
RGGI Inc.



**REPORT ON THE SECONDARY MARKET
FOR RGGI CO₂ ALLOWANCES: FIRST QUARTER 2011**

Prepared for:

RGGI, Inc., on behalf of the RGGI Participating States

Prepared By:

**POTOMAC
ECONOMICS**

May 2011

This report was prepared by Potomac Economics (the contractor) in the course of performing work contracted for and sponsored by RGGI, Inc. on behalf of the RGGI Participating States (Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont). The opinions expressed in this report do not necessarily reflect those of RGGI, Inc. or any of the Participating States, and reference to any specific product, service, process, or method does not constitute an implied or expressed recommendation or endorsement of it. Further, RGGI, Inc., the Participating States, and the contractor make no warranties or representations, expressed or implied, as to the fitness for particular purpose or merchantability of any product, apparatus, or service, or the usefulness, completeness, or accuracy of any processes, methods, or other information contained, described, disclosed, or referred to in this report. RGGI, Inc., the Participating States, and the contractor make no representation that the use of any product, apparatus, process, method, or other information will not infringe privately owned rights and will assume no liability for any loss, injury, or damage resulting from, or occurring in connection with, the use of information contained, described, disclosed, or referred to in this report.

The Regional Greenhouse Gas Initiative (RGGI) is a cooperative effort by participating states to reduce emissions of carbon dioxide (CO₂), a greenhouse gas that causes global warming.

RGGI, Inc. is a non-profit corporation created to provide technical and administrative services to the CO₂ Budget Trading Programs of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont.

A. INTRODUCTION

The primary market for RGGI CO₂ allowances consists mainly of the auctions where allowances are initially sold. Once a CO₂ allowance is purchased in the primary market, it can then be resold in the secondary market. The secondary market for RGGI CO₂ allowances comprises the trading of physical allowances and financial derivatives, such as futures and options contracts.

The secondary market is important for several reasons. First, it gives firms an ability to obtain CO₂ allowances at any time during the three months between the RGGI auctions. Second, it provides firms a way to protect themselves against the potential volatility of future auction clearing prices. Third, it provides price signals that assist firms in making investment decisions in markets affected by the cost of RGGI compliance.

This report provides a summary of activity in the secondary market in the first quarter of 2011 and discusses the results of our market power screens. Several patterns have emerged in this period in the secondary market:

- *Prices* – CO₂ allowance prices were very stable in the first quarter of 2011 as the daily closing price of 2009 vintage allowances traded in a narrow range between \$1.86 and \$1.97, averaging \$1.93.
- *CO₂ Allowance Holdings* – In the first quarter of 2011, CO₂ allowance transfers between unaffiliated firms totaled 21.8 million, up from just 0.6 million in the fourth quarter of 2010. Ninety-six percent of the transfers occurred in the first week of January 2011, primarily due to the delivery or expiration of December 2010 contracts.
- *Futures Trading* – The volume of trading decreased 69 percent to 4.7 million CO₂ allowances in the first quarter of 2011, down from 14.9 million allowances in the fourth quarter of 2010.
- *Open Interest* – The delivery of December 2010 contracts led to large reductions in futures open interest following the close of the fourth quarter of 2010. After falling 89 percent during the first week in January to 2.5 million CO₂ allowances, futures open interest increased gradually throughout the first quarter of 2011, ending the quarter at 5.7 million allowances.

We evaluate information on the holdings of CO₂ allowances and allowance derivatives as well as the demand for allowances to identify firms that may have acquired a position that raises competitive concerns. We find no evidence of anticompetitive conduct; however, we will continue to evaluate the competitiveness of the market.

B. BACKGROUND

The secondary market for RGGI CO₂ allowances comprises the trading of physical allowances and financial derivatives, such as futures and options contracts. A physical allowance trade occurs when the parties to the transaction register the transfer of ownership in RGGI's CO₂ Allowance Tracking System ("COATS"). Futures, options, and other financial derivatives are called "exchange-traded" when they are traded on a public exchange, and are called "over-the-counter" ("OTC") when they are not traded on one of the public exchanges. Many financial derivatives eventually result in the transfer of physical allowances (i.e., the transfer is registered in COATS), but this may occur months or years after the parties enter into a transaction.

