# QUARTERLY REPORT ON THE ELECTRICITY GENERATOR EMISSIONS LIMITS PROGRAM (310 CMR 7.74): FOURTH QUARTER 2021

**Prepared for:**

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## A. Introduction and Summary

The Massachusetts Department of Environmental Protection ("MassDEP") implemented its program to limit $CO_2$ emissions from electricity generators in January 2018. This report provides background on key aspects of the program, a summary of market activity through the compliance deadline for 2021, an overview of emissions and allowance holdings patterns, and discussion of the results of our market power screens.

- *$CO_2$ Emissions versus the Annual Caps*: Emissions have fallen dramatically since the program began, resulting in a large number of banked allowances after each annual compliance deadline.
  - ✓ In 2019, the cap was 8.73 million allowances compared to 5.83 million metric tons of emissions. The cap is not scheduled to fall below this level of emissions until 2032.
  - ✓ In 2020, the cap was 8.51 million allowances compared to 5.48 million metric tons of emissions. The cap is not scheduled to fall below this level until 2034.
  - ✓ In 2021, the cap was 8.28 million allowances compared to 5.92 million metric tons of emissions (which was up 8 percent year-over-year). The cap is not scheduled to fall below this level until 2032.
- *Load, Generation, and Emissions Trends*: As emissions from covered generation have fallen, electric load has fallen more modestly, so electricity imports have risen. However, load increased 2.4 percent in 2021 from the previous year.
  - ✓ Generation from covered units rose by 8.3 percent in 2021 from the previous year. Higher combined cycle generation accounted for nearly all of the increase in generation.
- *$CO_2$ Allowance Prices and Trading Activity*: Trading activity was very limited in 2021 and early 2022 as regulated entities relied on banked allowances and auctions to satisfy most or all of their projected compliance obligations for 2021.
  - ✓ Most of the allowances purchased were made through the auctions rather than the secondary market.
    - In the March 11, 2021 auction, 1,656,685 allowances for the 2021 compliance year cleared at a price of $6.50 per metric ton.
    - In the June 9, 2021 auction, 1,001,334 allowances for the 2021 compliance year cleared at a price of $7.75 per metric ton.
    - In the September 15, 2021 auction, 1,001,334 allowances for the 2021 compliance year cleared at a price of $10.00 per metric ton.

  - In the December 15, 2021 auction, 1,611,909 allowances for the 2022 compliance year cleared at a price of $9.75 per metric ton.
  - In the March 8, 2022 auction, 1,611,909 allowances for the 2022 compliance year cleared at a price of $0.50 per metric ton.

- ✓ Prices for 2021 vintage allowances remained high relative to expectations given the large allowance surpluses.
  - Prices in the secondary market have exhibited a premium over contemporaneous auction clearing prices.
  - Illiquid market conditions have afforded limited opportunity for price discovery and encouraged regulated entities to hold excess allowances as a hedge against their compliance obligations in future years. The wide dispersion of bid prices in the auctions highlights that illiquid conditions have provided limited price discovery and also reflects that there is a wide dispersion of hourly prices in the regional electricity market.

- *Distribution of Allowances for 2021 Compliance*: The vast majority of allowances usable for 2021 compliance were distributed by auction (62 percent) while the balance was banked from 2020 (38 percent).
  - ✓ In 2021, 100 percent of allowances were distributed through auctions, although the total auction amount was reduced by the bank of allowances from 2020.
  - ✓ The increased auction quantities and quarterly auction schedule has helped provide more frequent access to allowances. These changes have helped improve liquidity in the secondary market.

We evaluate information on the holdings and demand for allowances to identify firms that may have acquired a position that raises competitive concerns. In the current study period, we find no evidence of anti-competitive conduct in the secondary market for allowances, and we find that firms have generally sought to acquire or sell allowances consistent with their expected needs for 2021 and 2022.

## B. BACKGROUND

Regulation 310 CMR 7.74 created a cap-and-trade program to reduce carbon dioxide emissions from electricity generating facilities located in Massachusetts beginning in 2018.[1] 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 hold 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.

