San Diego County
Air Pollution
Control District

Strategies to Reduce Indirect Source Emissions at Warehouses and Distribution Centers White Paper

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SAN DIEGO COUNTY
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EXECUTIVE SUMMARY

Introduction

This "Strategies to Reduce Indirect Source Emissions at Warehouses and Distribution Centers White Paper" (or White Paper) presents the District's evaluation of a potential warehouse indirect source rule (ISR) and other alternative strategies for San Diego County.

Background

In November 2021, the San Diego County Air Pollution Control District (SDAPCD or District) staff began work pursuant to California Assembly Bill (AB) 423 (Gloria, 2019) to evaluate the feasibility of various actions to address indirect sources of pollution, particularly warehouses and distribution centers. More specifically, AB 423 required the District to "consider adopting an indirect source rule to address pollution from mobile sources that is associated with stationary sources, such as ports, warehouses, and distribution centers."

In addition to the requirements of AB 423, AB 617 (Garcia, 2017) requires the California Air Resources Board (CARB) and the air districts to develop and implement Community Emission Reduction Plans (CERPs) to reduce exposures and emissions in communities that are the most impacted by poor air quality. Accordingly, one of the strategies in the CERP for the Portside Community (July 2021) is for the District to evaluate and, if feasible, propose a new rule to control emissions from indirect sources.[1] Similarly, one of the strategies in the CERP for the International Border Community (March 2024) is for the District to develop and advocate for rules or other strategies that reduce emissions from indirect sources, including heavy-duty trucks in Otay Mesa and San Ysidro.[2]

In May 2023, District staff prepared a report titled "Options and Considerations for Reducing Indirect Source Emissions at Warehouses, Distribution Centers, and Ports," also referred to as the "ISR Framework," and presented the preliminary findings at the

[1] Portside Community Emissions Reduction Plan, July 2021, Action C3, p. 156, https://www.sdapcd.org/content/dam/sdapcd/documents/capp/cerp/Portside-Environmental-Justice-CERP-July-2021.pdf

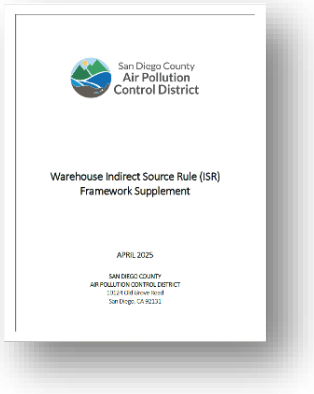
[2] International Border Community Emissions Reduction Plan, March 2024, Heavy-Duty Vehicles/Strategy 5, p. 50, https://www.sdapcd.org/content/dam/sdapcd/documents/capp/meetings/int--border/reports/IBCSC%20CERP%2003.29.24.pdf

June 2023 Governing Board meeting.[3] The ISR Framework provided an update on staff's research and evaluation of the District's legal authority to regulate indirect sources, other California air districts' indirect source rules, warehouse building inventory in San Diego County, an overview of the possible rule development process, and ongoing activities associated with a potential Memorandum of Understanding (MOU) with the San Diego Unified Port District (Port District).

In June 2023, the Governing Board approved staff's recommendation to convene a working group, otherwise known as the Warehouse Working Group (WWG), to further engage with stakeholders and to evaluate additional concepts to reduce emissions from warehouses and distribution centers. As part of its direction, the Governing Board also instructed staff to (1) prioritize under-resourced communities, (2) consider smaller warehouses and warehouses near sensitive receptors (e.g., residences, hospitals, schools, etc.), and (3) return to the October 2023 Governing Board meeting with a timeline for action and proposed composition of the working group. The Governing Board also directed staff to pursue an MOU with the Port District that includes emissions reduction, facilitative, and health protective mitigation measures.

In October 2023, staff presented an informational update to the Governing Board on the establishment of the WWG, potential working group participants, and a proposed tentative timeline for action as detailed in the Board letter attachment "Warehouse Working Group (WWG) Tentative Timeline and Possible Working Group Participants." The proposed scope and goal of the working group were provided in the attachment "Warehouse Working Group Purpose Statement." Feedback received from the Governing Board included adding representation from public health and/or physician groups to the working group participant list, a status update on the SCAQMD Rule 2305 litigation, and expanded outreach to communities impacted by warehousing activities. Staff subsequently convened 10 virtual public WWG meetings between September 2023 and October 2024, comprising over 20 hours of in-depth, technical conversations with subject matter experts and engaged stakeholders.

[3] SDAPCD, Options and Considerations for Reducing Indirect Source Emissions at Warehouses, Distribution Centers, and Ports [ISR Framework], May 2023, https://www.sdapcd.org/content/dam/sdapcd/documents/rules/warehouse-work-group/references/isr-framework-english.pdf



In April 2025, District staff prepared a report titled "Warehouse Indirect Source Rule (ISR) Framework Supplement."[4] The report, also referred to as the Supplement, presents an update to pertinent sections found in the initial ISR Framework for warehouses and distribution centers. The Supplement also provides new or updated information through analysis that was either directed by the Governing Board, Planning and Policy Committee, and/or discussed through the WWG.

In June 2025, District staff presented a proposed MOU with the Port District for the Governing Board's consideration. The MOU incorporated voluntary commitments that will: (1) support installation of charging infrastructure for zero-emission vehicles and equipment; (2) further the transition to zero-emission cargo handling equipment; (3) continue and enhance the SDAPCD zero-emission truck pilot program and Port District zero-emission truck activities; (4) prioritize access to incentives and grants to help achieve shared Portside emission reduction goals; (5) reduce emissions from ocean going vessels and commercial harbor craft; (6) enhance public participation and transparency on Port District and SDAPCD projects in the Portside area; and (7) create additional opportunities to maximize air quality benefits from the Port's Maritime Industrial Impact Funding. The Governing Board approved the District to approve and enter into the MOU during the meeting. In July 2025, the Board of Port Commissioners also approved the MOU. On August 4, 2025, the MOU between the SDAPCD and the Port District became effective.

Findings and Considerations

The following is a summary of the findings and considerations that informed the conclusions of this White Paper. See the referenced sections for more detailed discussions on each item.

- The estimated emission reductions from a potential warehouse ISR in San Diego County are projected to be significantly less than the reductions anticipated from other rulemakings (Section 3.1).
- The estimated public health benefits, both regionwide and in under-resourced communities, of a potential warehouse ISR are less than the benefits anticipated from recent and potential future rulemakings (Section 3.2).

[4] SDAPCD, Warehouse Indirect Source Rule (ISR) Framework Supplement, April 2025, https://www.sdapcd.org/content/dam/sdapcd/documents/rules/warehouse-work-group/april-2025/isr-framework-supplement.pdf

- The estimated compliance costs of a potential warehouse ISR are greater than the costs anticipated from other rulemakings (Section 3.3).
- The estimated cost-effectiveness values of a potential warehouse ISR significantly exceed those for other District rulemakings, as well as cost-effectiveness thresholds used in other air districts (Section 3.4).
- A substantial percentage of the facilities identified as "warehouses" in the District's inventory may not be conducting warehousing activities. This will likely reduce the number of facilities that would potentially be subject to a potential warehouse ISR (Section 3.5).
- The estimated one-time and on-going District costs for rule development and administration are substantial in light of current fiscal uncertainty (Section 3.6).
- A warehouse ISR in San Diego County modeled after the South Coast Air Quality Management District (SCAQMD) Rule 2305, which is the only warehouse ISR that has withstood litigation to date, is anticipated to require significant District staff effort for program implementation, outreach, and compliance/enforcement activities (Section 3.7).
- SCAQMD Rule 2305 was developed with the goal of reducing regional emissions to attain the federal and state Ozone and PM2.5 ambient air quality standards while achieving localized emission reductions as a co-benefit (Section 4.1).
- The District considered applicable comments received (Section 4.2).
- An analysis of warehouse buildings located in under-resourced communities compared to the rest of the county demonstrated that a majority of potential warehousing locations (over 70%) are located outside of identified under-resourced communities (Section 4.3.2).
- Other state activities, such as Assembly Bill 98 and a possible statewide ISR if adopted in the future, would likely achieve and support mobile source emission reductions from warehousing operations (Section 4.4).
- A third-party study that analyzed SCAQMD's WAIRE Program (Rule 2305) to date, which noted inconsistencies in reported data and the benefits that can be directly attributed to Rule 2305, and other findings (Section 4.5).
- Other potential non-regulatory alternatives for consideration, such as a focused Transport Refrigeration Unit (TRU) incentive program, may provide comparable emission reductions at lower costs and/or resources than anticipated with an ISR (Section 5.0).

Conclusion

The District believes the analysis outlined in this White Paper supports prioritizing the alternative strategies detailed in Section 5.0. These strategies are expected to reduce emissions, help meet state and federal air quality goals, and improve air quality in communities most impacted by pollution. Given the relatively high estimated cost of implementing a local rule and the potential for a future statewide Indirect Source Rule (ISR), the District believes focusing on these alternatives represents the most efficient use of resources at this time.

As part of future planning, the District will designate a potential warehouse ISR as a "Further Study Measure" in the upcoming Regional Air Quality Strategy (RAQS). This ensures the measure remains under active review, with status updates provided to stakeholders as part of the regular RAQS development process. If future analysis demonstrates that the measure is both feasible and cost-effective, it may be considered for adoption.

Should the selected alternative strategies experience delays or fail to achieve intended outcomes, the District can reassess the appropriateness of a local warehouse ISR, taking into account any statewide ISR developments and implementation progress.

1.0 INTRODUCTION

This “Strategies to Reduce Indirect Source Emissions at Warehouses and Distribution Centers White Paper” (or White Paper) presents the District’s evaluation of a potential warehouse indirect source rule (ISR) and other alternative strategies for San Diego County.

2.0 BACKGROUND

2.1 Assembly Bill 423

In November 2021, the San Diego County Air Pollution Control District (SDAPCD or District) staff began work pursuant to California Assembly Bill (AB) 423 (Gloria, 2019) to evaluate the feasibility of various actions to address indirect sources of pollution, particularly warehouses and distribution centers. More specifically, AB 423 required the District to "consider adopting an indirect source rule to address pollution from mobile sources that is associated with stationary sources, such as ports, warehouses, and distribution centers."

