



**ANNUAL REPORT ON THE MARKET  
FOR RGGI CO<sub>2</sub> ALLOWANCES: 2012**

**Prepared for:**

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

**Prepared By:**



April 2013

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The Regional Greenhouse Gas Initiative (RGGI) is a cooperative effort of Northeast and Mid-Atlantic states 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.

Table of Contents

I. Executive Summary .....	5
II. Background on the CO <sub>2</sub> Allowance Market.....	9
III. CO <sub>2</sub> Allowance Prices.....	14
IV. Trading and Acquisition of CO <sub>2</sub> Allowances .....	19
V. Participation in the CO <sub>2</sub> Allowance Market .....	30
VI. Discussion of Market Monitoring.....	39

Table of Figures

**Figure 1: CO<sub>2</sub> Allowance Prices in the Auctions and Secondary Market ..... 15**

**Figure 2: Distribution of Auction Awards..... 21**

**Figure 3: Volume of Trading of CO<sub>2</sub> Allowances and Allowance Futures..... 22**

**Figure 4: Futures Open Interest and Net Transfers of CO<sub>2</sub> Allowances..... 25**

**Figure 5: Sources of CO<sub>2</sub> Allowances Held in COATS Accounts ..... 28**

**Figure 6: Estimated Demand for CO<sub>2</sub> Allowances..... 31**

**Figure 7: Number of Bidders According to the Quantity of Bids Submitted..... 33**

**Figure 8: Distribution of Auction Awards..... 35**

**Figure 9: Distribution of CO<sub>2</sub> Allowance Holdings ..... 36**

## I. EXECUTIVE SUMMARY

The Regional Greenhouse Gas Initiative (“RGGI”) became the first mandatory cap-and-trade program to limit CO<sub>2</sub> emissions in the United States in 2009. Electric power generators 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 that have entered into circulation initially entered the market through one of the auctions. Through the end of 2012, RGGI has conducted eighteen successful auctions, selling a total of 498 million CO<sub>2</sub> allowances for \$1.1 billion. In 2012, RGGI completed the compliance process for the first control period in which compliance entities were required to surrender CO<sub>2</sub> allowances to cover their emissions for the three years from 2009 to 2011.

This report evaluates activity in the market for RGGI CO<sub>2</sub> allowances in 2012, 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> allowances remained stable throughout 2012 with monthly average prices ranging from a high of \$2.01 in February to a low of \$1.93 in October. The auction clearing prices of CO<sub>2</sub> allowances were also very stable as each auction cleared at the auction reserve price of \$1.93. Since the minimum auction reserve price is designed to escalate with inflation over time, it is unlikely that CO<sub>2</sub> allowance prices will drop below this level in the future.<sup>1</sup> The stability of prices around the auction reserve price reflects that firms expected the supply of

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<sup>1</sup> The minimum auction reserve price was adjusted based on the Consumer Price Index from 2008 to 2013. On February 7, 2013, RGGI announced that the minimum reserve price would escalate 2.5 percent per year, starting at \$2.00 in 2014.

allowances to exceed demand by a substantial margin in the first control period and that they have had similar expectations about the second control period.<sup>2</sup>

### *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 2012, purchasing 98 percent of the allowances sold. Although non-compliance entities purchased significant quantities of CO<sub>2</sub> allowances in the auctions prior to 2012 (14 percent), they subsequently sold the majority of these to compliance entities in the secondary market, so the holdings of non-compliance entities were low throughout 2012.

The number of CO<sub>2</sub> allowances that were offered for sale in the auctions but that went unsold remained high in 2012. Of the 147 million CO<sub>2</sub> allowances offered for sale in 2012, 41 percent went unsold, down slightly from 50 percent in 2011, while just 10 percent of the allowances offered for sale went unsold from 2008 to 2010. The high percentage of unsold CO<sub>2</sub> allowances over the past two years reflects that firms have increasingly expected the supply of allowances to exceed the demand for allowances by a substantial margin in both the first and second control periods.<sup>2</sup>

Leading up to the compliance deadline for the first control period on March 1, 2012, CO<sub>2</sub> allowance trading increased as compliance entities purchased allowances that were needed to satisfy their first control period compliance obligations. Of the CO<sub>2</sub> allowances transferred between unaffiliated firms in 2012, 80 percent were first control period allowances that were transferred prior to the March 1 compliance deadline. The majority of CO<sub>2</sub> allowances transfers were over-the-counter off-exchange deals between firms, reflecting that the volume of trading of RGGI contracts on public exchanges remained low throughout 2012 as a share of the overall secondary market for RGGI allowances.

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<sup>2</sup> On February 7, 2013, as part of the 2012 program review, the RGGI states announced that the future supply of allowances would be reduced considerably beginning in 2014. See "[http://www.rggi.org/docs/PressReleases/PR130207\\_ModelRule.pdf](http://www.rggi.org/docs/PressReleases/PR130207_ModelRule.pdf)". However, this announcement was made after the period evaluated in this report.

The number of CO<sub>2</sub> allowances in circulation fell considerably from 440 million at the beginning of January to 161 million at the end of 2012 following the surrender of most first control period allowances. .

### *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. The number of compliance entities submitting bids decreased from an average of 35 in 2010 to 29 in 2011 and 23 in 2012. Likewise, the number of non-compliance entities fell from an average of nine in 2010 to four in 2011 to one in 2012. Although the number of firms participating in the current control period offerings fell from previous years, we found no material evidence of anti-competitive conduct or significant barriers to participation in our reviews of the bids and the qualification process before 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. The demand for CO<sub>2</sub> allowances is dispersed relatively widely across firms, inviting participation in the auctions by large number of firms. The two largest compliance entities account for a total of 29 percent of the total projected demand, the top five compliance entities account for 47 percent, and the top ten compliance entities account for 67 percent. The shares have increased moderately from the estimates in the previous annual report due to several corporate acquisitions by electric generation owners.

In a well-functioning market, we expect each firm to acquire a number of allowances that is broadly consistent with its compliance obligations, and we did find this to be the case in 2012. Several firms had large holdings relative to their demand for allowances, but this does not raise significant competitive concerns given the current size of the bank of allowances and the fact that the compliance entities will require the allowances for compliance in the second control period.

### ***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 2012, 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 and 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 in 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 ran from January 1, 2009 to December 31, 2011, and the second control period will run from January 1, 2012 to December 31, 2014.

In 2012, RGGI completed the compliance process for the first control period. By January 30, compliance entities were required to submit all CO<sub>2</sub> emissions data for CO<sub>2</sub> budget sources for the first control period to the Environmental Protection Agency's ("EPA's") Clean Air Markets Division ("CAMD") Business System. By March 1, the Compliance Account for each CO<sub>2</sub> budget source was required to hold a number of first control period CO<sub>2</sub> allowances (not including any CO<sub>2</sub> allowances surrendered previously) sufficient to satisfy its compliance obligation. Each CO<sub>2</sub> budget source was also required to submit a Compliance Certification Report certifying that it was in compliance with its state's CO<sub>2</sub> Budget Trading Program.<sup>3</sup>

### ***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. Through the end of 2012, 93 percent of the CO<sub>2</sub> allowances that have been put into circulation initially entered the market through one of the eighteen auctions that have taken place on a quarterly basis since September 2008.

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

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<sup>3</sup> The requirements of compliance entities at the first control period compliance deadline can be found on the CO<sub>2</sub> Budget Source Compliance Process Checklist on the RGGI website: "[http://www.rggi.org/docs/RGGI\\_Compliance\\_2012\\_Checklist.pdf](http://www.rggi.org/docs/RGGI_Compliance_2012_Checklist.pdf)"

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 were allocated by individual states through either fixed-price sales or free allocations. Approximately 4.6 million CO<sub>2</sub> allowances for the second control period have been allocated by individual states. Regardless of how CO<sub>2</sub> allowances initially enter the market, they can be traded to other firms in the secondary market.

