



**ANNUAL REPORT ON THE MARKET  
FOR RGGI CO<sub>2</sub> ALLOWANCES: 2011**

**Prepared for:**

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

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The Regional Greenhouse Gas Initiative (RGGI) is a cooperative effort of Northeast and Mid-Atlantic to reduce emissions of carbon dioxide (CO<sub>2</sub>) from the power sector.

RGGI, Inc. is a non-profit corporation created to provide technical and administrative services to the states participating in the Regional Greenhouse Gas Initiative.

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## I. EXECUTIVE SUMMARY

The Regional Greenhouse Gas Initiative (“RGGI”) began full operation on January 1, 2009, becoming the first mandatory cap-and-trade program to limit CO<sub>2</sub> emissions in the United States. Electric power generators that are located in the states participating in RGGI are required to obtain a number of CO<sub>2</sub> allowances equal to the number of tons of CO<sub>2</sub> they emit. RGGI distributes CO<sub>2</sub> emissions allowances to the market primarily through auctions, making it distinctive among existing cap-and-trade programs. Ninety-three percent of the CO<sub>2</sub> allowances in circulation at the end of the first control period initially entered the market through one of the auctions.<sup>1</sup> By the end of the first control period, the RGGI participating states had conducted fourteen successful auctions, selling a total of 411 million CO<sub>2</sub> allowances for \$952 million.

This report evaluates activity in the market for RGGI CO<sub>2</sub> allowances in 2011, focusing on the following areas: allowance prices, trading and acquisition of allowances in the auctions and the secondary market, participation in the market by individual firms, and market monitoring.

### *CO<sub>2</sub> Allowance Prices*

The prices of CO<sub>2</sub> allowance futures for the first control period remained stable throughout 2011 with monthly average prices ranging from a low of \$1.87 in August to a high of \$1.94 in March. The auction clearing prices of CO<sub>2</sub> allowances for the first control period were also very stable as each auction cleared at the auction reserve price of \$1.89. Since the minimum auction reserve price is indexed to inflation (based on the Consumer Price Index), it is unlikely that CO<sub>2</sub> allowance prices will drop below this level in the future. The stability of prices around the auction reserve price reflects that firms have expected the supply of allowances to exceed demand by a substantial margin in at least the first control period.

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<sup>1</sup> The first control period began on January 1, 2009 and extended through December 31, 2011, and the second control period began on January 1, 2012 and extended through December 31, 2014.

### *Trading Patterns and Acquisition of CO<sub>2</sub> Allowances*

Compliance entities consistently acquired the majority of CO<sub>2</sub> allowances in each auction in 2011, purchasing 91 percent of the allowances sold for the first control period and 69 percent of the allowances sold for the second control period. Although non-compliance entities purchased significant quantities of CO<sub>2</sub> allowances in the auctions, they sold the majority of these in the secondary market. Consequently, at the end of the first week of January 2012, 98 percent of the CO<sub>2</sub> allowances in circulation were held by compliance entities. This percentage is unchanged from one year earlier.

The majority of CO<sub>2</sub> allowances held by compliance entities at the end of first control period were acquired before 2011 or in an auction during 2011. As of the first week of January 2012, 413 million CO<sub>2</sub> allowances from the first control period were held by compliance entities, and 73 percent were held by firms since the beginning of 2011, 16 percent were acquired through auctions in 2011, 2 percent were acquired in direct sales and allocations by individual states, and 9 percent were purchased in the secondary market in 2011 or the first week of 2012. Hence, the auctions were the primary source of CO<sub>2</sub> allowances for most firms in 2011, but the portion of allowances that have been acquired in the secondary market was still significant.

The number of unsold CO<sub>2</sub> allowances increased significantly in 2011 as 48 percent of the 177 million allowances offered for sale in the quarterly auctions went unsold. This was up from 18 percent in 2010 and 0 percent in 2008 and 2009, reflecting that firms have increasingly expected the supply of allowances to exceed the demand for allowances by a substantial margin in at least the first control period.

Trading activity in the secondary market for RGGI CO<sub>2</sub> allowances has declined over the past three years. This is reflected in the average daily volume of trading of futures contracts listed on the Chicago Climate Futures Exchange (“CCFE”), which fell from 2.7 million in 2009, to 0.2 million in 2010, to 0.03 million in 2011.

In keeping with its plan to wind-down its operations, the CCFE announced in February 2012 that it would delist all futures and option contracts related to RGGI CO<sub>2</sub> allowances.<sup>2</sup> Firms are still able to buy and sell RGGI allowance derivatives on the Intercontinental Exchange, although the volumes and open interest remained very low in the first quarter of 2012.

### *Participation in the Market by Individual Firms*

Participation in the auctions by a large number of firms promotes competition and helps ensure that the auction clearing price reflects the market value of CO<sub>2</sub> allowances. We found that large numbers of compliance entities participated in the offerings of first control period CO<sub>2</sub> allowances in the four auctions held in 2011, although the number of compliance entities fell from 35 in 2010 to 29 in 2011. Participation by non-compliance entities fell significantly to an average of four bidders in 2011, down from nine bidders in 2010. Although the number of firms participating in the first control period offerings fell in 2011, we found no material evidence of anti-competitive conduct or significant barriers to participation in our reviews of the bids and the qualification process of each auction. Ultimately, the competitiveness of the auction results was ensured by the use of an auction reserve price, which prevents individual firms from under-bidding in order to depress auction clearing prices below competitive levels.

In a well-functioning market, we expect each firm to acquire a number allowances that is broadly consistent with its compliance obligations. We found that the top ten compliance entities, which collectively account for approximately 67 percent of the demand for first control period CO<sub>2</sub> allowances, held 77 percent of the allowances. Other compliance entities, which collectively account for approximately 33 percent of the demand for first control period CO<sub>2</sub> allowances, held 21 percent of the allowances. Non-compliance entities collectively accounted for just two percent of holdings. Hence, firms have acquired quantities of CO<sub>2</sub> allowances that are broadly consistent with their needs, although some compliance entities had to acquire significant

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<sup>2</sup> See press release at “[http://www.ccfе.com/membership\\_ccfe/advisories/2012/021312CFTC.pdf](http://www.ccfе.com/membership_ccfe/advisories/2012/021312CFTC.pdf).”

quantities of additional first control period allowances in the two months before the compliance deadline on March 1, 2012 in order to satisfy their compliance obligations.

### *Market Monitoring*

As the RGGI Market Monitor, we evaluate the conduct of market participants in the auctions and in the secondary market to identify potential anti-competitive conduct. We also assess whether the auctions were administered properly by World Energy Solutions.

In our reviews of the four auctions in 2011, we found no material concerns regarding the auction process, barriers to participation in the auctions, or the competitiveness of the results. Large numbers of firms participated in the offerings of CO<sub>2</sub> allowances for the first control period. Although interest in the small number of CO<sub>2</sub> allowances auctioned for the second control period has been more limited, we find no evidence of anti-competitive conduct or barriers that would impede wider participation. The competitiveness of the auction results was further ensured by the use of an auction reserve price, which prevents individual firms from under-bidding in order to depress auction clearing prices below competitive levels. Further, we found that the auctions were administered in accordance with the noticed rules and bids received.

We find no evidence of anti-competitive conduct in the secondary market for CO<sub>2</sub> allowances, and we find that firms have generally purchased quantities of allowances that are consistent with their expected needs.



## II. BACKGROUND ON THE CO<sub>2</sub> ALLOWANCE MARKET

RGGI began full operation on January 1, 2009, becoming the first mandatory cap-and-trade program to limit CO<sub>2</sub> emissions in the United States. Cap-and-trade programs work by setting an aggregate emissions limit for a particular class of emitters, and requiring them to acquire a number of allowances sufficient to cover their emissions. Firms that own allowances can decide whether it is more profitable to use them to cover their emissions or to sell them to an emitter that can use them more efficiently. In this manner, the goal of cap-and-trade programs is to use market forces to reduce overall emissions in the most cost-effective ways.

RGGI is a collaborative effort of Northeast and Mid-Atlantic states to reduce overall CO<sub>2</sub> emissions. Electricity generating plants with more than 25 MW of capacity (“CO<sub>2</sub> budget sources”) must acquire a number of CO<sub>2</sub> allowances sufficient to cover their CO<sub>2</sub> emissions by the end of each control period. Firms that own budget sources (“compliance entities”) can acquire CO<sub>2</sub> allowances through a variety of means, including by purchasing them in the quarterly RGGI auctions or in the secondary market for allowances.

The market for RGGI CO<sub>2</sub> allowances has several key elements, which are discussed in this section: compliance obligations, the CO<sub>2</sub> Allowance Tracking System (“COATS”), the primary market for allowances, and the secondary market for allowances.

### *Compliance Obligations*

CO<sub>2</sub> budget sources are fossil fuel-fired electricity generating plants with greater than 25 MW of capacity. Shortly after the end of each control period, compliance entities must submit a sufficient number of CO<sub>2</sub> allowances to cover their CO<sub>2</sub> emissions during the control period. The first control period runs from 2009 through 2011, and the second control period runs from 2012 through 2014.

## *COATS*

COATS is the registry for RGGI CO<sub>2</sub> allowances. Each CO<sub>2</sub> allowance has a unique serial number and can be used to satisfy one short ton of compliance obligations. When firms trade CO<sub>2</sub> allowances in the secondary market, the seller must record the transfer of ownership in COATS before the buyer is recognized as the owner.

### *Primary Market for RGGI CO<sub>2</sub> Allowances*

The participating states have taken the approach of using auctions rather than free allocations as the primary means for distributing RGGI CO<sub>2</sub> allowances to the market. Accordingly, the primary market for CO<sub>2</sub> allowances consists mainly of the quarterly auctions. Thus far, 93 percent of the CO<sub>2</sub> allowances in circulation initially entered the market through one of the auctions. Quarterly auctions have taken place since September 2008. The majority of CO<sub>2</sub> allowances have been sold for the first control period, but a small number of CO<sub>2</sub> allowances have also been sold for the second control period.

