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Summary

While much of the recent attention in policy communities has been on natural gas wholesale prices or gasoline pump prices, the reality is that our problems are much deeper and more interrelated. In the past, our energy problems tended to be with a single energy source, be that gasoline, heating oil, natural gas, or electricity. This situation has in the past allowed us to switch between energy sources to relieve tightness in a single market. What the United States faces now is tightness in *all* major energy markets, which has put the country in an energy straightjacket, unable to turn to other conventional energy resources for relief.

The good news is that ACEEE research shows that energy efficiency and conservation are the most viable near-term strategy for moderating natural gas prices and are also vital to stabilizing longer-term gas markets. Our testimony first discusses the roots of the current situation, assesses the potential impact of energy efficiency on wholesale natural gas prices, and points out the limits of supply-side solutions. It then focuses on ACEEE's analysis, which shows that we can cut wholesale gas prices by as much at 25%, or about $1.50 per MCF. These savings would put over $100 billion back into the U.S. economy, at a cost of $30 billion in new investment, of which $7 billion would be public funds.

Federal and state governments currently spend over $2.5 billion annually on energy efficiency, in research, development, deployment, and other programs. The 5-year, $7 billion public investment we recommend would average $1.4 billion annually and would represent a 56% increase in public commitment to efficiency. Given the benefits (a 25%-plus drop in natural gas prices, more than $100 billion in direct economic benefits, and thousands of new jobs), an aggressive federal and state energy efficiency and conservation effort over the next 5 years is perhaps the best investment we could make in the American economy.

ACEEE's recommendations for near-term action include:

1. **Increase funding for efficiency deployment programs.** We recommend that Congress increase FY 2006 appropriations for federal programs that deliver near-term energy savings to consumers (including the ENERGY STAR programs, the Weatherization program, and DOE's suite of other best practice programs) and that the Administration follow suit in its FY 2007 budget request. These programs can be of great help in Katrina-affected areas, and with added funding, they can quickly ramp up energy savings nationally in the next few years.
2. **Expand public benefits funds for efficiency.** Eighteen states collectively spend over $1 billion on public benefits efficiency programs funded through utility bill fees. Other states (and Congress) should follow this example, and states with current programs should increase funding levels. Most states operating such programs coordinate their efforts with federal programs like ENERGY STAR; this partnership should be continued and expanded, so that the benefits can be felt in more states**.**
3. **Expand and extend tax incentives for high-efficiency technologies.** Congress should add to and extend the incentives for energy efficiency technologies that were included in the Energy Policy Act of 2005. The Combined Heat and Power incentive that was included in the Senate bill should be restored and the incentives for new homes and commercial buildings should be extended since a two-year tax credit is too short to significantly influence design and construction practices.
4. **Conduct a national efficiency and conservation campaign.** The Energy Policy Act of 2005 authorized a $90 million per year public education campaign on energy efficiency. DOE and EPA should co-lead this partnership effort among efficiency manufacturers, farm organizations, utilities, states, local governments, and others to accelerate efficiency investments and encourage short-term behavior modifications. California spent about $30 million in 2001 on a concerted public awareness campaign; evaluations indicate that this campaign was responsible for a more than 6 percent energy reduction in California in that year, and that a significant fraction of these savings persisted for several years.

Recommendations for longer-term action include:

1. **Accelerate federal efficiency standards.** The recently enacted Energy Policy Act of 2005 includes important new appliance standards for which DOE's appliance efficiency standards program will need to undertake rulemakings. In addition, DOE has a backlog of rulemakings from earlier laws. DOE should accelerate these rules and in particular allow cold-weather states to elect a higher standard level for residential furnaces and include furnace fan efficiency in the standard. DOE should take higher gas prices into account in setting the final rule.
2. **Support advanced building codes.** Building codes are an important element in the efficient policy portfolio, insuring that buildings built today place minimum strain on tomorrow's energy supplies and put minimum pressure on market prices. The International Energy Conservation Code (IECC) is widely adopted in states, but many states need to update their codes. DOE should both push for more aggressive model codes like the IECC and provide more support to states and local governments in implementing better codes.

