Coal: Myths and Facts

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Coal Facts: Time to clean up the confusion over coal

Now is the perfect time to rely on our abundant, affordable/secure, and increasingly clean domestic coal resources. Not only do those resources provide secure jobs, a strong tax base, and social and economic sustainability, the implementation of new and more efficient technologies is allowing coal-based energy to rapidly improve its efficiency and environmental record.

With our lagging economic conditions, rising energy costs, and near double-digit unemployment, it is time for us to implement reasonable energy policies. We need to move back to relying on our domestic coal reserves for clean, secure, and affordable energy. Several special interest groups have opened the door to discussion on these issues by asserting that we must stop using coal and that we can rely solely on gas and renewables to affordably meet our energy needs. They have developed a multitude of marketing campaigns with impressive websites and videos. They have created various 'fact' sheets and websites that they claim support the policy demands. Since they have opened the door to these discussions, we believe that it is worthwhile to engage the discussion and offer up some basic facts as balance to the myths being spread about coal.

We need to rely on coal; it's our ROCK!

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Let's take a look at a few commonly heard myths about coal and coal-fueled electricity, and a few facts to replace the rhetoric with reality.

1. Replacing fossil fuels with renewable energy necessarily reduces CO_2 emissions
2. There's no "clean coal" plants in the U.S.A
    - Clean Coal Technologies
3. Wind-based generation is capable of replacing coal
4. Natural gas generation is capable of replacing coal

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Myth 1

Removing coal and fossil fuel-based electricity generation and replacing them with althernative energy will

necessarily reduce CO_2 emissions.

Fact: The reality is that relying on renewables to reduce CO_2 emissions may do nothing and could even have the opposite effect.

> *Since wind power has a "limited load factor (http://www.coalblog.org/?p=1085) even when technically available," utilities need to maintain permanently online back up generation "with capacities equal to 90% of the installed wind power capacity … to guarantee power supply at all times."*

That back up generation typically has to be a fossil fuel. Other research suggests that, depending on the nature of the firming power needed to back it up, the addition of wind power to the generation mix may have no impact on CO_2 emissions – or, it may even increase them.

> *Natural gas (http://www.masterresource.org/2009/11/wind-integration-incremental-emissions-from-back-up-generation-cycling-part-i-a-framework-and-calculator/) used as wind back-up in place of baseload or intermediate gas (in the absence of wind) results in approximately the same gas burn and an increase in related emissions, including CO_2. Extrapolating from this example to the whole, the working hypothesis is that intermittent wind (and solar) are not effective CO_2 mitigation strategies because of inefficiencies introduced by fast-ramping (inefficient) operation of gas turbines for firming otherwise intermittent and thus non-usable power.*

European utilities are discovering the same negative and perverse outcomes to the widespread use of wind as a CO_2 mitigation strategy.

> *Flemming Nissen (http://network.nationalpost.com/np/blogs/fpcomment/archive/2009/04/08/wind-power-is-a-complete-disaster.aspx#ixzz0iSQt33mA), the head of development at West Danish generating company ELSAM (one of Denmark's largest energy utilities) tells us that "wind turbines do not reduce carbon dioxide emissions." The German experience is no different. Der Spiegel reports that "Germany's CO_2 emissions haven't been reduced by even a single gram," and additional coal- and gas-fired plants have been constructed to ensure reliable delivery.*