Additional CO<sub>2</sub> allowances can also be awarded for approved CO<sub>2</sub> emissions offset projects (project-based greenhouse gas emissions reductions or carbon sequestration that occurs outside the capped electricity generation sector), although no such allowances have been awarded thus far. In 2009, there was a one-time award by certain participating states of 2.4 million early reduction allowances (ERAs), which were awarded for qualifying CO<sub>2</sub> emissions reductions achieved at CO<sub>2</sub> budget sources during 2006 through 2008, prior to the start of the first control period. Approximately 28.1 million CO<sub>2</sub> allowances for the first control period have been allocated by individual states, through either fixed-price sales or free allocations. Regardless of how CO<sub>2</sub> allowances initially enter the market, they can be traded to other firms in the secondary market.

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### *Secondary Market for RGGI CO<sub>2</sub> Allowances*

The secondary market is important for several reasons. First, it gives firms an ability to obtain CO<sub>2</sub> 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.

The secondary market for RGGI CO<sub>2</sub> allowances comprises the trading of physical allowances and financial derivatives, such as futures, forwards, and options contracts. A physical CO<sub>2</sub> allowance trade occurs when the parties to the transaction register the transfer of ownership in 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 a public exchange. Many financial derivatives eventually result in the transfer of physical CO<sub>2</sub> allowances (i.e., the transfer is registered in COATS), but this may occur months or years after the parties enter into a financial transaction. These include the following types of transactions:

- **Futures** – Under these contracts, two parties agree to exchange a fixed number of CO<sub>2</sub> 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 CO<sub>2</sub> 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 CO<sub>2</sub> allowance that is to be transferred. One standard futures contract equals 1,000 RGGI CO<sub>2</sub> allowances.
- **Forwards** – These are like futures contracts, but a forward contract typically requires that all financial settlement occur at expiration.
- **Call Options** – Call options give the purchaser the option to buy a fixed number of CO<sub>2</sub> 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 2009 expiration date. If the price of the corresponding futures contract rose to \$5.75, the firm could exercise the option to buy CO<sub>2</sub> allowances at \$5 and immediately sell them at \$5.75. Alternatively, if the price of the futures contract stayed below \$5, the firm would let the option expire without exercising it. One standard options contract can be exercised for 1,000 CO<sub>2</sub> allowances.

- Put Options – Put options are similar to call options but they give the purchaser the option to *sell* a certain number of CO<sub>2</sub> allowances of a particular vintage year at a specified strike price any time prior to the expiration date.

Futures, forwards, and options contracts allow firms to manage risks associated with unforeseen swings in commodity prices. Futures and forwards 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 and forward contracts, they usually require less financial security, making them more attractive to some firms.

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

### III. CO<sub>2</sub> ALLOWANCE PRICES

The market for RGGI CO<sub>2</sub> allowances consists primarily of purchases in the quarterly auctions, as well as trading of allowances and allowance futures, forwards, and options contracts in the secondary market. The clearing prices from the quarterly auctions provide information about the market value of CO<sub>2</sub> allowances to the public four times per year, while the prices of trades on the CCFE and transaction prices recorded in COATS provide price information on a more frequent basis. This section of the report summarizes prices in the markets for RGGI CO<sub>2</sub> allowances in 2011.

Key observations regarding RGGI CO<sub>2</sub> allowance prices:

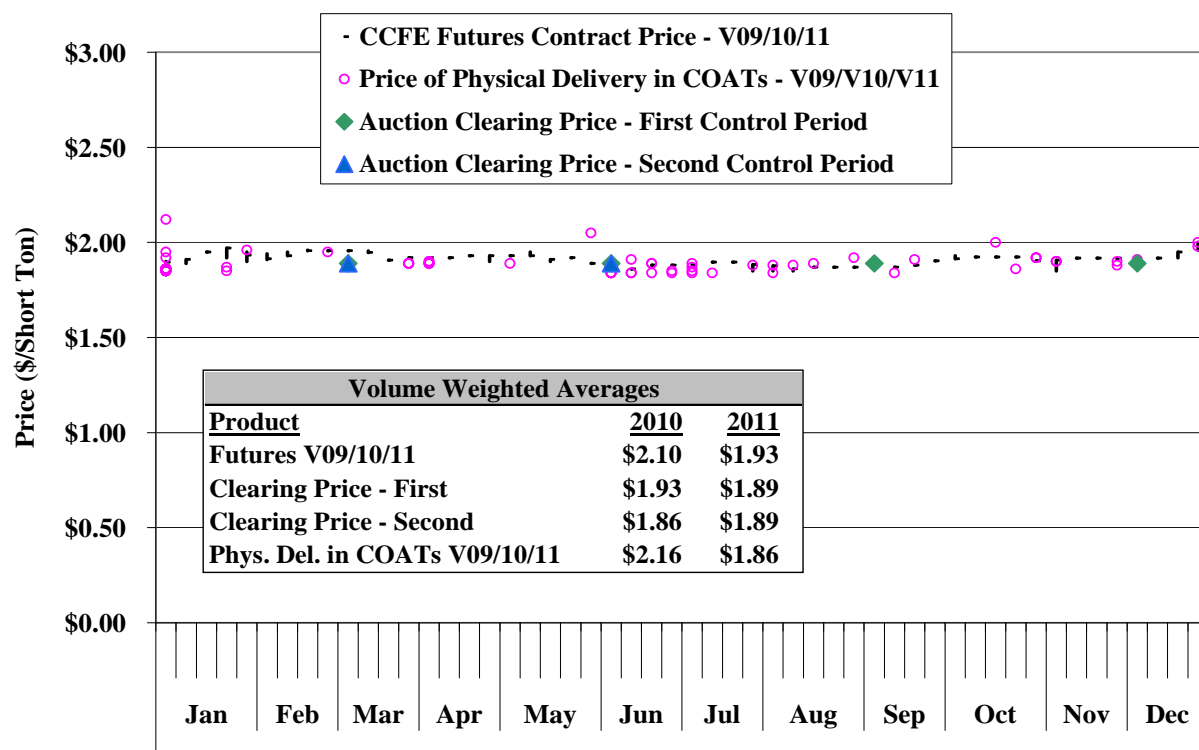
- Futures Prices – The prices of CO<sub>2</sub> allowances for the first control period remained stable throughout 2011 with monthly average prices ranging from a low of \$1.87 in August to a high of \$1.94 in March. Futures prices were consistent with the prices of physical deliveries in COATS and auction clearing prices throughout the year.
- Auction Prices (First Control Period) – The auction clearing prices of CO<sub>2</sub> allowances for the first control period have cleared at the reserve price in each of the last six auctions, reflecting the excess supply of allowances for the first control period. The volume-weighted average auction clearing prices for the first control period fell 2 percent from \$1.93 in 2010 to \$1.89 in 2011.
- Auction Prices (Second Control Period) – The auction clearing prices of CO<sub>2</sub> allowances for the second control period averaged \$1.89 in 2011, as the first two auctions of the year both closed at the reserve price. No CO<sub>2</sub> allowances for the second control period were sold in the last two auctions.
- Prices of Physical Deliveries Reported in COATS – The prices of physical deliveries reported in COATS have been generally consistent with futures prices and auction clearing prices.

#### *Prices in the Auctions and the Secondary Market*

Figure 1 summarizes prices in the auctions and the secondary market on a weekly basis from January to December 2011. CCFE futures contract prices are summarized for each week by a black vertical line from the minimum transaction price to the maximum transaction price in the

week and by a black horizontal tick mark at the closing price at the end of the week.<sup>3</sup> CCFE futures prices are shown for the benchmark contracts, which were the contracts for first control period CO<sub>2</sub> allowances for December 2011 delivery. The volume-weighted average price of physical deliveries in COATS of first control period CO<sub>2</sub> allowances is shown by a pink circle for each day when a transaction took place at a price that was recorded by the transacting parties.<sup>4</sup> The figure also shows the auction clearing prices of first control period and second control period CO<sub>2</sub> allowances in the four quarterly auctions held during 2011.

**Figure 1: CO<sub>2</sub> Allowance Prices in the Auctions and Secondary Market 2011**



Key observations regarding prices in auctions and the secondary market:

<sup>3</sup> Closing price is the settlement price as defined in Section 2604 of the CCFE Rulebook. The settlement price can be based on factors such as a volume-weighted average of trade prices before market close, the mid-point between the best bid and best offer before market close, and the time value between the delivery months of contracts.

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

- Futures Prices – The prices of CO<sub>2</sub> allowances for the first control period remained stable throughout 2011 with monthly average prices ranging from a low of \$1.87 in August to a high of \$1.94 in March. Futures prices were consistent with the prices of physical deliveries in COATS and auction clearing prices throughout the year. Volume-weighted average futures prices for the first control period fell 8 percent from \$2.10 in 2010 to \$1.93 in 2011.
- Auction Prices (First Control Period) – The auction clearing prices of CO<sub>2</sub> allowances for the first control period have cleared at the reserve price in each of the last six auctions, reflecting the excess supply of allowances for the first control period. The volume-weighted average auction clearing prices for the first control period fell 2 percent from \$1.93 in 2010 to \$1.89 in 2011.
- Auction Prices (Second Control Period) – The auction clearing prices of CO<sub>2</sub> allowances for the second control period averaged \$1.89 in 2011, as the first two auctions of the year both closed at the reserve price. No CO<sub>2</sub> allowances for the second control period were sold in the last two auctions. The volume-weighted average auction clearing prices for the second control period rose 2 percent from 2010 to 2011 because the reserve price increased from the previous year and each auction held in 2010 and 2011 cleared at the reserve price.
- Prices of Physical Deliveries Reported in COATS – The prices of physical deliveries reported in COATS have been generally consistent with futures prices reported by the CCFE, which is to be expected in a well-functioning market. Many of the transaction prices reported in COATS are associated with physical deliveries that result from the expiration of the previous month's futures contract.<sup>5,6</sup> Although the prices of physical deliveries in COATS were generally consistent with futures prices, the prices of physical deliveries were occasionally higher by a significant margin. For instance, four physical delivery transactions were reported in 2011 with prices greater than \$2.00. In each case the volumes transacted were relatively small—less than 50 thousand CO<sub>2</sub> allowances.

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<sup>5</sup> Several business days after a futures contract reaches expiration, CO<sub>2</sub> allowances are exchanged for funds according to the closing price on the last day of the expiration month. Accordingly, many of the transaction prices recorded in COATS are consistent with the prices of futures contracts in the previous week. Physical deliveries in COATS generally occur on the third business day following the expiration day of the futures contract. For instance, contracts for December 2011 delivery resulted in a large number of transfers in COATS on January 5, 2012.

