over time, more than 10% of U.S. gas demand can be avoided via efficiency, and a significant portion of those savings can be realized in the short term. In addition, saving electricity can expand those savings because so much electricity is generated by natural gas, especially in peak demand periods. A substantial portion of these savings—enough to have an effect on gas prices—can be realized in the next two to three years through an aggressive program of energy efficiency and conservation.

ACEEE's recommendations for near-term action include:

1. **Supplement current efficiency deployment programs.** We recommend Congress pass a supplemental appropriation for federal programs that deliver energy savings, including the ENERGY STAR® programs and support for state-based efforts.
2. **Conduct a national efficiency and conservation campaign.** DOE should lead a partnership effort among efficiency manufacturers, utilities, states, and others to accelerate efficiency investments and encourage short-term behavior modifications. California used this approach with great success in responding to its 2001 crisis.

Recommendations for longer-term action include:

1. **Accelerate federal efficiency standards.** DOE should accelerate its standards rulemakings for residential heating equipment and commercial air conditioning equipment, and should take gas price and supply issues into account in setting these standards.
2. **Expand incentives for high-efficiency technologies.** Congress should increase incentives for gas-saving technologies in the current energy bills.

3. **Expand research and development.** DOE budgets for advanced technologies that save gas in the residential, commercial, industrial, and power sectors should be increased.
4. **Create a public benefits fund for efficiency.** Congress should include a public benefits fund for energy efficiency and other clean energy initiatives in the current energy bills. While originally aimed at electricity savings, this fund would be equally applicable to natural gas utilities and their customers.
5. **Create efficiency performance standards for utilities.** Congress should follow Texas' example and require utilities to offset a portion of demand growth through energy efficiency.
6. **Expand support for combined heat and power (CHP).** Congress should expand support for CHP by improving proposed CHP tax credits, and encouraging states and utilities to provide fair and reasonable interconnection and tariff treatment for new CHP systems.

Introduction

ACEEE appreciates the opportunity to provide our comments to the Subcommittee on the important subject of energy efficiency as a response to the severe problems emerging in U.S. natural gas markets. Our analysis shows that energy efficiency and conservation efforts are the most effective response to these challenges over the next 24 to 30 months, and also offer longer-term insurance against future gas price spikes and shortages.

ACEEE is a nonprofit organization dedicated to increasing energy efficiency as a means for both promoting economic prosperity and environmental protection. We were founded in 1980 and have developed a national reputation for leadership in energy efficiency policy analysis, research and education. We have contributed in many ways to congressional energy legislation adopted during the past 20 years, including the current energy bills, the Energy Policy Act of 1992 and the National Appliance Energy Conservation Act of 1987. We are also an important source of information for the press and the public on energy efficiency opportunities in technology, policies, and programs.

The Current Natural Gas Problem

Senior officials, including Chairman Greenspan and Secretary Abraham, have recently stated that natural gas price and supply problems are significant enough to warrant serious federal response in the near term. As Chairman Greenspan said in his Energy and Commerce Committee testimony last week, gas prices are already shutting down some industrial production, costing U.S. jobs and threatening the sluggish economic recovery.

Gas prices are not only historically high, they are quite volatile, meaning that the rapid swings in prices we have seen since 2000 are likely to continue. Volatility is almost as much a threat to economic growth as high prices, because it makes it difficult for investors to plan rationally, either for exploration and development of new supplies, or for energy efficiency investments. It was expected that the sophisticated risk-management and trading techniques pioneered by companies like Enron would provide a

price-stabilizing effect in energy markets. However, the demise of Enron and other traders has left gas markets without the hedging options than can moderate price swings.

Natural gas is proving to be a prisoner of its own success: increasing demands for this relatively low-emission, low-cost fuel over the past 15 years have outrun the North American supply system. As a result, we are experiencing prices that are both high and volatile. Indications are that new supply initiatives in North America will have a limited impact on this situation, especially in the near term, and that policy actions on the demand side are the most effective near-term measures to bring gas markets back into balance.