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Myth 2

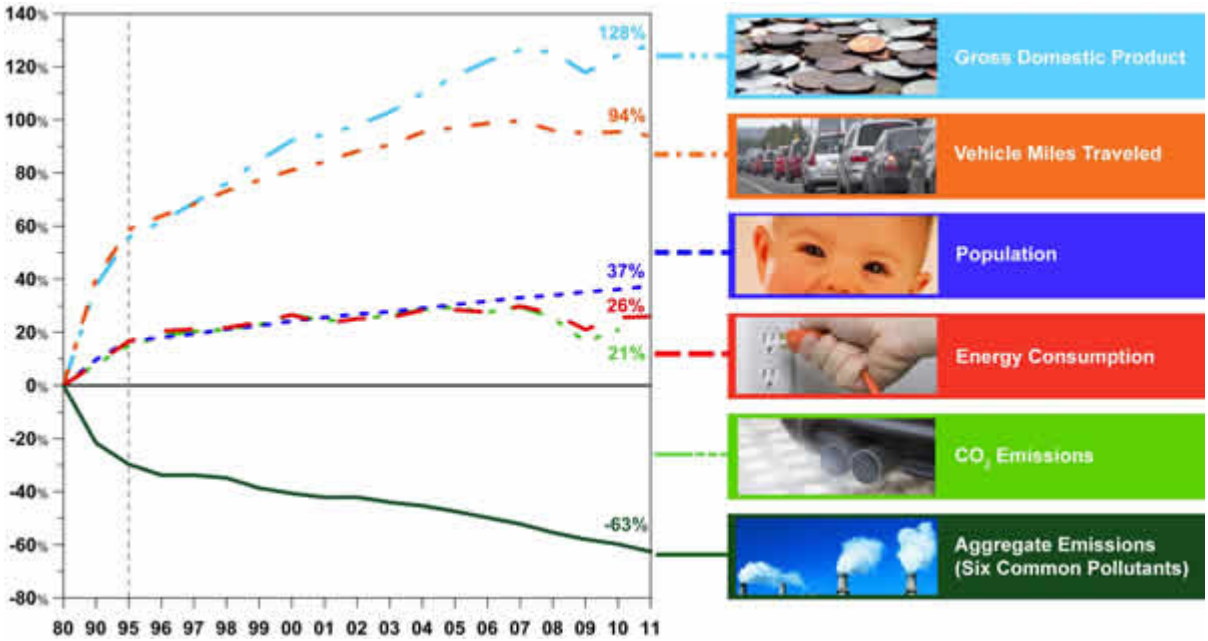
There are no "clean coal" plants operating in the United States.

Fact: There are many examples of clean coal technologies operating throughout the U.S. and the world.

To be able to make the claim that there are no clean coal plants operating in the U.S., special interest groups have had to continually redefine the term "clean" to suit the needs of their latest marketing campaign and

had to continually redefine the term "clean" to suit the needs of their latest marketing campaign and membership drive.

The reality is that while coal use has more than doubled (http://www.nationalcoalcouncil.org/Documents/coaldoc.pdf) over the past 40 years, overall emissions of the six common pollutants on the EPA's National Ambient Air Quality Standards (http://www.epa.gov/airtrends/) (NAAQS) list have decreased by more than 60%.



Comparison of growth measures and emissions, 1970-2008 (Source: EPA)

Reductions like these have been achieved for a variety of reasons, including legislation, industry and public effort to reduce emissions, etc. The coal industry has been at the forefront of those efforts, implementing billions of dollars in efficiency upgrades and installing billions more in emissions reduction equipment. But that's not all that the coal industry is doing - we're not resting on our laurels. We're continuing to invest several billion more in clean coal research (http://www.americaspower.org/The-Facts/Clean-Coal-Technology) and clean coal technologies to provide even more reductions in emissions.

Click here to see our listings and descriptions of commonly used and developing clean coal technologies (/?cct).

Keen eyes will pick up that the only emission listed on the EPA chart above to go up was CO_2. However, as we described in Myth 1 above, trying to replace coal with renewables doesn't always mean CO_2 emissions will go down (sometimes they even go up!) If we are serious about reducing CO_2 emissions, we will look at other creative options, like reworking or rescinding the New Source Review (http://www.masterresource.org/2010/02/time-to-repeal-new-source-review/) (NSR) rule. As currently written, the NSR rule threatens any utility that attempts to upgrade or update their coal-fueled plants with fines, expensive and drawn out audits and reviews, and potential mandates for prohibitively expensive rebuilds and changes. The NSR rule effectively sacrifices the good on the altar of perfection.

> *For years, the NSR rule has actually provided a disincentive for utility plant efficiency improvements - the exact opposite of the rule's stated intent.*

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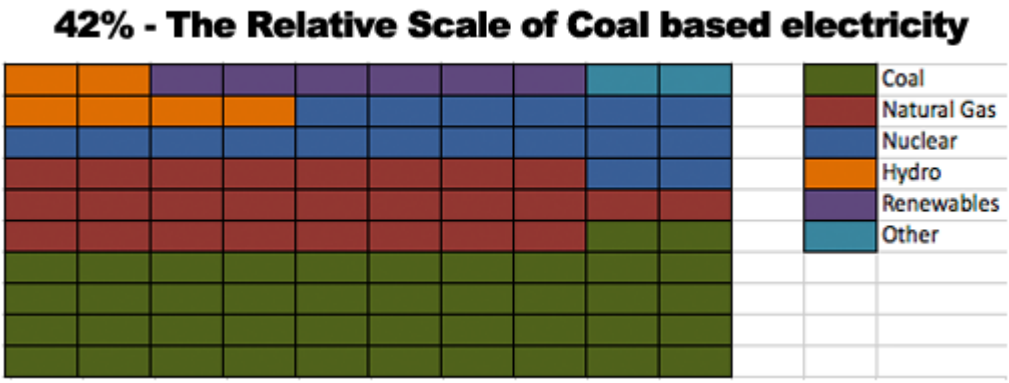
Myth 3

