RESOURCES for the FUTURE

Electric Sector Highlights from Three Reports About Prioritizing Justice in New York State Climate Policy

RFF: Alan Krupnick, Molly Robertson, Wesley Look

NYC-EJA: Eddie Bautista, Victoria Sanders, Eunice Ko

Modeling Team: Daniel Shawhan (RFF), Joshua Linn (RFF), Miguel Jaller (University of California, Davis), Narasimha Rao (Yale University), Miguel Poblete Cazenave (Yale University), Yang Zhang (Northeastern University), Kai Chen (Yale University), and Pin Wang (Yale University).

Presented by Daniel Shawhan

At NYISO EAC meeting June 2024

Overview: 3 Recent Reports About NYS Options for Energy Emissions Reductions Under the CLCPA

1. Two Policy Packages for Implementing the CLCPA, one more responsive to the recommendations of EJ advocates than the other. Electric, residential, and vehicle sectors.

2. Different potential implementations of cap-trade-and-invest.

3. What are effects of including power sector in cap-trade-and-invest program, and what are effects of facility-specific emission caps on power plants?

Report 1

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Prioritizing Justice in New York State Climate Policy: Cleaner Air for Disadvantaged Communities?

Alan Krupnick, Molly Robertson, Wesley Look, Eddie Bautista, Victoria Sanders, Eunice Ko, Dan Shawhan, Joshua Linn, Miguel Jaller, Narasimha Rao, Miguel Poblete Cazenave, Yang Zhang, Kai Chen, and Pin Wang

Policy Case Summaries

CAC- Inspired case

- Carbon cap to meet targets
- LCFS in transport
- CCUS permitted
- Means-tested heat pump subsidy

EJ Stakeholder Case

- CCIA carbon + co-pollutant fee
- New fossil fuel generation ban
- Full cost heat-pump subsidy for low-income homes
- Residential fossil fuel phase out

Both Cases

70% CES, ZEV Mandate, Stretch Building Codes, Shell Upgrades

Research Overview

This Presentation

Build BAU and Policy Cases

Consult the State's draft scoping plan, local policy experts, and climate justice advocates to build different policy cases

→

Model Emissions Outcomes

Model emissions in transportation, residential, and electric power sectors

→

Model Air Quality Changes

Pass emissions projections to air quality modeling team for estimates of fine particulate matter at the 4 km^2 scale

→

Evaluate Impact on Disadvantaged Communities

Map air quality changes to census tracts and analyze effects on DACs and non-DACs

Scope and Limitations

What it does…

- Leverages behavioral modeling
- Uses location-specific emissions changes to inform air quality changes
- Uses advanced air quality modeling to estimate $PM_{2.5}$ concentration changes

What it doesn't…

- Does not cover the entire economy
- Does not evaluate macroeconomic/labor impacts
- Does not analyze impacts of individual policies
- Not for years other than 2030

Policies that are same in both cases, by 2030

Electricity sector	CAC-Inspired ("CPC")	EJ Stakeholder-Inspired ("SPC")	
Clean energy standard	70% of electricity must come from clean energy sources, as defined in CLCPA.	Same as CPC.	—
Distributed solar target	Mandates 10 GW solar installed by 2025.	Same as CPC.	—
Battery storage target	Mandates 3 GW battery storage installed by 2030.	Same as CPC.	—
Offshore wind target	Mandates 9 GW offshore wind installed by 2035.	Same as CPC.	—
Transmission investment	Two new DC lines will be built in New York: Clean Path and Champlain Hudson Power Express.	Same as CPC.	—
Demand response policy, flexible demand, distributed energy resource subsidy[5]	Shift 6% of peak electricity to off-peak times based on New York integration analysis flexible load assumptions in 2030 (developed by E3 Consulting).	Same as CPC.	—

Combustion policies that differ between cases, by 2030

	CAC-Inspired (“CPC”)	EJ Stakeholder-Inspired (“SPC”)	EJ Stakeholder Rationale
Peaker plant policy[6]	Shut down fossil fuel peaker plants in line with stated policy, enforcing NYC NO_x rule and Pollution Justice Act of 2022 (Brisport’s S4378B).	All NYS fossil fuel peaker plants close by 2030.	Peaker plants disproportionately contribute to air pollution in disadvantaged communities.
New combustion fuels, CCUS	Allow biofuels, natural gas, hydrogen, and CCUS if economical after other abatement policies are in place.	Ban use of new natural gas and CCUS in power sector by 2025.	SPC reflects more ambitious transition away from polluting generators, does not support investment in technologies that may prolong fossil fuel use (deemed as “false solutions”).
Carbon regulation[2]	An economy-wide carbon fee is established to achieve emissions reductions across sectors we are analyzing. Fee is $25/ton in 2030.[3] Fee was determined iteratively with our models to meet state’s target after other policies were in place, similarly to how carbon cap would be modeled.	Carbon fee introduced in 2023 at $55/ton, increases 5% annually to $77/ton in 2030. Copollutant prices ($2017): NO_x: $9,025/short ton SO_2: $36,382/short ton $PM_{2.5}$: $231,965/short ton	SPC carbon-pricing scheme reflects ambition of CCIA polluter fee. It prices copollutants based on social marginal cost in addition to CO_2. This could also be achieved with an economy-wide cap on pollutants.

Nuclear policies that differ between cases, by 2030

	CAC-Inspired ("CPC")	EJ Stakeholder-Inspired ("SPC")	EJ Stakeholder Rationale
Nuclear subsidies[4]	Extend ZECs for nuclear until after 2030; extend nuclear licenses to 80 years.	End ZECs for nuclear in 2029 when they are set to expire; do not extend nuclear licenses; no new generating units to be developed in NYS.	SPC reflects lack of consensus on how supporting nuclear affects electricity costs and trade-offs with supporting other technologies.
Nuclear subsidies[4]	Extend ZECs for nuclear until after 2030; extend nuclear licenses to 80 years.	End ZECs for nuclear in 2029 when they are set to expire; do not extend nuclear licenses; no new generating units to be developed in NYS.	SPC reflects lack of consensus on how supporting nuclear affects electricity costs and trade-offs with supporting other technologies.