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; industry through CHP, advanced manufacturing processes, motors and other components; and power generation through CHP and other advanced generation technologies, plus efficient transmission and distribution technologies.
4. **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. Similar approaches have been pursued in Nevada, Hawaii, Illinois, Connecticut, and California, and the Energy Policy Act of 2005 authorizes a study and pilot program on this issue. DOE should request and Congress should approve funds for these efforts
5. **Expand support for Combined Heat and Power (CHP).** CHP generates electricity far more efficiently than most of the conventional natural gas generation. Congress should expand its support for CHP by restoring the CHP tax credit that was dropped in the energy bill conference at the last minute. States should also mandate 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 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 few years, and also offer longer-term insurance against future gas price spikes and shortages.

ACEEE is a non-profit 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 National Appliance Energy Conservation Act of 1987, the Energy Policy Act of 1992, the Energy Title of the 2002 Farm Bill, and the Energy Policy Act of 2005. We are also an important source of information for the press and the public on energy efficiency technologies, policies, and programs.

The Current Natural Gas Problem

While much of the recent attention in policy communities has been on natural gas wholesale prices or gasoline pump prices, the reality is that our problems are much deeper and more interrelated. In the past our energy problems tended to be with a single energy source, be that gasoline, heating oil, natural gas or electricity. This situation has in the past allowed us to switch between energy sources to relieve tightness in a single market. What the United States faces now is tightness in <u>all</u> major energy markets, which has put the country in an energy straightjacket, unable to turn to other conventional energy resources for relief.

These problems have been many years in the making, and should have not come as a surprise. We initially became aware of impending energy problems in the winter of 2000-2001, when

limited supplies hydro-electric power and tight natural gas combined with a cold winter that forced natural gas prices to record high levels and contributed to shortages in electricity in California and other parts of the country in the hot summer that followed. While it is now clear that some players manipulated these tight markets to their advantage, it is also clear that tight supplies of natural gas combined with high demand for electricity created the conditions that allowed this manipulation to occur.

In part these tight markets resulted from a dramatic shift to natural gas-fired electric power generation, fueled in part by low cost of gas for much of the 1990s, the low cost to build new natural gas fuel generation, and the prospects for continued plentiful supplies of low-cost gas projected for the future (Figure 1). This resulted in the construction of over 250,000 megawatts of new generation in the 2000-2005 period – an unprecedented addition of new generation to the power base. While some of this capacity was highly-efficient combined cycle units, a significant share was inefficient simple cycle turbines. This new demand came during a period when increases in domestic production of natural gas slowed due to a maturing of existing gas fields and imports from Canada fell as their "gas bubble" was depleted. These factors combined to fundamentally shift North American gas markets, leading to a dramatic and sustained increase in natural gas prices resulting from the increasing demand for natural gas exceeding the market's ability to deliver new supplies. While we saw imports of liquefied natural gas surge as importation facilities built in the late 1970s were reactivated, this rapid increase was small and has not been sustained because the siting and construction of new LGN terminals takes years.

During the same period, demand for gasoline surged in the U.S. as the economic recovery and consumer shift to larger vehicles drove demand. As a result of this high demand (and resulting high prices), refiners shifted their limited production capacity for the past few years to these motor fuels during the late winter when they would normally be producing heating oil, meaning that fuel oil inventories have been falling. In the fall when refiners shifted to heating oil production, they had to try and catch up with demand to avoid shortages. This means that our refineries, in spite of making significant additions to production capacity for the past few years, have found themselves pushing their refineries to production levels they were not intended to maintain just to keep up. As a result we have seen steadily increasing refined goods prices for the past few summers.

With four unusually warm winters and three cool summers, many forgot about problems with natural gas, heating oil markets and electric power systems. Over the past two year the focus turned instead to gasoline prices, while demand for electricity and natural gas continued to increase. Natural gas market experts became increasingly alarmed that we were but a hot summer or a cold winter away from not just market tightness but acute shortages.

As natural gas prices continued to rise, electric generators turned increasingly to coal as their fuel of choice, leading to surging demand. This year has seen growing strains emerge in coal markets as demand has exceeded the industry's ability to ramp up production and late-winter snows and rains lead to derailments in the west, reducing the ability to get Power River Basin coal to eastern power generators, forcing generators to draw down coal supplies at power plants normally reserved to handle supply disruptions during extreme winter weather. As this summer's late heat wave baked the country, generators were forced to turn to natural gas as their fuel of last resort.

With this surge in natural gas demand, additions to storage for the coming winter began to drop precipitously (see Figure 2).

