Saving Money and Reducing Risk: How Energy Efficiency Enhances the Benefits of the Natural Gas Boom

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Executive Summary

The recent boom in shale gas production and the subsequent decrease in the price of natural gas have put natural gas front and center in the national energy discussion. This abundant source of domestic fuel presents a great opportunity for the United States to increase our energy independence and reduce carbon emissions. The current low prices are likely to result in greater overall consumption of natural gas by power, industry, transportation, and export sectors, which could prematurely deplete our natural gas reserves and potentially expose our economy to renewed price volatility. Changes in the natural gas market also represent challenges and opportunities for energy efficiency measures. Electric and natural gas efficiency help reduce consumption of natural gas. Reducing natural gas consumption helps keep prices stable while still meeting energy demands. Efficiency also reduces pollution, creates jobs, bolsters economic activity, and lowers customer utility bills.

In addition to the benefits inherent in reducing energy consumption, energy efficiency measures are still cost-effective even with low natural gas prices. Energy efficiency is cheaper than new natural gas combined cycle plants. Electric efficiency measures are only marginally affected by the price of natural gas and the majority of measures are still economical. Some natural gas efficiency measures on the margin are not cost-effective with natural gas prices at $2 per million British thermal units (MMBtu) but the price of natural gas is increasing and is projected to level out between $4 and $7 per MMBtu. Under the projected natural gas price environment, well-designed natural gas efficiency programs will remain cost-effective.

Maintaining diversity in the United States' fuel supply is crucial to a stable energy market. Though the current price of natural gas is low, states should continue to create a diverse fuel portfolio to prevent price spikes and reliability issues. Energy efficiency can substantially reduce the demand for natural gas, which helps to extend this new domestic resource and lessen the need for construction of new natural gas power plants. Therefore, states should implement energy efficiency measures prior to bringing new gas plants online and ensure that energy efficiency is in future utility regulatory plans.

Energy efficiency is an important tool in addressing and maintaining electrical reliability and the potential is large. However, there are embedded market barriers, like upfront investment costs and the unfavorable utility regulatory business model, that hinder the rapid deployment of energy efficiency programs. For the United States to realize its full energy efficiency potential it must establish a unified effort for energy savings to complement and improve on existing state policies. Implementation of energy efficiency measures will increase stability in our electricity and natural gas sectors, create jobs, lower customer utility bills, reduce pollution, and extend the available supply of natural gas.

Introduction

Changes in natural gas availability and price have led to a discussion about the long-term role for gas in the national energy fuel mix. In particular, one question is how low natural gas prices and increases in availability will impact the way energy is used in the United States. One concern is that the perception of an abundant and cheap domestic fuel will lead to an unstable increase in overall consumption of natural gas, prematurely drain our supply of natural gas, and result in over-dependence on a single fuel—all of which could lead to price increases and energy security issues.

Alternatively, energy efficiency as a resource helps avoid these natural gas market problems, and delivers substantial economic benefits. Continuing to improve and implement electric and natural gas energy efficiency measures reduces natural gas demand, which mitigates price and reliability risks associated with natural gas and prevents the need for costly construction of new natural gas plants and pipeline infrastructure (Elliott 2005). However, current low prices of natural gas may cause some to question the cost-effectiveness of electric and natural gas efficiency programs. Even with those current low prices, energy efficiency programs will generally be cost-effective. In this white paper we assess the current and future natural gas market, the cost-effectiveness of energy efficiency, and the ability for efficiency to substantially reduce demand for natural gas.

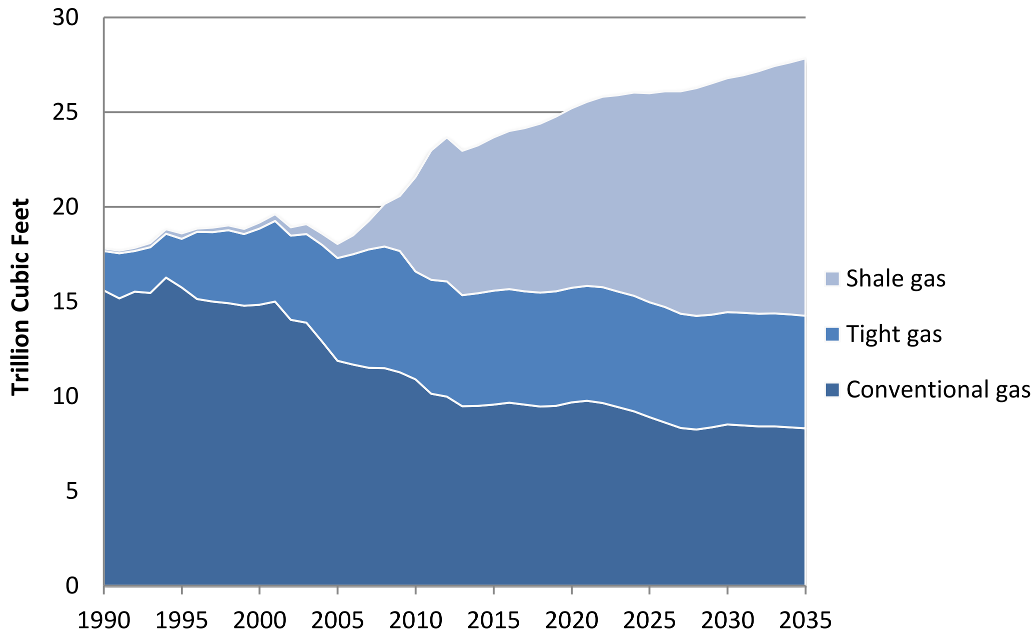
Why the Price of Natural Gas Is Low

Natural gas accounts for nearly 25% of the United States total energy consumption (EIA 2010). The role of natural gas is complex because it is used across all sectors of the economy in many different ways: heating and cooking in residential and commercial buildings; heat and power generation and feedstock in industry; power generation in the utility sector; and increasingly as a transportation fuel (MIT 2011).

