Assessing Power Sector Impacts on Environmental Justice Communities

Prepared for Alternatives for the Community and Environment

May 2026

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ACKNOWLEDGMENTS

We would like to thank the stakeholders who contributed to the review of this analysis, including Alternatives for Community and the Environment (ACE), Marcos Luna, GreenRoots, Institute for Policy Studies, New Jersey Environmental Justice Alliance, NYC Environmental Justice Alliance, Pennsylvania Utility Law Project, Connecticut Coalition for Economic and Environmental Justice, and Center for Coal Field Justice.

The analysis in this report was performed with data available as of Spring 2025.

ACRONYMS AND DEFINITIONS

Term	Definition
AMHI	Annual median household income
ArcGIS	A software for GIS analysis
CEJST	Climate and Economic Justice Screening Tool
CO_2	Carbon dioxide
DAC	Disadvantaged Community
EJ	Environmental Justice
EJC	Environmental Justice Community
EJScreen	EPA environmental justice screening mapping tool; includes data on community characteristics
EPA	Environmental Protection Agency
FPL	Federal Poverty Level
GIS	Geographic Information System. *Software to visualize and analyze spatial data (i.e., mapping analysis)*
GW	Gigawatt *Unit of capacity (equivalent to 1,000 MW)*
GHG	Greenhouse gas
IRA	Inflation Reduction Act
MW	Megawatt *Unit of capacity (equivalent to 1,000 kW)*
NO_x	Nitrogen oxides
$PM_{2.5}$	Particulate Matter with diameter <2.5 microns
RGGI	Regional Greenhouse Gas Initiative
SO_2	Sulfur Dioxide

EXECUTIVE SUMMARY

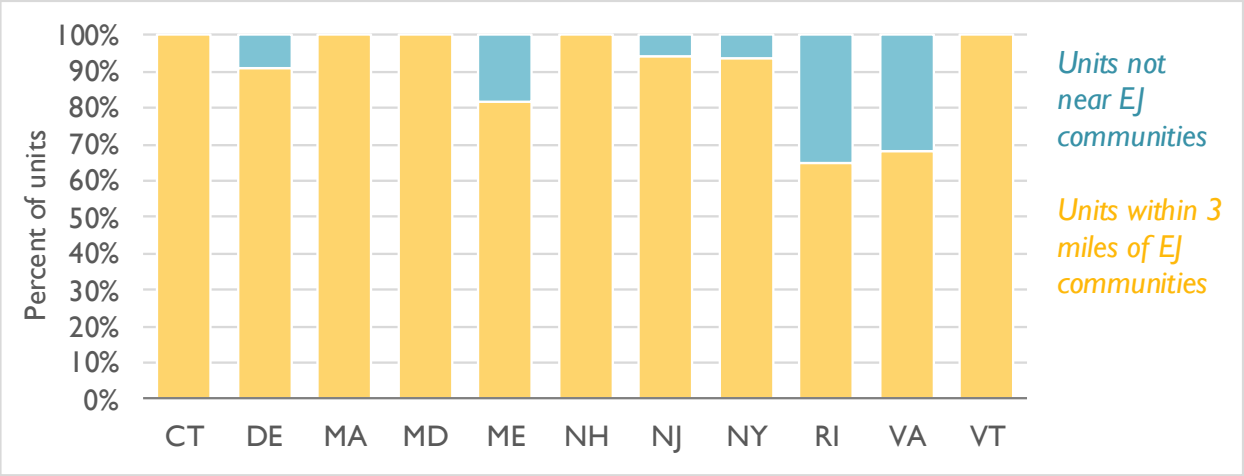
Emissions of greenhouse gases are a leading cause of climate change, and exposure to fossil fuel-based air pollutants have both short- and long-term health effects. Emissions from electricity generation from power plants disproportionately affect low-income, minority, and native communities throughout the United States. Many states in the Northeast have passed statutory requirements and implemented procedures to integrate environmental justice priorities into energy and environmental policies. At the same time, states have passed policies to reduce emissions from greenhouse gases. These policies include the Regional Greenhouse Gas Initiative (RGGI), a multi-state cooperative among states in the Northeast and Mid-Atlantic to cap and reduce greenhouse gas emissions (GHG) from power plants. Reducing CO_2 emissions has the co-benefits of reducing emissions of harmful air pollutants from power plants. Alternatives for Community and Environment (ACE) and other environmental organizations hired Synapse Energy Economics Inc. (Synapse) to analyze the impact of power plants on environmental justice (EJ) communities in the states currently taking action through their mutual cooperation on RGGI.[1]

We conducted geospatial analysis to assess the proximity of power plants to EJ communities in the RGGI states. We found that:

- **30 percent of EJ communities in RGGI states are located within 3 miles of a regulated power plant**, compared to only 16 percent of non-EJ communities. People living in EJ communities near power plants are exposed to higher levels of $PM_{2.5}$ pollution than other communities.
- **91 percent of generating units regulated under RGGI are located within 3 miles of an EJ community**. (See Figure 1) As a result, emissions of plants regulated under RGGI directly impact EJ communities in those states.
- **EJ communities near RGGI plants are disproportionately affected, even when compared to other EJ communities.** The EJ communities near power plants tend to be ones with higher proportions of people of color, low income, unemployment, limited English-speaking households, and lower levels of educational attainment. EJ communities near RGGI power plants also have higher levels of ambient particulate matter, when compared to other non-EJ communities.
- **EJ communities continue to bear the brunt of new power grid infrastructure**. Over 2009-2022, 90 percent of the emitting units added were built near EJ communities. These communities continue to face higher exposure to power plant air pollutants.

[1] EJ communities are also referred to as disadvantaged, underserved, frontline, vulnerable, priority, equity focus, or overburdened populations. For this analysis, we use the term "environmental justice community" to encompass all these categories.

Figure 1. Percent of regulated power plant generating units by state and proximity to EJ communities



An overwhelming majority of units currently regulated under RGGI (91 percent) are located within 3 miles of an EJ community, impacting 8.9 million people across 11 states in the northeast and Mid-Atlantic. These communities continue to bear the brunt of new power grid infrastructure and their associated externalities. EJ communities near these power plants are disproportionately affected by ambient air pollution, even when compared to other EJ communities.

1. INTRODUCTION

In 2022, the electric power sector was responsible for 25 percent of total greenhouse gas (GHG) emissions in the United States, making it the second largest source of emissions after transportation. In addition to greenhouse gases, fossil fuel power plants emit harmful air pollutants. In 2023, the power sector emitted 862,000 short tons of particulate matter with a diameter of 2.5 micrometers or less ($PM_{2.5}$), 2,235,000 short tons of NO_X, and 747,000 short tons of sulfur dioxide (SO_2). Nationally, power plants and other fuel combustion sources were responsible for 14 percent of $PM_{2.5}$ emissions, 32 percent of NO_X emissions, and 43 percent of SO_2 emissions.[2] Exposure to these fossil fuel-based air pollutants have both short- and long-term health effects.

Pollution from power plants disproportionately impacts low-income, minority, and native communities throughout the United States.[3,4] Many states, including many RGGI member states, have passed statutory requirements and implemented procedures to integrate environmental justice (EJ) priorities into energy and environmental policies. Alternatives for Community and Environment (ACE), and other environmental justice organizations retained Synapse to study the impacts of air pollution from power plants in the states currently participating in the Regional Greenhouse Gas Initiative (RGGI) program.

RGGI is a cooperative program across multiple states in the Northeast and Mid-Atlantic to cap and reduce power sector emissions of CO_2. States currently participating in RGGI include Connecticut, Delaware, Massachusetts, Maryland, Maine, New York, New Jersey, New Hampshire, Rhode Island, and Vermont (see Figure 2). Virginia began participating in 2021 but suspended its participation in 2024. This suspension is currently under legal challenge, with a November 2024 ruling declaring the suspension unlawful.[5] Pennsylvania began participation in 2022 but is unable to distribute allowances and enforce compliance due to ongoing litigation.[6] For the purposes of this analysis, Virgina is included as a full RGGI participant, but Pennsylvania is excluded. In this analysis, the 10 fully operating members of RGGI and Virginia are together referred to as the "RGGI states."