Natural gas markets have been largely deregulated since the 1970s, when federal price regulation limited supply investments, shortages appeared in many markets, and new gas connections were embargoed by many gas utilities. Since the late 1980s, natural gas has become more widely available, and more popular as an environmentally-preferred, relatively inexpensive fuel.

Electric power generation continues to be the fastest-growing demand sector for gas. (See Figure 1.) While industrial demand remains the largest consuming sector, its gas use has declined somewhat from peak levels in the late 1990s. Commercial and residential natural gas demand continues to be strong. However, the power sector has been the dominant factor in driving gas demand recently, as gas is increasingly preferred for environmental and other reasons. (See Figure 2.) Gas is increasingly the dominant fuel used in peak-period generation: gas combustion turbines are relatively inexpensive to install and can be brought on line quickly.

However, these "peaker" turbines are also among the least efficient generation technologies, with thermal efficiencies between 12% and 20%. Today's combined-cycle gas power plants can perform at close to 50% efficiency, and combined heat and power (CHP) technology provides efficiencies in the 75% range. The overall U.S. system average thermal efficiency is about 33%; so gas peaking generation is about half as efficient as average generators, and wastes more than three times the energy as today's best generation technologies.

The disproportionate use of natural gas for peaking generation, combined with the low efficiency of peaking units, shows that saving electricity, especially at peak times, is a key to freeing up natural gas for other uses. In this way, pursuing electric energy efficiency in peak demand periods is a powerful tool for saving natural gas.

The long-term prospects for significant increases in U.S. gas production are limited. The exploration and production of natural gas and petroleum are historically linked. U.S. oil production peaked in 1970, and has declined since. Oil imports have steadily grown to make up the difference. U.S. natural gas dry production peaked in 1973, and in 2002 was 13% below that peak. Most low-cost fields have been drilled; recovery of additional gas from existing and new fields will come at a premium price.

Imports, mostly from Canada, have helped fill the supply gap in recent years, but Canada's growing domestic consumption is limiting their ability to export. Liquefied natural gas (LNG) is available in limited supplies, and the gas industry is reactivating several LNG terminals, but LNG bears a premium price. If we rely on LNG as the marginal source for gas, it will tie U.S. gas markets to a permanent higher-cost baseline.

U.S. gas production and delivery can be increased on the margin in the medium term through industry investments and policy measures. However, these efforts will not ultimately reverse the long-term decline in U.S. gas production. Imports may provide limited additional supply, but as LNG they will come at a price premium and also bear safety and homeland security risks. Most of these new supply initiatives are likely to come at a price premium.

Given the limitations and cost premiums associated with natural gas supply options, Congress must consider options to manage demand as part of a balanced energy policy. Energy efficiency and conservation are proven resources for moderating energy demand, and are also the most effective tools to apply in the near term to bring balance to gas markets. By combining aggressive demand management with supply development, we can stabilize natural gas markets and husband this strategic fuel to support America's economic growth and environmental protection.

Energy Efficiency as a Vital National Resource

Energy efficiency is a quiet but effective energy resource, contributing substantially to our nation's economic growth and increased standard of living over the past 30 years. Energy efficiency improvements since 1973 accounted for approximately 25 quadrillion Btu's in 2002, which is about 26% of U.S. energy use and more energy than we now get annually from coal, natural gas, or domestic oil sources. Consider these facts which are based primarily on data published by the federal Energy Information Administration (EIA):

- Total primary energy use per capita in the United States in 2002 was almost identical to that in 1973. Over the same 29-year period, economic output (GDP) per capita increased 74 percent.

- National energy intensity (energy use per unit of GDP) fell 43 percent between 1973 and 2001. About 60% of this decline is attributable to real energy efficiency improvements and about 40% is due to structural changes in the economy and fuel switching.[1]

[1] Murtishaw and Schipper, 2001, *Untangling Recent Trends in U.S. Energy Use*. Washington, D.C.: U.S. Environmental Protection Agency.

- If the United States had not dramatically reduced its energy intensity over the past 29 years, consumers and businesses would have spent at least $430 billion more on energy purchases in 2002.

