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WHITE PAPER

Walking the Environmental Compliance Tightrope

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Energy investors and plant operators are walking a compliance tightrope with no clear end in sight. With several strict mandates on the horizon—affecting mercury, nitrogen oxides, sulfur dioxide, and carbon emissions—investing in new energy infrastructure may seem like walking blindfolded. Luckily, though, even with the onslaught of stricter pollution regulations, most investors and operators can still retain their balance.

Several major compliance issues are converging at virtually the same time. New mandates to install pollution control equipment to meet tough environmental rules are coming. Coal in particular is a top target. The resource is not only the nation's No. 1 source of energy but also the No. 1 source of carbon and mercury emissions. As a result, a push to carbon light production is gaining substantial momentum.

But other economic factors, such as high crude oil prices, are making coal a smart choice—at least for new plants and older plants that have installed pollution control retrofits. In addition, many coal-fired plants have already made sufficient upgrades to become compliant with future regulations.

There are four major compliance issues affecting energy investors and plant operators in the near term. They include:

- **The Clean Air Interstate Rule.** CAIR mandates the largest reduction of air pollution in more than a decade. It permanently caps emissions of sulfur dioxide (SO₂) and nitrogen oxides (NO_x) in 28 Eastern states and offers power plants options to buy allowances from other utilities with fewer emissions. The SO₂ part of the rule starts in 2010. The NO_x part begins in 2009. In order to meet these NO_x requirements, all coal plants will have to run expensive selective catalytic reduction systems year-round. They currently only have to run these systems during the summer months.
- **Federal greenhouse gas legislation.** Congress is considering a federal global warming bill similar to CAIR that would allow carbon emission trading. With both presidential candidates supporting some greenhouse gas legislation, it appears likely that some federal mandate aimed at reducing carbon dioxide (CO₂)—the main culprit for global warming—is coming within a few years.
- **State and regional greenhouse gas rules.** California last year instituted a landmark law that would curb greenhouse gases at least 30 percent by 2020. In addition, the Northeastern states will hold a carbon allowance auction in September for a cap-and-trade program that becomes effective in 2009. The program, called the Regional Greenhouse Gas Initiative, is a cooperative effort by nine Eastern states that plans to reduce greenhouse gas emissions incrementally over time.

- **Mercury Regulation.** On a case-by-case basis, plants currently have to reduce mercury emissions. Because the Environmental Protection Agency's proposal to institute a cap-and-trade system for this deadly neurotoxin was recently struck down, the old Clean Air Act mercury standard—which calls for incremental decreases with no trading—is still law. In addition, there are at least 22 states that have passed their own mercury reduction regulations.

KEY ISSUES AFFECTING INVESTMENT DECISIONS

In determining how increased prices for mercury, NO_x, SO₂ and CO₂ compliance will affect the energy industry, several key factors from natural gas prices to the mood of the next presidential administration need to be accounted for.

With natural gas and crude oil prices reaching record levels, the cost of coal for the time being still makes it a good option—even with increased regulations aimed at reducing coal use. The cost of natural gas has increased in 2008 to an average price of \$11 per 1,000 cubic feet. And crude oil has skyrocketed, reaching nearly \$140 a barrel in June.

For several reasons, most coal plants that can achieve an 80 percent capacity factor can bear these increasing compliance burdens. For many plants, reaching 80 percent won't be too difficult as preexisting upgrades stemming from the Clean Air Act have gotten them close to reaching new mandates. If the cost of upcoming CO₂ allowances remain relatively low, as they are expected to be, coal still remains an attractive option. However, if those prices get too high, it could start shifting the move to switch to other energy sources. And plants that cannot achieve efficiency over the next few years will face substantial economic pressures.

Another factor boding well for coal investors is the fact that state public service commissions have for the most part been amenable in letting utilities pass along infrastructure expenditures and fuel costs to ratepayers. While good for investors, though, everyday ratepayers are faced with a double whammy. The first whammy: Fuel costs are rising, which have a direct impact on utility bills. The second: Utilities are passing on the costs associated with building new scrubbers, selective catalytic reduction systems and particulate control units down to customers.