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[2] EPA. Air Pollutant Emissions Trends Data – National Tier 1 CAPS Trends for 1970-2023 (2024). Available at https://www.epa.gov/air-emissions-inventories/air-pollutant-emissions-trends-data

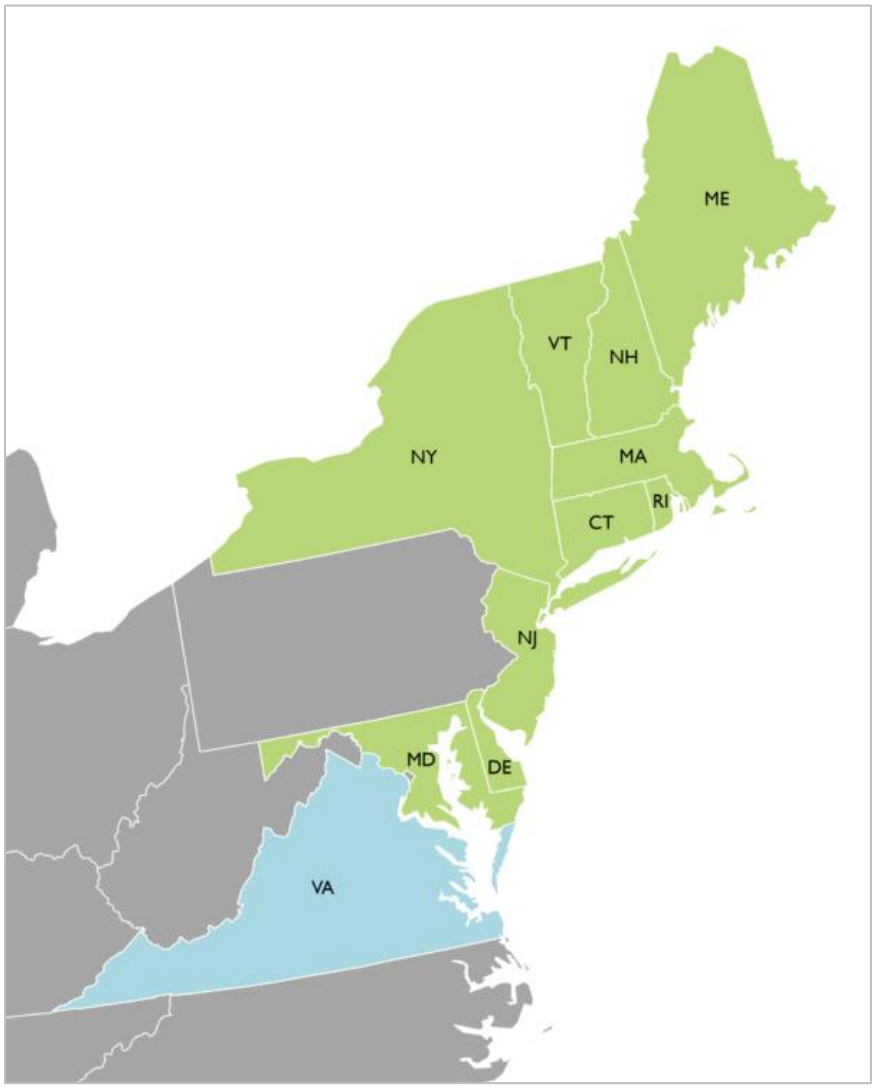
[3] Christopher W. Tessum et al. PM2.5 polluters disproportionately and systemically affect people of color in the United States. Sci. Adv.7,eabf4491(2021).DOI:10.1126/sciadv.abf4491. Available at https://www.science.org/doi/10.1126/sciadv.abf4491

[4] EPA. Power Plants and Neighboring Communities. (2024) Available at https://www.epa.gov/power-sector/power-plants-and-neighboring-communities

[5] See https://npr.brightspotcdn.com/9b/d7/198dd7f649399d65960e651e80df/lowe-opinion-11-18-2024-cl23-173-floyd-co-cc.pdf.

[6] RGGI. The Investment of RGGI Proceeds in 2022 (July 2024). Pg 4. Available at https://www.rggi.org/sites/default/files/Uploads/Proceeds/RGGI_Proceeds_Report_2022.pdf

Figure 2. Map of RGGI states



Note: Virginia is shown with a different color in this figure, indicating its uncertain legal status with respect to RGGI. For the purposes of this analysis, Virginia is included as a RGGI state.

2. IMPACTS OF POWER PLANTS ON ENVIRONMENTAL JUSTICE COMMUNITIES

Power plants release harmful air pollutants when they burn fossil fuels. Exposure to fossil fuel-based air pollutants has both short- and long-term health effects. Research has shown that increased exposure to these air pollutants leads to higher risk for cardiac arrest, asthma attacks, low infant birth weight, and mortality.[7, 8] People who live in closer proximity to power plants are more likely to suffer from respiratory and cardiovascular diseases and have increased risk of death and hospitalization.[9,10] Pollution from power plants disproportionately impacts low-income, minority, and native communities throughout the United States.[11,12] Permitting decisions for power plants and industries have historically relied on racist redlining practices, leading to polluting industries overwhelmingly being sited in Black, Hispanic, Native American, and Asian communities.[13]

Many jurisdictions are taking action to identify those groups most burdened by environmental pollution and the communities most vulnerable to those harms. Environmental justice (EJ) communities are communities that experience disproportionate environmental harms, vulnerability to climate impacts and/or shared socioeconomic conditions. In some jurisdictions, EJ communities may also be referred to as "disadvantaged", "underserved", "frontline", "vulnerable", or "overburdened" communities. For this analysis, we use the term "environmental justice community" to encompass all these categories. Nine out of the eleven RGGI states have enacted policies defining environmental justice (EJ) communities.

To assess the impacts of regulated power plants on vulnerable and disadvantaged groups, we conducted geospatial analysis to identify EJ communities in the eleven-state region in our analysis.

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[7] Doctrow, B. *Deaths associated with pollution from coal power plants*. National Institutes of Health (Dec 2023). Available at https://www.nih.gov/news-events/nih-research-matters/deaths-associated-pollution-coal-power-plants

[8] U.S. EPA. *Human Health & Environmental Impacts of the Electric Power Sector* (updated Oct 2024). Available at https://www.epa.gov/power-sector/human-health-environmental-impacts-electric-power-sector

[9] Declet-Barreto J, Rosenberg AA. Environmental justice and power plant emissions in the Regional Greenhouse Gas Initiative states. PLoS One. 2022 Jul 20;17(7):e0271026. doi: 10.1371/journal.pone.0271026. PMID: 35857722; PMCID: PMC9299318. Available at https://pmc.ncbi.nlm.nih.gov/articles/PMC9299318/

[10] Schneider, C. G., Banks, J. M., & Tatsutani, M. (2010). The toll from coal: An updated assessment of death and disease from America's dirtiest energy source. Clean Air Task Force. Available at https://www.catf.us/resource/the-toll-from-coal/

[11] Christopher W. Tessum et al. PM2.5 polluters disproportionately and systemically affect people of color in the United States. Sci. Adv.7,eabf4491(2021).DOI:10.1126/sciadv.abf4491. Available at https://www.science.org/doi/10.1126/sciadv.abf4491

[12] EPA. Power Plants and Neighboring Communities. (2024) Available at https://www.epa.gov/power-sector/power-plants-and-neighboring-communities

[13] Cushing, L.J., Li, S., Steiger, B.B. *et al.* Historical red-lining is associated with fossil fuel power plant siting and present-day inequalities in air pollutant emissions. *Nat Energy* **8**, 52–61 (2023). https://doi.org/10.1038/s41560-022-01162-y. Available at https://www.nature.com/articles/s41560-022-01162-y#citeas

2.1 Identifying EJ communities near regulated power plants

To analyze the impacts of power plants on EJ communities in the RGGI states, we reviewed national and state-specific definitions for environmental justice communities, which describe the quantifiable thresholds that qualify a geographic area as an EJ community, typically based on environmental, socioeconomic, and health factors. Most of the states included in this analysis have enacted bills with specific definitions for EJ communities. For states without statutory definitions for EJ communities (Delaware and New Hampshire), we used a federal definition. Some states use multiple definitions of environmental justice communities (state offices or programs may use different EJ definitions to suit their specific purposes). In those instances, we chose to use one or more EJ definitions that were most likely to be used in energy planning (i.e., permitting and siting) or are encoded in state legislation. In general, EJ communities are commonly defined as specific geographies (e.g., census tracts or counties) that meet quantitative criteria related to income, race and ethnicity, or other metrics.

