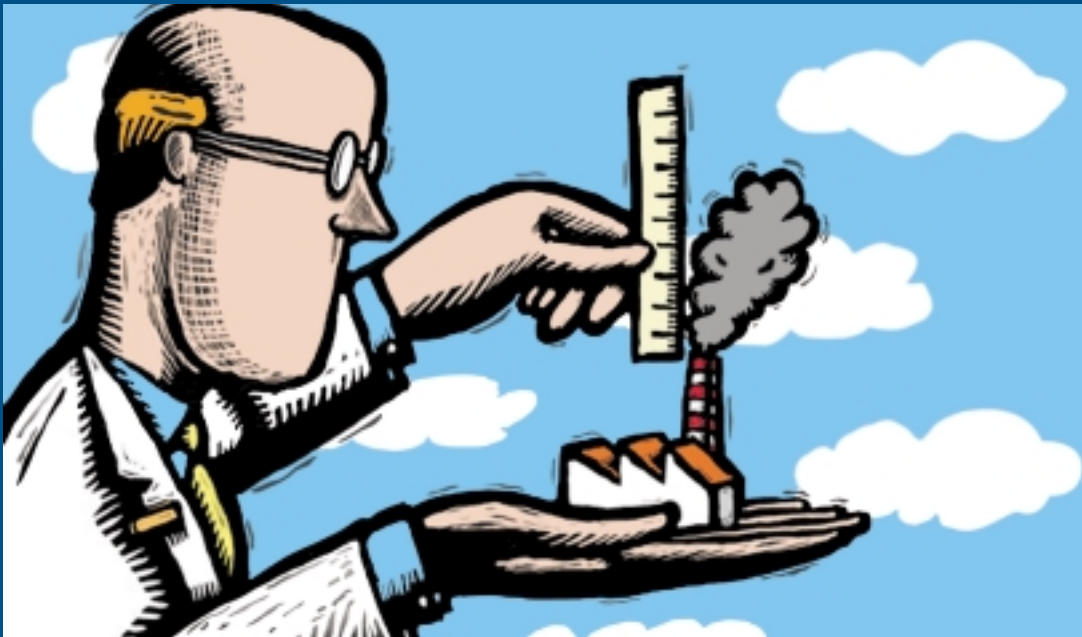


# GHG COMPLIANCE COMPLEXITIES



Greenhouse-gas regulation will impose vastly greater compliance difficulties than did the Acid Rain program.

By JOHN A. BEWICK



The cap-and-trade mechanism in the Clean Air Act Acid Rain legislation represented a path-breaking shift in environmental regulation, by moving from command and control to market mechanisms. Industry was given the freedom to meet SO<sub>2</sub> reduction targets using least-cost options, with financial incentives to reduce emissions below caps and to sell the resulting credits. According to some estimates, this saved 55 to 75 percent of initially projected program costs.

Regulation of greenhouse gases (GHG) differs dramatically. Instead of 110 power plant sources (263 units) initially affected by the SO<sub>2</sub> regulations, millions of sources emit GHG in many industrial sectors. Rather than the single gas regulated in Phase I of Acid Rain, there are multiple GHGs to regulate. This makes the problem of accurate measurement, enforcement and validation dramatically more difficult. And the expected costs are in the hundreds of billions of dollars to replace or retrofit coal-fired generating plants. If the regulations are crafted poorly, this could lead to major disruptions and dislocations in the U.S. economy.

Additionally, special interests failed to undermine the Acid Rain legislation, which kept the program simple and easy to administer. So far, climate-change regulation appears likely to be far more complex by comparison, with set asides for multiple special interests, limitations on the use of market options such as offsets to meet caps, and auctions for allocations that would impose huge punitive costs on coal-based power.

As presently drafted, for example, the Lieberman-Warner bill could make the climate-change regulatory program a bureaucratic nightmare to administer, and eliminate the incentives for reducing emissions below caps—a feature that proved important in Acid Rain regulation. Plus, carbon markets inherently are more complex than the Acid Rain market, given their international components.

In short, the impacts of proposed climate-change legislation dwarf the costs of the Acid Rain program.

