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Report RL34235

*Air Pollution as a Commodity: Regulation of the Sulfur
Dioxide Allowance Market*

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Division

October 31, 2007

Abstract. A number of congressional proposals to advance programs that reduce greenhouse gases (GHGs) have been introduced in the 110th Congress. Proposals receiving particular attention would create market-based GHG reduction programs along the lines of the allowance trading provisions of the current acid rain reduction program established by Title IV of the 1990 Clean Air Act Amendments. Under the program, an allowance is limited authorization to emit a ton of pollutant.

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Air Pollution as a Commodity: Regulation of the Sulfur Dioxide Allowance Market

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Summary

A number of congressional proposals to advance programs that reduce greenhouse gases (GHGs) have been introduced in the 110th Congress. Proposals receiving particular attention would create market-based GHG reduction programs along the lines of the allowance trading provisions of the current acid rain reduction program established by Title IV of the 1990 Clean Air Act Amendments. Under the program, an allowance is limited authorization to emit a ton of pollutant.

However, there are several important differences. For example, the scope of the greenhouse gases control program would be substantially greater than the Title IV program, involving more covered sectors and entities. This diversity multiplies as the global nature of the climate change issue is considered, along with the multiple GHGs involved. Thus, a carbon market is likely to involve far greater numbers of affected parties from diverse industries than the current Title IV program.

It will also involve far greater numbers of tradeable allowances than the current Title IV program. Under the current program, about 9 million allowances are allocated to over 2,000 emission sources annually. In contrast, a greenhouse gas program that capped emissions in the electric power, transportation, and industry sectors at their 1990 levels at some point in the future would be allocating about 4.85 billion allowances annually. Trading activities under Title IV has been increasing since 2005. However, it doesn't approach the anticipated volumes that would occur if a greenhouse gas cap-and-trade program was instituted. Likewise, the economic value of a future carbon market is likely to be substantially greater than the Title IV program. Currently, the annual allocation of SO₂ allowances has a market value of about \$4.5 billion. Using estimates of \$15 to \$25 an allowance, the annual allocation of 4.85 billion allowances posited above for a greenhouse gas program would have a market value of \$72.8 billion to \$121.3 billion.

Despite these differences in scope and magnitude, there are trends in Title IV trading that are likely to continue in a carbon market. First, there is a trend toward more diverse, non-traditional participants in the Title IV market. Like the Title IV market, the economic importance of a carbon market will likely draw in entities not directly affected by the reduction requirements, such as financial institutions. These entities' motivations may be equally diverse, including facilitating projects involving the need for allowances, portfolio balancing, intermediary fees, and trading profits.

Second, as noted, there is a trend in the Title IV market toward using financial instruments to manage allowance price risk. Given the greater economic stakes involved in a carbon market, this trend toward more sophisticated financial instruments is likely to emerge early as a hedge against price uncertainty. The emergence of entities well-versed in the use of these instruments may reinforce the trend and make options, collars, strangles, and other structures as common in the allowance market as they are in other commodity markets. With a more liquid and dynamic market, a carbon market may look more like other energy markets, such as natural gas and oil, than the somewhat sedate SO₂ allowance market.

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Introduction

A number of congressional proposals to advance programs that reduce greenhouse gases have been introduced in the 110th Congress. Proposals receiving particular attention would create market-based greenhouse gas reduction programs along the lines of the trading provisions of the current acid rain reduction program established by the 1990 Clean Air Act Amendments.¹ These “cap-and-trade” schemes would impose a ceiling (cap) on total annual emissions of greenhouse gases and establish a market in pollution rights, called allowances, between affected entities. An allowance would be a limited authorization by the government to emit one metric ton of carbon dioxide equivalent (CO₂e), and could be bought and sold (traded) or held (banked) by participating parties.

These domestic proposals have parallels with the programs being implemented in Europe to meet its obligations under the Kyoto Protocol. Specifically, the European Union (EU) has decided to implement a cap-and-trade program, along with other market-oriented mechanisms permitted under the Kyoto Protocol, to help it achieve compliance at least cost.² The EU’s decision to use emission trading to implement the Kyoto Protocol is at least partly based on the successful emissions trading program used by the United States to implement its sulfur dioxide (acid rain) control program contained in Title IV of the 1990 Clean Air Act Amendments.³

These two operating cap-and-trade programs—the U.S.’s acid rain program and the EU’s climate change program—may provide insights for the design of a domestic greenhouse gas reduction scheme. However, while the experiences of the EU system directly relate to the greenhouse gas reduction initiative of the domestic legislative proposals, it has operated only a short time (see text box). The acid rain control program has a longer operating history, although the control scheme differs in some important ways—e.g., it is internal to one nation and involves fewer types of sources.

Among the lessons that Phase 1 of the European Trading System may have for a similar U.S. program is that allowance prices are linked to the price of other energy commodities.⁴ Analysis of ETS allowance prices during Phase 1 suggests the most important variables in determining allowance price changes have been oil and natural gas price changes.⁵ This suggests that traders will pursue arbitrage strategies involving simultaneous transactions in allowances and oil and gas contracts. For example, a trader anticipating a rise in the price of oil might take a position in allowances in the expectation that the two prices would move in tandem. Since there is

¹ P.L. 101-549, Title IV (November 15, 1990).

² Norway, a non-EU country, also has instituted a CO₂ trading system. Various other countries and a state-sponsored regional initiative located in the northeastern United States involving several states are developing mandatory cap-and-trade system programs, but are not operating at the current time. For a review of these emerging programs, along with other voluntary efforts, see International Energy Agency, *Act Locally, Trade Globally* (2005).

³ P.L. 101-549, Title IV (November 15, 1990).

⁴ For more on the EU-ETS, see CRS Report RL34150, *Climate Change and the EU Emissions Trading Scheme (ETS): Kyoto and Beyond*, by Larry Parker.

⁵ For example, when natural gas, the cleaner fuel, becomes more expensive relative to oil, industrial users may switch to oil, creating increased demand for allowances. Maria Mansanet-Bataller, Angel Pardo, and Enric Valor, “CO₂ Prices, Energy and Weather,” 28 *The Energy Journal* 3 (2007), pp. 73-92. Powernext (a French energy exchange) has described CO₂ prices as the cornerstone of relative energy prices for generating electricity. See Jean-Francois CONIL-LACOSTE, Chief Executive Officer, Powernext SA, *Market Based Mechanisms to Fight Climate Change* (2006).

widespread suspicion that excessive speculation by hedge funds and others has affected energy prices in recent years,⁶ the possibility that the price of allowances could also be subject to distortion or manipulation will be a policy concern.