In the winter of 2011 and 2012, natural gas wellhead prices in the United States declined to a record low of under $2 per million British thermal units (MMBtu) in April 2012 (EIA 2012d). Although the sluggish economy in the wake of the 2008–2009 recession has contributed to lower natural gas prices since 2008, two factors were the primary drivers behind the current record low prices of natural gas. First, there was a significant increase in nonconventional natural gas production. Second, unusually warm winter weather dramatically dropped consumption in the residential and commercial markets, and left the United States with a large amount of gas in storage at the end of the winter heating season (Petak and Brock 2012).

Conventional natural gas deposits were, traditionally, the most easily accessible pockets of natural gas and made up the majority of the natural gas supply. As technology and geological knowledge has advanced, we are now able to access more unconventional natural gas deposits, which are, in turn, making up a greater percentage of the total natural gas market (as can be seen in Figure 1). In recent years, a combination of horizontal drilling and hydraulic fracturing (or "fracking") has enabled the energy industry to economically access and produce unconventional gas (tight gas and shale gas) in many new regions of the country. The EIA projects that shale gas will rise from its current make-up of 23% of the United States' natural gas supply to 49% by 2035 (EIA 2012j).

Figure 1. U.S. Natural Gas Production, 1990 – 2035

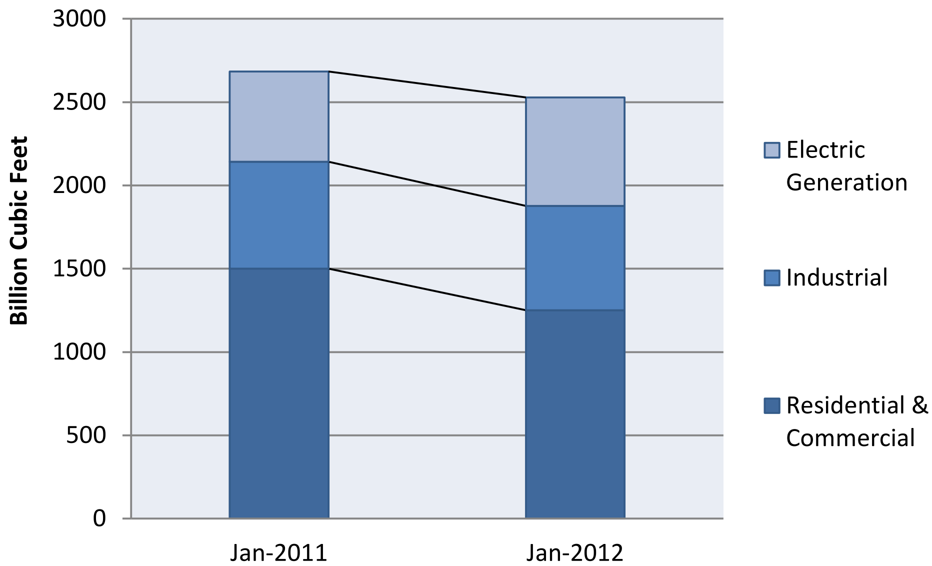


Source: EIA 2012f
Note: "Unconventional natural gas" includes both shale gas and tight gas.

The second major event that contributed to the fall in natural gas prices was the warm 2011–2012 winter. It was the warmest winter on record in the last 80 years. According to ICF, this past winter was 16% warmer than normal (Petak and Brock 2012). As a result, residential and commercial building energy gas demand for water heating and space heating dropped significantly by 6 billion cubic feet per day (Petak and Brock 2012).

In contrast to the reduced demand in the residential and commercial building sector, the industrial natural gas load recovered somewhat as the economy began to improve and manufacturing output started to rise (ISM 2012). Power generation gas use increased as well, primarily driven by a shift of utility-operated generation from coal to gas. Despite the increase in consumption from the industry and power sectors, Figure 2 shows that overall net gas use was lower in January 2012 compared to January 2011 because of the significant decrease in residential and commercial heating (EIA 2012b). As a result of this decrease in demand and the rise in production—supply, the price of natural gas in the United States fell to about $2.80 per MMBtu in January 2012 (EIA 2012c).

Figure 2. United States Natural Gas Fuel Consumption

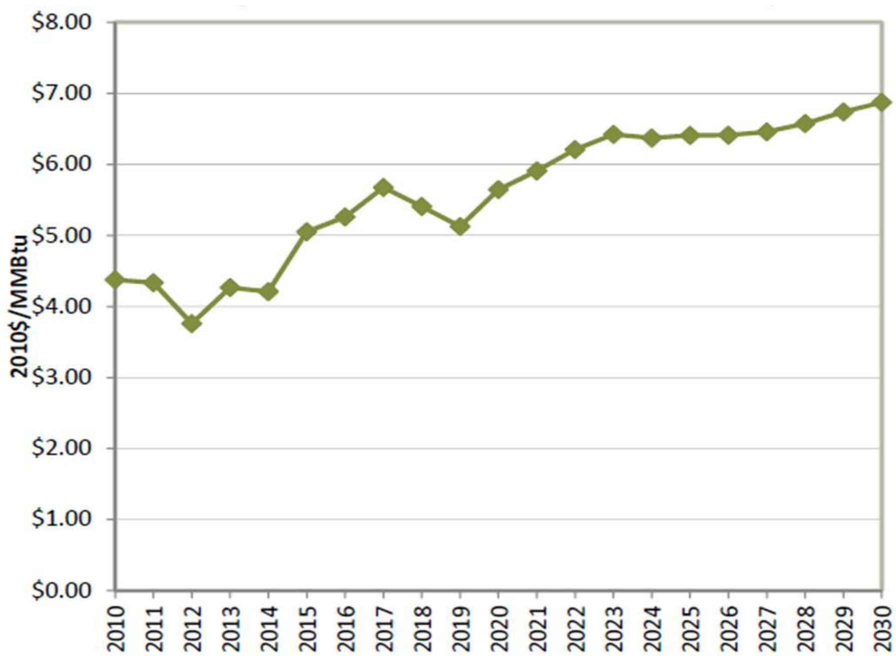


Source: EIA 2012b

The current wellhead natural gas price of about $2 to $3 per MMBtu is not likely to persist because there are many uncertainties and risks associated with natural gas production and supply. Natural gas production in the United States is even now beginning to level off due to the large amount of supply, net decrease in demand, and low prices. Total drilling declined by around 30% between January and April 2012 (Petack and Brock 2012).This production decline is the beginning of efforts to alleviate the oversupply of natural gas. At the same time, low prices are also driving growth in the demand for natural gas. Natural gas prices rose over the April to July 2012 period from below $2 per MMBtu to about $3 per MMBtu and will continue to rise until the supply and demand return to balance (Hargreaves 2012).