<sup>6</sup> 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 CO<sub>2</sub> allowances at \$2.50/allowance, the purchasing firm (firm with a long position) must put \$2,500 in an account (or whatever share of the entire liability the exchange requires). If the futures price declines to \$2/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 \$2,000 in the account.

Such cases can occur when the delivery results from: settlement of a forward contract signed at an earlier date when the futures price was higher,<sup>7</sup> the exercise of an option with a strike price higher than the futures price, or settlement of a contract bundling the sale of allowances with additional services. Hence, the transaction prices reported in COATS may be affected by factors that are not reported.

### *CO<sub>2</sub> Allowance Futures Contract Prices by Delivery Month and by Vintage Year*

The delivery month of the contract determines when the actual exchange occurs of funds for CO<sub>2</sub> allowances, so a firm that buys a futures contract for delivery in thirteen months rather than in one month is able to delay payment for one year. Since the purchasing firm can earn interest on funds it holds prior to making payment, it may be willing to pay more for a contract with a future delivery date. A firm's willingness to pay a premium for a future delivery date depends on interest rates.<sup>8</sup> Hence, in a very liquid market for CO<sub>2</sub> allowances, the prices of futures contracts with different delivery months should be consistent with expected interest rates over the period.

Key observations regarding futures contract prices by delivery month and year:

- Although trading volumes were relatively low and the market for CO<sub>2</sub> allowances was not highly liquid, the relative prices of futures contracts were generally consistent with interest rates over the period.

### *Volatility of CO<sub>2</sub> Allowance Prices*

Cap-and-trade markets are designed to give firms efficient incentives to reduce or offset emissions. In the short-term, high-emitting generators will operate less frequently in favor of low-emitting generators. In the long-term, the market will affect the decisions of firms to develop offset projects, retire older inefficient generation, and perform maintenance that

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<sup>7</sup> 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.

<sup>8</sup> Firms that purchase futures contracts must deposit funds to satisfy margin requirements until the delivery of the contract. Firms can satisfy margin requirements by depositing cash, U.S. Treasuries, or other readily marketable securities. Hence, firms have the opportunity to earn interest on the funds they use to satisfy margin requirements.



increases fuel efficiency and lowers carbon-intensity. Predictable CO<sub>2</sub> allowance prices decrease the risks associated with making long-term investments in reducing CO<sub>2</sub> emissions. Since CO<sub>2</sub> allowance prices can be volatile, the availability of futures and options contracts allows firms to protect themselves from the risks of such investments.

One measure of the volatility of CO<sub>2</sub> allowance prices is known as *historic volatility*.<sup>9</sup> This measures the volatility based on day-to-day price variations over a recent period (e.g., several months or one year). This is a useful measure when factors influencing the volatility of prices in the recent period are likely to be the same as the factors influencing the volatility of prices in the future.

Another measure of the volatility of CO<sub>2</sub> allowance prices is known as *option-implied volatility*.<sup>10</sup> This measures the volatility that is implied by the trading of option contracts for CO<sub>2</sub> allowances. If a firm perceives that CO<sub>2</sub> allowance prices are volatile, the firm may be willing to pay a high price for an option contract that protects it from unforeseen allowance price fluctuations. Likewise, if a firm perceives that CO<sub>2</sub> allowance prices are relatively stable, the firm will be willing to pay relatively little for the same option contract.<sup>11</sup>

Key observations regarding volatility of CO<sub>2</sub> allowance prices:

- Historic Volatility of Futures Prices – CCFE futures prices have become progressively less volatile over the past three years. The historic volatility of futures prices fell from 26

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<sup>9</sup> 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.

<sup>10</sup> The option-implied volatility of a CO<sub>2</sub> allowance refers to the expected standard deviation of the distribution of allowance prices one year in the future. For example, if the expected value of the price one year in the future is \$1 and the option-implied volatility is 25 percent, this implies that the probability that the price will be within 25 percent of \$1 (i.e., between \$0.75 and \$1.25) is 68.2 percent assuming that the price is distributed log-normally.

<sup>11</sup> The price of an option contract depends primarily on two factors: (i) the expected value of a CO<sub>2</sub> allowance relative to the strike price of the option, and (ii) the expected volatility of an allowance over the period until the expiration date. When call option prices and put option prices move in opposite directions, it signals a change in the expected price of allowances. Conversely, when call option prices and put option prices move in the same direction, it signals a change in the expected volatility of allowance prices.

percent in 2009 to 16 percent in 2010 and 9 percent in 2011. The low volatility of futures prices in 2011 is consistent with the pattern of auction clearing prices, which have been very stable since 2010.

- Option-Implied Volatility of Futures Prices – The lack of options trading may itself reflect that firms perceive little risk from variations in future CO<sub>2</sub> allowance prices. Since the auction reserve price of \$1.89 is indexed to inflation, compliance entities are unlikely to be able to obtain CO<sub>2</sub> allowances at a lower price in the future. Prices in the futures market have remained near the auction reserve price, suggesting that firms perceive little risk that CO<sub>2</sub> allowances will fall or rise substantially from the current level.

#### IV. TRADING AND ACQUISITION OF CO<sub>2</sub> ALLOWANCES

This section evaluates the trading and acquisition of CO<sub>2</sub> allowances in the primary and secondary allowance markets. Firms initially acquire CO<sub>2</sub> allowances in the primary market, mainly by purchasing them in the quarterly auctions.<sup>12</sup> Firms then buy and sell CO<sub>2</sub> allowances in the secondary market. Secondary market activity can be observed from information about the trading of futures, forwards, and options contracts on public exchanges and in the OTC market, as well as from the transfers of ownership recorded in COATS. This section traces the movement of CO<sub>2</sub> allowances from their initial introduction to the market and through the secondary market.

The figures in this section evaluate the activity of firms in the CO<sub>2</sub> allowance market in 2011, including: (i) the purchases by compliance entities and non-compliance entities in the quarterly auctions, (ii) the volume of trading of CO<sub>2</sub> allowances and allowance futures contracts, (iii) the general shift in ownership of allowances through the secondary market from non-compliance entities to compliance entities, and (iv) the holdings of CO<sub>2</sub> allowances in COATS.

Key observations regarding trading and acquisition of CO<sub>2</sub> allowances:

- Compliance Entities – Compliance entities consistently acquired the majority of CO<sub>2</sub> allowances in each of the four auctions in 2011, purchasing 91 percent of the allowances sold for the first control period and 69 percent of the allowances sold for the second control period. At the end of the first week of January 2012, 98 percent of the CO<sub>2</sub> allowances in circulation were held by compliance entities. This percentage is unchanged from one year earlier.
- Non-Compliance Entities – Although non-compliance entities purchased significant quantities of CO<sub>2</sub> allowances in the auctions (9 percent for the first control period and 31 percent for the second control period), they sold the majority of these in the secondary

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<sup>12</sup> Some allowances are also allocated by individual states directly to individual entities (through free allocation or fixed-price sales). In 2009, there was a one-time award of early reduction allowances (ERAs), which were awarded for qualifying CO<sub>2</sub> emissions reductions achieved at CO<sub>2</sub> budget sources during 2006 through 2008, prior to the start of the first control period.

market. Consequently, by the first week of January 2012, only 2 percent of the CO<sub>2</sub> allowances in circulation were held by non-compliance entities.

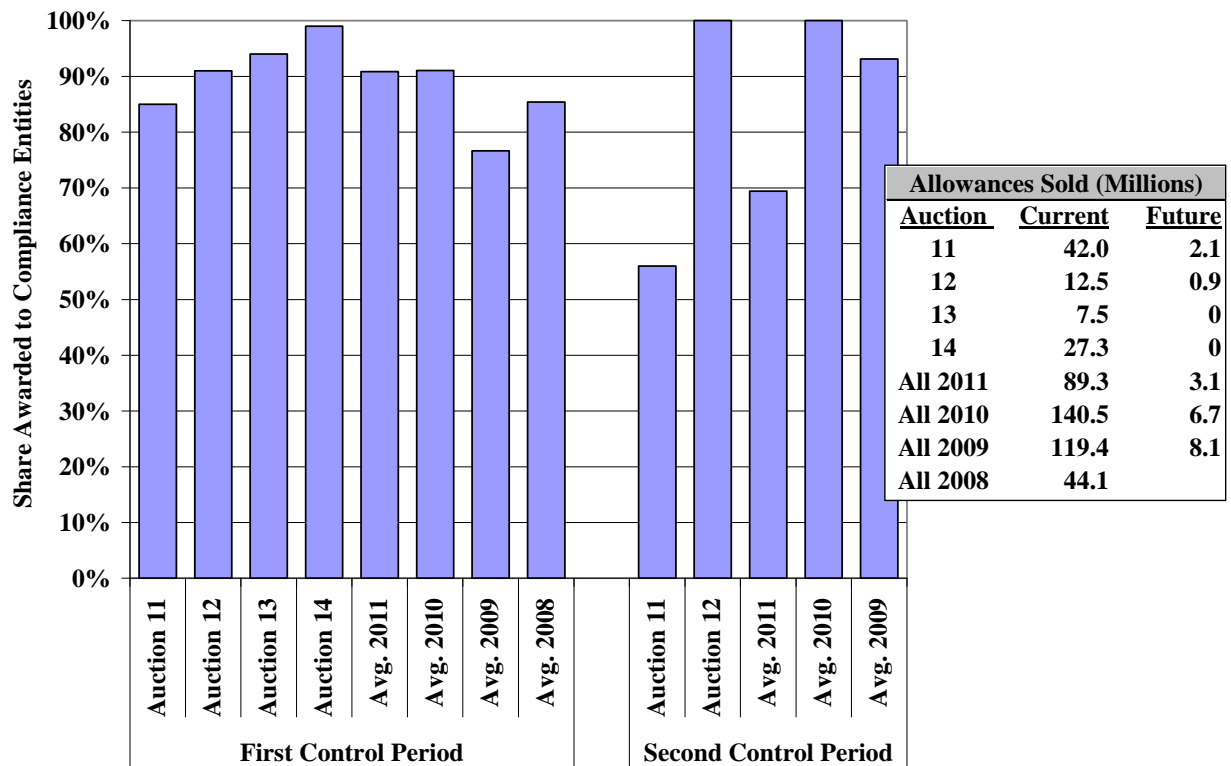
- Unsold CO<sub>2</sub> Allowances – Of the 177 million allowances offered for sale in 2011, 48 percent went unsold. This was up from 18 percent in 2010, 0 percent in 2009, and 0 percent in 2008, reflecting that firms have increasingly expected the supply of allowances to exceed the demand for allowances by a substantial margin in at least the first control period.
- Trading Activity in the Secondary Market – Trading activity in the secondary market for RGGI CO<sub>2</sub> allowances has declined over the past three years. This is reflected in the average daily volume of trading of CCFE-listed futures contracts, which fell from 2.7 million in 2009, to 0.2 million in 2010, to 0.03 million in 2011. Although futures trading volumes fell in 2011, the volume of OTC transfers between unaffiliated firms increased.
- Sources of CO<sub>2</sub> Allowance Holdings – The majority of CO<sub>2</sub> allowances held by compliance entities at the end of first control period were acquired before 2011 or in an auction during 2011. As of the first week of January 2012, 413 million CO<sub>2</sub> allowances from the first control period were held by compliance entities, and 73 percent were held by firms since the beginning of 2011, 16 percent were acquired through auctions in 2011, 2 percent were acquired in direct sales and allocations by individual states, and 9 percent were purchased in the secondary market in 2011 or the first week of 2012. Hence, the auctions have been the primary source of CO<sub>2</sub> allowances for most firms, but the portion of allowances that have been acquired in the secondary market and through direct sales and allocations has still been significant.