Table H1. New York State Electricity Consumption and Wholesale Prices

	BAU 2030	CPC 2030	SPC 2030
Electricity demand	155 million MWh	182 million MWh	200 million MWh
Electricity price	$98/MWh	$107/MWh	$116/MWh
Share of demand met in-state	89%	96%	96%

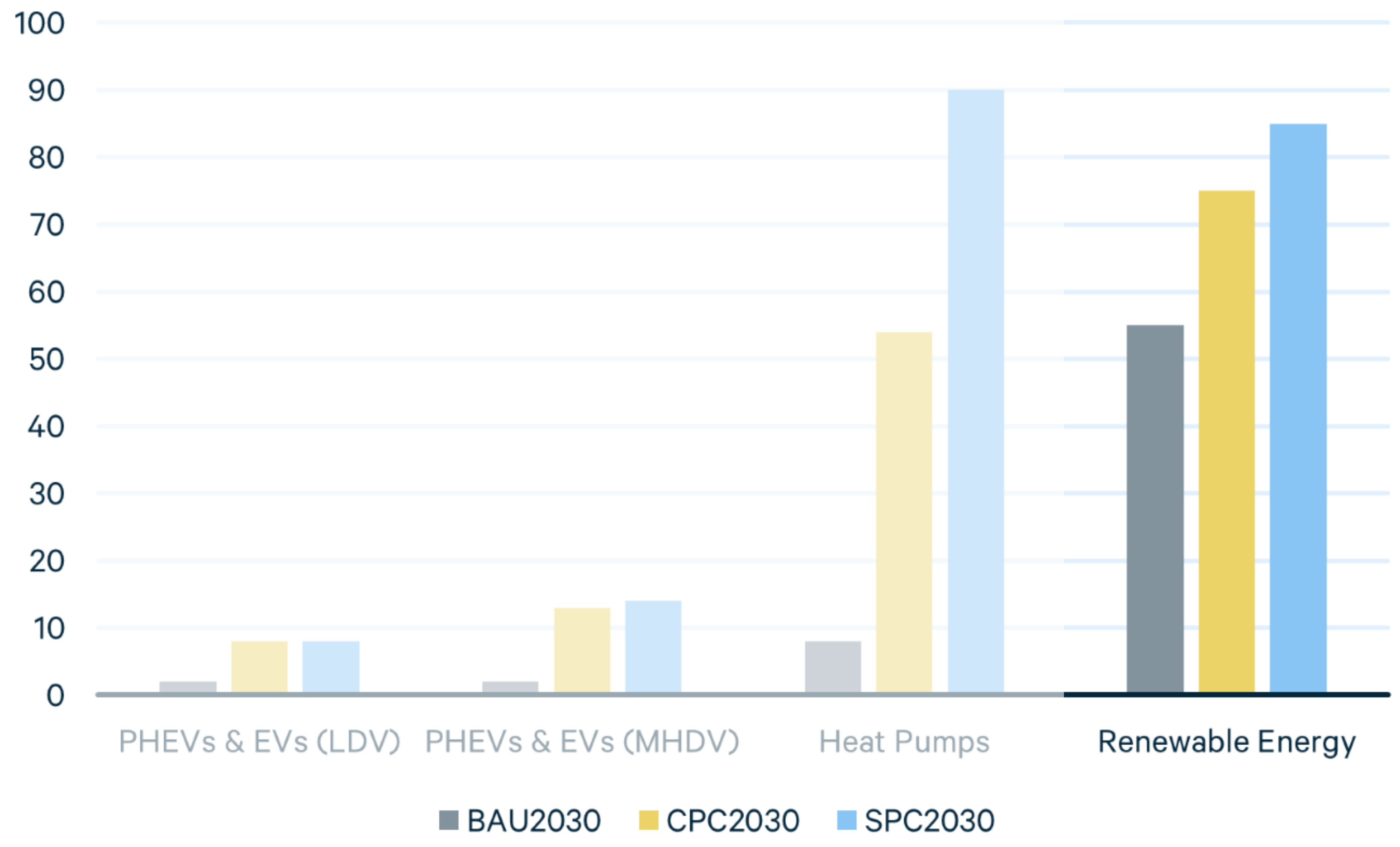
Table H2. New York State Generation Mix (MWh and Percentage)

Generation Source	BAU 2030	Percentage	CPC 2030	Percentage	SPC 2030	Percentage
Total generation	138,471,392	100%	174,251,411	100%	191,065,047	100%
Nuclear	17,302,119	12%	27,069,379	16%	17,302,118	9%
Coal	—	0%	—	0%	—	0%
Natural gas	40,975,962	30%	14,589,190	8%	10,571,238	6%
With CCUS	—	0%	10	0.00%	—	0%
Solar	33,708,907	24%	73,055,753	42%	94,337,759	49%
Distributed solar	3,600,547	3%	19,808,517	11%	19,593,577	10%
Wind	15,578,218	11%	29,129,736	17%	40,257,449	21%
Hydro	27,870,324	20%	27,863,663	16%	27,849,494	15%
Geothermal	—	0%	—	0%	—	0%
Storage	–68,199	–0.05%	–518,083	–0.30%	–1,511,674	–1%

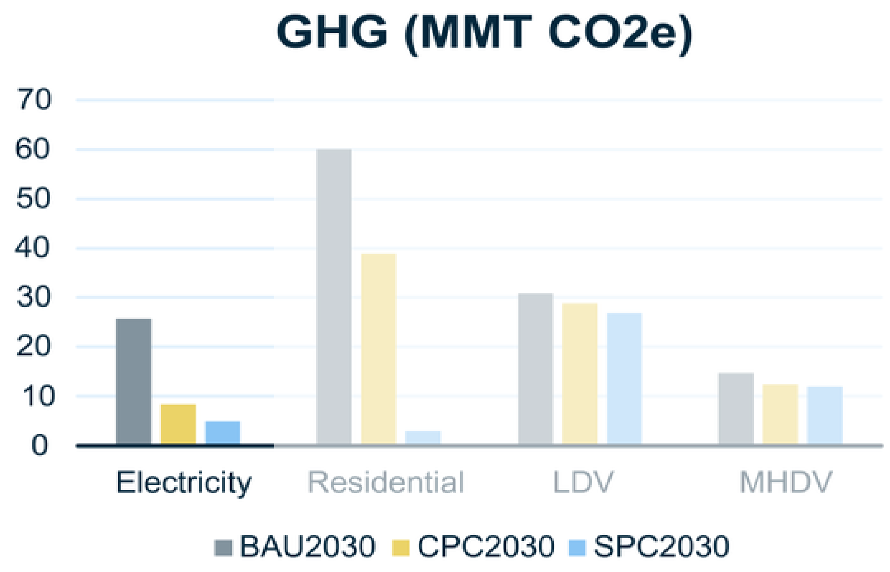
Table I1. New York Emissions Estimates, 2030, by Case and Sector

