Environmental Justice Options in California's Cap-and-Trade Program

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Introduction

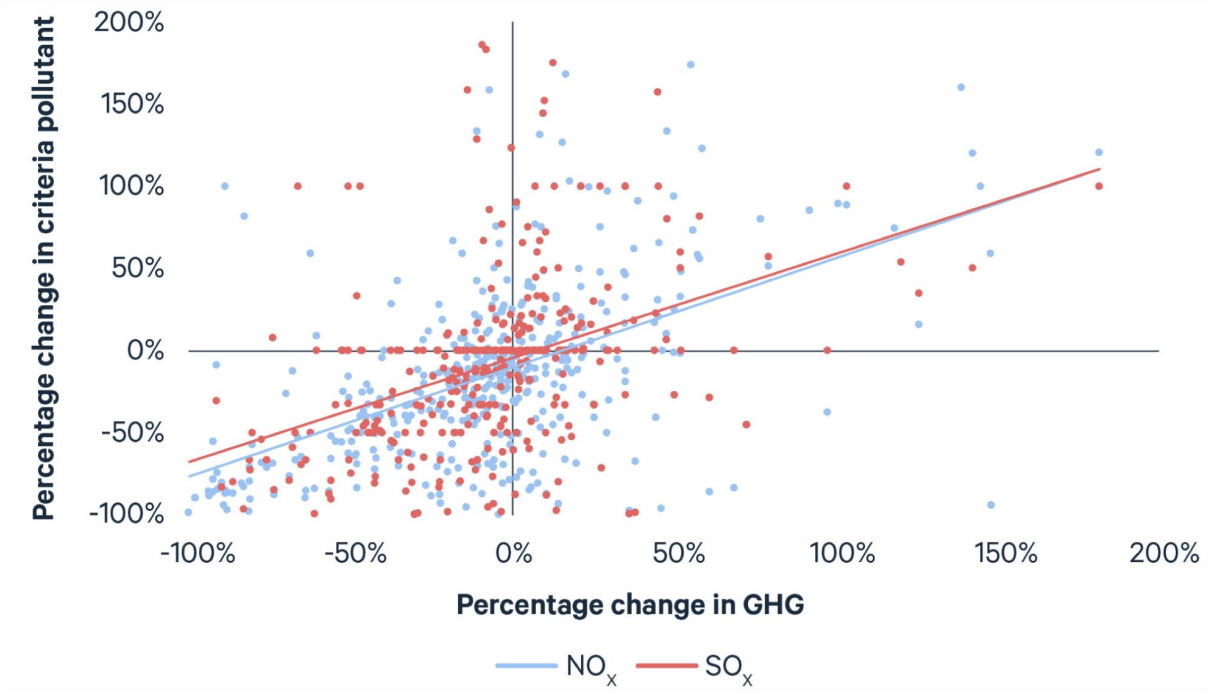
The Environmental Justice Advisory Committee (EJAC) at the California Air Resources Board (CARB) has raised numerous concerns about the cap-and-trade program over the years.[1] Broadly, these include concerns about the program's failure to deliver tangible environmental improvements to disadvantaged communities; concerns that the use of offsets will reduce the extent to which industrial point sources invest in abatement that can improve environmental quality in disadvantaged communities; and concerns that the allocation of free allowances to industrial facilities (which tend to be located in or near communities already overburdened by environmental, socioeconomic, and health challenges) reduces the incentives to invest in pollution reductions in these communities.

To place these concerns into context, it is important to clarify the connection between the greenhouse gas emissions (GHGs) that the cap-and-trade program is designed to limit and the local air pollutants that are the focus of EJAC concerns. While EJ advocates are deeply concerned about global climate change, their objections to California's GHG cap-and-trade program generally stem from the impact of this program- or lack thereof - on *local* air pollutants such as sulfur dioxide and nitrogen oxides.