The American Gas Association (AGA), the U.S. Energy Information Agency (EIA), ICF International, and other natural gas experts agree that, based on an analysis of market fundamentals, average price of natural gas will double or triple from its recent levels to somewhere between $5 and $7 per MMBtu over the next 3 to 5 years (Meyer et al. 2012; Petak and Brock 2012). Price projections from ICF estimate a steady increase in the price of natural gas, assuming normal winter weather. They project $4+ per MMBtu in late 2012. Over the long term, ICF forecasts that prices will increase as demand accelerates, bringing the price closer to $7 per MMBtu ($2010) (see Figure 3).

Figure 3. Average Annual Natural Gas Prices at Henry Hub



Source: Petak 2011

Note: ICF International presented a new natural gas price projection in Petack and Brock 2012. The figure is still reasonably representative of the possible increase in the price of natural gas.

Energy Efficiency Measures Are Still Cost-Effective

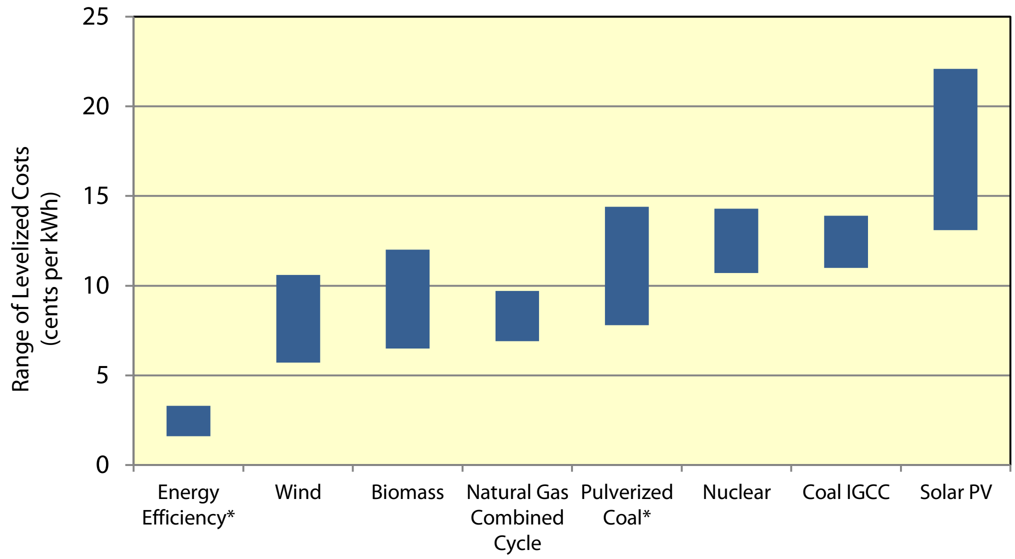
There are two primary ways energy efficiency can reduce natural gas consumption: energy efficiency programs that reduce electricity consumption and the need for gas-fired electricity generation; and natural gas-targeted efficiency programs, which reduce the end-use of natural gas in customer facilities (York et al. 2012). Despite the low natural gas prices in late 2011 and early 2012, energy efficiency is still the lowest cost energy resource. Below we show that electric and natural gas efficiency programs are still cost-effective despite the low natural gas prices and we illustrate that efficiency measures will become even more cost-effective once the prices rise to between $4 and $7 per MMBtu.

ELECTRIC EFFICIENCY MEASURES

ACEEE research has found that the average levelized cost of electric energy efficiency to a utility is 2.5 cents per kWh while the typical cost of new natural gas-fired electricity is 7 cents per kWh; see Figure 4 below (Friedrich et al 2009; Lazard 2011).

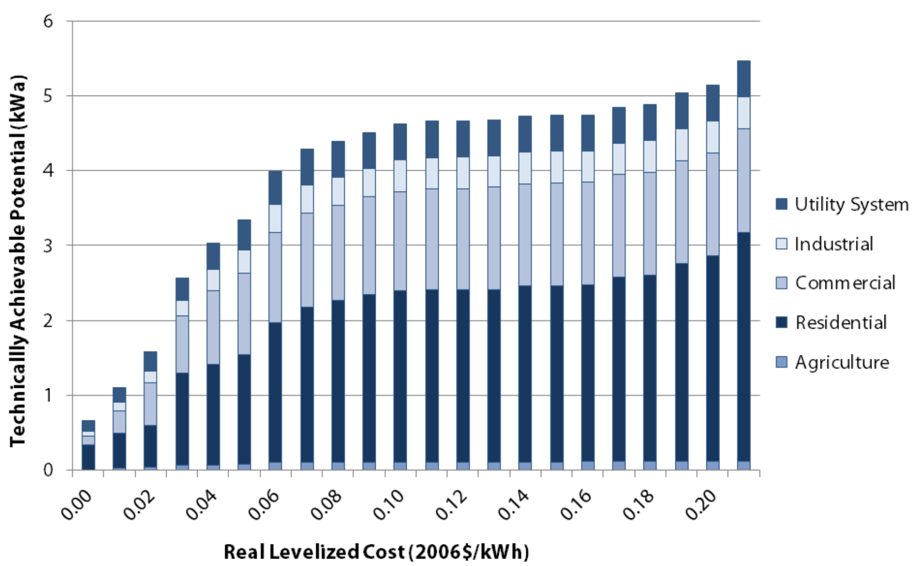
Even with the current low natural gas fuel prices, most electric energy efficiency programs will still be robustly cost-effective. EIA projects that the levelized cost of natural gas-fired electricity in 2017 will still be in the $0.06–0.10 per kWh range (EIA 2012f). A few residential and commercial programs on the margin may become less cost-effective but the impacts are very small. An interesting examination of energy efficiency technical potential at various cost levels for the Northwest is shown in Figure 5.