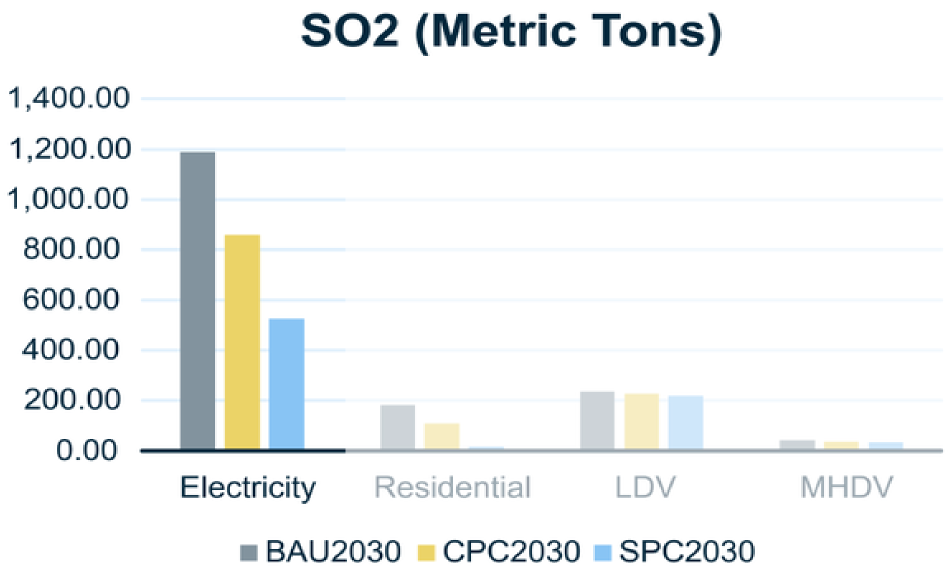
		BAU 2030	CPC 2030	CPC percentage reduction from BAU	SPC 2030	SPC percentage reduction from BAU
Electric power						
GHGs						
CO_2	**$MMTCO_2e$**	15.70	5.10	–68%	3.20	–80%
Methane	**$MMTCO_2e$***	10.08	3.36	–67%	1.68	–83%
$PM_{2.5}$ and precursors						
SO_2	**MT**	1,190.00	858.00	–28%	525.00	–56%
NO_X	**MT**	6,930.00	5,094.00	–26%	3,573.00	–48%
$PM_{2.5}$ (direct)	**MT**	1,423.00	554.00	–61%	280.00	–80%

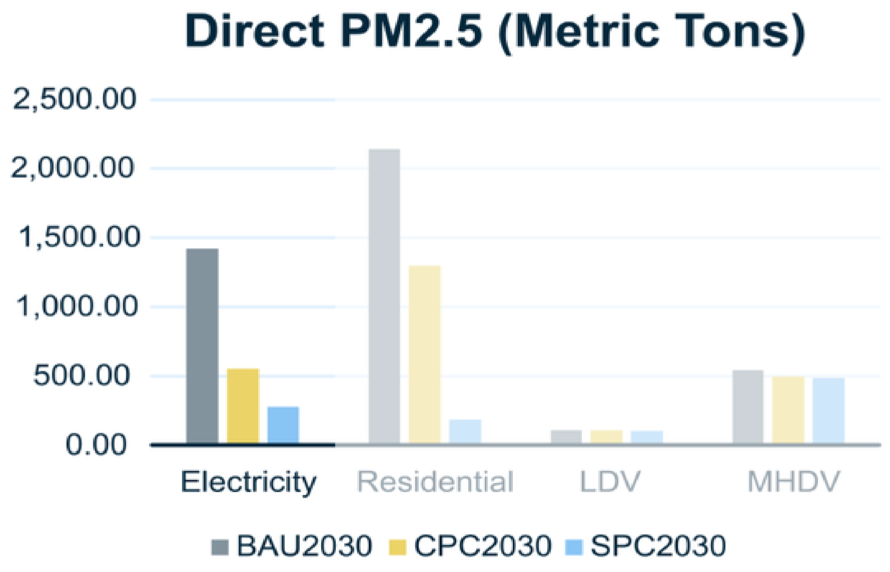
Results: Renewable Energy % of NY Electricity Generation



Results: Emissions







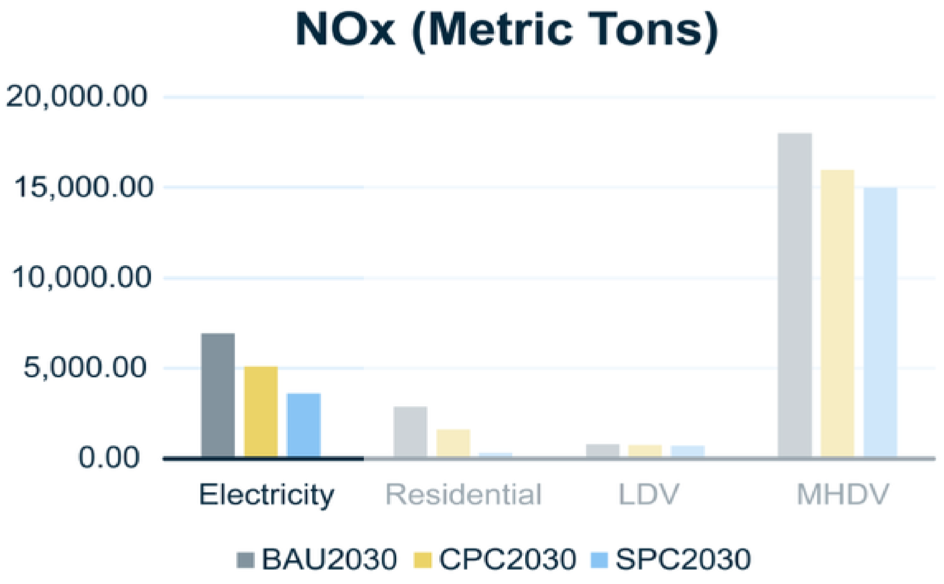


Table 3. Concentration-Response Factors and Mortality Rates, by Race and Ethnicity

Race, ethnicity[17]	CRF[18]	Mortality rate range (deaths/1,000 people)
White	6.3	.01 to .11
Black	20.8	.02 to .10
Asian	9.6	.006 to .08
Hispanic	11.6	.01 to .08

Table J1. $PM_{2.5}$ Emissions Effects and New York DACs, SPC vs. CPC, 2030

	SPC	CPC
Emissions decreases in short tons (number of electricity-generating units)		
Direct $PM_{2.5}$ emissions decreases in DACs	−312.98 (126)	−166.63 (105)
Direct $PM_{2.5}$ emissions decreases within 10 km of DACs (NYS generators only)	−1154.67 (283)	−848.77 (231)
Direct $PM_{2.5}$ emissions decreases within 10 km of DACs (all states' generators)	−1156.05 (322)	−853.23 (270)
Emissions increases in short tons (number of electricity-generating units)		
Direct $PM_{2.5}$ emissions increases in DACs	11.71 (3)	16.34 (24)
Direct $PM_{2.5}$ emissions increases within 10 km of DACs (NYS generators only)	27.34 (5)	16.34 (57)
Direct $PM_{2.5}$ emissions increases within 10 km of DACs (all states' generators)	472.56 (28)	284.74 (80)