Wind-based generation is capable of replacing coal

Fact: The development of renewable energy helps to support a diverse and stable electrical generation portfolio and wind and other renewables do play an role in helping to provide the electricity that we rely on to run our daily lives. However, the current state and costs of wind-based energy generation make it technologically and economically infeasible for wind to replace coal-based generation, now or well into the future. Furthernore, given the current state of renewable and energy storage technologies, mandating the use of wind in place of coal can actually have the perverse outcome of increasing overall emissions.

Current generation numbers show that coal produces approximately 42% of American electricity. EIA data



(http://www.eia.gov/electricity/monthly/index.cfm) for November 2012 indicates that coal produced 42.2% of our electricity, while wind and solar together generated less than 4.0%. While coal use has declined overall in the past few years, coal saw a 6.2% growth from the same period in 2011. The figure to the right gives some indication of the relative amount of coal-based generation this country uses vs. other energy sources. It hints at the sheer scale and cost of the task some have set for themselves when they talk of replacing coal with wind.

If we somehow manage to overlook the cost and scale of that task, we are still left with the fact that wind cannot act as a baseload energy supply. It has approximately a 25 - 30% capacity factor because wind is an ephemeral resource - it doesn't blow 100% of the time. Because of this reality, you will always need some means of storing excess wind power so it can be used to smooth out spikes and lulls in generation caused by changing wind patterns and speeds. At present, there are some small-scale ideas being researched and used around the country, but they remain a very expensive addition onto an already expensive generation option (http://www.coalblog.org/?p=1085). Furthermore, those storage options have a limited capacity, meaning they are limited in both size and number. Without an option or means to store massive amounts of power, "utilities need to maintain permanently online back up generation "with capacities equal to 90% of (their) installed wind power capacity … to guarantee power supply at all times." This means that utilities have to **build and maintain almost double the generation capacity** they would need if they were simply building coal, nuclear, gas, or hydro. (As we have noted in Myth #1 (above), as well as in posts on the Coalblog (http://www.coalblog.org/?p=1085) and in American Coal magazine (/displaycommon.cfm?an=1&subarticlenbr=164), that firming power in today's world means coal or natural gas.) That reality leads to massive expansions in the cost of providing electricity, which means your electric bill has to grow to cover those costs.

Recent studies are now compounding this problem by showing that the useful service lives of wind installations (http://theenergycollective.com/willem-post/169521/wind-turbine-energy-capacity-less-estimated) are far less than originally forecast. Real world findings in Denmark and the UK (http://www.ref.org.uk/press-releases/281-wearnandntearnhitsnwindnfarmnoutputnandneconomicnlifetime) indicate "that the economic life of onshore wind turbines is between 10 and 15 years, not the 20 to 25 years projected by the wind industry itself, and used for government projections." Cutting the productive (economic) life of these wind installations by 45% means they will need to be replaced and repaired far sooner than expected. Shorter life spans, increased replacement and repair costs necessarily entails that the cost of wind power is far more expensive than originally forecast.

Adding to these difficulties is the fact that one of the key reasons for the push to replace coal with wind - emissions reductions. It is coming to light that renewable portfolio standards (RPS) may have had serious negative unintended consequences in Colorado, Texas, and other areas around the world. Bentek's "Wind, Coal and Gas in Colorado: How less became more (http://www.bentekenergy.com/WindCoalandGasStudy.aspx)" demonstrated that mandating the use of wind generation forced coal and natural gas generating units to operate in an inefficient manner (a process called "cycling," where those units are forced to ramp up and cut back on generation rapidly in response to wind's variable nature). In many instances over a four year study period, this cycling actually "(added) to the air pollution problem" by causing increases in emissions of CO_2, NO_X, and SO_X. Other studies and utilities are arriving at similar conclusions.