2.2 Assembly Bill 617

In addition to the requirements of AB 423, AB 617 (Garcia, 2017) requires the California Air Resources Board (CARB) and the air districts to develop and implement Community Emission Reduction Plans (CERPs) to reduce exposures and emissions in communities that are the most impacted by poor air quality. Accordingly, one of the strategies in the CERP for the Portside Community (July 2021) is for the District to evaluate and, if feasible, propose a new rule to control emissions from indirect sources.[5] Similarly, one of the strategies in the CERP for the International Border Community (March 2024) is for the District to develop and advocate for rules or other strategies that reduce emissions from indirect sources, including heavy-duty trucks in Otay Mesa and San Ysidro.[6]

2.3 August 2022 Governing Board Meeting

In August 2022, staff provided an informational update to the Governing Board on their research and evaluation to date including the District's legal authority to regulate indirect sources, other California air districts' indirect source rules, warehouse building inventory in San Diego County, stakeholder feedback, an overview of the rule development

[5] Portside Community Emissions Reduction Plan, July 2021, Action C3, p. 156, https://www.sdapcd.org/content/dam/sdapcd/documents/capp/cerp/Portside-Environmental-Justice-CERP-July-2021.pdf

[6] International Border Community Emissions Reduction Plan, March 2024, Heavy-Duty Vehicles/Strategy 5, p. 50, https://www.sdapcd.org/content/dam/sdapcd/documents/capp/meetings/int--border/reports/IBCSC%20CERP%2003.29.24.pdf

process, and ongoing rule development activities associated with the evaluation of a potential indirect source rule.

2.4 May 2023 – ISR Framework

In May 2023, District staff prepared a report titled "Options and Considerations for Reducing Indirect Source Emissions at Warehouses, Distribution Centers, and Ports," also referred to as the "ISR Framework." and presented the preliminary findings at the June 2023 Governing Board meeting.[7] The ISR Framework provided an update on staff's research and evaluation of the District's legal authority to regulate indirect sources, other California air districts' indirect source rules, warehouse building inventory in San Diego County, an overview of the possible rule development process, and ongoing activities associated with a potential Memorandum of Understanding (MOU) with the San Diego Unified Port District (Port District).

The conclusion of the ISR Framework suggested that a warehouse ISR and associated administrative fees for facilities above 100,000 square feet in size are potentially feasible and could be successfully implemented in San Diego County. It was also determined that while a local ISR could provide some emission reductions from the freight sector, such a rule was estimated to be the costliest measure the District has ever enacted in terms of the compliance costs per pound of reduced emissions. The ISR Framework further informed the public and the Governing Board that if staff were to proceed with rule development, further technical analyses (including required socioeconomic and environmental impact studies), and public review would be necessary in accordance with State law to further assess and verify feasibility prior to rule adoption.

2.5 June 2023 Governing Board Meeting

In June 2023, the Governing Board approved staff's recommendation to convene a working group, otherwise known as the Warehouse Working Group (WWG), to further engage with stakeholders and to evaluate additional concepts to reduce emissions from warehouses and distribution centers. As part of its direction, the Governing Board also instructed staff to (1) prioritize under-resourced communities, (2) consider smaller warehouses and warehouses near sensitive receptors (e.g., residences, hospitals, schools, etc.), and (3) return to the October 2023 Governing Board meeting with a timeline

[7] SDAPCD, Options and Considerations for Reducing Indirect Source Emissions at Warehouses, Distribution Centers, and Ports [ISR Framework], May 2023, https://www.sdapcd.org/content/dam/sdapcd/documents/rules/warehouse-work-group/references/isr-framework-english.pdf

for action and proposed composition of the working group. The Governing Board also directed staff to pursue an MOU with the San Diego Unified Port District (Port District) that includes emissions reduction, facilitative, and health protective mitigation measures.

2.6 August 2023 Planning and Policy Committee Meeting

On August 2, 2023, District staff presented the draft timeline and potential composition of WWG participants, as well as a WWG Purpose Statement, to the SDAPCD Planning and Policy Committee. Feedback received by the Committee and stakeholders included requests to (1) expedite the projected timeline for possible regulatory action where feasible, (2) de-linking the timelines for possible regulatory and non-regulatory actions to accelerate implementation, (3) add representation to the list of possible working group participants, specifically from Tijuana-based organizations (such as the Mexican Consulate) and North/East San Diego County, and (4) begin developing proactive public messaging strategies on indirect sources and their corresponding emissions. Staff incorporated this feedback into attachments for the Board's consideration at the October Board meeting.

2.7 October 2023 Governing Board Meeting

In October 2023, staff presented an informational update to the Governing Board on the establishment of the WWG, potential working group participants, and a proposed tentative timeline for action as detailed in the Board letter attachment "Warehouse Working Group (WWG) Tentative Timeline and Possible Working Group Participants." The proposed scope and goal of the working group were provided in the attachment "Warehouse Working Group Purpose Statement." Feedback received from the Governing Board included adding representation from public health and/or physician groups to the working group participant list, a status update on the SCAQMD Rule 2305 litigation, and expanded outreach to communities impacted by warehousing activities.

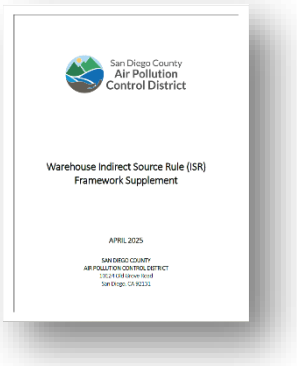
2.8 Warehouse Working Group Meetings

As directed by the Governing Board, between September 2023 and October 2024, staff conducted 10 virtual public meetings with Warehouse Working Group (WWG) participants, comprising almost 20 hours of in-depth, technical conversations about indirect source emissions. Over 90 stakeholders were invited, comprising of key local community, environmental, industrial, and government stakeholders, to collect varying perspectives from a wide variety of stakeholders. The group was not typically able to

reach a consensus on most topics. While such agreements were not anticipated, the WWG nonetheless continually provided thoughtful and meaningful information for the District's consideration.

2.9 April 2025 – ISR Framework Supplement

In April 2025, District staff prepared a report titled "Warehouse Indirect Source Rule (ISR) Framework Supplement."[8] The report, also referred to as the Supplement, presented an update to pertinent sections found in the initial ISR Framework for warehouses and distribution centers. The Supplement also provided new or updated information through analysis that was either directed by the Governing Board, Planning and Policy Committee, and/or discussed through the WWG.



2.10 June 2025 Governing Board Meeting

In June 2025, District staff presented a proposed MOU with the Port District for the Governing Board's consideration. The MOU incorporated voluntary commitments that will: (1) support installation of charging infrastructure for zero-emission vehicles and equipment; (2) further the transition to zero-emission cargo handling equipment; (3) continue and enhance the SDAPCD zero-emission truck pilot program and Port District zero-emission truck activities; (4) prioritize access to incentives and grants to help achieve shared Portside emission reduction goals; (5) reduce emissions from ocean going vessels and commercial harbor craft; (6) enhance public participation and transparency on Port District and SDAPCD projects in the Portside area; and (7) create additional opportunities to maximize air quality benefits from the Port's Maritime Industrial Impact Funding. The Governing Board approved the District to approve and enter into the MOU during the meeting. In July 2025, the Board of Port Commissioners also approved the MOU. On August 4, 2025, the MOU between the SDAPCD and the Port District became effective.

[8] SDAPCD, Warehouse Indirect Source Rule (ISR) Framework Supplement, April 2025, https://www.sdapcd.org/content/dam/sdapcd/documents/rules/warehouse-work-group/april-2025/isr-framework-supplement.pdf

3.0 SUPPLEMENT FINDINGS

The following are findings outlined in the Supplement that support the conclusion of this White Paper.

3.1 Emission Reductions

The estimated emission reductions from a potential warehouse ISR in San Diego County are projected to be significantly less than the reductions anticipated from other rulemakings.

3.1.1 Countywide

With an applicability threshold for warehouses 100,000 square feet or larger, the estimated maximum emission reductions from warehouses in San Diego County subject to a potential ISR are 13 tons per year of nitrogen oxide (NOx), and 0.1 tons per year of particulate matter (PM2.5). If the applicability threshold is lowered to warehouses 50,000 square feet or larger, the estimated maximum emission reductions from warehouses are 27 tons per year NOx, and 0.3 tons per year PM2.5.

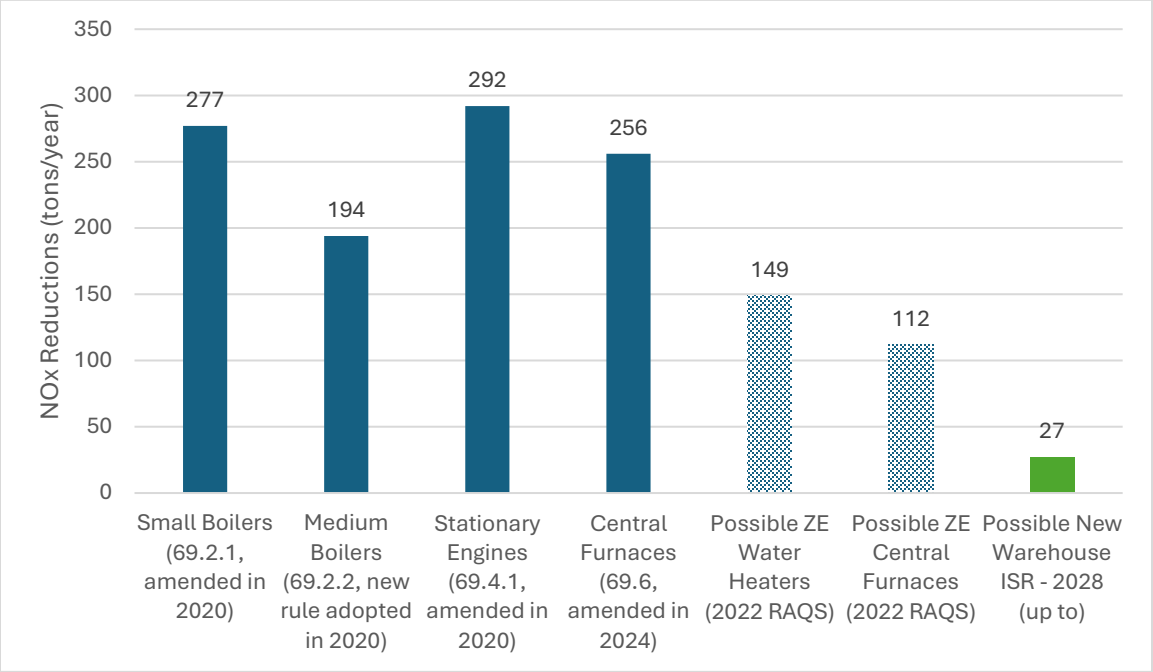
It's important to note that actual baseline emissions, and consequently emission reductions, are likely to be less in practice for a potential local warehouse ISR than the estimated values presented in the Supplement and should be considered best-case estimates. The analysis assumes that all the facilities identified in the various size categories conduct warehousing activities, and all would be subject to a potential warehouse ISR. However, based upon a case study of a specified geographic area conducted by staff and discussed in the Supplement, a significant portion of these facilities countywide are highly likely to be conducting non-warehousing activities (e.g., retail, office, or other light commercial use) in buildings classified as warehouses, and thus would not be subject to a potential warehouse ISR.[9] While the District used a conservative adjustment factor to account for such non-warehousing activities when estimating truck trip rates, a greater percentage of the warehouse inventory may not be conducting goods movement-related activities, and thus would not be subject to a potential ISR.