While most utilities now agree that GHG regulation is necessary to fight global climate change, such regulation will lead to a vast sea change, with major impacts on the U.S. economy. The technology required to enable this transition, unlike scrubber technology in the 1990s, has not yet been shown economically viable.

Carbon-based fuel has been the engine of the industrial

age for 150 years. With the complexities inherent in the transition from a carbon-based economy to a carbon-free economy, any GHG regulation must be developed with an eye toward fairness, and implemented in a gradual transition.

In the words of Michael Wilson, vice president of governmental affairs with Florida Power & Light (FP&L), “Congress needs to take more time, hold more hearings and do more in-depth modeling of the consequences before acting.”

### Acid Rain vs. GHG Regulations

The experience of Acid Rain regulation provides valuable lessons for industries anticipating GHG regulation. There are shared regulatory structures and similar monitoring technologies. The differences between the programs, however, are far greater than the similarities.

The Acid Rain legislation required electricity generators to reduce annual SO<sub>2</sub> emissions to 8.95 million tons a year by 2010, with intermediate goals set to be met in Phase I by 2000. It also reduced NO<sub>x</sub> emissions in Phase II, which started in 2000, by 2.1 million tons a year. The target was fixed, the major sources were known, and the technical path forward for utilities—scrubbers—was well understood.

Also some pleasant surprises helped:

The price of low-sulfur coal decreased, and rail rates for shipping coal from Wyoming East were greatly reduced following rail deregulation. So utilities had known tools, and known costs for tackling the goals.

The cap-and-trade system was enacted in Title IV of the Clean Air Act to provide the basic regulatory structure. Emissions caps were set by EPA to diminish over time. Allowances were given freely, based on past SO<sub>2</sub> emissions from generating units. Less than 3 percent of the allowances were set aside and auctioned, mainly to establish allowance pricing. Very quickly, 98 percent

of the allowances were traded on private markets.

Now, SO<sub>2</sub> and NO<sub>x</sub> emissions levels are measured precisely with continuous emissions monitoring systems (CEM), and reported into an EPA database. EPA also maintains a database of allocations. Banking of excess allowances is allowed and recorded by EPA. As a result, emissions reductions can be precisely tracked, recorded and documented.

There were no offsets in the Acid Rain program, since all the major sources of SO<sub>2</sub> were known, and the environmental impacts principally affected local or adjacent geographic regions—those also containing the sources of the emissions.

For GHG emissions, current proposed legislation would

**‘Leakage,’ double counting, indirect emissions and outright fraud could undermine the credibility of the entire GHG-regulation process.**

implement a cap-and-trade system, building on the success of the model that led to the reduction of Acid Rain at what was perceived to be an affordable cost. However, significant differences separate prospective GHG regulation from the Acid Rain program.

First, CO<sub>2</sub> is a byproduct of oxidizing all fuels to produce energy. It cannot be simply scrubbed out of the exhaust stream. This complicates the technical solutions and regulatory structures required to achieve GHG-reduction goals.

For GHG, emission reduction targets will be set by year, as in the Acid Rain program. The formula for allocation of emissions allowances may be strikingly different than that for Acid

cost-effective way to meet allocation caps and therefore provide an invaluable “bridge to the future” needed by utilities in the next 10 to 15 years to meet emission-reduction goals while new technologies are being demonstrated and deployed. International offsets might cushion the near-term financial impact of emission caps more than anticipated—like rail deregulation did for Acid Rain compliance. Already 188 million CERs per year have been registered from 896 sources worldwide under the CDM mechanism in the Kyoto Protocol—91 million from China alone. This could make offsets more affordable.

However, offsets provide unprecedented challenges to ensure their legitimacy.

## The relative cheapness of some offsets will provide temptations to overlook the inherent murkiness of their validity and could cause future liabilities.

Rain, with the final allocation formula depending on the outcome of political negotiations in Congress among all the interested stakeholders.

Utilities are only one of several major sources of GHG emissions, where they are the principal source (~66 percent) of SO<sub>2</sub> emissions. GHGs are emitted by many sectors of the economy. Other major sources of GHGs include transportation, manufacturing and processing industries, and agriculture. Lobbyists representing all of these interests are scrambling to write in set-asides for allocation allowances in GHG legislation.