Based on the state and federal definitions, we find that across all eleven states in our analysis on average, 49 percent of the population lives in an EJ community. Some states such as Maryland have broader definitions or multiple definitions, and thus a larger share of the state population lives in an EJ community, and vice versa for states like Maine or Virginia whose definition identifies fewer people living in an EJ community. Summaries of the exact definition and criteria used for each state are included in Table 4 in Appendix A.

2.2 Power plant proximity to EJ communities

To assess the impact of power plants on EJ communities, we conducted a geospatial analysis to analyze the locations of RGGI-regulated power plants in relation to EJ communities.[14] RGGI regulates 87 percent of the generating capacity of emitting power plants in the RGGI states. The remaining 13 percent of unregulated capacity comes from numerous smaller plants (typically less than 25 MW). These plants are not required to comply with RGGI emissions reductions. Of the units not regulated under RGGI, 86 percent are located near an EJ community. For the purposes of this analysis "emitting power generating units" are those currently subject to each state's version of the RGGI program, unless otherwise stated.

After conducting a literature review of distances used by states, the federal government, and in academic research, we identified three miles as a quantitative indicator of being "near" a power plant.[15,16] This is supported by recent work done by EPA that found air pollutant concentrations were highest between 0.6-0.7 miles from the power plant. The 3-mile radius is therefore very likely to capture

[14] A generating unit is a single generator. A power plant may be comprised of multiple generating units.

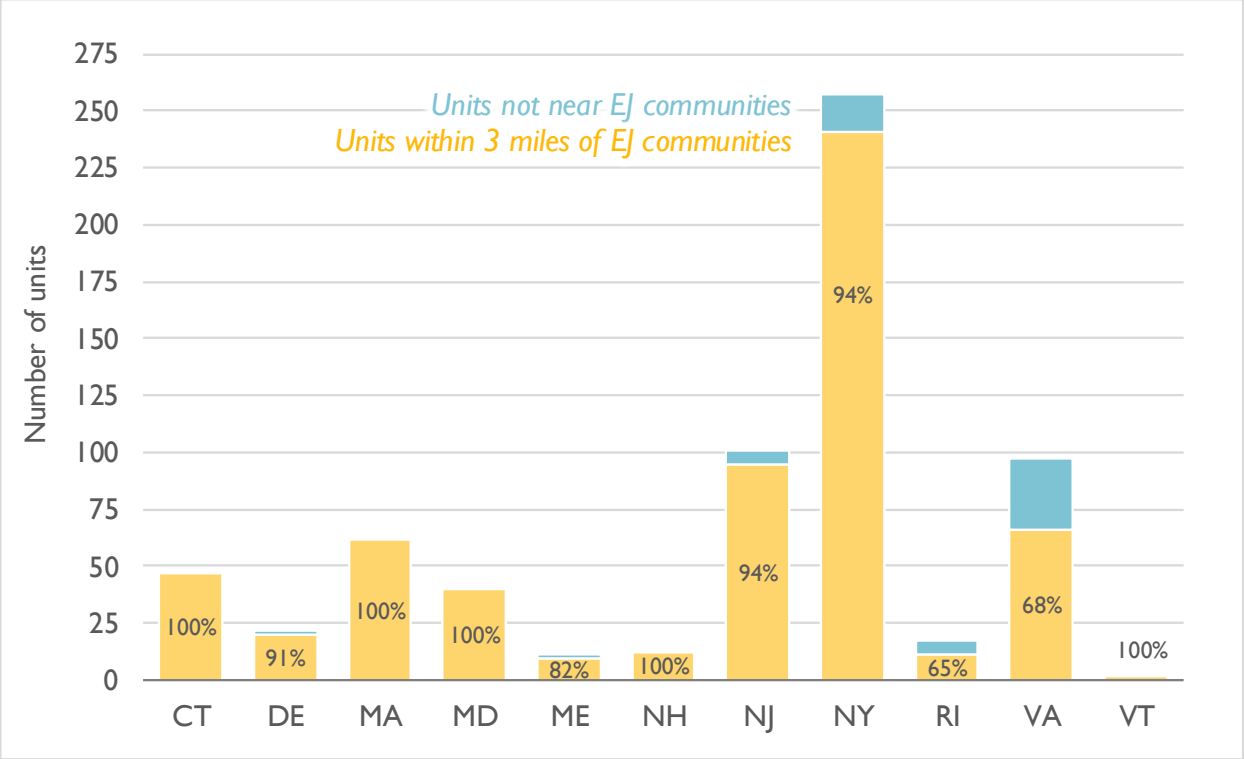
[15] United States Environmental Protection Agency (EPA). 2022. "Power Plants and Neighboring Communities (PPNC), 2020" Washington, DC: Office of Atmospheric Programs, Clean Air Markets Division. Available from EPA's PPNC web site: https://www.epa.gov/airmarkets/power-plants-and-neighboring-communities

[16] Chakraborty J., Maantay J.A., Brender J.D.. Disproportionate proximity to environmental health hazards: methods, models, and measurement. Am J Public Health. 2011 Dec;101 Suppl 1(Suppl 1):S27-36. doi: 10.2105/AJPH.2010.300109. Available at: https://pmc.ncbi.nlm.nih.gov/articles/PMC3222485/

communities that are experiencing the highest burden of pollution from power plants. A wider radius may have captured communities differently and led to different results.

Figure 3 shows the number of generating units regulated by RGGI by state and proximity to EJ communities. Overall, 91 percent of emitting power generating units are located within 3 miles of an EJ community. This represents 88 percent of the total capacity of emitting generating units in these states (81 GW). In Connecticut, Massachusetts, Maryland, New Hampshire and Vermont, all of the emitting units are located within 3 miles of an EJ community in that state. In other words, in all 11 states considered in our analysis, nearly all of the emitting power plants are located near an EJ community.

Figure 3. Emitting power generating units by state by proximity to EJ communities



Approximately half of the population in these eleven states is located within an EJ community (see Table 1). Across all these states, 30 percent of the people living in an EJ community (8.9 million people) are located within 3 miles of a power plant regulated under RGGI. In comparison, only 16 percent of the people not living in EJ communities (4.9 million people) are located within 3 miles of a regulated power plant. States with the highest percentage of residents that reside in EJ communities *and* live within 3-miles of a regulated unit are Connecticut, Delaware, and Rhode Island at 56 percent, 50 percent, and 50 percent of the total EJ community population, respectively. Maryland, New Hampshire, Maine and Virginia have a much lower percentage of people living in an EJ community and living within 3 miles of a regulated unit (5 to 8 percent). These state-specific results are dependent in part on how many power plants a state has and where they are located, as well as how broad or narrow the state's EJ community definition is. New Hampshire, Maine and Virginia are the states with the smallest share of the

population living in an EJ community, and the states with the smallest percent of EJ communities living near regulated power plants.