By way of comparison of recent rulemaking reductions to a potential warehouse ISR, in July 2020, the District adopted rules that are estimated to reduce NOx emissions upon full rule implementation from small boilers (Rule 69.2.1) by 277 tons per year, medium boilers (Rule 69.2.2) by 194 tons per year, and stationary engines (Rule 69.4.1) by 292 tons per year. Also, in November 2024 the District adopted amendments to its central

[9] Ibid., Section 2.7.4, pp. 46-49

furnace rule (Rule 69.6) that are estimated to reduce NOx emissions by 256 tons per year upon full rule implementation (Figure 1).

Figure 1 – Estimated NOx Reduction Comparison to Recent/Possible Future Rulemakings[10]



For future rulemakings, the District must evaluate rulemaking projects based on reducing emissions, improving public health, and supporting the attainment of the federal ozone standards as quickly as possible. For example, the estimated emission reductions for two "further study measures" outlined in the District's most recent air quality plan to attain state ozone standards, the "2022 Regional Air Quality Strategy" (RAQS), were also included in the Supplement and Figure 1. As noted in the 2022 RAQS, these control measures require a more detailed analysis to assess potential adoption/implementation in San Diego County. While they are scheduled to be evaluated during the next three years by staff, forthcoming State regulations could also mandate the need to amend corresponding local rules in a shorter timeframe.

For Further Study Measure FS-7, Zero-Emission Water Heaters, the possible incorporation of zero-emission standards for all new/existing water heaters has the potential to reduce NOx emissions by at least 149 tons per year (0.4 tons per day), if such

[10] Ibid., Figure 9, p. 36

limits were determined to be feasible, cost-effective, and adopted.[11] Proportioning this estimated emission reduction by population at the community level, this equates to 0.16% reduction in NOx in comparison to the baseline emission inventory for the Portside Community.[12] As shown in Section 3.1.2, a warehouse ISR could potentially reduce 0.07% of the NOx emission inventory for Portside, meaning Measure FS-7 could potentially provide more emission reductions to the Portside community than an ISR, if implemented. Similarly, the emission reductions associated with a zero-emission water heater rule equate to 0.48% reduction in NOx in comparison to the baseline emission inventory for the International Border Community.[13] Note that because this measure is not a current rulemaking and additional analysis will be needed, these are preliminary estimates that are subject to change.

For Further Study Measure FS-10, Zero-Emission Central Furnaces, the possible incorporation of zero-emission standards for all new/existing fan-type central furnaces has the potential to reduce NOx emissions by at least 112 tons per year (0.3 tons per day), if such limits were determined to be feasible, cost-effective, and adopted.[14] Proportioning this estimated emission reduction by population at the community level, this equates to 0.12% reduction in NOx in comparison to the baseline emission inventory for the Portside Community.[15] As noted above, this measure would also reduce more NOx in the Portside community than a warehouse ISR. Similarly, the emission reductions associated with a zero-emission central furnace rule equate to 0.36% reduction in NOx in comparison to the baseline emission inventory for the International Border Community.[16] Note that because this measure is not a current rulemaking and additional analysis will be needed, these are preliminary estimates that are subject to change.

The two further study measures identified (if determined to be feasible, cost-effective, and adopted) could provide NOx emission reductions in under-resourced communities and the region at large, and directly within the homes of all residents countywide, including in

[11] Approximately 0.63% of the regionwide NOx emission inventory (23,587 tons/year), per CARB CEPAM2019v1.04. The estimated emission reductions from a potential warehouse ISR are approximately 0.06% to 0.11% of the regionwide NOx emission inventory.
[12] Portside Community population = 53,049, Portside CERP, p.17; 2021 SD County population = 3,274,954, https://usafacts.org/data/topics/people-society/population-and-demographics/our-changing-population/state/california/county/san-diego-county/?endDate=2021-01-01&startDate=2010-01-01; NOx percent reduction = (1.62% x 149 tpy) / (1,462 tpy)
[13] International Border Community population = 64,400, International Border CERP, p. 22; 2024 SD County population = 3,298,799, https://www.california-demographics.com/san-diego-county-demographics; NOx percent reduction = (1.95% x 149 tpy) / (606 tpy)
[14] Approximately 0.47% of the regionwide NOx emission inventory (23,587 tons/year), per CARB CEPAM2019v1.04. The estimated emission reductions from a potential warehouse ISR are approximately 0.06% to 0.11% of the regionwide NOx emission inventory.
[15] NOx percent reduction = (1.62% x 112 tpy) / (1,462 tpy)
[16] NOx percent reduction = (1.95% x 112 tpy) / (606 tpy)

under-resourced communities. The measures could also provide greater NOx emission reductions to help support attainment of near-term federal ozone attainment deadlines in 2032.[17]

As shown in Figure 1 and discussed above, the estimated NOx emission reductions anticipated from a potential warehouse ISR are significantly less than the reductions from past rulemakings and the two further study measures discussed above. With limited resources available at the District to do rulemakings, it is necessary for the District to prioritize rulemaking projects that can effectively achieve both localized and regionwide emission reductions to the greatest extent practicable.

3.1.2 AB 617 Communities

In more localized areas where emission inventories have been quantified, staff determined the estimated emission benefits a potential ISR may achieve within the Portside and International Border Communities.

Portside Community

The Portside Community Emissions Reduction Plan (CERP) includes a baseline emission inventory for the entire community, including stationary, areawide, on-road, and off-road sources (Table 1).

Table 1 – 2018 Community Baseline Criteria Emissions Summary[18]

Source Category	NOx (tons/year)	ROG (tons/year)	PM_{10} (tons/year)	$PM_{2.5}$ (tons/year)
Off-road mobile	**922.4** (63.1%)	**317.8** (25.5%)	**36.2** (5.0%)	**34.4** (17.7%)
On-road mobile	**462.8** (31.6%)	**259.9** (20.8%)	**69.5** (9.5%)	**32.1** (16.6%)
Stationary Sources	**50.6** (3.5%)	**215.1** (17.2%)	**33.2** (4.6%)	**8.5** (4.4%)
Area Sources	**26.6** (1.8%)	**455.0** (36.5%)	**589.2** (80.9%)	**118.9** (61.3%)
Total (tons/year)	**1462.4**	**1247.8**	**728.1**	**193.9**

NOx: Nitrogen Oxides

ROG: Reactive Organic Gases

PM_{10}: Particulate Matter 10 Microns or Smaller

$PM_{2.5}$: Particulate Matter 2.5 Microns or Smaller

[17] Supplement, Section 2.4.3, pp. 33-37

[18] Portside CERP, Table 5, p. 37

Approximately 1,462 tons per year of NOx and 193 tons per year of PM2.5 are emitted within the Portside community. The maximum possible emission reductions associated with an ISR that were estimated within the Supplement for the Portside Community are up to 1.0 tons per year of NOx and 0.01 tons per year of PM2.5.[19] These equate to 0.07% reduction in NOx and 0.005% reduction in PM2.5, in comparison to the baseline emission inventory for the Portside Community. As previously mentioned, other potential future measures under consideration such as Zero-Emission Water Heaters and Zero-Emission Central Furnaces, are anticipated to result in a combined 0.28% reduction in NOx for the Portside community, in comparison to the baseline emission inventory for the Portside community, which is four times greater than what is anticipated from an ISR. These results suggest that an ISR, as proposed, may not provide significant local emission reduction benefit, and thus may not be an effective control strategy specifically for the Portside Community.

International Border Community

The International Border CERP includes a baseline emission inventory for the entire community, including stationary, areawide, on-road, and off-road sources (Table 2).

Table 2 – Summary of NOx, ROG, PM10, and PM2.5 Base Year 2021 Emissions in the Community[20]

Source Category	NOx		ROG		PM_{10}		$PM_{2.5}$	
Stationary	66	11%	209	29%	59	4%	47	4%
Areawide	14	2%	234	33%	1,227	93%	149	11%
On-Road	148	24%	129	18%	15	1%	6	0%
Off-Road	379	63%	147	20%	12	1%	12	1%
Total (tons per year)	606		720		1,313		213	

Approximately 606 tons per year of NOx and 213 tons per year of PM2.5 are emitted within the International Border community. The maximum possible emission reductions associated with an ISR that were estimated within the Supplement for the International Border Community are up to 4.2 tons per year of NOx and 0.04 tons per year of PM2.5.[21] These equate to 0.69% reduction in NOx and 0.02% reduction in PM2.5, in comparison to the baseline emission inventory for the International Border Community. As previously mentioned, other potential future measures under consideration, such as Zero-Emission Water Heaters and Zero-Emission Central Furnaces, are anticipated to result in a combined 0.84% reduction in NOx for the International Border community in comparison

[19] Supplement, Table 8, p. 34
[20] International Border CERP, Table 3, p. 19
[21] Supplement, Table 8, p. 34

to the baseline emission inventory for the International Border community, which is greater than what is anticipated from an ISR. These results suggest that an ISR, as proposed, may not provide as great of a local emission reduction benefit in comparison to other potential rulemakings under consideration, and thus may not be the most effective near-term control strategy specifically for the International Border Community.