Taking that hint from ETS, this report examines the Title IV sulfur dioxide cap-and-trade program, with a focus on the market activity and the current regulatory overlay. From that discussion, observations are drawn about implications for a future greenhouse gas trading scheme. No current U.S. proposal has specific provisions with respect to carbon allowance financial instruments or who would regulate such a market or its participants.

The EU's **Emissions Trading System (ETS)** covers more than 11,500 energy intensive facilities across the 27 EU Member countries, including oil refineries, powerplants over 20 megawatts (MW) in capacity, coke ovens, and iron and steel plants, along with cement, glass, lime, brick, ceramics, and pulp and paper installations. Covered entities emit about 45% of the EU's carbon dioxide emissions. The trading program covers neither CO₂ emissions from the transportation sector, which account for about 25% of the EU's total greenhouse gas emissions, nor emissions of non-CO₂ greenhouse gases, which account for about 20% of the EU's total greenhouse gas emissions. A "Phase 1" trading period began January 1, 2005. A second, Phase 2, trading period is scheduled to begin in 2008, covering the period of the Kyoto Protocol, with a third one planned for 2013. (For further background on the ETS and its first year of operation, see CRS Report RL33581, *Climate Change: The European Union's Emissions Trading System (EU-ETS)*, by Larry Parker. Relevant directives on the EU-ETS are available at <http://ec.europa.eu/environment/climat/emission.htm#brochure>.)

Overview: Title IV

Title IV of the 1990 Clean Air Act Amendments supplements the sulfur dioxide (SO₂) command-and-control system of the Clean Air Act (CAA) by limiting total SO₂ emissions from electric generating facilities to 8.95 million tons annually, beginning in the year 2000.⁷ Title IV essentially caps SO₂ emissions at individual utility sources operating before enactment of the CAA in 1990 (known as "existing sources") through a tonnage limitation, and at those plants beginning operation after enactment (known as "new sources") through an emissions offset requirement. SO₂ emissions from most existing sources are capped at a specified emission rate times a historical average fuel consumption level. Beginning January 1, 2000, SO₂ emissions from new plants commencing operation after enactment must be offset—in effect, the emissions cap for new sources is zero. Their allowances come from emissions reductions at existing facilities. The program was implemented through a two-phase process with the final phase beginning in 2000.

To implement the SO₂ reduction program, the law creates a comprehensive permit and emissions allowance system (cap-and-trade program). An allowance is a limited authorization to emit a ton of SO₂ during or after a specified year. Issued by EPA, the allowances are allocated to existing power plant units in accordance with formulas delineated in the law. The owner of the facility receives the allowances for a given plant regardless of the actual operation of the plant. For example, an owner may choose to shut down an existing power plant and use those allowances to offset emissions from two newer, cleaner facilities. As noted, generally, a power plant that commences operation after enactment receives no allowances, requiring new units to obtain allowances from those with allowances, or purchase them at an EPA-sponsored auction, in order

⁶ See, e.g., Senate Permanent Subcommittee on Investigations, "Excessive Speculation in the Natural Gas Market" (Staff Report), June 2007, 135 p.

⁷ Clean Air Act Amendments of 1990, P.L. 101-549, Title IV. For a more detail discussion of the title, see Larry B. Parker, Robert D. Poling, and John L. Moore, "Clean Air Act Allowance Trading," 21 *Environmental Law* 2021-2068 (1991).

to operate after 2000. An owner may trade allowances nationally as well as bank allowances for future use or sale.

If an affected unit does not have sufficient allowances to cover its emissions for a given year, it is subject to an emission penalty of \$2,000 (indexed to inflation) per ton of excess SO₂, and it submits to EPA a plan for offsetting those excess emissions in the next year (or longer if EPA approves). Further, EPA must deduct allowances equal to the excess tonnage from the source's allocation for the next year.

Another EPA responsibility is to provide for allowance auctions. For the post-2000 period, the law sets aside a percentage of available allowances for auction. Anyone may participate in these auctions as a buyer or seller, and those selling allowances may specify a minimum sale price. EPA may delegate or contract the conduct of the auctions to other agencies, such as to the Department of the Treasury, or even to nongovernmental groups or organizations. Two streams of allowances are sold in the auctions. The first stream represents "spot sales" of allowances that must either be used in the year they are sold or banked for use in a later year. The second stream represents "advance sales" of allowances that must either be used in the seventh year after the year they are first offered for sale or be banked for use in a later year. For 2000 and thereafter, Title IV provides that 125,000 allowances be set-aside annually for spot sales, and 125,000 for advance sales.

Administering the Program: The Environmental Protection Agency (EPA)

It is EPA's responsibility to administer the trading, banking, and auctioning of allowances.

Allowance Accounting

EPA has developed an integrated system to track allowances (the Allowance Tracking System—ATS);⁸ to verify and record SO₂ emissions from affected units (the Emission Tracking System—ETS); and to reconcile (true-up) allowances and emissions at the end of the year. The Allowance Tracking System is the official record of allowance transfers and balances used for compliance purposes. Each participant in the system has an ATS account, and each account has an identification number.

Table 1 identifies what the ATS tracks and does not track with respect to allowance activity. As suggested, EPA primarily gathers information to ensure compliance with the emission limitations of Title IV—the ATS is not a trading platform. Participants are not required to record all transfers with EPA until the affected allowances are to be used for compliance. Participants must notify EPA to have any transfers recorded in the ATS. When parties agree on a transaction that they want recorded on the ATS, they provide information on the buyer and seller and the serial numbers of the affected allowances to the ATS which records the transfer.

⁸ EPA has renamed the ATS the Allowance Management System (AMS), but ATS remains the commonly used term and will be used in this report.