As a result of these events, the U.S. found its inventories of natural gas, heating oil and coal at the end of August at levels well below the last few years. While the stores of fuels have sufficed for the past few winters, the past several winters have been quite mild and even then many energy experts have been nervous that we were perilously to shortages at those levels. Thus we saw run-ups in heating oil, coal and natural gas prices for much of late July and August to nominal if not real record problems.

Then came Katrina. This storm disrupted energy infrastructure in the Gulf of Mexico on an unprecedented scale. As of this week, oil and gas production remain disrupted – perhaps for months to come – while almost 5 percent of U.S. oil refining capacity remains down. These challenges make what was already on track to be a difficult winter for energy even more difficult. The economic and social consequences of high energy prices perhaps combined with outright shortages paints a dire picture. In particular the pain will fall disproportionately on lower income consumers who are least able to absorb the additional energy costs. ACEEE has estimated that combining heating, electricity and motor fuels, the average household will be paying about $2000 per year more in 2006 than in 2002 – an increase of over two-thirds in just four years. These energy bills add up to a $200 billion tax on the economy that is already reducing economic growth forecasts. While we can hope for a mild winter, Congress must prepare for the harsh consequences that would result from an early, cold winter.

The good news is that there is a proven energy resource that could provide near-term relief. Energy efficiency and conservation represents a significant opportunity to quickly and cost effectively reduce energy demand, thus allowing available energy resources to go further while also providing some price relief to consumers, and reducing the risk that energy expenditures will derail the economic recovery.

It is important to remember, however, that all our energy markets are interrelated, so energy efficiency and conservation cannot be about one fuel only – say natural gas – but rather needs to be deployed broadly to achieve significant market impacts. Reducing gasoline consumption frees refining capacity to produce heating oil. Reducing electricity consumption reduces demands on coal and natural gas markets, allowing them to recover. So what is needed is a call to action on energy efficiency and conservation.

Energy Efficiency as a Vital National Resource

Energy efficiency is a quiet but effective energy resource, having contributed 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 2003 was down slightly relative to 1973. Over the same 30-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

- 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 will 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

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

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

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.

- ACEEE's analysis of efficiency potential studies shows that cost-effective technologies could save a median 24% of electricity use and 9% of gas use nationwide.[7] While the efficiency potential number for gas seems low, there has been relatively little analysis of gas efficiency potential. Moreover, other ACEEE analysis shows that the greatest source of natural gas savings is indirect; it comes through reducing electricity use, which then displaces gas consumed in power generation.

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 for all the major energy supply resources. For example if we look at the efficiency potential for natural gas, we identified a number of cost-effective efficiency measures that would collectively save more than 10% of U.S. gas usage by 2020. A sample of these measures is shown in Table 1. It is important to note that these savings are only direct gas end-use savings; indirect savings, which reduce gas used in power generation by saving end-use electricity, greatly expand the potential for gas energy efficiency.

[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.

[7] Nadel, S., et al. 2004. "The Technical, Economic, and Achievable Potential for Energy Efficiency in the United States: A Meta-Analysis of Recent Studies." In *Proceedings of the ACEEE Summer Study on Energy Efficiency in Buildings.* American Council for an Energy-Efficient Economy, Washington, DC.

Table 1. A Sample of Natural Gas Energy Efficiency Measures[8]

	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.

Energy Efficiency's Effect on Wholesale Natural Gas Prices

- Over the past three years, ACEEE has conducted analyses of the effect energy efficiency and renewable energy could have on natural gas wholesale prices. In the tight markets we are experiencing, small changes in demand or supply have large impacts on price. To test this market principle, we used one of the best available markets model of U.S. gas markets, designed and operated by Energy and Environmental Analysis, Inc., the consulting firm who used the same model to support the National Petroleum Council (NPC)'s 2003 natural gas study. We tested the wholesale price impact of small (2-4%) changes in natural gas demand over the next 1-5 years. The next five years contain large

[8] Nadel, S., 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.

risks for the American economy if gas prices do not stabilize, and energy efficiency is the most widely available and rapidly deployable resource in that timeframe, as most new gas supply options will take six or more years to bring on line.