Standard futures and options contracts for RGGI CO₂ allowances are traded on the Chicago Climate Futures Exchange ("CCFE"). Three categories of standard contracts are traded:

- **Futures** – Under these contracts, two parties agree to exchange a fixed number of CO₂ allowances of a certain vintage year at a particular price at a specific point in the future (called the "delivery month"). At the end of the delivery month, the contracted number of CO₂ allowances must be physically transferred to the buyer's account in the COATS registry and funds must be transferred to the seller. The vintage year refers to the compliance year of the CO₂ allowance that is to be transferred. One standard futures contract equals 1,000 RGGI allowances.¹
- **Call Options** – Call options give the purchaser the option to buy a fixed number of CO₂ allowances of a certain vintage year at a particular strike price at any time prior to the expiration date. For example, suppose a firm holds a call option with a 2009 vintage year, \$5 strike price, and June 2011 expiration date. If the price of the corresponding futures contract rose to \$5.75, the firm could exercise the option to buy CO₂ allowances at \$5 and immediately sell them at \$5.75. Alternatively, if the price of the futures

¹ More precisely, a futures contract requires parties with an open interest to post financial assurance in an account with the exchange until the contract reaches expiration. The exchange continually withdraws and deposits funds according to changes in the prices of the contracts in which the party has interest. For example, if a firm buys a contract for 1,000 allowances at \$3.50/allowance, the purchasing firm (firm with a long position) must put \$3,500 in an account (or whatever share of the entire liability the exchange requires). If the futures price declines to \$3/allowance, the exchange transfers \$500 from the account of a firm with a long position to the account of a firm with a short position (firm that sold a contract), and the firm with a long position is only required to keep \$3,000 in the account. At the end of the delivery month, allowances are exchanged for funds according to the closing price on the last day of the month.

contract stayed below \$5, the firm would let the option expire without exercising it. One standard options contract can be exercised for 1,000 RGGI allowances.

- Put Options – Put options are similar to call options but they give the purchaser the option to *sell* a certain number of CO₂ allowances of a particular vintage year at a specified strike price any time prior to the expiration date.

Futures and options contracts are important because they allow firms to manage risks associated with unforeseen swings in commodity prices. Futures allow firms to lock-in the prices of future purchases or sales. Options allow firms to limit their exposure to price volatility. Call options protect the purchaser if the price of the commodity increases, while put options protect the purchaser if the price of the commodity decreases. Although options provide less certainty than futures contracts, they usually require less financial security, making them more attractive to some firms.

Public exchanges are attractive to firms that need a simple way to trade standard products. Moreover, public exchanges effectively eliminate the risk of default by counter-parties, since the exchange constantly monitors the account holdings of each participant to ensure that they have posted sufficient financial security to meet their obligations.

OTC trading is attractive to firms that prefer contracts with non-standard provisions. Firms with on-going business relationships may have other ways to manage the risk of default by the other party.² Compliance entities may prefer to buy RGGI CO₂ allowances bundled with other goods and services from their fuel suppliers or plant operations service providers. The OTC market allows parties to create contracts specifically tailored to their needs. In general, much more information is available about trading on public exchanges than trading in the OTC market.

The amount of *open interest* is the net amount of futures or options contracts that have been traded for a contract with a particular set of specifications (i.e., vintage year, delivery month,

² For instance, firms may enter into forward contracts rather than futures contracts. The primary difference between a futures contract and a forward contract is that a futures contract typically requires parties with an open interest to post financial assurance which the exchange draws upon or adds to until the contract reaches expiration, while a forward contract requires that all financial settlement occur at expiration.

etc.), but have not reached the time of delivery, expired, or been exercised. For example, if Firm A sells 100 contracts of a particular type to Firm B, Firm A will have a short position of 100 contracts, Firm B will have a long position of 100 contracts, and the total open interest for the particular type of contract will be 100 contracts. Hence, the total open interest can be determined by summing across all of the long positions of market participants or by summing across all of the short positions.

C. SUMMARY OF PRICES

This section of the report summarizes prices in the secondary market for RGGI CO₂ allowances during the first quarter of 2011. Figure 1 shows the transaction prices of actual CO₂ allowances and futures contracts for allowances on trading days. This section also summarizes the prices of options contracts for CO₂ allowances. For context, Figure 1 shows prices through the first five trading days of the second quarter of 2011 when settlement was completed for futures contracts for March 2011 delivery, and the figure shows average prices in the first quarter of 2011 compared to the previous quarter and to the first quarter of the previous year.