Table 1. Information Recorded by EPA's Allowance Tracking System

ATS Records	ATS Does Not Record
Allowances issued	Allowance prices
Allowances held in each account	Option trades
Allowances held in various EPA reserves	Any allowance transaction not officially reported to EPA
Allowances surrendered for compliance purposes	
Allowances transferred between accounts	

To facilitate its primary compliance responsibility, EPA assigns each allowance allocated a unique 12-digit serial number that incorporates the first year it can be used for compliance purposes. These allowances may be held in one of two types of ATS accounts. First, there are Unit Accounts where allowances provided under Title IV allocation formulas are deposited and where allowances are removed by EPA for compliance purposes. Second, there are General Accounts that may be created by EPA for anyone wishing to hold, trade, or retire allowances. Participating entities with General Accounts include (1) utilities who keep a pooled reserve of allowances not needed immediately for compliance (i.e., an allowance bank); (2) brokers who need a holding account for allowances in the process of being bought or sold; (3) investors holding allowances for future sale; and (4) environmental and other groups holding allowances they wish to remove from the market (i.e., retire).

Allowance Auctions

A key provision of Title IV to ensure liquidity in the SO₂ markets for new entrants is the EPA allowance auction. As noted above, the EPA is required to auction 250,000 allowances annually in two streams, spot and advance. The auctions began in 1993 and are held annually—usually on the last Monday in March. Sealed bids entailing the number, type, and price, along with payment, are sent to EPA no later than three business days before the auctions.

The auctions sell the allowances according to bid price, starting with the highest bid and continuing down until all allowances are sold or there are no more bids. Unlike allowances offered by private holders for auction, these EPA allowances do not have a minimum price.

For the first 13 years, the auctions were conducted by the Chicago Board of Trade (CBOT) for EPA. CBOT received no compensation for the service, nor was it allowed to charge fees. Beginning in March 2006, CBOT decided to stop administering the auctions, resulting in EPA now conducting them directly.

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Interface with Electricity Regulation: The Federal Energy Regulatory Commission (FERC) and State Public Utility Commissions (PUCs)

Background

The 1990 Clean Air Act Amendments were enacted during a time of transition in the electric utility industry. There are three components to electric power delivery: generation, transmission, and distribution. Historically, electricity service was defined as a natural monopoly, meaning that the industry had (1) an inherent tendency toward declining long-term costs, (2) high threshold investment, and (3) technological conditions that limited the number of potential entrants. In addition, many regulators considered unified control of generation, transmission, and distribution the most efficient means of providing service. As a result, most people (about 75%) were served by vertically integrated, investor-owned utilities.

The Public Utility Holding Company Act (PUHCA)⁹ and the Federal Power Act (FPA) of 1935 (Title I and Title II of the Public Utility Act)¹⁰ established a regime for regulating electric utilities that gave specific and separate powers to the states and the federal government. Essentially, a regulatory bargain was made between the government and utilities. Under this bargain, utilities must provide electricity to all users at reasonable, regulated rates in exchange for an exclusive franchise service territory. State regulatory commissions address intrastate utility activities, including wholesale and retail rate-making. Authorities of these commissions tend to be as broad and varied as the states are diverse. At the least, a state public utility commission will have authority over retail rates, and often over investment and debt. At the other end of the spectrum, the state regulatory body will oversee many facets of utility operation. Despite this diversity, the essential mission of the PUC is the establishment of retail electric prices. This is accomplished through an adversarial hearing process complete with attorneys, briefs, witnesses, etc. The central issues in such cases are the total amount of money the utility will be permitted to collect (revenue requirement) and how the burden of the revenue requirement will be distributed among the various customer classes (rate structure).¹¹ This is commonly known as “rate of return” (ROR) regulation.

Under the regime set up by FPA, federal economic regulation addresses wholesale transactions and rates for electric power flowing in interstate commerce. Historically, federal regulation followed state regulation and is premised on the need to fill the regulatory vacuum resulting from the constitutional inability of states to regulate interstate commerce. In this bifurcation of regulatory jurisdiction, federal regulation is limited and conceived to supplement state regulation. The Federal Energy Regulatory Commission (FERC) has the principal functions at the federal level for the economic regulation of the electricity utility industry, including financial transactions, wholesale rate regulation, transactions involving transmission of unbundled retail

⁹ 15 U.S.C. 79 et seq.

¹⁰ 16 U.S.C. 791 et seq.

¹¹ For a comprehensive discussion of state and federal regulation, see Robert Poling, et. al., *Electricity: A New Regulatory Order?* Report for the Committee on Energy and Commerce, House of Representative (June 1991), committee print.

electricity, interconnection and wheeling of wholesale electricity, and ensuring adequate and reliable service. In addition, until passage of the 2005 Energy Policy Act (EPACT05),¹² the Securities and Exchange Commission (SEC) regulated utilities' corporate structure and business ventures under PUHCA to prevent a recurrence of the abusive practices of the 1920s (e.g., cross-subsidization, self-dealing, pyramiding, etc.).

This comprehensive, cost-based approach to regulation began to undergo change in the 1970s and 1980s as passage of the Public Utility Regulatory Policies Act of 1978 (PURPA)¹³ and the Fuel Use Act of 1978 (FUA)¹⁴ helped establish independent electricity generators—electricity producers who sold at wholesale and had no exclusive franchise area. Building on the perceived success of these independent generators under PURPA, the Energy Policy Act of 1992 (EPACT92) created a new category of wholesale electric generators called Exempt Wholesale Generators (EWGs) that are not considered utilities and not regulated under PUHCA.¹⁵ EWGs, also referred to as *merchant generators*, were intended to create a competitive wholesale electric generation sector. EPACT92 effectively initiated deregulated wholesale generation by creating a class of generators that were able to locate beyond a typical service territory with open access to the existing transmission system. EPACT05 continued this process by adding provisions to address system reliability, repeal PUHCA, and modify PURPA.¹⁶

The current status of these initiatives and resulting state responses is a mixture of states with traditional, comprehensive ROR regulation of electricity and those with a restructured industry with segmented generation, transmission, and distribution components. Over the past 20 years, some States have truncated their ROR regulation to the extent they have chosen to restructure their industry in response to Federal initiatives. In states that have not restructured, the system operates as it has since enactment of the Federal Power Act, with retail consumers paying one price that includes transmission, distribution, and generation. This is referred to as a *bundled transaction*. In states that have restructured, consumers are billed for separate transmission, distribution, and generation charges. This is referred to as *unbundled electricity service*. In those states, retail consumers are allowed to choose their retail generation supplier; however, few states actually have competitive markets for retail choice (exceptions include Texas and Massachusetts). FERC regulates all transmission, including unbundled retail transactions.¹⁷

¹² P.L. 109-58.

¹³ P.L. 95-617, 16 U.S.C. 2601.

¹⁴ P.L. 95-620.

