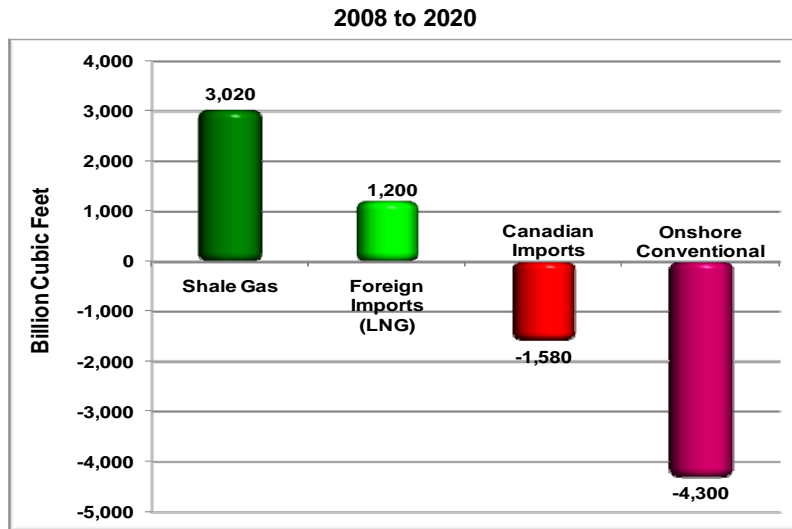


## Why coal plants should not be converted to natural gas

"Increased supply from shale gas appears to have changed the production profile, we have seen similar scenarios occur after past spikes. The inherent lags between changes in drilling and production created natural gas spikes over the last ten years, and will continue to do so after this and every trough. All Americans paid a high price for over-reliance on natural gas in the last ten years. Our country cannot afford to repeat that mistake." -- Edward Stones, representing Dow Chemical Co. in testimony before the U.S. Senate, October, 2009

### Shale Gas increases will not even offset other declining supply



Source: EIA at <http://www.eia.doe.gov/oiaf/aeo/index.html>

About 90% of electricity in the United States is generated by either coal (49%), nuclear power (20%) or natural gas (21%). Coal and nuclear are the established baseload fuels with natural gas typically serving as the peaking fuel. This combination has given the United States one of the most reliable electric power supply systems in the world, steadily increasing our quality of life and enabling manufacturers to be competitive at the global level.

But more than 90% of capacity constructed since 2000 is natural gas-based and this trend will continue for the foreseeable future. We have now reached the stage where natural gas capacity will approach 500 GW by 2013, coal will be about 350 GW and nuclear 108 GW. In other words, although, natural gas comprises 50% of the capacity of the three fuels, it only represents 24% of their actual generation. The capacity factor for natural gas power plants is about 35% while coal is above 70% and nuclear 90%. Natural gas is

generally the last of the three fuels to be dispatched because it is consistently the most expensive and by far has the greatest price volatility.

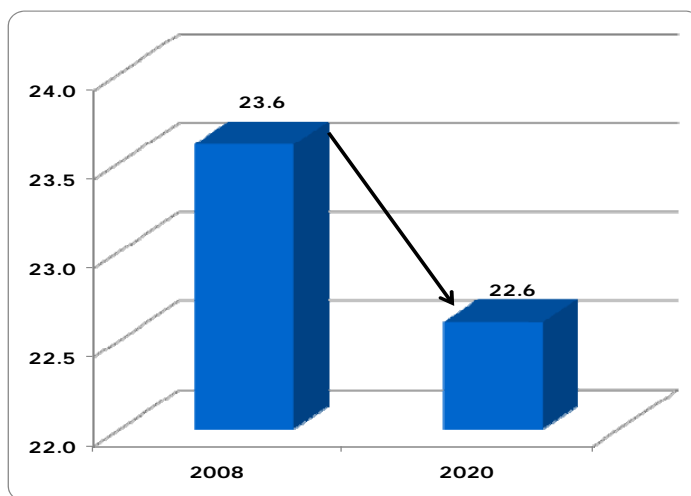
Recent calls to convert existing coal plants to natural gas blithely ignore the problems associated with increasing our dependence on natural gas for power generation. In the major report *America's Energy Future*, the National Academy of Sciences warned about the supply issues associated with relying further on natural gas for power " it is not clear whether natural gas supplies at competitive prices would be adequate to support substantially increased levels of electricity generation"(2009)

The fundamental flaw is that the "convert to natural gas" proposals are monolithically based on the assumption that shale gas production will greatly expand. Since there is virtually unanimous agreement that shale gas is the only substantial source of new domestic supply going forward, the proposals to convert are inextricably linked to a risky bet on shale gas production and price.