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

The secondary market is important for several reasons. First, it gives a firm the ability to obtain CO<sub>2</sub> allowances at any time during the three months between the RGGI auctions. Second, it provides a way for a firm to protect itself against the potential volatility of future auction clearing prices. Third, it provides price signals that can assist a firm 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. Financial derivatives include any contracts whereby parties agree to exchange funds and/or allowances at some future date, depending in many cases on factors such as the price of allowances at some future date. 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

allocation 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 December 2012 expiration date. If the price of the corresponding forward 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 forward 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 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, which could make them more attractive to some firms.

The terms of futures, forward, and option contracts vary in the degree to which they are standardized. “Exchange-traded” contracts typically have the most standardized provisions, while the term “over-the-counter” (“OTC”) is applied to contracts with less standardized provisions. However, OTC contracts, once entered into, are often settled through a clearinghouse in order to protect the parties from the risk that the counterparty defaults.

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 and trading of allowances and allowance futures, forwards, and options in the secondary market. The clearing prices from quarterly auctions provide public information about the market value of CO<sub>2</sub> allowances four times per year, while the prices of futures and forwards trades on public exchanges and transaction prices recorded in COATS provide price information more frequently. This section of the report evaluates prices in the markets for RGGI CO<sub>2</sub> allowances in 2012.

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

- *Auction Clearing Prices* – CO<sub>2</sub> allowances have cleared at the reserve price in each auction since September 2010, reflecting the excess supply of first control period allowances. The reserve price was \$1.86 in 2010, \$1.89 in 2011, and \$1.93 in 2012.
- *Price Trends in the Secondary Market* – The prices of CO<sub>2</sub> allowance transfers in the secondary market were stable and remained close to the auction reserve price of \$1.93 throughout 2012. Monthly average prices ranged from a high of \$2.01 in February to a low of \$1.93 in October.
- *First Control Period CO<sub>2</sub> Allowance Prices* – Leading up to the compliance deadline for the first control period on March 1, first control period CO<sub>2</sub> allowances traded at a small premium over second control period allowances as a small number of compliance entities purchased allowances that were needed to satisfy their first control period compliance obligations. Accordingly, the volume-weighted average price for first control period CO<sub>2</sub> allowances was \$2.00 before March, 4 percent higher than the March auction clearing price and the average transaction price of second control period allowances.
- *Futures and Forward Contract Prices* – These were generally consistent with the auction clearing prices and transaction prices of physical deliveries reported in COATS all year.<sup>4</sup>

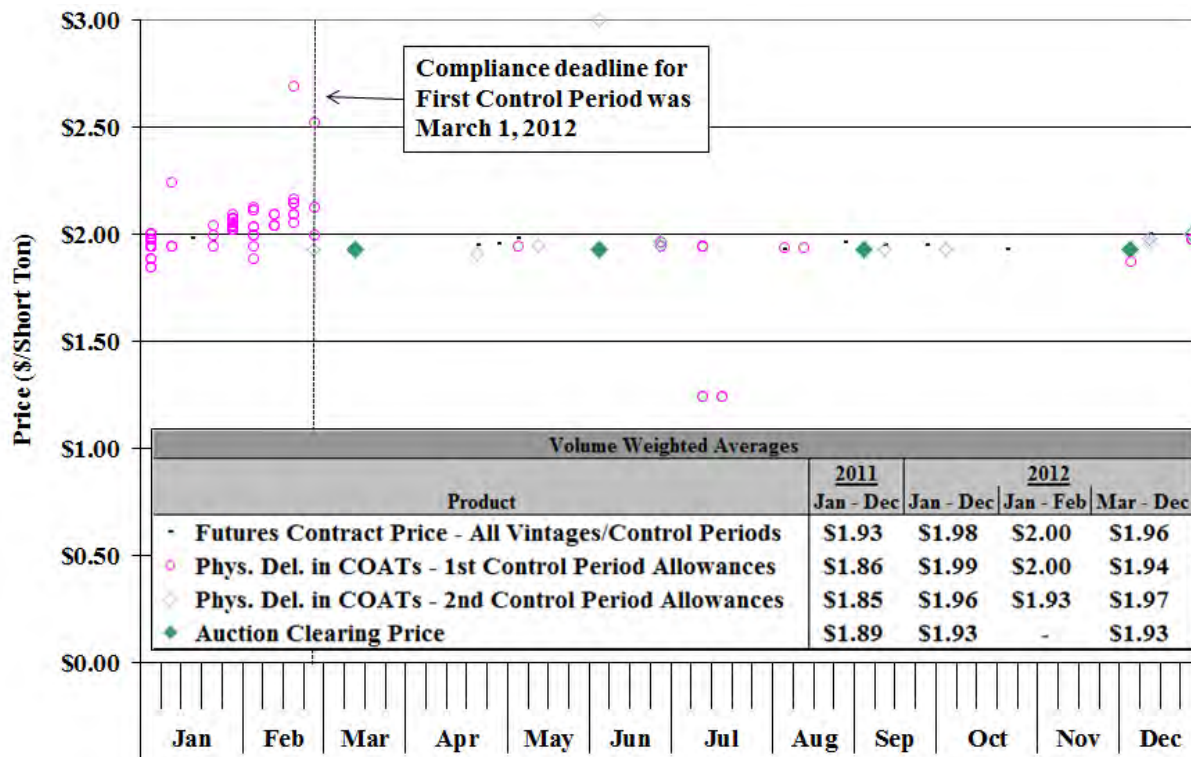
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<sup>4</sup> This category includes trades of futures contracts and forward contracts on the CCFE and ICE. RGGI futures contracts were traded on the CCFE until February 14, 2012, when it delisted all RGGI contracts as a part of the process to wind-down its operations. See press release at “[http://www.ccfе.com/membership\\_ccfe/advisories/2012/021312CFTC.pdf](http://www.ccfе.com/membership_ccfe/advisories/2012/021312CFTC.pdf).” RGGI forward contracts were traded on ICE until October 16, 2012, when ICE announced that, as a part of its efforts to implement Dodd-Frank regulations, it would convert existing positions in RGGI forward contracts to positions in futures contracts. See “<https://www.theice.com/S2F.jhtml>” for additional details. Since the settlement provisions of ICE’s forward contracts had been similar to the settlement provisions of futures contracts, the impact of the switch was limited.

*Prices in the Auctions and the Secondary Market*

Figure 1 summarizes prices in the auctions and in the secondary market on a weekly basis from January to December 2012. Futures and forward contract prices are summarized by a black horizontal tick mark at the weighted-average price for each week with trading volume. The volume-weighted average price of physical deliveries in COATS of first and second control period CO<sub>2</sub> allowances are shown by pink circles and blue diamonds, respectively, for each day when a transaction took place at a price that was recorded by the transacting parties.<sup>5</sup> The figure also shows the auction clearing prices of CO<sub>2</sub> allowances in the four quarterly auctions held during 2012, which are represented by the green diamonds.

**Figure 1: CO<sub>2</sub> Allowance Prices in the Auctions and Secondary Market<sup>6</sup> 2012**



<sup>5</sup> Parties must report the transaction price if there is an underlying financial transaction related to the transfer.

<sup>6</sup> COATS transactions dated March 1 were included in the Jan-Feb timeframe for the averages shown in the table.



Observations regarding prices in auctions and the secondary market:

- *General Price Levels* – The prices of CO<sub>2</sub> allowances remained stable throughout 2012 with monthly average prices ranging from a low of \$1.93 in October to a high of \$2.01 in February. In general, prices remained close to the auction reserve price of \$1.93.<sup>7</sup>
- *Futures and Forward Contract Prices* – These were generally consistent with the prices of physical deliveries in COATS and auction clearing prices throughout the year. The volume-weighted average futures price for all vintages and control periods was \$1.98 in 2012, which is a 3 percent increase from 2011. Some of the transaction prices reported in COATS are associated with physical deliveries that result from the expiration of a futures contract or forward contract.<sup>8</sup>
- *Auction Clearing Prices* – The auctions have cleared at the reserve price in each of the last ten quarterly auctions, reflecting the excess supply of first control period allowances. The auction reserve price was \$1.86 in 2010, \$1.89 in 2011, and \$1.93 in 2012. Accordingly, the average auction clearing prices increased 2 percent from \$1.89 in 2011 to \$1.93 in 2012.
- *First Control Period CO<sub>2</sub> Allowances* – In the January to February timeframe 2012, first control period CO<sub>2</sub> allowances traded at a volume-weighted average of \$2.00, which is 4 percent greater than the March auction clearing price and 4 percent greater than the average transaction price for second control period allowances in the same period. The premium reflected that a small number of compliance entities purchased allowances at elevated prices that were needed to satisfy their first control period compliance obligations.
- *Average Annual Prices* – The volume-weighted average transaction price for first control period allowances increased from \$1.86 in 2011 to \$1.99 in 2012, and the volume-weighted average transaction price for second control period allowances increased from \$1.85 to \$1.96.