Key observations regarding RGGI CO₂ allowance prices:

- CO₂ allowance prices were very stable in the first quarter of 2011 as the daily closing price of 2009 vintage allowances averaged \$1.93 and ranged between \$1.86 and \$1.97.
- CO₂ allowance prices were consistent with the previous quarter as the average daily closing price of 2009 vintage allowances rose just 2 percent from the previous quarter.
- The prices of futures contracts were generally consistent with the clearing prices in the March auction and with the transaction prices recorded in COATS.

Prices of CO₂ Allowances and Allowance Derivatives

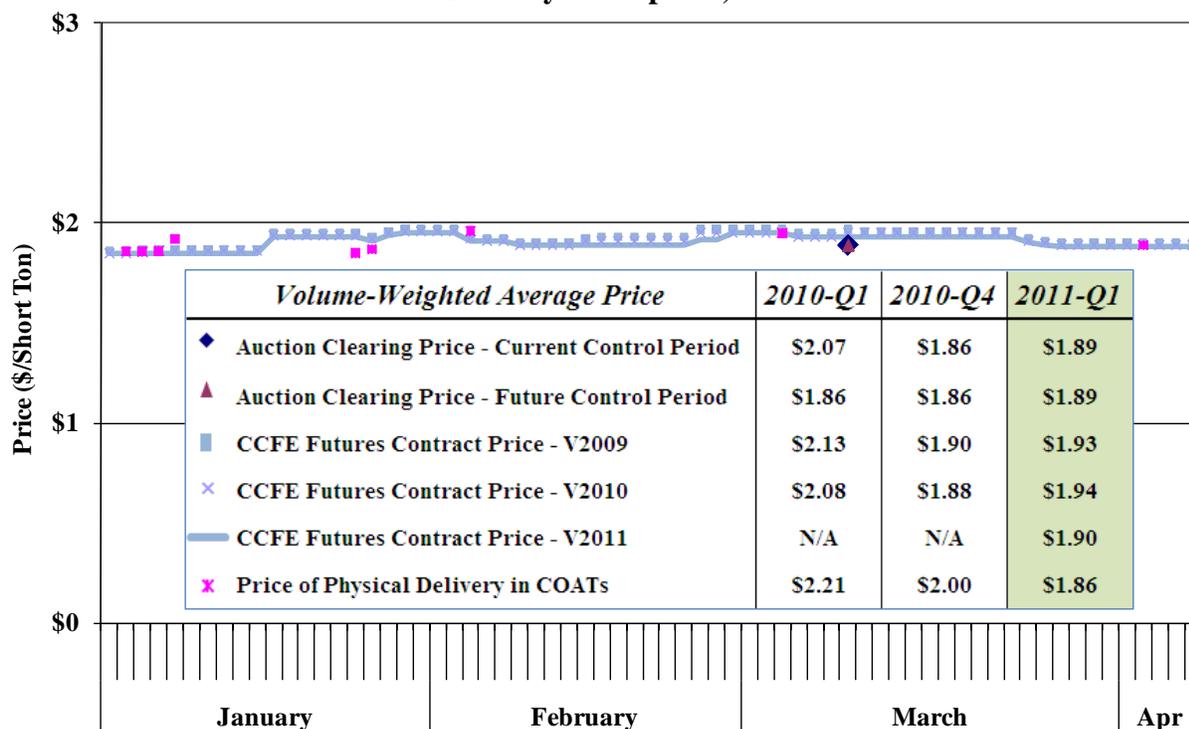
Figure 1 summarizes prices in the secondary market during the period. One light blue series shows the closing price on each trading day of the 2009 vintage CCFE futures contract with delivery at the end of the month.³ A second light blue series shows the closing price of the 2010 vintage futures contract with delivery at the end of the month. A blue line shows the closing price of the 2011 vintage futures contract with delivery at the end of the month. The red squares show the volume-weighted average price of physical deliveries in COATS on each day when a transaction took place and where the parties recorded the transaction price.^{4, 5} The blue

³ For instance, in January, the price of the futures contract for January 2011 delivery is shown.

⁴ Parties are required to report the transaction price if there is an underlying financial transaction related to the transfer of allowances between accounts.

diamonds show the clearing prices of CO₂ allowances sold in the RGGI auction held on March 9 for the current control period (i.e., 2009 through 2011) and a future control period. For comparison, Figure 1 also shows volume-weighted average prices for each category of prices in the first quarter of 2011, the previous quarter, and the first quarter of the previous year.

**Figure 1: Prices in the Secondary Market for RGGI CO₂ Allowances⁶
January 1 to April 7, 2011**



Key observations regarding CO₂ allowance prices:

- For 2009 vintage CCFE futures contracts, the daily closing price remained stable in the fourth quarter, trading in a narrow range between \$1.86 and \$1.97 throughout the period.