In the Acid Rain legislation, Congress gave extra allocations to utilities in three states with high coal use (Illinois, Indiana, and Ohio) so adjustments for special circumstances are not unprecedented. But a particularly intense battle looms over the amount of allocations that will be auctioned. Environmentalists in particular argue that all allocations should be auctioned. Utilities disagree among themselves about whether allocations should be based on kilowatt hours generated or on historic GHG emissions by generating unit.

A new aspect of GHG legislation is the practice of allowing regulated entities to use offsets to mitigate emissions and meet emission-allocation caps. Limits to the use of offsets are being hotly debated both nationally and internationally.

From a global-warming perspective, reductions of GHG emissions have equal value anywhere in the world, from any source. Under the Kyoto Protocol, offsets are certified for a variety of sources including: afforestation (planting trees), reducing emissions from Freon manufacturing, combustion of agricultural wastes, and many others. Offsets are often a more

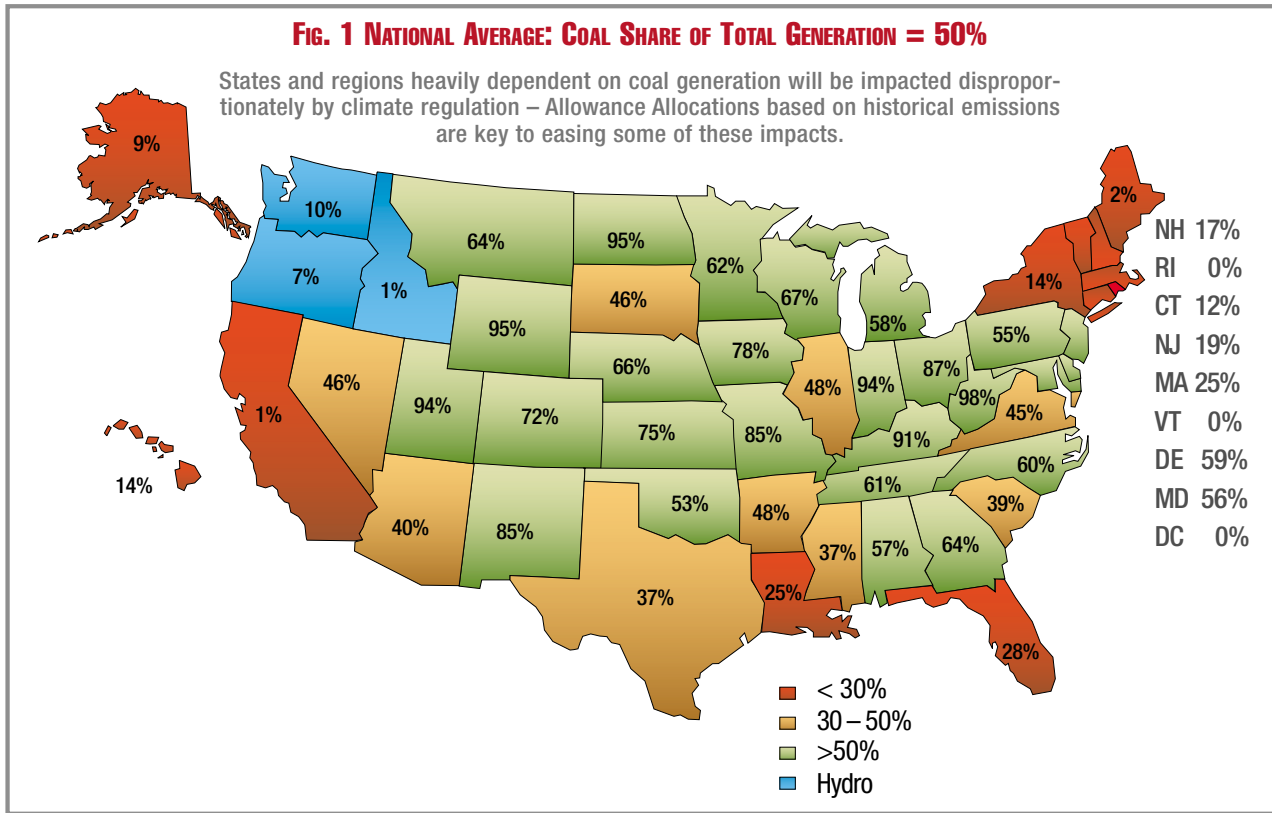
Ensuring a utility is not exceeding its allowable GHG-emission targets presents a far more complicated scenario for responsible executives than encountered with Acid Rain legislation. First, there is the challenge of monitoring and reporting emissions, tracking allocations and compensating offsets so a company knows the status of compliance at all times. The GHG challenge is that many of the offsets that will be available on