Plus, the mood of the White House toward global warming will be a factor. With the most recent global warming bill, sponsored by Joseph Lieberman (I-Connecticut) and John Warner (R-Virginia), being squelched in June, Congress is now looking at other options. Both top presidential candidates support some form of greenhouse gas legislation, a fact that pretty much guarantees that carbon regulation is coming. But ultimately, the devil will be in the details.

Finally, the nation's vigor for nuclear and renewable options is on the rise. The Bush Administration as well as the top presidential candidates for 2009 support new nuclear capacity. And green technologies such as solar cells and wind turbines are getting more advanced, which could cause demand for coal to decrease.

How EMISSION LIMITS WILL PINCH

Between CAIR and other regulations, there are tough cuts looming. However, there are offsetting factors that minimize the financial impact of these rules.

Here's a forecast predicting how mandated cuts in mercury, NO_x, SO₂ and CO₂ will affect investors and plant operators:

Mercury

Since a cap-and-trade program for mercury has been struck down, the EPA will now need to review actual retrofits from 2001 and prospective retrofits at every coal plant to determine the maximum amount that can be reduced. Mercury reductions will likely range from 45 percent to 90 percent.

Retrofits already in place since 2001 will take 16 tons of mercury out of the air. However, there are still a number of plants that have not installed these retrofits, which will soon be required to do so. Mercury-reducing flue gas desulfurization retrofits already taken or planned account for 20 percent of the total required reduction. With the current system in place, and with the federal cap-and-trade program dead, there will likely not be additional federal mercury requirements established in the near future.

NO_x

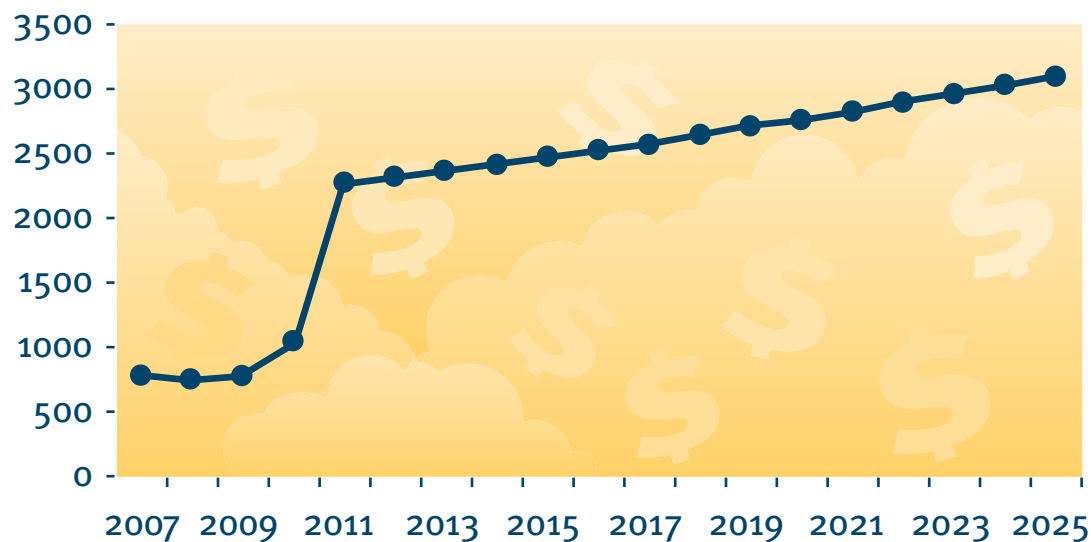
The NO_x requirement of CAIR mandates the removal of 53 percent of NO_x that was emitted in 2003 by 2009. And it requires utilities to remove 61 percent of NO_x that was emitted in 2003 by 2013.

Initial targets in 2009 appear fairly easy to achieve as many upgrades have already been performed. Simply running selective catalytic reduction units year-round will achieve these mandates until 2012, which an estimated 80 percent of coal-fired plants affected by CAIR can do. Running these systems will cost about \$3,000 per ton of emitted NO_x in 2009, just a slight increase from today's levels.

The cost to trade NO_x emissions for allowances, meanwhile, is not expected to increase much in 2009. The estimated price for one ton of NO_x emissions will range from \$700 to \$1,000.