⁵ Many of the transaction prices reported in COATs are associated with physical deliveries that result from the expiration of the previous month's CCFE futures contract. By the third business day following the expiration month of the futures contract, CO₂ allowances are exchanged for funds according to the closing price on the last day of the expiration month.

⁶ Sources: Auction clearing prices are available at "www.rggi.org/co2-auctions/results", CCFE futures contract prices are available at "www.ccfе.com/mktdata_ccfe/futuresSummary.jsf?symbol=rggi", and the prices of physical deliveries in COATs are based on information in COATs available at "<https://rggi-coats.org/eats/rggi/>".

The average daily closing price of 2009 CCFE futures contracts was \$1.93. Due to the stability of prices, the historic volatility of 2009 vintage futures prices was 13 percent in the first quarter of 2011, down from 18 percent in the first quarter of 2010.⁷

- There were no significant differences between the prices of contracts for 2009 vintage, 2010 vintage, or 2011 vintage CO₂ allowances during the first quarter. This is to be expected, since they are interchangeable for compliance purposes in the RGGI program.
- The CO₂ allowances that were auctioned on March 9 for the current and future control periods cleared at \$1.89, which is equal to the reserve price in the auction. This was slightly lower than the futures prices of 2009 vintage, 2010 vintage, and 2011 vintage CO₂ allowances, which closed between \$1.93 and \$1.95 on the day before the auction.
- The prices of physical deliveries reported in COATS have been generally consistent with the prices reported by the CCFE.

Prices of Options for CO₂ Allowances

The clearing prices of options contracts are important because they can provide insight about how the market expects the price of the underlying commodity to behave. The price of an option depends on two factors: (i) the expected value of the underlying commodity relative to the strike price of the option, and (ii) the expected volatility of the underlying commodity over the period before the expiration date. When call option price decreases coincide with put option price increases, it signals a decrease in the expected price of the underlying commodity. Conversely, when call option prices and put option prices move in the same direction, it signals a change in the expected volatility of the underlying commodity price.

Key observations regarding prices of options for CO₂ allowances in the first quarter of 2011:

- One call option traded on March 4 for 150 thousand 2012 vintage CO₂ allowances. This was the first trade of an options contract since August 2010.
- The low volume of options trading may reflect that firms perceive little risk from variations in future CO₂ allowance prices. Since the auction reserve price of \$1.89 is indexed to inflation, compliance entities are unlikely to be able to obtain CO₂ allowances

⁷ Historic volatility is a measure of the standard deviation of the day-over-day percentage change in price. Volatility is normally expressed as an estimated standard deviation for a one year period, even if it is calculated from a shorter period of time.

at a lower price in the future. Prices in the futures market have remained above the auction reserve price, suggesting that firms perceive little risk that CO2 allowances will fall below this level.

D. VOLUMES AND OPEN INTEREST

This section evaluates the volume of trading and the open interest in exchange-traded futures and options as well as transfers of CO₂ allowances between unaffiliated parties as recorded in COATS. Figure 2 summarizes the volumes of futures and options contracts traded on the CCFE, while Figure 3 shows the open interest. Figure 4 examines the volume of CO₂ allowance transfers recorded in COATS and the net change in allowance ownership recorded in COATS.