Figure D4. Calculation of the Final Climate Health Vulnerability Index Score for Census Tract 41 (The Bronx)

	Environmental burdens and climate change risks			Population characteristics and health vulnerabilities			
	Potential pollution exposures	Land use associated with historical discrimination or disinvestment	Potential climate change risks	Income, education, and employment	Race, ethnicity, and language	Health impacts and burdens	Housing, energy, and communications
Factor scores	58.3	47.7	50.8	98.2	81.5	79.5	50.2
Weighted average of factor scores	[1 (58.32) + 1 (47.68) + 2 (50.77)]/(1+1+2) **= 51.88**			[98.17 + 1 (81.54) + 1 (79.50) + 1 (50.20)]/(1+1+1+1) **= 77.36**			

Figure J1B. Change in Direct $PM_{2.5}$ Emissions, BAU vs. CPC

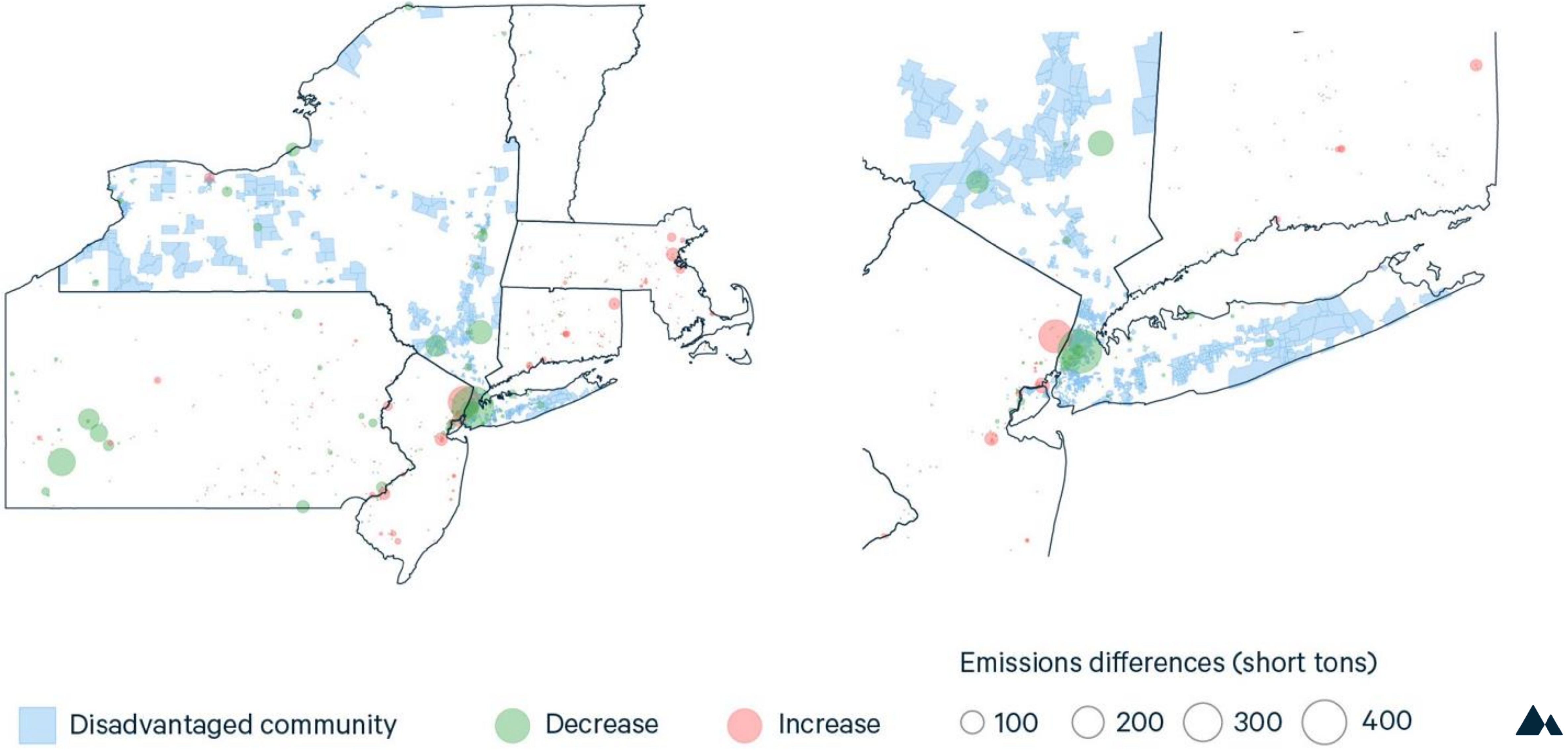


Figure J1C. Change in Direct $PM_{2.5}$ Emissions, CPC vs. SPC

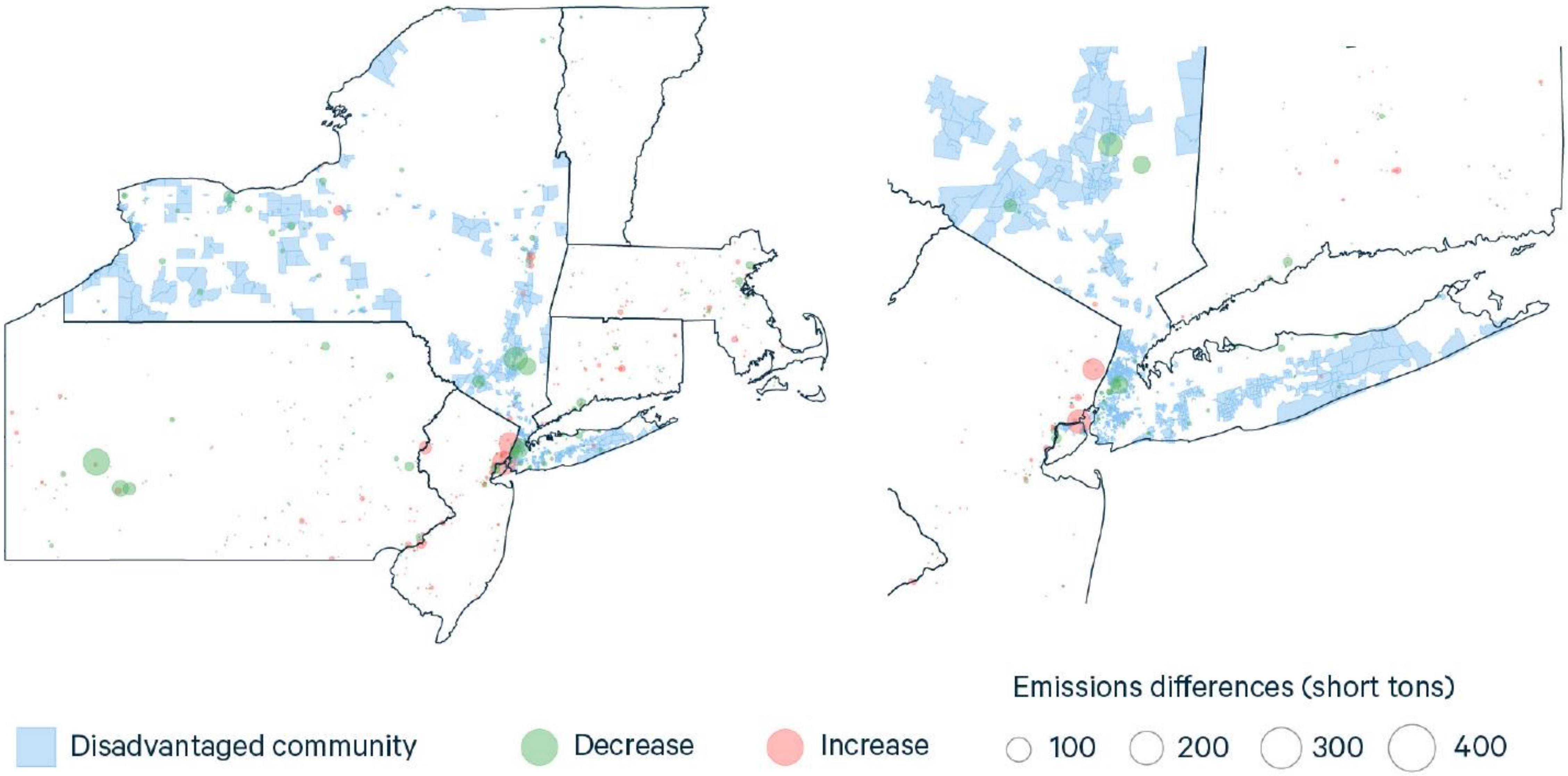
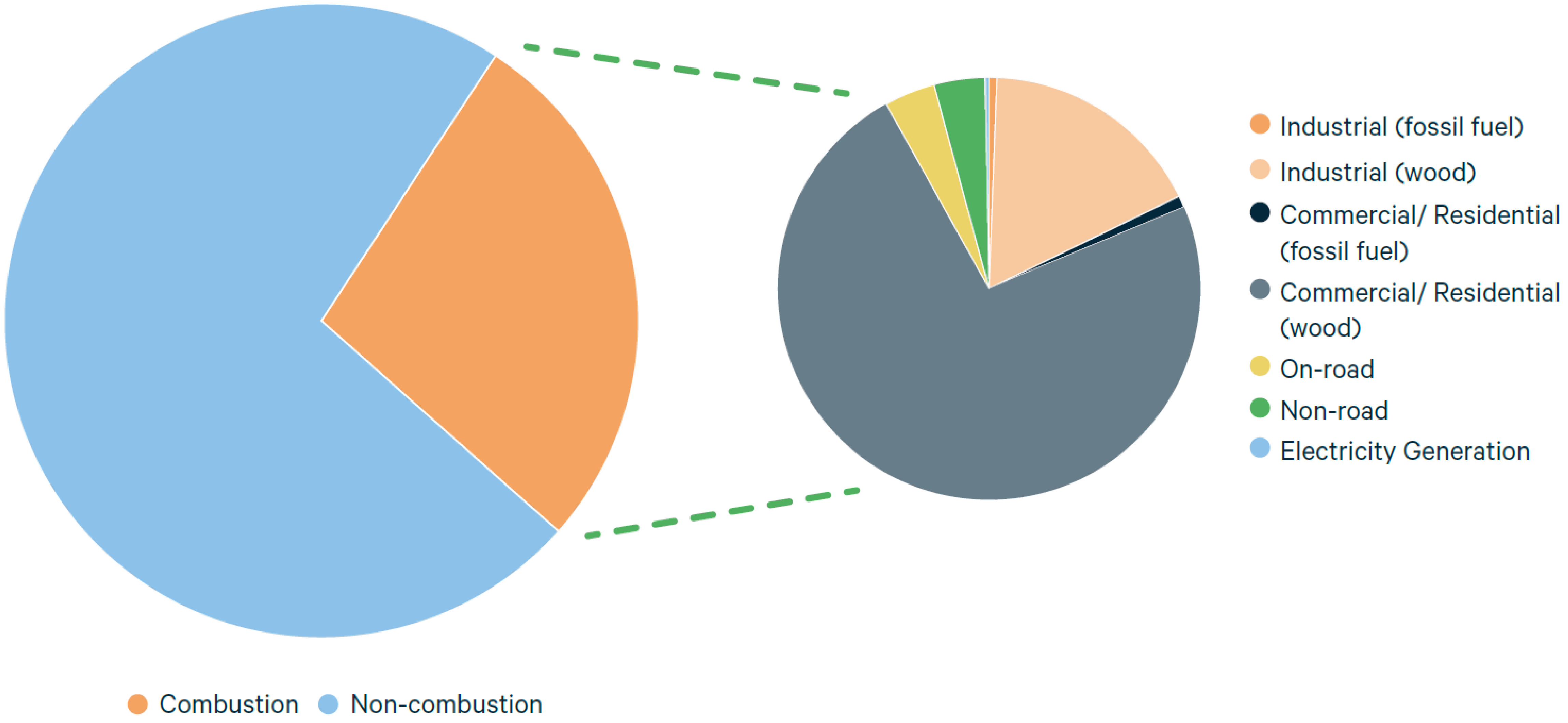


Figure K1. New York Integration Analysis Sector-Level $PM_{2.5}$ Reference Case Emissions, 2025



Note: This data is available in Appendix G of the New York State integration analysis (E3 2022).