FORECASTED NO_x CAP-AND-TRADE PRICES

NO_x \$/TON



In 2012, the cost associated with running selective catalytic reduction systems in order to meet new CAIR mandates will increase from \$3,000 per ton to about \$5,500. And the cost to trade one ton of NO_x will jump substantially to nearly \$2,500 per ton, more than a 100 percent increase from 2009 prices. The cost to trade emissions for allowances will increase because compliance budgets will be tighter and NO_x allowances will be scarcer.

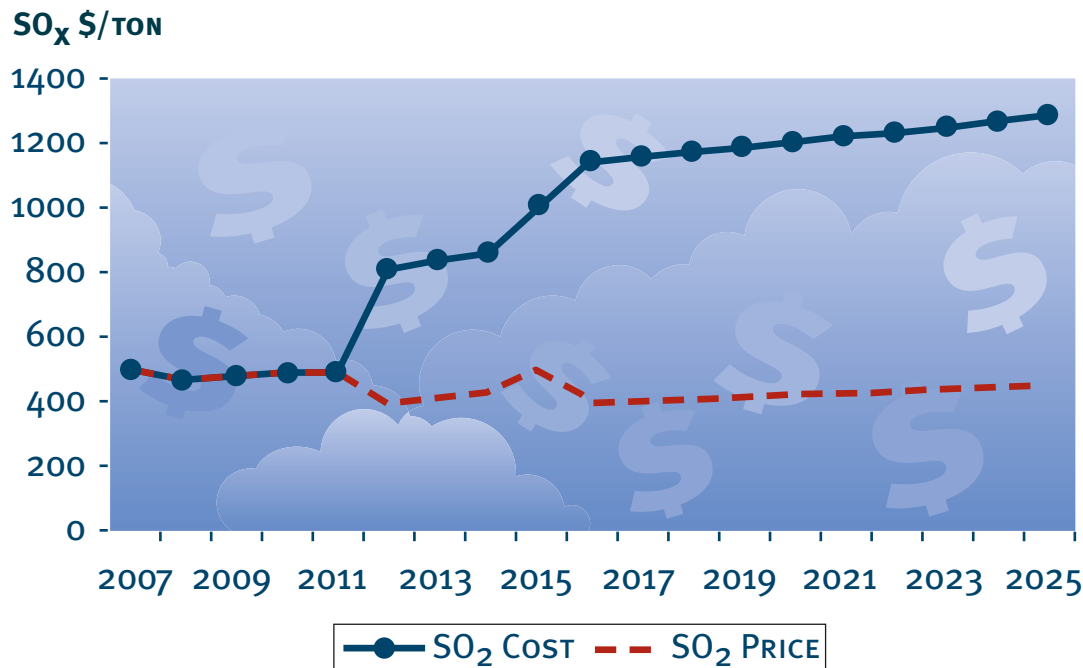
Also in 2012, the 20 percent of Eastern coal plants that don't have efficient retrofits—about 25 plants as it stands now—will face increasing financial risks of becoming uneconomical. But for those coal-fired plants that do have retrofits and are efficient—as long as the price of natural gas and crude oil stay where they are—the cost to run these plants will stay profitable.

SO₂

In 2010, CAIR proposes to reduce SO₂ emissions 45 percent lower than 2003 levels. By 2015, the rule will reduce SO₂ emissions by 57 percent.

Because there has been little market need to substantially reduce SO₂, costs have remained low—about \$500 per ton of SO₂ emissions. In 2010, however, the cost to run scrubbers will increase 80 percent to \$900 per ton. As for the cost to trade SO₂ emissions, it will likely remain flat, at about \$500 per ton of emitted SO₂. The bottom line in 2010 is that efficient plants will not be pinched by the first wave of SO₂ mandates. Inefficient plants, though, will start to feel increased pressure.