### *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

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<sup>7</sup> Bids submitted in the auction must be priced at or above the auction reserve price, which was \$1.89 in each auction in 2011 and \$1.93 in each auction in 2012.

<sup>8</sup> Several business days after a contract reaches expiration, CO<sub>2</sub> allowances are exchanged for funds according to the closing price on the last day before expiration. Accordingly, the transaction prices recorded in COATS are consistent with the prices of futures and forward contracts in the previous week.



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 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> which is a measure of 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> which 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>

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

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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.

- *Historic Volatility of Futures Prices* – CCFE futures prices have become progressively less volatile over the past four years. The historic volatility of futures prices fell from 26 percent in 2009 to 16 percent in 2010 to 9 percent in 2011 to 5 percent in 2012. The low volatility of futures prices in 2012 is consistent with the pattern of auction clearing prices, which have closed at the reserve price in the last ten auctions.
- *Option-Implied Volatility of Futures Prices* – The lack of options trading reflects that firms perceive little risk from variations in future CO<sub>2</sub> allowance prices. Since the auction reserve price of \$1.93 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 in the secondary market.

The figures in this section evaluate the activity of firms in the CO<sub>2</sub> allowance market in 2012, 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 – At the beginning of 2012, 98 percent of the CO<sub>2</sub> allowances in circulation were held by compliance entities. Additionally, compliance entities acquired 98 percent of the CO<sub>2</sub> allowances sold in the four auctions in 2012. By the end of 2012, the percentage of CO<sub>2</sub> allowances held by compliance entities had decreased to 93 percent as a result of the surrender of CO<sub>2</sub> allowances in the first control period compliance process.
- Non-Compliance Entities – Although non-compliance entities purchased significant quantities of CO<sub>2</sub> allowances in the auctions prior to 2012 (14 percent for the first control period and 8 percent for the second control period), they have sold most of these to compliance entities in the secondary market, so only 2 percent of the CO<sub>2</sub> allowances in

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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.

circulation were held by non-compliance entities at the beginning of 2012. The holdings of non-compliance entities remained low throughout 2012.

- Unsold CO<sub>2</sub> Allowances – Of the 147 million allowances offered for sale in 2012, 41 percent went unsold. This was down from 48 percent in 2011, but up from 18 percent in 2010, and zero percent in 2008 and 2009. The high percentage of unsold allowances over the past two years reflects that firms have increasingly expected the supply of allowances to exceed the demand for allowances by a substantial margin in the first control period and that they have had similar expectations about the second control period.
- Trading Activity in the Secondary Market – Leading up to the compliance deadline for the first control period on March 1, 2012, CO<sub>2</sub> allowance trading increased as compliance entities purchased allowances that were needed to satisfy their first control period compliance obligations. Of the CO<sub>2</sub> allowances transferred between unaffiliated firms in 2012, 80 percent were first control period allowances that were transferred prior to the March 1 compliance deadline.
- CO<sub>2</sub> Allowances in Circulation – Four hundred and forty million allowances were in circulation at the beginning of 2012. The number of allowances in circulation fell to 116 million following the surrender of allowances for first control period compliance. At the end of 2012, the number of allowances in circulation was 161 million of which 40 percent were held by firms that had held them since the beginning of 2012, 57 percent had been acquired through auctions and state allocations during 2012, and 3 percent had been purchased in the secondary market during 2012.

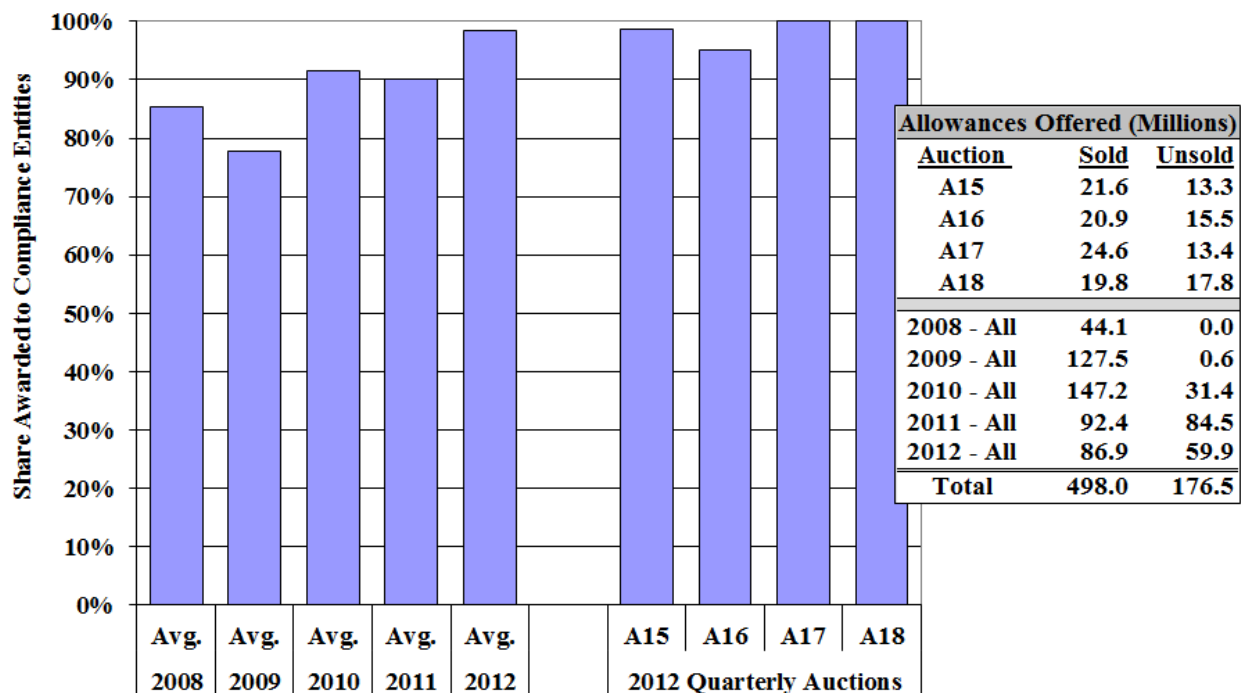
### *Distribution of Auction Awards*

The following figure reports the quantity of CO<sub>2</sub> allowances that were offered and sold in each of the four auctions that were held in 2012 (i.e., Auctions 15 through 18) and in each year from 2008 to 2012. The bars show the percentage of CO<sub>2</sub> allowances (as a share of allowances sold) that was purchased by compliance entities in each calendar year since 2008 and in each auction held in 2012, while the remaining share of allowances sold in each period was purchased by non-compliance entities.<sup>13</sup> The table in the figure shows the numbers of sold and unsold allowances in each calendar year since 2008 and in each auction held in 2012.