Report 2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ENVIRONMENTAL JUSTICE ALLIANCE
Prioritizing Justice
in New York State
Cap-Trade-and-Invest
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Research Process Background

Build BAU and policy cases

Consult other cap-trade-and-invest designs and climate justice advocates to build different policy cases

Model emissions outcomes

Model emissions in transportation, residential, and electric power sectors

Model air quality changes

Pass emissions projections to air quality modeling team for estimates of fine particulate matter at the 4 km^2 scale

Evaluate impact on disadvantaged communities

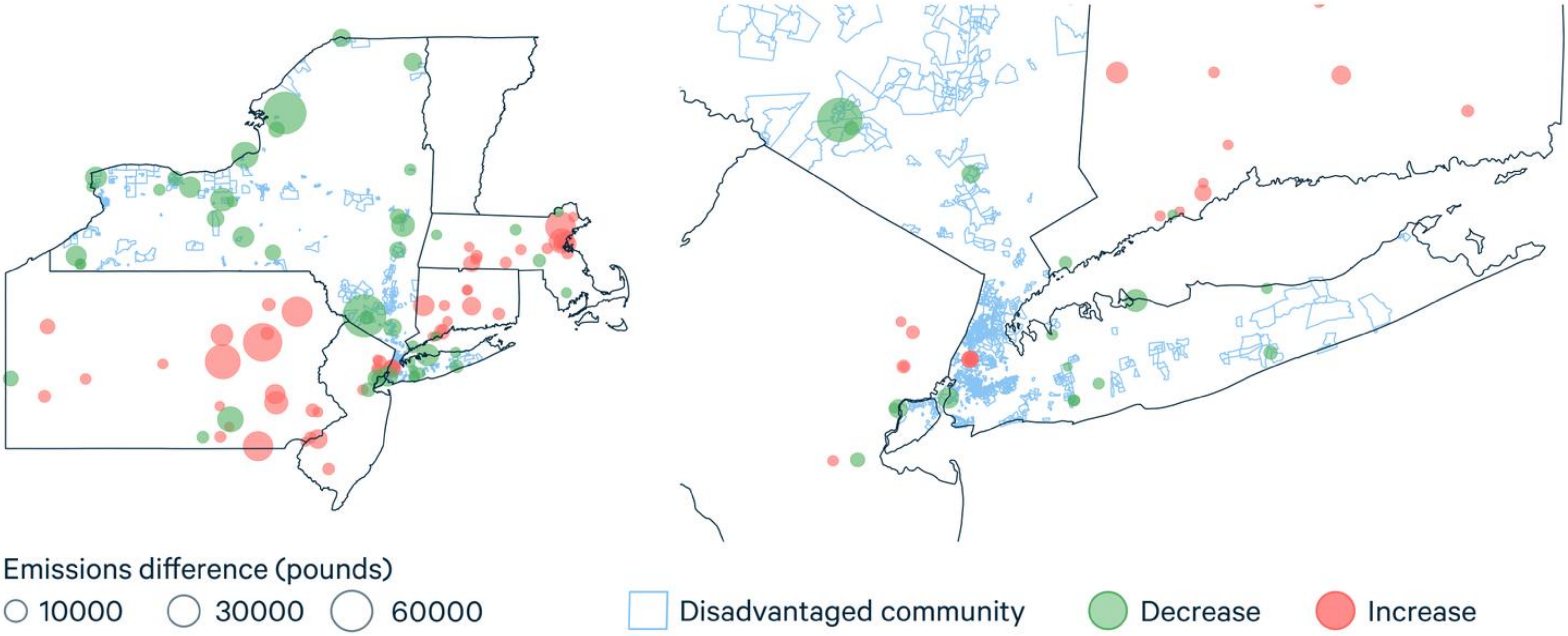
Map air quality changes to census tracts and analyze effects on DACs and non-DACs

Policy Cases Analyzed

1. Business as Usual (BAU) – includes CLCPA policies, IRA, IIJA
2. Full Trading Case (FTC) – includes one price across sectors, full trading, no facility specific caps
3. Restricted trading case (RTC) – includes specific guardrails to support DACs:
   - sector-specific caps that force each modeled sector to reduce emissions by a minimum amount from 1990;
   - a prohibition on trading between sectors;
   - facility-specific caps on power generators that force each facility to reduce emissions at the economy-wide rate (40 percent) between 1990 and 2030.

Both FTC and RTC include generous electrification subsidies, particularly for heat pumps, to reflect the invest side of the program

Both cap-trade-and-invest cases modeled lead to decreased direct $PM_{2.5}$ emissions at most power sector facilities relative to BAU (BAU -> FTC shown here)



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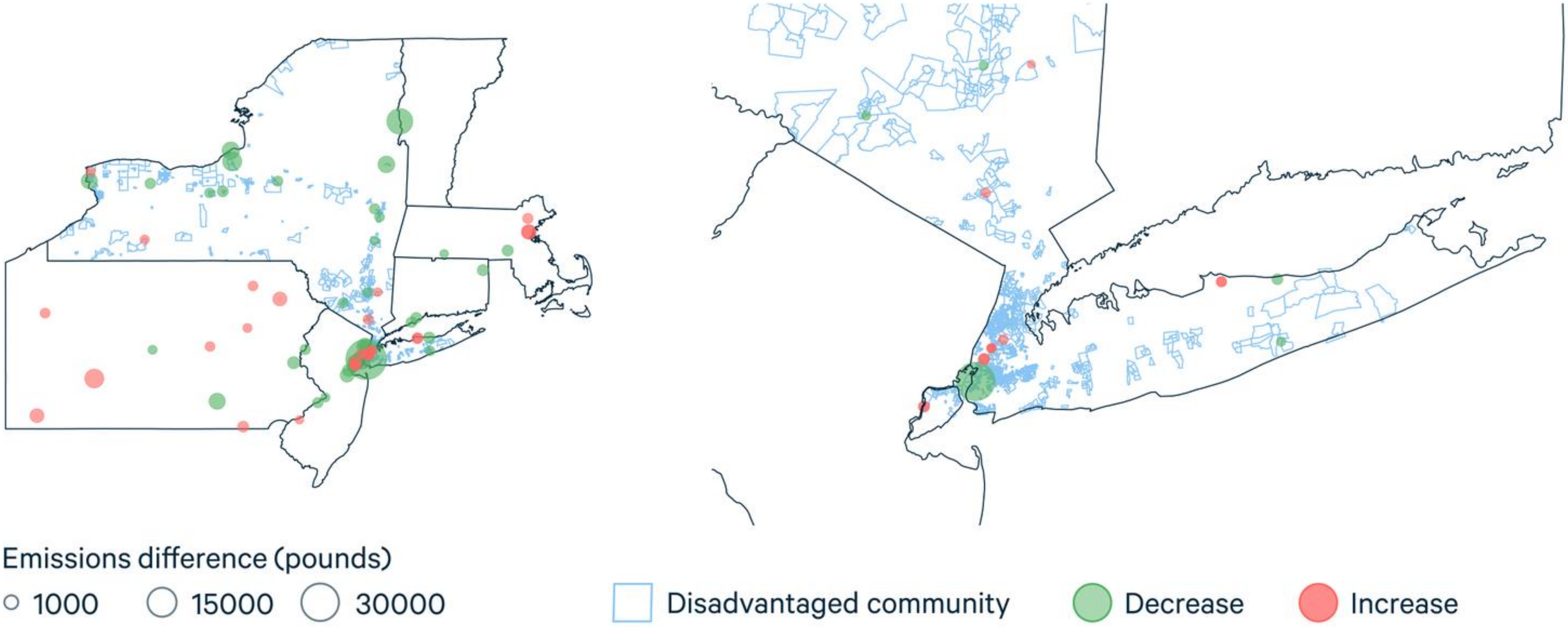
Facility Specific Caps