Covered compliance entities and emissions are consistent with the Regional Greenhouse Gas Initiative (RGGI) regulation, implemented as 310 CMR 7.70 in Massachusetts. Under 310 CMR 7.74, compliance periods are annual. The Massachusetts Carbon Allowance Registry ("Registry") is used to track the ownership of allowances. Once an allowance is allocated or purchased in the auction, it can be resold in the secondary market. Participation in the market for allowances is limited to regulated electricity generating facilities.

The secondary market is important for several reasons. First, it gives firms an ability to obtain allowances at any time, while the auctions are relatively infrequent. Second, it provides firms a way to protect themselves against unexpected swings in future prices. Third, it provides price signals that assist firms in deciding how much electricity to produce and in making investment decisions that are affected by the costs of compliance.

The market for Massachusetts allowances has several key elements, which are discussed in this section: the emissions cap, allocations, auctions, banking, program participation, and compliance.

### *Annual Emissions Cap*

The program's annual emissions cap was set at 9,149,979 metric tons for 2018, which was the first year of program implementation. The annual cap fell to 8,731,175 metric tons in 2019,

[1] https://www.mass.gov/guides/electricity-generator-emissions-limits-310-cmr-774

8,507,299 metric tons in 2020, 8,283,423 metric tons in 2021, and it declines by 223,876 metric tons in each subsequent year, eventually reaching 1,791,019 metric tons in 2050.[2]

### *Allowance Allocations*

One hundred percent of the 2018 vintage allowances were allocated to individual generators, including new facilities. Starting with the 2019 compliance year, the MassDEP began to transition from allocating allowances directly to using auctions as the primary mechanism for distributing allowances.[3] For the 2019 and 2020 compliance years, the MassDEP distributed a number of allowances equal to 75 and 50 percent of the cap through direct allocation. As of the 2021 compliance year, all allowances are distributed by auction, subject to the banking adjustment described below.

### *Banking of Allowances*

In August 2018, the MassDEP adopted changes to the provisions for banked allowances (i.e., allowances held by covered entities after the compliance deadline for a given year). Under these provisions, if the number of banked allowances after a particular year exceeds 223,875, the number of allowances distributed in the subsequent year will be adjusted downward by the difference between the number of banked allowances and 223,875. Since the annual cap falls by 223,876 metric tons each year, emissions will never exceed the prior year's annual cap.

For instance, after 2020 compliance obligations were satisfied, 3,191,261 allowances were held in facility accounts on April 1st, 2021. Thus, the number of allowances to be distributed for the 2021 compliance year was adjusted down by 2,967,386 (which equals the 3,191,261 allowances held after 2020 minus the limit of 223,875 allowances). Consequently, the number of 2021 vintage allowances distributed was 5,316,037 metric tons, and the total number allowances

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2 310 CMR 7.74(5)(a)

3 In this report, the term "allowance" refers to allowances that can be used to comply with 310 CMR 7.74 only. These allowances cannot be used to comply with requirements of the Regional Greenhouse Gas Initiative, which is implemented in Massachusetts pursuant to a different regulation, 310 CMR 7.70.

available for the 2021 compliance year was 8,283,423 (the 2021 annual cap) plus an additional 223,875 allowances.

The same calculation will be used to determine the adjusted emissions cap for 2022 and the number of 2022 allowances to be sold in the auctions. In 2022, the post-compliance holdings amount was 2,652,320, so the number of allowances to be auctioned for the 2022 compliance year was adjusted down by 2,428,445. Because a total of 3,223,818 vintage 2022 allowances were auctioned in December 2021 and March 2022, the remaining 2022 allowances to be distributed is 2,407,284.

### *Auctions*

The MassDEP's schedule to distribute allowances for the 2022 vintage year consists of four quarterly auctions:

- On December 15, 2021: 20 percent of the 2022 unadjusted emissions limit was offered (1,611,909 allowances).
- On March 8, 2022: an additional 20 percent of the 2022 unadjusted emissions limit was offered (1,611,909 allowances).
- In June 2022: 50 percent of the remaining 2022 vintage allowances will be offered (1,203,642 allowances).
- In September 2022: All remaining 2022 vintage allowances will be offered for sale (1,203,642 allowances).