¹⁵ Exempt Wholesale Generators may sell electricity only at wholesale. EWGs may be located anywhere, including foreign countries. Before enactment of EPACT05, utility generators were limited by the Public Utility Holding Company Act of 1935 (PUHCA) to operate within one state.

¹⁶ In repealing PUHCA, EPACT05 provides that FERC and state regulatory bodies must be given access to utility books and records. Also, FERC is given approval authority over the acquisition of securities and the merger, sale, lease, or disposition of facilities under FERC's jurisdiction with a value in excess of \$10 million. With respect to PURPA, EPACT05 repeals the PURPA mandatory purchase requirement for new contracts if FERC finds that a competitive electricity market exists and a qualifying facility has adequate access to wholesale markets. Among its provisions to address reliability, FERC is authorized to certify a national electric reliability organization (ERO) to enforce mandatory reliability standards for the bulk power system. For more information on EPACT05, see CRS Report RL33248, *Energy Policy Act of 2005, P.L. 109-58: Electricity Provisions*, by Amy Abel.

¹⁷ On October 3, 2001, the U.S. Supreme Court heard arguments in a case (*New York et al. v. Federal Energy Regulatory Commission*) that challenged FERC's authority to regulate transmission for retail sales if a utility unbundles transmission from other retail charges. In states that have opened their generation market to competition, unbundling occurs when customers are charged separately for generation, transmission, and distribution. Nine states, led by New York, filed suit, arguing that the Federal Power Act gives FERC jurisdiction over wholesale sales and interstate (continued...)

FERC Allowance Accounting

With the restructuring of the electric utility industry, FERC generally does not set cost-based rates for electricity generation under its jurisdiction. Rather, FERC conducts a two-pronged horizontal and vertical market power analysis to determine an entity's eligibility for "market-based" wholesale rates.¹⁸ If eligible, the entity may set its wholesale prices according to market demand, not according to production costs.

Because of the market-based nature of FERC wholesale rates, allowances are an accounting issue, not a ratemaking issue for FERC. Electric public utilities and licensees within FERC jurisdiction are required to maintain their books and records in accordance with FERC's Uniform System of Accounts (USofA).¹⁹ The USofA guides the jurisdictional entity in understanding the information it needs to report on various FERC forms. Included in the USofA are instructions on how to account for allowances allocated to the entity under the 1990 Clean Air Act, or acquired by the entity for speculative purposes. Allowances owned for other than speculative purposes are accounted for at cost in either Account 158.1 (Allowance Inventory), or Account 158.2 (Allowances Withheld) as appropriate. Allowances acquired for speculative purposes are accounted for in Account 124 (Other Investments).²⁰

By defining allowance value in terms of historic costs, allowances allocated by EPA to entities are valued at zero. FERC does require that the records supporting Account 158.1 and 158.2 be maintained "in sufficient detail so as to provide the number of allowances and the related cost by vintage year." Likewise, the Uniform System of Accounts also provides instruction on accounting for gains and losses from selling allowances.

It should be noted that the Internal Revenue Service (IRS) also values allowances allocated by EPA to an entity on a zero-cost basis.²¹

State Public Utility Commissions

In states with bundled rates, the valuing and disposition of allowances is more than an accounting issue, it is also a ratemaking issue. During and after passage of Title IV, there was substantial debate and studies were done on the role of the PUCs in facilitating (or hindering) allowance trading.²² In Title IV, the regulatory treatment of allowances is left to the appropriate state and

(...continued)

transmission and leaves all retail issues up to the state utility commissions. Enron in an amicus brief argued that FERC clearly has jurisdiction over all transmission and FERC is obligated to prevent transmission owners from discriminating against those wishing to use the transmission lines. On March 4, 2002, the U.S. Supreme Court ruled in favor of FERC and held that FERC has jurisdiction over transmission, including unbundled retail transactions.

¹⁸ FERC Order 697, *Market-Based Rates for Wholesale Sales of Electric Energy, Capacity and Ancillary Services by Public Utilities*, Docket No. RM04-7-000, Final Rule (issued June 21, 2007).

¹⁹ Code of Federal Regulations, Title 18, *Conservation of Power and Water Resources*, Part 101.

²⁰ Code of Federal Regulations, Title 18, *Conservation of Power and Water Resources*, Part 101. Allowance accounting is described under *General Instructions Number 21*.

²¹ Treatment of emission allowances under the Federal income tax is spelled out in Rev. Rul. 92-16, *Internal Revenue bulletin*, No. 1992-12, March 23, 1992, p. 5 and Rev. Proc. 92-91, *Internal Revenue Bulletin*, No. 1992-46, November 16, 1992-13, p. 32-33. See also, Announcement 92-50, *Internal Revenue bulletin*, No. 1992-12, March 30, 1992, p. 32.

²² For example, see Kenneth Rose, et. al., *Public Utility Implementation of The Clean Air Act's Allowance Trading Program*, National Regulatory Research Institute, May 1992.

federal regulatory bodies. Title IV contains no mandated requirements regarding the treatment of allowance transactions in state utility rate proceedings. Basically, Congress chose to leave the state commissions free to apply any rate treatment they deem reasonable and appropriate.

The states responded in a diverse manner, some states issuing broad guidelines on treatment of allowance transactions while others decided such events on a case-by-case basis. An analysis of the interaction between PUCs and the allowance system made three general observations about the resulting PUC treatment of allowances: (1) regulations tend to require 100% of both expenses and revenues from allowances to be returned to ratepayers with net gains (losses) incurred used to offset (or increase) fuel costs; (2) a few states have allowed utilities to retain some of the profits as an incentive to sell excess allowances; (3) state regulations tend to be tailored to a state's specific circumstance—"allowance rich" states have regulations encouraging sales, "allowance poor" states have regulations encouraging purchases.²³ The focus of PUC decisions has not been to encourage allowance transactions, but generally to ensure ratepayers and not shareholders receive the benefits of the allowances. In some cases, PUCs have also used their authority to encourage utilities to protect high-sulfur coal production, even if it is not the most cost-effective control strategy.²⁴

Allowance Transactions

Internal Transfers

When the 1990 Clean Air Act Amendments were enacted, about 75% of the allowances were allocated to vertically integrated, ROR regulated entities. Today, that percentage has shifted with more allowances allocated to independent generating entities as some utilities have divested themselves of their generating assets. This diversification of ownership is reflected to some degree in the ATS statistics on official transfers and transactions.²⁵ As indicated by **Table 2**, in the first two years of trading, transfers between economically unrelated entities were a small percentage of total transfers. More recent data suggest that transfers between unrelated entities account for about 50% of total transfers. However, it is clear that internal transfers remain a major part of the allowance market, even in a restructured industry, and that the total number of official transactions occurring is quite modest.