There is a well-documented positive correlation between greenhouse gas emissions and local air emissions from industrial sources in California. On average, when an industrial facility reduces its GHG emissions, emissions of local criteria pollutants are also reduced. However, the figure below shows that this positive correlation is quite noisy. More specifically, this figure shows how emissions of GHGs and criteria pollutants from industrial and electricity generating sources in California have changed between 2013 (the start of the cap-and-trade program) and 2020. For 30% of these facilities, reductions in GHG emissions are associated with *increases* in SO2 emissions (top left). In the lower right quadrant, 17% of sources increased GHG emissions while decreasing criteria emissions over this period. This figure helps to illustrate the positive - but noisy- correlation between point-source GHG emissions and emissions precursors to local air pollution. Given the nature of this correlation, policies targeting GHG emissions are a relatively indirect and blunt tool for addressing local air quality concerns.

[1] https://ww2.arb.ca.gov/sites/default/files/2024-10/DRAFT%20EJAC%20cap%20and%20trade%20resolution_October%202024.pdf

Figure 1. Percentage Change in NO_x–SO_x GHG Emissions in California, 2013–2020



Note: NO_x = nitrogen oxides; SO_x = sulfur oxides.

Notes: This figure summarizes emissions data from all California facilities that report emissions. Changes in annual GHG emissions (between 2013 and 2020) are measured on the horizontal axis. The vertical axis measures changes in nitrogen oxides and sulfur dioxide. Source: Burtraw and Roy, 2023.

Decades of regulations targeting local air pollution more directly have failed to eliminate local pollution exposure inequities in California (and across the country). Given these persistent inequities, California policymakers should be looking for every opportunity to improve conditions in disadvantaged communities. Along these lines, EJAC has made a number of recommendations to reform the GHG cap-and-trade program.[2]

In this chapter, we briefly review the latest research investigating the impacts of the GHG cap-and-trade programs on local air quality. We then consider a subset of EJAC recommendations that specifically pertain to GHG market reforms. We note that EJAC has asked that their recommendations not be "taken piecemeal", but rather as a holistic set of reforms that work together. However, we focus below on the subset recommendations that pertain directly to the GHG cap-and-trade program because of the limited scope of IEMAC. With this chapter we do not aim to make specific recommendations. Rather, our objective is to elevate the consideration of EJAC concerns, and to begin the conversation around how carbon market-related EJAC recommendations could interact with the program design and implementation.

[2] EJAC resolution

Recent Research[3]

Estimating the causal impacts of a cap-and-trade program on local pollution outcomes requires constructing credible estimates of what pollution levels would have been had the program not been implemented. This is inherently challenging, particularly when multiple climate policies and programs are implemented at the same time. These challenges notwithstanding, several recent papers have endeavored to isolate and estimate the effects of California's GHG cap-and-trade program on air quality in environmental justice communities. Appendix A summarizes findings from recent research on this topic.

Overall, researchers have found evidence that the GHG cap-and-trade program has delivered reductions in local air pollution, although they disagree on the extent to which these reductions have mitigated pre-existing inequities in exposure to harmful local pollution.

Environmental Justice Advisory Committee (EJAC)

In what follows, we consider changes to the cap-and-trade program proposed by EJAC, as well as potential trade-offs and additional design options. EJAC has requested that environmental justice groups be included in conversations regarding these recommendations as full partners. However, we view this annual report as an opportunity for IEMAC to offer a perspective on those recommendations that pertain directly to market design issues. For this reason, we focus on a small subset of EJAC recommendations articulated in the document titled "Environmental Justice Priorities for an Extension of the Cap-and-Trade Program".

EJAC Proposed Program Reform #1: Elimination of Free Allowances in the Industrial Sector

While most allowances in the cap-and-trade program are sold through quarterly auctions administered by CARB, 30-45% of allowances are distributed to covered entities at no cost.[4] As we explain in Chapter X, these output-based allowance allocations are designed to mitigate emissions "leakage" (i.e. the movement of economic activity and associated emissions out of state) in industrial sectors deemed to be exposed to leakage risk. About 10–15% of allowances are freely given to regulated industrial emitters in emissions intensive and trade exposed (EITE)

[3] This is not intended to be an exhaustive review of the research into the cap-and-trade program's impact on environmental justice communities but the latest installments in an ongoing body of work.

[4] https://ww2.arb.ca.gov/sites/default/files/2021-01/CT_Allowance_FactSheet_Jan2021.pdf

sectors. Output-based allowance allocation acts like a production subsidy and can incentivize industrial production within California which helps to mitigate emissions leakage.