### *Distribution of Auction Awards*

The following figure reports the quantity of CO<sub>2</sub> allowances awarded in each offering of the four auctions that were held in 2011 (i.e., Auctions 11 through 14). Each auction included two offerings: one for the first control period (2009 to 2011) and one for a second control period (2012 to 2014). The bars show the percentage of CO<sub>2</sub> allowances in each offering that was purchased by compliance entities, while the remaining share in each offering was purchased by non-compliance entities.<sup>13</sup> Additional bars report the average percentage of CO<sub>2</sub> allowances that was purchased by compliance entities for each control period in each calendar year since 2008.

<sup>13</sup> Throughout this report, the compliance entity category includes corporate affiliates of compliance entities. In some cases, a firm that does not have stock ownership in a budget source is categorized as a compliance entity if it is believed that the firm has substantial control over the operation of a budget source and/or responsibility

Figure 2: Distribution of Auction Awards  
Auctions 11 to 14<sup>14</sup>



Key observations regarding distribution of auctions and awards:

- First Control Period – Compliance entities have consistently purchased a substantial majority of the first control period CO<sub>2</sub> allowances sold in each auction. Compliance entities purchased 91 percent of the 89 million first control period CO<sub>2</sub> allowances sold in 2011, equal to the percentage purchased in 2010, and up from 77 percent in 2009 and 85 percent in 2008.
- Second Control Period – Compliance entities have consistently purchased a substantial majority of the second control period CO<sub>2</sub> allowances sold in auctions. Compliance entities purchased 69 percent of the 3.1 million second control period CO<sub>2</sub> allowances sold in 2011.

for acquiring RGGI allowances to satisfy the owner’s compliance obligations.

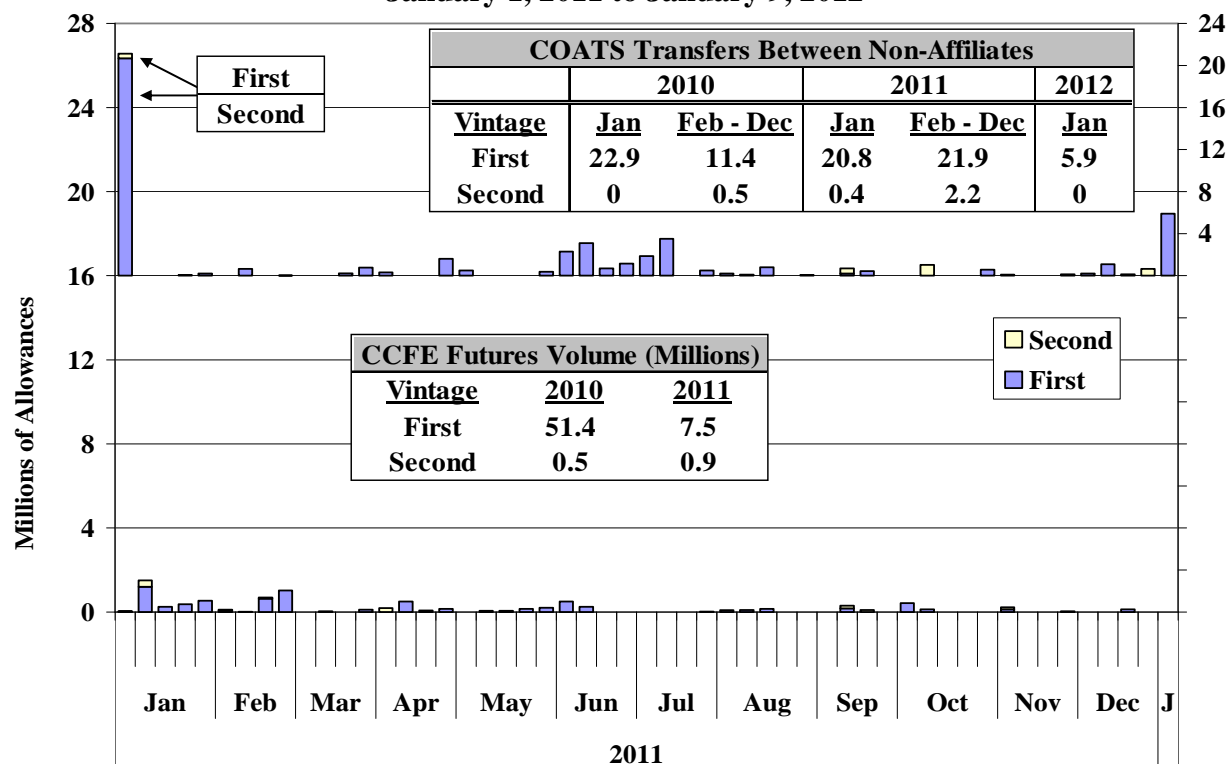
<sup>14</sup> The share awarded to compliance entities is not shown for the second control period offerings of Auctions 13 and 14 because no allowances were sold in those offerings.

- Unsold CO<sub>2</sub> Allowances – Of the 177 million allowances offered for sale in 2011, 48 percent went unsold. This was up from 18 percent in 2010, 0 percent in 2009, and 0 percent in 2008, reflecting that firms have increasingly expected the supply of allowances to exceed the demand for allowances by a substantial margin in at least the first control period.
- Distribution of Awards – The high share of CO<sub>2</sub> allowances purchased by compliance entities is consistent with our expectations given that they constitute nearly all of the demand for allowances. Although non-compliance entities purchased significant quantities of CO<sub>2</sub> allowances in the auctions, they sold the majority of these in the secondary market. Consequently, by the first week of January 2012, 98 percent of the CO<sub>2</sub> allowances in circulation were held by compliance entities.

### *CO<sub>2</sub> Allowance Trading Volumes*

The following figure summarizes the volume of trading of CCFE-listed futures contracts as well as transfers of CO<sub>2</sub> allowances between unaffiliated parties that were recorded in COATS on a weekly basis from January 1, 2011 to January 9, 2012. The first full week of January 2012 is shown in the figure because that is when CO<sub>2</sub> allowances were transferred between COATS accounts as a result of the delivery of CCFE and OTC contracts with a December 2011 delivery month. The bottom portion of the figure shows the weekly volume of futures trading on the CCFE for contracts with delivery in the first and second control periods. The bottom portion of the figure is plotted against the left vertical axis. The top portion of the figure shows the weekly volume of first and second control period CO<sub>2</sub> allowance transfers between unaffiliated firms that are reported in COATS. The top portion of the figure is plotted against the right vertical axis. The tables show a year-to-year comparison of the total volumes of futures trading and CO<sub>2</sub> allowance transfers in COATS.

**Figure 3: Volume of Trading of CO<sub>2</sub> Allowances and Allowance Futures  
January 1, 2011 to January 9, 2012**



Key observations regarding CO<sub>2</sub> allowance trading volumes:

- **Volume of Futures Trading** – The volume of futures trading totaled 8.5 million CO<sub>2</sub> allowances in 2011, an 84 percent decrease from 52 million in 2010. Trading of first control period CO<sub>2</sub> allowances accounted for 89 percent of the total volume in 2011.
- **Delivery of the Benchmark Contracts** – Large volumes of CO<sub>2</sub> allowance transfers typically occur in the first week of January as a result of the final maturity, expiration, and delivery of December contracts for futures, forwards, and options. Forty-seven percent of the CO<sub>2</sub> allowances transferred between the COATS accounts of unaffiliated firms during 2011 occurred in the first full week of January. Another large quantity of CO<sub>2</sub> allowances was transferred during the first full week of January 2012.
- **Other CO<sub>2</sub> Allowance Transfers** – Of the 24 million CO<sub>2</sub> allowances transferred between unaffiliated firms from February to December 2011, 55 percent occurred in June and July. The volume of CO<sub>2</sub> allowance transfers rose following the announcement at the end of May that New Jersey would leave RGGI after the first control period.<sup>15</sup>

<sup>15</sup> See [http://www.rggi.org/docs/New\\_Jersey\\_Letter.pdf](http://www.rggi.org/docs/New_Jersey_Letter.pdf) and <http://www.rggi.org/docs/Documents/NJ->

### *Acquisition of CO<sub>2</sub> Allowances in the Secondary Market*

This part of the section evaluates how the ownership of CO<sub>2</sub> allowances has changed as a result of trading in the secondary market.<sup>16</sup> Changes in the ownership of CO<sub>2</sub> allowances are quantified using two measures:

- *Open Interest* – This is the net amount of futures contracts that have been purchased or sold by a particular firm, but that have not reached delivery. For example, if a firm sells 100 contracts to another firm, it will have an open interest, or short position, of 100 contracts. If the firm then buys 40 contracts, these will partly offset its short position, resulting in an open interest, or short position, of 60 contracts. The total open interest in the market can be determined by summing across all of the long positions of firms (or alternatively, by summing across all of the short positions).<sup>17</sup>
- *Net Purchases/Sales of CO<sub>2</sub> Allowances* – This is the net change in the amount of CO<sub>2</sub> allowances in a firm's COATS account that has resulted from trading (rather than the auction or allocations). For example, if a firm purchases 100,000 CO<sub>2</sub> allowances from another firm, and then sells 30,000 allowances, the firm's net purchase of allowances would be 70,000. The total net change in CO<sub>2</sub> allowance holdings in the market can be determined by summing across all of the net purchases of individual firms (or alternatively, by summing across all of the net sales).<sup>18</sup>

Figure 4 summarizes net changes in ownership as of the first week of each month from January 2011 to January 2012.<sup>19</sup> Futures open interest is shown for all firms in a single category, while net purchases and sales of CO<sub>2</sub> allowances are shown separately for compliance entities and non-compliance entities.