the carbon market have no measurement or documentation methods like those available for SO<sub>2</sub> emissions. Offsets involving agriculture, for instance, will have to rely on protocols for calculating emission reductions and verifications by third-party auditors. These auditors will require credentials certified by responsible parties in a new system of regulations.

Further, issues of “leakage,” double counting, indirect emissions and outright fraud could undermine the credibility of the entire process. Double counting could occur if there is joint ownership of facilities or financial ownership but not operational control of a facility. Utilities will have to develop and subscribe to a common practice to avoid double counting. And things like transmission losses might be considered an “indirect emission”—*i.e.*, emissions that are the consequences of the operations of the reporting company but actually occur at sources owned or controlled by another company.

As a result, new, legally challenging, internal protocols will need to be established for managing the risks associated with carbon markets. Groups like the World Resources Institute and ISO have published such protocols. The details will need to await future regulations, but the processes need to be established now to allow the development of new software tools, people skills and organizational structures (*see sidebar, “GHG Regulation Competencies”*).

Further, strategic planning will be enormously more difficult. Planners making 40- to 50-year investment decisions face uncertainty in many areas, including: future regulations; emission targets; costs of offsets and allowances; and availability and costs of new, unproven technologies both for generat-



ing power and for capturing and sequestering GHG emissions that will comply with regulations.

**Credit and Trading Regimes**

Trading in GHG credits presents another new challenge for utilities that differs from the annual Acid Rain auctions. The regulations that will determine trading markets are yet to be written, but the complexities are obvious.

First, credits will be available from worldwide sources for six chemical types, not just one, since greenhouse gases are defined more broadly. Then, emission reduction credits must be computed from protocols and certified by some acceptable international body rather than measured with instruments. As a result, the validity of the credits poses inherently greater uncertainty. There are issues about which protocols are acceptable and which bodies can certify credits. Then the credits must be audited periodically to assure legitimacy. Standards for GHG credits still are emerging with experience, as the Kyoto Protocol has demonstrated over the last several inaugural years.

The design of the GHG market, especially how allowances for emissions will be allocated, will have far greater economic consequences for utilities than did the Acid Rain program. Some of the new technologies for capturing and sequestering carbon require the equivalent of 30 percent of power output—a huge cost compared with scrubbers.

The key issue keeping utility executives awake at night—and keeping the industry somewhat divided—is the question of how emissions allowances under a cap-and-trade regime will be allocated. Unlike the legislation leading to Acid Rain regulations, the Lieberman-Warner Act does not propose to allocate allowances freely to generators of emissions. Instead, it proposes a limit on allowances, with an auction of the remainder.

Some companies, including FP&L, favor this approach and argue against so-called “free” allowances. Free allowances, they suggest, would reduce program revenues from auctions that could be used to subsidize technologies and reduce costs to consumers from investments in new, carbon-free sources.

On the other hand, an allocation formula like the one in the Lieberman-Warner bill would disproportionately penalize states in the Midwest that have high coal use, compared to states with less coal dependence coal (see Fig. 1). “Economists don’t get to the impact on coal fired plants,” says Bruce Braine, senior v.p. for analysis at American Electric Power (AEP).

As early as 2012, anticipated carbon prices of \$15 per ton could lead to rate increases of 7 to 18 percent in some states with high dependence on coal. For example, in these states, Duke Energy forecasts it would have to buy allowances for between 44 and 57 percent of its total emissions from Day 1 in 2012. Such costs will be passed on to ratepayers, who later will face a second bill for the costs to deploy new technolo-

gies. Duke estimates that auctioning 100 percent of allowances would increase customers' power bills by \$1 billion annually for every \$10/ton increase in allowance prices. According to Tom Williams, director of public affairs for Duke Energy, Indiana ratepayers would see increases as much as 63 percent if carbon prices were to reach \$30 a ton (see Fig. 2).