> *Natural gas (http://www.masterresource.org/2009/11/wind-integration-incremental-emissions-from-back-up-generation-cycling-part-i-a-framework-and-calculator/) used as wind back-up in place of baseload or intermediate gas (in the absence of wind) results in approximately the same gas burn and an increase in related emissions, including CO_2. Extrapolating from this example to the whole, the working hypothesis is that intermittent wind (and solar) are not effective CO_2 mitigation strategies because of inefficiencies introduced by fast-ramping (inefficient) operation of gas turbines for firming otherwise intermittent and thus non-usable power.*

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> *Flemming Nissen (http://network.nationalpost.com/np/blogs/fpcomment/archive/2009/04/08/wind-power-is-a-complete-disaster.aspx), the head of development at West Danish generating company ELSAM (one of Denmark's largest energy utilities) tells us that "wind turbines do not reduce carbon dioxide emissions." The German experience is no different. Der Spiegel reports that "Germany's CO_2 emissions haven't been reduced by even a single gram," and additional coal- and gas-fired plants have been constructed to ensure reliable delivery.*

Poorly designed policy is, therefore, putting utilities in the difficult position of being forced to choose between meeting environmental regulations and providing sufficient and affordable energy.

At the end of all of this discussion is the fact that there are still very strong forces arrayed against the development of new energy generation and transmission capacity. As was demonstrated in Issue 1, 2010 of American Coal (/displaycommon.cfm?an=1&subarticlenbr=164) magazine, the extreme green's NIMBY (Not In My Back Yard) mindset is having a profound impact on wind and other renewable energy development. While many green groups make a big deal out of the number of permits and applications for coal plants that have been denied, the reality is that there have been more renewable projects cancelled than coal plants and nuclear plants added together. As the U.S. Chamber of Commerce noted in their American Coal magazine (/displaycommon.cfm?an=1&subarticlenbr=164) article, of the 381 projects listed in their database, 167 are

renewable projects that have been delayed or killed, 129 are coal projects, 41 natural gas, 20 nuclear, and 24 transmission. Take a look at the Chamber's Project-No-Project (http://pnp.uschamber.com/) website for up to date information on the NIMBY's push to stop the development of new energy generation capacity.

There's no doubt that wind energy will continue to be a valuable addition to our generation mix. However, the reality is that wind is a high-cost option, by its nature it is limited in the amount of generation it can provide, and mandating its use can actually cause an increase in overall emissions. Furthermore, renewables are now challenged by opposition that is as dedicated as any of the groups attacking the coal, gas, and nuclear industries. Adding all these challenges together makes it difficult to see how wind-based generation could possibly replace the ~40% of our energy that is currently supplied by coal.

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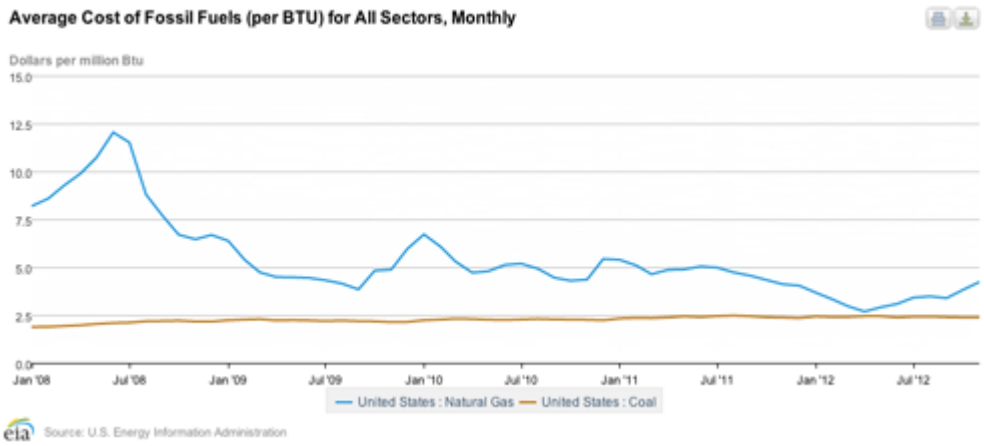
Myth #4

Natural Gas is capable of replacing coal



Fact: Natural gas is a valuable fossil fuel with many uses beyond electricity generation. Gas is used for approximately 26% of electricity generation in the United States, and is currently enjoying relatively low pricing due to increased production from shale gas wells. However, the energy in our natural gas reserves is less than half of that in our coal reserves and gas continues to be plagued by relatively wild price swings.

Thinking that natural gas can replace coal? Some quick facts to consider (http://www.americaspower.org/The-truth-about-the-cost-of-natural-gas).