Figure 4. Levelized Utility Cost of New Electricity Resources



*Notes: Energy efficiency average program portfolio data from Friedrich et al. 2009. All other data from Lazard 2011. High-end range of advanced pulverized coal includes 90% carbon capture and storage. This figure is based on an analysis done in 2009 but since natural gas prices only minimally impact the price of electricity the figure is still reasonably representative.

Figure 5. Pacific Northwest Electricity Efficiency Supply Curve, Achievable by 2029



Source: NW Council 2010

Figure 5, which was developed by the Northwest Power and Conservation Council for their sixth annual Power Plan, shows the range of technically available energy efficiency potential by sector (y-axis) relative to its cost (x-axis) (NW Council 2010). Though this figure is for the Northwest region, it is reasonably representative of the technically achievable potential for electrical efficiency in the United States. The steep curve on the left side in Figure 5 demonstrates that the vast majority of efficiency is highly cost-effective while the remaining technical potential becomes marginally more expensive to achieve for each additional unit of savings. Roughly 50% of the efficiency potential costs 4 cents/kWh or less, 75% of the potential costs 6 cents/kWh or less, 85% of the potential costs about 10 cents per kWh or less, and the remaining 15% costs between 9 cents and 21 cents/kWh.

This trend suggests that small changes in electricity prices will not have large impacts on the range of cost-effective electricity efficiency potential. Furthermore, natural gas prices only minimally impact electricity prices because generation costs are only a small portion of the total electricity price. The *Annual Energy Outlook* (AEO) projects that the average retail electricity prices will remain relatively stable through 2030 (around $0.096 per kWh in 2010$) while they project that the wellhead natural gas prices will rise from the current price of around $2 per MMBtu to $6 per MMBtu by 2029 in 2010$ (EIA 2012f). These projections are consistent with previously cited numbers provided by ICF (see Figure 3). It is unlikely, but even if electricity prices dropped from $0.09 per kWh to $0.08 per kWh from changes in natural gas prices the vast majority of energy efficiency measures remain economical.

In some ways energy efficiency and natural gas are competing to serve new generation loads. Energy efficiency has a price advantage and natural gas enjoys an advantage among those who favor supply-side over demand-side resources. Still we need a balanced portfolio and the two sources used together will maintain stability, reliable electricity, and lower electricity and natural gas prices.

NATURAL GAS EFFICIENCY MEASURES

Figure 6 shows the supply curve for natural gas efficiency measures in the Pacific Northwest in levelized cost per million therms.[1] The figure shows that the median cost of conserved natural gas, $0.40 per therm (equal to $4 per MMBtu),[2] can achieve 300 million therms of savings. A number of studies that examined the utility cost of conserved natural gas have reported those costs to be less than $4.00 per MMBtu (Friedrich et al. 2009; Tegen and Geller 2006; Kushler et al. 2005). Retail natural gas prices are higher than this level currently for all but the largest customers. The cost and savings data gathered in ACEEE's most recent study (York et al. 2012) suggests similar results.

As seen in Figure 6, even with the current wellhead prices between $2 and $3 per MMBtu and retail price of natural gas at around $6.50 per MMBtu ($0.65 per therm), significant cost-effective savings can be attained by customers. For example, more than half of the efficiency potential shown in Figure 6 is cost-effective at retail gas prices of $0.65 per them or less. Given the previously cited medium- to longer-term wellhead price projections of natural gas in the $5 to $7 per MMBtu range (see Figure 3), and average retail prices at $8–9 per MMBtu (EIA 2012f) well-designed utility natural gas energy efficiency programs should be easily cost- effective (e.g., in Figure 6, about 75% of the efficiency potential shown is cost-effective at a retail gas price of $0.85 per therm).[3] Therefore, utilities should

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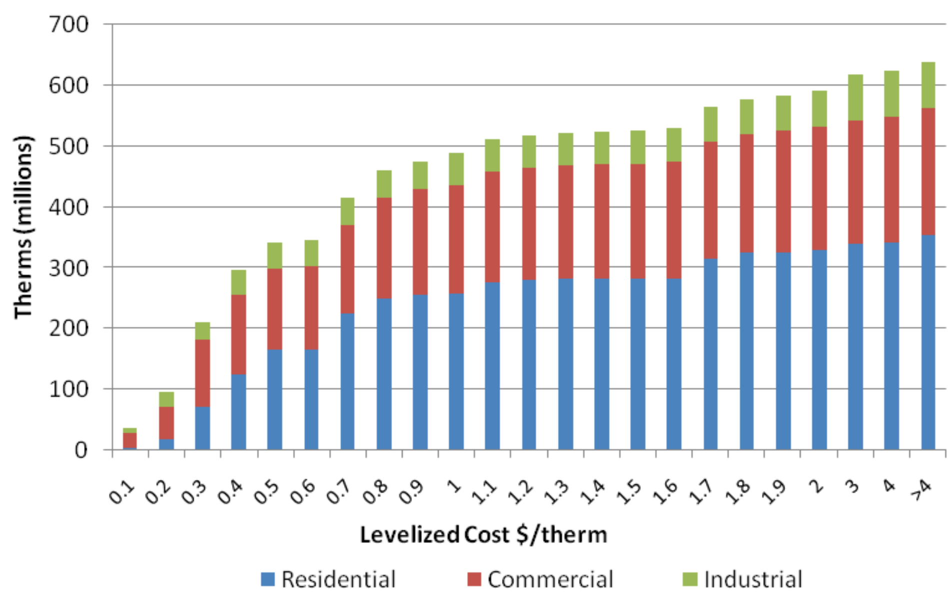
[1] 10 therms is equal to one MMBtu

[2] Note that the Pacific Northwest analysis of potential assumes the full cost of the energy efficiency measure is paid by the program. If, as in most programs, the participant picks up a major share of the measure, the "utility cost" of the energy efficiency will be much lower.