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

**Figure 2: Distribution of Auction Awards  
Auctions 15 to 18<sup>14</sup>**



Observations regarding distribution of auctions and awards:

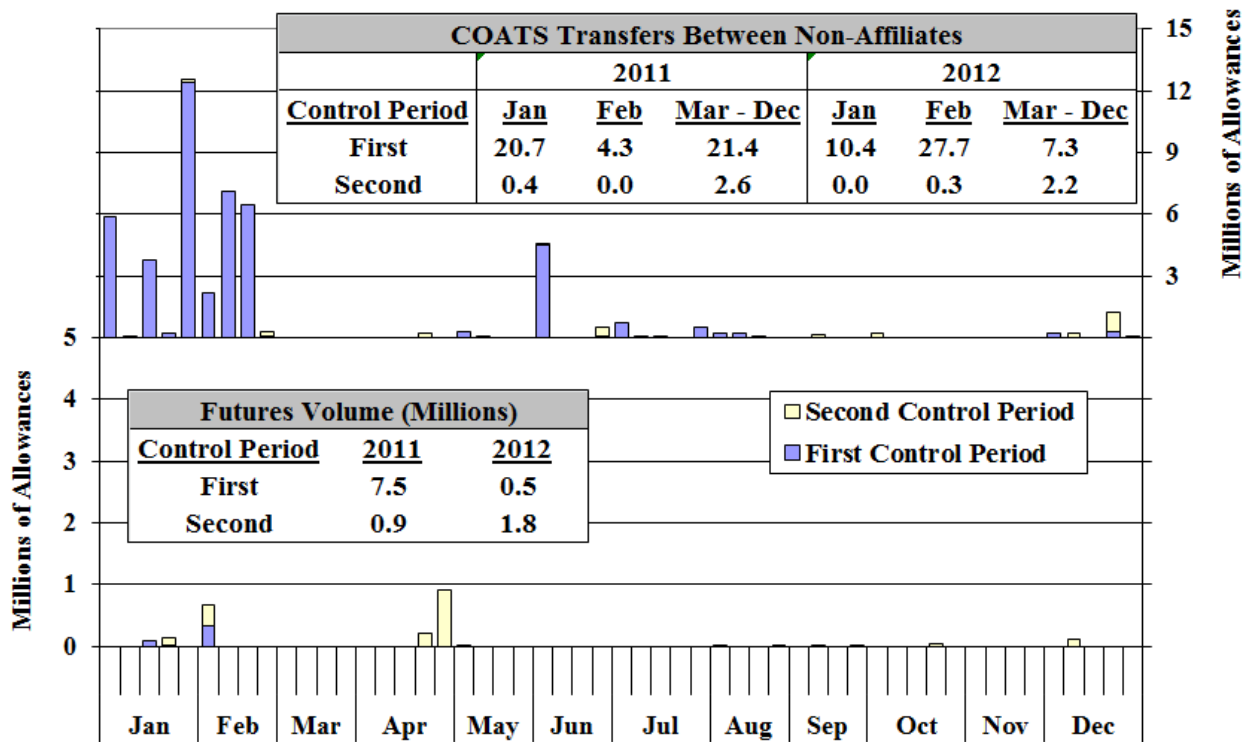
- Distribution of Auction Awards* – Compliance entities have consistently purchased a substantial majority of the CO<sub>2</sub> allowances sold in each auction. Compliance entities purchased 98 percent of the 87 million CO<sub>2</sub> allowances sold in 2012, up from 90 percent in 2011, 91 percent in 2010, 78 percent in 2009, and 85 percent in 2008. The reduced share of CO<sub>2</sub> allowances purchased by non-compliance entities is consistent with expectations given the low volatility of allowance prices. Although non-compliance entities purchased significant quantities of CO<sub>2</sub> allowances in 2008 and 2009, they have subsequently sold most of these in the secondary market, which is discussed later in this section.
- Unsold CO<sub>2</sub> Allowances* – Of the 147 million allowances offered for sale in 2012, 41 percent went unsold. This was down from 48 percent in 2011, but up from 18 percent in 2010, and zero percent in 2008 and 2009. The high percentage of unsold allowances in 2011 and 2012 reflects that firms have increasingly expected the supply of allowances to exceed the demand for allowances by a substantial margin in both the first and second control periods.

<sup>14</sup> First and second control period allowances are grouped together for all auctions prior to Auction 15. Beginning with Auction 15 (March 2012) only second control period allowances were offered for sale.

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

The following figure summarizes the volume of trading of exchange-traded futures and forward contracts as well as transfers of CO<sub>2</sub> allowances between unaffiliated parties that were recorded in COATS on a weekly basis in 2012. The bottom portion of the figure is plotted against the left vertical axis, and shows the weekly volume of futures and forward trading of contracts for first and second control period CO<sub>2</sub> allowances. The top portion of the figure is plotted against the right vertical axis, and 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 tables show year-over-year comparisons 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<sup>15</sup>  
2012**



<sup>15</sup> In the figure, quantities labeled as “Futures” actually include futures contracts and forward contracts traded on the CCFE and ICE.

Observations regarding CO<sub>2</sub> allowance trading volumes:

- *Volume of Futures and Forward Trading* – The volume of futures and forward trading totaled 2.2 million CO<sub>2</sub> allowances in 2012, a 74 percent decrease from 8.5 million in 2011. Trading of second control period CO<sub>2</sub> allowances accounted for 80 percent of the total volume in 2012. Trading of RGGI contracts on public exchanges has diminished in recent years as a share of the overall secondary market for RGGI allowances.
- *CO<sub>2</sub> Allowance Transfers* – The majority of CO<sub>2</sub> allowance transfers between unaffiliated firms occurred at several points in 2011 and 2012:
  - ✓ *January 2011* – Large volumes of CO<sub>2</sub> allowance transfers occurred in the first week of January as a result of the final maturity, expiration, and delivery of the benchmark (i.e., December 2010) 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 this week.
  - ✓ *May to July 2011* – Of the 28 million CO<sub>2</sub> allowances transferred between unaffiliated firms from February to December 2011, 49 percent occurred in May, 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>16</sup>
  - ✓ *January to February 2012* – Leading up to the compliance deadline for the first control period on March 1, CO<sub>2</sub> allowance trading increased as compliance entities purchased allowances that were needed to satisfy their first control period compliance obligations. Although the volume of CO<sub>2</sub> allowance transfers increased to 5.9 million in the first week of January as a result of the final delivery of the benchmark (i.e., December 2011) futures and forward contracts, the volume was much smaller than in 2010 and 2011 due to the overall decline in futures trading activity in recent years.

### *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>17</sup> Changes in the ownership of CO<sub>2</sub> allowances are

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<sup>16</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-Statement\\_112911.pdf](http://www.rggi.org/docs/Documents/NJ-Statement_112911.pdf)

<sup>17</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.

quantified in Figure 4 using two measures: the open interest in RGGI futures contracts and the net purchases and sales of CO<sub>2</sub> allowances. These are defined below.

*Open Interest in Futures/Forward Contracts* includes the net amount of futures contracts and forward contracts that have been purchased or sold on the CCFE or ICE 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>18</sup>

*Net Purchases/Sales of CO<sub>2</sub> Allowances* includes 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 auctions 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>19</sup>