Table 1. Population by state, EJ community, and proximity to regulated power plants (in millions of people)

State	Population in state as a whole	Population in EJ communities	Population in EJ communities near regulated unit
Connecticut	3.6	1.6	0.9
Delaware	1.0	0.2	0.1
Maryland	6.1	5.4	0.3
Massachusetts	7.0	3.4	1.1
New Hampshire	1.4	0.3	0.02
New Jersey	9.2	5.1	1.6
New York	20.1	10.6	4.3
Rhode Island	1.1	0.4	0.2
Maine	1.4	0.2	0.02
Vermont	0.6	0.4	0.1
Virginia	8.6	1.7	0.1
Total all states	**60.1**	**29.5**	**8.9**

2.3 Demographic and environmental characteristics of EJ communities near power plants

We compared the characteristics of EJ populations living near a regulated power plant to the rest of each state's EJ populations, and to the overall state population using data from the U.S. Environmental Protection Agency's (EPA) Environmental Justice Screening and Mapping Tool (EJScreen). EJScreen is an online mapping tool that provides socioeconomic, demographic, and environmental data for the entirety of the United States at the Census block group level.[17] Indicators from EJScreen include environmental data such as air pollutant concentrations and demographic population characteristics such as the number of low-income households, unemployment rate, or population of color. As described by EPA, EJScreen's indicators are used to generally characterize a community's potential susceptibility to environmental harms.[18]

We matched the EJScreen block groups data to EJ communities in the RGGI states, and calculated demographic and environmental indicators statistics for EJ communities and EJ communities near regulated units. We found that on average, the EJ communities living within 3 miles of a RGGI power

[17] U.S. Environmental Protection Agency. "EJScreen: Environmental Justice Screening and Mapping Tool." Hosted by Open Environmental Data Project. Available at: https://screening-tools.com/epa-ejscreen Originally accessed at: https://www.epa.gov/ejscreen.

[18] U.S. Environmental Protection Agency. 2024. "EJScreen Technical Documentation, Version 2.3." Page 6. Hosted by Harvard Dataverse. Available at: https://dataverse.harvard.edu/file.xhtml?fileId=10775982&version=3.0 Originally accessed at: https://www.epa.gov/system/files/documents/2024-07/ejscreen-tech-doc-version-2-3.pdf

plant ranked higher for different indicators of vulnerability or exposure to environmental harms in comparison to communities not living near a RGGI power plant (see Table 2).

In comparison to the statewide average, EJ communities in all states have higher percentages of residents who are people of color, low-income, unemployed, English-limited, and have less than a high school education. When isolating further the EJ communities near RGGI power plants, nearly all demographic indicators increase by several percentage points (aside from unemployment). EJ communities located near RGGI power plants have a higher percentage of people that fall under an EJScreen socioeconomic indicator compared to other EJ communities or the state as a whole.

Table 2. Demographic indicators for EJ communities in 11 states analyzed

Demographic indicator	State average	EJ Communities average	EJ Communities near regulated power plant average	Definition
People of color	40%	60%	64%	All people other than non-Hispanic white-alone individuals
Low-income	24%	32%	36%	Household income less than 200% federal poverty level
Unemployment	6%	7%	7%	Population that did not have a job, made >1 specific active effort to find a job during the prior 4 weeks, and were available for work
Limited English-speaking households	2%	9%	12%	Household in which no one age 14+ speaks English "very well", as defined by the U.S. Census Bureau
Less than high school education	10%	15%	17%	People age 25+ whose education is short of a high school diploma

In addition, ambient air pollution in EJ communities near power plants is generally greater than in other communities, including other EJ communities (see Table 3). According to EJScreen data, the median PM2.5 concentration is 5 percent higher in EJ communities as compared to all block groups across the RGGI states, and 8 percent higher in EJ communities near regulated power plants. This holds true at the state level for most states, with the exception of Maryland, Massachusetts, Rhode Island and Maine, where EJ communities near a regulated power plant have a lower median $PM_{2.5}$ air concentration than EJ communities not near a regulated power plant. Given that Table 3 describes median values, there are communities in each category with $PM_{2.5}$ concentrations that exceed these values.

Table 3. Median annual average $PM_{2.5}$ concentrations from all sources in eleven analyzed states ($\mu g/m^3$)

State	State average	EJ Communities average	EJ Communities near regulated power plants average
Connecticut	7.43	7.45	7.58
Delaware	7.70	8.11	8.28
Maryland	7.93	7.95	7.67
Massachusetts	6.73	6.87	7.11
New Hampshire	5.10	5.14	5.27
New Jersey	8.08	8.48	8.57
New York	7.87	8.23	8.53
Rhode Island	6.15	6.38	6.31
Maine	5.47	4.90	4.59
Vermont	5.62	5.72	6.19
Virginia	7.42	7.51	7.64
Median across all states	**7.51**	**7.89**	**8.07**

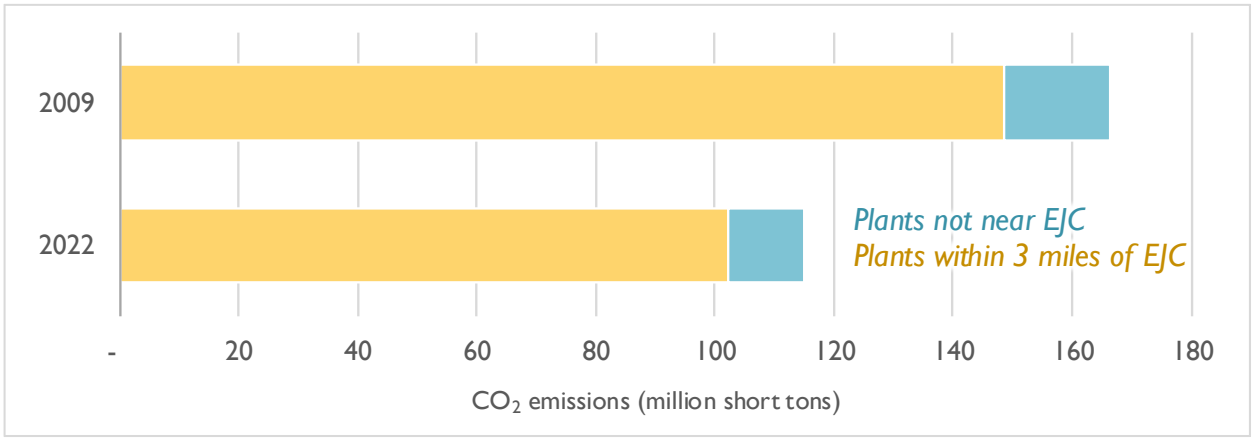
Note: $PM_{2.5}$ concentrations are affected by emissions from numerous sources including vehicles and wildfires, as well as emissions from power plants. The values in this table do not distinguish between sources of $PM_{2.5}$.

2.4 Historical power plant impacts on EJ Communities

To better understand the historical changes in emissions from power plants near EJ communities, we compared emissions data in 2009 (the beginning of the RGGI program) with 2022, the most recent year with full emissions data available.[19]

Figure 4 and Figure 5 show the change in power plant emissions of CO_2, NO_X and SO_2 in the RGGI region in 2009 with those in 2022, by proximity to EJ communities.[20] CO_2 and SO_2 emissions produced at power plants near EJ communities decreased more than emissions from power plants not located near EJ communities. CO_2 emissions decreased by 31 percent for plants located within 3 miles of an EJ community, and by 27 percent for plants not located within an EJ community. Overall, the total share of CO_2 emissions from EJ plants stayed the same between 2009 and 2022, even as total emissions decreased by 31 percent. Conversely, NO_X emissions decreased by 57 percent for plants located near EJ communities and 69 percents for plants not near an EJ community.

Figure 4. CO_2 emissions in 11-state region (million short tons)

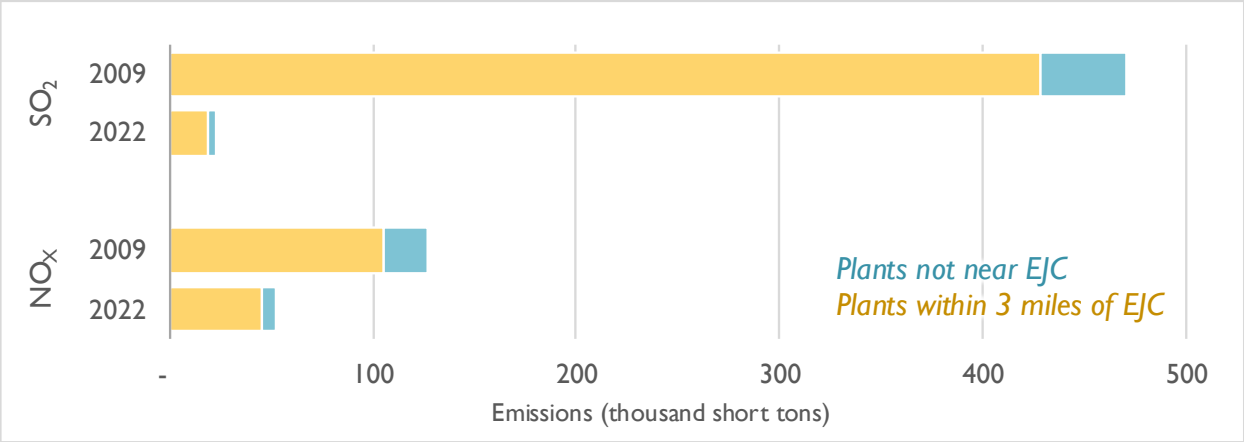


Note: This figure includes emissions from all power plants in the region, including plants regulated by RGGI and plants not regulated under RGGI.

