QUARTERLY REPORT ON THE ELECTRICITY GENERATOR EMISSIONS LIMITS PROGRAM (310 CMR 7.74): THIRD QUARTER 2018

Prepared for:

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November 2018

A. INTRODUCTION AND SUMMARY

The Massachusetts Department of Environmental Protection ("MassDEP") implemented its program to limit CO_2 emissions from electricity generators in 2018. This report provides background on relevant aspects of the program, a summary of market activity during the third quarter of 2018, and discussion of the results of our market power screens.

- *CO_2 Allowance Prices and Volumes* – Reported allowance transfer prices averaged $8.77 per metric ton based on a volume of 109k allowances.
  - ✓ Prices have fallen since the first half of 2018 when reported transaction prices ranged between $10 and $20 per metric ton.
  - ✓ These anomalously high prices reflect the illiquid conditions in this nascent market rather than fundamentals of supply and demand.
- *CO_2 Allowance Holdings and Emissions* – At the end of the third quarter of 2018:
  - ✓ The total rolling emissions over the first 3 quarters of 2018 and the 4th quarter of 2017 totaled 8.1 million metric tons. This amount is 12 percent lower than the 2018 cap, suggesting that regulated entities should be able to acquire allowances as required prior to compliance.
  - ✓ Nevertheless, several regulated entities are on a pace to exceed their current allowance holdings and may, therefore, be expected to purchase additional allowances in the secondary market before the compliance deadline.

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.

B. BACKGROUND

Regulation, 310 CMR 7.74, creates a cap-and-trade program to reduce carbon dioxide emissions from electricity generating facilities located in Massachusetts.[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. The first compliance period under 310 CMR 7.74 began January 1st, 2018, and ends December 31st, 2018. The Massachusetts Carbon Allowance Registry ("Registry") went online in July of 2018. 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.

In 2019, the MassDEP will begin to transition from allocating allowances based on historic usage to using auctions as the primary mechanism for distributing allowances.[2] The first auction for 2019 vintage allowances is expected to be held in mid-December 2018.

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

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

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

2 In this report, the term "allowance" refers to allowances that can be used to comply with 310 CMR 7.74 only. In particular, 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.

Emissions Cap and Allowance Acquisition

The program's annual emissions cap was set at 9.1 million metric tons for 2018, the first year of program implementation. The annual cap will fall to 8.7 million in 2019 and by 223,876 metric tons in each subsequent year, eventually reaching 1.7 million metric tons in 2050.[3]

One hundred percent of the 9.1 million 2018 vintage allowances will be allocated to individual generators. This includes 1.5 million allowances allocated for new facilities. If new facilities do not utilize the entire 1.5 million allowances, the remainder will be apportioned among existing facilities in proportion to their initial allocations.[4]

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.[5] The table lists regulated facilities at the beginning of 2018 and their initial allowance allocation.[6]

Facility	Limit
ANP Bellingham	860,250
ANP Blackstone	787,429
Bellingham	233,789
Berkshire Power	437,049
Braintree Electric	24,425
Canal Station	101,922
Cleary Flood	50,453
Dartmouth Power	48,348
Dighton	330,396
Fore River Energy	1,433,568
Kendall Square	502,191
MASSPOWER	304,108
Medway Station	1,603
Milford Power, LLC	148,912
Millennium Power	667,082
Mystic	1,516,066
Pittsfield Generating	79,959
Stony Brook	68,844
Tanner Street	36,655
Waters River	1,587
West Springfield	15,343

3 310 CMR 7.74(5)(a)

4 310 CMR 7.74(5)(c)(2)

5 For example, Medway Station and Mystic receive allocations separately, but are both owned by Exelon, so for tracking and market monitoring purposes their demand is aggregated. A list of facilities and associated regulated entities is available to the public at https://macar.apx.com/ (select "Reports").

6 310 CMR 7.74(5)(b): Table B

The new Salem Harbor and West Medway facilities are also covered under the program.

Compliance

On March 1st, every generating facility's Registry account is required to hold sufficient allowances to satisfy obligations from the prior calendar year. Emergency deferred compliance is also an option for emissions incurred during periods in which ISO New England has triggered "Master Local Control Center Procedure No.2" (MLCCP#2). Under emergency deferred compliance, the current year compliance obligation for any emissions that occurred during a MLCCP#2 designated period can be deferred to the following year. However, those emissions are required to be offset on a two for one basis in that following year.[7] For example, if a facility deferred 1,000 allowances for 2018 compliance, they are required to hold a number of allowances for 2019 compliance equal to their 2019 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. The Registry tracks current holdings, allowance transfers, and allocations, as well as ownership and representation of each facility or regulated entity.

