

## [RGGI Allowance Holdings Projection Procedure](#)

I have tried several times to replicate the allowances in circulation numbers in the Potomac Economics Secondary Market Monitoring reports but have had little success. Many of the problems are the result of the fact that allowance trades are constantly occurring and, I suspect, that the RGGI states are transferring allowances so soon after any report is published the numbers change. In order to document my estimates I will document my assumptions here.

The starting point for my analysis is the current status of the allowances in circulation and the number of allowances held by compliance entities. For the allowances in circulation the Q2 2021 data are derived from the [Potomac Economics Q2 2021 secondary market report](#) and the auction monitoring report for the third quarter of 2021 held on September 8, 2021. Table 1 quotes references to allowance quantities in both reports. The secondary market report lists the number of allowances in circulation but the auction report does not. For the total allowances in circulation, I added the 143 million allowances from the secondary market report and the 22.9 million allowances sold at auction from the auction monitoring report.

The fraction of allowances held by compliance entities is problematic. In the first place, Potomac Economics' definition changes. The category investors with compliance obligations definition explains:

The assessment of whether a compliance entity holds a number of allowances that exceeds its compliance obligations by a margin that suggests they are also buying for re-sale or some other investment purpose is based on: (a) the entity's forecasted share of the total compliance obligations for the entire RGGI footprint through 2026, (b) the total number of allowances in circulation, and (c) consideration of the pattern of the entity's allowance transfers to unaffiliated firms versus affiliated firms. Since the designation of a compliance entity as an investor is based on a review of its transactions and holdings, the designation of a particular firm may change over time as more information becomes available.

The other problem with this fraction is that sales occur regularly and, if the sale is from an investor without compliance obligations to the other categories the fraction changes. For example, we know the allowances in circulation that only changes when allowances are added to the system in an auction or when allowances are taken out of circulation when affected sources surrender them. The Potomac Economics reports gave the percentage of allowances at the end of the second quarter and sold in the auction. As a result, you can estimate the allowances for compliance and back-calculate the percentage. However, Table 1 shows that the calculated value 44% does not equal the auction monitoring report value of 46%. For this analysis I used the auction monitoring report that is reliably accurate only on the day of the report preparation.

**Table 1: Comparison of Potomac Economics Allowances for Compliance Purposes**

Potomac Economics Report on the Secondary Market for RGGI CO2 Allowances

[https://www.rggi.org/market/market\\_monitor](https://www.rggi.org/market/market_monitor)

8/26/2021 - CO2 Allowance Holdings – At the end of the second quarter of 2021:

There were 143 million CO2 allowances in circulation.

Compliance-oriented entities held approximately 52 million of the allowances in circulation (36 percent).

Approximately 61 million of the allowances in circulation (43 percent) are believed to be held for compliance purposes.

Potomac Economics Market Monitor Report for Auction 53

[https://www.rggi.org/market/market\\_monitor](https://www.rggi.org/market/market_monitor)

9/10/21 - CO2 Allowance Holdings

In Auction 53, Compliance Entities purchased 52 percent of the allowances sold.

In Auction 53, Compliance-Oriented Entities purchased 50 percent of the allowances sold.

After settlement of allowances sold in Auction 53:

Forty percent of the allowances in circulation will be held by Compliance-Oriented Entities.

Forty-six percent of the allowances in circulation are believed to be held for compliance purposes.

**Current Status of Allowances in Circulation Held for Compliance Purposes**

<b>Date</b>	<b>Allowances in Circulation</b>	<b>% for Compliance</b>	<b>Allowances for Compliance</b>
8/26/2021	143.0	43%	61.5
Auction	22.9	52%	11.9
9/10/2021	165.9	44%	73.4
Report	165.9	46%	76.3

Table 2 is my initial attempt to project RGGI allowance holdings in the fifth compliance period. There are two main components in this table: allowances in circulation and emissions. The projection for the fifth compliance period allowance holdings should equal the known allowance holdings at the end of the second quarter of 2021 plus the sum of allowance auctions through the end of 2023 minus the emissions over the same period which are known through the second quarter of 2021 and must be estimated for the rest of the period. Unfortunately, Potomac Economics data constantly vary and RGGI documentation is so poor that this is a difficult task.