- What we found was that moderate gains in end-use efficiency over the next five years can reduce wholesale gas prices would cut wholesale gas prices as much at 25%, or about $1.50 per MCF (see Figure 3). This would bring substantial price relief to all gas consumers, particularly farmers and manufacturers. Achieving these results would cost about $30 billion in new investment, including about $7 billion in public expenditures, but would generate over $100 billion in direct economic benefits, including direct energy savings to customers who invest in efficiency and lower gas prices to all energy users. The ratio of benefits to costs would be more than three to one.[9] Our most recent analysis was conducted before the recent further tightening in the energy markets, so we would anticipate that the price impacts would be even greater.
- Our findings are quite consistent with those of the National Petroleum Council study. The NPC report calls for energy efficiency to offset about 4% of demand growth by 2010, and about 19% by 2025.[10] It also estimates that 2010 wholesale prices would fall by about 20% under its Balanced Future policy scenario.[11] Our analysis simply took a more detailed look at a specific efficiency investment scenario, using the same analytical approach and tools.
- A major finding of our study, which is not apparent in the NPC report, was that the majority of the natural gas savings came indirectly, through investments in electricity efficiency. This effect stems from the fact that natural gas has become the marginal generating fuel in many power markets, so that electricity savings tend to displace gas used for generation more than any other fuel. Also, because the average efficiency of natural gas generation remains low, especially at peak times, saving one unit of electricity backs out several units of gas at the generator. Thus saving electricity is a key to saving natural gas, and adding electricity-saving measures to the list in Table 1 would greatly expand the potential for gas demand reduction.

Impact of Efficiency at the Regional Level

While it would be ideal to achieve energy efficiency and conservation benefits in all parts of the country, achieving savings in just a few key regions would still benefit all consumers nationally. Our recent report also analyzed a scenario based on natural gas and electric end-use efficiency investment in eight Midwestern states (IA, IL, IN, MI, MN, MO, OH, and WI). Gas prices for power generators in the region have tripled since 1999, while industrial rates jumped 64% and residential/commercial rates increased by 44%. These price increases translate into an increase in natural gas expenditures of almost $350 per household in the Midwest.[12]

Realizing these efficiency gains in the Midwest would benefit both the region and the nation as a whole (see Figure 3). Our analysis shows that a 1% electricity and gas annual efficiency savings

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[9] Elliott, N. et al. 2005. *Impacts of Energy Efficiency And Renewable Energy On Natural Gas Markets: Updated and Expanded Analysis.* American Council for an Energy-Efficient Economy, Washington, DC.

[10] National Petroleum Council. 2003. Op. cit., Vo. 1, page 8, Figure 3.

[11] Ibid., page 11, Figure 6.

12 Kushler, K., et al. 2005. *Examining the Potential for Energy Efficiency to Help Address the Natural Gas Crisis in the Midwest*, American Council for an Energy-Efficient Economy, Washington, DC.

in just the Midwest would result in a national reduction in natural gas prices of 2% in the first year and 6 % in 2010; this would benefit all U.S. gas users. Within the Midwest region, natural gas bill savings to residential, commercial, and industrial consumers would exceed $4.14 Billion from an investment of about $1.12 Billion over five years. Energy efficiency investments could reduce residential gas bills by over 3% in the first year alone. These savings will grow in the future, averaging $86 per year per residential natural gas customer.

The bottom line of our most recent analysis is that with gas markets becoming tighter this year, as the economy grows and as high oil prices induce some industrial users to switch back to gas, a near-term strategy to invest in energy efficiency holds even greater potential to benefit the economy

Economic Impacts of Investments in Natural Gas Savings

Our analysis shows that a new public commitment to energy efficiency investment, on the order of $7 billion over 5 years, would generate $23 billion in private investment and create over $100 billion in economic benefits. These benefits would appear in the form of natural gas and electric bill reductions to consumers who invest in efficiency, price reductions to all natural gas users, and price reductions to electric utilities. We have not accounted for the non-energy benefits of energy-efficient technology, which can include increased productivity and improved quality. Moreover, we have not modeled the indirect economic impacts of increased sales and services related to energy efficiency investments, nor the induced effects of consumer spending of reduced energy bills on other goods and services. These effects would substantially increase the economic benefits of energy efficiency investment.