Figure 4 summarizes net changes in ownership as of the first week of each month from January 2012 to January 2013.<sup>20</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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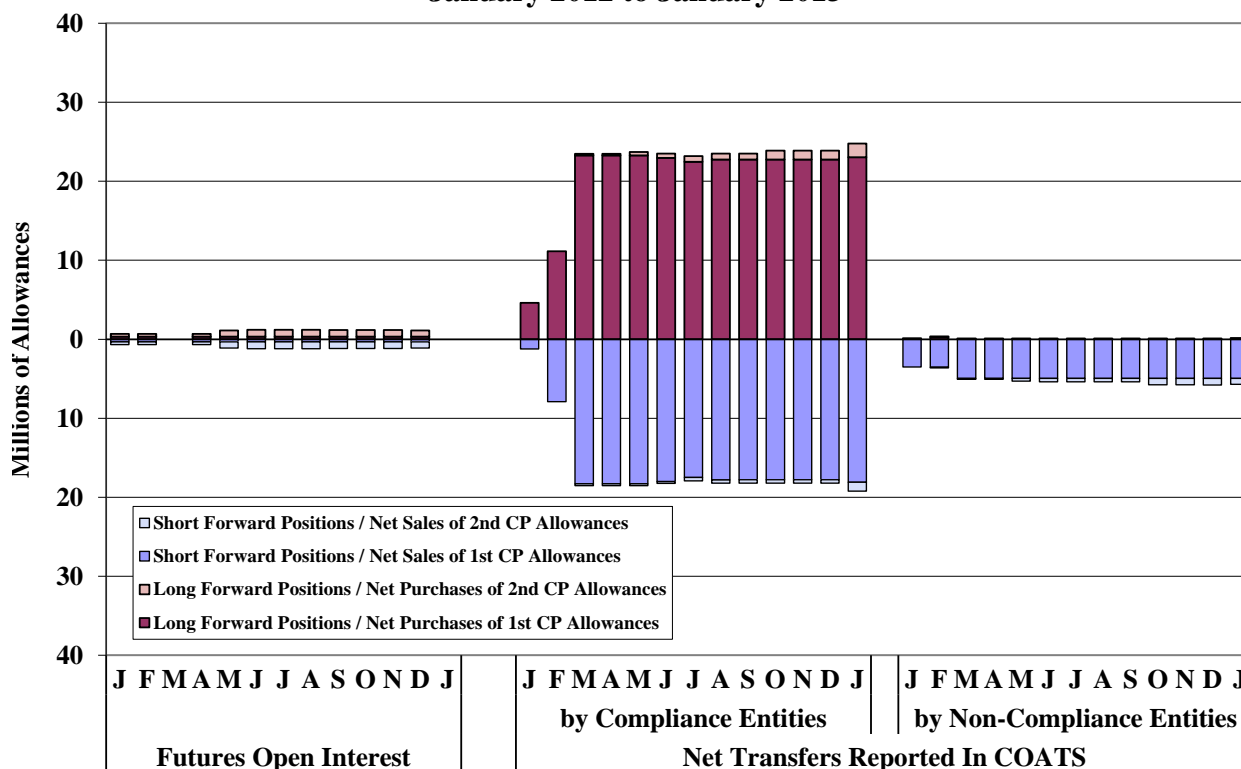
<sup>18</sup> Information on the open interest in futures contracts and forward contracts is available from the CCFE and ICE.

<sup>19</sup> Information on the ownership of actual CO<sub>2</sub> allowances comes from COATS.

<sup>20</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.



**Figure 4: Futures Open Interest and Net Transfers of CO<sub>2</sub> Allowances<sup>21</sup>  
January 2012 to January 2013**



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

- *Open Interest in Futures and Forwards* – Changes in the open interest of firms in futures and forwards contracts were limited throughout 2012, reflecting the low volume of exchange-traded RGGI contracts.
- *Net Transfers Reported by Compliance Entities* – Most transfer activity was from compliance entities using the secondary market to acquire CO<sub>2</sub> allowances that they needed to satisfy their compliance obligations for the first control period. The majority of these CO<sub>2</sub> allowances were purchased from other compliance entities with excess allowances rather than non-compliance entities. In the first week of January 2012, compliance entities acquired a net 4.6 million CO<sub>2</sub> allowances through the secondary market as a result of the delivery of December 2011 contracts. Market activity remained elevated through the March 1 compliance deadline. By the end of the first week in

<sup>21</sup> Net transfers of CO<sub>2</sub> allowances include transfers that occurred since January 1, 2012. Hence, transfers that occurred before January 1, 2012 are excluded.

March, compliance entities had acquired a net 23.5 million CO<sub>2</sub> allowances through the secondary market in 2012, 99 percent of which were first control period allowances.

- *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 2012. By the March 1 compliance deadline, non-compliance entities sold a net total of 5.1 million CO<sub>2</sub> allowances to compliance entities.
- *Total Net Purchase Reported in COATS* – The total net purchase of CO<sub>2</sub> allowances from in 2012 (25 million) is smaller than the gross volume of transactions between unaffiliated firms (48 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, it was still much smaller than the 87 million CO<sub>2</sub> allowances that were acquired in the auctions in 2012. Hence, the auctions are still the principal means by which firms acquired CO<sub>2</sub> allowances in 2012.

### ***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, 2012. 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 2012, (ii) through the primary market, or (iii) through the secondary market. Figure 5 reports several categories of CO<sub>2</sub> allowances that are described below.

- *Initial Holdings – Retained in COATS Account* includes CO<sub>2</sub> allowances that were still held in the COATS account of the firm that held them at the end of 2011. If a firm surrendered CO<sub>2</sub> allowances in 2012, those allowances were first deducted from this category.
- *Awards and Allocations – Retained in COATS Account* includes CO<sub>2</sub> allowances that were still held in the COATS account of the firm that purchased them in an auction or acquired them through an allocation in 2012. If a firm surrendered CO<sub>2</sub> allowances in

2012 that exceeded the amount of its *Initial Holdings*, the remaining CO<sub>2</sub> allowances were deducted from this category.

- *Net Sales in the Secondary Market* includes CO<sub>2</sub> allowances that were held at the end of 2011, purchased in an auction in 2012, or acquired through an allocation in 2012 and then subsequently sold in the secondary market.
- *Net Purchases in the Secondary Market* includes CO<sub>2</sub> allowances that were held in the COATS account of a firm that purchased them in the secondary market after January 1, 2012. If a firm surrendered CO<sub>2</sub> allowances in 2012 that exceeded the sum of that firm's *Initial Holdings* (at the end of 2011) and its *Awards and Allocations* (acquired in 2012), the remaining CO<sub>2</sub> allowances were deducted from this category.

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>22</sup>

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<sup>22</sup> The following two examples illustrate how the categories of allowances are calculated:

First, 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, sold 130,000 allowances in the secondary market, and then surrendered 10,000 allowances, the firm would contribute:

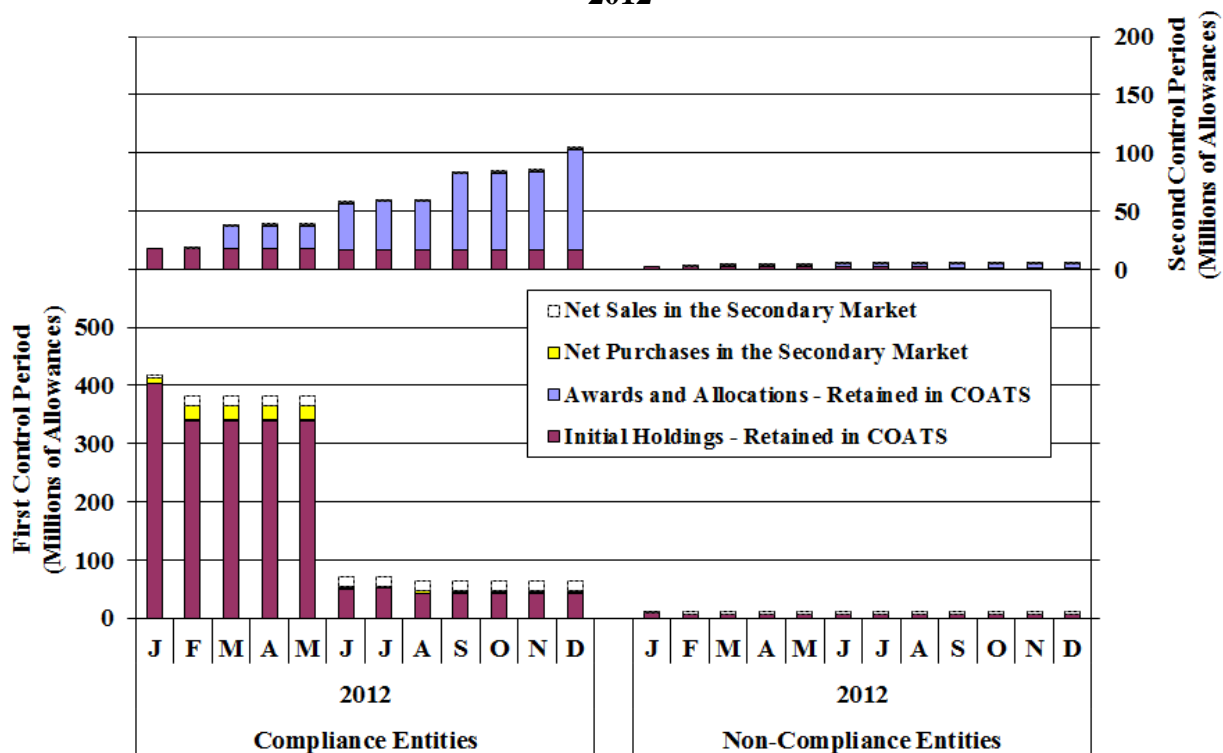
- 10,000 allowances to *Initial Holdings – Retained in COATS Account* (10,000 surrendered allowances are deducted from this category),
- 20,000 allowances to *Awards and Allocation – Retained in COATS Account*, and
- 30,000 allowances to *Net Sales in Secondary Market*. The calculation does not consider the serial numbers of individual allowances. Hence, in the example, it would not matter whether the 130,000 allowances sold had originally been acquired in the auction or in the secondary market.

