



American Council for an Energy-Efficient Economy
WASHINGTON, DC

**NATURAL GAS PRICE EFFECTS OF
ENERGY EFFICIENCY AND
RENEWABLE ENERGY PRACTICES
AND POLICIES**

FINAL REPORT

Report Number E032

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About the American Council for an Energy-Efficient Economy (ACEEE)

ACEEE is a nonprofit organization dedicated to advancing energy efficiency as a means of promoting both economic prosperity and environmental protection. For more information, see <http://www.aceee.org>. ACEEE fulfills its mission by:

- Conducting in-depth technical and policy assessments
- Advising policymakers and program managers
- Working collaboratively with businesses, public interest groups, and other organizations
- Organizing conferences and workshops
- Publishing books, conference proceedings, and reports
- Educating consumers and businesses

Projects are carried out by staff and selected energy efficiency experts from universities, national laboratories, and the private sector. Collaboration is key to ACEEE's success. We collaborate on projects and initiatives with dozens of organizations including federal and state agencies, utilities, research institutions, businesses, and public interest groups.

ACEEE is not a membership organization. Support for our work comes from a broad range of foundations, governmental organizations, research institutes, utilities, and corporations.

Glossary of Terms

Energy and Power Units

British thermal unit (Btu): basic unit of energy

Million Btu (MMBtu)

Quad = quadrillion Btu = 1,000,000,000,000 Btu

Therm = 100,000 Btu

Decatherm = 10 Therms = 1 MMBtu

Watt (W): basic unit of power

Kilowatt (kW) = 1,000 Watts

Megawatt (MW) = 1 million Watts

Kilowatt-hour (kWh) = 3,412 Btu

Megawatt-hour (MWh) = 1,000 kWh

Natural Gas Units

Cubic foot (cf): basic unit of natural gas delivery = ~1030 Btu

Thousand cubic feet (Mcf) = ~ million Btu

Million cubic feet (MMcf) = ~ billion Btu

Billion cubic feet (Bcf) = ~ trillion Btu

Trillion cubic foot (Tcf) = ~Quad

Market Terms

Distributed generation: electric power generation located at or near the point of use.

Renewable generation: electric power generation from a renewable energy source such as wind, solar, sustainably harvested biomass, or geothermal.

Demand destruction: reduction in industrial plant operation or plant closures that result in reductions in energy demand.