Starting with the June 2022 auction, the MassDEP will begin to sell multiple vintages in a single auction. The schedule for the June and September 2022 auctions is as follows:

- In June 2022: five percent of the 2023 annual cap (391,784 vintage 2023 allowances) will be offered for sale.
- In September 2022: another 5 percent of the 2023 annual cap (391,784 vintage 2023 allowances) will be offered for sale.

### *Participants in the Program*

Participation in the program, including auctions, is restricted to the owners and operators of covered facilities. The term "Regulated Entity" is used in the Registry to refer to the highest

level of facility ownership, and in the case of shared ownership groups together several facilities.[4] A list of facilities and associated regulated entities is available to the public at https://macar.apx.com/ (select "Reports").

### *Compliance*

On March 1st of each year, every generating facility's Registry account is required to hold sufficient allowances to satisfy obligations from the prior calendar year. Facilities that do not hold sufficient allowances may qualify for "emergency deferred compliance." Under emergency deferred compliance, the compliance obligations from emissions that occurred during a MLCCP#2 designated period can be deferred to the following year.[5] However, those emissions are required to be offset on a two for one basis in that following year.[6] For example, if a facility deferred 1,000 allowances for 2019 compliance, they are required to hold a number of allowances for 2020 compliance equal to their 2020 emissions plus 2,000 additional allowances for their deferred compliance from the previous year. This provision is intended to provide generators with additional flexibility when they may be needed for system reliability, while still discouraging generators from exceeding the cap in a given year. Thus, it is unlikely that facilities will use this option under normal circumstances.

By April 1st, the Department will deduct allowances from each generating facility's registry account; first to address any deferred obligations, then to meet the facility's obligations from the previous calendar year. For 2021, allowance deductions were carried out successfully and all facilities met their obligations without the use of emergency deferred compliance. The Registry tracks current holdings, allowance transfers, and allocations, as well as ownership and representation of each facility or regulated entity.

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4 For example, Medway Station and Mystic receive allocations separately, but they are both owned by Exelon, so for tracking and market monitoring purposes their demand is aggregated.

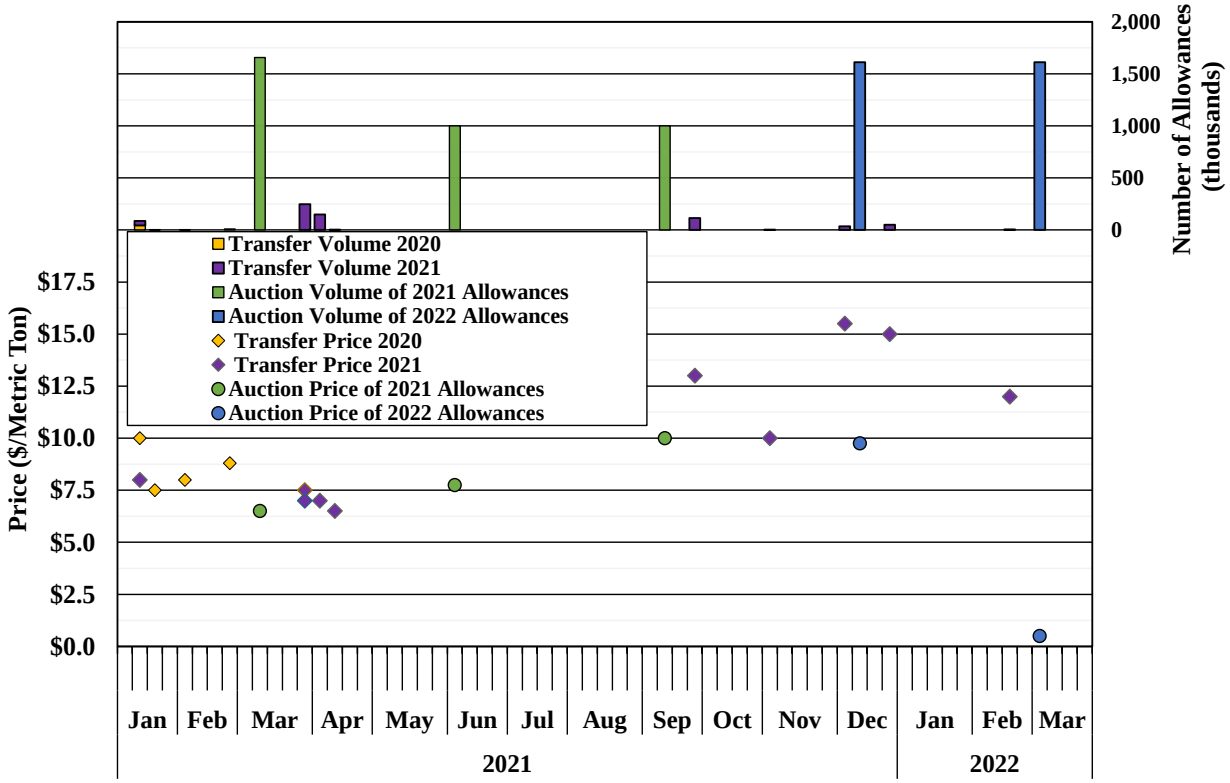
5 These are periods when ISO New England has triggered "Master Local Control Center Procedure No.2"