To determine how many free allowances industrial facilities receive, CARB considers four variables: (1) an assistance factor (which was initially intended to reflect the degree of leakage risk) (2) product benchmark (a sector-specific efficiency benchmark defined in terms of emissions intensity) (3) the cap decline factor (the rate at which the economy-wide cap declines), and (4) a facility's overall output or production.[5] CARB and the Legislature could reduce the number of allowances allocated to industrial sources by adjusting one or more of these variables.

Pros of eliminating free allowances

Reducing the quantity of allowances allocated to industrial sources could increase revenues available for other uses. Taking 2025 EITE allocations as an example, if the roughly 32 million[6] freely allocated allowances were instead sold at auctions at the November 2024 settlement price of $31.91, this translates to over $1 billion in additional revenue to the GGRF. Had these revenues flowed to the Greenhouse Gas Reduction Fund, they could have enabled more investments in environmental justice and other priorities.

Cons of Eliminating Free Allowances

Eliminating free allowances could have detrimental impacts on the state's ability to limit leakage. The primary justification for providing free allowances to industrial sources is to minimize the extent to which industrial activity – and associated GHG emissions - moves out of state to avoid having to comply with the cap-and-trade program. Output-based allocations effectively subsidize production at industrial facilities under the cap. This provides an incentive to keep industrial production under the cap versus moving production (and associated emissions) out of the state. Eliminating this production incentive could increase emissions leakage and undermine the integrity of the cap-and-trade program.

Options for Reforming Free Allocation of Allowances

Policymakers could consider alternatives that would reduce the number of allowances to EITE sectors by updating the criteria used to determine allocations:

1. Reauthorize the California Air Resources Board (CARB) to set assistance factors based on leakage risk, rather than assuming a uniform 100% risk across all facilities with no decline over time. The 2017 cap-and-trade extension set leakage factors for all emissions-intensive trade-exposed (EITE) sectors at 100%, a departure from the original program where CARB set lower assistance factors for sectors deemed to face lower

[5] https://ww2.arb.ca.gov/our-work/programs/cap-and-trade-program/allowance-allocation/allowance-allocation-industrial
[6] https://ww2.arb.ca.gov/our-work/programs/cap-and-trade-program/allowance-allocation

levels of leakage risk. A recalibration of assistance factors to reflect actual leakage risk could support targeted leakage risk mitigation where it is most needed.
2. Implement a steeper cap adjustment factor rather than having all facilities' allocation follow the economy-wide cap decline.
3. Direct CARB to update product efficiency benchmarks to accurately reflect the latest technology. The standards for efficiency are several years out of date. Updating the benchmarks would help ensure that facilities are incentivized to adopt best practices.

EJAC Proposed Program Reform #2: Elimination of Offsets

Offsets allow covered entities to meet a portion of their emissions reduction requirements by investing in projects that reduce or remove greenhouse gases in sectors not directly regulated by the program. Currently, offset usage is capped at 4% of an entity's compliance obligation, but actual utilization remains well below this limit. In the 2021-2023 compliance period, offsets accounted for 3.1% of overall compliance obligations, with a few entities relying heavily on offsets while most use none at all.[7] The offset usage limit increases to 6% of an entity's compliance obligation in 2026.

Pros of Eliminating Offsets

Eliminating offsets could result in increased carbon market revenues assuming facilities that currently purchase offsets start purchasing allowances instead. This could also incentivize more direct reductions in greenhouse gas emissions at compliance entities. It is not clear where these additional reductions would occur, as the facilities that would have used offsets for compliance purposes could alternatively purchase GHG allowances to satisfy their compliance obligations, unless their ability to use allowances for compliance purposes has also been eliminated (we return to this below). Eliminating offsets would also increase emission reductions in California that count toward statewide greenhouse gas emissions limits, rather than support climate mitigation in sectors or states that do not currently count.

Cons of Eliminating Offsets

Offsets provide significant funding for Tribes in California which sell offset credits into the market, such as the Yurok Tribe. Eliminating offsets as a compliance option would reduce financial support for these projects, and the flow of resources to Tribes, absent alternative funding mechanisms, as discussed in Chapter X.