3.2 Public Health Benefits

The estimated public health benefits, both regionwide and in under-resourced communities, of a potential warehouse ISR are less than the benefits anticipated from recent and potential future rulemakings.

3.2.1 Countywide

Quantifying the emission reductions to the anticipated health benefits using the EPA's CO-Benefits Risk Assessment Health Impacts Screening and Mapping Tool (COBRA) tool, implementation of a potential warehouse ISR could result in avoiding between 25 and 68 health-related incidences per year, and a potential savings of $313k to $1.1 million per year in associated regionwide healthcare costs, depending on the applicability threshold used and baseline year evaluated (Table 3).

Table 3 – Total Health Benefits for Scenario 3 (Low-NOx, ZEV, Other)[22]

Year	ISR Applicability Threshold (sq ft)	Change in Incidence (per year)				Total Health Benefits (per year)	
		Minor Restricted Activity Days	School Loss Days	Work Loss Days	Health Related Incidences (up to)[23]	Low Value	High Value
2028	100k and greater	6.3	17.0	1.1	32.6	$410,984	$514,534
2028	50k and greater	13.1	35.4	2.2	67.9	$854,940	$1,068,368
2032	100k and greater	5.1	12.7	0.9	24.6	$312,957	$395,797
2032	50k and greater	10.4	26.4	1.8	51.0	$646,898	$816,603

[22] Supplement, Table 10, p. 38

[23] Health related incidences include the following: total mortality; nonfatal heart attacks; infant mortality; total hospital admits, all respiratory; total emergency room visits, respiratory; total asthma onset; total asthma symptoms; emergency room visits, asthma; lung cancer; hospital admits (cardio-cerebro/peripheral vascular disease, Alzheimer's disease, Parkinson's disease); stroke; total hay fever/rhinitis; cardiac arrest, out of hospital; and emergency room visits, all cardiac (Appendix A – EPA COBRA Output Tables).

For comparison, the District's recent amendment to Rule 69.6 (Natural Gas-Fired Fan-Type Central Furnaces), which was estimated to reduce 256 tons per year of NOx regionwide, was anticipated to result in an estimated reduction of 617 negative health-related incidences per year in San Diego County. The potential regionwide savings of Rule 69.6 were estimated at $5.8 to $13.1 million per year in associated healthcare costs.[24]

As discussed in the previous section, Further Study Measure FS-7, Zero-Emission Water Heaters, has the potential to reduce NOx emissions by at least 149 tons per year (Section 3.1.1). Quantifying the emission reductions to the anticipated health benefits using the EPA's COBRA tool results in an estimated reduction of 625 negative health-related incidences per year in San Diego County.[25] The potential regionwide savings of the measure are estimated at $4.5 to $5.3 million per year in associated healthcare costs (Appendix A – EPA COBRA Output Tables).

Also discussed in the previous section, Further Study Measure FS-10, Zero-Emission Central Furnaces, has the potential to reduce NOx emissions by at least 112 tons per year (Section 3.1.1). Quantifying the emission reductions to the anticipated health benefits using the EPA's COBRA tool results in an estimated reduction of 470 negative health-related incidences per year in San Diego County. The potential regionwide savings of the measure are estimated at $3.4 to $4.0 million per year in associated healthcare costs (Appendix A – EPA COBRA Output Tables).

3.2.2 AB 617 Communities

Portside Community

As mentioned above, a warehouse ISR is projected to potentially reduce approximately 0.07% of the NOx Portside emission inventory per year, and 0.005% of the PM2.5 Portside inventory per year, in a best-case scenario. Quantifying the emission reductions to the anticipated health benefits using the EPA's COBRA tool results in small improvements in mortality, heart attacks, infant mortality, emergency room visits, asthma onset, and stroke (Appendix A – EPA COBRA Output Tables). When summed together, the change in health-related incidences is less than five overall per year (Table 4).

[24] SDAPCD, Final Staff Report – Amendments to Rule 69.6 Natural Gas-Fired Fan-Type Central Furnaces, November 4, 2024, Table 3, p. D-19, https://legistarweb-production.s3.amazonaws.com/uploads/attachment/pdf/2961677/Item_E3_AttD_Rule_69.6_Staff_Report.pdf

[25] https://cobra.epa.gov/

Table 4 – Portside Community Health Benefits for Scenario 3 (Low-NOx, ZEV, Other)

Year	ISR Applicability Threshold (sq ft)	Change in Incidence (per year)				Total Health Benefits (per year)	
		Minor Restricted Activity Days	School Loss Days	Work Loss Days	Health Related Incidences (up to)[26]	Low Value	High Value
2028	50k and greater	0.5	1.3	0.08	4.4	$32,075	$40,129

Note: Preliminary estimates subject to change.

International Border Community

As mentioned above, a warehouse ISR is projected to potentially reduce approximately 0.69% of the NOx International Border emission inventory per year, and 0.02% of the PM2.5 International Border inventory per year, in a conservative, best-case scenario. Quantifying the emission reductions to the anticipated health benefits using the EPA's COBRA tool results in some improvements in mortality, heart attacks, infant mortality, emergency room visits, asthma onset, and stroke (Appendix A - EPA COBRA Output Tables). When summed together, the change in health-related incidences is approximately 19 overall (Table 5).

Table 5 – International Border Community Health Benefits for Scenario 3 (Low-NOx, ZEV, Other)

Year	ISR Applicability Threshold (sq ft)	Change in Incidence (per year)				Total Health Benefits (per year)	
		Minor Restricted Activity Days	School Loss Days	Work Loss Days	Health Related Incidences (up to)[27]	Low Value	High Value
2028	50k and greater	2.0	5.6	0.35	18.6	$134,297	$167,663

Note: Preliminary estimates subject to change.

3.3 Compliance Costs

The estimated compliance costs of a potential warehouse ISR are greater than the costs anticipated from other rulemakings.

[26] Footnote 23
[27] Footnote 23

The average annual compliance costs that would be incurred by each local warehouse subject to a potential ISR are estimated to be between $29,000 and $49,000 per year. This equates to a total maximum estimated regionwide compliance cost between $11.9 to $19.3 million per year (Table 6).

Table 6 – Compliance Costs and Cost-Effectiveness for Scenario 3 (Low-NOx, ZEV, Other)[28]

ISR Applicability Threshold (sq ft)	Warehouse Building Count	Total Floor Area (sq ft)	Total Cost (per year)	Average Cost Per Warehouse (per year)	2028 Cost-Effectiveness ($/lb)	2032 Cost-Effectiveness ($/lb)
100k and greater	243	45,719,544	$11,932,039	$49,103	$464	$622
50k and greater	657	74,121,426	$19,344,457	$29,444	$362	$485

Note: Preliminary estimates subject to change.

For comparison, the District's new Rule 67.26 (Commercial Charbroiling Operations), adopted in August 2025, was estimated to incur a total countywide compliance cost of $790k to $2.6 million per year.[29] Another point of comparison is the District's Rule 69.2.2 (Medium Boilers, Process Heaters, and Steam Generators), which was adopted in 2020. Rule 69.2.2 was estimated to incur a total countywide compliance cost of $3.1 million per year (adjusted to 2024 dollars).[30] Both figures are substantially less than the estimated compliance costs of a potential warehouse ISR.

3.4 Cost-Effectiveness

The estimated cost-effectiveness values of a potential warehouse ISR significantly exceed those for other District rulemakings, as well as cost-effectiveness thresholds used in other air districts.

[28] Supplement, Table 11, p. 39

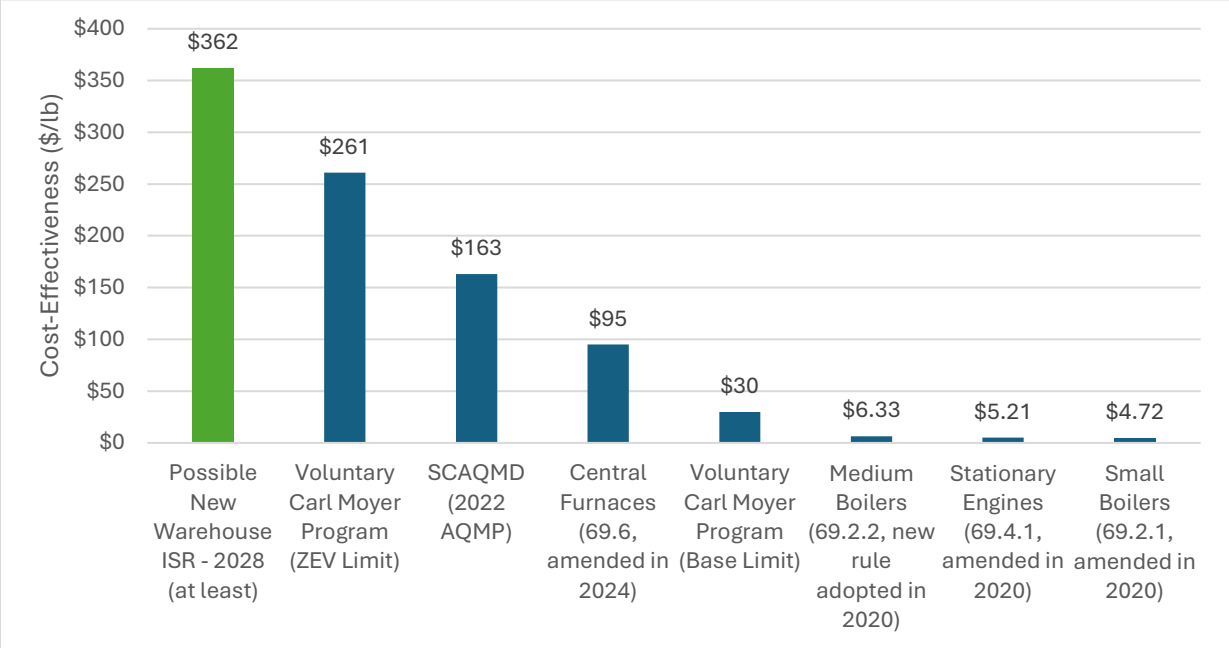
[29] SDAPCD, Final Staff Report – Proposed New Rule 67.26 – Commercial Charbroiling Operations & Corresponding Amendments to Rules 11, 12, and 40, July 2025, Tables 4 and 5, pp. G-16 and G-17, https://www.sdapcd.org/content/dam/sdapcd/documents/rules/rule-workshops/081425/Rule-67.26-Staff-Report.pdf. Estimated range of total compliance costs is (137 x $19,027/yr) and (137 x $5,768/yr).