Internal transfers (i.e., transfers within or between economically related entities) tend to be transacted in accordance with agreements that the utility and/or holding company has filed with the appropriate state PUC, or FERC, or both.²⁶

²³ Elizabeth M Bailey, *Allowance Trading Activity and State Regulatory Rulings: Evidence from the U.S. Acid Rain Program*, MIT, March 1998, pp. 9-10.

²⁴ See Ken-Ichi Mizobuchi, *The Movements of PUC Regulation Effects in the SO₂ Emission Allowance Market*, Kobe University, May 2004.

²⁵ "Official" here means that the transfer has been recorded by the ATS. The actual transfer of ownership may have occurred earlier. As noted earlier, parties are not required to notify the ATS of any transfer within a specific time period and may choose for some reason to delay informing the ATS of a transfer.

²⁶ For example, see the now terminated agreement AEP System Interim Allowance Agreement filed with the FERC on August 30, 1996 in Docket No ER96-2213-000 designated as Appalachian Power Company Supplement No. 9 to Rate Schedule FPC No. 20; Columbus Southern Power Company Supplement No. 3 to Rate Schedule FPC No. 30; Indiana Michigan Power Company Supplement No. 10 to Rate Schedule FPC No. 17; Kentucky Power Company Supplement (continued...)

Table 2. EPA Official Allowance Transfers and Transactions: 1994-2003

Year	Total Transfers (millions of allowances)	Transfers between economically distinct organizations (millions of allowances)	Percent of Total Transfers	Total Number of Transactions	Transactions between economically distinct organizations	Percent of Total Transactions
1994	9.2	0.9	9.8%	215	66	30.7%
1995	16.7	1.9	11.4%	613	329	53.7%
1996	8.2	4.4	53.7%	1,074	578	53.8%
1997	15.2	7.9	52.0%	1,429	810	56.7%
1998	13.5	9.5	70.4%	1,584	942	59.5%
1999	18.7	6.2	33.2%	2,832	1,743	61.5%
2000	25.0	12.7	50.1%	4,690	2,889	61.6%
2001	22.5	12.6	56.0%	4,900	2,330	47.6%
2002	21.4	11.6	54.2%	5,755	2,841	49.4%
2003	16.5	8.1	49.1%	4,198	1,544	36.8%
2004	15.3	7.5	49.0%	20,000	n/a	n/a
2005	19.9	10.0	50.3%	5,700	n/a	n/a

Source: U.S. Environmental Protection Agency, 2007.

Over the Counter: Cash Market, Futures and Options

Beyond restructuring, other entities are emerging as participants in the allowance markets. This increased diversity of interest in the allowance market is reflected in the most recent (2007) EPA allowance auction. As indicated by **Table 3**, several brokerages have created positions in the allowance market, both for themselves and their clients. This may suggest an increasing importance of intermediaries to the functioning of the allowance market, the development of a more liquid market, and to the maturing of that market.

Table 3. EPA 2007 Auction Results

(Winners of more than 20 allowances)

Spot Market Bid Winners	Quantity	Percent of Total Allowances offered (125,000)
Morgan Stanley	50,000	40.00%
KS&T, LP	30,575	24.46%

(...continued)

No. 6 to Rate Schedule FPC No. 11; and, Ohio Power Company Supplement No. 9 to Rate Schedule FPC No. 23. Agreement terminated by FERC, effective January 1, 2002, in accordance with the mutual consent of the parties thereto.

Saracen Energy LP	15,000	12.00%
Transalta Energy Marketing U.S.	9,900	7.92%
South Carolina Public Service Authority	7,500	6.00%
Alpha	5,000	4.00%
Constellation Energy Commodities Group, Inc.	2,500	2.00%
Merrill Lynch Commodities Inc.	2,500	2.00%
The Detroit Edison Company	2,000	1.60%
TOTAL SPOT	124,975	99.98%

7 Year Advance Bid Winners	Quantity	Percent of Total Allowances offered (125,000)
American Electric Power	80,000	64.00%
DTE	30,000	24.00%
Cantor Fitzgerald Brokerage	10,000	8.00%
Bear Energy	4,986	3.99%
TOTAL ADVANCE	124,986	99.98%

Source: Environmental Protection Agency, 2007

The basic market for allowance trading is the Over-The-Counter (OTC) market. The most common trading structure involves spot sales with immediate settlement accounting and delivery into EPA's Allowance Tracking System (ATS) with payment by wire transfer in three business days.²⁷ Daily spot trading volumes for immediate settlement are estimated in the 10,000 to 25,000 ton range.²⁸ Forward settlement transactions are less common and are fairly short-dated—6 to 18 months out. Vintage swaps also occur in both markets with the difference in value usually paid in additional allowances rather than cash.²⁹ This preference for allowances reflects regulated entities' desire to keep these transactions non-taxable under current IRS regulations. Cash market transactions are facilitated in some cases through available electronic trading platforms, such as Intercontinental Exchange, Inc. (ICE) and TradeSpark (CantorCO2e), and by the emergence of a number of allowance brokers. Currently, EPA lists a dozen allowance brokers on its website.³⁰ A similar list is available from the Environmental Markets Association—a trade association.³¹ Brokers tend to be registered with the SEC and one or more Self-Regulatory Organizations, such as FINRA; but participation in this market would not in itself make a firm subject to SEC regulation. Four brokers—Cantor Fitzgerald, Evolution, ICAP Energy, and TFS Energy—form

²⁷ Peter Zaborowsky, *The Trailblazers of Emissions Trading*, Evolution Markets Inc. (April 23, 2002).

²⁸ Ibid. In September 2007, the monthly volume was estimated at 175,000-200,000 by Evolution Markets Inc., who termed it low volume. Evolution Markets Inc., *SO₂ Markets—September 2007* at http://www.evomarkets.com/assets/mmu/mmu_so2_sep_07.pdf.

²⁹ The first year an allowance may be used for compliance is called its “vintage.” This situation can result in entities engaging in a “vintage swap.” For example, a “vintage swap” may occur because one entity has excess allowances in the upcoming year (2008) but anticipates it will have insufficient allowances in 2009. Another entity may be in the opposite position because of planning future emission reductions. The two entities agree to “swap” allowances to improve their allowance streams over these years.

