White Paper:

Financial Risks of Investments in Coal

AS YOU SOW
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Amy Galland has written numerous publications analyzing industry performance on key issues of corporate responsibility including benchmarking best practices in supply chain monitoring, recycling, sustainability, purchasing, and product safety. Amy oversees As You Sow's research department and has led successful shareholder engagements on greenhouse gas reduction/renewable energy, sustainability, and environmental health resulting in increased disclosure, the development of new corporate policies, commitments to labeling for product safety, and the Federal Trade Commission expanding its jurisdiction to mercury warnings on CFLs. Prior to joining As You Sow, Amy worked as a consultant providing strategy, business development, marketing, and organizational design expertise to nonprofit organizations and small businesses. Amy was awarded an MBA and a PhD from the University of California, Los Angeles, an MA from Stanford University, and a BA from Tufts University.

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About As You Sow

As You Sow is a nonprofit organization dedicated to increasing environmental and social corporate responsibility. Founded in 1992, As You Sow envisions a safe, just, and sustainable world in which environmental health and human rights are central to corporate decision making. Its Energy, Environmental Health, Waste, and Human Rights programs create positive, industry-wide change through corporate dialogue, shareholder advocacy, coalition building, and innovative legal strategies. **www.asyousow.org**

INTRODUCTION

In June 2011, As You Sow released *White Paper: Financial Risks of Investments in Coal* that assessed three primary risks facing coal-based industries: cumulative regulatory risks, commodity risk, and construction risk. Since the *White Paper* was published, the risks to coal mining companies have been underscored, most recently by the bankruptcy of Patriot Coal; and the risks to coal-dependent electric utilities have only increased – in July 2012 wholesale power producer Dynegy followed its subsidiary into bankruptcy caused by low power prices and high corporate debt.[1]

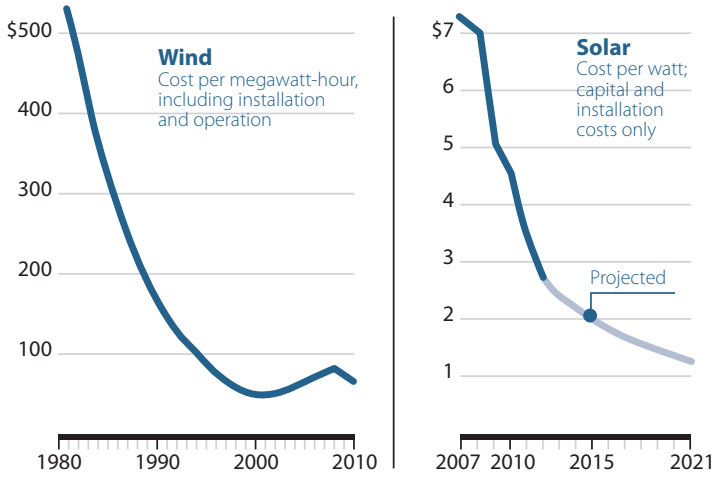
The *White Paper* was, if anything, conservative in its assessment of the cumulative impact on coal-burning utilities of environmental compliance costs and volatile coal prices at the same time that the price of natural gas, coal's biggest competitor, dropped to historic lows that drove down electric power prices.

In October 2012, Brattle Group issued a new report stating that "gas prices are a much more significant influence on retirements than the stringency of the remaining regulations."[2] Currently, low-priced natural gas often makes it more economical to dispatch gas – rather than coal-fired generation – and in some markets, wind power undercuts gas as the price setter, pushing coal further down in the dispatch order. In 2011, 42% of U.S. net power output was generated from coal, down from 52% in 2000, while electricity generated from natural gas reached 25% of net output in 2011, up from 16% in 2000.[3] From July 2011 to July 2012, the percentage of electricity generated from coal declined even further, to 39% while the percentage of electricity generated from natural gas increased to 34%.[4] In 2011, 31% more wind power was installed in the U.S. than in 2010 and wind power accounted for 32% of U.S. generating capacity additions; and the U.S. installed 1,855 megawatts (MW) of photovoltaic solar systems, a growth of 109% over 2010.[5]

Although the switch away from coal is financially and environmentally responsible, natural gas will – in time – face many of the same risks as coal: price increases and volatility as the easily recoverable resources are depleted, more stringent environmental regulations that will demand capital investments, and competition from wind, solar, and other forms of renewable energy. Recent data indicate that the cost and price of both wind and solar are falling dramatically, while the current low prices of natural gas are increasing and are projected to increase over time.