The combined benefits of energy efficiency and lower natural gas prices would be especially helpful to two consumer groups: lower-income households and gas-intensive industries. High energy prices are generally very regressive, as lower-income households spend a much higher percentage of total income, and of housing costs, on energy. Households that are able to obtain below-market housing may initially believe that they have found affordable housing, but a series of high gas heating bills can change that perception. Non-payment can lead to gas service disconnection, which can lead to health problems from under-heated homes, safety problems from improvised heating devices, and homelessness. Federal programs, such as the Low Income Home Energy Assistance Program (LIHEAP) and Weatherization Assistance Program (WAP), can help offset the impacts of high energy prices, but these programs are under-funded, particularly in this current high energy price environment. Indications are that last winter's LIHEAP allocations were used up by mid-winter. An energy efficiency scenario that emphasized low-income programs would make LIHEAP dollars go much further, minimizing the impact on low income consumers and on local governments and utilities that would otherwise have to pick up the bill.

Gas-intensive industries have a very different but nonetheless vital set of concerns regarding natural gas prices. Leaders of the chemical industry wrote to the President and leaders of Congress at the beginning of 2004, urging major new policy action to balance natural gas

markets.[13] This letter pointed out that natural gas has imposed more than $100 billion in an effective "tax" on the economy since 2000, and that many thousands of industry jobs have been lost as a result. Many of these companies, being unusually attuned to gas prices, have already implemented many energy efficiency and other measures, and thus their ability to control gas costs internally is very limited. They depend on the broader efficiency policy scenario we describe to bring relief to their businesses. If we can achieve the price reductions our analysis shows is possible, we can reduce costs in these vital industries, bring back some good manufacturing jobs to the U.S., and support the overall economic recovery.

In this context, we suggest that the energy efficiency policy scenario we describe should be viewed as an economic stimulus, analogous to a tax cut. Our analysis shows that an efficiency policy commitment could generate a "tax cut" of similar magnitude. Moreover, the efficiency scenario provides economic benefits at a very low public cost. Our analysis shows that the $100 billion-plus in benefits from efficiency requires a public outlay on the order of $7 billion, achieving very high leverage.

Energy efficiency investments not only provide substantial economic benefits at low levels of public expenditure, they also compete very effectively in terms of net employment and GDP impacts in comparison to other energy resource investments. A key fundamental economic reality in this regard is that energy efficiency investments create more jobs per dollar invested than do energy supply investments. For example, sectoral employment multipliers differ greatly between sectors. Energy supply sectors, including mining, refining, and utilities, create 5 to 10 jobs per million dollars of expenditure. Sectors affected by efficiency investments, including services, construction, and retail trade, create 19 to 25 jobs per million dollars of expenditure.[14] This means that energy efficiency investments can create two to five times as many jobs as supply-side investments. While both supply and demand-side investments will be needed to achieve and sustain balanced natural gas markets, we submit that energy efficiency investments provide a stronger job-creation stimulus.

Barriers to Free-Market Solutions to the Energy Problem

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:

- Falling energy intensity. Over the last 30 years, U.S. energy intensity (measured in BTU per dollar of GDP) has fallen by more than 40%, in part because of improving energy efficiency. While this is generally good news for the economy, it also has the effect of blunting the market-based response to high energy prices. When energy costs less as a percentage of the total cost of running a business, owning a home, or driving a car, consumers typically are less sensitive to price increases, and that market waits longer to

[13] Letter from 11 chemical industry CEOs to President Bush and leaders of Congress, January 20, 2004
[14] 2001 IMPLAN database for the United States, per MRG Associates 2004.

respond to the situation than in a higher energy-intensity environment – this leads to a crisis. The implication is that relying solely on market response to price signals would require energy prices to rise to economically damaging levels before the market corrects itself. We should not, and need not have to incur such economic damage—judicious energy policy action can forestall needlessly high natural gas prices.

- Income elasticity of demand. Indications are that rising incomes in many demographic segments tends to increase demand for energy services. Households that can afford half-million dollar homes and $50,000 vehicles are relatively insensitive to energy costs.
- Current policies promote increased use of natural gas. Environmental policies aimed at reducing air pollutant and greenhouse gas emissions have made natural the fuel of choice for power generation and industrial use in many areas. This tends to override fuel price considerations.
- Lack of Price Transparency. Price signals work only when customers receive clear, consistent, and timely price information. In today's gas markets, it is very difficult to understand prices in ways that encourage efficiency investments. Several issues stem from this point:

    - Contract structures, in which many utilities and customers purchase gas in annual or multi-year contracts, have delayed the "bad news" of price increases, such that motivations for efficiency investment are delayed. Unfortunately, this will shortly change.
    - Price volatility not only confuses customers seeking to predict future prices, it also reduces investors' willingness to take risks on efficiency or on supply investments.
    - Most customers see prices only retrospectively, after they receive bills for past consumption.
    - With today's complex bills, calculating the full price per unit of energy and normalizing it for weather or other factors, takes a level of analytical ability beyond most consumers.