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<sup>16</sup> This excludes the majority of CO<sub>2</sub> allowances, which are held by firms that purchased them directly in the auction or received them through allocations by one of the Participating States.

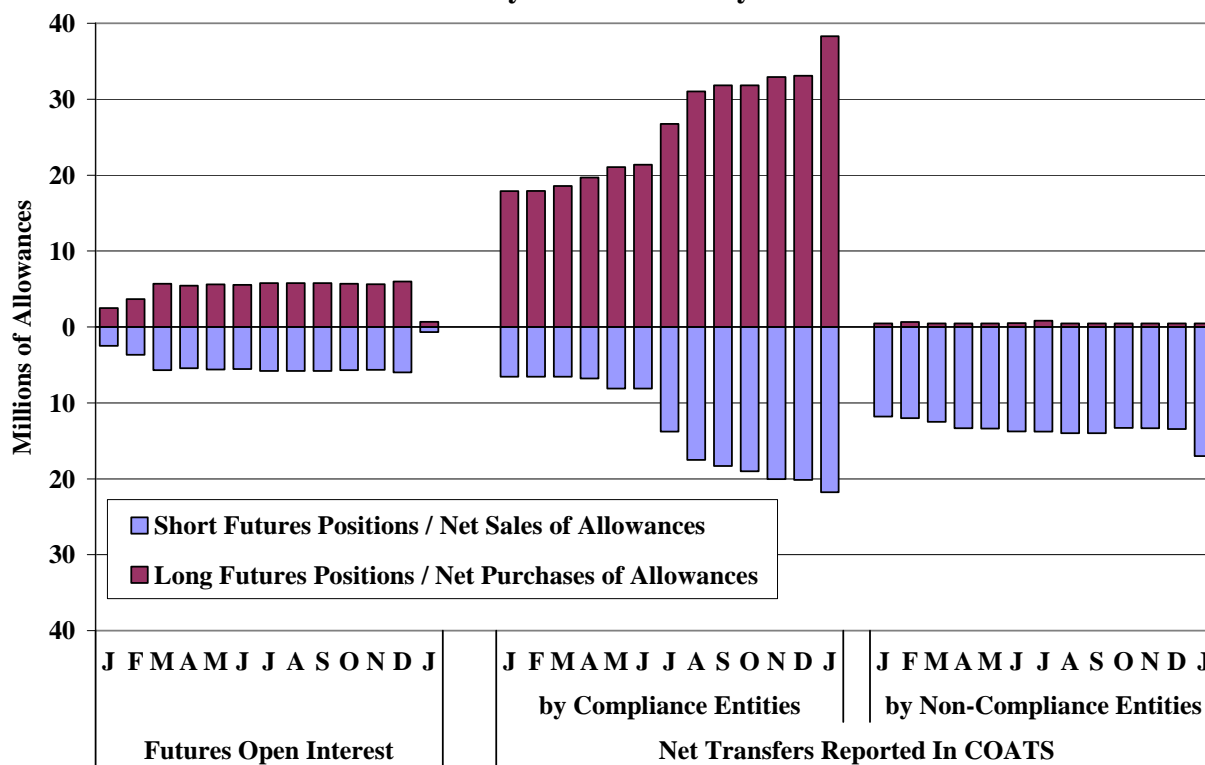
<sup>17</sup> Information on the open interest in CCFE futures contracts is available from the CCFE.

<sup>18</sup> Information on the ownership of actual CO<sub>2</sub> allowances comes from COATS.

<sup>19</sup> The futures open interest is based on futures positions at the end of the first business day of each month, while the net purchases and sales are based on registered holdings in COATS at the end of the third business day of each month, which is after delivery was made on contracts from the previous month.



**Figure 4: Futures Open Interest and Net Transfers of CO<sub>2</sub> Allowances<sup>20</sup>  
January 2011 to January 2012**



Key observations regarding the acquisition of CO<sub>2</sub> allowances in the secondary market:

- Futures Open Interest** – The open interest of firms in futures contracts rose slowly in the first quarter of 2011 and then fell sharply in the first week of January 2012. The open interest in futures contracts rose from 2.5 million CO<sub>2</sub> allowances in the first week of January 2011 to 6 million allowances for most of the year, and then it fell to 0.7 million allowances in January 2012 after the delivery of futures contracts for December 2011 delivery. Open interest in futures contracts has decreased significantly over the past three years, from annual highs of 38 million in December 2009 and 22 million in December 2010.
- Net Transfers Reported by Compliance Entities** – Compliance entities generally used the secondary market to increase their holdings of CO<sub>2</sub> allowances. In the first week of January 2011, compliance entities acquired a net 18 million CO<sub>2</sub> allowances through the secondary market as a result of the delivery of December 2010 contracts. In the first week of January 2012, compliance entities increased their net acquisition from 33 to 38

<sup>20</sup> Net transfers of CO<sub>2</sub> allowances include transfers that occurred since January 1, 2011. Hence, transfers that occurred before January 1, 2011 are excluded.

million CO<sub>2</sub> allowances through the secondary market. The delivery of futures contracts with December 2010 and December 2011 delivery dates were responsible for a large share of the increase in net purchases and net sales shown in the first week of each year.

- Net Transfers Reported by Non-Compliance Entities – Non-compliance entities substantially reduced their holdings of CO<sub>2</sub> allowances in the first week of January 2011 and in the first week of January 2012. These reductions were primarily due to the delivery of futures contracts with December 2010 and December 2011 delivery dates.
- Total Net Purchase Reported in COATS – The total net purchase of CO<sub>2</sub> allowances from January 2011 through the first week in January 2012 (39 million) is smaller than the gross volume of transactions between unaffiliated firms (51 million as shown in Figure 3). This is because some firms have both purchased and sold CO<sub>2</sub> allowances in the secondary market such that the net change in their position is smaller than the total volume of their transactions. Although the total net purchase of CO<sub>2</sub> allowances was substantial in 2011, it was still much smaller than the 89 million first control period CO<sub>2</sub> allowances that were acquired in the auctions in 2011. Hence, the auctions are still the principal means by which firms acquired CO<sub>2</sub> allowances in 2011.

### ***Registered CO<sub>2</sub> Allowance Holdings***

The following figure combines information on the acquisition of CO<sub>2</sub> allowances from the auctions and state allocations with information on the purchase and sale of allowances in the secondary market and the initial holdings of allowances on January 1, 2011. Together, this information provides a summary of the holdings of CO<sub>2</sub> allowances in COATS accounts according to whether the allowances were acquired: (i) prior to 2011, (ii) through the primary market, or (iii) through the secondary market. The figure reports the following categories of CO<sub>2</sub> allowances:

- *Initial Holdings – Retained in COATS Account* – These CO<sub>2</sub> allowances are still held in the COATS account of the firm that held them at the end of 2010.
- *Awards and Allocations – Retained in COATS Account* – These CO<sub>2</sub> allowances are still held in the COATS account of the firm that purchased them in an auction or acquired them through an allocation.
- *Net Sales in the Secondary Market* – These CO<sub>2</sub> allowances were held at the end of 2010, purchased in an auction in 2011, or acquired through an allocation in 2011 and then subsequently sold in the secondary market.

- *Net Purchases in the Secondary Market* – These CO<sub>2</sub> allowances are held in the COATS account of a firm that purchased them in the secondary market after January 1, 2011.

For each firm, its holdings of CO<sub>2</sub> allowances in COATS are equal to the sum of three categories: *Initial Holdings – Retained in COATS Account*, *Awards and Allocations – Retained in COATS Account*, and its *Net Purchases in Secondary Market*.<sup>21</sup>

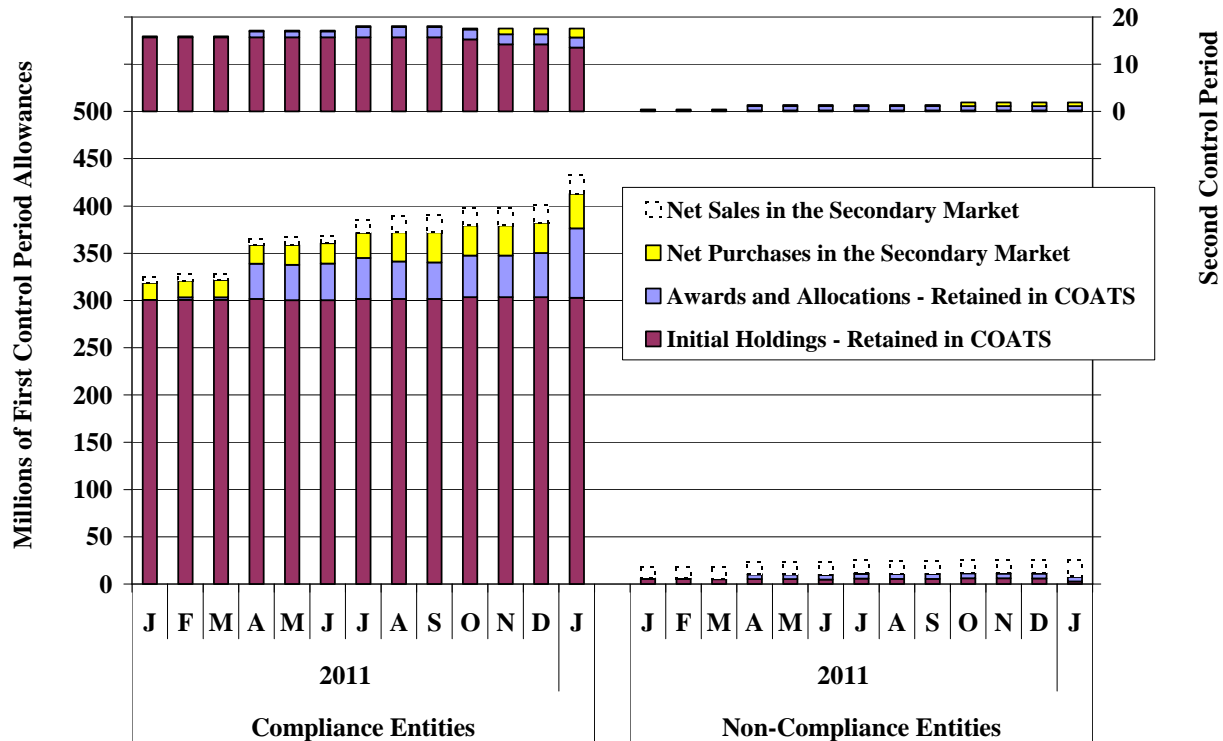
Figure 5 shows the four categories of CO<sub>2</sub> allowances as of the first week of each month from January 2011 to January 2012. The information is aggregated separately for compliance entities and non-compliance entities. The bottom portion of the figure shows CO<sub>2</sub> allowances for the first control period against the left vertical axis, while the top portion of the figure shows CO<sub>2</sub> allowances for the second control period against the right vertical axis.