[19] United States Environmental Protection Agency. "Emissions & Generation Resource Integrated Database (eGRID)." Historical data available at: https://www.epa.gov/egrid/historical-egrid-data

[20] Note: Because most states only adopted EJ community definitions in recent years, we used the current EJ communities at the time of this analysis to determine which plants are located near EJ communities in both 2009 and 2022, which does not account for any changes in population demographics between 2022 and 2009.

Figure 5. NO_X and SO_2 emissions in 11-state region (thousand short tons)



Note: This figure includes emissions from all power plants in the region, including plants regulated by RGGI and plants not regulated under RGGI.

These reductions in power plant emissions are primarily due to the changing mix of the resources providing electricity to the eleven states, which has evolved from 2009 to 2022. For example, in 2009, 15 percent of generation capacity in this region came from coal plants, which has historically been the primary source of SO_2 pollution. In 2022, only 6 percent of generating capacity in this region was from coal, and the share of total gas and renewable energy capacity has increased. While RGGI has likely been a contributing factor to the decline of coal generation and the increases in generation by lower or zero-emitting resources, these changes are also attributable to stricter federal-and state-level environmental regulations, declining costs of clean energy and natural gas, and other federal and state policies in addition to RGGI (such as clean energy portfolio standards). While power plant emissions have shown a decline between 2009 and 2022, the net emissions reductions indicate little about the spatial impact of these emissions. EJ communities continue to have higher exposure and face disproportionate impacts from these remaining emissions.

Notably, CO_2 emission reductions from RGGI-regulated power plants may be offset to a degree via "leakage." Because the RGGI program does not include power plants in nearby non-RGGI states, nor does it include many small power plants in the RGGI states, as RGGI becomes more stringent over time, non-RGGI and smaller power plants may increase their generation and associated emissions. Without regulating those smaller units, if RGGI becomes more stringent for plants currently in the program, the smaller units outside the program (which are frequently dirtier units located near EJ communities) would increase their generation and associated emissions. While the CO_2 emissions from these non-regulated power plants are small compared to the regional total, these units are often the dirtiest plants in terms of pollutants that affect air quality, especially in EJ communities.

Analysis of historical data shows that while emissions have been declining in the eleven states of interest (including emissions from power plants near EJ communities), most new emitting power plants continue to be built near EJ communities. Figure 6 shows the number of emitting generating units added and retired between 2009 and 2022 in each state. In total, 461 units were retired, of which 92 percent were located near an EJ community. Meanwhile, 764 units were added region-wide, of which 90 percent

were added near EJ communities. As illustrated by these plant additions, RGGI has not necessarily discouraged the construction of new emitters in EJ communities.

At least one state has begun to address the burden of pollution in historically overburdened communities. An environmental justice law passed in New Jersey in 2023 has begun to require cumulative impact assessments for certain types of facilities seeking air, water, and waste. Under this law, an application for a new pollution permit will be denied if the proposed facility would contribute to certain environmental or health stressors that are higher, or contribute to making these stressors higher, in the community that would host the facility than in other communities

. The process also requires proponents to submit an environmental justice impact statement and engage in meaningful public participation.[21]

Figure 6. Additions and retirements of emitting generating units in RGGI region between 2009 and 2022, by state and proximity to EJ communities

[21] "Environmental Justice Law." New Jersey Department of Environmental Protection (2023). Available at: https://dep.nj.gov/wp-content/uploads/rules/rules/njac7_1c.pdf

3. CONCLUSIONS

Our analysis assessed the impacts of power plants on EJ communities in the RGGI region. We find that:

- An overwhelming 91 percent of units currently regulated under RGGI are located within 3 miles of an EJ community, impacting 8.9 million people across 11 states in the northeast and Mid-Atlantic. We find that 30 percent of EJ communities in RGGI states are located within 3 miles of a regulated power plant.
- These disparities have existed and continue to exist to the detriment of EJ communities. Between 2009 (the start of the RGGI program) and 2022, 90 percent of new emitting power plant units were built near EJ communities. These communities continue to bear the brunt of new and existing power grid infrastructure and their associated externalities, including exposure to pollution like particulate matter, nitrogen oxides, and sulfur dioxide.
- EJ communities near these power plants are disproportionately affected by ambient air pollution, even when compared to other EJ communities. We find that EJ communities near regulated power plants experience higher levels of ambient particulate matter compared to non-EJ communities.

Our analysis shows that overall emissions of greenhouse gases and other air pollutants have decreased since 2009, the start of the RGGI program. However, disparities in exposure to power plant pollution persist to this day. This underscores long-standing concerns voiced by environmental justice communities and indicates that additional action is necessary to reduce emissions and address disproportionate pollution burdens in EJ communities.

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APPENDIX A. DEFINITIONS OF ENVIRONMENTAL JUSTICE COMMUNITIES

Most RGGI states define EJ populations using a similar set of indicators. These include low-income status, racial makeup, and English language proficiency. Income status is defined in relation to either the Federal Poverty Level or annual median household income. States use a threshold between 25 percent-50 percent to define populations that are minority-identifying and a threshold between 15-40 percent to define populations that have limited English proficiency.

We also surveyed nationally available definitions for EJ populations. The White House Council on Environmental Quality has developed the Climate and Economic Justice Screening Tool (CEJST), which includes 33 socioeconomic, demographic, and environmental burdens indicators to identify disadvantaged census tracts.[22] The U.S. Environmental Protection Agency (US EPA) produces EJScreen which shows 13 environmental, 7 socioeconomic, and 5 demographic indicators by block group and calculates percentile rankings for each block group in comparison to state or national averages. For the purposes of Inflation Reduction Act (IRA) funding and programs, the US EPA defined Disadvantaged Communities at a federal level. This definition combines the disadvantaged community definition from the CEJST tool and census tracts that rank greater than the 90th percentile for certain demographic indicators from EJScreen. New Hampshire and Delaware lack a state-approved EJ definition, so we chose the IRA Disadvantaged Communities definition since it combines features from both EJScreen and CEJST.

One state—New York—has two different, overlapping definitions. Both are used to identify EJ communities for the purposes of this analysis.

Table 4 summarizes the specific environmental justice definitions used for each state.