Advocates of a free allowance formula argue that giving allowances to entities that neither generate GHG emissions nor have to meet caps simply will reward non-GHG emitting utilities financially, while adding costs to those who will have to invest in new technologies or credits in order to meet caps.

### Offset Uncertainties

Under the Kyoto Protocol, the Clean Development Mechanism (CDM) was established to allow offsets from projects in non-Annex I countries (the developing world, including China, India, Africa, Brazil, etc.) that reduce GHG emissions. Certified emission reductions (CERs) may be acquired and traded in the European Union's Emissions Trading Scheme (EU ETS).

Carbon offsets provide a potentially valuable tool for buying time for utility transition to lower carbon generation. Offsets serve the function of keeping a lid on the price of allocations on the market, and thereby can benefit consumers. As long as offsets are verifiable and real, no matter the location in the world, they should be treated the same as a reduction.

U.S. utilities are very aware of the problems of verification, legitimacy and leakage associated with offsets. All agree that the process must be transparent and auditable with international standards that will be possible when a Kyoto II agreement is signed in the future. There are risks in illegitimate offsets, but

the problems are being addressed based on experience.

Fundamental issues with offsets have arisen in the European Union's attempt to use offsets to cushion the financial shock of Kyoto Protocol mandates for emissions reductions by 2012.

In the early years of the Kyoto Protocol in Europe, it turned out that the major and cheapest source of CERs was in projects that reduced emissions of hydrofluorocarbons (HFC23) in the manufacture of Freon. The cost of incineration of waste gases is about \$0.50/ton of CO<sub>2</sub>e, much cheaper than carbon credits being traded in the EU ETS. The problem is that this lowers the cost of plants participating in the CDM market, thereby promoting the manufacture of Freon that is supposed to be phased out by 2040 in developing countries, under the Montreal Protocol for controlling ozone. The CDM's solution is to allow credits only for existing Freon plants, not new plants. Nothing is simple.

Pending regulations will have to identify acceptable protocols for obtaining emission reduction credits from offsets. Many protocols now exist. The Kyoto CDM established a process for obtaining CERs, and likewise the Chicago Climate Exchange (CCX) has established its own protocols. In California, the California Climate Action Registry also issued its own protocols for registering emissions and claiming credits for offsets from forestry and livestock manure projects.

One of the problems of offsets stems from leakage of various kinds. A reforestation project in Honduras that reduces rainforest cutting in one area simply may lead to the transfer in cutting of forests elsewhere in the same country, unless the regional government has a program in place to control and verify incremental emission reductions and monitor the offsets.

Land sinks, the CERs available from projects that reduce deforestation or plant new forests, present a range of problems. Britain's Royal Society issued a report in 2001 denouncing this practice for several reasons:

First, techniques for monitoring, quantifying, and verifying land carbon sinks under the Kyoto Protocol pose significant uncertainties. Some critics argue that in the northern boreal forests, afforestation may accelerate global warming by absorbing more of the sun's rays rather than reflecting them back into the atmosphere. And

**FIG. 2 POTENTIAL COST & RATE IMPACTS — INDIANA**

"America's Climate Security Act of 2007" — (S. 2191 as Originally Introduced)

	Year	Allocation Distribution Under S. 2191			If Amended to Require Full Auction	
		If Allowance Price =	Cost to Purchase Allowance Shortfall	Estimated Cumulative Rate Change	Cost to Purchase 100% of Allowances	Estimated Cumulative Rate Change
<b>Scenario 1</b>	2012	\$15.00	\$340 M	17.70%	\$600 M	31.60%
	2015	\$17.36	\$360 M	18.60%	\$640 M	33.80%
	2020	\$22.16	\$560 M	29.60%	\$830 M	43.60%
<b>Scenario 2</b>	2012	\$30.00	\$670 M	35.40%	\$1.20 B	63.20%
	2015	\$34.73	\$710 M	37.40%	\$1.28 B	67.50%
	2020	\$44.32	\$1.13 B	59.40%	\$1.66 B	87.30%
<b>Scenario 3</b>	2012	\$45.00	\$1.01 B	53.10%	\$1.80 B	94.90%
	2015	\$52.09	\$1.07 B	56.10%	\$1.93 B	101.30%
	2020	\$66.49	\$1.69 B	89.20%	\$2.49 B	130.90%

**Notes:**

- 1) Estimated rate changes are relative to current rates and reflect average rates across all customer classes.
- 2) Allowance prices escalated at 5% per year from the starting price.
- 3) These rate changes do not reflect future capital spend.