[3] There is some discussion in the industry that the current most commonly used benefit cost test (the TRC) undervalues energy efficiency because it does not quantify any 'non-energy' benefits (NEBs). We would note that energy efficiency

continue funding and supporting these programs to reduce customer energy consumption, help mitigate risks associated with natural gas volatility, and gain the economic and environmental benefits. Furthermore, as gas prices rebound some of the measures on the margin will again become cost-effective.

Figure 6. Natural Gas Efficiency Northwest Regional Supply Curve, 2020



Source: NW Energy 2009

Opportunities for Combined Heat and Power

The low price of natural gas is a significant opportunity for expanding the role of combined heat and power (CHP). Low natural gas prices make CHP more cost-effective (RMI 2011). CHP, also known as co-generation, is a method of simultaneously generating thermal energy (heat) and electricity in an integrated system that substantially improves efficiency (Chittum and Kaufman 2011).

Natural gas fuels over half of the CHP installed since 1990 (ORNL 2008). The best scenario for CHP operators is high electricity prices and low fuel prices (Chittum and Kaufman 2011), which cause lower operating costs and higher sell-back rates. Currently the price of the fuel, natural gas, is low and it is economically beneficial to operate CHP units (EPA 2012). Industries and utilities should take advantage of the current favorable conditions and invest in CHP systems.

Sources of Potential Natural Gas Price Uncertainty

Historically, the price of natural gas has not been low or stable. Over the past 15 years, the United States has seen unprecedented volatility in natural gas prices.

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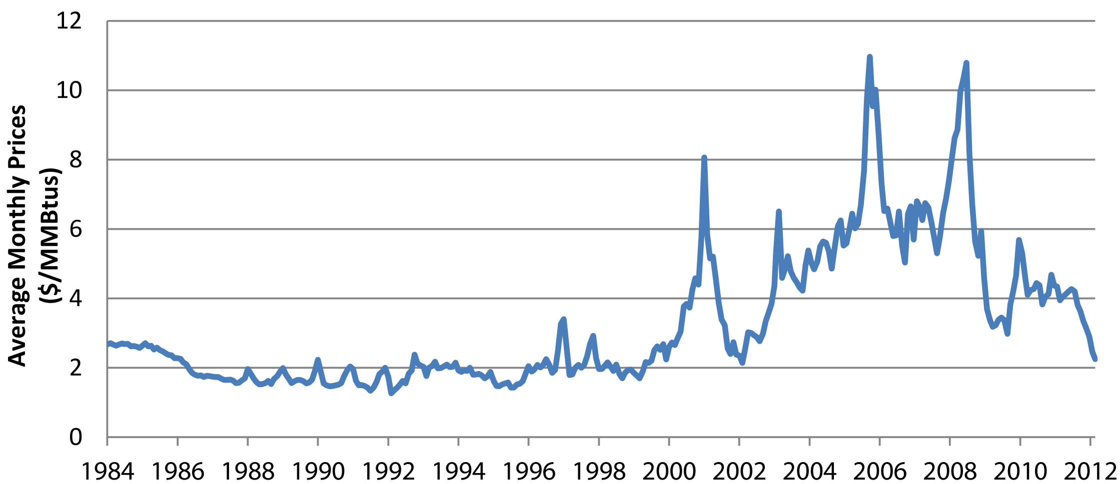
programs are largely cost-effective using any of the predominantly used tests (TRC, Utility, and Societal), and any new approaches that valued NEBs would only make energy efficiency more cost-effective.

> There are three things in life you can depend on: death, taxes, and the volatility of the natural gas market.—Jim Rogers, Chairman, President and C.E.O, Duke Energy, April 11, 2012

Within the last 30 years, wellhead natural gas prices have fluctuated between under $2 per MMBtu to over $14 per MMBtu (EIA 2012d). Figure 7 shows the historical average nominal prices of natural gas for industry and utilities, and at the wellhead between January 1984 and March 2012. Prices of natural gas in the 1990s were relatively stable with an average monthly wellhead of around $2 per MMbtu. However, since 1999 the price of natural gas has oscillated and increased throughout most of the recent decade, peaking in 2001, 2005, and 2009.

Figure 7. Historic Nominal Wellhead Prices of Natural Gas



Source: EIA 2012e

With the new supply, resources forecasts suggest that the natural gas market may become less susceptible to volatility; however, experts agree that the price of natural gas will not remain at the $2–3 per MMBtu level. Moreover, pipeline and storage constraints and unpredictable accidents could cause a tightening of the market and price increases, as seen in the past. Natural gas supply is vulnerable to interruptions from accidents, weather changes, pipeline disruptions (DOT 2012), storage constraints, and pending hydraulic fracturing regulations. These factors are contributors to the price volatility and electricity reliability.

Accidents and Disruptions

Impacts from weather on the supply of natural gas include the conditions that were seen this past winter when heating degree days decreased because of warmer weather. Just as easily, the opposite may occur where there is an increase in heating degree days due to a colder than normal winter causing demand to increase and reducing the available supplies of natural gas.

A weather phenomenon can also cause pipeline disruptions and accidents. For example, in 2004 and 2005 hurricanes in the Gulf of Mexico and on the Gulf Coast interrupted domestic natural gas production. As a result, the already tight supply of natural gas was magnified by the hurricane causing additional supply disruptions, blackouts, and increased energy prices (Energy and Environmental Analysis, Inc. 2005).