More broadly, the offset market is one of the key ways in which California finances investments in nature-based climate solutions, which are vital for mitigating the worst impacts of climate change and helping landscapes and communities adapt. The 2022 Scoping Plan and the 2024 Nature-Based Climate Solutions Targets published by the California Natural Resources Agency both include the use of markets, among other strategies, to achieve necessary climate

[7] https://ww2.arb.ca.gov/sites/default/files/2024-12/nc-CP4compliancereport.xlsx

outcomes.[8] Eliminating offsets could weaken the financial incentives for these projects, undermining their potential to deliver climate and societal benefits.

These cons would arise if offsets were eliminated without a simultaneous commitment to replace offsets with an alternative funding mechanism. However, if the use of offsets is further limited or eliminated as part of a broader set of reforms that also provides dedicated funding to Tribes and Nature-Based Climate Solutions, then these disadvantages could be reduced or avoided — contingent on the stability of new funding resources.

Options for Offset Reform

To maintain the benefits of offsets while addressing equity concerns, policymakers could explore alternatives to refine and enhance their use. Options for reform or replacement of the offset program are explained at greater length in Chapter X.

1. Further reduce the percentage of a compliance obligation that a covered entity can meet through offsets. The offset usage limit increases to 6% of an annual compliance obligation in 2026, with half of those offsets required to provide DEBs to California. A post-2030 program could revisit these limits, or reconsider the split between DEBs and non-DEBs offsets.
2. Relatedly, California could establish a Tribal-specific offset compliance option. Washington State provides an example, where the offset usage limit is 5% annually, with an additional 3% allowed if they are Tribal offsets.
3. California could retire allowances from the program (permanently removing them), equal to the number of offsets turned in for compliance each year. This is sometimes referred to as counting offsets “under the cap” because the emissions cap is effectively lowered to compensate for offset usage.
4. Offsets could be replaced with dedicated funding from the Greenhouse Gas Reduction Fund (see Chapter X), which would resolve concerns related to the efficacy of offset use and could help address local air quality disparities, though could also require significant resources from GGRF to support Tribes and Nature-Based Climate Solutions.
5. CARB could update regularly the compliance offset protocols to ensure they reflect the best available science.

EJAC Proposed Program Reform #3: No Trade Zones or Facility-Level Emission Caps

The 2023 IEMAC report discussed no trade zones and facility-level emission caps at length.[9] The stated goal of these proposed reforms, which would limit the compliance flexibility for a subset of regulated entities, is to ensure that facilities in disadvantaged communities reduce

[8] https://resources.ca.gov/-/media/CNRA-Website/Files/Initiatives/Expanding-Nature-Based-Solutions/Californias-NBS-Climate-Targets-2024.pdf

[9] https://calepa.ca.gov/wp-content/uploads/sites/6/2023/02/2022-ANNUAL-REPORT-OF-THE-INDEPENDENT-EMISSIONS-MARKET-ADVISORY-COMMITTEE-2.pdf see pages 14-17

GHG emissions. There are a variety of ways that this objective could be met, but all would reduce the compliance flexibility of sources in targeted areas.

Pros of Reduced Compliance Flexibility

Reducing the extent to which facilities in certain locations can achieve compliance via the purchase of GHG allowances could result in local air pollution reductions in those locations if the imposed compliance limits are binding. As noted above, there is a positive correlation between global greenhouse gas pollutants and localized air pollution on average. As such, reductions in GHG emissions at targeted facilities could result in direct local air quality benefits for the most polluted communities.

Cons of Reduced Compliance Flexibility

The inherent compliance flexibility of a market-based approach facilitates coordination of cost-effective GHG emissions reductions. Allowing a facility to determine their own compliance strategy - reducing emissions on-site, buying and selling allowances, or purchasing offsets - based on their facility-specific abatement costs means that every covered entity can find the lowest-cost pathway to complying with an economy-wide goal. If restrictions on compliance flexibility are binding, the costs incurred to comply with the program will increase. By how much would depend on the design of the trading limits and the relative costs of the impacted facilities. Increases in program compliance costs- and thus allowance prices- would be passed on to California consumers.