[30] SDAPCD, Rule 69.2.2 (Medium Boilers, Process Heaters, and Steam Generators), Board Package, Attachment C - Incremental Cost-Effectiveness Analysis, Table 1, p. C-1, https://www.sdapcd.org/content/dam/sdapcd/documents/rules/rule-archive/2020/Rules-69.2.2-11-12-Board-Package.pdf. The total annualized cost was adjusted from 2018 to 2024 dollars using the ratio of the respective average consumer price indices for those years, https://inflationdata.com/Inflation/Consumer_Price_Index/HistoricalCPI.aspx?reloaded=true.

As noted in the Supplement, preliminary cost-effectiveness estimates for a potential warehouse ISR in San Diego County currently range between $362 to $464/lb of NOx reduced in 2028. The cost-effectiveness values are estimated to increase to a range between $485 and $622/lb in 2032 as NOx emission reductions are anticipated to decrease each year due to increasing emission benefits from various CARB mobile source regulations.[31]

The estimated cost-effectiveness value for a potential ISR (between $362 and $622/lb) greatly exceeds the cost-effectiveness values estimated for other recent District rulemakings ($95/lb or less). The estimated cost-effectiveness value for a potential ISR also exceeds the value for incentive-based projects within the Carl Moyer program (approximately $261/lb), which are generally recognized as some of the highest cost-effectiveness values for achieving emission reductions (Figure 2).

Figure 2 – Cost-Effectiveness Comparison to Recent Rulemakings and Incentive Programs[32]



In regulating and controlling air quality, a higher cost-effectiveness value is generally considered as a negative indicator since it requires more money (either by the emitter, or by the District) to achieve emission reductions on a per pound basis. For example, a cost-effectiveness value of $100/lb is considered less favorable than $10/lb, because it would

[31] Supplement, Section 2.5, p. 39
[32] Ibid., Figure 10, p. 40

cost the emitter or the District ten times as much as the second value to achieve the same level of emission reductions.

California Health and Safety Code Section 40703 requires that prior to adopting any regulation or rule, air pollution control districts shall consider, pursuant to Health and Safety Code Section 40922, and make available to the public its findings related to the cost-effectiveness of a control measure, as well as the basis for the findings and the considerations involved. Air districts typically try to minimize economic impacts to the extent practicable when controlling emissions. Since a potential ISR in San Diego County is likely to far exceed the cost-effectiveness of other recent rulemakings and incentive programs, the District could likely achieve the same emission reductions through other programs at a far lower cost to implement (either by industry compliance, or voluntarily through District incentive programs).

Additionally, a new health-based rule development cost-effectiveness threshold found at the South Coast Air Quality Management District (SCAQMD), which equates to $325,000/ton of NOx reduced ($163/lb, rounded), is also included in Figure 2 for comparison. While each air district's cost-effectiveness threshold differs, SCAQMD is generally recognized as having one of the highest, if not the highest, rule development cost-effectiveness threshold in the nation due to that district's need to reduce air pollution even at extremely high costs. The SCAQMD uses this screening criteria to evaluate and screen out possible NOx emission reduction measures to determine the measures that are cost-effective to pursue rulemaking.

The cost-effectiveness of a possible new warehouse ISR in San Diego County, estimated at a minimum of $362/lb, is more than double the SCAQMD's new health-based threshold of $163/lb.[33] Thus, based on their health-based rule development cost-effectiveness threshold of $163/lb, it stands to reason that the SCAQMD may have prioritized other compliance or implementation options, i.e., alternatives to their warehouse Rule 2305, if the cost-effectiveness for their rule was as high as the estimated value for a potential warehouse ISR for San Diego ($362/lb).

District staff derived the cost-effectiveness values estimated for Rule 2305 to be an average of $235/lb to $261/lb.[34] These derived values are greater than the SCAQMD's new health-based threshold of $163/lb. Although the estimated average cost-effectiveness of SCAQMD Rule 2305 was greater than their health-based threshold of $163/lb used for rule development purposes, the SCAQMD does note that their threshold

[33] Ibid., Section 2.5, pp. 38-40

[34] SCAQMD, Rule 2305, Warehouse Indirect Source Rule – Warehouse Actions and Investments to Reduce Emissions (WAIRE) Program, Staff Report, May 2021, Table 23, p. 77, http://www.aqmd.gov/docs/default-source/Agendas/Governing-Board/2021/2021-May7-027.pdf?sfvrsn=10

is neither considered a starting point for control costs, nor an absolute cap, and is thus not an absolute method for determining to proceed with rule development action.[35]

The Supplement's minimum cost-effectiveness estimate of $362/lb is also greater than SCAQMD's estimates for Rule 2305 because the total annual compliance costs for San Diego County were estimated using a weighted annual cost of $0.26/sq ft.[36] This increase in the estimated compliance costs was due to a greater average cost per square feet used in the Supplement ($0.26/sq ft) than the average costs presented in SCAQMD's Socioeconomic Impact Assessment report, which staff derived as $0.10 to $0.14/sq ft.[37] For comparison, the average annual costs estimated for SCAQMD's Rule 2305 range from -$0.02/sq ft (the lowest cost scenario, Scenario 10: ZE Class 6 Visits from a Non-owned Fleet) up to $1.21/sq ft (the highest cost scenario, Scenario 11: Solar Panel Installations). According to the SCAQMD, the maximum cost warehouse operators would be expected to incur in complying with Rule 2305 is $0.83/sq ft/yr resulting from the mitigation fee scenario.[38]

The weighted annual cost ($0.26/sq ft) used in the Supplement was derived as a potential "achieved-in-practice," i.e., more realistic, scenario based on the reported implementation rates in the SCAQMD region of certain Low-NOx and ZE compliance options that would result in direct emission reductions at subject facilities. The scenario also reflects the true cost of compliance because it accounts for facilities accruing WAIRE points through the "Other" category, which includes alternative options such as mitigation fees and air filtration installations. It's important to note that the scenario is an approximation only and was based on the reported implementation rates in the SCAQMD region, which is the best information currently available. Due to multiple compliance options that would be available in a potential warehouse ISR that operators may select from, and other characteristics unique to the San Diego region (e.g., warehouse size distribution), staff cannot forecast the implementation rates that may occur for future years in the San Diego region.[39]

These points illustrate how emission reductions, costs, and overall benefits of a rule are generally unique to each air district, and how a rule may achieve varying results in different regions. The SCAQMD, and other air districts that might adopt warehouse ISRs in the future, may achieve greater benefits with an ISR than estimated for San Diego County due to the number of large warehouses (100,000 sq ft or larger) in each region.

[35] SCAQMD, 2022 Air Quality Management Plan, December 2, 2022, p. 4-76, https://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2022-air-quality-management-plan/final-2022-aqmp/final-2022-aqmp.pdf?sfvrsn=16
[36] Supplement, Section 2.5, p. 38
[37] Ibid., footnote #67, p. 38
[38] SCAQMD, Rule 2305, Socioeconomic Impact Assessment, pp. ES-6 and ES-7
[39] Supplement, Section 2.4.2, p. 32

SCAQMD has over 3,000 large warehouses, and Bay Area AQMD has over 1,000. In comparison, there are approximately 240 large warehouse buildings in San Diego County.

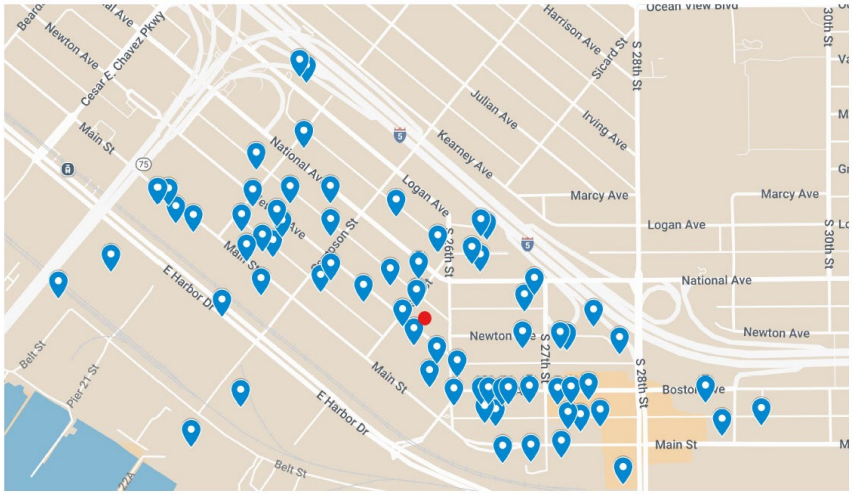
3.5 District Study of Warehouse Facilities in the Portside Community

A substantial percentage of the facilities identified as "warehouses" in the District's inventory may not be conducting warehousing activities. This will likely reduce the number of facilities that would potentially be subject to a potential warehouse ISR.

As noted in the Supplement, in December 2024, staff conducted an informal case study of warehouses in the Portside community located in the vicinity of a specific sensitive receptor. In all, staff researched 70 buildings classified in the CoStar inventory as a "warehouse" to better determine how many facilities may be conducting goods-movement related activities that would likely be subject to a possible warehouse ISR.