Facility specific caps redistribute direct $PM_{2.5}$ emissions across facilities with limited impact on electricity prices



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When measuring average % $PM_{2.5}$ change from 2016 by facility (grouped by location), FSCs drive greater reductions for DAC and non-DAC facilities, and reverse the historical DAC disparity observed in BAU

Location of facility	BAU	FTC	RTC, no facility-specific caps	RTC, facility-specific caps
Within 1 mile of DAC	49.1%	78.1%	80.0%	88.8%
All other facilities	62.2%	87.0%	85.6%	87.1%

Direct $PM_{2.5}$ emissions reductions improve near DACs and at all other facilities compared to 2016

Location of facility	BAU	FTC	RTC, no facility-specific caps	RTC, facility-specific caps
Within 1 mile of DAC	75.6%	90.4%	89.5%	90.9%
All other facilities	80.3%	93.9%	93.3%	94.5%
Difference	4.7 pp	3.5pp	3.8pp	3.6pp

Conclusions and Next Up

- Without facility specific caps, there are some facilities that increase emissions or have only small decreases in emissions even with cap-trade-and-invest (FTC and RTC) in place.
- When facility specific caps are added, the average emissions reductions by facility increase, particularly for DAC adjacent facilities, *with virtually no impact on electricity prices*.
- Total $PM_{2.5}$ emissions reductions are highest under facility specific caps for regions surrounding DACs as well as the rest of the state.
- **We will be more fully analyzing the impact of these policy designs on specific communities in our next report, focusing on air quality.**

Report 3

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Prioritizing Justice in New York's Cap-Trade-and-Invest: Obligating Electricity and Capping Generator Emissions

Issue Brief 24-04 by **Molly Robertson**, **Eunice Ko**, **Eddie Bautista**, **Alan Krupnick**, and **Wesley Look** — June 2024

Table 1. Modeled Policy Case Details

	No CT&I	CT&I cases			
	BAU	**Electricity obligated**	**Electricity obligated with caps**	**Electricity not obligated**	**Electricity not obligated with caps**
CT&I obligation in the power sector?	No	Yes	Yes	No	No
CT&I obligation in other sectors?	No	Yes	Yes	Yes	Yes
Facility-specific caps in the power sector?	No	No	Yes	No	Yes
Existing state and federal policies (incl. RGGI)?	Yes	Yes	Yes	Yes	Yes

Table 2. 2030 Electricity Demand and Emissions, by Policy Case

	BAU	Electricity obligated	Electricity obligated with caps	Electricity not obligated	Electricity not obligated with caps
Electricity demand (TWh)	179	188	188	188	188
Percentage renewable generation	80%	88%	88%	80%	81%
GHG emissions (MMT CO_2e)	12.167	6.274	6.230	13.997	13.008

Table 3. GHG and Copollutant Power Sector Emissions, by Policy Case

	BAU	Electricity obligated	Electricity obligated with caps	Electricity not obligated	Electricity not obligated with caps
GHG emissions (MMT CO_2e)	12.17	6.27	6.23	14.00	13.01
NY $PM_{2.5}$ emissions (MT)	648.12	263.66	232.15	715.64	588.53
NY SO_2 emissions (MT)	781.52	199.20	172.41	772.13	542.97
NY NO_x emissions (MT)	4,880.67	1,448.77	1,271.20	5,031.73	3,705.78

Table 4. Direct $PM_{2.5}$ Emissions (lbs) Reductions between 2016 and 2030, by Policy Case

	BAU	Electricity obligated	Electricity obligated with caps	Electricity not obligated	Electricity not obligated with caps
DAC-adjacent facilities					
Total $PM_{2.5}$ reduction	2,701,495	3,208,826	3,261,072	2,655,874	2,776,215
Average $PM_{2.5}$ reduction	24,338	28,908	29,379	23,927	25,011
25th percentile $PM_{2.5}$ improvement	92	296	468	92	414
All other facilities					
Total $PM_{2.5}$ reduction	931,386	1,089,500	1,101,948	926,051	986,375
Average $PM_{2.5}$ reduction	16,058	18,784	18,999	15,966	17,006
25th percentile $PM_{2.5}$ improvement	39	706	724	39	714

Figure 1. Facility-Level Impacts of Obligating the Electricity Sector under CT&I, Direct PM2.5 emissions (lbs)