In terms of both reliability and cost, calls to convert coal plants to natural gas fail the test of prudence because they cannot answer four key questions relating to shale gas: (1) how much of this gas can be delivered in a timely fashion? (2) how long can production be sustained?, (3) how much will it cost? and (4) what will the environmental impact be? Despite the high rhetoric associated with shale gas none of these questions has been even marginally resolved. In fact, even the American Natural Gas Alliance admits " Most of the industry's leaders and experts did not see a boom of this magnitude even five years ago". This is hardly a testimonial to the extent to which the natural gas industry understands the extent and availability of its own resources.

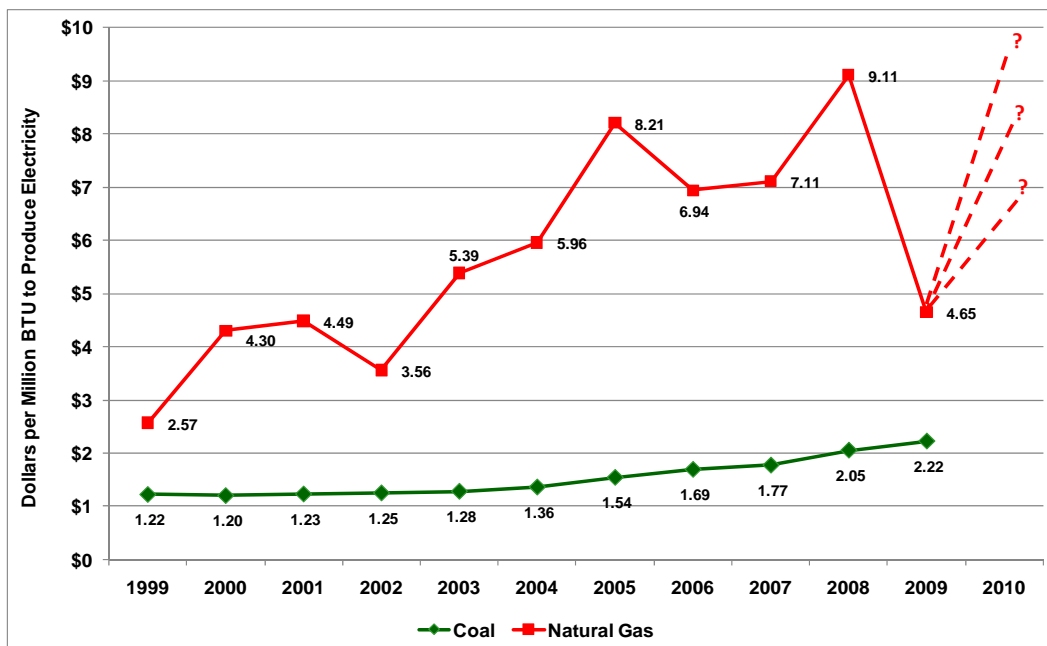
## Ten reasons not to convert coal to gas

1. Natural gas supply is projected to **decline over 4%** by 2020--- even the highly optimistic forecasted shale gas increases will not offset declines in conventional drilling and decreasing Canadian imports.



2. Previous optimistic forecasts of natural gas supply and price have failed to materialize. Projections by the AGA, EIA, Gas Foundation and many others have greatly underestimated price and significantly overestimated production. The California Energy Commission recently noted: "efforts to forecast natural gas prices have been highly inaccurate compared to actual prices ... future natural gas price forecasts likely will be more uncertain and less useful"
  - In 1998, the American Gas Association predicted U. S. production would exceed 25 TCF in 2010. The DOE now estimates that next year's production will only be 20 TCF -- a difference of three Oklahomas.
  - In 2000, the EIA stated "production from conventional sources is projected to grow rapidly through 2010" But production actually was **lower** in seven of the next eight years.
  - In 2005, the American Gas Foundation declared: "6 Tcf per year ... of liquefied gas is pointed toward U.S. markets". We have yet to receive even one Tcf.
  - In 2008, Michael Stoppard, Director of Gas at Cambridge Energy Research Associates (CERA) claimed: "The LNG armada has already set sail." Unfortunately, Stoppard's fleet was more like the Spanish Armada of 1588--- only 352 Bcf of LNG made it to the United States in 2008, the lowest amount in the past six years.
  