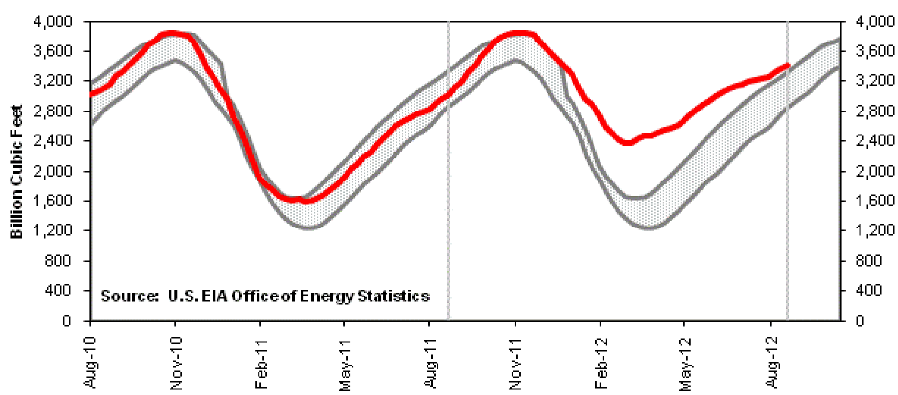
FRACKING REGULATIONS

Unconventional natural gas, or shale gas, is extracted through hydraulic fracturing techniques, commonly known as "fracking," which makes shale gas extraction economically viable. There has been controversy over the safety of fracking (Frosch 2012) and the U.S. Environmental Protection Agency (EPA) and Federal Energy Regulatory Commission (FERC) are implementing new regulations (Broder 2012). In addition, several state regulators and state governments are tightening regulations (Galbraith 2012; Malewitz 2012). These regulation increases could cause complications in natural gas production and increase prices. Law suits are a further source of uncertainty to future gas production.

STORAGE AND DISTRIBUTION CONSTRAINTS

The warmer winter of 2011 and 2012 caused a significant increase in the working storage of natural gas. As seen in Figure 8, current underground storage is significantly greater than previous years. The EIA estimates that stocks of natural gas in March 2012 were 86% higher than the historical national average at that time. Figure 8 shows the historical range between the minimum and maximum values of weekly underground storage; the red line indicates the average working gas storage that is currently higher than the historical average maximum level. Storage constraints are part of the reason natural gas production has been slowing since February 2012 (Petack and Brock 2012).

Figure 8. Working Gas in Underground Storage Compared with a Five-Year Average



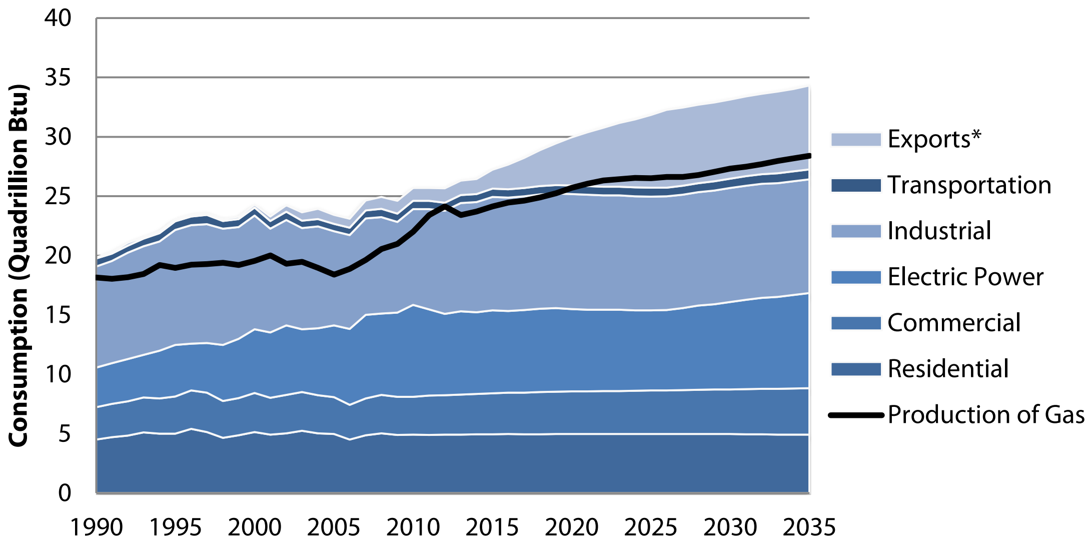
Note: The shaded area indicates the range between the historical minimum and maximum values for the weekly series from 2007 through 2011. Source: Form EIA-912, "Weekly Underground Natural Gas Storage Report." The dashed vertical lines indicate current and year-ago weekly periods. http://ir.eia.gov/ngs/ngs.html

High levels of storage help meet potential increases in demand; however, the amount of storage may not be enough to ensure that all demands are met. Even if the production levels are high enough to prevent price spikes, there are still distribution constraints. There are currently over 100 new pipelines or pipeline expansions announced or under construction between 2012 and 2015. The projects vary in size, type, and region. The United States currently has 305,000 miles of interstate and intrastate transmission pipelines (EIA 2012h). New demand will require new pipelines to prevent a bottleneck in distribution. Reducing the demand for natural gas will help reduce the need for additional pipelines.

New Demands for Natural Gas

Every sector of the economy uses natural gas as a fuel source and it is likely that demand for natural gas will rise now that there is a new abundance of shale gas and prices are low. With prices low, ICF projects increased consumption in the industrial and power sectors and modest growth in other sectors, including transportation (Petak and Brock 2012). Figure 9 shows the projected sector wedges of natural gas consumption through 2035 as projected by EIA. The line is the EIA's projection of natural gas production (Figure 9; EIA 2012f).

Figure 9. Natural Gas Consumption Projection



Source: EIA 2012f

Notes: * Export projection data is the high/slow scenario from EIA export model EIA 2012a

Each wedge displays the amount of natural gas consumed by each sector cumulatively making up a natural gas demand scenario for the future. These projections, with the exception of the exports data, were taken from the EIA's 2012 *Annual Energy Outlook* (EIA 2012f). The export data was collected from EIA's analysis of the effect of increased natural gas exports (EIA 2012a). The data is a moderate scenario where the export level is high but it requires a slow ramp-up, 12 billion cubic feet per day (Bcf/d) phased in at a rate of 1 Bcf/d per year (high/slow scenario). Historically, the United States imported more natural gas than we exported, either from Canada or through the 11 liquefied natural gas (LNG) marine ports (FERC 2012). The balance of domestic supply has shifted dramatically in the past few years and there is a prospect for significant exports. The IEA (2011) reports that the average price for natural gas in the EU is around $13 per MMBtu and the prices in Asia are even higher, making exporting natural gas attractive for the United States natural gas industry.