Wind and Solar Energy Are Getting Cheaper…[6]

Costs for both energy sources have declined, using common measurements for each.



Simultaneous to the declines in cost of wind and solar, the cost of combined cycle gas turbine (CCGT) power "has seen a 6% increase, and coal-fired power a 9% rise over that same period."[7] The price of natural gas is currently a driving force in both dispatch curves and investments in generation, but "based on current cost reduction trends, it is predicted that the average onshore wind project worldwide will be fully competitive with combined-cycle gas turbine generation by 2016."[8]

In addition, the price of natural gas historically has been volatile and is currently increasing and expected to increase from its current below $3/mmBtu to over $6.00/mmBtu by 2025.[9] However, as noted in the *White Paper*, at $6.50/mmBtu gas is competitive with coal.[10]

Natural Gas Spot Prices (Henry Hub) [11]

As the price of natural gas increases, solar and wind – which have no fuel costs – will become increasingly cost competitive not only against coal, but also against natural gas. In 2011, "photovoltaic module prices fell by close to 50%, and onshore wind turbine prices by between 5% and 10%."[12] It would be poor financial planning to invest in a generation source that will soon be underpriced by competition.

The impact of low natural gas prices and the efforts of environmentalists and investors have been significant. Since June 2011 electric utilities have announced the retirement of 46 coal plants, representing more than 6% of the total 2011 coal capacity. More retirements are expected if gas prices remain low, especially from merchant fleets that are more exposed to market forces.[13] Shareholder value has been impaired, with write-downs for retired or underutilized coal assets ranging from $34 million at Ameren to $444 million at FirstEnergy.[14]

This update to the *White Paper* provides a snapshot of the trends underlying five financial risks for investments in coal: for mining companies, they are driving shifts in generator demand away from coal; for electric utilities, they are making "cheap coal" costly compared to other generating options or increased efficiency. These trends have dramatically altered the context within which electric utilities do business and plan for reliable delivery of electricity to their customers. They have also altered the dynamics for long-term profitability of centralized power providers as rising costs for electricity drive customers large and small to use less or to invest in on-site generation and worldwide investments in distributed capacity continue to increase.[15]

Investors with holdings in coal-dependent electric utilities continue to face significant and increasing financial risks, arising from:

1. Increasing capital costs for environmental controls at existing coal plants and uncertainty about future regulatory compliance costs
2. Declining prices for natural gas, a driver of electric power prices in competitive markets
3. Upward price pressures and price volatility of coal
4. High construction costs for new coal plants and unknown costs to implement carbon capture and storage
5. Increasing competitiveness of renewable generation resources

1. Regulatory Risk

Analysts estimate that 75 GW of coal-fired capacity may be retired by 2030 due to the costs of environmental controls.[16] In November 2011, Fitch Ratings concluded that "approximately 83 gigawatts (GW) of capacity is at risk for retirement as a result of the new rules by the U.S. Environmental Protection Agency (EPA), versus an estimated 51 GW in the earlier report. Approximately 39 GW, or 47%, of this capacity is operating without adequate SO_x control."[17]

The *White Paper* highlighted several pending environmental regulations that were expected to adversely impact the profitability of coal as a generating source for electricity. The impact of the mercury air toxics rule requiring electric

power generators to be equipped with the Maximum Achievable Control Technology for this air toxin has forced companies to retire, or mothball, plants – particularly merchant plants – that are no longer profitable to operate. The Cross-State Air Pollution Rule (CSAPR) was also expected to impose additional capital costs on power plants in the Midwest and Southeast that would have to meet reduced standards for nitrogen oxide (NO_X) and sulfur oxide (SO_X). However, the U.S. Court of Appeals overturned CSAPR in August and reinstated the Bush-era Clean Air Transport Rule (CATR) until EPA can develop a new rule to limit interstate air pollution. This decision prolongs the regulatory uncertainty for coal plant operators who face the incremental imposition of more stringent standards over time.