Table 4. Environmental justice community definitions used in RGGI states

State	Term for EJ Community	Definition
CT	Environmental Justice Community	A United States census block group, as determined in accordance with the most recent United States census, for which thirty per cent or more of the population consists of low income persons who are not institutionalized and have an income below two hundred per cent of the federal poverty level; [,] or (B) a distressed municipality, as defined in subsection (b) of section 10 32-9p [23]

[22] At the time of this report the White House no longer publishes CEJST. An archived version of the tool is hosted by the Public Environmental Data Project, available at: https://screening-tools.com/climate-economic-justice-screening-tool

[23] State of Connecticut General Assembly. Bill No. 7008. September 2020 Special Session. *An Act Concerning Enhancements to the State's Environmental Justice Law*. Available at https://www.cga.ct.gov/2020/TOB/H/PDF/2020HB-07008-R00-HB.PDF

State	Term for EJ Community	Definition
DE	Disadvantaged Community - IRA	Any census tract that is included as disadvantaged in the Climate and Economic Justice Screening Tool (CEJST), any census block group at or above the 90th percentile for any of EJScreen's Supplemental Indexes when compared to the nation or state, and/or any of the following geographic areas within the Tribal lands category in EJScreen: Alaska Native Allotments, Alaska Native Villages, American Indian Reservations, American Indian Off-reservation Trust Lands, Oklahoma Tribal Statistical Areas.[24]
MA	Environmental Justice Community	(A) a neighborhood (i.e., census block group) that meets 1 or more of the following criteria: (i) the annual median household income is not more than 65 per cent of the statewide annual median household income; (ii) minorities comprise 40 per cent or more of the population; (iii) 25 per cent or more of households lack English language proficiency; or (iv) minorities comprise 25 per cent or more of the population and the annual median household income of the municipality in which the neighborhood is located does not exceed 150 per cent of the statewide annual median household income; or (B) a geographic portion of a neighborhood designated by the Secretary as an environmental justice population in accordance with law.[25]
MD	Underserved Communities	Any census tract in which, according to the most recent U.S. Census Bureau survey: at least 25% of the residents qualify as low-income; at least 50% of the resident identify as nonwhite; or at least 15% of the residents have limited English proficiency.[26]
ME	Environmental Justice Population	A census tract that meets one or more of the following criteria: the annual median household income in the census tract is not more than 65% of the statewide annual median household income; minority populations comprise 40% or more of the population in the census tract; 25% or more of the households in the census tract lack English language proficiency; or minority populations comprise 25% or more of the population in the census tract and the annual median household income in the census tract is not more than 150% of the statewide annual median household income.[27]
NY	Potential Environmental Justice Areas	U.S. Census block groups of 250 to 500 households each that, in the Census, had populations that met or exceeded at least one of the following statistical thresholds: 1. At least 52.42% of the population in an urban area reported themselves to be members of minority groups; or 2. At least 26.28% of the population in a rural area reported themselves to be members of minority

[24] U.S. EPA (2024). *Inflation Reduction Act Disadvantaged Communities Map*. Available at https://www.epa.gov/environmentaljustice/inflation-reduction-act-disadvantaged-communities-map

[25] Massachusetts Senate and House of Representatives in General Court. Bill S.29995. 192nd General Court (2021-2022). An Act creating a next-generation roadmap for Massachusetts climate policy. Available at https://malegislature.gov/bills/192/S9

[26] Maryland General Assembly. Bill 1200/SB0528. (2022). An Act concerning Environment - Permit Applications – Environmental Justice Screening. Available at https://mgaleg.maryland.gov/mgawebsite/Legislation/Details/hb1200?ys=2022rs

[27] Maine General Assembly. Legislative document No. 1682/H.P. 1251. 130th Maine Legislature. An Act To Require Consideration of Climate and Equity Impacts by the Public Utilities Commission. Available at https://legislature.maine.gov/legis/bills/getPDF.asp?paper=HP1251&item=1&snum=130#:~:text=Frontline%20communities.,greater%20degree%20than%20other%20communities

State	Term for EJ Community	Definition
		groups; or 3. At least 22.82% of the population in an urban or rural area had household incomes below the federal poverty level.[28]
NY	Disadvantaged Communities	Each census tract is scored based on relative burden, risk, vulnerability, or sensitivity. Specifically, the percentile ranks of the indicators for each census tract are combined to produce a value that measures a census tract's relative level of "Environmental Burdens and Climate Change Risks," as well as "Population Characteristics and Health Vulnerabilities" relative to other tracts. Tracts with higher scores relative to (a) other tracts statewide; or (b) their region (New York City or Rest of State) were identified as DACs. Based on this combined score, the top 35% of the census tracts are considered DACs. Additionally, 19 tracts that contain federally designated reservation territory or State-recognized Nation-owned land are automatically included as DACs—regardless of percentile ranking on these indicators.[29]
NJ	Overburdened Community	Census block groups in which, according to the most recent US Census: 1) At least 35 percent of the households qualify as low-income households (at or below twice the poverty threshold as determined by the United States Census Bureau); or 2) At least 40 percent of the residents identify as minority or as members of a State recognized tribal community; or 3) At least 40 percent of the households have limited English proficiency (without an adult that speaks English "very well" according to the United States Census Bureau).
NH	Disadvantaged Community - IRA	Any census tract that is included as disadvantaged in the Climate and Economic Justice Screening Tool (CEJST), any census block group at or above the 90th percentile for any of EJScreen's Supplemental Indexes when compared to the nation or state, and/or any of the following geographic areas within the Tribal lands category in EJScreen: Alaska Native Allotments, Alaska Native Villages, American Indian Reservations, American Indian Off-reservation Trust Lands, Oklahoma Tribal Statistical Areas.[30]
RI	Environmental Justice Focus Area	A census tract that meets one or more of the following criteria: 1. Annual median household income is not more than sixty-five percent (65%) of the statewide annual median household income; 2. Minority population is equal to or greater than forty percent (40%) of the population; 3. Twenty-five percent (25%) or more of the households lack English language proficiency; or 4. Minorities comprise twenty-five percent (25%) or more of the population and the annual median household income of the municipality in

[28] New York State Department of Environmental Conservation. March 2003. *DEC Policy on Environmental Justice and Permitting issued by Erin M. Crotty*. Available at https://dec.ny.gov/regulatory/guidance-and-policy-documents/commissioner-policy-29-environmental-justice-and-permitting

[29] New York Senate Assembly. Bill S6599. 2019-2020 Regular Sessions. *AN ACT to amend the environmental conservation law, the public service law, the public authorities law, the labor law and the community risk and resiliency act, in relation to establishing the New York state climate leadership and community protection act*. Available at https://www.nysenate.gov/legislation/bills/2019/S6599

[30] Environmental Protection Network. "Resources to Help Identify Disadvantaged Communities." 2024. Available at: https://www.environmentalprotectionnetwork.org/wp-content/uploads/2024/03/EJ-Screen-Overview.pdf

State	Term for EJ Community	Definition
		the proposed area does not exceed one hundred fifty percent (150%) of the statewide annual median household income.[31]
VT	Environmental Justice Focus Population	Any census block group in which: (A) the annual median household income is not more than 80 percent of the State median household income; (B) Persons of Color and Indigenous Peoples comprise at least six percent or more of the population; or (C) at least one percent or more of households have limited English proficiency." Limited English proficiency" means that a household does not have a member 14 years or older who speaks English "very well" as defined by the U.S. Census Bureau.[32]
VA	Environmental Justice Community	Census block groups in which 30 percent or more of the population is composed of people having an annual household income equal to or less than the greater of (i) an amount equal to 80 percent of the median income of the area in which the household is located, as reported by the Department of Housing and Urban Development, and (ii) 200 percent of the Federal Poverty Level or any geographically distinct area where the population of color, expressed as a percentage of the total population of such area, is higher than the population of color in the Commonwealth expressed as a percentage of the total population of the Commonwealth (37.8% 2014-2018 ACS). In addition to these statutorily defined environmental justice communities, there may be communities or partial communities with a unique historical importance, population of color or other characteristics which are not identified by traditional screening or mapping tools. These areas will be evaluated on a case-by-case basis by the OEJ and included in the meaningful involvement and fair treatment process as appropriate.[33]

[31] Rhode Island Department of Environmental Management (Sept 2023). *DEM Environmental Justice Policy*. Available at https://dem.ri.gov/sites/g/files/xkgbur861/files/2023-09/ridem-environmental-justice-policy_0.pdf

[32] General Assembly of the State of Vermont. S. 148. Session 148 - 2022. *An Act relating to environmental justice in Vermont*. Available at https://legislature.vermont.gov/bill/status/2022/S.148

[33] Virginia Department of Environmental Quality (2023). *Guidance Memo No. 23-XXXX – Environmental Justice in the Permitting Process*. Available at https://www.deq.virginia.gov/home/showpublisheddocument/17431/638144773847470000

APPENDIX B. STATE-SPECIFIC MAPS

Figures on the following pages identify the EJ communities used in this analysis, which are created based on the state-specific (or federal) definitions described in Appendix A. These EJ communities are shown in blue and orange, if within 3 miles of a power plant unit regulated under RGGI. EJ community locations are based on the most recent definitions and data at the time of this analysis in late 2024 (See Appendix A). These maps also identify the power plants as of 2022 currently regulated under RGGI (square symbols) and the power plants that are not currently regulated under RGGI but emit CO_2 and other air pollutants. These tend to be power plants that are smaller than 25 MW in size. Locations where a square and a circle overlap indicate one or more co-located units that are not currently regulated under RGGI.