Second, if a firm initially held 20,000 allowances, purchased 50,000 allowances in an auction, purchased 100,000 allowances in the secondary market, sold 10,000 allowances in the secondary market, and then surrendered 150,000 allowances, the firm would contribute:

- Zero allowances to *Initial Holdings – Retained in COATS Account* (all 20,000 allowances are considered surrendered),
- Zero allowances to *Awards and Allocations – Retained in COATS Account* (all 50,000 allowances are considered surrendered), and

Figure 5 shows the four categories of CO<sub>2</sub> allowances at the end of each month in 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.

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



Observations regarding registered CO<sub>2</sub> allowance holdings:

- *Holdings by Compliance Entities of First Control Period Allowances* – Four hundred and twenty-one million first control period allowances were in circulation at the beginning of January 2012. Of these, 410 million (97 percent) were held by compliance entities. After the surrender of first control period allowances, the number of first control period

- 10,000 allowances to *Net Purchases in the Secondary Market* (80,000 of the 90,000 allowances are considered surrendered).

allowances in circulation fell to 53 million by the end of August, 88 percent of which were held by compliance entities.<sup>23</sup> Thus, although the majority of the first control period allowances were surrendered in 2012 during the compliance process, a large number of allowances were banked for the second control period.<sup>24</sup> Nearly all of the first control period allowances that were purchased in the secondary market in January and February were subsequently surrendered, reflecting that the purchases were necessary for the firms to satisfy their compliance obligations.

- *Holdings by Compliance Entities of Second Control Period Allowances* – Twenty million second control period allowances were in circulation at the beginning of January 2012, and 89 percent of these were held by compliance entities. The number of second control period allowances in circulation grew to 108 million by the end of 2012, primarily as a result of sales in the four quarterly auctions. Including excess first control period allowances, a total of 161 million allowances were in circulation at the end of 2012, and 93 percent of these were held by compliance entities.
- *Holdings by Non-Compliance Entities* – Thirty-five percent of the 16 million CO<sub>2</sub> allowances (first and second control period) that non-compliance entities held at the beginning of 2012 or acquired in the auctions or allocations were subsequently sold in the secondary market during 2012. Eighty-nine percent of net sales by non-compliance entities in 2012 took place prior to the March 1 deadline for first control period compliance, reflecting sales to compliance entities that needed additional CO<sub>2</sub> allowances to satisfy their compliance obligations for the first control period.

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<sup>23</sup> Nearly all compliance entities surrendered allowances to satisfy their compliance obligations for the first control period before June 1. There was a correction to one budget source's emissions in August 2012. Compliance summary reports for the first control period may be found at: "[https://rggi-coats.org/eats/rggi/index.cfm?fuseaction=reportsv2.compliance\\_summary\\_rpt&clearfuseattribs=true](https://rggi-coats.org/eats/rggi/index.cfm?fuseaction=reportsv2.compliance_summary_rpt&clearfuseattribs=true)"

<sup>24</sup> We report 53 million first control period allowances as banked. For the 2012 program review analysis the RGGI states have estimated that 47 million first control period allowances would be considered banked for the "first control period interim adjustment for banked allowances." (See [http://www.rggi.org/docs/ProgramReview/February11/13\\_02\\_11\\_IPM.pdf](http://www.rggi.org/docs/ProgramReview/February11/13_02_11_IPM.pdf)). There are two reasons for this difference. First, approximately 5 million allowances had not yet been surrendered to satisfy the compliance obligations of five budget sources at the time of this report, while it was assumed that these would be satisfied before the first control period interim adjustment is made by January 15, 2014. Second, approximately one million first control period allowances were sold in Auctions 15 to 18 (2012 auctions).

## 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:

- *Demand for CO<sub>2</sub> Allowances* – The demand for CO<sub>2</sub> allowances is dispersed relatively widely across firms, inviting participation in the auctions by large number of firms. The two largest compliance entities account for a total of 29 percent of the total projected demand and the top ten compliance entities account for 67 percent. The shares have increased moderately from the estimates in the previous annual report due to several corporate acquisitions by electric generation owners.
- *Participation in the Auctions* – The number of compliance entities submitting bids decreased from an average of 35 in 2010 to 29 in 2011 and 23 in 2012. Likewise, the number of non-compliance entities fell from an average of nine in 2010 to four in 2011 to one in 2012. Although the average number of bidders participating in the auctions has fallen in recent years, the number rose during 2012 from 20 bidders in Auction 15 to 29 bidders in Auction 18.
- *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 current control period offerings fell from previous years, we found no material evidence of anti-competitive conduct or significant barriers to participation in our reviews of the bids and the qualification process before each auction. Ultimately, the competitiveness of the auction results was

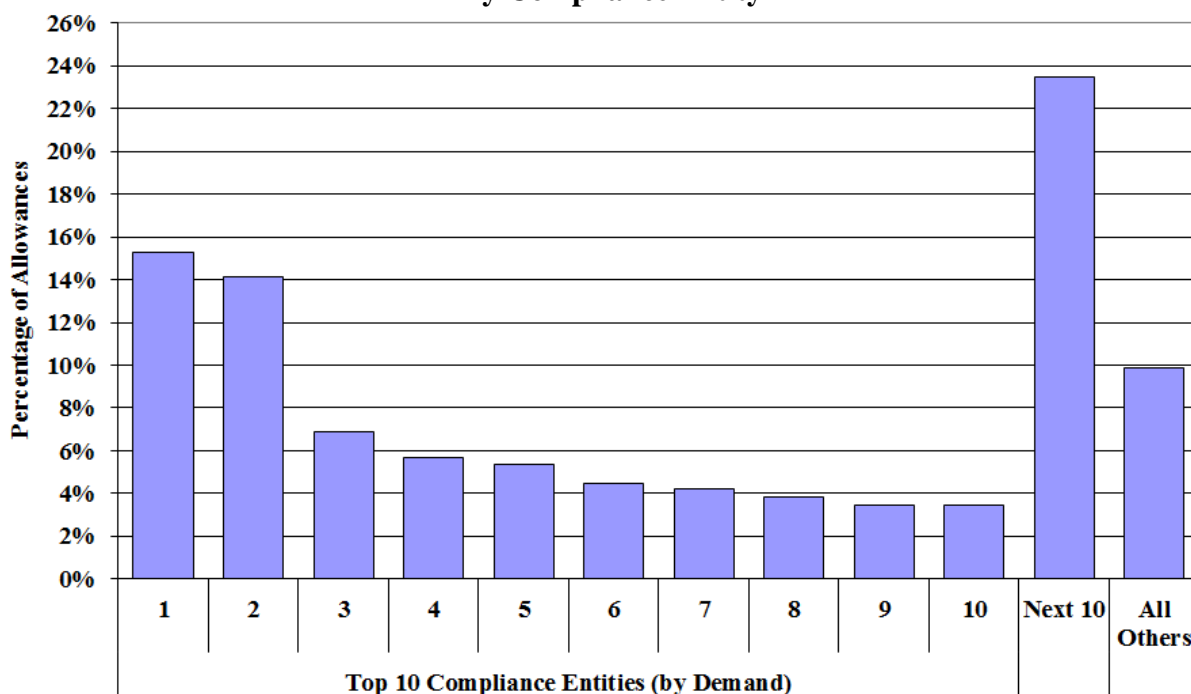
ensured by the use of an auction reserve price, which prevents individual firms from under-bidding in order to depress auction clearing prices below competitive levels.