- Between 1996 and 2002, GDP increased 21 percent while primary energy use increased just 2 percent. Imagine how much worse our energy problems would be today if energy use had increased 10 or 20 percent during 1996-2002.

Energy Efficiency's Resource Potential

Even though the United States is much more energy-efficient today than it was 25 years ago, there is still enormous potential for additional cost-effective energy savings. Some newer energy efficiency measures have barely begun to be adopted. Other efficiency measures could be developed and commercialized in coming years, with proper support:

$ The Department of Energy's national laboratories estimate that increasing energy efficiency throughout the economy could cut national energy use by 10 percent or more in 2010 and about 20 percent in 2020, with net economic benefits for consumers and businesses.[2]

$ ACEEE, in our *Smart Energy Policies* report, estimates that adopting a comprehensive set of policies for advancing energy efficiency could lower national energy use from EIA projections by as much as 11 percent in 2010 and 26 percent in 2020.[3]

$ The opportunity for saving energy is also illustrated by experience in California in 2001. Prior to 2001 California was already one of the most-efficient states in terms of energy use per unit gross state product (ranking 5th in 1997 out of 50 states[4]). But in response to pressing electricity problems, California homeowners and businesses reduced energy use by 6.7% in summer 2001 relative to the year before (after adjusting for economic growth and weather)[5], with savings costing an average of 3 cents per kWh,[6] far less than the typical retail or even wholesale price of electricity.

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[2] Interlaboratory Working Group, 2000, *Scenarios for a Clean Energy Future*. Washington, D.C.: Interlaboratory Working Group on Energy-Efficient and Clean-Energy Technologies, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy.

[3] Nadel and Geller, 2001, *Smart Energy Policies: Saving Money and Reducing Pollutant Emissions through Greater Energy Efficiency*, www.aceee.org/energy/reports.htm. Washington, DC: American Council for an Energy-Efficient Economy.

[4] Geller and Kubo, 2000, *National and State Energy Use and Carbon Emissions Trends*. Washington, DC: American Council for an Energy-Efficient Economy.

[5] California Energy Commission, 2001, *Emergency Conservation and Supply Response 2001.* Report P700-01-005F. Sacramento, CA.

[6] Global Energy Partners, 2003, *California Summary Study of 2001 Energy Efficiency Programs, Final Report.* Lafayette, CA.

Energy Efficiency Potential for Natural Gas

ACEEE has conducted years of research on the energy efficiency potential in a wide range of technologies and end-use sectors. We have a research effort underway to refine energy efficiency potential estimates specifically for natural gas. On a preliminary basis, we identified a number of cost-effective efficiency measures that would collectively save more than 10% of U.S. gas usage by 2020. A summary of these measures is shown in Table 1.

Table 1
Natural Gas Energy Efficiency Measures

	Measure	Current Efficiency	Efficiency Target	Units for Efficiency Target	Potential Gas Savings In 2020 (TBtu)	Average Cost of Saved Energy ($/therm)*
1	Ind'l management practices	Typ. plant	8%	savings	402	0.351
2	Comm'l building retrocommissioning	149	134	kBtu/sf	362	0.229
3	Res duct sealing & infiltration reduction	Avg. home	20%	H&C svgs	310	0.450
4	Residential windows	.64/.65	.33/.44	U-Factor/ SHGC	233	0.154
5	Commercial furnaces and boilers	standard units	Power burner	savings	181	0.082
6	New homes	Avg. home	30%	H&C svgs	178	0.401
7	Res. furnaces/boilers (equip. & install.)	82%	90%+	AFUE+	162	0.479
8	Sector-based comm retrofit (e.g. offices)	0.5	0.4	therms/sf	162	0.361
9	Advanced commercial glazing	1.3/.69	.45/.45	U/SHGC	145	0.301
10	Comm'l new construction	90.1-1999	30%	savings	140	0.322
11	Res. combo gas space & water htg unit	82/59	90/90	AFUE/EF	85	0.543
12	Comm'l cooking and ventilation	typ equip	improved		76	0.300
13	Major residential appliances	Federal Standards	21%	savings	53	-0.859
14	Res. gas water htg (stand-alone units)	0.59	0.62	Energy Factor	52	0.370
15	Bldg. operator training & certification	Typ O&M	Better		51	0.063
				TOTAL	2,590	

* Note: Cost of Saved Energy is the cost of a measure per unit of unit of fuel saved. Measures costing less than retail gas prices (currently averaging $0.83/therm for residential customers) are cost-effective. A negative cost of saved energy means that savings in non-energy costs can fully pay for the measure.