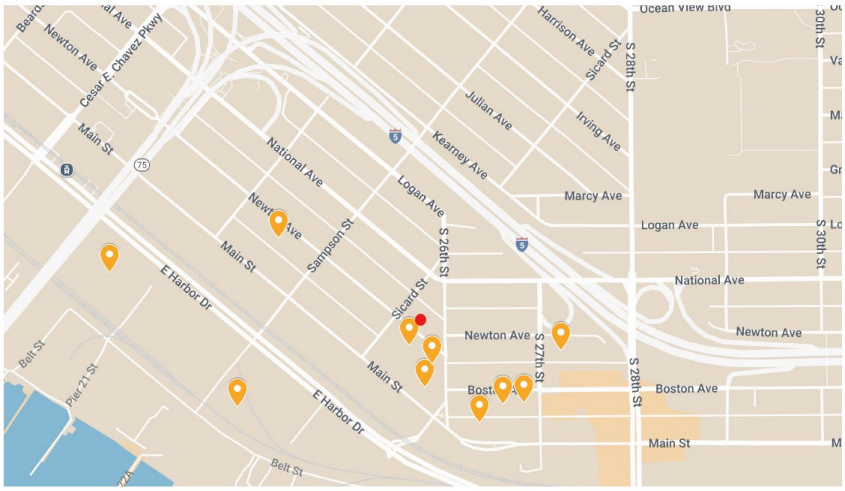
Figure 3 shows the 70 warehouse building locations (in blue) assessed around the sensitive receptor selected in the sample area in the Portside community. Figure 4 shows within the same sample area the warehouse building locations (in yellow) that staff identified as likely to be subject to a possible warehouse ISR due to their size and operational characteristics. The red dot on both maps indicates the location of the sensitive receptor assessed.

Figure 3 – Warehouse Building Locations Assessed[40]



[40] Ibid., Figure 11, p. 48

Figure 4 – Warehouse Building Locations Potentially Subject to a Possible ISR (if developed)[41]



The findings concluded that: (1) many facilities did not appear to be doing prototypical goods-movement activities, (2) it is uncertain whether smaller facilities would have adequate pathways to comply with a potential ISR similar in scope to SCAQMD Rule 2305, and (3) approximately 14% of the 70 facilities researched were likely be conducting goods-movement related activities.

The study's findings indicate that the potential emission reductions that may be realized from a potential ISR in San Diego County are likely to be less in practice than the estimates presented in the Supplement, regardless of whether smaller warehouses (less than 50,000 square feet) are included in a warehouse ISR or not. According to the preliminary findings in the study, of the 70 sample warehouse buildings researched, an estimated 64% (45 out of 70) of those facilities do not appear to be involved in goods-movement activities at all (e.g., educational facility, residential housing, and a church).[42]

Applying this value of 64% to the warehouse inventory in the Portside community to account for facilities that are not likely conducting warehousing activities, would reduce the estimated emission benefits in the Portside community from a potential ISR to 0.1 – 0.4 tons per year of NOx, and 0.001 – 0.004 tons per year of PM2.5 for the 2028 baseline year. Applying the same 64% value to the warehouse inventory countywide, would reduce the estimated emission benefits for the region to 5 – 10 tons per year of NOx, and 0.04 – 0.11 tons per year of PM2.5 for the 2028 baseline year. Both metrics reinforce that actual implementation of a warehouse ISR in San Diego County, would likely achieve less emission reductions than estimated to date.

[41] Ibid., Figure 12, p. 49
[42] Ibid., Section 2.7.4, pp. 46-49

It is possible that other regions of the county may have higher or lower percentages of warehouses conducting goods movement activities. Regardless of the exact percentage in each area, the results indicate that not all of the facilities identified in the warehouse building inventory are conducting prototypical warehousing activities, and thus may not be emitting indirect source emissions. Thus, the actual emission reductions are likely to be less than the estimates presented in the Supplement if a potential ISR is implemented.

3.6 District Costs for Rule Development and Administration

The estimated one-time and on-going District costs for rule development and administration are substantial in light of current fiscal uncertainty.

In the Supplement, staff re-evaluated the potential costs associated with rule development, implementation, and administration of a possible warehouse ISR in San Diego County, including ongoing rule development, administration, outreach, possible litigation defense, and enforcement activities. Such costs include the items listed below, which are subject to revision during a possible future formal rulemaking process. While "direct" costs associated with implementation of the program could potentially be recouped through District fees, other "one-time" costs would likely not be recoupable, unless the District received a one-time grant and/or other funding contributions for such work.

<u>One-time cost estimates</u>

- $250,000 to prepare required California Environmental Quality Act (CEQA) documentation.
- $250,000 to prepare required Socioeconomic Impact Assessment (SIA) documentation.
- $200,000 to develop a new District web portal for reporting requirements.
- $135,000 for District/County legal costs to defend a potential ISR if litigated.

<u>Ongoing cost estimates</u>

- Up to $900,000 per year (ongoing) for additional staff to administer the program (e.g. report evaluation, compliance, outreach activities).
- $25,000 per year (ongoing) to annually maintain the District web portal.
- $75,000 per year for enhanced enforcement-related actions (if necessary).
- Unknown outside legal counsel costs if a potential ISR is litigated (if necessary).

Staff believe ongoing costs associated with the direct implementation of the program (e.g., costs associated with reviewing, evaluating, and enforcing standard rule provisions) could potentially be recouped by District fees. However, costs associated with CEQA

document development, SIA development, web portal development, internal/external legal counsel, and enhanced enforcement activities may not be recouped through fees alone, though legal judgments, grants, and/or enforcement agreements could potentially recoup some costs incurred.[43]

In the District's fiscal year 2025-2026 adopted budget, approximately $184,000 is potentially available for a contracted consultant to prepare the required CEQA and SIA documents if a formal warehouse ISR rulemaking were to be initiated. However, staff estimate $500,000 total would be needed to prepare the CEQA and SIA documents and that preparation of both documents would take approximately 12 months to complete.

Additionally, the FY 25-26 budget does not include funds for the development of a new District web portal for report submissions ($200,000), as well as potential legal costs for defending litigation if necessary ($135,000 estimate).

If the District were to proceed with formal rulemaking for a potential warehouse ISR, the potential estimated costs would likely require the reallocation (or diversion) of funds from other District programs towards the development of a local warehouse ISR in future fiscal years, unless the District received one-time grant money and/or other contributions. Concurrently, there is also significant uncertainty regarding the availability of funding from federal and state sources, which could further decrease available funds that could be available for such work in the District's budget, or with other high priority programs. The projected funding needed to start implementing a potential warehouse ISR, coupled with long-term funding uncertainty, could put significant strain on the District's existing and future budgets, jeopardize District efforts for full cost-recovery of operations, and could reduce existing emission reduction and monitoring programs already being implemented.

3.7 Implementation and Compliance Efforts

A warehouse ISR in San Diego County modeled after the South Coast Air Quality Management District (SCAQMD) Rule 2305, which is the only warehouse ISR that has withstood litigation to date, is anticipated to require significant District staff effort for program implementation, outreach, and compliance/enforcement activities.

If a potential warehouse ISR were to be developed, the District has determined that an ISR would need to be modeled after SCAQMD Rule 2305 to minimize potential legal challenge. This is because Rule 2305 was upheld in federal court and later approved by the EPA. Any significant deviation from the model of Rule 2305 could potentially result in legal challenge of a local warehouse ISR on untested legal grounds. In addition, the

[43] Ibid., Section 2.6, pp. 40-42

District could be at risk of administering a unique program that may not be consistent with a potential statewide indirect source regulation if one is developed by CARB in the future. An inconsistent program could then necessitate the need to do a "clean-up" rulemaking, which could result in additional costs and resources not already accounted for. Staff efforts to implement and conduct outreach and compliance/enforcement activities for a program modeled after Rule 2305 are anticipated to be resource intensive, as described below.

Below are some key highlights presented by SCAQMD staff on their "2nd Annual Report for the Warehouse Actions and Investments to Reduce Emissions (WAIRE) Program." The report provides an overview of the WAIRE Program's implementation from Rule 2305 adoption on May 7, 2021, through August 31, 2024. Additional outreach totals are included as were reported at the SCAQMD Mobile Source Committee on October 17, 2025.

- Low levels of warehouses reporting: 28% - 43% submission rate of the expected annual reports from warehouses subject to Rule 2305.
- Significant SCAQMD outreach efforts: 21,875+ compliance advisories sent; 18,400+ calls and emails to the SCAQMD program hotline; 4,800+ in-person staff visits; over 150 presentations to stakeholders.[44]
- Notices of Violation (NOV): Over 725 Notices of Violation (NOV) issued to warehouses subject to Rule 2305 for failure to submit required reports.[45]

The results above indicate the District would in all likelihood need additional staffing to implement a similar warehouse ISR program for San Diego County. While ongoing staff costs may potentially be recouped by District fees, additional resources will likely be necessary to adequately handle the anticipated significant increase in workload. This work would include, but is not limited to, reviewing submitted reports, conducting stakeholder outreach and engagement activities, and enforcement actions for non-compliance.

For context, the District currently issues and maintains a total of approximately 8,300 Permits to Operate in San Diego County. The introduction of a potential ISR that applies to facilities greater than 50,000 sq. ft. may potentially add up to a maximum of 657 new facilities (i.e., warehouses) to the District's enforcement caseload, which equates to an almost 8% increase in a short period of time, although as noted above the number of facilities ultimately subject to a potential rule is likely to be lower. The District anticipates

[44] Ibid., Section 2.7.1, pp. 43-44

[45] SCAQMD, Rule 2305 Implementation Status Report: Warehouse Actions and Investments to Reduce Emissions (WAIRE) Program, October 17, 2025, p. 47, https://www.aqmd.gov/docs/default-source/agendas/mobile-source/msc-agenda-101725.pdf?sfvrsn=a2d36c7e_9

that staff costs to maintain these new permits could potentially be recouped through permit fees, and that an increase in staffing could occur incrementally to coincide with the phasing in of rule requirements. However, an increase of this magnitude in enforcement caseload (not including the additional activities conducted by SCAQMD staff) would nonetheless strain existing resources until such resources could be procured and costs recouped. Additionally, due to the uncertainty on the number of warehouse locations that could be subject to a potential ISR (Section 3.5), and present uncertainty with the level of funding overall that could be allocated to the District (Section 3.6), additional analysis of these factors would be needed before developing a warehouse ISR.

4.0 ADDITIONAL CONSIDERATIONS

The following are additional items considered by the District that informed the conclusion of this White Paper.

4.1 SCAQMD Rule 2305

SCAQMD Rule 2305 was developed with the goal of reducing regional emissions to attain the federal and state Ozone and PM2.5 ambient air quality standards while achieving localized emission reductions as a co-benefit.