- Coal is at least twice as plentiful and only one-third the cost of natural gas.
- Natural gas prices from 1998-2008 have been on average four times higher than coal prices. While natural gas prices have been $5.75/MMBTU, coal has been priced at $1.46/MMBTU.
- Natural gas prices are not only on average higher than coal, they are also much more volatile. That volatility makes planning and budgeting extremely difficult. From 2008 to 2012 natural gas prices have fluctuated between a low of $1.94/MMBTU (2012) to a high of $10.79/MMBTU (2008). At the same time, coal's average annual prices have remained rock solid, moving from a low of $1.20/MMBTU (2000) to a high of $2.52/MMBTU (2008).
- Moving forward EIA predictions forecast that natural gas prices (Henry Hub) will remain at or just below $4.00 / mmbtu through 2018. Of course, low gas prices like this will rely heavily on continued association with oil production. Fluctuations in world oil prices will have heavy impacts on natural gas pricing.
- Coal prices are forecast to move very slowly, over the next three decades, from their 2011 price of $2.04 / mmbtu to a high of $3.08 /mmbtu in 2040.

Coal is the fuel of our future. It is domestically-sourced, affordable, abundant/secure, and increasingly clean. **It's our rock!** Read the Behind the Plug (http://www.americaspower.org/The-truth-about-the-cost-of-natural-gas) blog post for more information.

For more information:

- Read the APPA (http://www.appanet.org) report: Implications of Greater Reliance on Natural Gas for Electricity Generation

Electricity Generation (http://www.appanet.org/files/PDFs/ImplicationsOfGreaterRelianceOnNGforElectricityGeneration.pdf)

From the report Executive Summary: "*This report—Implications of Greater Reliance on Natural Gas for Electricity Generation—examines the impacts on natural gas and deliveries to electric utilities should rules limiting utility emissions of carbon or other pollutants result in a shift away from coal towards using more natural gas to generate electricity.*"

The report authors contend that should a large-scale switch from coal to natural gas be promoted as a primary policy option, demand for natural gas utility demand for natural gas would rise to 36 Tcf per year, while natural gas supplies (even with expanding shale gas production) would become quickly limited and gas prices would rise to the range of $10/MMBtu. Additionally, as much as $348 billion in new pipeline capacity would need to be constructed to handle the growth in transmission. At the same time many states would find their natural geology greatly limiting for storage purposes, necessarily leading to increased prices and potential supply shortfalls. Numerous other operating constraints, such as curtailment and extreme weather events, are reviewed in the report.

- Read Dr. Frank Clemente, Penn State University, Energy Facts reports "MIT Report Ignores Natural Gas Environmental Impacts (http://us1.campaign-archive.com/?u=29bc7d5d85828d574f86c157a&id=a0da92e49c)," "MIT Report Ignores Volatility in Natural Gas Prices (http://us1.campaign-archive.com/?u=29bc7d5d85828d574f86c157a&id=6a1b06b2a6&e=4c47ef2312)," and "MIT Gas Report Glosses Over Both Price and Security Risks (http://us1.campaign-archive.com/?u=29bc7d5d85828d574f86c157a&id=b6b0e823b7)" In these reports, Dr. Clemente critiques the recent MIT report "*The Future of Natural Gas.*" He notes that the risk-benefit study presented in the report "left the risk section to someone else" and essentially ignored or underplayed the rapidly growing concerns over the environmental impacts of shale gas production, the potential business and economic impacts of natural gas price volatility, and the elevated risks of higher energy prices and inadequate supply.

- Read the Congressional Research Service Report "Displacing Coal with Generation from Existing Natural Gas-Fired Power Plants (http://assets.opencrs.com/rpts/R41027_20100119.pdf)" by Specialist in Energy and Environmental Policy, Stan Mark Kaplan. In this report, Mr. Kaplan urges Congress to consider many factors related to available gas-fired capacity, current power system flexibility and operating patterns, the ability of the transmission grid to handle increased power generation from existing gas plants, and whether sufficient gas supply/transmission/storage capacity exist to handle the increased gas demand. Kaplan also encourages Congress to consider the economic impacts of the suggested switch on the economy, regions, and states.

ACC members can read former ACC CEO, Janet Gellici's article - "What's Going On? Natural Gas Displacement of Coal: Perspectives on Prospects (http://americancoalcouncil.org/displaycommon.cfm?an=1&subarticlenbr=155)"

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