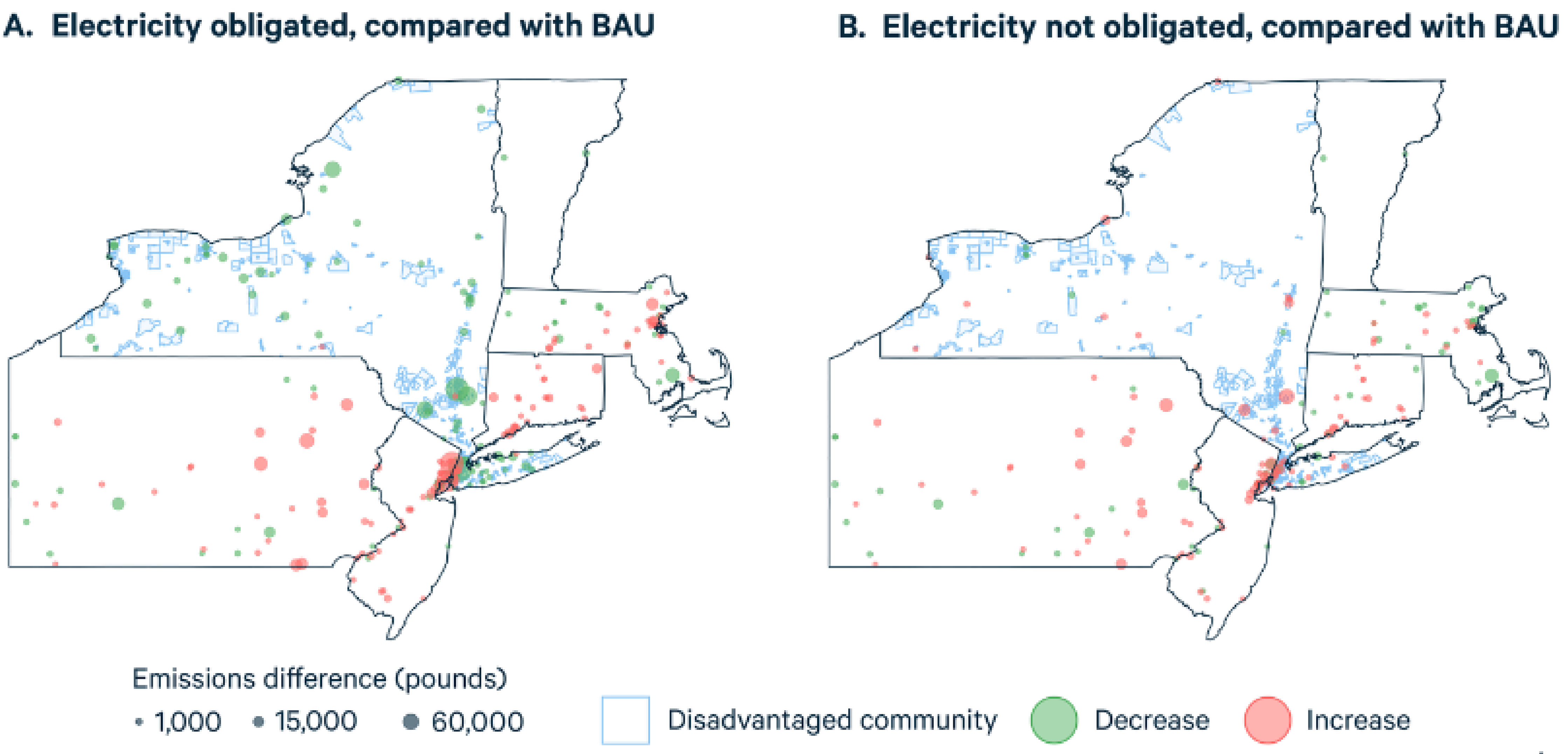

Figure 2. Facility-Level Impacts of Obligating the Electricity Sector under CT&I, Direct PM2.5 emissions (lbs)

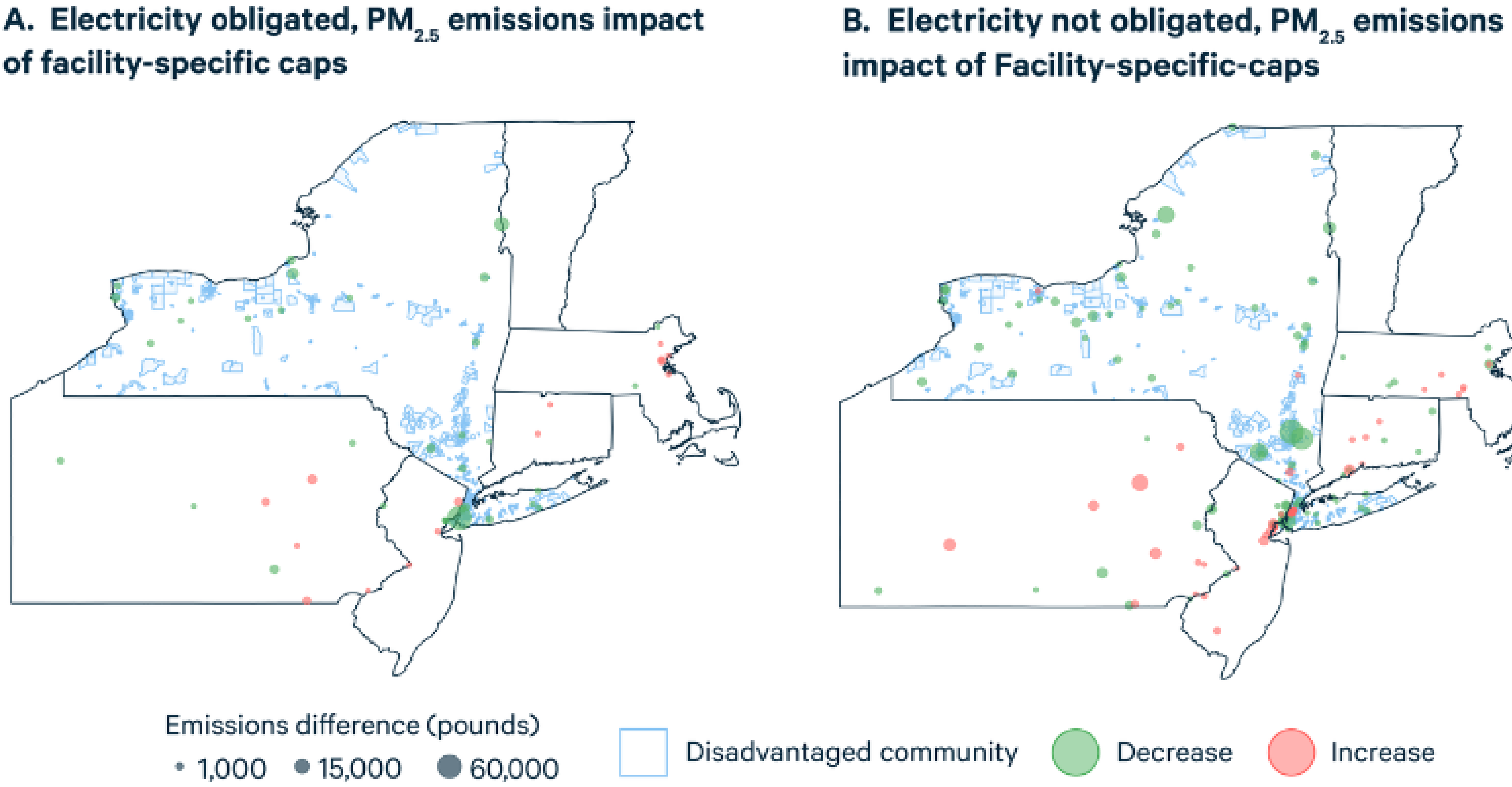

Table 6. 2030 Electricity Prices and In-State Load, by Policy Case

	BAU	Electricity obligated	Electricity obligated with caps	Electricity not obligated	Electricity not obligated with caps
NY annual average LMP[a] ($/MWh)	26.52	26.36	26.33	26.12	26.24
NY residential retail electricity price ($/kWh)	0.191	0.193	0.193	0.191	0.191

Table 5. MW New Capacity Estimated by 2030, by Policy Case

	BAU	Electricity obligated	Electricity obligated with caps	Electricity not obligated	Electricity not obligated with caps
New solar (utility scale and distributed)	45,618	56,041	56,099	47,089	47,354
New offshore wind	4,500	4,500	4,500	4,500	4,500
New onshore wind	3,487	4,622	4,634	3,864	3,809
New hydro	2	2	2	2	2
New natural gas	1,881	1,932	1,881	2,086	1,881

Note: Capacity additions from BAU include some capacity built between the data year (2016) and the current year (2024). The 2016 data include all existing and planned builds (some out to 2024) but not every generator built during that period. Some capacity captured in the BAU column represents existing capacity as of 2024. Higher capacity in the policy cases than in the BAU scenario can be interpreted as entirely new capacity.

Questions?

- Feel free to reach out to shawhan@rff.org or mrobertson@rff.org with additional questions about this work.