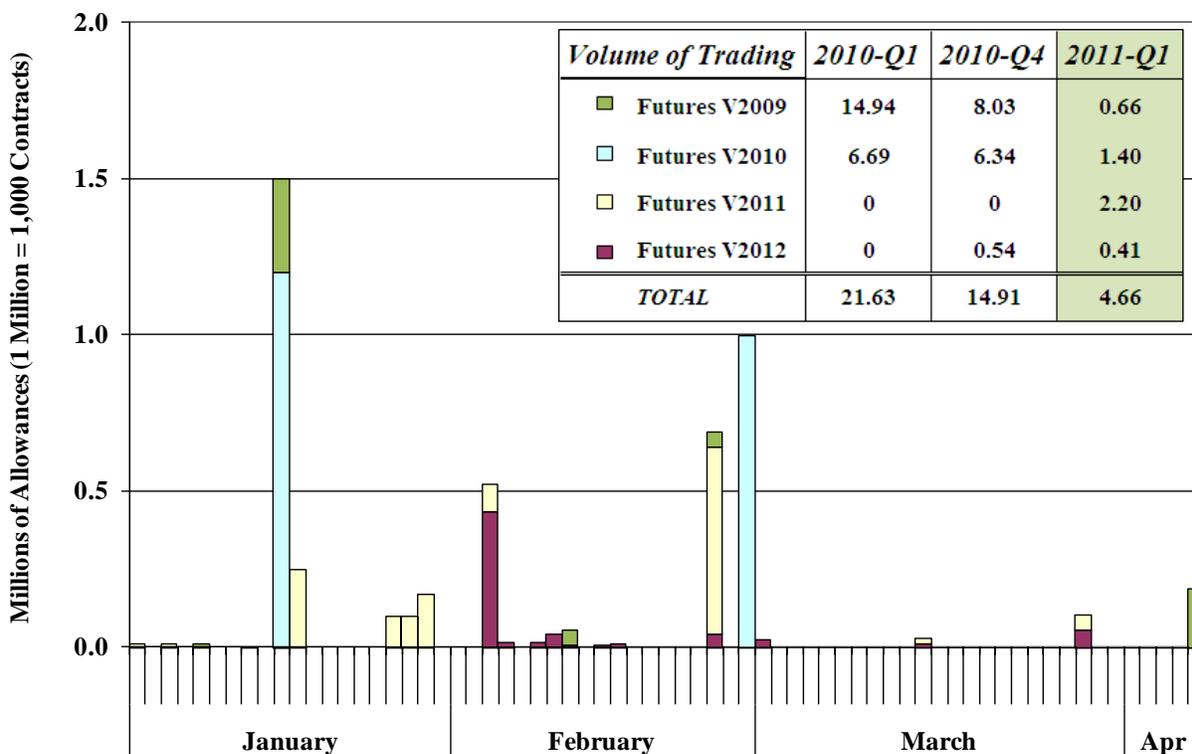
Key observations regarding trading volumes and open interest:

- The volume of futures trading decreased 69 percent to 4.7 million CO₂ allowances in the first quarter of 2011, down from 14.9 million allowances in the fourth quarter of 2010.
- CO₂ allowance transfers between unaffiliated firms totaled 21.8 million, up from just 0.6 million in the fourth quarter of 2010. Ninety-six percent of the transfers occurred in the first week of January 2011, primarily due to the delivery or expiration of December 2010 contracts.
- The delivery of December 2010 contracts led to large reductions in futures open interest following the close of the fourth quarter of 2010. After falling 89 percent during the first week in January to 2.5 million CO₂ allowances, futures open interest increased gradually throughout the first quarter of 2011, ending the quarter at 5.7 million allowances.
- The share of CO₂ allowances held by compliance entities and their affiliates was 97 percent following delivery of March 2011 contracts.
- The majority of CO₂ allowances are held by firms that acquired them through the auctions, although there are some firms that have acquired most of the allowances they hold through the secondary market.

Volume and Open Interest in CCFE Futures and Options Contracts

Figure 2 shows the volume of trading on the CCFE each day for futures contracts according to the vintage year. The figure also shows the volume of trading for each product in the first quarter of 2011, in the previous quarter, and in the first quarter of the previous year. The volume of options trading is not shown in the figure, since there was only one trade during the first quarter.

**Figure 2: Volume of Trading of CCFE Futures Contracts⁸
January 1 to April 7, 2011**



Key observations regarding the volume of CCFE futures trading:

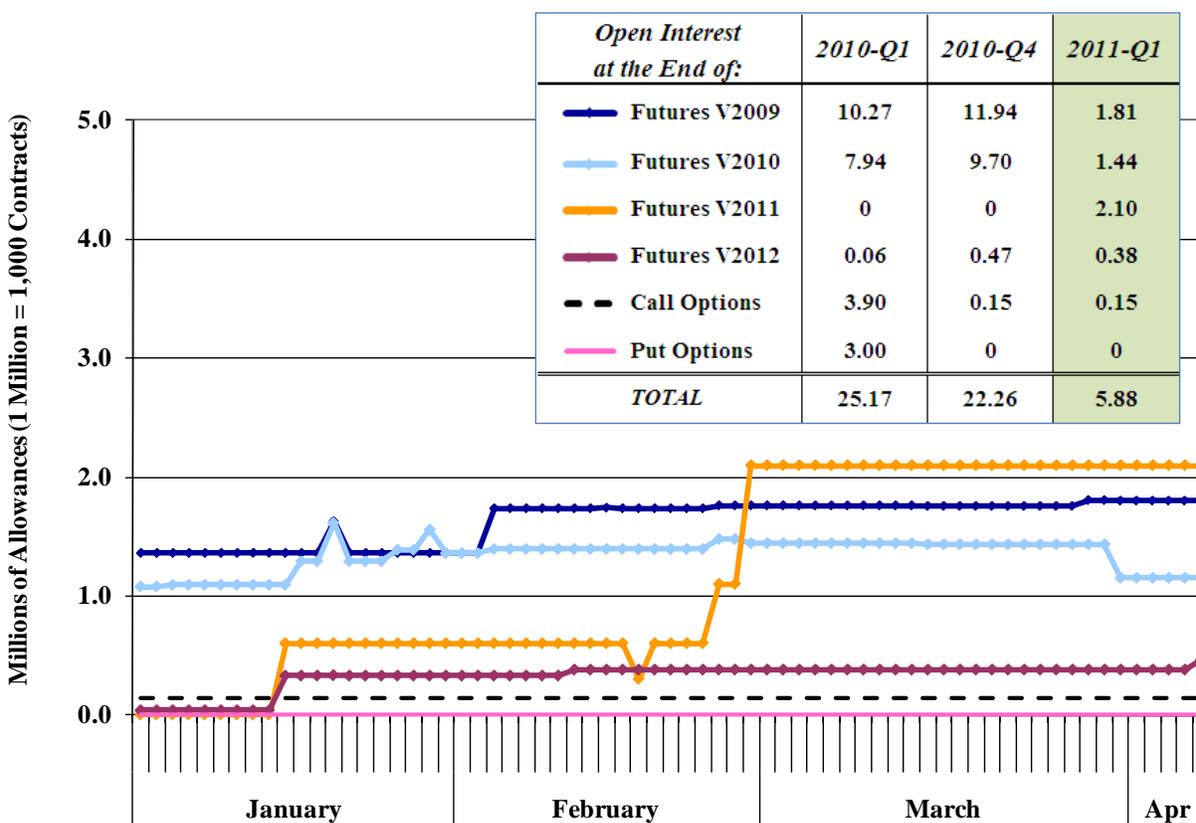
- The volume of futures trading decreased 69 percent to 4.7 million CO₂ allowances in the first quarter of 2011, down from 14.9 million allowances in the previous quarter and 21.6 million allowances in the first quarter of 2010.
- Trading of 2009 vintage and 2010 vintage CO₂ allowances decreased, while trading of 2011 vintage and 2012 vintage allowances has increased. The share of the total volume related to 2011 vintage and 2012 vintage CO₂ allowances increased to 56 percent in the first quarter of 2011 from 3 percent in the previous quarter.

Figure 3 shows the open interest on each day for the futures contracts shown in the previous figure as well as for options contracts. For comparison, Figure 3 also shows the total open

⁸ Sources: Options volumes are available at “www.ccf.com/mktdata_ccfe/optionsSummary.jsf?symbol=rggi” and futures volumes are available at “www.ccf.com/mktdata_ccfe/futuresSummary.jsf?symbol=rggi”.

interest for each product at the end of the first quarter of 2011, the previous quarter, and the first quarter of the previous year.

Figure 3: Open Interest in CCFE Futures and Options^{9,10}
January 1 to April 7, 2011



Key observations regarding the open interest in CCFE futures and options contracts:

- The delivery of December 2010 contracts led to large reductions in futures open interest following the close of the fourth quarter of 2010.
- After falling 89 percent during the first week in January to 2.5 million CO₂ allowances, futures open interest increased gradually throughout the first quarter of 2011, ending the quarter at 5.7 million allowances.

⁹ Sources: Open interest in options is available at “www.ccfе.com/mktdata_ccfe/optionsSummary.jsf?symbol=rggi”, and open interest in futures is available at “www.ccfе.com/mktdata_ccfe/futuresSummary.jsf?symbol=rggi”.

¹⁰ The table in the figure reports the open interest at the end of each quarter just prior to the delivery or expiration of contracts at the end of the quarter.

- 2009 vintage and 2010 vintage futures contracts accounted for nearly all of the futures open interest at the beginning of the first quarter of 2011, while the share of open interest related to 2011 vintage futures contracts rose to a plurality by the end of February.