[7] 310 CMR 7.74(6)(d)

C. Summary of Prices and Traded Volumes

This section evaluates the available information regarding activity in the secondary market for allowances. The Massachusetts GHG program allowance registry did not begin operating until July, but several transactions were reported to the registry as having occurred in the first and second quarters. The following transactions have been reported to the registry through the end of the third quarter, but since there is no prompt reporting requirement, it is possible that other transactions have occurred but have not yet been reported:

- In the first quarter, three transactions were reported, totaling 105k allowances at prices between $15 and $20 per metric ton in February.
- In the second quarter, two transactions were reported, totaling 150k allowances at prices between $10 and $14 per metric ton in April and May.
- Two transactions were reported in the third quarter, totaling 109k allowances at prices ranging from $8 to $9 per metric ton in July and September.

Although the reported prices fell from February to September, prices were still much higher in the third quarter than: (a) levels that would be expected given the supply and demand for allowances in 2018 (which are evaluated in Section D of this report), and (b) levels anticipated based on analysis that was performed to support the implementation of the regulation, which suggested that prices would be much closer to $0 per metric ton and that the demand for allowances would be relatively price-elastic.[8] Thus, the anomalously high transaction prices observed in the first three quarters of 2018 cannot be explained by market fundamentals alone.

Trading in the first three quarters of 2018 indicates that several market participants placed a much higher value on allowances than was expected. However, these results should be interpreted as anomalous outcomes driven by a short-term lack of liquidity rather than an indication of the supply-demand balance for several reasons. First, high prices were not a

[8] The most credible modeling results forecasted that BAU ("Business As Usual") emissions would not exceed the cap, suggesting that prices would be near $0/ton. To the extent that scenarios were run to evaluate price-elasticity (i.e., how prices might respond to unexpectedly high emissions), they suggested that prices might be expected to rise from $0 to $2 if emissions were reduced by 1 million below BAU emissions.

widespread phenomenon given that they involved just seven reported transactions among just five parties for a total of just 364k allowances.

Second, the anomalous prices have likely been affected by elements of the market power mitigation rules used by ISO New England. The rules allow a generator whose offer is mitigated (i.e., reduced to an administratively determined competitive benchmark) to seek cost recovery if it is later determined that the competitive benchmark was set below the generator's verifiable costs.[9] Generators that seek cost recovery after being mitigated by the ISO New England may not have strong incentives to obtain allowances at a competitive price level, since the cost recovery provision allows them to pass the cost on to the ISO.

Third, some suppliers may have been reluctant to sell allowances until more information was available regarding the demand for 2018 vintage allowances. Demand is affected by the timing of entry of newly-constructed generators, so some suppliers may have been waiting to learn when the new Salem Harbor and West Medway units would begin operating. Demand for 2018 vintage allowances is also affected by supply and demand in subsequent years because of the banking provisions in the regulation. Banking allows firms to keep allowances for use in a future year, so firms may choose to hold on to 2018 allowances as a hedge against the possibility of higher prices in 2019. Previous versions of the regulation would allow only a small amount of banking from one year to the next, but amendments to the regulation to allow unlimited banking were proposed in April and adopted in August. This amendment will tend to increase price levels relative to when the effects of the original regulation were analyzed.

Fourth, there was no established venue (e.g., a public commodity exchange) where suppliers post standing offers, so some firms may have been willing to sell allowances for lower prices but were not aware of opportunities to sell. Thus, it is unclear whether or not the anomalous prices reflected the market expectations of most regulated entities.