6 310 CMR 7.74(6)(d)

## C. Summary of Prices and Traded Volumes

This section evaluates the available information regarding the purchase of allowances in the auctions and transfers in the secondary market for allowances. Figure 1 displays the weekly volumes of allowance transfers and weighted average prices as well as auction results.

**Figure 1: Allowance Prices and Volumes[7] [8]**




There were fifteen priced transfers between different regulated entities in 2021, and there has been one so far in 2022. All of the transfers were for allowances usable for 2021 compliance. In 2021, the average price was $8.97 for nearly 649 thousand allowances.

7 Figure 1 shows transfers reported to the registry through March 31, 2022, but since there is no prompt reporting requirement, other transactions may have occurred that have not yet been reported. Trades are reported by transaction date if one is provided that differs from the date it is reported to the Registry.

8 "2020 Allowances" indicates allowances usable for 2020 compliance, which includes previous vintages.

Prices generally increased during 2021 in the secondary market and in the auctions. The average price of secondary market transactions rose from $7.58 in the first half of 2021 to $13.56 in the second half of the year. Likewise, the auction clearing prices were lower in March and June 2021 than in September and December 2021.

The March 2022 auction clearing price of $0.50 per metric ton was much lower than secondary market transaction prices reported for 2021 compliance year allowances and previous auction clearing prices. Bid prices were generally much higher than the clearing price and, as has been the case for prior auctions, widely dispersed.. The wide dispersion of bid prices reflects considerable variation among regulated entities in their expectations regarding the value of allowances and that: (a) relatively little information from trading in the secondary market has been available regarding the value of allowances, and (b) some generators earn high margins on the sale of electricity in some periods due to the wide distribution of hourly prices in the ISO New England market. In general, the dispersion contributes to variability in auction clearing prices. In the case of the March 2022 auction, the low quantity of bids (1.01 x supply) was also a factor.

The prices in the secondary market have been substantially higher than auction clearing prices for the comparable vintages. Transactions in January 2021 indicate there may have been a premium on allowances usable for 2020 compliance. The December 2021 and March 2022 auctions of vintage 2022 allowances cleared far below the prices of contemporaneous secondary market transactions of 2021 vintage allowances, although it is unclear whether these price differences were driven by the differences in vintage or because there is a consistent price premium for secondary market transactions.

Given the large surplus of allowances compared to emissions in 2021, prices were relatively high before the March 2022 auction. Thus, the pricing of allowances before the March 2022 auction was likely driven by expectations of higher prices in future years. Section A of this report shows that emissions were below the emissions cap by 35 percent in 2020, and emissions are on pace to be below the cap by 28 percent in 2021. The banking provisions encourage firms to hold allowances if they anticipate higher prices in the future. However, the annual emissions cap will not fall to the level of 2021 emissions until the 2031 compliance year.

The high prices observed before March 2022 were at least partly attributable to lack of liquidity rather than an indication of the supply-demand balance. Just fifteen transactions were reported in 2021. Given the low volume of transactions to-date, regulated entities may anticipate difficulty obtaining additional allowances without paying a significant premium. Regulated entities with long-term contractual obligations to deliver electricity in 2022 and beyond can hedge exposure to fluctuations in natural gas prices and RGGI (CMR 7.70) allowance prices through liquid futures markets, but no comparable financial hedges exist for Massachusetts (CMR 7.74) program allowances. Consequently, some regulated entities may have been setting aside current vintage allowances as a hedge for obligations in future years.