Source: Nadel, Steven, 2002, *Screening Market Transformation Opportunities: Lessons from the Last Decade, Promising Targets for the Next Decade*, Washington, DC: American Council for an Energy-Efficient Economy available online at http://aceee.org/pubs/u022full.pdf.

A significant portion of this efficiency potential could be realized within three years through an aggressive nationwide effort. In addition, conservation efforts aimed at short-term usage reductions could increase these savings by at least double. The California experience of 2001 indicates that the energy savings were divided roughly equally between efficiency investments and conservation behavior. The natural gas savings

potential for electricity efficiency measures is also substantial, and will add significantly to direct natural gas end-use savings. We will be completing that analysis in the near future.

Overall, we project that energy efficiency and conservation initiatives, if pursued vigorously in the next two years, will moderate natural gas demand sufficiently to have a significant impact on gas prices.

Barriers to Free-Market Solutions to the Natural Gas Problem

An economist or a free-market advocate might argue that high natural gas prices contain their own remedy, since by economic theory price elasticity would cause demand to fall when prices rise. This argument contains a fundamental element of truth, and ACEEE believes in markets as a key focus for energy efficiency solutions. However, several factors in today's U.S. markets keep the laws of economics from being applied in their purest form:

- **Regulatory Lag.** In many states, public utility commissions set retail prices, at least for residential and smaller business customers. In these cases, gas utilities that experience gas commodity price increases must go through rate case proceedings to pass through these costs in rates. This can take a year or more, and masks the effect of market prices on customers.
- **Contract Structures.** Most gas in the U.S. is sold under long-term contracts, which serves to delay the impact on most customers. Some utilities in deregulated states pass gas costs through to customers on a monthly basis, and some industrials buy some of their gas on the spot market. But for those with most of their supply in multi-year contracts, it can take years to fully feel the effect of market prices.

These factors are currently insulating many consumers from the pending gas crisis. But they must not mislead Congress into waiting to take action on this problem. If we wait until most customers feel the full effect of today's gas prices, the ensuing crisis could be much worse than if we act now to take prudent steps that will help keep markets in balance.

In addition to these price-masking effects, a variety of market barriers to energy efficiency keep worthwhile investments and behavior changes from being made, even when prices rise. These barriers are many-fold and include: "split incentives" (landlords and builders often don't make efficiency investments because the benefits of lower energy bills are received by tenants and homebuyers); panic purchases (when a product such as a water heater needs replacement, there often isn't time to research energy-saving options); and bundling of energy-saving features with high-cost extra "bells and whistles."

Energy efficiency is also hobbled by being a "distributed resource." It is found in more than 100 million homes, over 5 million commercial buildings, and hundreds of thousands of factories. For many homes and businesses, energy costs are a small enough percentage

of total budgets that price changes may not motivate efficiency investments, especially when compounded by the other barriers listed above. By the same token, the information and technical skills needed to understand and pursue energy efficiency projects are not available to most, smaller customers.

For these reasons, policy and program initiatives are needed to realize the benefits of energy efficiency for the economy and the environment as a whole.

Energy Efficiency Policy Solutions for Natural Gas Markets

Energy efficiency and conservation can help bring balance and price stability to gas markets in the near term and the longer-term. ACEEE's analysis indicates that several policy and program initiatives can be effective in curbing demand on the margin. Given the sensitivity of volatile gas markets to small changes in supply or demand, efficiency initiatives can make enough difference on the margin to affect prices.