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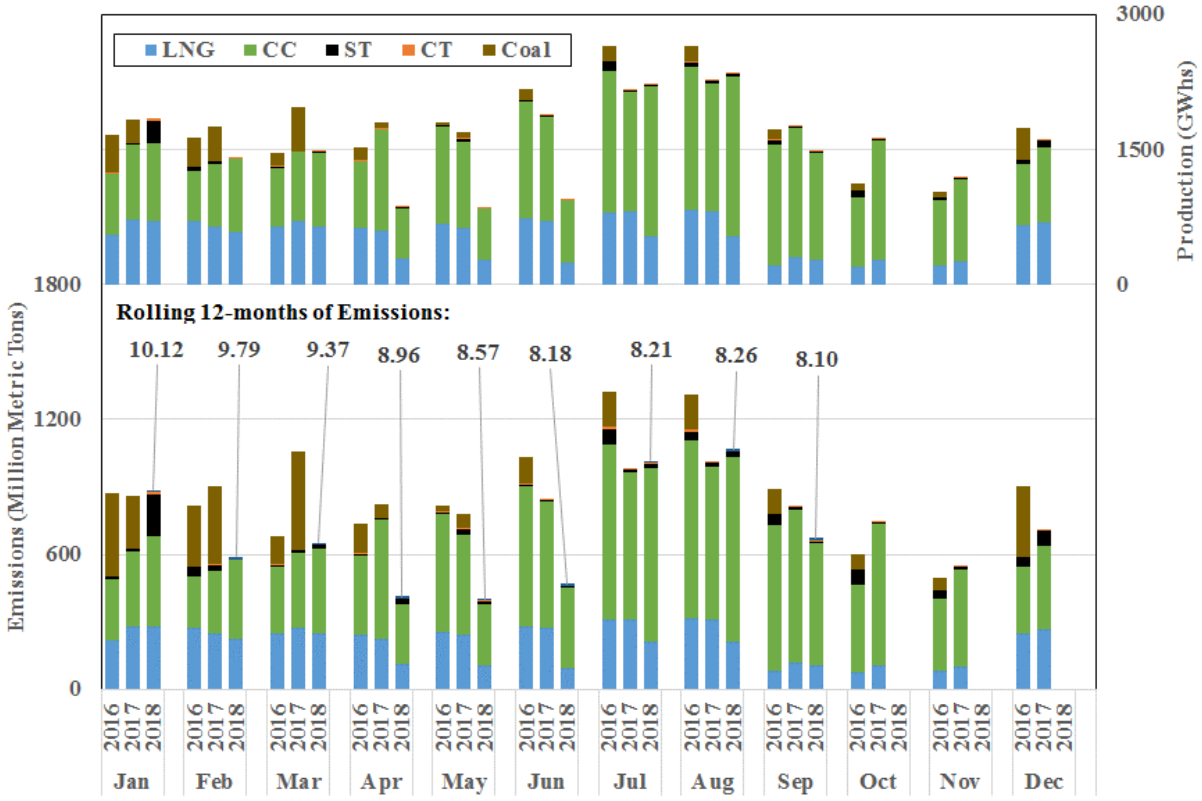
9 Normally, the generator must seek cost recovery within 60 days, although on January 8, NRG submitted a filing asking the Federal Energy Regulatory Commission ("FERC") to extend this deadline because generators do not have an accurate way to estimate the cost of MassGHG allowances. FERC granted this request on February 8.

Finally, many generators received 2018 allocations at or near their emissions in prior years and may therefore have chosen to simply forgo participation in the allowance market rather than analyzing options for buying or selling allowances.

D. EMISSIONS AND ALLOWANCE HOLDINGS

Allowance prices are generally driven by the fundamentals of supply and demand, which we evaluate by reviewing patterns of generator emissions, allocations, and forecasted holdings of firms. Figure 1 summarizes emissions and electricity production in each month of 2018 compared to the last two years. Information is provided for combined cycle units running on liquified natural gas ("LNG"), all other combined cycle units ("CC"), gas/oil-fired steam turbines ("ST"), thermal peaking units ("CT"), and coal-fired steam turbines ("Coal"). The figure also reports total emissions on a rolling 12-month basis for each month of 2018, which provides a sense of how constrained emissions may have been as a result of 310 CMR 7.74.

Figure 1: Aggregate Monthly Emissions from Covered Units[10]



10 Figure 1 includes all emissions from eligible sources, although a portion of Kendall Green's emissions are eligible combined heat and power output and will therefore not count toward its compliance obligation. This is reflected in Figure 2, but monthly interval data does not reliably report this reduction.