The sale of future vintage allowances will be introduced in the June and September auctions in 2022. The availability of future allowance vintages will provide firms more opportunity to engage in hedging, will enhance price discovery for future vintages, and may increase liquidity for current period allowances which would otherwise be held for future compliance obligations.

## D. EMISSIONS AND ALLOWANCE HOLDINGS

In this section we review patterns of emissions and allowance holdings to assess the fundamentals of supply and demand. Table 1 and Figure 2 evaluate emissions and electricity supply over the last three years, while Figures 3 and 4 compare allowance holdings to emissions by regulated entity.

Table 1 summarizes electricity supply and emissions through 2021 compared to 2019 and 2020. Data is provided for regulated facilities by type: combined cycle units running on liquified natural gas ("LNG"), all other combined cycle units ("CC"), gas/oil-fired steam turbines ("ST"), and combustion turbine peaking units ("CT"). The table shows the supply of electricity from other non-regulated sources, including: nuclear generation, other non-program units such as renewables and waste burners, and net generation from the commercial and industrial sectors ("C&I").

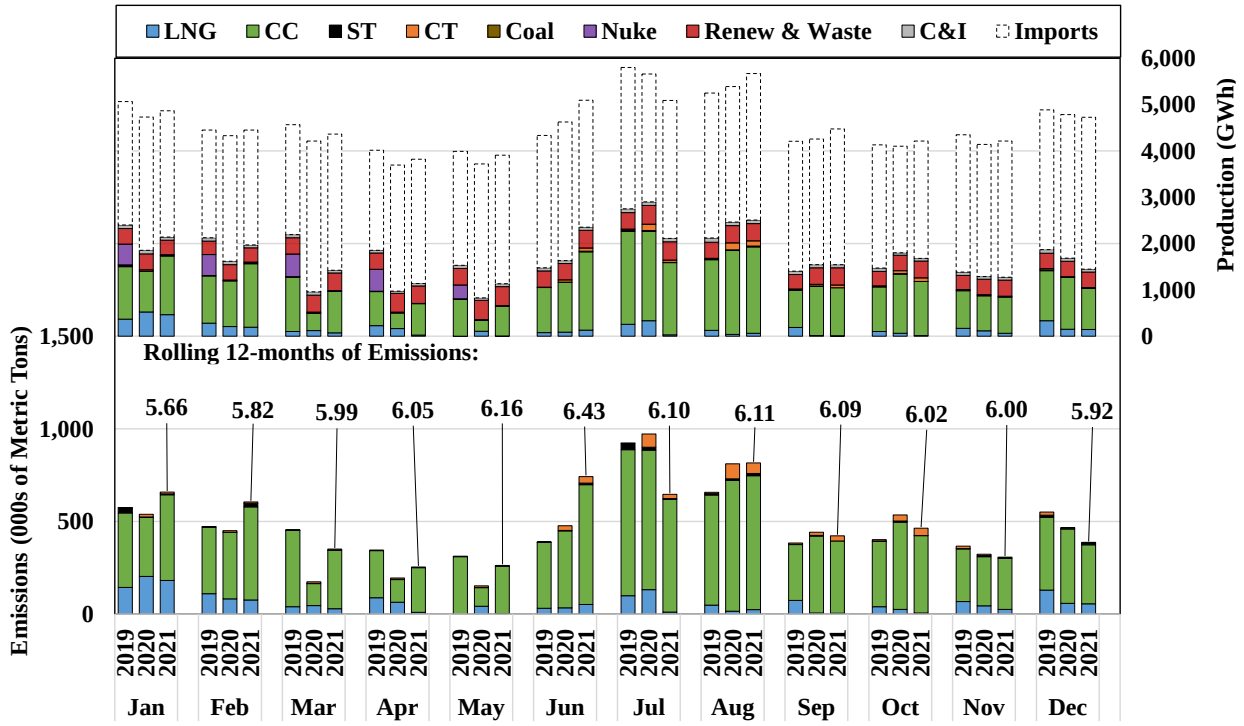
**Table 1: Electricity Supply[9] and Emissions**