3. Natural gas is considerably more expensive than coal--increased natural gas generation has led to higher electric rates across the nation--from 6.81 cents /kWh in 2000 to 10.02 cents/ kWh in 2009. Further, and importantly all consumers, natural gas for power generation will remain more expensive than coal.

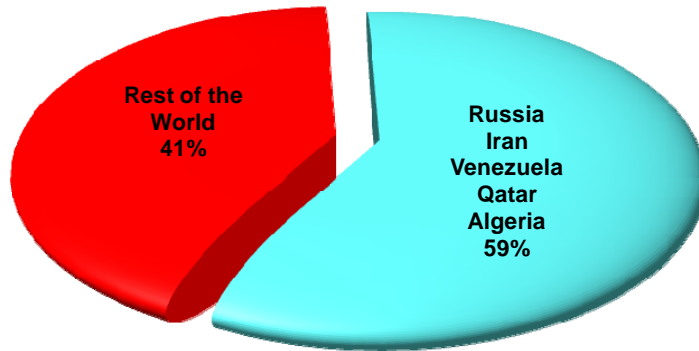
### Coal Prices to Produce Electricity are Lower and Far More Stable than Gas Prices



4. Natural gas prices to produce electricity are highly volatile compared to stable prices for coal. From 2000-2009, the price of natural gas per million Btu ranged from \$3.56 to \$12.04. The coal price never exceeded \$2.20.
5. Increased natural gas generation not only raises the price of electricity but also raises the price of natural gas. Families and businesses are caught in a "double whammy" as they compete with power producers for fuel. In 2000, for example, the residential price of gas was \$7.76/mcf. By June of 2008 it had increased over 160% to \$20.24 and in 2009 averaged over \$12.75,.
6. Natural gas is not a reliable baseload fuel given (a) vagaries of supply and (b) price volatility. This is clearly recognized by the National Academy of Sciences : "Natural gas generation of electricity could be expanded to meet a substantial portion of U.S. electricity demand---if there were no concerns about the behavior of world natural gas markets and prices and about further increasing CO2 emissions and U.S. import dependence." (2009)
7. If shale gas production does not meet expectations, liquefied natural gas (LNG) will become the default fuel for power generation. The National Energy Technology Laboratory has identified the risks of that path: "...the need for more LNG will create closer links to the world oil price, setting the stage for the marginal price of electricity to be set by the whims of foreign oil/LNG suppliers, for the first time in U.S. history"
8. The eventual water and land environmental impact of shale gas is unknown. More and more questions are being raised as to why hydraulic fracturing is exempt from the Federal underground injections control requirements in the Safe Drinking Water Act. This problem will become increasingly apparent as thousands of wells are drilled ever closer to population centers. Decline rates in shale gas wells can approach 80% the first year, creating a constant treadmill to find additional resources and drill new wells. New regulations to protect the environment from shale gas drilling will increase the price of natural gas.
9. The scale of eventual potential shale gas production is also unknown but even the perpetually optimistic EIA projects only an additional three TCF by 2035. Hyperbolic statements that shale gas will provide the fuel to replace coal generation are highly misleading since we currently consume almost 7 TCF just for gas generation and conventional production is on the decline. Shale gas may not be able to even support existing gas generation let alone replace coal.
10. Cavalier acceptance of shale gas projections threaten to slow progress toward one of the most important energy goals of the Obama Administration -- the rapid development of carbon capture and sequestration (CCS). Coal is the most important and extensive energy resource in the United States. Diverting attention

away from our most abundant, reliable, secure, diverse and affordable source of energy may not only adversely impact economic growth and stability but also impede our progress toward reduced greenhouse gas emissions. CCS at natural gas facilities is more expensive than CCS from coal power plants.

### **A Five Nation Cartel Would Control Almost 60% of the World's Natural Gas**



**"We are creating something similar to OPEC but with gas" --Hugo Chavez on the formation of a gas cartel ( 2009)**

<http://www.bp.com/bodycopyarticle.do?categoryId=1&contentId=7052055>

**Summary--** shale gas is the only significant viable source of new domestic gas production in the United States. But the unresolved questions relating to shale gas are so profound and far-reaching that any plan to increase our dependence on gas for generation opens the door to markedly higher costs of electricity. More importantly, these proposals put reliability of the electric supply system at risk since a shortfall of shale gas will inevitably lead to increased LNG imports in a world where 45% of the resource is controlled by Russia, Iran and Venezuela. Far from being a bridge fuel to the future, an unquestioning acceptance of unrealistic and optimistic shale gas projections may be leading us down the path to escalating energy prices and reduced reliability of the most important component of our societal infrastructure-- electricity.

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