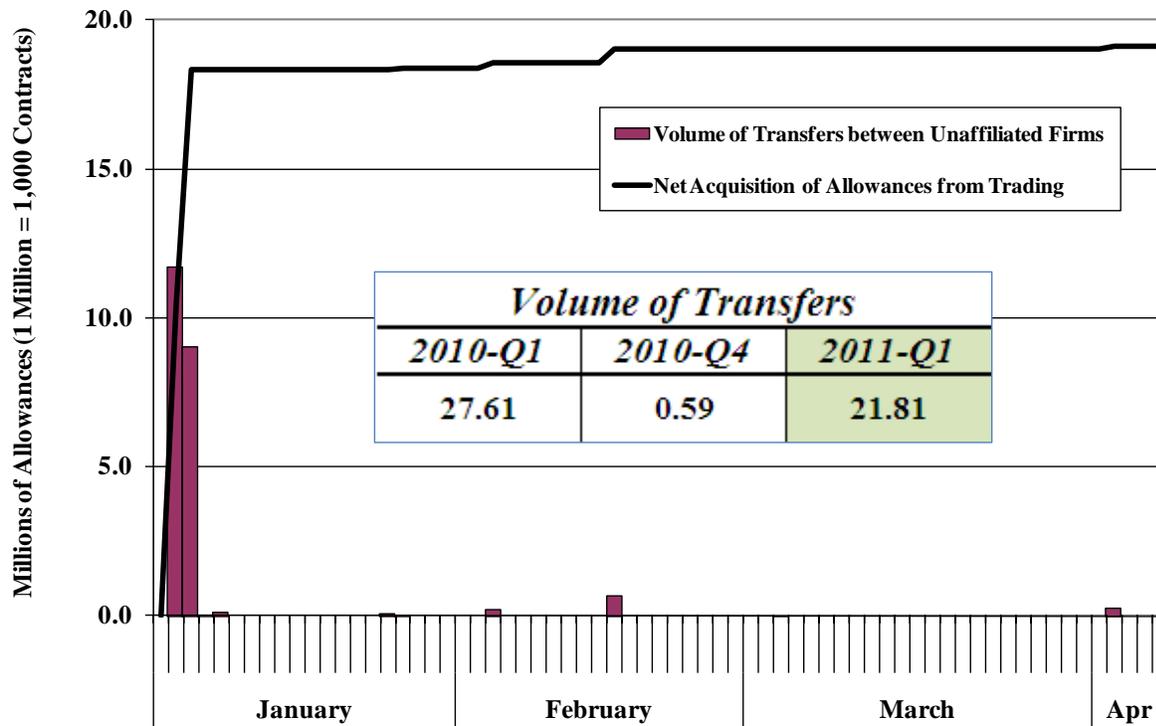
CO₂ Allowance Transfers Registered in COATS

Figure 4 summarizes transfers of CO₂ allowances between the COATS accounts of unaffiliated firms. The figure shows the volume of COATS transfers between unaffiliated firms and the net amount of CO₂ allowances that have been acquired as a result of transactions between unaffiliated firms during the first quarter of 2011.¹¹ The figure shows data through the first five trading days of April in order to include transfers that result from the delivery of futures and forward contracts with a March 2011 delivery month. The figure also shows the volume of transfers in the first quarter of 2011 compared to the previous quarter and to the first quarter of the previous year.

The net amount of CO₂ allowances that have been acquired from transactions is smaller than the gross volume of transactions between unaffiliated firms because the net acquisition offsets sales against purchases for each firm. For example, if Firm A purchases 100,000 CO₂ allowances but then sells 20,000 allowances, the figure would show a net acquisition by Firm A of 80,000 allowances even though the volume of transfers would be 120,000 allowances. This is an important distinction because the net amount of CO₂ allowances that have been acquired from trading since RGGI allowances have been in circulation was 42.7 million as of April 7, 2011, while the gross volume of transfers between unaffiliated firms has been almost 79 million allowances.

¹¹ This excludes the majority of allowances, which are held by firms that purchased them directly in the auction, received them through allocations by one of the Participating States, or acquired them as a result of a transaction prior to the first quarter of 2011.

**Figure 4: Net Acquisition of CO₂ Allowances from Trading¹²
January 1 to April 7, 2011**



Key observations regarding the transfer of CO₂ allowances in COATS between unaffiliated firms:

- In the first quarter of 2011, CO₂ allowance transfers between unaffiliated firms totaled 21.8 million, up from 0.6 million in the fourth quarter of 2010. Ninety-six percent of the transfers (21 million CO₂ allowances) occurred in the first week of January 2011 due to the delivery or expiration of December 2010 contracts.
- Most CO₂ allowance transfers between unaffiliated firms result from the delivery or expiration of December contracts. Accordingly, 23 million CO₂ allowances were transferred in the first week of January 2010, while just 12 million were transferred in the 11 months from February to December 2010..
- The net amount of CO₂ allowances acquired through the secondary market during the period shown in Figure 4 (19.1 million) is smaller than the total number of allowances exchanged (22.1 million) because some firms both purchased and sold allowances during the period.