| Year | Generation By Type, January-December (TWh) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | LNG | CC | ST | CT | Nuclear | Renew & Waste | C&I | Imports | Total |
| 2019 | 2.2 | 13.0 | 0.11 | 0.12 | 2.2 | 4.0 | 0.89 | 32.4 | 55.0 |
| 2020 | 1.9 | 11.8 | 0.07 | 0.55 | 0.0 | 4.4 | 0.79 | 34.1 | 53.6 |
| 2021 | 1.2 | 13.8 | 0.08 | 0.44 | 0.0 | 4.4 | 0.78 | 34.1 | 54.9 |
| | Carbon Dioxide Emissions, January-December (Million Metric Tons) | | | | | | | | |
| 2019 | 0.9 | 4.8 | 0.07 | 0.02 | - | - | - | - | 5.78 |
| 2020 | 0.8 | 4.4 | 0.04 | 0.24 | - | - | - | - | 5.48 |
| 2021 | 0.5 | 5.2 | 0.06 | 0.22 | - | - | - | - | 5.92 |

Figure 2 summarizes the same categories of information as Table 1 but on a monthly basis. The figure also reports emissions for entities subject to the cap under 310 CMR 7.74.

[9] Generation is based on EIA Form 923 data and Real-Time Load from the ISO-NE website. Form 923 data for 2021 is not final, so values for 2021 may change in future reports.