Research from Resources for the Future (RFF) investigates how the allocation of permitted GHGs might have been different had a form of facility-specific caps been implemented in the past. Overall, these researchers estimate that the facility-specific caps they evaluate would have delivered very modest air quality improvements to some DAC communities without significantly increasing overall costs. It is important to keep in mind, however, that this RFF analysis is retrospective. Looking ahead, we will need a more stringent cap to meet our future GHG emissions reduction targets. In a tighter carbon market, source-specific trading limits could have more significant effects on emissions, emissions leakage, and abatement costs.

Another important consideration is that any changes made to limit compliance flexibility of specific market participants could interact in significant ways with other important features of the program, including the price floor and ceiling discussed in Chapter X. Interactions between facility-specific compliance limits and cost containment mechanisms and other market design features (e.g. leakage mitigation) need to be weighed carefully to avoid unintended consequences.

Alternatively, policy-makers could more directly address local air pollution problems in disadvantaged communities by implementing other EJAC recommendations including:

1. Strengthen the Community Air Protection Program established by AB 617
2. Conducting statewide audits of facilities operating within environmental justice communities

Conclusion

The primary objective of this chapter is to acknowledge the important concerns of environmental justice groups around local air pollution in their communities, and to elevate the consideration of EJAC recommendations. We have discussed only a subset of the recommendations offered by EJAC. This discussion is intended to begin a discussion around EJAC priorities that pertain to carbon market design, as well as identify additional options that could more directly address concerns about local air pollution. Legislators should consider carefully how they can balance enhancing equity and air quality outcomes from cap-and-trade while supporting cost-effective and affordable climate policy.

EJAC has asked to be included in conversations around these recommendations as full partners so that EJ groups can articulate concerns and priorities as negotiations proceed.

Appendix 1:

"*Do environmental markets cause environmental injustice? Evidence from California's carbon market*" by Danae Hernandez-Cortes and Kyle Meng (2023). This research focuses on a subset of compliance entities covered by California's cap-and-trade program and compares emissions at these facilities with emissions trajectories at observationally similar facilities that are not covered by the program. The authors detect a significant difference in emissions between these "control" and "treatment" groups. They then model how that difference maps onto local air emissions using a pollution dispersion model from the National Oceanic and Atmospheric Administration to map estimates of the emissions impacts of cap-and-trade to downwind air quality impacts. The authors estimate that "during 2012-2017, the cap-and-trade program reduced emissions annually at a rate of 9%, 5%, 4%, and 3% for GHG, PM 2.5, PM10, and NOx, respectively, for the average sample regulated facility."[10]

In "*Cap and trade: Understanding the research and remedies"* Michael Ash, Manuel Pastor et al (2024) critically review the Hernandez-Cortes and Meng paper. These authors assert that they misidentified control and treatment groups by failing to reflect changes in the status of whether individual polluters were covered by the California cap-and-trade program. Ash and Pastor run several alternative regressions with control and treatment groups they deem more appropriate. In a recent presentation, Dr. Manuel Pastor explained that with these alternative regressions "the estimated changes are smaller and close to what we might have expected". Specifically, Dr. Pastor showed that in their analysis the C&T program reduced emissions annually at a rate of 3.2%, 2.3%, 0.7%, and 0.0% for GHG, PM 2.5, PM 10, and NOx. These values indeed show smaller reductions than presented by Hernandez-Cortes and Meng.[11]

Glenn Sheriff in "*California's GHG Cap-and-Trade Program and the Equity of Air Toxic Releases*" (2024) uses several empirical strategies, including a "difference-in-difference"

[10] https://www.sciencedirect.com/science/article/pii/S0047272722001888

[11] https://ww2.arb.ca.gov/sites/default/files/2024-07/CARB_EJAC_2024_07_18_v_03%20RMF%20%28ADA%20Checked%20and%20updated%29.pdf

approach as employed by Hernandez-Cortes and Meng, in combination with a pollution dispersal to estimate the impact of California's cap-and-trade program on air toxic releases as reported through EPA's Toxic Release Inventory. The author finds that "minority communities experience a relative reduction in cumulative exposure from [air toxic releases]" caused by the California cap-and-trade program.[12]

[12] https://www.journals.uchicago.edu/doi/10.1086/725699