³⁰ EPA Website: <http://www.epa.gov/airmarkets/trading/buying.html>.

³¹ EMA Website: <http://www.environmentalmarkets.org/page.ww?section=About+Us&name=Company+Directory>.

the basis of the *Platts* emission price index. *Argus AIR Daily* also produces price indices through daily phone surveys of active brokers.

Two exchanges provide SO₂ future contracts as well as clearing services: New York Mercantile Exchange (NYMEX) and Chicago Climate Futures Exchange (CCFE). The availability of exchanges as a trading platform for allowances or to clear transactions was cheered by traders when established in late 2004 and 2005. As stated by the Environmental Markets Association with respect to NYMEX's decision: "NYMEX does offer information on power, and any time you have them expanding into our market, that's going to create opportunities for people who may be using other products to take a second look at emissions."³² Both exchanges offer standardized and cleared futures contracts, along with clearing services for off-exchange transactions. As reported by *Platts*, futures volume on both exchanges have expanded greatly over the past year. SO₂ futures trading on the CCFE was nearly 1.9 million allowances in the first half of 2007, compared with about 500,000 during the same time in 2006. For the NYMEX, volumes in the first half of 2007 was 665,000 allowances—a more than three-fold increase over the first half of 2006.³³ **Table 4** summarizes the basic features of the trading instruments.

Table 4. SO₂ Futures Contract Specifications

	NYMEX	CCFE
Trading Platform	ClearPort	ICE
Clearing Organization	NYMEX ClearPort Clearing	The Clearing Corporation (CCorp)
Self Regulatory Organization	NYMEX and National Futures Association (NFA)	National Futures Association (NFA)
CFTC Regulatory Status	Designated Contract Market	Designated Contract Market
Contract size	100 SO ₂ allowances	25 SO ₂ allowances
Minimum Price Fluctuation	\$25 per contract	\$2.50 per contract
Settlement	Physical through EPA's ATS	Physical through EPA's ATS
Symbol	RS	SFI

Source: NYMEX and CCFE.

In April, 2007, the CCFE began offering SO₂ options.³⁴ For October 2007, the CCFE offers European-style options³⁵ on its futures contracts for expiration on the October 2007, November 2007, December 2007, April 2008, and December 2008 futures contracts.³⁶ As with the futures market, participants are required to settle their delivery obligations via the ATS. Volume remains light with the CCFE reporting in July that there were 200 calls on July contracts, 5,315 calls and 411 puts on August 2007 contracts, 740 calls and 46 puts on September 2007 contracts, and 440

³² Comment of Matt Most, Emissions Market Association, as reported in *Platts Emissions Daily*, "Emissions market hails NYMEX move," February 15, 2005, p. 1.

³³ *Platts Emissions Daily*, "Emissions exchanges continue to grow SO₂, NO_x futures markets," August 10, 2007, p. 1.

³⁴ Chicago Climate Futures Exchange, *Chicago Climate Futures Exchange to Launch Options market on Sulfur Financial Instrument Futures Contracts*, Chicago, April 5, 2007.

³⁵ An option that can only be exercised for a short, specified period of time just prior to its expiration, usually a single day. "American" options, however, may be exercised at any time before expiration.

³⁶ For current options market data, see http://www.ccfex.com/mktdata_ccfe/sfi_options.jsf.

calls on the December 2007 contracts.³⁷ The spike in calls and puts in the August 2007 contracts in July may reflect a peak in allowance prices that occurred in July 2007 and future uncertainty about allowance price direction over the summer.³⁸ The NYMEX does not offer SO₂ options.

Regulation of Allowances as an Exempt Commodity: Commodity Futures Trading Commission (CFTC)

Definition

The Commodity Exchange Act provides the basis for federal regulation of “derivative” transactions in contracts based on commodity prices. Pursuant to the act, the Commodity Futures Trading Commission (CFTC) regulates the futures exchanges, such as NYMEX, and certain other derivative transactions that occur off-exchange. The CFTC’s authority varies according to the identities of the market participants and the nature of the underlying commodity. In general, the CFTC does not regulate spot (or cash) trades in commodities, or forward contracts that will be settled by delivery of the physical commodity (which are also considered cash sales).³⁹

In terms of allowances, the CFTC’s jurisdiction is confined to trades that take place on those markets it regulates. It has no jurisdiction over spot trades in allowances, full jurisdiction over futures and options trades on regulated exchanges, and limited jurisdiction over derivatives trades on certain other markets subject to lighter regulation than the exchanges.

Allowances are regulated by the CFTC as exempt commodities under the Commodity Futures Modernization Act of 2000.⁴⁰ The Commodity Exchange Act defines an exempt commodity as any commodity other than an excluded commodity (e.g., financial indices, etc.) or an agricultural commodity. Examples include energy commodities and metals. Emission allowances are related to energy production. This designation has been supported by other federal entities. In a 2005 Interpretive Letter approving physically settled emission derivatives transactions, the Office of the Comptroller of the Currency, Administrator of National Banks, states that physical settlement of emission allowances do not pose the same risk as other physical commodities:

The proposed emissions derivatives transactions [e.g., futures, forwards, options, swaps, caps, and floors] will be linked to three emission allowance markets: the U.S. SO₂ (Sulfur Dioxide) and NO_x (Nitrogen Oxide) markets and the European Union’s CO₂ (carbon dioxide) market. These emissions markets are volatile and price fluctuates considerably.

³⁷ CCFE Market Report, *CCFE SFI Options*, (July 2007), p. 3, table 4.

³⁸ Traditional Financial Services (a brokerage firm) noted the peak in allowance prices in July because of higher than expected storage in the natural gas markets. See TFS, *Global Environmental Markets*, August 2007, available at <http://www.tfsbrokers.com/pdf/global-reports/2007/tfs-ger-08-07.pdf>.

³⁹ The CFTC has occasionally brought enforcement actions for fraud in the spot market, but these are rare. The legislative history does not suggest that Congress meant the CFTC to be a regulator of cash commodity markets.

⁴⁰ See CFTC approval of CCFE application for designation as a Contract Market: *Order of Designation: In the Matter of the Application of the Chicago Climate Futures Exchange, LLC for Designation as a Contract Market*, November 9, 2004.