FORECASTED SO₂ CAP-AND-TRADE PRICES:



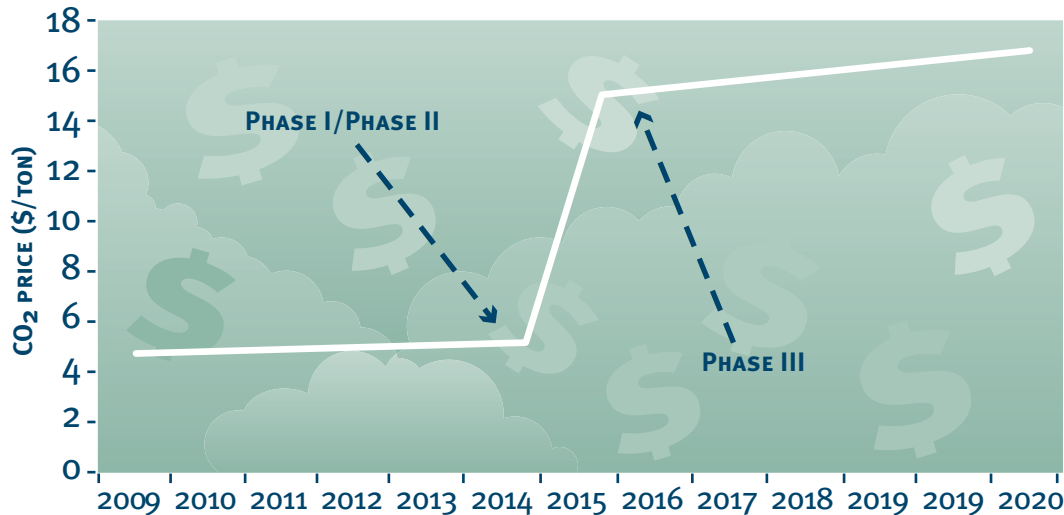
In 2015, the second wave of SO₂ mandates will increase the cost to run scrubbers from \$900 a ton to \$1,500. The cost to trade SO₂ emissions will jump substantially from \$500 a ton to \$1,000. The bottom line in 2012 for SO₂ compliance is similar to NO_x compliance. Old or inefficient plants will start to see serious pressure. However, new or efficient plants should fare well. As long as the price of natural gas and crude oil remain high, that is.

CO₂

The carbon reduction mandate that will first affect investors and plant operators is the Regional Greenhouse Gas Initiative. The

plan calls for utilities to reduce CO₂ emissions by 120 million tons per year and gives them the option to trade for allowances to offset high infrastructure costs. However, even with the cap-and-trade scheme, the initiative will likely tilt the pendulum slightly in favor of resources other than coal.

REGIONAL GREENHOUSE GAS INITIATIVE COMPLIANCE COSTS:



From 2009 to 2014, the cost to trade CO₂ will be around \$5 per ton. By Phase II of the plan, the cost will increase substantially—perhaps to \$14 per ton or more by 2015. How will this affect the mindset of investors? A \$5 per ton price tag likely won't be enough for anyone to change habits, given the cost of energy sources other than coal. However, a \$10 per ton price could discourage the development of new coal plants. It would take a

price tag of \$20 per ton to encourage downright shifts in energy production from coal to other resources.

Some Midwestern states will be watching how the initiative plays out. If the plan is successful, these coal-dependent states will likely start crafting their own regional plan.

COAL ISN'T GOING ANYWHERE ANYTIME SOON

Even with all of these regulations colliding virtually at once, coal generation will not go by the wayside as quickly as some think. Most plants have completed retrofits to be compliant with different waves of the Clean Air Act as well as in anticipation of CAIR. Even if the most costly mercury standards are imposed, today's power pricing still makes coal cost effective for most plants. Plus, the rising costs of natural gas and crude oil are in line to keep coal alive for some time. Finally, even if federal carbon legislation is passed, the likely slow incremental mandates will present little risk to most coal fleets.

of building new nuclear reactors. And both top presidential candidates for 2009 also support new nuclear capacity.

Never has there been more environmental pressure on the energy industry. And coal is a top target for environmentalists and regulators right now. But if investors monitor market forces and the compliance landscape closely, it should be easier to walk the tightrope for some time.

However, there are issues investors and plant operators need to look at, including the financial implications for the 20 percent of coal plants that have not installed retrofits. Investors also need to monitor the cost of CO₂ allowances, with \$20 per ton setting a red alarm to look elsewhere.

Finally, the country's renewed interest in nuclear and the surging interest in renewables are two things that could affect coal generation. The Bush Administration has been a firm supporter



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