Per the California Health and Safety Code (H&SC), the SCAQMD is required to adopt an Air Quality Management Plan (AQMP) to demonstrate compliance with both federal and state ambient air quality standards for SCAQMD's jurisdiction. The AQMP is a blueprint for meeting federal and state air quality standards, which include the National Ambient Air Quality Standards (NAAQS) for the SCAQMD jurisdiction. On March 3, 2017, SCAQMD's Governing Board adopted the 2016 AQMP. To attain the federal ozone and PM 2.5 NAAQS, the 2016 AQMP relies on reducing regional NOx emissions as a primary strategy (NOx is a precursor to the formation of both ozone and PM 2.5) but also includes measures to reduce directly emitted PM 2.5.

In the 2016 AQMP, the SCAQMD committed to assist CARB and U.S. EPA in developing the Further Deployment Measures, including through the development of local Facility Based Mobile Source Measures (FBMSMs). One of the FBMSMs includes MOB-03 – Emissions Reductions at Warehouse Distribution Centers. After considering the results of a year-long process for SCAQMD staff to evaluate potential emissions reduction strategies for the FBMSMs, in May 2018, the Governing Board directed staff to initiate rulemaking for a warehouse Indirect Source Rule (ISR), namely Proposed Rule (PR) 2305 - Warehouse Indirect Source Rule – Warehouse Actions and Investments to Reduce Emissions Program, and PR 316 – Fees for Rule 2305.[46]

Thus, Rule 2305 was developed with the intent to reduce regional emissions to attain the federal and state Ozone and PM2.5 ambient air quality standards. As a co-benefit, Rule 2305 would provide localized health benefits, particularly for those living in close proximity to a subject warehouse.[47] While a potential warehouse ISR for San Diego may similarly help to reduce regional and localized emissions, staff estimate that other measures implemented in San Diego County could achieve greater NOx emission reductions in support of attaining federal ozone and particulate matter standards.

[46] SCAQMD, Rule 2305, Staff Report, pp. 7-9
[47] Ibid., p.16

4.2 Stakeholder Comments

The District considered applicable comments received.

The following are summaries of comments received by the District on the Supplement and a potential warehouse ISR. The District is not required per state law (California Environmental Quality Act) to provide written responses to these comments received because the CEQA process does not apply simply to the District's consideration of a warehouse ISR, which is not yet a rulemaking project. Nonetheless, feedback is included here to acknowledge that the comments received were considered by the District.

4.2.1 Written Comments

The District received written comments from various stakeholders following the public release of the Supplement on April 15, 2025.[48] Some key comments received (*in italics*) are summarized below along with District feedback.

1. *Implementing an appointment system at the Otay Mesa Cargo Port of Entry presents a more practical, cost-effective solution for reducing emissions than a proposed ISR.*

   This comment was similarly discussed in the Supplement.[49] It is still uncertain whether an appointment system would provide emission reduction benefits. Short and long-term emissions models may be necessary to determine if such a project would result in induced demand at the Otay Mesa Port of Entry (POE) over time. This could potentially increase emissions due to a possible increase in truck traffic. A pilot project at the POE in Calexico currently in the conceptual stage may provide additional information on the effectiveness of such an appointment system. However, the District's role in the planning, development, and implementation of such a system would be limited because Caltrans is the main project lead in Calexico. Furthermore, it is uncertain whether the District would have the regulatory authority to require and/or set up the proposed system. The District will continue to monitor the progress of the Calexico appointment system project. If the

[48] https://www.sdapcd.org/content/dam/sdapcd/documents/rules/warehouse-work-group/april-2025/Comments.pdf; and https://www.sdapcd.org/content/dam/sdapcd/documents/rules/warehouse-work-group/comments/additional-comments.pdf

[49] Supplement, Section 2.1.5, pp. 13-14

project results in short and long-term emission reductions, the District could consider supporting a similar project in the future at the Otay Mesa Cargo POE.

2. *Goods movement is important to the economy of the San Diego region, as it supports jobs and ensures the availability of essential goods. Having warehouses in the region can improve access of distributors to their customers, which include both retail outlets and people ordering products for delivery to their own homes. The [Supplement] notes that it is necessary to consider "whether an ISR specifically in San Diego County would result in tenants moving their operations out of the county or state, or into Mexico to avoid becoming subject to a local ISR. If operations were moved into Mexico or a neighboring county, those emissions may potentially continue to impact San Diego air quality." We would like to emphasize this consideration.*

   As a result of Rule 2305 being implemented, SCAQMD staff did not expect warehouse relocation, and anticipated minimal goods movement diversion.[50] However, the impact for San Diego County from a local ISR is uncertain considering the region's proximity to a shared border with Mexico, and the daily movement of goods that currently occurs across the international border. Consequently, an SIA is needed to determine such potential impacts for San Diego County. Additionally, economic uncertainties involving tariffs at the federal level could represent an additional cost and/or factor that might result in operations moving from the San Diego County region to Mexico and vice versa. This aspect and others would need to be fully assessed in an SIA for San Diego County since these factors could not be accounted for in the Supplement.

3. *Under any scenario in which rules cause higher shipping costs, there will be some decline in marginal economic activity, loss of jobs/economic output locally and nationally, and an accompanying rise in prices throughout the chain from producer to consumer. These losses may or may not be modest in comparison to benefits.*

   According to the SCAQMD's SIA, based on the compliance cost of Rule 2305, it is projected that -240 to 11,100 jobs would be forgone on average annually from 2022 to 2031 in total across all SCAQMD industries for the low-cost (Scenario 10) and high-cost (Scenario 7) scenarios. Scenario 10 assumes all potentially affected warehouse operators comply with Rule 2305 through third party visits from Class 6 zero-emission vehicles, while Scenario 7 assumes all potentially affected

[50] SCAQMD, Rule 2305, Socioeconomic Impact Assessment, p. ES-7

warehouse operators comply with Rule 2305 by paying a mitigation fee and not receiving any funds from the mitigation fee for future compliance with Rule 2305.

Estimated forgone jobs are not currently existing jobs which are lost in the future. Rather, they are jobs which were expected to be created in the future which are no longer expected to be created, as the total number of jobs in the compliance period is higher than the total number of jobs before the compliance period. In effect, this results in a stifling of job creation. Additionally, the negative jobs forgone values presented for Scenario 10 are indicative of estimated additional jobs created if all facilities complied in the manner modeled in Scenario 10.[51]

Jobs may similarly be forgone in San Diego County if a local ISR is developed, though likely at a smaller scale than those projected for SCAQMD due to less industry and warehouse population in the region. An SIA would need to be prepared to determine such impacts for the region.

4. *Implementation of Assembly Bill (AB) 98 is anticipated to reduce truck traffic and other impacts from new warehouses. Adding an ISR [in San Diego County] could make it especially difficult to develop and operate new warehouses despite the building standards, truck routes, and other mitigations required by the law.*

While AB 98 imposes strict requirements to new/expanded warehouses greater than 250,000 sq. ft. in size, it also includes requirements for new/expanded warehouses smaller than that size threshold. For example, for new/expanded warehouse sites under 250,000 sq. ft. zoned in industrial areas, requirements include: (1) complying with the most current building energy efficiency standards; (2) providing conduits at every loading bay serving cold storage; (3) prohibiting the use of auxiliary truck engine power to power refrigeration; (4) using high-efficiency HVAC systems; (5) orienting loading bays on the opposite side of the building from sensitive receptors; (6) having a separate entrance for heavy-duty trucks; (7) locating truck entrances/exits and internal circulation away from sensitive receptors; and (8) using at least 50 feet of landscape buffering along sensitive receptors.

For new/expanded warehouse sites smaller than 250,000 sq. ft. in a location not zoned for industrial use, the requirements are similar, but in some cases more stringent. Such requirements would include the following, in addition to those listed above: (1) comply with 21st Century Warehouse design elements; (2) use at least 100 feet of landscape buffering along sensitive receptors instead of 50 feet; (3)

[51] Ibid., p. ES-7

ensure all truck loading bays be setback 500 feet from any property line abutting a sensitive receptor; or (4) rezone as applicable.[52]

Operators of new or expanded warehouses are subject to the requirements of AB 98 as of January 1, 2026. This would be in addition to the requirements of a potential local warehouse ISR if adopted, though some requirements would be complementary to one another. For example, a local ISR would include a menu of compliance options to choose from, such as the operation of zero-emission cargo handling equipment. If the proposed new facility has requirements to only use zero-emission cargo handling equipment to comply with AB 98, in practice, the proposed new facility could potentially comply with both AB 98 and a local ISR by opting to use zero-emission cargo handling equipment. Considering that operators at new or expanded warehouses would be subject to the requirements of both AB 98 and a potential local ISR, having to comply with the regulations could have the effect of stifling the development and/or expansion of such operations in San Diego County.

5. *We encourage APCD to assist businesses in the San Diego region with complying with existing federal, state, and local rules rather than adding additional rules specific to the region.*

District staff engage regularly with affected industry to assist with compliance with federal, state, and local rules and regulations. One example of this engagement is through the District's current Business Assistance Program, which provides sites with courtesy inspections, permitting assistance, and training opportunities to facilitate compliance and for sites to be informed about regulations at all levels of government.[53] The District acknowledges that with the potential adoption of a warehouse ISR such engagement efforts would need to be significantly enhanced.

[52] AB 98 defines "21st century warehouse" as meaning a logistics use that meets all of the following: (1) complying with or exceeding all requirements of the most current building energy efficiency standards including but not limited to photovoltaic system installation and battery storage, cool roofing, medium and heavy-duty vehicle charging readiness, and light duty electric vehicle charging readiness and installed charging stations, (2) skylights in at least 1% of the roof area or equivalent LED efficient lighting, (3) providing conduits at every loading bay serving cold storage and prohibiting the use of auxiliary truck engine power to power refrigeration, (4) using high-efficiency HVAC systems, (5) pursuant to CARB's Zero-Emission Forklifts regulation, ensuring all forklifts used on-site are zero-emission by 1/1/2030 to the extent operationally feasible, and (6) pursuant to CARB's SORE regulation, ensuring all small off-road engines used on-site are zero-emission to the extent operationally feasible, https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=202320240AB98#96CHP.

[53] https://www.sdapcd.org/content/sdapcd/compliance/business-assistance.html

Pursuant to federal and state law, the District adopts new and amended rules to support attainment of federal and state ambient air quality standards, and to meet federal, state, and local requirements. The District balances these obligations along with and in parallel to the goal of improving air quality in under-resourced communities pursuant to separate state law, and with resources to implement such obligations. In addition, the District administers several state, federal, and local funding programs to assist businesses with reducing emissions from mobile sources that go above and beyond the requirements of any regulation.