- *Distribution of CO<sub>2</sub> Allowance Holdings* – The holdings of individual firms were broadly consistent with their demand, although several firms had large holdings relative to their demand for allowances. This has not raised significant competitive concerns given the current size of the bank of allowances and the fact that the compliance entities will require the allowances for compliance in the second control period.

### *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 2012. We project the 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. 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**



Observations regarding demand for CO<sub>2</sub> allowances:

- *Demand for Second Control Period CO<sub>2</sub> Allowances* – The demand for CO<sub>2</sub> allowances is dispersed relatively widely across firms. The two largest compliance entities account for 29 percent of the total projected demand, while the top five compliance entities account for 47 percent. The top ten compliance entities account for 67 percent of the total projected market demand, while the next ten compliance entities account for 23 percent, and all compliance entities that are not among the top 20 firms account for 10 percent.
- *Concentration of Demand* – The concentration of demand for CO<sub>2</sub> allowances increased moderately from 2011 to 2012, primarily reflecting that corporate acquisitions have increased the concentration of ownership of electricity generation assets. The demand shares for the largest two compliance entities rose from 24 percent of total projected demand in the previous annual report to 29 percent in this report.

### *Participation in RGGI Auctions*

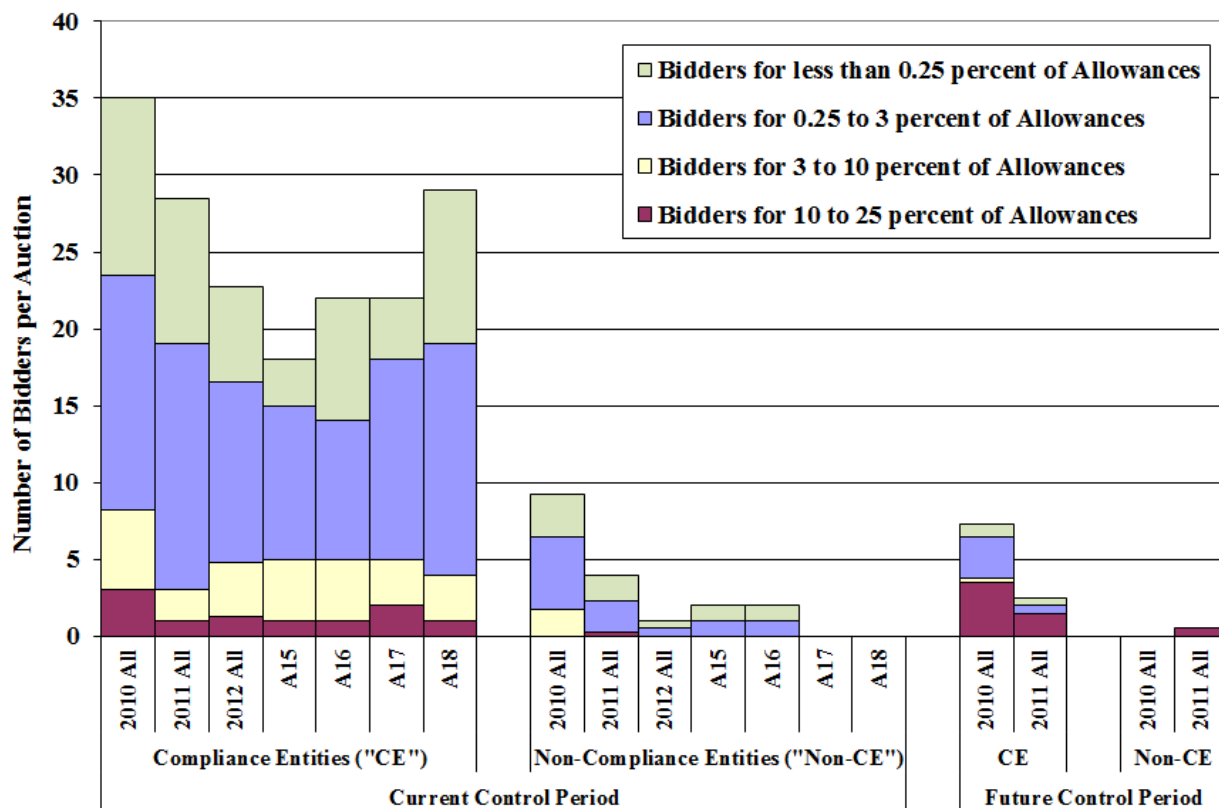
The following figure summarizes the breadth of participation in the four auctions during 2012. The figure reports the number of firms that submitted bids in each offering of each auction. The number of bidders is shown separately according to whether the bidder was a compliance entity or non-compliance entity. The figure also shows these quantities averaged across the auctions in each year from 2010 to 2012.<sup>25</sup>

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<sup>25</sup> For example, in the first control period offering of Auction 15 where 35 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  $500,000 \div 35 \text{ million} = 1.4 \text{ percent}$ .



Figure 7: Number of Bidders According to the Quantity of Bids Submitted



Observations regarding participation in the RGGI auctions:

- Participation in Current Control Period Offerings* – The number of bidders in the four 2012 auctions trended upward from 20 in Auction 15 to 29 in Auction 18 due to an increase in the number of smaller bidders (i.e., firms submitting bids for up to three percent of allowances offered for sale). The number of compliance entities submitting bids has decreased in recent years from an average of 35 in 2010 to 29 in 2011 and to 23 in 2012 (excluding the future control period offerings). The number of non-compliance entities submitting bids in the current control period offering decreased from an average of nine in 2010 to four in 2011 and to one in 2012.
- Participation by Large Bidders in Current Control Period Offerings* – The number of large bidders (i.e., firms submitting bids for more than three percent of the allowances in a current control period offering) increased from an average of three in 2011 to five in 2012. In 2012, no non-compliance entities submitted bids for at least three percent of the allowances in a single offering.
- 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 current control period offerings fell from 2011 to 2012, 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 fourth full year of the RGGI market's operation. Figure 8 illustrates how broadly CO<sub>2</sub> allowances were distributed in the first 18 auctions, while Figure 9 illustrates how the holdings of allowances in COATS accounts were distributed after the close of 2012. 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 18 auctions as well as the average quantities of CO<sub>2</sub> allowances that were awarded to firms in the 2012 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 awards from the current and future control period offerings are grouped together, and the top ten compliances entities are ranked in descending order based on total awards rather than demand.