Regulatory Risk: Uncertainty over Evolving Standards, Timing, and Cost of Compliance

White Paper	Update
More and more, stringent regulation under existing environmental laws requires investor owned utilities to either make large capital investments in aging coal plants or retire them. • Cross-State Air Pollution Rule (CSAPR) • Mercury and Air Toxics Standards (MATS) • Carbon Pollution Standard for New Power Plants • Coal Combustion Waste Rules • Cooling Water Intake Structures (CWIS) [p 9-12]	***November 2011:*** Fitch predicts: "a reduced dispatch of coal units is likely to occur as an interim compliance measure in addition to fuel switching. The utilization rate of natural gas-fired units is expected to increase as a consequence."[18] ***July 2012:*** The EPA issued a partial stay of the Mercury MATs while reconsidering the rule as it applies to five planned facilities in Georgia, Kansas, Texas, and Utah. "This review will not change the expected costs or public health benefits of the rule," the agency says. EPA is expected to issue a reconsideration rule by March 2013.[19] ***August 2012:*** The U.S. Court of Appeals overturned CSAPR and reinstated CATR until the EPA can adopt a new rule, which may take several years and increases uncertainty for operating coal plants.[20]
The EPA moved forward with the greenhouse gas Tailoring Rule after the U.S. Supreme Court affirmed its authority to regulate greenhouse gases. [p 11]	***June 2012:*** U.S. Court of Appeals unanimously upholds EPA's Tailoring Rule limiting greenhouse gas emissions from power plants and other large stationary sources.[21]
Lobbying and litigation prolong uncertainty over the scope and timing of new rules, making it more difficult and costly to plan for the modernization of electric power generating fleets. [p 7 & 9]	***June 2012:*** The U.S. Senate refuses to vote on a House bill that would limit the EPA's authority to regulate carbon dioxide and other air pollutants.
After decades of litigation and delay, many of the regulations affecting coal plants are now being issued pursuant to court order. [p 5, 7, 9 & 12]	***June 2012:*** A federal court order in a lawsuit filed by 11 states requires the EPA to issue new rules restricting particulate pollution (soot) from power plants and other sources. The Obama Administration had hoped to defer the rules until after the November elections.[22]

In March 2012, the EPA proposed a Carbon Pollution Standard for New Power Plants that will set national limits on the amount of carbon pollution that power plants can emit. New power plants designed to use coal could meet the standard by implementing carbon capture and storage technology (CCS)."[23] However, the EPA has recognized that CCS is an expensive technology that may make the price electricity generated from power plants with CCS uncompetitive compared to electricity from plants with other GHG controls.[24]

Regulatory Risk: Carbon Capture and Storage

White Paper	Update
Industry opposition to climate legislation that limits carbon dioxide emissions undermines the case for investing in expensive CCS technology. [p 30]	***July 2011:*** American Electric Power places a CCS project at Mountaineer on hold "until economic and policy conditions create a viable path forward."[25]
A 2010 Government Accountability Office report found that commercial deployment of CCS was 10 to 15 years away and would increase electricity costs by 30% to 80%. [p 11]	***November 2011:*** Citing cost concerns, Ameren cancels the only CCS demonstration project in the U.S.[26]
Even if CCS technology were available to control emissions from coal plants it is unlikely to be economically competitive against gas plants with CCS, wind, or other alternatives. [p 11]	***March 2012:*** The EPA proposes a Carbon Pollution Standard that sets national limits on carbon from new power plants. It would require new power plants to meet an output-based standard of 1,000 pounds of CO_2 per megawatt-hour.[27] Almost all the natural gas combined cycle plants built since 2005 will meet the proposed standard.[28]

2. Commodity Risk – Natural Gas

Coal faces significant competition from natural gas. "According to industry experts, if coal loses out in utilities' decisions on what to build, it would be because the economics of burning gas are simply better than burning coal."[29] This is a tectonic shift in the utility industry and, increasingly, the price of coal as a commodity is playing into these economics.

Barclays concludes that although pollution control costs have increased significantly for both mining and burning coal, "natural gas is going to kill more coal-fired power plants than the EPA regulations."[30] In 2011, 93% of domestic coal produced was consumed by the U.S. electric power sector.[31] Yet there has been a decline in the power output generated from coal – 42% in 2011, down from 52% in 2000 – and a simultaneous uptick in the percentage of electricity generated from natural gas, 25% in 2011 up from 16% in 2000.[32] In 2012, independent power producers have generated almost twice as many megawatt hours from natural gas as from coal (308,677 vs. 158,224 thousand MWh). The preference for gas among these producers who sell their electricity on the open market is a manifestation of how the low price of natural gas cuts into the demand for coal.[33]

According to the U.S. Energy Information Administration (EIA), it is not only the price of natural gas that is enhancing its competitiveness but also its efficiency: "natural gas combined-cycle units operate at higher efficiency than do older, coal-fired units, which increases the competitiveness of natural gas relative to coal."[34] Aram Sogomonian, Vice President of Risk Management for Edison Mission Energy stated that "[i]t will be tough to build something other than natural gas plants, given the current environmental rules, capacity factors and low prices."[35]