Market participants manage price risk through the use of derivative structures, such as forwards, futures, options, caps and floors. These derivatives are generally physically settled, because the current emissions market is primarily physical in nature....

The OCC has previously concluded in a variety of contexts that national banks may engage in customer-driven commodity transactions and hedges that are physically settled, cash-settled and settled by transitory title transfer.... Similarly, the OCC permitted a national bank to make and take physical delivery of commodities in connection with transactions to hedge commodity price risk in commodity linked transactions....

In these decisions, the approved activities were subject to a number of conditions due to risks associated with physical transactions in certain commodities. Those risks included storage (e.g., storage tanks, pipelines), transportation (e.g., tankers, barges, pipelines), environmental (e.g., pollution, fumigation, leakage, contamination) and insurance (e.g., damage to persons and property, contract breach, spillage). Physical settlement of emissions derivatives and hedging with physicals would not pose those risks, however. Emission allowances are not tangible physical commodities, such as electricity or natural gas. Rather, they are intangible rights or authorizations. They can be bought and sold like other commodities, but they exist only as a book entry in an emissions account.⁴¹ [footnotes omitted]

The Federal Reserve also considers emission allowances as commodities for purposes of trading.⁴²

Regulation of Trading Venues

The CFTC identifies four venues for trading exempt commodities under the Commodity Exchange Act: (1) Designated Contract Markets (DCM), (2) Commercial Derivatives Transaction Execution Facilities [none currently in operation], (3) Exempt Commercial Markets (ECM), and (4) Over-the-Counter (OTC)—not on a trading facility.⁴³ As suggested by the discussion above, allowances are traded on three of these venues. Futures contracts and clearing services are provided by NYMEX and CCFE—both DCMs—with options also available on the CCFE. ICE and TradeSpark—both ECMs—are used by brokers and principals for allowance transactions. Finally, principal-to-principal transactions and broker-assisted transactions are occurring OTC without the use of a trading facility. **Table 5** summarizes these venues and their regulation under the Commodity Exchange Act.

For the three trading venues set out in **Table 5**, the degree of regulation varies, most significantly according to the identities of the participants. Small public investors are allowed to trade only on regulated exchanges (DCMs); these are subject to extensive self-regulation and CFTC oversight. Electronic trading facilities, where small traders are not present, are subject to much less regulation, because traders are assumed to be capable of protecting themselves from fraud. However, if an electronic trading facility plays a significant price discovery role (that is, if the prices it generates are used as reference points by the cash market or other derivatives markets),

⁴¹ Comptroller of the Currency, Administrator of National Banks, Interpretive Letter #1040: Emissions Derivatives Proposal, September 15, 2005.

⁴² Board of Governors, Federal Reserve System, JPMorgan Chase & C. New York, New York: Order Approving Notice to Engage in Activities Complementary to a Financial Activity, November 18, 2005.

⁴³ See table entitled: *Venues for the Trading of Exempt Commodities under the Commodity Exchange Act (CEA)*, available on the CFTC website at http://www.cftc.gov/stellent/groups/public/@newsroom/documents/file/exemptcommoditiesvenues_091207.pdf.

the CFTC may require disclosure of certain information about trading volumes, prices, etc. Where trades are purely bilateral, negotiated, and executed between principals, the transaction is said to occur in the OTC market, which is entirely exempt for CFTC regulation, with the exception of certain provisions dealing with fraud manipulation.

Table 5. Summary of Trading Venues for Exempt Commodities under the Commodity Exchange Act (CEA)

	Designated Contract Markets (CEA Sec. 5)	Exempt Commercial Markets (CEA Sec. 2(h)(3)-(5))	OTC—Not on a Trading Facility (CEA Sec. 2(h)(1)-(2))
Commodities Permitted	No limitations	Exempt commodities (e.g., energy metals, chemicals, emission allowances, etc.)	Exempt commodities (e.g., energy metals, chemicals, emission allowances, etc.)
Method of Trading	Trading can take place on an electronic trading facility or by open outcry	Electronic multi-lateral trading (i.e., many-to-many platforms)	Non-multi-lateral trading (e.g., dealer markets; individually-negotiated, bilateral transactions)
Notice Requirement	Must apply to and receive prior approval from CFTC; must satisfy various non-prescriptive designation criteria and core principles	Yes; simple notice containing contact information and description of operations	None; exemption is self-executing
Participants	No limitations	Eligible Commercial Entities only—subset of Eligible Contract Participants; excludes individuals but includes funds	Eligible Contract Participants (i.e., institutions, funds, and wealthy, sophisticated individuals)
Intermediation	Permitted	None; principal-to-principal trading only	Limited; only if done through another Eligible Contract Participant
Types of Transactions	Futures and options	Derivatives, including swaps, futures and options (Note: ECMs often also trade products outside CFTC jurisdiction, including spot and forward contracts)	Derivatives, including swaps, futures, and options
Standardized Products?	Yes	Yes, terms set by the entity	Usually yes when executed on a dealer market. Usually no, when executed bilaterally

http://wikileaks.org/wiki/CRS-RL34235

	Designated Contract Markets (CEA Sec. 5)	Exempt Commercial Markets (CEA Sec. 2(h)(3)-(5))	OTC—Not on a Trading Facility (CEA Sec. 2(h)(1)-(2))
Cleared?	Transactions must be cleared through a Derivatives Clearing Organization (DCO) approved by the CFTC	Clearing not mandatory; if offered, it must be through an SEC-registered clearing agency or a DCO (many ICE transactions are cleared at LCH; other ECMs offer clearing at NYMEX Clearport or The Clearing Corp.)	Can be if a standardized contract; many traders choose to clear trades at NYMEX or LCH
Transaction Prohibitions	Subject to all provisions of the CEA	Only anti-manipulation and anti-fraud	Only anti-manipulation and anti-fraud (but anti-fraud rules do not apply to transactions between Eligible Commercial Entities)
Self-regulatory responsibility	Yes, significant self-regulatory responsibilities; must comply on a ongoing basis with 8 designation criteria and 18 core principles. Must have compliance and surveillance programs	Minimal and they include nothing that goes to the integrity of trading. Responsibilities include a reporting requirement for contracts over a minimum volume threshold; ensuring compliance with exemption conditions; and dissemination of contract activity information for "price discovery" contracts	None
Responsibility to CFTC	Comply with designation criteria and core principles	Provide notice of operation and weekly transaction data for high-volume contracts; report manipulations and fraud complaints; maintain and provide access to records of activity	None
CFTC Oversight Authority	Unlimited, including continuous and ongoing market surveillance and trade practice programs, ability to intervene in markets (e.g., force reduction/liquidations of position, alter/supplement DCM rules). CFTC receives large trader reports transaction data and assesses DCMs' compliance programs via rule enforcement reviews.	Limited (special calls); Sec 8a(9) emergency authority does not apply	None

Source: *Venues for the Trading of Exempt Commodities under the Commodity Exchange Act (CEA)*, available on the CFTC website at http://www.cftc.gov/stellent/groups/public/@newsroom/documents/file/exemptcommoditiesvenues_091207.pdf.