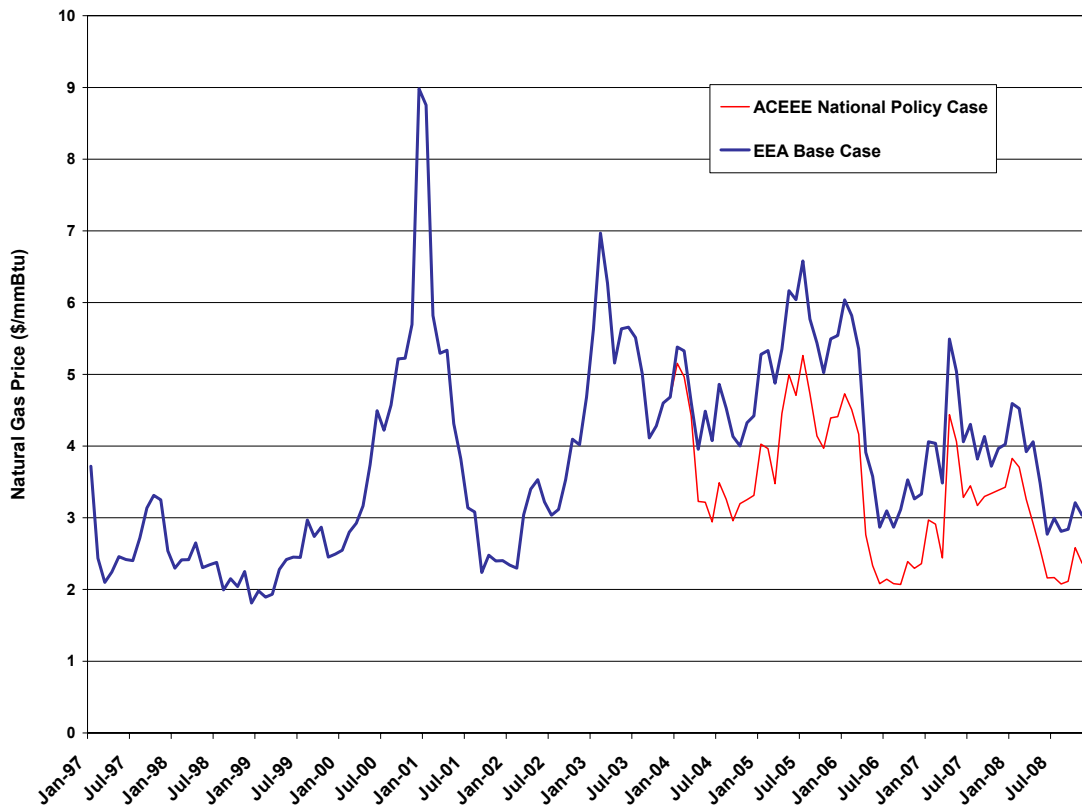
Executive Summary

This analysis, undertaken by the American Council for an Energy-Efficient Economy (ACEEE) (with the modeling assistance of Energy and Environmental Analysis (EEA)), shows that energy efficiency and renewable energy could cost-effectively reduce natural gas prices and volatility, while significantly reducing consumer natural gas expenditures. Much of the recent growth in natural gas use has been fueled by new natural gas-powered electricity generation, so it is important to understand the linkages between the natural gas and electric power sector. The analysis incorporated price, consumption and expenditure effects of aggressive, but readily achievable efficiency programs and renewable energy resources in the lower 48 states.

Summary of Findings

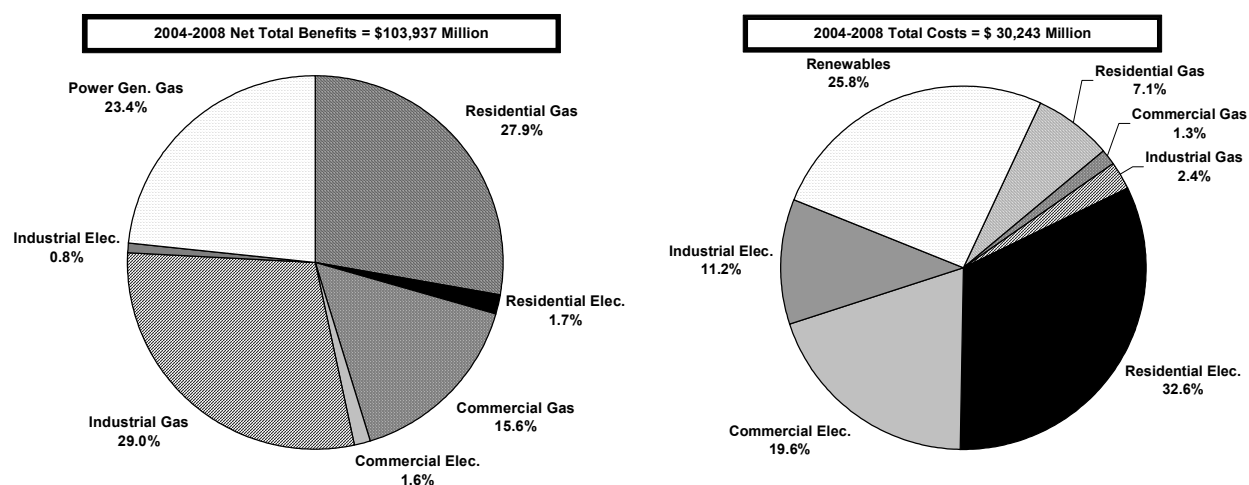
This analysis found that modestly reducing both natural gas and electricity consumption, and increasing the installation of renewable energy generation could dramatically affect natural gas price and availability. In just 12 months, nationwide efforts to expand energy efficiency and renewable energy could reduce wholesale natural gas prices by 20% (Figure ES- 1) and save consumers \$15 billion/year in retail gas and electric power costs. Efforts to increase energy efficiency and renewable energy in just one state or region are also found to have significant effects on natural gas prices both regionally and nationally.