**Figure 8: Distribution of Auction Awards  
Auctions 1 – 18**

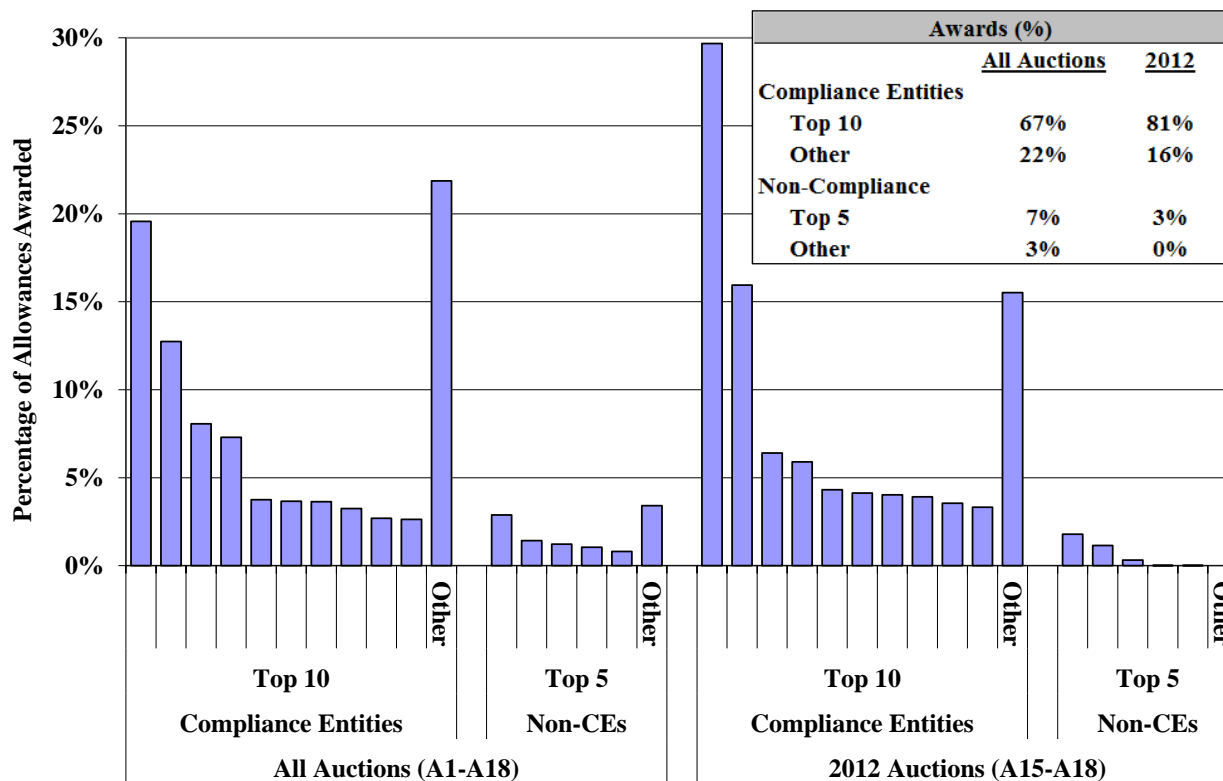
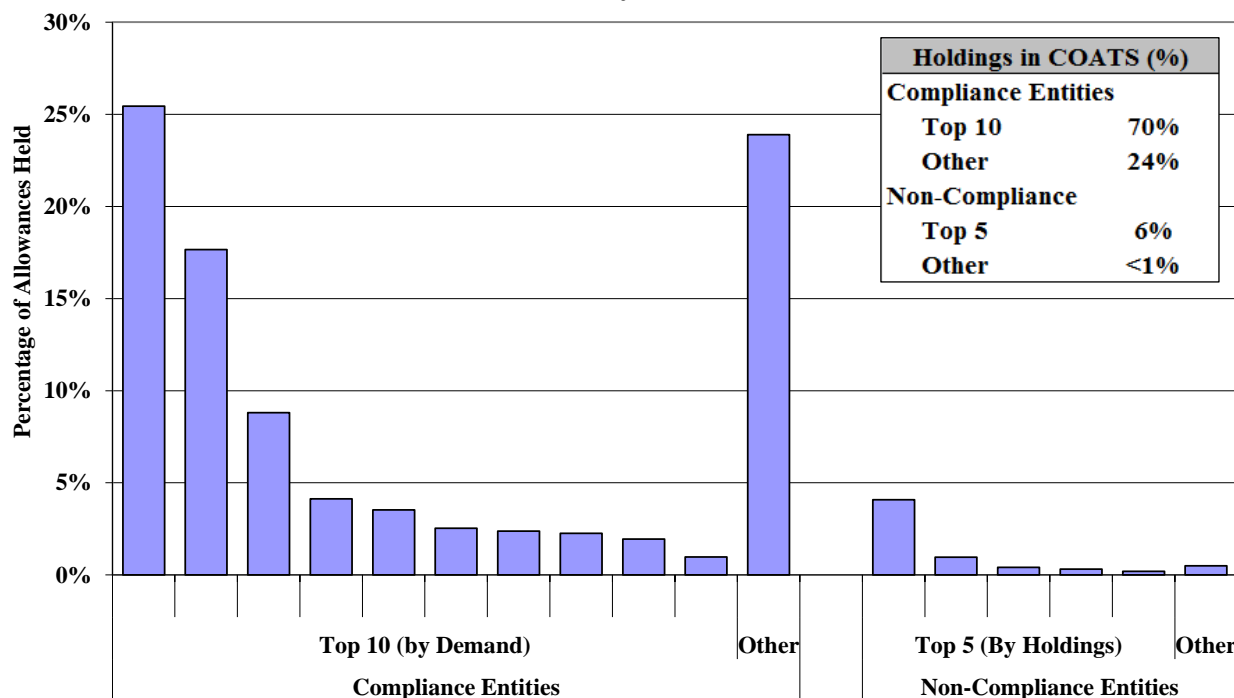


Figure 9 reports the quantities of CO<sub>2</sub> allowances that were held in the COATS accounts of individual firms on January 9, 2013, following the delivery of contracts for December 2012 delivery. The holdings are shown for each of the top ten compliance entities, all other compliance entities as 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 9: Distribution of CO<sub>2</sub> Allowance Holdings  
January 9, 2013**



Observations regarding the distribution of CO<sub>2</sub> allowances:

- 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 current control period offerings, one or more bidders were awarded 25 percent of the CO<sub>2</sub> allowances offered for sale in eight of the first 18 auctions and at least 15 percent in the other ten auctions. In six auctions, including in each auction held in 2012, a single party or affiliate was awarded more 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). For this reason, a single compliance entity was awarded 30 percent of the CO<sub>2</sub> allowances that were sold in 2012.
- Distribution of CO<sub>2</sub> Allowances Awarded** – The total awards from the first 18 auctions were dispersed across firms generally consistent with the demand of those firms. Across all 18 auctions, the largest number of CO<sub>2</sub> allowances awarded to a single firm went to a compliance entity that purchased nearly 20 percent of the allowances. The top ten compliance entities accounted for 67 percent of the total awards, while the top five non-compliance entities accounted for 7 percent. In the four auctions conducted in 2012, the largest number of CO<sub>2</sub> allowances awarded to a single firm went to a compliance entity that purchased nearly 30 percent of the allowances. The top ten compliance entities accounted for 81 percent of the total awards, while the top five non-compliance entities accounted for just 3 percent.

- *Distribution of CO<sub>2</sub> Allowance Holdings* – The holdings of CO<sub>2</sub> allowances were distributed across firms at the close of 2012 generally consistent with the demand of most firms, although several firms had large holdings relative to their demand for allowances. The top 10 compliance entities accounted for 70 percent of the total holdings compared with 67 percent of the overall demand for CO<sub>2</sub> allowances. The top two compliance entities (ranked by their holdings) held 43 percent of allowances at the end of 2012, while the top two compliance entities (ranked by their demand) accounted for just 29 percent of demand. Smaller compliance entities accounted for 24 percent of holdings, and non-compliance entities collectively accounted for just 6 percent. Although several firms held relatively large quantities of allowances at the end of 2012, this does not raise significant competitive concerns given the current size of the bank of allowances and the fact that the compliance entities will require the allowances for compliance in the second control period.
- *Holdings by Compliance and Non-Compliance Entities* – Prior to the first control period compliance deadline on March 1, 2012, non-compliance entities accounted for a smaller share of CO<sub>2</sub> allowances holdings than awards. This is because of the pattern of trading in the secondary market, which is that 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. (This pattern is shown clearly in Figure 5). Although this trading pattern has continued, non-compliance entities accounted for a larger share of CO<sub>2</sub> allowances holdings than awards at the end of 2012 due to the surrender of a large number of CO<sub>2</sub> allowances by compliance entities after the first control period.

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

Information on the open interest in futures and option contracts on the CCFE and ICE 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>26</sup> However, participation in this market remained low as the numbers of firms maintaining significant positions in each vintage was lower than 20

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<sup>26</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.

throughout 2012. 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.

## 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. 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 substantial number of firms as observed in Figure 7 is a positive indicator regarding the competitiveness of the first eighteen auctions. 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 over the current control period. Moreover, the results of Figure 9 demonstrate that the allowances are adequately 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.