Commodity Risk: Natural Gas Prices are Down, Compressing Electric Power Prices

White Paper	Update
A key driver of the coal-to-gas switch "is a $4-6/mmBtu natural gas price due to the major increase in supply coming from unconventional shale gas." [p 4]	***March 2012:*** "The share of electricity generated by burning coal in the U.S. has fallen to near a 35-year low as utilities shift to cheaper gas on the back of the shale revolution."[36]
Natural gas prices are at historic lows and analysts predict modest increases of 1% annually to 2020. The EIA foresees gas prices reaching $6.00 per mmBtu by 2025. [p 4]	***January–September 2012:*** Natural gas prices remain below $3/mmBtu and the New York Mercantile Exchange (NYMEX) future price for October 2012 is $3.063/mmBtu.[37]
Industry analysts find that the low price of natural gas will lead to dispatching gas before coal, leading to the retirement of additional coal plants. [p 24 & 25]	***August 2012:*** FirstEnergy announced it will "dispatch-as-needed" from one of its largest coal-fired plants due to low wholesale prices as a result of low natural gas prices.[38]

3. Commodity Risk – Price and Price Volatility of Coal

Three trends continue to affect the economic viability of coal as a generating fuel for electric power: increasing price and price volatility, a shift in production from Central Appalachia (CAPP) to the Powder River Basin (PRB), and increased export demand for PRB coal.

Commodity Risk: Coal Prices Are Up and Price Volatility Is Increasing

White Paper	Update
Massey Energy, one of the largest producers of CAPP coal reported that from 2003 – 2009 the average cost per ton of coal increased by 48%. [p 17]	***June 2011:*** Alpha Natural Resources acquires Massey Energy. ***September 2011:*** "The declining competitiveness [of coal] is due in large part to the increased cost of producing coal in Central Appalachia, for both surface and underground mining."[39] ***February 2012:*** Alpha reports that in "2011, the weighted-average cost [of coal] rose to $47.15/st from $30.08/st a year ago" with the greatest share of the increase coming from its eastern operations.[40]
As CAPP coal becomes more expensive, it becomes less desirable as a fuel for domestic electricity producers. [p 14]	***February 2011:*** The cost of delivered coal per net kilowatt-hour generated for Duke Energy's coal plants has increased 10% since 2009, while the cost of delivered gas has decreased 23.6%.[41] ***September 2012:*** Between December 2009 and October 2011, the price of CAPP coal increased 48%.[42] As of September 2012, CAPP coal was up 18% over 2009 prices.[43]
Coal prices will be volatile "regardless in which direction they may ultimately trend, the price swings will be more erratic and of greater magnitude." [p 15]	***March 2012:*** One indicator of the difficulty of predicting the future price of coal: Peabody Energy "has 40 to 50 percent of planned production unpriced for 2013."[44]

Commodity Risk: Shift in Production from CAPP to PRB

White Paper	Update
CAPP mines are more mature and declining coal reserves together with increased regulations will produce price increases for the remaining high quality product. As CAPP coal becomes more expensive, it becomes less desirable as a fuel for electricity. PRB, located in western U.S., is now the nation's leading coal producing region. [p 14]	***August 2012:*** Doyle Trading Consultants calculated that the U.S. coal supply declined more than 100 million tons in 2012 and that many of the cuts, particularly in Central Appalachia, are permanent. "Some mines that may be closed as we head into 2013 because utilities don't necessarily need the coal next year are unlikely to reopen when utilities are out looking for coal for 2014."[45]
The pinch of diminished reserves in CAPP coal has been balanced by increased demand for low-sulfur coal from the PRB. Some utilities use PRB coal due to cost, others in order to meet stricter air pollution rules. [p 14 & 17]	***September 2012:*** "The demand for low-sulfur coal will result in more production from western states, potentially 1% more a year between 2015 and 2035."[46] However, U.S. Geological Survey found that total U.S. recoverable reserves in the country's most prolific coalfield, the PRB's Gillette coalfield, are only 47% of previous estimates.[47]