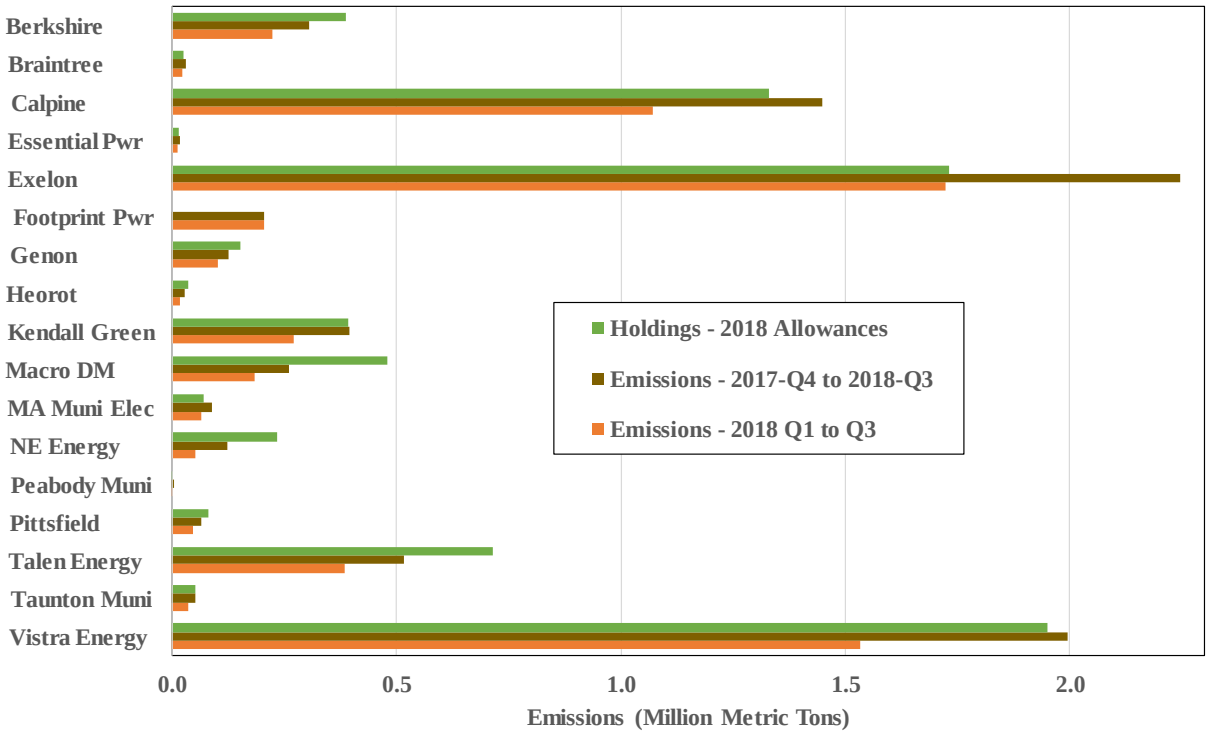
Figure 1 shows that emissions in April, May, June, and September of 2018 were considerably lower than during the comparable portions of 2016 and 2017, which likely contributed to the decrease in transaction prices from February to May. January 2018 emissions were elevated primarily because of increased utilization of fuel oil and less fuel-efficient units during a period of extreme cold weather, which largely offset the emissions reduction that resulted from the retirement of coal-fired generation in May 2017. Emissions in February, March, July, and August 2018 were consistent with emissions from non-coal-fired generation in previous years and emissions throughout the second quarter were significantly lower than in recent years.[11] For the twelve months ended September 30, 2018, aggregate emissions equaled 8.1 million metric tons, which is approximately 12 percent lower than the cap for 2018 of 9.15 million metric tons.

Figure 2 shows emissions for the first three quarters of 2018, emissions for the 12-months ended in September 2018, and holdings of 2018 allowances at the end of the third quarter by Regulated Entity. The current year emissions indicate the obligations that have already been incurred this year for each Regulated Entity, while the emissions during the last 12 months indicates what a Regulated Entity's obligations will be for 2018 if its operation during the remaining portion of the year is similar to its operation the previous year. The comparison of allowance holdings to the last 12 months of emissions provides an indication of which firms may seek additional allowances through the secondary market versus one that may sell allowances.

Figure 2 shows that several Regulated Entities' emissions are trending over their holdings, but only one has emissions that may be on track to outpace its holdings by a large quantity. It is important to consider that 1.5 million metric tons were set aside for the new generators, including the Footprint facility (also known as Salem Harbor). This unit began operating in the second quarter. It is not on track to emit 1.5 million metric tons, so some of these allowances will be reallocated to other Regulated Entities.

[11] Some have raised the concern that the Massachusetts cap-and-trade program could exacerbate New England's fuel security issues, but the reduction in emissions during the second quarter suggests that regulated entities are able to offset higher winter emissions with emission reductions during low-demand periods such as the spring.

Figure 2: Allowance Allocations, Holdings, and Emissions by Regulated Entity



Four Regulated Entities hold at least 50,000 allowances more than the quantity of their emissions over the last 12 months, suggesting that these entities may have excess quantities available to sell. On the other hand, two Regulated Entities hold at least 50,000 fewer allowances than their emissions over the last 12 months. As discussed earlier, allowances originally allocated to new facilities (i.e., Salem Harbor) that go unused will be reallocated to other Regulated Entities, so this will cause some allowances to shift from the accounts with excess to accounts in deficit. Many Regulated Entities can address this deficit by reducing emissions during the remainder of 2018, but certain generators may be called upon to run regardless of their own financial incentives, and at least one Regulated Entity will likely rely on the secondary market to obtain a substantial number of allowances.

In general, entities that are trending above their allocation can satisfy their obligations through some combination of: (a) allowances reallocated from new facilities later this year, (b) reduced emissions relative to previous years, and (c) allowance purchases in the secondary market.

To the extent that individual Regulated Entities are unable to obtain sufficient allowances to satisfy their compliance obligations for 2018 before the March 2019 compliance deadline, the rules related to the Emergency Deferred Compliance provision may become important. Through the third quarter of 2018, approximately 470,000 metric tons of emissions had already been designated as eligible for the deferral.

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.