Figure 7. EJ communities and RGGI power plants, focused on Maine, New Hampshire, and Vermont

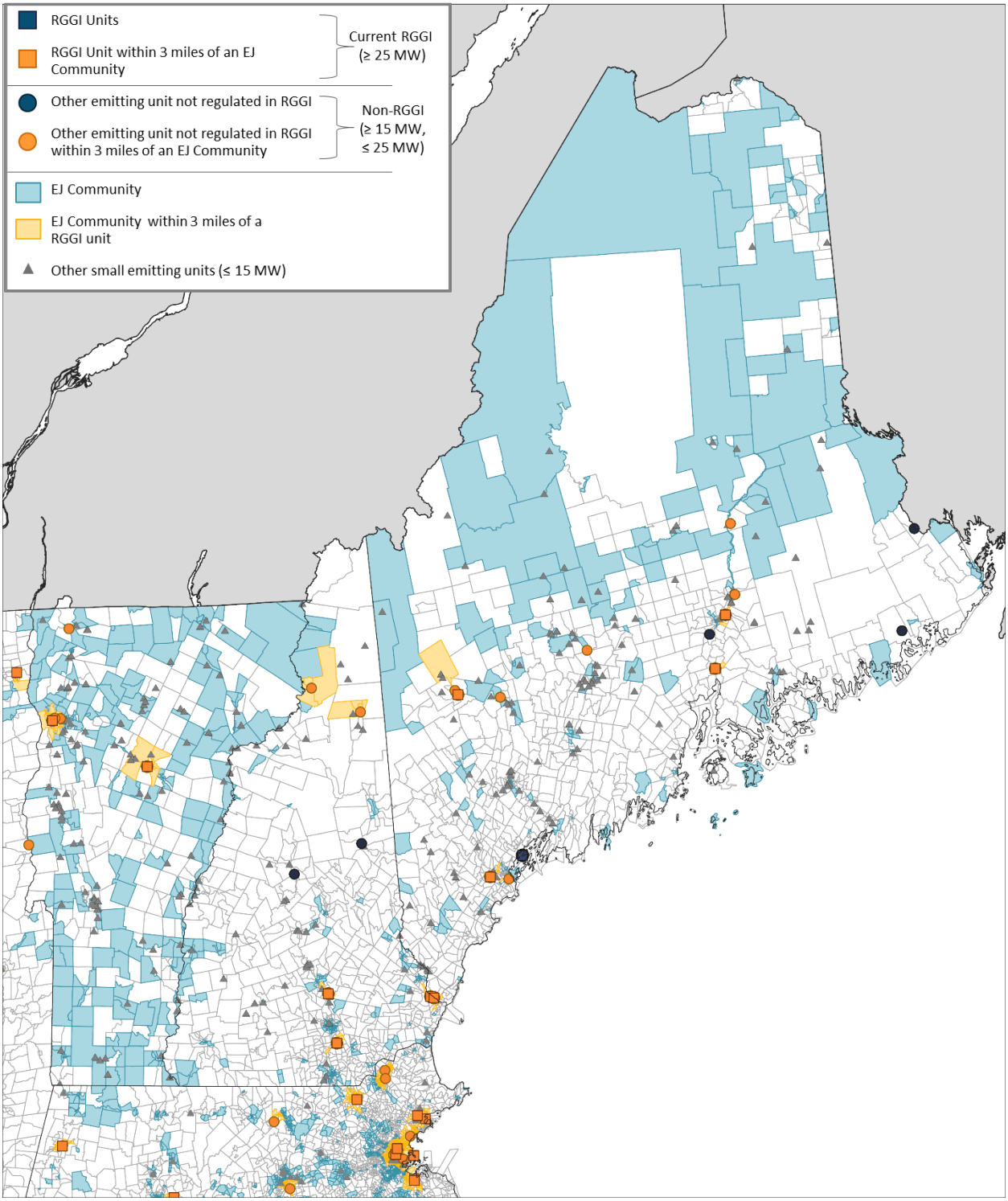

Figure 8. EJ communities and RGGI power plants, focused on Massachusetts, Connecticut, and Rhode Island