Commodity Risk: Increased Exports

White Paper	Update
As coal is displaced in the U.S. power sector, coal mining companies seek to increase export sales to more lucrative foreign markets. [p 14]	***February 2012:*** Cloud Peak Energy's exports of its PRB coal to Asia have risen from 1 million tons in 2008 to 3.3 million tons in 2010 and 4.7 million tons in 2011.[48] ***March 2012:*** Peabody Energy estimates that "U.S. coal-fueled electricity demand could decrease in excess of 100 million tons in 2012, with net U.S. coal exports increasing approximately 15 million tons to more than 110 million tons."[49] ***March 2012:*** One PRB coal producer placed the net margin from current domestic sales at $4.19 per ton and estimated net margins from exports at $14.59 per ton.[50] ***August 2012:*** Doyle Trading Consultants found that the seaborne market was a lifeline for thermal coal producers and that, through June, thermal exports were up over 53% year over year to 28.3 million tons.[51]

4. Construction:

Costs for both construction of new coal-fired plants and upgrades to existing plants are increasing exponentially. In addition, the cost of improvements to maintain operations are increasing and implementing certain maintenance improvements trigger laws that mandate that plants invest in environmental upgrades as well.

Construction Risk: No Assurance of Cost Recovery for Expensive New Plants and Retrofits

White Paper	Update
In 2002 a 600 MW plant cost $1500/kW to build ($900 million) but by 2009 that same plant design cost $3500/kW or $2.1 billion. [p 21]	***March 2012:*** Costs keep rising. Construction costs at Duke Energy's Edwardsport IGCC plant have risen to $3.3 billion from the original estimate of $1.985 billion.[52] ***August 2012:*** Mississippi Power's Kemper coal plant costs have also risen from $2.4 billion to more than $2.8 billion, leading Fitch Ratings to downgrade the company.[53]

5. Alternatives

In many markets, wind is the most economical source of electricity – and, if one includes impacts on water resources, wind energy has lower operating costs than both gas and coal. According to EIA, the levelized cost for the least expensive wind power is cheaper ($77/MWh in 2010 dollars for plants coming online in 2017) than the least expensive conventional coal plant.[54] Lazard's *Levelized Cost of Energy Analysis* demonstrates that currently the levelized cost of electricity (LCOE) for wind is, in most cases, less than that for coal and thin-film solar, biomass, and geothermal are, in many cases, less than that for coal.[55]

Alternatives Risk: Price of Renewables Declining

White Paper	Update
Bloomberg New Energy Finance projects that solar technology costs, "could fall by as much as 40 percent over 2010–20 due to experience curve effects." [p 29]	In the first quarter of 2012 "Pv-generated electricity has fallen in cost by some 44%, and onshore wind power by some 7%."[56]
Deutsche Bank and others link the rates of adoption of renewable resources to an energy policy that supports renewable energy. [p 29]	***July 2012:*** The Obama Administration passed a measure to streamline the permitting process in order to fast-track utility-scale solar projects on public lands in six southwestern states. This is estimated to yield 23,700 MW generated from solar in the region.[57]

Despite the lingering effects of the recession being felt in financial markets into 2010, competition from low natural gas prices and an increased reluctance for utilities to enter power purchase agreements with wind, renewable capacity expanded by 3%, or 4,019 MW in 2010.[58]

In September 2012, President Obama signed an Executive Order to reduce the barriers to developing energy efficient technologies – which, in general, are two- to three-times less expensive than creating supply-side resources – and established a national goal of deploying 40 gigawatts (GW) of new industrial combined heat and power (CHP) and waste heat recovery by the end of 2020. This alone could reduce energy use by 10% of 2010 levels and further reduce the demand for coal by the U.S. power sector.

Conclusion

Since the publication of *White Paper: Financial Risks of Investments in Coal* the prognosis for coal as a financially viable source from which to generate electricity continues to decline. This is seen in the announcements of plant retirements – 46 more coal plant closures announced since June 2011. The EIA estimates that nearly 27,000 MW of capacity from 175 coal plants, representing 8.5% of total 2011 U.S. coal capacity, will be retired by 2016. This is more than four times what was retired from 2007-2011 (6,500 MW). The expected coal plant retirements in 2012 alone represent the largest one-year amount in the nation's history.[59]

The recent reversal of the Cross-State Air Pollution Rule and reinstatement of the Clean Air Transport Rule only increases regulatory uncertainty for coal plants. One industry analyst called it "a stay of execution" for older, dirtier coal plants that "will ultimately retire."[60] Although natural gas prices are expected to increase, gas will still remain competitive with coal and the cost of wind power in some regions will continue to undercut both coal and gas. More importantly for the business model of electric utilities, business and residential consumers will continue to reduce their energy consumption through efficiency and demand management, and will move increasingly to distributed, rather than centralized, generation as the price of solar technology declines. All of which indicate troubled times ahead for coal-dependent utilities.

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