These factors have insulated many consumers from the emerging energy crisis. Market forces will ultimately drive gas demand down, but the question is how soon and at what cost to our economy.

In addition to these broad barriers to efficiency investment, a variety of more specific 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. In most homes and smaller businesses, the information and technical skills needed to understand and pursue energy efficiency projects are not available. Moreover, the transaction costs of

developing, financing and implementing a multitude of small projects are much higher than for a relatively few, large energy supply projects. This tends to shift investment capital toward the larger projects, even when studies show that the efficiency resource is more cost-effective.

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.

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. **Increase funding for efficiency deployment programs.** We recommend Congress increase FY 2006 appropriations for federal programs that deliver near-term energy savings to consumers, including the Energy Star programs, the Weatherization program, and DOE's suite of other best practice programs, and that the Administration follow suit in its FY 2007 budget request. These programs can be of great help in Katrina-affected areas, and with added funding, they can quickly ramp up energy savings nationally in the next few years.
2. **Expand public benefits funds for efficiency.** 18 states collectively spend over $1 Billion on public benefits efficiency programs funded through utility bill fees. Other states, and Congress, should follow this example, and states with current programs should increase funding levels. Most states operating such programs coordinate their efforts with federal programs like Energy Star; this partnership should be continued and expanded, so that the benefits can be felt in more states.
3. **Expand and extend tax incentives for high-efficiency technologies.** Congress should add to and extend the incentives for energy efficiency technologies that were included in the Energy Policy Act of 2005. The Combined Heat and Power incentive that was included in the Senate bill should be restored and the incentives for new homes and commercial buildings should be extended since two-year tax credit is too short to significantly influence design and construction practices.
4. **Conduct a national efficiency and conservation campaign.** The *Energy Policy Act of 2005* authorizes a $90 million per year public education campaign on energy efficiency. DOE and EPA should co-lead this partnership effort among efficiency manufacturers, farm organizations, utilities, states, local governments and others to accelerate efficiency investments and encourage short-term behavior modifications. California spent about $30 million in 2001 on a concerted public awareness campaign; evaluations indicate that this campaign was responsible for about 20 percent in that year, and that a significant fraction of these savings persisted for several years.[15]

These initiatives can make a difference in the next five years, which will be critical in avoiding crippling gas market problems. Otherwise, U.S. economic growth will remain at risk.

15 Kushler, M. and E. Vine. 2003. *Examining California's Energy Efficiency Policy Response to the 2000/2001 Electricity Crisis*. American Council for an Energy-Efficient Economy, Washington, DC.