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<sup>21</sup> The following two examples illustrate how the categories of allowances are calculated:

- If a firm initially held 20,000 allowances at the beginning of the year, purchased 50,000 allowances in an auction, purchased 100,000 allowances in the secondary market, and then sold 70,000 allowances in the secondary market, the firm would contribute:
  - 20,000 allowances to *Initial Holdings – Retained in COATS Account*,
  - 50,000 allowances to *Awards and Allocation – Retained in COATS Account*, and
  - 30,000 allowances to *Net Purchases in Secondary Market*. The calculation does not consider the serial numbers of individual allowances. Hence, in the example, it would not matter whether the 70,000 allowances sold had originally been acquired in the auction or in the secondary market.
- Alternatively, if a firm initially held 20,000 allowances, purchased 50,000 allowances in an auction, purchased 100,000 allowances in the secondary market, and then sold 160,000 allowances in the secondary market, the firm would contribute:
  - 10,000 allowances to *Initial Holdings – Retained in COATS Account*,
  - Zero allowances to *Awards and Allocations – Retained in COATS Account*, and
  - 60,000 allowances to *Net Sales in the Secondary Market*.

**Figure 5: Sources of CO<sub>2</sub> Allowances Held in COATS Accounts  
January 2011 to January 2012**



Key observations regarding registered CO<sub>2</sub> allowance holdings:

- Holdings by Compliance Entities – In 2011, the majority of CO<sub>2</sub> allowances were held by compliance entities that held them at the beginning of 2011 or that acquired their allowances through the auctions and/or state allocations. As of the first week of January 2012, 413 million CO<sub>2</sub> allowances from the first control period were held by compliance entities, and 73 percent were held by firms that held them at the beginning of 2011, 16 percent were acquired through auctions in 2011, 2 percent were acquired through direct sales and allocations by individual states, and 9 percent were purchased in the secondary market in 2011 or the first week of 2012. Since January 2011, some compliance entities have been net sellers of CO<sub>2</sub> allowances, selling approximately 20 million allowances to other compliance entities.
- Holdings by Non-Compliance Entities – Sixty-three percent of the 27 million CO<sub>2</sub> allowances that non-compliance entities held at the beginning of 2011 or acquired in the auctions or allocations were subsequently sold in the secondary market during 2011.
- Holdings of Second Control Period CO<sub>2</sub> Allowances – The holdings of second control period CO<sub>2</sub> allowances have not changed significantly as a result of trading in the secondary market. Of the 19 million second control period CO<sub>2</sub> allowances that were held by firms as of the first week of January 2012, 71 percent were held by the same firm

at the start of 2011, 16 percent were acquired in one of the auctions in 2011, and 13 percent were purchased in the secondary market.

## V. PARTICIPATION IN THE CO<sub>2</sub> ALLOWANCE MARKET

This section evaluates participation by individual firms in the CO<sub>2</sub> allowance market.

Participation by a large number of firms tends to promote competition, which helps ensure that CO<sub>2</sub> allowance prices are determined efficiently. Over time, firms that need CO<sub>2</sub> allowances for compliance should be able to acquire them through the auctions and/or the secondary market, and the holdings of individual firms should be relatively consistent with their potential uses for allowances.

This section evaluates four aspects of the CO<sub>2</sub> allowance market that reveal the level of participation by individual firms: (i) the demand for allowances by individual firms, (ii) the breadth of participation in the quarterly auctions, (iii) the holdings of individual firms relative to their demand for allowances, and (iv) the breadth of participation in the trading of allowance futures contracts.

Key observations regarding participation in the CO<sub>2</sub> allowance market:

- Participation in First Control Period Offerings – Large numbers of compliance entities participated in the offerings of first control period CO<sub>2</sub> allowances in the four auctions held in 2011 as the number of compliance entities submitting bids averaged 29, down from 35 in 2010. Participation by non-compliance entities fell significantly to an average of four bidders in 2011, down from nine bidders in 2010. The number of bidders submitting bids for at least three percent of the CO<sub>2</sub> allowances in a first control period offering dropped from an average of five in 2010 to an average of two in 2011.
- Participation in Second Control Period Offerings – Substantially fewer firms submitted bids in the offerings of second control period CO<sub>2</sub> allowances, which cannot be used to satisfy compliance obligations until after the first control period. The average number of bidders decreased from seven in 2010 to three in 2011, and there were no bidders that participated in Auction 13 or Auction 14.
- Competition – Participation in the auctions by a large number of firms promotes competition and helps ensure that the auction clearing price reflects the market value of CO<sub>2</sub> allowances. Although the number of firms participating in the first control period offerings declined in 2011 and few firms participated in the second control period offerings, we found no material evidence of anti-competitive conduct or significant barriers to participation in our reviews of the bids and the qualification process of each

auction. Ultimately, the competitiveness of the auction results was ensured by the use of an auction reserve price, which prevents individual firms from under-bidding in order to depress auction clearing prices below competitive levels.

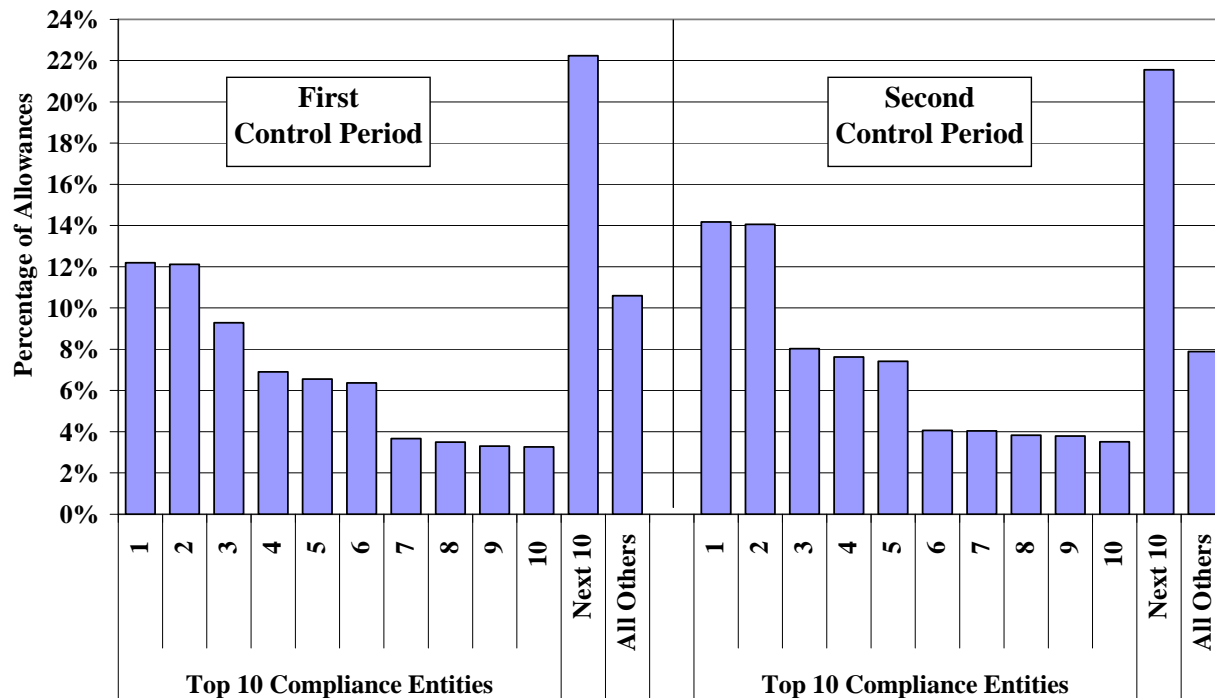
- Demand for CO<sub>2</sub> Allowances and Distribution of Holdings – The holdings of CO<sub>2</sub> allowances were widely distributed across firms after the first control period.
  - ✓ The largest demand for CO<sub>2</sub> allowances by a single firm was 12 percent, while the largest holding of CO<sub>2</sub> allowances by a single firm was by a compliance entity that held 16 percent of the allowances in circulation.
  - ✓ The top ten compliance entities, which collectively account for approximately 67 percent of the demand for first control period CO<sub>2</sub> allowances, held 77 percent of the allowances.
  - ✓ Other compliance entities, which collectively account for approximately 33 percent of the demand for first control period CO<sub>2</sub> allowances, held 21 percent of the allowances.
  - ✓ Non-compliance entities collectively accounted for just two percent of holdings.

Hence, firms have acquired quantities of CO<sub>2</sub> allowances that are broadly consistent with their needs, although some compliance entities had to acquire significant quantities of additional first control period allowances in the two months before the compliance deadline on March 1, 2012 in order to satisfy their compliance obligations.