Although allowances are regulated like any other commodity by the CFTC, it should be noted that it is not a deep liquid cash market. As noted by emissions broker Evolution Markets LLC, the affected source base for SO₂ allowances is about 500 companies. The broker also estimated in

2005 that about 20 companies represented the bulk of trading activities.⁴⁴ In recommending CFTC approval of the CCFE as a DCM, the Staff memorandum noted the following:

In futures markets generally, the existence of a liquid market for a particular contract and the ability of an FCM to liquidate positions therein which it may inherit from a defaulting customer are important to the financial integrity of such an FCM and, in turn, its ability to fulfill its obligations to other customers and to the clearing system. The EPA will facilitate the delivery process of these contracts in a manner that makes cash positions known and compensates for any current lack of a developed deep liquid cash market for the contracts as compared to other futures contracts. Collectively CCorp, NFA, and EPA will carry out financial surveillance, monitor situations, and provide information the effect of which should counterbalance any disparate effects on financial integrity, which might be imposed by the initial lack of trading history and prices.⁴⁵

Observations

Despite the tendency to view the Title IV program as a model for a future greenhouse gas reduction scheme, there are several important differences. For example, the Title IV program involves up to 3,000 new and existing electric generating facilities that contribute two-thirds of the country's SO₂ and one-third of its nitrogen oxide (NO_x) emissions (the two primary precursors of acid rain). This concentration of sources makes the logistics of allowance trading administratively manageable and enforceable with continuous emissions monitors (CEMs) providing real time data. However, greenhouse gas emissions are not so concentrated. In 2005, the electric power industry accounted for about 33% of the country's GHG emissions, while the transportation section accounted for about 28%, industrial use about 19%, agriculture about 8%, commercial use about 6%, and residential use about 5%.⁴⁶ Thus, small dispersed sources in transportation, residential/commercial and agricultural sectors, along with industry, are far more important in controlling GHG emissions than they are in controlling SO₂ emissions. This diversity multiplies as the global nature of the climate change issue is considered, along with the multiple GHGs involved.⁴⁷ Thus, a carbon market is like to involve far greater numbers of affected parties from diverse industries than the current Title IV program.

It will also involve far greater numbers of tradeable allowances than the current Title IV program. Under the current program, about **9 million** allowances are allocated to participating entities annually. In contrast, a greenhouse gas program that capped emissions in the electric power, transportation, and industry sectors at their 1990 levels at some point in the future would be allocating about **4.85 billion** allowances annually. This is a two and a half orders-of-magnitude increase over the Title IV program and double the Phase 2 allocations under the ETS. As

⁴⁴ Evolution Markets LLC, "An Overview of Trading Activity and Structures in the U.S. Emissions Markets," NYMEX Emissions Futures Seminar, July 28, 2005.

⁴⁵ The Division of Market Oversight and The Division of Clearing and Intermediary Oversight, CFTC, DCM Designation Memorandum: *Application of Chicago Climate Futures Exchange, LLC ("CCFE") for Designation as a Contract Market pursuant to Sections 5 and 6(a) of the Commodity Exchange Act ("Act" or "CEA") and Part 38 of Commission regulations*, November 3, 2004.

⁴⁶ U.S. territories account for the remaining 1%. Data from EPA, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005*, April 15, 2007, p. ES-14.

⁴⁷ The EU addresses this issue by having the ETS cover only 45% of its emissions and no non-carbon dioxide emissions, as noted earlier. Still, it has 11,500 entities to oversee.

suggested here, trading activities under Title IV has been increasing since 2005. However, it doesn't approach the anticipated volumes that would occur if a greenhouse gas cap-and-trade program was instituted.

Finally, the economic value of a future carbon market is likely to be substantially greater than the Title IV program. With EPA's pending implementation of the Clean Air Interstate Rule (CAIR), the price of a Title IV allowance has increased to about \$500.⁴⁸ Thus, the annual allocation of SO₂ allowances has a market value of about **\$4.5 billion**. Using estimates of \$15 to \$25 an allowance, the annual allocation of 4.85 billion allowances posited above for a greenhouse gas program would have a market value of **\$72.8 billion to \$121.3 billion**.⁴⁹ Unlike the Title IV market, a carbon market may be quite liquid.

Despite these differences in scope and magnitude, there are trends in Title IV trading that are likely to continue in a carbon market.

First, there is a trend toward more diverse, non-traditional participants in the Title IV market. Like the Title IV market, the economic importance of a carbon market will likely draw in entities not directly affected by the reduction requirements, such as financial institutions. The motivations of these entities may be equally diverse, including facilitating projects involving the need for allowances, portfolio balancing, and profits earned through intermediary fees or proprietary trading.

Second, there is trend in the Title IV market toward using financial instruments to manage allowance price risk. This trend is partly the result of the regulatory uncertainty introduced in the allowance market by CAIR. Given the greater economic stakes involved in a carbon market, this trend toward more sophisticated financial instruments is likely to emerge early as a hedge against price uncertainty. The emergence of entities well-versed in the use of these instruments may reinforce the trend and make options, collars, strangles, and other structures as common in the allowance market as they are in other commodity markets. With a more liquid and dynamic market, a carbon market may look more like other energy markets, such as natural gas and oil, than the somewhat sedate SO₂ allowance market.

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⁴⁸ Based on data from Cantor Fitzgerald, October 2007.

⁴⁹ Range based on EPA estimates for reducing emissions to 1990 levels by 2020 as required under S. 280. See EPA, *Analysis of The Climate Stewardship and Innovation Act of 2007*, July 16, 2007. For reference, a Phase 2 ETS allowance currently sells for about \$32. Data from the European Climate Exchange, http://www.ecx-europe.com/default_flash.asp.