**Table 2: Projected RGGI Allowance Holdings in the Fifth Compliance Period Scenario 1**

Year	Quarter	Allowances in Circulation	Allowances for Compliance Purposes	Other Holdings	Emissions	
					Observed	Surrender
2021	Q2	143	61.0	82.0	49.9	
2021	Q3	165.9	76.3	89.6	74.9	
2021	Q4	138.6	49.0	89.6	99.9	50.0
2022	Q1	160.6	71.0	89.6	124.9	
2022	Q2	182.5	93.0	89.6	149.9	
2022	Q3	204.5	114.9	89.6	174.9	
2022	Q4	176.5	86.9	89.6	199.9	50.0
2023	Q1	197.8	108.2	89.6	224.9	
2023	Q2	219.2	129.6	89.6	249.9	
2023	Q3	240.5	150.9	89.6	274.9	
2023	Q4	61.8	-27.8	89.6	299.9	200

Consider the allowance distributions. Historical allowance allocations to each state and for numerous categories are [available on the RGGI website](#). I would find it very useful if there were a single table available that listed the RGGI total allowance allocations for each year and was compatible with the Potomac Economics estimates but nothing like that is available. Instead, there are spreadsheets available for every year. The problem with the individual years is described in a RGGI note:

The trackers below offer more detail on the distribution of allowances, organized by allocation year. Note that the allocation year of the allowance does not necessarily equal the year that the allowance was distributed. Trackers are updated to account for any changes to the status of past allocation years' allowances (such as retirement or distribution from set-aside accounts).

[RGGI 2021 Allowance-Distribution](#) lists the RGGI 2021 allowance distributions and illustrates the problem trying to estimate future allowance availability. The CO2 allowance base budget allowances are the initial distribution. The RGGI states decided to adjust the allowance allocations because they were worried that the allowance bank had become too large initially and in the third adjustment in an effort to make the cap “binding”. The third adjustment for banked allowances references [documentation](#) purportedly providing additional information but the reference does not incorporate changes since the addition of Virginia so it is out of date. The CO2 allowance adjusted budget is the difference between the base budget and the third adjustment. The column listing the sold at auction allowances equals the adjusted budget minus the allowances in the remaining six columns. Note that at the time of this writing in the list of allowance distribution annual tracker reports that reports as old as the 2012 allocation year were updated as recently as June 2021. I believe these reports are updated when the states get around to reporting to RGGI that they have allocated the allowances in the remaining six column accounts to other accounts. There is no documentation that attempts to explain whether the allowances in, for example, the “Transferred from State Set-Aside Accounts” category will be made available to the market and whether they will be available before the end of the current compliance period. In 2020, the sum of the allowances sold at auction and those sold at fixed price was

10% of the adjusted budget. Therefore, the conservative assumption for future allowance availability is that 10% of the adjusted budget is unavailable.

I described above how the starting point for the allowance holdings were derived. For the fourth quarter of 2021 I assumed that the auction amount would equal one quarter of the adjusted CO2 allowance reduced 10% to account for the other account allocations. For the remainder of the fifth compliance period the quarterly auction allocations were set to one quarter of the adjusted annual CO2 allowance reduced 10% to account for the other account allocations.

Because of the opaque documentation for allowance ownership the only source of data is the Potomac Economics reports. For this analysis I assumed that all the allowances sold at auctions would be sold to compliance entities and would be used for compliance purposes. That means that the allowances allocated to investors without compliance obligations will not change. Note, however, that in the last auction compliance entities only purchased 52% of the allowances available.