### *Demand for CO<sub>2</sub> Allowances*

The following figure summarizes the projected demand for CO<sub>2</sub> allowances of individual compliance entities at the end of 2011. We project demand of each compliance entity for CO<sub>2</sub> allowances based on historical CO<sub>2</sub> emissions patterns and expected changes in future market conditions. The projected demand is shown for each of the top ten compliance entities (i.e. the ten firms with the highest projected demand), the second ten compliance entities as a group, and all other compliance entities as a group. Projected demand is shown separately for the first and second control periods because the demand of individual firms with budget sources in New Jersey will change after the first control period. The projected demand is reported in Figure 6 as a percentage of the total projected market demand.

**Figure 6: Estimated Demand for CO<sub>2</sub> Allowances  
By Compliance Entity**



Key observations regarding demand for CO<sub>2</sub> allowances:

- Demand for First Control Period CO<sub>2</sub> Allowances – The demand for first control period CO<sub>2</sub> allowances is dispersed relatively widely across firms. The two largest compliance entities each account for 12 percent of the total projected demand and the top five compliance entities account for 47 percent of the projected demand. The top ten compliance entities account for 67 percent of the total projected market demand for first control period CO<sub>2</sub> allowances, while the next ten compliance entities account for 22 percent and all compliance entities that are not among the top 20 firms account for 11 percent.
- Demand for Second Control Period CO<sub>2</sub> Allowances – The demand for second control period CO<sub>2</sub> allowances is also dispersed relatively widely across firms. The two largest compliance entities each account for 14 percent of the total projected demand and the top five compliance entities account for 51 percent of the projected demand. The top ten compliance entities account for 71 percent of the total projected market demand for second control period CO<sub>2</sub> allowances, while the next ten compliance entities account for 22 percent and all compliance entities that are not among the top 20 firms account for 8 percent.
- Concentration of Demand – The concentration of demand for first control period CO<sub>2</sub> allowances changed very little from 2010 to 2011. However, concentration will increase



modestly in the second control period when New Jersey budget sources no longer have compliance obligations. The modest increase in concentration is reflected by the higher demand shares for the largest compliance entities (e.g., the top ten compliance entities account for 67 percent of the total projected demand in the first control period versus 71 percent of the total projected demand in the second control period).

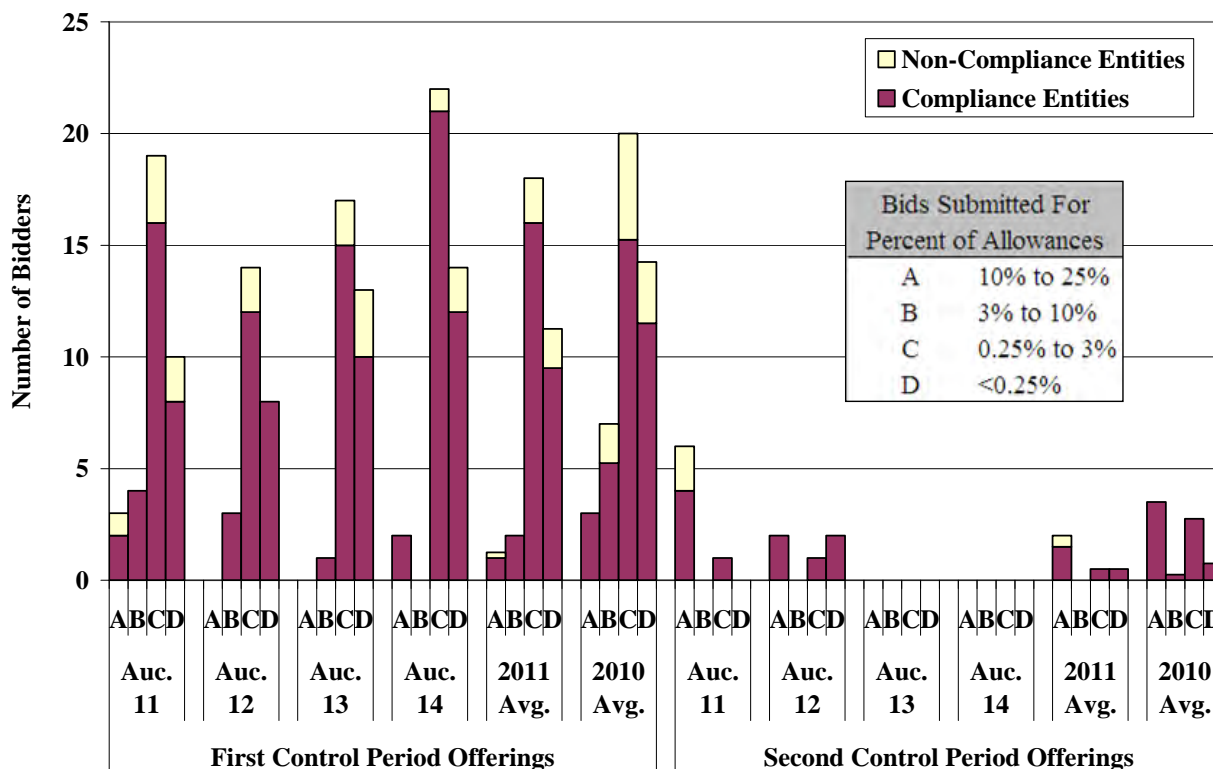
### *Participation in RGGI Auctions*

The following figure summarizes the breadth of participation in the four auctions during 2011. The figure reports the number of firms that submitted bids in each offering of each auction. The number of bidders is shown separately according to whether they were compliance entities or non-compliance entities. The figure also shows these quantities averaged across the auctions in 2010 and in 2011.<sup>22</sup>

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<sup>22</sup> For example, in the first control period offering of Auction 11 where 42 million CO<sub>2</sub> allowances were offered, a firm that submitted bids for 500,000 allowances would be counted in the “C: 1% to 3%” category, since  $500,000 \div 42 \text{ million} = 1.2 \text{ percent}$ .

**Figure 7: Number of Bidders According to the Quantity of Bids Submitted  
Auctions 11 - 14**



Key observations regarding participation in the RGGI auctions:

- Participation in First Control Period Offerings – Compliance entities and non-compliance entities submitted bids in each first control period offering of 2011. The number of bidders ranged from a low of 25 in Auction 12 to a high of 38 in Auction 14. The number of bidders that were compliance entities decreased from an average of 35 in 2010 to an average of 29 in 2011, while the number of bidders that were non-compliance entities decreased from an average of nine in 2010 to an average of four in 2011.
- Participation by Large Bidders in First Control Period Offerings – The number of bidders submitting bids for at least three percent of the CO<sub>2</sub> allowances in a first control period offering dropped from an average of five in 2010 to an average of two in 2011. In 2011, only one non-compliance entity submitted bids for at least three percent of the first control period allowances in a single offering.
- Participation in Second Control Period Offerings – Substantially fewer firms submitted bids in the offerings of second control period CO<sub>2</sub> allowances, which cannot be used to satisfy compliance obligations until after the first control period. The average number of bidders decreased from seven in 2010 to three in 2011, and there were no bidders that participated in Auction 13 or Auction 14.

- **Competition** – Participation by a large number of firms promotes competition and helps ensure that the auction clearing price reflects the market value of CO<sub>2</sub> allowances. Although the number of firms participating in the first control period offerings declined in 2011 and few firms participated in the second control period offerings, we found no material evidence of anti-competitive conduct or significant barriers to participation in our reviews of the bids and the qualification process of each auction. Ultimately, the competitiveness of the auction results was ensured by the use of an auction reserve price, which prevents individual firms from under-bidding in order to depress auction clearing prices below competitive levels.

### *Acquisition of CO<sub>2</sub> Allowances by Individual Firms*

In a well-functioning market, we expect each firm to purchase a number of CO<sub>2</sub> allowances that is generally consistent with its demand. Individual firms may purchase a larger or smaller share according to how the current price of CO<sub>2</sub> allowances compares to their expectations of allowance prices in the future. Firms that believe CO<sub>2</sub> allowances are currently undervalued can be expected to purchase a larger share, while firms that believe allowances are overvalued can be expected to purchase a smaller share. Thus, competition by many firms helps ensure that the current price of CO<sub>2</sub> allowances in the auctions and in the secondary market reflects reasonable expectations.

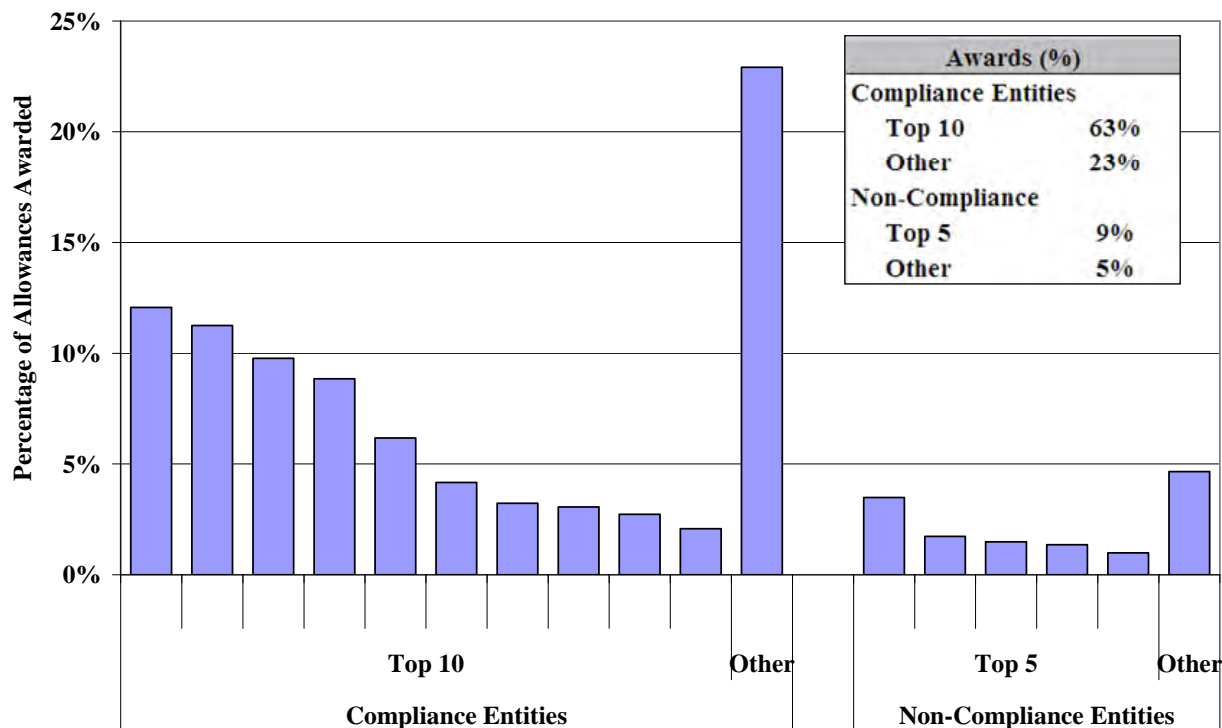
The following two figures examine the distribution of CO<sub>2</sub> allowances across firms following the third full year of the RGGI market's operation. Figure 8 illustrates how broadly CO<sub>2</sub> allowances were distributed in the first fourteen auctions, while Figure 9 illustrates how the holdings of allowances in COATS accounts were distributed after the close of 2011. The figures show that CO<sub>2</sub> allowances have generally been acquired by firms in quantities that are consistent with their demand, which is a positive indicator regarding the competitiveness of the market.