Figure ES- 1. Energy Efficiency and Renewable Energy Reduce Wholesale Gas Prices



Over the next five years, the cumulative net savings in natural gas expenditures to residential, commercial, and industrial consumers could exceed \$75 billion (Figure ES- 2). In addition, electric power generators would reduce expenditures for natural gas by \$24 billion. This reduction would result from the combined impacts of reduced natural gas prices, and reductions in natural gas consumption due to decreased consumer demand and expanded renewable electric power generation. In addition to the natural gas savings, electric consumers would see an additional net benefit of about \$4.2 billion over the next 5 years. The net benefits from the efficiency and renewable energy measures over the next 5 years would total \$104 billion.

Figure ES- 2. Net Benefits and Implementation Costs from Energy Efficiency and Renewable Energy



Achieving these benefits would require an investment of \$30.2 billion over five years (Figure ES-2). This total includes required investment in natural gas and electric efficiency measures and in new renewable electric power generation, along with program costs required to facilitate the implementation of the measures. These measures result in a net benefit/cost ratio of about 3.44 to 1. Nearly two-thirds (64%) of the total expenditures are for electric efficiency measures, with renewable electric generation accounting for about a quarter of the investment. However, almost three-quarters of the benefits accrue to residential, commercial and industrial gas consumers. Thus, one can see that reductions in natural gas consumption by the electric power sector resulting from electric efficiency and expanded renewable power generation are critical to addressing natural gas price pressures. Table ES- 1 summarizes results on the costs and benefits associated with a nationwide efficiency and renewables effort.

Table ES- 1. Summary by Sector and Measure of Net Benefits and Implementation Costs from Energy Efficiency and Renewable Energy

	Natural Gas Expenditure Reduction (Million \$)	Electricity Expenditure Reduction (Million \$)	Technology Investment (Natural Gas) (Million \$)	Technology Investment (Electricity) (Million \$)	Program Costs (Million \$)
Residential	28,964	1,764	1,684	7,913	561
Commercial	16,196	1,689	331	5,282	83
Industrial	30,151	788	603	2,727	158
Power Generation	24,361	N/A	N/A	N/A	N/A
Renewables	N/A	N/A	N/A	5,851	1,950
Total	99,672	4,241	2,618	21,773	2,752

What Will This Mean for Consumers?

Recent public concerns about natural gas supplies have been motivated by the price volatility in natural gas markets over the past three years. Consumers have seen prices spike to levels not observed in recent memory. The reasons for the price spikes are complex, though they can be characterized in general terms as a fundamental mismatch between gas supply and demand.

Many residential consumers have not become aware of the increases in natural gas prices that began last fall because customers are on fixed-cost annual contracts. Residential retail prices for 2003 are projected to be \$2/thousand cubic feet (Mcf) higher than for 2002, with the higher prices projected to persist for at least the next four years. These residential consumers will begin to experience the price increases this fall with a national average increase of 36% in natural gas bills. If we have another cold winter, the cost could be difficult for many modest-income consumers to handle. However, energy efficiency investments could reduce next year’s bills by 9%, saving the average residential natural gas consumer almost \$73. These savings would continue, with savings for the next five years averaging \$96/year.