## GHG COMPLIANCE COMPETENCIES

Greenhouse-gas reduction requirements will require utilities to develop and implement new internal competencies, including:

- ❑ Significant new staff requirements for auctions and trading credits implementation in utility planning and risk-management departments;
- ❑ Software systems to gather information status of allowances and credits to support trading and auditing activities (Chevron offers such a tool free of charge);
- ❑ Inventory quality teams to review and assure accuracy of compliance and reporting;
- ❑ Quality-management plans for auditing performance, with senior management review and after certification; and
- ❑ Uncertainty analysis skills to deal with scientific issues surrounding emission and offset calculations, models and protocols, etc. —**JB**

more than 50 percent of the timber exported from Brazil, Indonesia and Cameroon is alleged to be illegal, complicating validation of overseas reforestation or reforestation initiatives.

Plus, practical issues can threaten the permanence of land sinks. Even in the United States it's impossible to prevent major forest fires, which would liberate carbon from planted trees.

For these reasons, environmental advocates in the United States strenuously oppose land sinks and offsets. They argue projects designed to enhance carbon sinks shouldn't be allowed to divert financial and political resources away from the core issue—restructuring of energy generation and use.

For U.S. utilities there likely will be multiple markets for acquiring CERs with different protocols. Sorting out the strengths and weaknesses of these will be a challenge. Careful documentation will be required, and auditing the CERs over time to ensure their on-going legitimacy will be especially difficult. *Caveat emptor* will take on new relevance to utilities that purchase CERs, despite assurances from certifying bodies and their auditors.

The relative cheapness of some offsets will provide temptations to overlook the inherent murkiness of their validity and could cause future liabilities. With forestry and agricultural projects, emission reductions are based on models that are extremely hard to confirm by measurement. Reductions in emissions of specific GHGs from industrial processes may be more subject to measurement—as with SO<sub>2</sub>—and therefore will be more reliable sources of GHG offset credits.

### Regulatory Strategies

Compliance challenges for climate change dwarf those previously experienced in Acid Rain. They will require utilities to institute sophisticated protocols for assuring they're in defensible compliance with applicable regulations.

The World Resources Institute has issued a model protocol that identifies the key features that will be needed for corporations to comply with GHG regulations [See *The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard, Revised Edition*, (<http://www.wri.org/project/ghg-protocol>)]. The

116-page document outlines the new world of uncertainties utilities face—including regulatory limits on GHG emissions, availability of allowances and offsets, and unproven new technologies for meeting emission caps.

In addition to expanding their capabilities to play in the carbon markets, utilities will need to develop diverse technical skills to evaluate protocols for GHG reduction efforts and accounting skills to validate and document their choices. These skills will help eliminate errors in meeting caps on GHG emissions.

Many utilities in the near term will opt for currently available new low carbon-emitting generating capacity strategies. Demand for natural gas-fired plants is projected to grow in the short term as a preferred alternative to coal, until new coal technologies are demonstrated in the next decade. And proposals for new nuclear capacity are surfacing around the country—a hedge against both the regulatory and technology uncertainties utilities face (see *Business & Money*, p.18). Negotiating compensation for new investments with PUCs will be a challenge, requiring additional entrepreneurial skills that go beyond the traditional skill set.

In this changing landscape, strategic planning will become more important and more complicated for U.S. utility companies. There will be a need for much more sophisticated analyses using decision theory or other models to scope and evaluate options with huge, long-term investment costs. Losses from guessing wrong can be financially severe. New planning capacities with broader technical proficiencies will be the keys to success under a compliance regime that will be vastly more complex and costly than anything utilities have previously faced.

The good news is that despite the enormity of the challenges, there are promising options for breaking new paths to a less carbon-intensive future. ■

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