Figure 8 reports the quantities of CO<sub>2</sub> allowances that were awarded to individual firms in the first and second control period offerings of the first fourteen auctions. The awards are shown for each of the top ten compliance entities (i.e. the ten firms with the highest projected demand), all other compliance entities as a group, each of the top five non-compliance entities based on awards (i.e., the five firms with the largest total awards), and all other non-compliance entities as

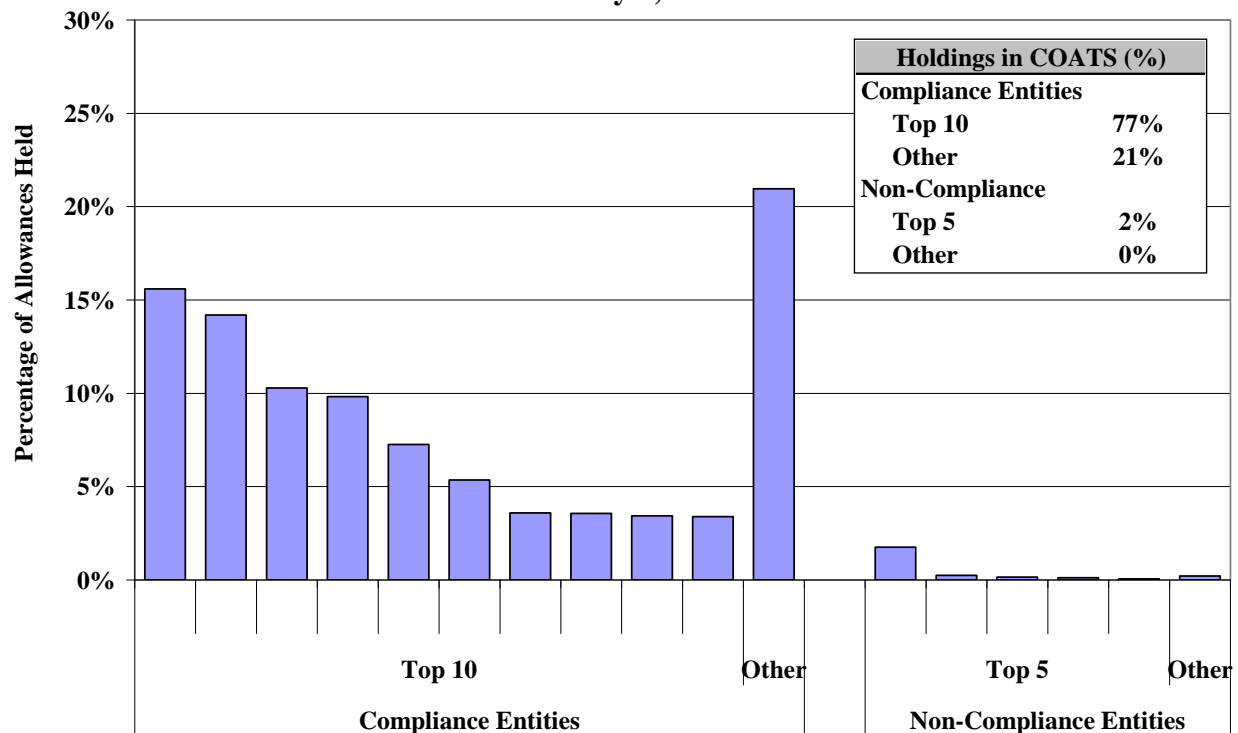
a group. The top ten compliances entities are ranked in descending order based on total awards rather than demand.

Figure 9 reports the quantities of CO<sub>2</sub> allowances that were held in the COATS accounts of individual firms in the first week of January 2012, following the delivery of contracts for December 2011 delivery. The holdings are shown for each of the top ten compliance entities, all other compliance entities as a group, each of the top five non-compliance entities based on holdings (i.e., the five firms with the largest holdings registered in COATS), and all other non-compliance entities as a group. The top ten compliances entities are ranked in descending order based on total holdings rather than demand.

**Figure 8: Distribution of Auction Awards  
Auctions 1 – 14**



**Figure 9: Distribution of CO<sub>2</sub> Allowance Holdings  
January 9, 2012**



Key observations regarding acquisition of CO<sub>2</sub> allowances:

- Distribution of CO<sub>2</sub> Allowances Awarded – The total awards from the first fourteen auctions were dispersed relatively widely across firms. The largest number of CO<sub>2</sub> allowances awarded to a single firm went to a compliance entity that purchased 12 percent of the allowances. The top ten compliance entities accounted for 63 percent of the total awards, while the top five non-compliance entities accounted for 9 percent.
- Large Bidders – Auction rules state that a single party or group of affiliated parties can purchase to 25 percent of the CO<sub>2</sub> allowances offered in any given auction. In the first control period offerings, one or more bidders were awarded 25 percent of the CO<sub>2</sub> allowances offered for sale in seven of the first 14 auctions and at least 15 percent in the other seven auctions. In two cases a single party or affiliate was awarded greater than 25 percent of the CO<sub>2</sub> allowances that were actually sold (this can be possible when the number of allowances purchased is less than the total number that was for sale). Since the bidders receiving the largest awards were not the same from auction to auction, the most that any single compliance entity purchased was just 12 percent of all allowances sold in the first 14 auctions.
- Distribution of CO<sub>2</sub> Allowance Holdings – The holdings of CO<sub>2</sub> allowances were widely distributed across firms after the first control period. The largest holdings were those of

four compliance entities that held a combined 50 percent of the allowances. The top ten compliance entities accounted for 77 percent of the total holdings, while smaller compliance entities accounted for 21 percent and non-compliance entities collectively accounted for just 2 percent. Hence, firms have acquired quantities of CO<sub>2</sub> allowances that are broadly consistent with their needs, although some compliance entities had to acquire significant quantities of additional first control period allowances in the two months before the compliance deadline on March 1, 2012 in order to satisfy their compliance obligations.

- Holdings by Compliance and Non-Compliance Entities – Figure 8 and Figure 9 reflect a pattern of trading in the secondary market that is consistent with the results of Figure 5. Non-compliance entities generally purchased CO<sub>2</sub> allowances in the auctions and then subsequently sold most of them in the secondary market, while compliance entities generally acquired most of their CO<sub>2</sub> allowances in the auctions and increased their holdings by purchasing more allowances in the secondary market. As a result, non-compliance entities account for a smaller share of the CO<sub>2</sub> allowances in Figure 9 than in Figure 8.

### *Participation in the CO<sub>2</sub> Allowance Futures Market*

Information on the open interest in CCFE futures and option contracts is reported by individual traders to the CFTC. The CFTC has published aggregated information from these reports in the past on a weekly basis.<sup>23</sup> However, participation in this market remained low as the numbers of firms maintaining significant positions in each vintage was lower than 20 throughout 2011. The CFTC does not publish information from the COT reports when fewer than 20 firms have reportable positions, so the content of the COT reports are not evaluated here.

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<sup>23</sup> These are known as Commitments of Traders (“COT”) reports. Each day, firms with an open interest of 25 contracts (1 contract is for 1,000 CO<sub>2</sub> allowances) 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 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.

## VI. DISCUSSION OF MARKET MONITORING

As the RGGI Market Monitor, we evaluate the conduct of market participants in the auctions and in the secondary market to identify potential anti-competitive conduct. In addition, the CFTC evaluates trading in the secondary market consistent with its role as the regulator of futures and option markets in the U.S. We also assess whether the auctions were administered properly by the auction administrator.

Participation in the auctions by a large number of firms promotes competition and helps ensure that the auction clearing price reflects the market value of allowances. Hence, the participation by a large number of firms in the first control period offerings that can be observed in Figure 7 is a positive indicator regarding the competitiveness of the first fourteen auctions. Although interest in the small number of allowances auctioned for the second control period has been more limited, we have found no material evidence of anti-competitive conduct or significant barriers to participation in our reviews of the bids and the qualification process for each product in each auction. The competitiveness of the auction results was further ensured by the use of an auction reserve price, which prevents individual firms from under-bidding in order to depress auction clearing prices below competitive levels. We also found that the auctions were conducted in accordance with the noticed rules and bids received.

In our monitoring of the secondary market, we evaluate whether firms could potentially hoard a substantial share of the supply of allowances to influence prices or to prevent a competitor from obtaining allowances. Based on our review of the holdings of individual firms, we find no evidence that hoarding is a significant concern, and that the holdings of individual firms are generally consistent with their expected need for allowances. Moreover, the results of Figure 9 demonstrate that the allowances are widely distributed across the COATS accounts of individual firms.

Another potential concern is that a firm expecting to purchase CO<sub>2</sub> allowances in the auction might sell a large number of futures contracts in an effort to push prices in the secondary market

below the competitive level. Such a firm might profit from buying a large number of CO<sub>2</sub> allowances in the auction at a discount if the bidding in the auction were influenced by the depressed futures 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 CO<sub>2</sub> 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 CO<sub>2</sub> 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 auction reserve price, firms would have a strong incentive to make additional purchases if a firm deliberately attempted to depress the futures price.