Recommended Longer-Term Steps

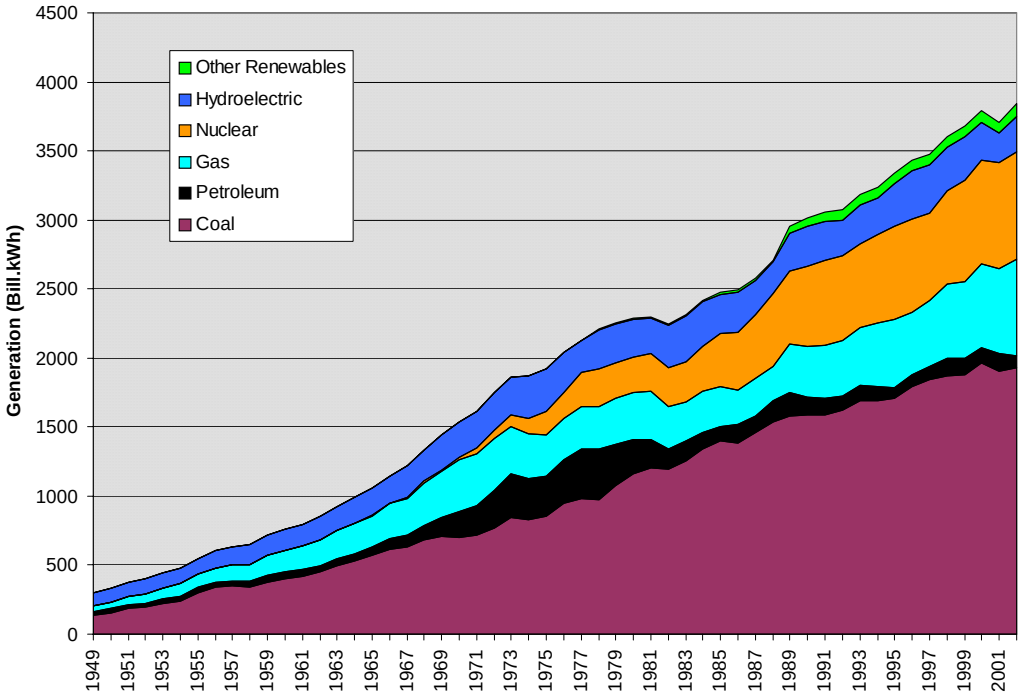
Looking three years and beyond, ACEEE recommends the following actions:

1. **Accelerate federal efficiency standards.** The recently enacted *Energy Policy Act of 2005* includes important new appliance standards for which the Department of Energy's appliance efficiency standards program will need to undertake rulemakings. In addition, DOE has a backlog of rulemakings from earlier laws. DOE should accelerate these rules, and in particular allow cold-weather states to elect a higher standard level for residential furnaces and include furnace fan efficiency in the standard. DOE should take higher gas prices into account in setting the final rule.
2. **Support Advanced Building Codes.** Building codes are an important element in the efficient policy portfolio, insuring that buildings built today place minimum strain on tomorrow's energy supplies and put minimum pressure on market prices. The International Energy Conservation Code (IECC) is widely adopted in states, but many states need to update their codes. DOE should both push for more aggressive model codes like the IECC, and provide more support to states and local governments in implementing better codes.
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 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. Similar approaches have been pursued in Nevada, Hawaii, Illinois, Connecticut, and California, and the Energy Policy Act of 2005 authorizes a study and pilot program on this issue. DOE should request and Congress should approve funds for these efforts
5. **Expand support for Combined Heat and Power (CHP).** CHP generates electricity far more efficiently than most of the conventional natural gas generation. Congress should expand its support for CHP by restoring the CHP tax credit that was dropped in the energy bill conference at the last minute. States should also mandate 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 Committee on these important issues.

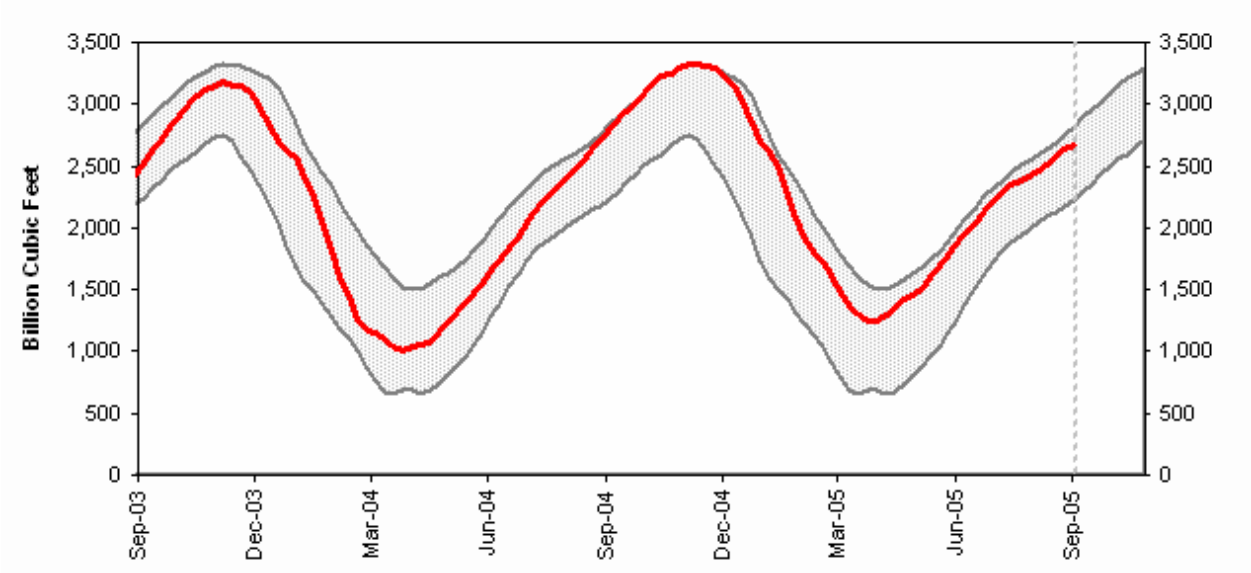
Thank you for the opportunity to share our views with the Subcommittee.