First, it is important to define key terms used in describing these initiatives:

- **Efficiency:** permanent reductions in energy use based on changes in technology and management practice. Examples: replacement of older gas furnaces with new high-efficiency models; installing efficient showerheads; computerized rescheduling of building operations to keep equipment off during unoccupied hours.
- **Conservation:** temporary reductions in demand from voluntary curtailments in customer end-uses. Examples: changing thermostat settings beyond normal ranges; taking shorter showers; reducing lighting levels.

In our experience, affecting energy demand in the near term requires a mix of efficiency and conservation. As mentioned earlier, the state of California used such a strategy in 2001 to bring down state electricity use by almost 7%. This had the effect of bringing electricity prices down substantially. And because of the link between electricity and natural gas, this effort also helped reduce natural gas prices.

Recommended Near-Term Steps

ACEEE recommends the following near-term actions for Congress and the Administration to respond to the looming threat of natural gas prices.

1. **Supplement current efficiency deployment programs.** We recommend Congress pass a supplemental appropriation for federal programs that deliver energy savings, including the EPA and DOE Energy Star programs, weatherization and other state grants, LIHEAP energy assistance funds (with a rider to expand the allowable percentage usable for weatherization from 15% to 30%), and DOE's industrial assistance programs. EPA's Energy Star budget has just been cut by 30%; these funds should be restored and directed toward gas-saving measures. This bill could also create matching grants for states that operate energy efficiency programs with

their own funds; approximately 20 states, representing a majority of the population, fall in this category.

2. **Conduct a national efficiency and conservation campaign.** DOE should lead a partnership effort among efficiency manufacturers, utilities, states, and others to accelerate markets for efficient technologies, and to motivate consumers and businesses to moderate their gas usage. This campaign would include public service announcements, educational materials, voluntary commitments from industry, and accelerated market transformation efforts. The California Legislature worked closely with the utility commission, utilities, and state and local agencies to mount a campaign in 2001 that succeeded in reducing electricity usage by almost 7%. This helped bring down both electricity and gas prices within that same year.

These initiatives can make a difference in the next 24-30 months, which will be critical in avoiding crippling gas price and supply problems

Recommended Longer-Term Steps

Looking three years and beyond, ACEEE recommends the following actions:

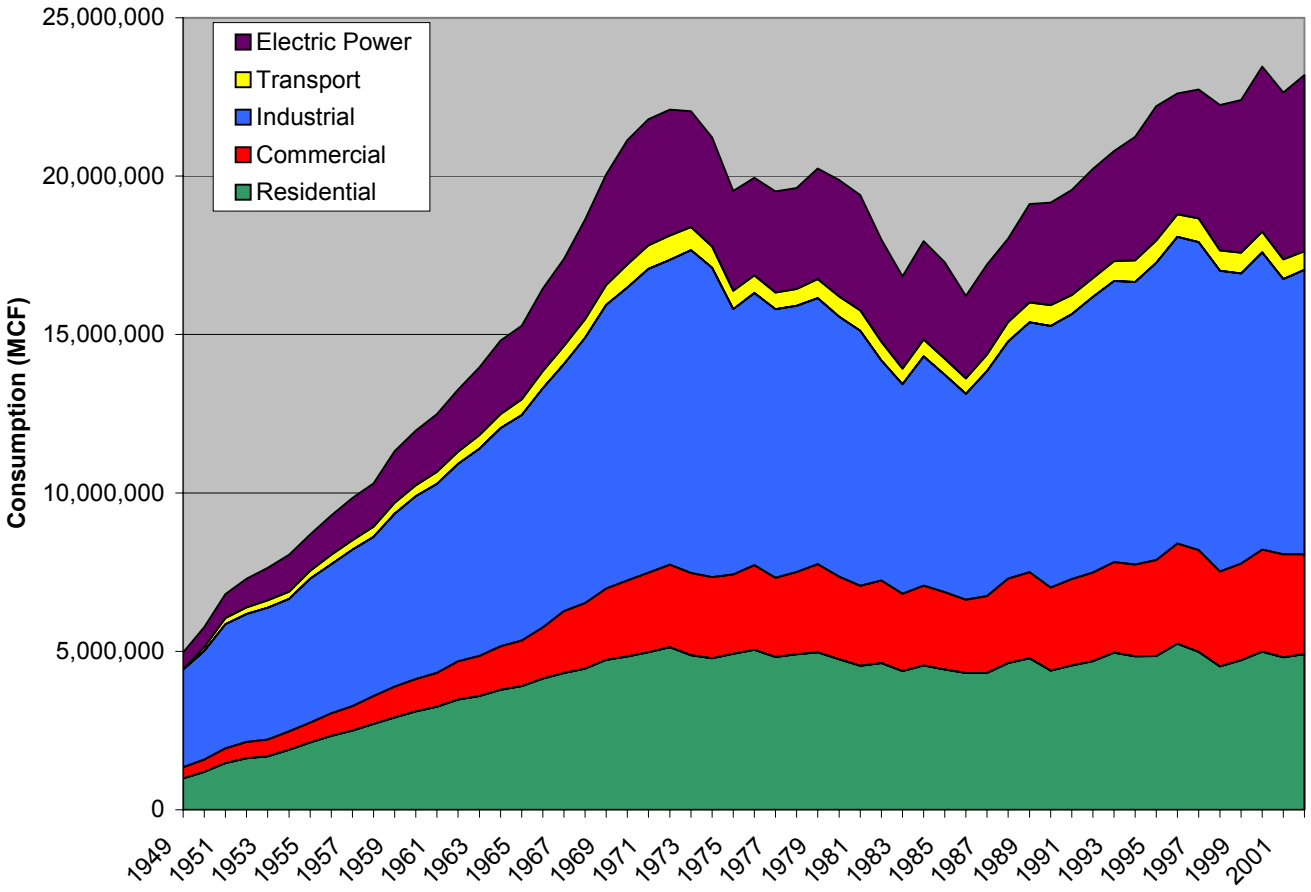
1. **Accelerate federal efficiency standards.** The Department of Energy's appliance efficiency standards program currently has a rulemaking underway for residential heating equipment. Unfortunately, DOE recently downgraded the priority for this rulemaking. DOE should restore this rule as a top priority, and should take higher gas prices into account in setting the final rule. DOE should also accelerate its commercial air conditioning standard rulemaking, as commercial cooling is served mainly by inefficient gas-fired peaking turbines.
2. **Expand incentives for high-efficiency technologies.** The current energy bills offer tax credits for efficient technologies such as combined heat and power systems, new and existing homes, commercial buildings, and residential furnaces, air conditioners, and hot water heaters. Congress should consider increasing incentive levels, years of eligibility, and other features of these incentives to increase their natural gas savings. For example, the existing home credits do not cover duct sealing, which is one of the largest opportunities for reducing gas usage.
3. **Expand research and development.** Congress should increase funding for advanced technologies that save natural gas in: buildings through advanced heating, cooling, and hot water systems, advanced envelope designs, and control systems; in industry through CHP, advanced manufacturing processes, motors and other components; and in power generation through CHP and other advanced generation technologies, plus efficient transmission and distribution technologies.
4. **Create public benefits funds for efficiency.** One provision Congress has not included in the current energy bills is a Public Benefits Fund for energy efficiency. It would place a small charge on utility bills to fund a pool of money that would be allocated to states for efficiency and other clean energy programs. While originally aimed at electricity savings, it should be equally applicable to natural gas utilities and their customers.

5. **Create efficiency performance standards for utilities.** Texas' electricity restructuring law created a requirement for electric utilities to offset 10% of their demand growth through energy efficiency, and enabled them to use public benefits funds for this purpose. Bills along these same lines have been introduced in Colorado and Washington, and have been discussed in Congress. This kind of performance standard also can be applied to natural gas utilities.
6. **Expand support for Combined Heat and Power (CHP).** CHP generates electricity far more efficiently than the majority of the conventional natural gas generation. Congress should expand its support for CHP by improving the proposed CHP tax credit by removing the minimum size limit and restoring depreciation periods to the 10 years allowed in current law. The Congress should also include language in the energy bill that encourages states and utilities to provide fair and reasonable interconnection and tariff treatment for new CHP systems.