The power sector has added nearly 237 GW of new natural gas-fired generating capacity over the last decade. Natural gas-fired combined-cycle units were used at relatively low rates while coal-fired generation was less expensive. Recently, with low natural gas prices and rising coal prices, natural gas has become a relatively lower cost resource. Natural gas is expected to make up 30% of fuel mix for electricity generation in 2012 and 2013, up from 18% in 2004 (EIA 2012g). The United States will likely see continuing shifts to natural gas from coal as power from coal becomes increasingly expensive due to updated EPA pollution regulations (Elliott, Gold and Hayes 2011).

Manufacturing is helping lead the global economic recovery; the Institute for Supply Management (ISM) has reported 37 consecutive months of growth in their July 2012 Manufacturing Report on Business (ISM 2012). Improvement in the manufacturing sector has the potential to increase the domestic industrial consumption of natural gas. For example, United States' petrochemicals predominantly use methane and other natural gas liquids as both a raw material for manufacturing and as an energy source (ACC 2011). Dow Chemical Company anticipates an even greater increase in consumption, $65 billion in industrial expansions, estimated to be 10 Bcf/day (Molinaro 2012). The industrial sector is one of the largest consumers of natural gas, and experts agree that as manufacturing continues to rise, and with natural gas prices at their current low level, natural gas consumption in the industrial sector will continue to increase (Petak and Brock 2012).

Any of the consumption wedges in Figure 9 could be greater or less depending on the implementation of efficiency programs and policies to limit exports or fracking and pipeline infrastructure. The purpose is to present the multitude of areas where natural gas consumption will increase. It is important that the United States maintains a diverse fuel supply, utilizing all fuel options and emphasizing energy efficiency. All of these demands for natural gas can be reduced by energy efficiency measures, which would elongate the availability of gas and ensure a stable energy market.

Energy Efficiency Reduces Natural Gas Demand and Prevents Volatility

Energy efficiency lowers the demand for electricity, which can reduce the price of natural gas, avoid costly disruptions of energy provided to business and homes, and help keep the United States on the road to recovery (Elliott 2005). Reducing the demand for natural gas in turn reduces any threat of future price volatility and can prevent natural gas price spikes while maintaining the reliability of the electrical grid. It does so through reducing demand and the need to deploy peaking generation resources. Energy efficiency also prevents outages by lowering the load and stress in the power distribution network. Energy efficiency also diversifies energy resources across multiple, small and moderate sized projects, and reduces a utility's exposure to fuel price volatility.

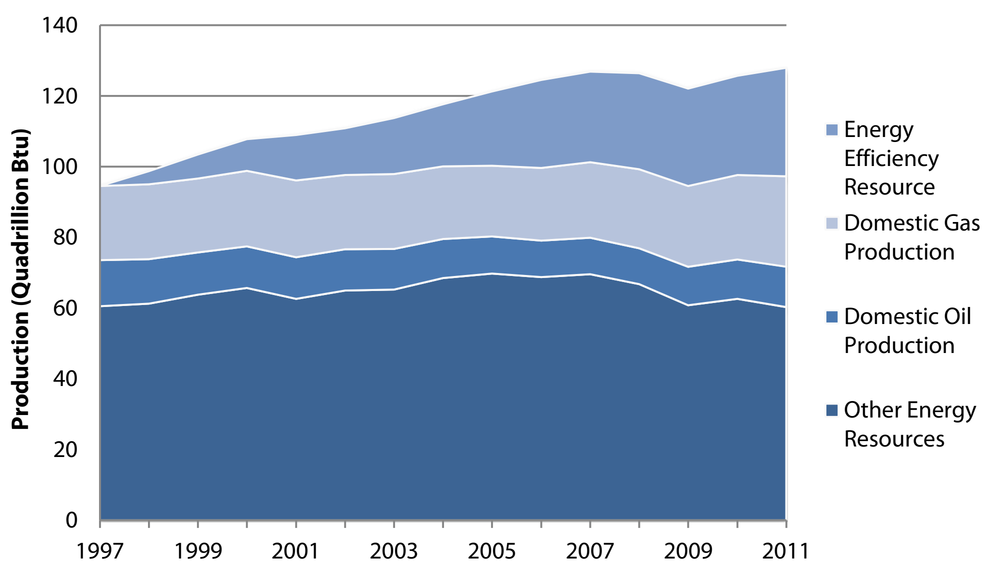
Energy efficiency can also significantly cut into the demand for natural gas in the power sector and reduce construction of new natural gas power plants. These plants require a large upfront investment, take time to come online, and the costs are transferred to ratepayers. Energy efficiency can be deployed now and for less than a new natural gas plant (see Figure 4). One such analysis estimated that by 2018 new energy efficiency programs could decrease summer peak capacity demand by 20,000 MW, rather than constructing new natural gas power plants (Bradley et al. 2010; NERC 2010). An ACEEE 2012 study on the long-term energy efficiency potential found that by 2050 energy efficiency can reduce United States energy use by 42–59% relative to a business-as-usual base-case (Laitner et al.

2012). Since energy efficiency is still the most cost-effective resource compared to new combined-cycle natural gas plants, energy efficiency should be deployed by states first to prevent costly construction of new natural gas plants.

Newly updated EPA pollution regulations are driving power plants to convert from coal to natural gas because natural gas is a less dirty fossil fuel with nearly half the emissions compared to coal (EIA 2012i; Silverstein 2012). Unlike natural gas, energy efficiency is a zero emission energy resource and can be utilized to comply with EPA regulations (Hayes and Young 2012).

Even as sources of natural gas continue to increase, energy efficiency is still the number one new resource. Many states and utilities already recognize the benefits of energy efficiency. Over the past 15 years, there has been a rapid increase in the use of energy efficiency (see Figure 10) and this trend is expected to continue.