**Figure 2: Monthly Electricity Supply and Emissions, 2019-2021**



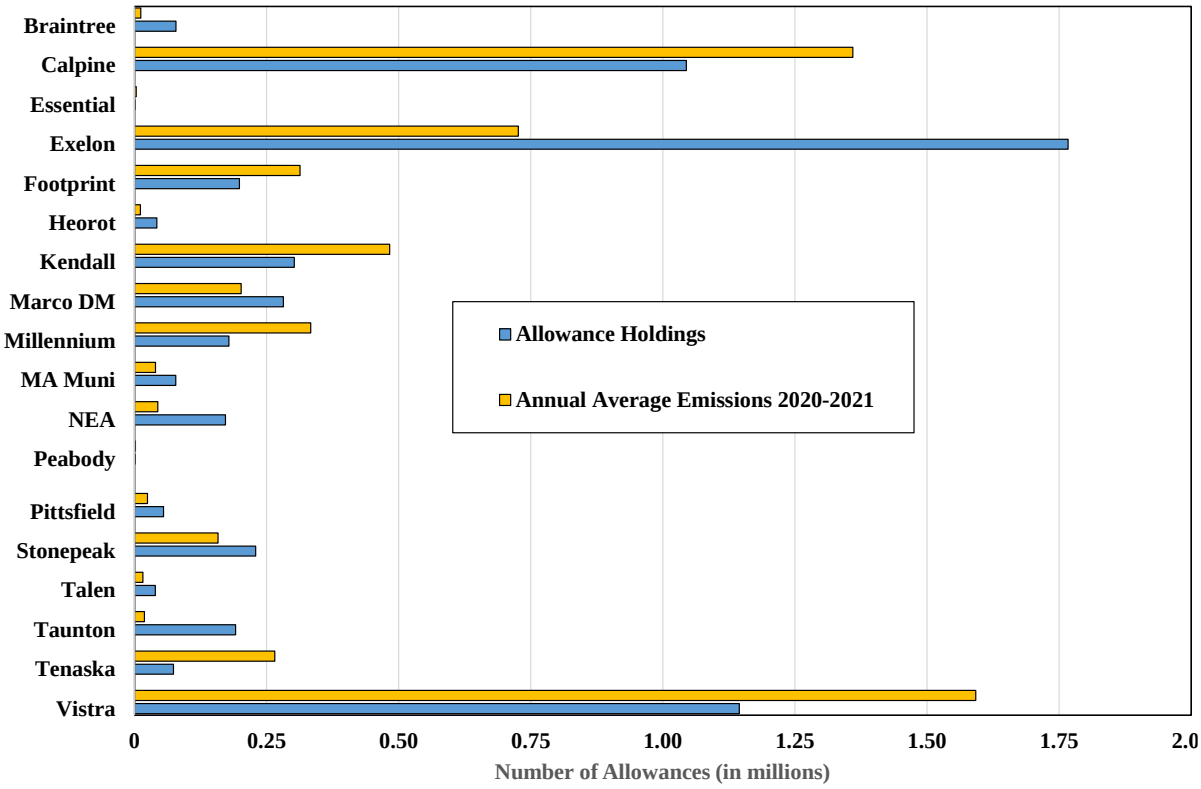

Emissions fell significantly from 2019 to 2020 but rose in 2021. The impact of COVID-19 significantly reduced load and emissions from March through May of 2020, but load and emissions recovered during the summer and fall before falling again during a relatively mild winter. Except for July and December, load in 2021 exceeded monthly load in 2020 as the economy continued to recover from the pandemic. Similarly, emissions in 2021 were higher than 2020 for each month between January and June. Lower imports during those months also contributed to higher monthly emissions. In the second half of 2021, each month's emissions were lower or similar to those of 2020. Annual emissions rose to 5.9 million metric tons in 2021. This increase in emissions reflected:

- Load levels increased as the economy began to recover, and this load was met mostly by covered generation in the first half of the year. In particular, combined cycle emissions during these months were 16 percent higher than in 2020. However, higher allowance prices in late 2021 may have contributed to reduced year-over-year emissions despite the increase in year-over-year load levels.
- Emissions from LNG-supplied generation remained very low in 2021 largely because pipeline gas prices were low relative to prices of imported LNG.

- Emissions from combustion turbines decreased by about 20 thousand metric tons from 2020 while emissions from steam plants decreased by a similar quantity.

Figure 3 shows, for each regulated entity, its average annual emissions over 2020 and 2021 compared to its estimated holdings of allowances that are usable for 2022 compliance, including allowances purchased in the December 2021 and March 2022 auctions.[10] This is composed of the sum of allowances banked from previous years and its Vintage 2022 allowance holdings.

**Figure 3: Allowance Holdings for 2022 and Annual Emissions by Regulated Entity**




The figure shows that some regulated entities already hold sufficient allowances to meet their compliance obligations if emissions are similar to the average annual emissions across 2020 and 2021. However, others currently hold a number that is lower than their average historical emissions. These regulated entities will be able to satisfy their obligations through some combination of:

10 Holdings and allocations are shown as of April 6, 2022.

- Allowance purchases in the remaining two auctions for 2022 vintage allowances.
- Allowance purchases in the secondary market – Based on Figure 3, some regulated entities already have sufficient allowances to satisfy their likely compliance obligations in 2022, suggesting that they may be willing to sell some. However, some regulated entities may prefer to bank a number of allowances for future years. The sale of future vintage allowances beginning in the June 2022 auction will provide additional options regulated entities that would otherwise have to bank current year allowances.
- Reduced emissions relative to recent patterns of operation – Emissions fell more than 40 percent from 2017 to 2021. There is relatively little transmission congestion into Massachusetts from neighboring states, which could allow additional electricity imports if fossil-fuel generators in Massachusetts reduce generation further.

Thus, it appears that regulated entities will have options for satisfying their 2022 compliance obligations.

## E. Discussion of Market Monitoring

As the Massachusetts Carbon Allowance Program Market Monitor, we monitor trading and holdings amongst regulated entities in order to identify anticompetitive conduct. This section discusses two types of anti-competitive conduct for which we monitor in the secondary market. In the current period we find no evidence of anti-competitive conduct.

In any commodity market, one potential concern is that a firm could hoard a substantial share of the supply of a commodity to influence prices or to prevent a competitor from obtaining production inputs. Hence, we screen information on the holdings of $CO_2$ allowances and the demand for allowances to identify firms that might acquire a position that raises competitive concerns.

Another potential concern is that a firm expecting to purchase $CO_2$ allowances in the auction might sell a large number of allowances below the competitive level. Such a firm might profit from buying a larger number of $CO_2$ allowances in the auction at a discount if the bidding in the auction were influenced by the depressed transfer price. For this to be a profitable strategy, the firm would need to be able to substantially depress the current price with a relatively small amount of sales—an amount smaller than the amount of $CO_2$ allowances it planned to buy in the auction. Firms that are looking for an opportunity to sell excess allowances or to purchase $CO_2$ allowances for their future compliance needs help limit the effectiveness of a strategy to depress prices below the competitive level.