The goal of the analysis is to estimate the allowance holdings at the end of the compliance period. In order to do that the emissions during the period also have to be included. In the first two quarters of the ten-state RGGI program that includes Virginia, total CO2 emissions were just under 50 million tons. For the purposes of the initial estimate, I assumed that the quarterly emissions for each quarter were 25 million tons. Note that at the end of the first two years, allowances equal to 50% of the annual emissions have to be surrendered. At the end of the compliance period allowances equal to the remaining emissions have to be surrendered. Using these assumptions, I conclude that compliance entities will have to go to the market for banked allowances held by investors without compliance obligations during this compliance period.

I did two sensitivity analyses. In the second scenario (Table 3) the emissions remained the same but the 10% set aside for the other set-asides was not subtracted from the adjusted annual allocation. In this scenario compliance entities will also have to go to the investors without compliance obligations. In the third scenario (Table 4), the allowance allocations remained the same as the first scenario but I assumed that emissions dropped by 3% per year, the same factor as in the allowance cap calculation. This scenario also predicts that compliance entities will have to go to the investors without compliance obligations to obtain allowances.

The last question is when will compliance entities have to go to the investors without compliance obligations to purchase allowances necessary to cover their emissions. Table 5 starts adding allowances and emissions to the current allowance categories but does not include the allowances surrendered to meet 50% compliance obligation at the end of the first and second years. Using the assumptions of Scenario 1, the margin between emissions and total allowances for compliance obligations category indicates a deficit in the fourth quarter of 2021.

**Table 2: Projected RGGI Allowance Holdings in the Fifth Compliance Period Scenario 2**

Year	Quarter	Allowances in Circulation	Allowances for Compliance Purposes	Other Holdings	Emissions	
					Observed	Surrender
2021	Q2	143	61	82	49.9	
2021	Q3	165.9	83.9	82	74.9	
2021	Q4	141.1	59.1	82	99.9	50.0
2022	Q1	165.5	83.5	82	124.9	
2022	Q2	189.9	107.9	82	149.9	
2022	Q3	214.4	132.4	82	174.9	
2022	Q4	188.8	106.8	82	199.9	50.0
2023	Q1	212.5	130.5	82	224.9	
2023	Q2	236.2	154.2	82	249.9	
2023	Q3	259.9	177.9	82	274.9	
2023	Q4	83.5	1.5	82	299.9	200

**Table 3: Projected RGGI Allowance Holdings in the Fifth Compliance Period Scenario 3**

Year	Quarter	Allowances in Circulation	Allowances for Compliance Purposes	Other Holdings	Emissions	
					Observed	Surrender
2021	Q2	143	61	82	49.9	
2021	Q3	165.9	83.9	82	74.9	
2021	Q4	138.6	56.6	82	99.9	50.0
2022	Q1	160.6	78.6	82	124.2	
2022	Q2	182.5	100.5	82	148.4	
2022	Q3	204.5	122.5	82	172.7	
2022	Q4	178.0	96.0	82	196.9	48.5
2023	Q1	199.3	117.3	82	220.4	
2023	Q2	220.7	138.7	82	244.0	
2023	Q3	242.0	160.0	82	267.5	
2023	Q4	70.7	-11.3	82	291.0	192.6

**Table 5: Fifth Compliance Period Cumulative Allowances and Emissions - Scenario 1**

Year	Quarter	Allowances in Circulation	Allowances for Compliance Purposes	Constant Emissions	Compliance Margin
2021	Q2	143	61.0	49.9	11.1
2021	Q3	165.9	76.3	74.9	1.4
2021	Q4	188.6	99.0	99.9	-1.0
2022	Q1	210.5	120.9	124.9	-4.0
2022	Q2	232.5	142.9	149.9	-7.0
2022	Q3	254.5	164.9	174.9	-10.0
2022	Q4	276.5	186.9	199.9	-13.1
2023	Q1	297.8	208.2	224.9	-16.8
2023	Q2	319.1	229.5	249.9	-20.4
2023	Q3	340.4	250.8	274.9	-24.1
2023	Q4	361.7	272.1	299.9	-27.8