Analysis Approach

The savings are the result of reductions in natural gas consumption brought about by changes in state and federal energy policies designed to increase the efficiency of natural gas and electricity consumption, and expansion of renewable power generation. The analysis predicts that in just 12 months efficiency measures could reduce national gas consumption by 1.9% from the base case and reduce electricity consumption by 2.2%. By 2008, we project the U.S. could reduce electricity consumption by 3.2% and natural gas consumption by 4.1%, and increase renewable generation from 2.3 to 6.3% of national generation. These changes would reduce wholesale gas prices by 22%.

The analysis also shows that reducing energy consumption and increasing renewable energy generation in just one state or region could result in dramatic wholesale natural gas price reductions on the order of 5 to 7% in the region. Energy efficiency and renewable energy can be deployed quickly with minimal siting or environmental roadblocks. While energy efficiency and renewable energy cannot address all our nation’s future natural gas needs, they are the fastest and surest way to address high natural gas prices. Moreover, energy efficiency and renewable energy

are low-cost answers that would be an important part of a solution to rising natural gas and electricity prices.

Electric Efficiency Is Part of the Natural Gas Solution

Electric efficiency will also help the looming natural gas problems that are projected to send consumer gas bills soaring this coming winter. Saving peak electricity is one of the fastest ways to reduce natural gas consumption. Our analysis found that because gas is disproportionately used for peak electricity generation, reducing electricity used for cooling and heating, lighting, and industrial processes could have a significant impact on gas usage and price. In addition, reducing electricity consumption could help relieve overloading the grid, which contributed in part to the blackout that occurred in the Midwest and Northeast on August 14, 2003. Investing now in energy efficiency and conservation would reap huge benefits for American consumers and for the fragile economic recovery. By shaving peak demands for electricity and natural gas, we could reduce prices, make energy bills manageable, avoid costly disruptions to business and to our daily lives, and put the American economy more firmly on the road to recovery.

Renewable Generation Helps Take Pressure Off Natural Gas Markets

Renewable energy resources take pressure off gas-fired electric generation in much the same way as electricity conservation. Electricity generated by wind, solar, and farm-based biomass disproportionately displace electric power production from gas-fired generators, thereby reducing gas demand and making it available at lower prices for other uses. Our analysis showed that modestly increasing renewables over the next five years would significantly reduce natural gas prices nationally. The same is true for renewable energy policy initiatives in states or regions. For example, in New York State we would be able to reduce wholesale natural gas prices in New York City by almost 2% in 2008.

Policy Recommendations

Policymakers at the state and federal level could take a number of concrete actions to realize the benefits that would likely result from expanded energy efficiency and renewable energy resources. No single policy strategy will achieve the results outlined here. Rather, a portfolio of strategies is most likely to achieve quick and sustained savings from energy efficiency and renewable energy resources. These strategies include:

- Energy efficiency performance targets supported by utility fees or system benefits charges
- Expanded federal funding for energy efficiency and renewable energy implementation programs at DOE and EPA including *Energy Star*®
- Appliance efficiency standards at both the federal and state level
- Insuring more efficient buildings through codes
- Support of clean and efficient distributed generation technologies
- Renewable portfolio standards
- Public awareness campaigns by state and national leaders with support for implementation programs

Public and private leaders need to step up to the podium and issue a call to action to implement the policies and programs needed to realize the benefits that will result from increased use of

energy efficiency and renewable energy. A window of opportunity may be closing in the near future, so leaders must act now if the full, cost-effective benefits of energy efficiency and renewable energy are to be realized. We have provided some concrete policy recommendations. These policies are relatively low-cost and the measures recommended are cost-effective from the customer's perspective. However, local, state, and federal government must all be prepared to commit resources if this opportunity is to be realized.

Obtaining the Complete Report

The complete final report and the results data sets of model runs can be downloaded at <http://aceee.org/energy/efnatgas-study.htm>. In addition, other resources and links related to natural gas are available on the ACEEE website as well.