Figure 1. Fuel Sources for Electricity Generation



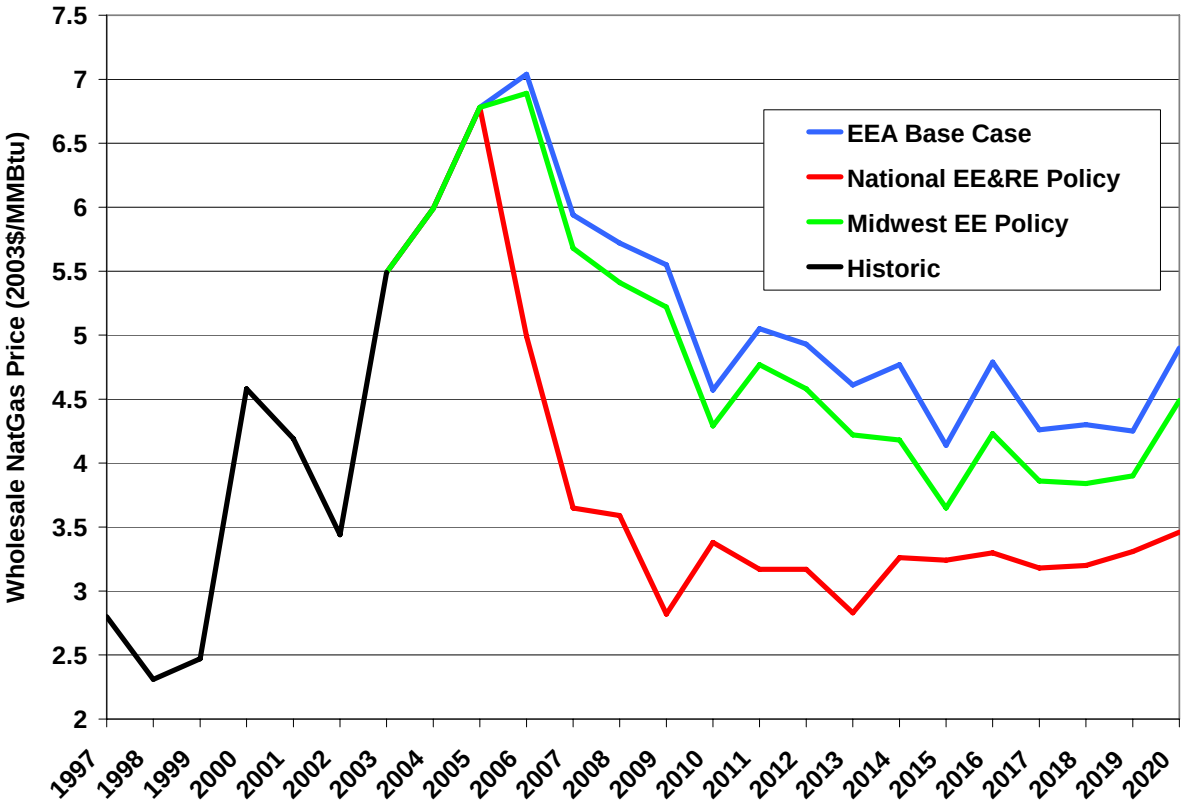
Source: ACEEE staff analysis based on Energy Information Administration data

Figure 2. Working Gas in Underground Storage Compared with 5-Year Range



Source: Energy Information Administration, September 8, 2005

Figure 3. Impact of Midwest and National Scenarios on Wholesale Natural Gas Prices (Henry Hub) Relative to 2004 EEA Forecast



Source: ACEEE Analysis, 2005