ACEEE's experience with these programs and policies gives us confidence that they can make a critical difference in bringing balance to natural price prices and supplies in the coming years. We look forward to working with the Subcommittee on these important issues.

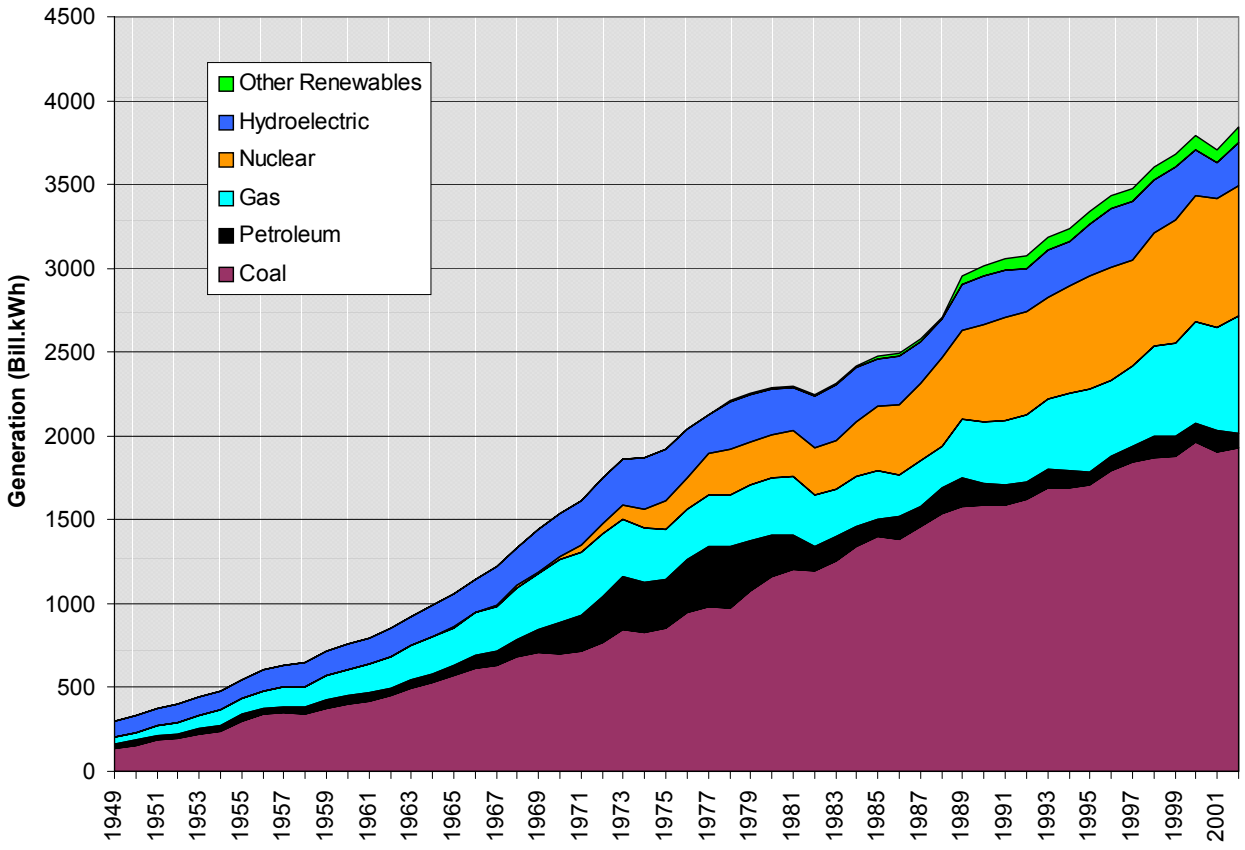
Thank you for the opportunity to share our views with the Subcommittee.

Figure 1
Natural Gas Demand By End-Use Sector



Source: ACEEE staff analysis based on Energy Information Administration data

Figure 2
Fuel Sources for Electricity Generation



Source: ACEEE staff analysis based on Energy Information Administration data