¹² Source: CO₂ allowance transfers are based on information in COATS.

- Firms have been able to acquire a substantial number of CO₂ allowances through the secondary market, which is important because some firms prefer to obtain allowances through the secondary market rather than in the quarterly auctions.

E. OPEN INTEREST OF INDIVIDUAL FIRMS IN FUTURES AND OPTIONS CONTRACTS

This section discusses additional information about the firms trading CCFE futures and options from the weekly Commitments of Traders (“COT”) reports, which are published by the Commodity Futures Trading Commission (“CFTC”).¹³

Participation in the market for RGGI CO₂ allowance derivatives fell as the numbers of firms maintaining significant positions in each vintage were lower than 20 throughout the first quarter of 2011. The CFTC does not publish information from the COT reports for a particular vintage at times when fewer than 20 firms have reportable positions, so no specific information was published during the first quarter.

Although firm-level information on open interest is not available, the information shown in Figure 3 provides an indication of the upper limits of the net long and net short positions of individual firms. Combined with firm-specific information about allowance holdings from COATS, the information on open interest that is shown in Figure 3 is useful for evaluating the potential for a firm to hoard RGGI allowances, which is discussed further in Section F.

¹³ Each day, firms with an open interest of 25 contracts or more are required to report their positions to the CFTC. The CFTC categorizes each firm as Commercial if it engages in trading primarily to supply its own need for allowances or Non-Commercial if it trades for another purpose. Hence, compliance entities are generally designated as Commercial and non-compliance entities are frequently designated as Non-Commercial. Each Tuesday, the CFTC publishes the COT report, which is a summary of the long and short positions of participants in the market.

F. DISCUSSION OF MARKET MONITORING

As the RGGI Market Monitor, we monitor trading in the secondary CO₂ allowance market in order to identify anticompetitive conduct. Additionally, the Commodity Futures Trading Commission (“CFTC”) evaluates trading in the secondary CO₂ allowance market consistent with its role as the regulator of futures and option markets in the U.S. This section discusses two types of anti-competitive conduct for which we monitor. As in previous reports on the secondary market, we find no evidence of anti-competitive conduct.

In any commodity market, one potential concern is that a firm could hoard a substantial share of the supply of a commodity to influence prices or to prevent a competitor from obtaining CO₂ allowances. Hence, we screen information on the holdings of CO₂ allowances and allowance-derivatives and the demand for allowances to identify firms that might acquire a position that raises competitive concerns. At this stage, hoarding is not a significant concern for the RGGI CO₂ allowance market because the amount of allowances in circulation and the open interest in allowance derivatives is small relative to the total supply of allowances. The total supply of CO₂ allowances that will ultimately be available in the first compliance period (from 2009 to 2011) is more than 560 million. Given that only 385 million CO₂ allowances are circulating in the secondary market,¹⁴ that the auction rules limit the amount of allowances that can be purchased by a single party or group of affiliated parties to 25 percent, and that the net transfers of CO₂ allowances between parties in the secondary market have been modest thus far, it is not yet possible for the holdings of any participant to raise potential hoarding concerns.

Another potential concern is that a firm expecting to purchase CO₂ allowances in the auction might sell a large number of futures contracts in an effort to push the futures price below the competitive level. Such a firm might profit from buying a large number of CO₂ allowances in the auction at a discount if the bidding in the auction were influenced by the depressed futures

¹⁴ 363 million allowances have been dispersed in the first ten auctions, and 22 million allowances have been allocated by the States.

price. For this to be a profitable strategy, the firm would need to be able to substantially depress the futures price with a relatively small amount of sales—an amount smaller than the amount of CO₂ allowances it planned to buy in the auction. The best protection against this strategy is a market where other firms respond by making additional purchases. Firms that are looking for an opportunity to reduce their short positions or to purchase CO₂ allowances for their future compliance needs help limit the effectiveness of a strategy to depress prices below the competitive level. Given current price levels relative to the floor price for CO₂ allowances, firms would have a strong incentive to make additional purchases if a firm deliberately attempted to depress the futures price. Nevertheless, the CFTC has access to confidential transaction data, which allows it to monitor for evidence of manipulative conduct.