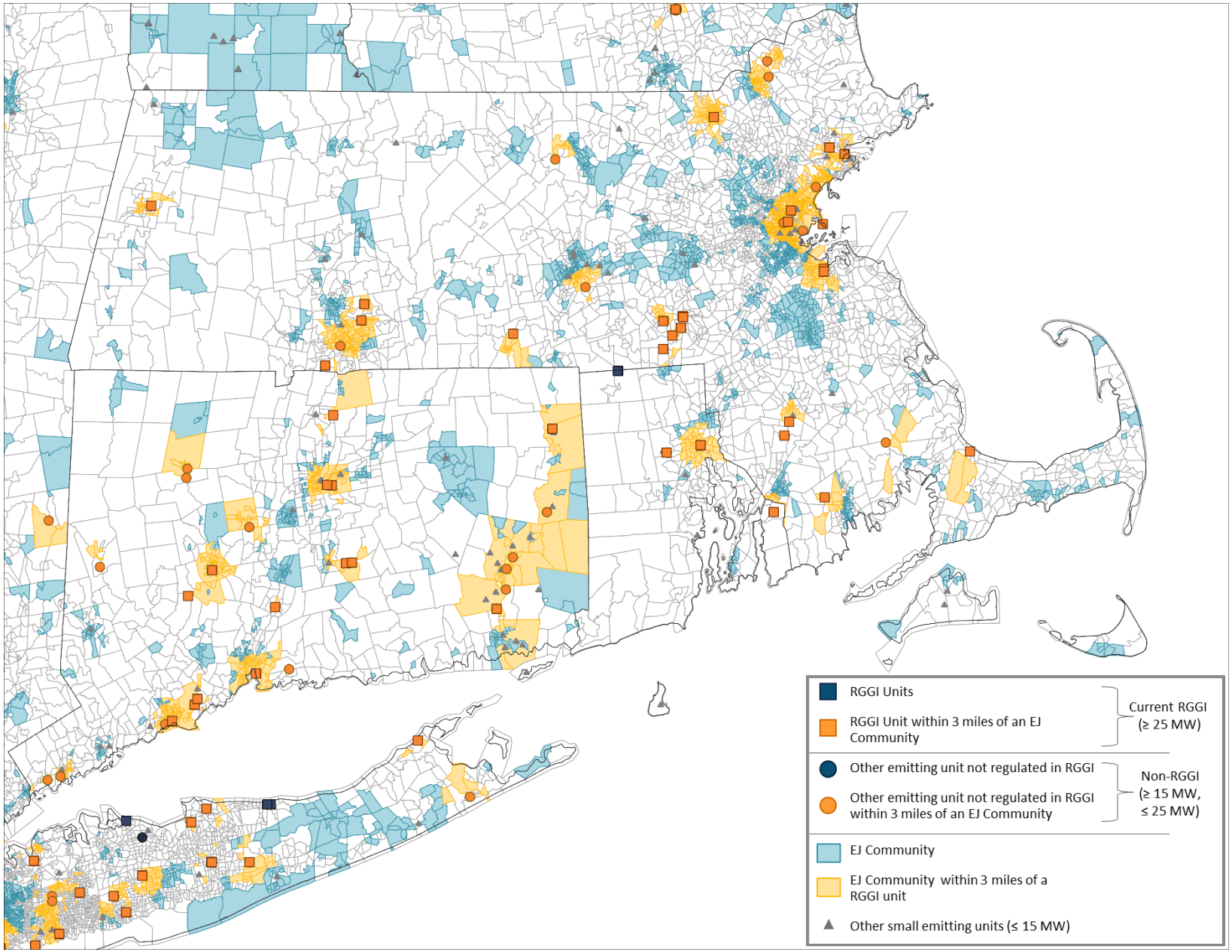

Figure 9. EJ communities and RGGI power plants focused on New York

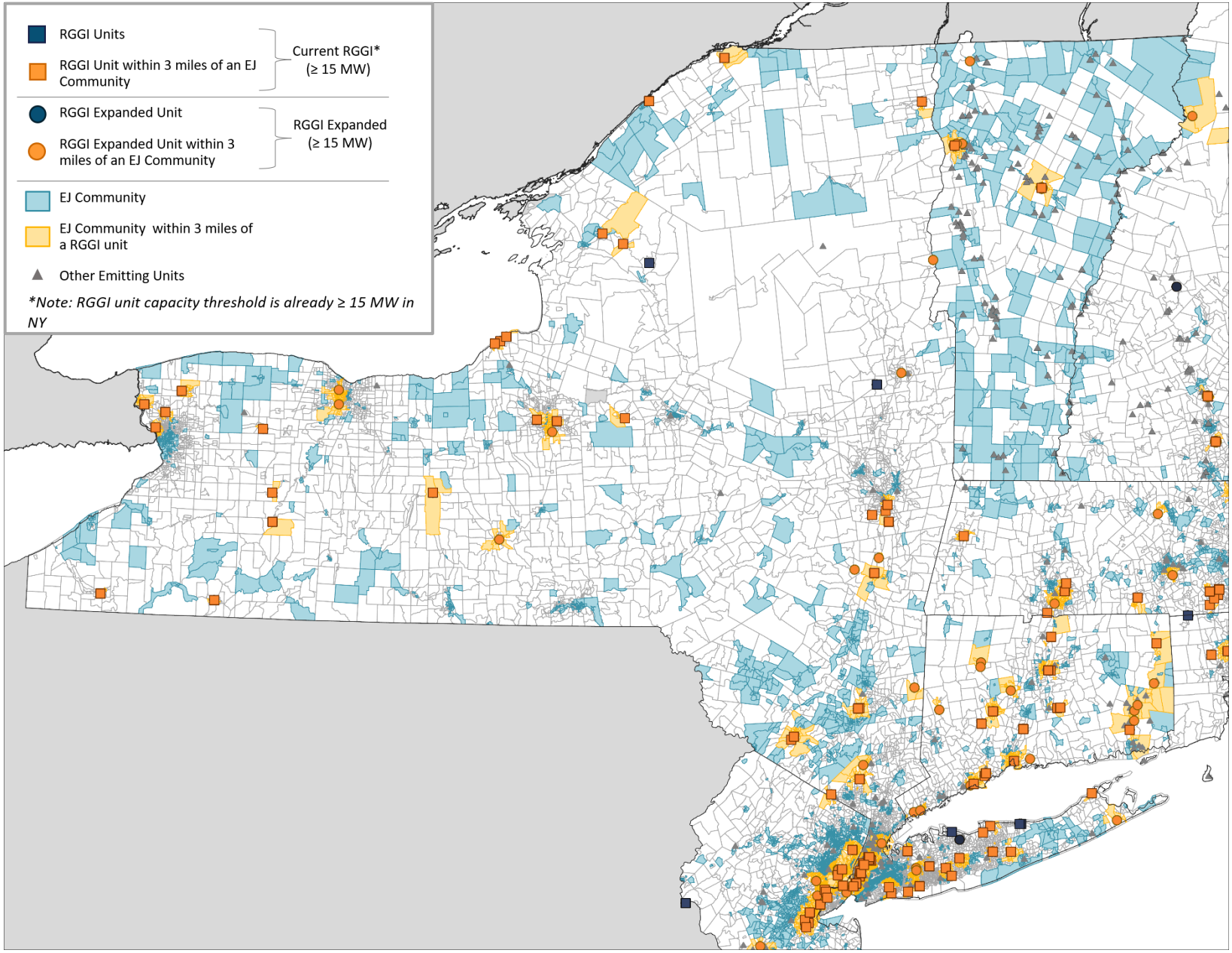

Figure 18. EJ Communities and RGGI power plants focused on New Jersey (left) and the New York City metro area (right)

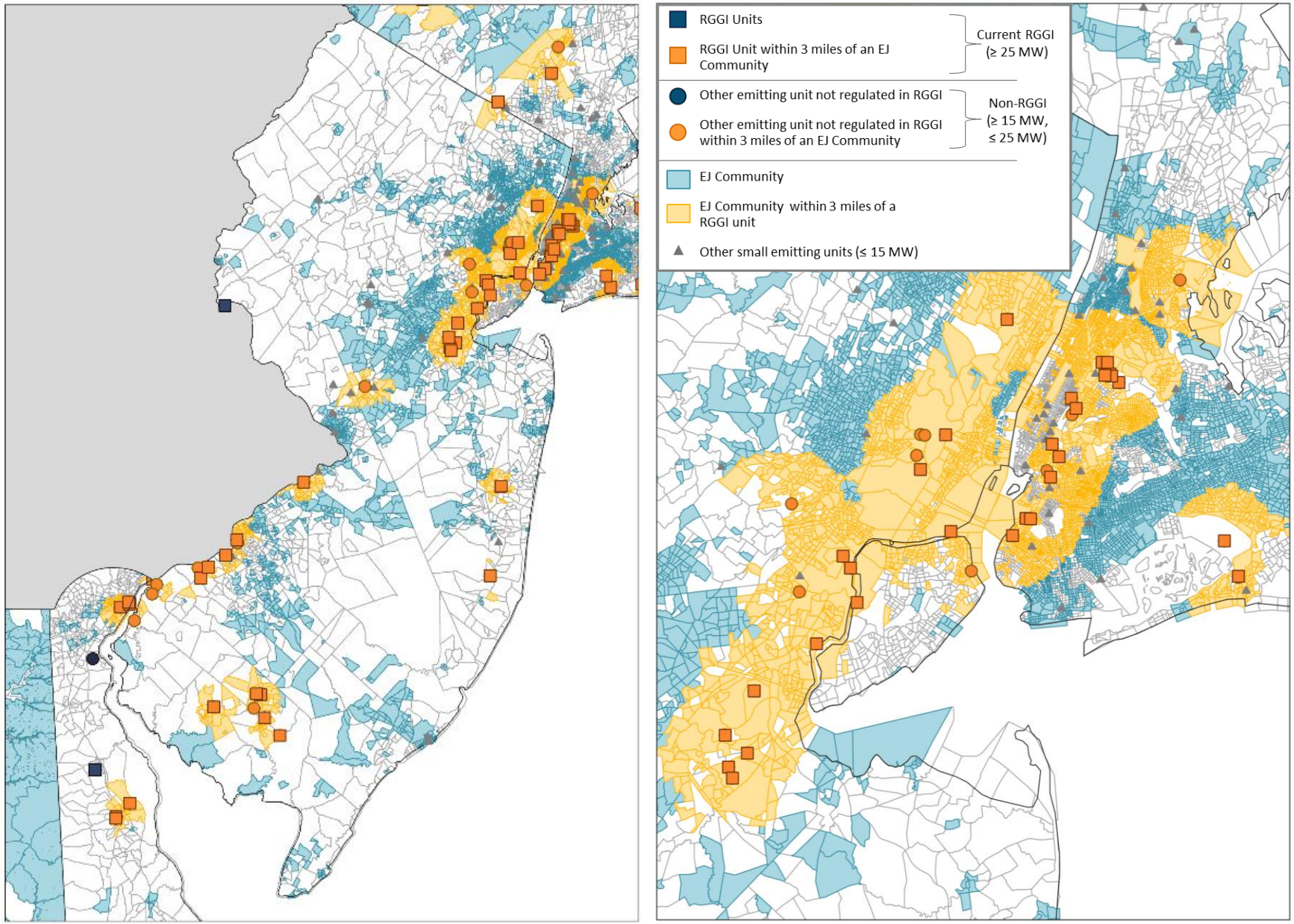

Figure 11. EJ communities and RGGI power plants, focused on Virginia, Delaware, and Maryland