Figure 10. Historical U.S. Energy Production by Type



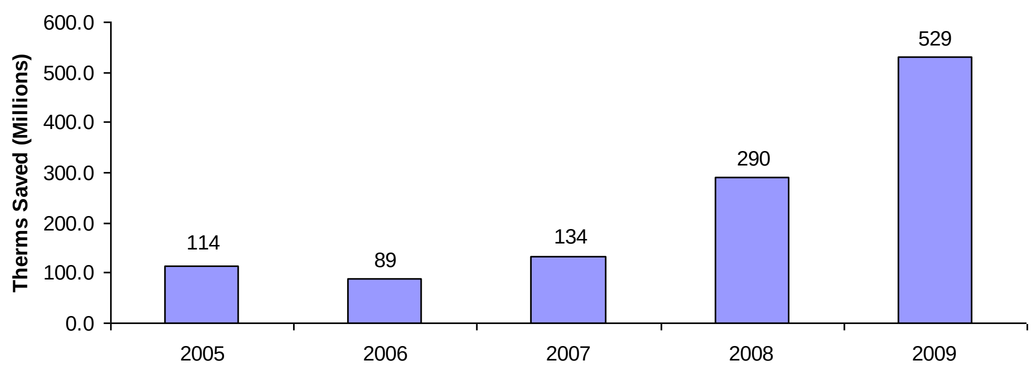
Source: EIA production and consumption data for all but energy efficiency, which came from an ACEEE analysis of EIA data.

Currently, 24 states have electric Energy Efficiency Resource Standards (EERS) in effect. An EERS is a simple market-based mechanism to encourage more efficient use of electricity and natural gas by requiring specific targets of end-user energy savings improvements. Nine out of the 19 states with EERS policies in place for more than a year are saving over 1% of energy consumption in 2009 (Sciortino et al. 2011). Vermont was the first state to achieve 2% savings in a year.

Additionally, programs designed to assist natural gas customers in reducing their energy use and cost through increased energy efficiency have existed for over 30 years. Traditionally, natural gas efficiency programs were in the residential energy market but in recent years they have expanded to serve commercial and industrial gas consumers. New programs not only target specific technologies, but also whole facilities and systems (York et al. 2012). The United States has a foundation of funding support and program experience to provide natural gas customers—households, businesses, institutions, and industries—with programs and services that enable them to reduce their energy costs through improved energy efficiency. Through well-planned efficiency measures, every sector of the economy can reduce natural gas consumption.

Energy savings data for utility-sector natural gas efficiency programs are limited because of differences in program data definitions, conventions, reporting metrics, and evaluation. However, natural gas utility efficiency programs have continued to improve and we have seen natural gas savings from state EERS's that include natural gas efficiency programs. Figure 11 shows the energy savings attributable to the utility-sector natural gas energy efficiency programs for 2005–2009. Based on the data collected, savings from utility-sector natural gas energy efficiency programs grew from 114 million to 529 million therms annually from 2005 to 2009 (York et al. 2012).

Figure 11. Energy Savings for Ratepayer-Funded Natural Gas Energy Efficiency Programs, 2005 through 2009



Source: York et al. 2012

Continuing such programs and implementing new programs in states that do not currently have EERS would unleash dramatic savings. As an example, Pennsylvania happens to be one of the many states with large deposits of shale gas and is currently projecting to increase natural gas production. An ACEEE analysis estimates that nearly 30% of Pennsylvania's projected electricity, natural gas, fuel oil, and propane can be met through existing, cost-effective efficiency measures currently available. There is economic potential for energy efficiency to meet 174,000 billion Btu, or 27%, of the state's projected natural gas needs in 2025 (Eldridge et al. 2009).

Recommendations

Energy efficiency is an important tool in addressing and maintaining electrical reliability and the prospect for future investment is large. Energy efficiency can be deployed at the state and national levels to mitigate risks associated with a potential overdependence on natural gas and maintain a diverse and reliable electrical sector. However, there are embedded market barriers, such as upfront investment costs and the unfavorable utility regulatory business model (York and Kushler 2011), that hinder the rapid deployment of energy efficiency programs. ACEEE makes six policy recommendations to overcome the barriers to energy efficiency and help expand the use of energy efficiency as a resource and maintain electrical reliability.

1. Congress should pass a national energy savings target to complement existing state policies and raise the bar for states. In the interim, states without mandatory targets for utility energy savings should adopt targets.
2. Utility regulators should require utilities to include energy efficiency in their plans when deciding how to replace retiring coal plants and meet new demand.
3. States should consider energy efficiency as an energy resource in their Integrated Resource Plans (IRP).
4. Utilities and industry should advance CHP generation systems.
5. Gas utilities and their regulators should continue support and provide funding for natural gas energy efficiency programs.
6. Regulators should modify the current utility regulatory business model to create favorable conditions for utilities to pursue customer energy efficiency (York and Kushler 2011; Hayes et al. 2011; RAP 2011).

The United States has made progress advancing energy efficiency over the last 15 years, but there are still abundant untapped resources available. Energy efficiency measures should be deployed first before states begin fuel switching. Implementation of the recommended policies and programs will increase stability in our electricity and natural gas sectors, create jobs (Bell 2011), lower customer utility bills, reduce pollution, and elongate the current supply of natural gas.

Conclusion

New supplies of natural gas have become available in the United States as a result of a substantial increase in shale gas development, lowering gas prices. Changes in the natural gas market represent challenges and opportunities for energy efficiency programs and policies. An extended period of very low gas prices could make certain energy efficiency measures uneconomical, but experts do not expect the recent low prices to be sustainable. Past experience indicates that most well-designed electric and natural gas energy efficiency programs should continue to be cost-effective under the forecasted moderate natural gas prices. Moreover, low gas prices make some measures, such as CHP, more competitive and the United States should take advantage of this opportunity.

Planning for energy efficiency policies and programs should also incorporate an assessment of several natural gas market risk factors, including the outlook for competing demands and potential export markets, as well as production, regulatory, and litigation risks. These factors tend to increase the value of energy efficiency as a means of mitigating risk. However, there is no substitute for the core economic benefits inherent in simply reducing energy consumption. Energy efficiency will help reduce the demand for natural gas, which will keep natural gas market prices low and benefit consumers. In addition, energy efficiency can benefit all ratepayers by helping avoid new power plant costs. Energy efficiency is cost competitive even when the average price of natural gas is low and there are many additional benefits on top of the cost savings: job creation, emissions reductions, and more stable electricity and natural gas markets.

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