6. *An ISR would likely take many years to develop and may even jeopardize a warehouse owner/operator's ability to qualify for future state funding for cleaner vehicles and equipment, should certain voluntary emission reduction measures become required.*

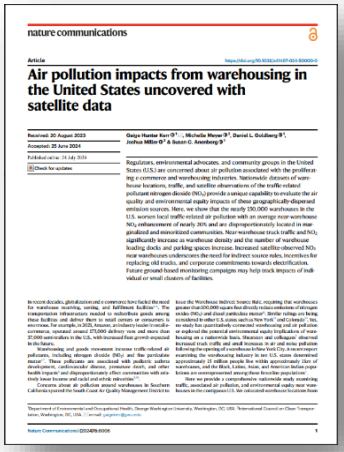
   If the District pursues formal warehouse ISR rulemaking, it is anticipated that a rule would not be effective until 2028 at the earliest. At that point, if adopted, an ISR would likely impede incentive funding opportunities for any warehouse owner/operator subject to the rule, including funding for zero-emission trucks and infrastructure. Many of the District's incentive programs utilize state or federal funding, which typically include requirements to ensure the funds are being used in "surplus" to existing rules or regulations and between 1-3 years in advance of regulatory deadlines. As such, potentially affected facilities planning to use incentive funding to comply with a potential warehouse ISR (if adopted) in the same year, would likely be ineligible for such funding. To avoid potential incentive funding complications, the District strongly encourages warehouse owners or operators who are planning to apply to the District for incentive funding, to apply as early as possible to such incentive programs, and in advance of any potential local or statewide warehouse ISR (if developed).[54] This would ensure that their equipment is as clean as possible prior to any potential future regulatory requirements, either at the local or state level, potentially limiting possible regulatory requirements.

7. *SCAQMD Warehouse Indirect Source Rule 2305 did not receive any creditable emission reductions from EPA. It is, therefore, reasonable to assume that a rule modeled after the South Coast's program would then not receive any SIP credit for emission reductions.*

[54] Information about available funding opportunities is available on the District's webpage, https://www.sdapcd.org/content/sdapcd/grants.html.

According to the EPA, if the SCAQMD corrected specific deficiencies relating to enforceability in Rule 2305, they could receive SIP credit (i.e., full approval) for the emission reductions achieved rather than a measure that simply "strengthens" the State Implementation Plan (SIP).[55] At this time, it is uncertain whether SCAQMD will amend their rule to correct those deficiencies. While SIP-creditable emission reductions are generally preferred for such measures, they are not always critically needed. If the District elected to pursue a warehouse ISR in the future, the District could potentially address these deficiencies to the extent feasible prior to submittal to the U.S. EPA. Regardless, under the current federal Administration it is uncertain whether a warehouse ISR for San Diego County would be approvable by the EPA.

8. *Staff's methodology is flawed in determining warehouse size and truck volumes, especially considering the District's refined analysis of CoStar "warehouses." As noted in the Kerr et al. study, if it was the case that the size of the facility correlated so strongly with increased truck volume/visits, then [the Kerr et al. study's] findings would have also indicated as such.[56]*


nature communications

Article

Air pollution impacts from warehousing in the United States uncovered with satellite data

Staff analyzed the data used in the Kerr et al study referenced in the comment. The results of the analysis indicate a strong correlation between warehouse floor area and on-road NOx emissions, 0.99, and between warehouse floor area and annual average daily traffic, 0.97 to 0.99 (Appendix B – Kerr Study Analysis). A correlation coefficient of 1 indicates a perfect positive correlation, which means that when one variable changes, the other variable changes in the same direction. This means that as warehouse square footage increases, on-road emissions and annual average daily traffic also proportionately increases.

9. *The Warehouse ISR concepts explored in the Framework Supplement are limited to compliance options available in the SCAQMD Warehouse Indirect Source Rule (Rules 2305 and 316), and do not properly consider the unique context of*

[55] 89 FR 73568, https://www.federalregister.gov/d/2024-20349/p-34. In the EPA's approval of Rule 2305, three specific types of deficiencies related to enforceability were identified: (1) two ambiguous definitions; (2) the sunset clause; and (3) two instances of unbounded director's discretion.

[56] Kerr et al, Air pollution impacts from warehousing in the United States uncovered with satellite data, July 24, 2024, https://www.nature.com/articles/s41467-024-50000-0#Sec4

warehousing operations in San Diego or its localized impacts on warehouse-adjacent communities. As a result, the Framework Supplement does not provide accurate estimates of potential emission reductions that may be achieved through an indirect source rule, the cost of regulation, or the effectiveness of an incentive-only framework.

Staff elicited input from stakeholders multiple times during the WWG meetings on any alternatives to a warehouse ISR that could specifically work for San Diego County. The District summarized the alternatives that were brought up for discussion within the Supplement, and while all were considered, staff determined that the only viable, and legally sound, non-regulatory option discussed during the WWG meetings was the incentive-based option. Furthermore, the Supplement did assess the truck-related emission impacts specific to San Diego County warehouse operations, and also assessed the estimated emission reductions that would be achieved on a localized basis within both AB 617 communities (Portside and International Border). Within this White Paper, the potential health benefits that could potentially be achieved in both referenced communities with a warehouse ISR, have also now been quantified.

Staff analyzed the potential impacts of a warehouse ISR for San Diego County using SCAQMD's Rule 2305 as the model considering it is the only rule adopted that currently regulates warehousing operations in California. Rule 2305 is also the only warehousing rule approved by the U.S. EPA and upheld in federal court after legal challenge. In addition, the analyses presented in the Supplement considers warehouses as small as 50,000 sq ft. This size category expands beyond the applicability threshold of Rule 2305, which only applies to warehouses 100,000 sq ft or larger. Consequently, even looking at warehouses at this size threshold, the District is on untested legal ground. Furthermore, warehouses smaller than 50,000 sq ft were not included in the analyses in the Supplement due to certain challenges for regulating within that size category (see Comment No. 10 below).

Regarding the comment on accuracy of potential emission reductions that could be achieved through a potential warehouse ISR, staff used the same methodology as the one used for the development of the SCAQMD Rule 2305 to estimate baseline emissions.[57] To date, the District has not been informed by stakeholders of any alternative methodologies that could be considered to estimate baseline emissions.

Staff then evaluated three best-case emissions reduction scenarios in the Supplement (Scenarios 1, 2 and 3). Scenario 3 (Low-NOx, ZEV, Other) was

[57] Supplement, Section 2.4.1, pp. 28-31

evaluated as a potential "achieved-in-practice," i.e., more realistic, scenario based on the reported implementation rates in the SCAQMD region of certain Low-NOx and ZE compliance options that would result in direct emission reductions at subject facilities.[58]

Regarding the comment on accuracy of the cost estimates presented in the Supplement, the total annual compliance costs for San Diego County were estimated using a weighted annual cost of $0.26/sq ft derived from SCAQMD's information on average costs and WAIRE Menu Items implemented. Cost-effectiveness values, expressed in dollars per pound of NOx emissions reduced ($/lb), were estimated using the total annual compliance costs and the emission reductions listed in the Supplement.[59]

All preliminary estimates presented in the Supplement (e.g., baseline emissions, emission reductions, compliance costs, and cost-effectiveness values) were calculated using the best available data and methodologies at the time. These estimates are subject to change pending further analysis and updated data as available if future rulemaking is pursued.

Regarding the comment on an incentive-only framework, discussions on incentive program concepts can be found in Section 4.7.

10. *Expanding the applicability of an ISR to a broader range of warehouses throughout the region would substantially increase emission reduction potential for the rule and help ensure cleaner air in San Diego's disadvantaged communities and neighborhoods that endure a disproportionate share of air pollutant emissions, exposure, and health impacts.*

    This comment was similarly discussed in the Supplement.[60] Lowering the applicability threshold of an ISR to warehouses less than 50k sq ft is not likely to result in increased emission reductions as suggested, for the following reasons:

    - Many smaller warehousing facilities identified as "warehouses" in the CoStar inventory may be conducting non-warehousing activities. As evaluated in the case study conducted with the Portside community, up to 64% of the warehouses identified by CoStar in that vicinity do not appear to be involved in goods movement activities. These facilities observed in the case study are used for non-warehousing activities, e.g., educational facilities, residential

[58] Ibid., Section 2.4.2, pp. 31-32
[59] Ibid., Section 2.5, pp. 38-40
[60] Ibid., Section 2.1.5, pp. 16-17

housing, and a church (Section 3.5). Similar trends of facilities being used for non-warehousing activities are likely to be seen throughout the County. While some of these facilities may have occasional truck activity (or none at all), they are not characterized as the prototypical goods movement operation seen at large warehouses that have been identified in other areas of California as being large contributors to indirect sources of emissions.

- SCAQMD Rule 2305 includes provisions that allow warehousing facilities with little/no trucking activity to be exempt from procuring WAIRE points in their respective ISR (i.e., below a de minimis value).[61] Effectively, this means that while a facility categorized as a "warehouse" might still need to report to SCAQMD under Rule 2305, they would not be required to modify any of their operations, purchase any new equipment or infrastructure, nor be required to reduce any emissions whatsoever. Coupled with the fact that many warehouses identified by CoStar are not conducting goods-movement operations, a similar de-minimis threshold for smaller facilities doing little/no trucking activity in San Diego County (and thus not producing significant emissions), would not likely achieve significant additional emission reductions.

- Finally, regulating smaller warehouses less than 100,000 sq ft of floor space poses significant logistical and legal challenges that may not be adequately addressed within already federally approved ISRs. SCAQMD Rule 2305 was developed to include a menu of compliance options specifically for warehouse facilities with floor area of 100,000 sq ft or more due to the type of activities occurring at facilities of this size. However, those compliance menu options that would be needed in a potential ISR may not be feasible for smaller warehouse operators to implement.

  Options such as installing solar panels or charging infrastructure may not be feasible for smaller facilities where adequate space is not available. Additionally, such options may not be available for warehouse tenants that lease the building they occupy, as approval by the warehouse owner would be required to make such improvements. For smaller warehouses, such constraints are further exacerbated as warehouse size decreases and facilities get used for multiple purposes (e.g., manufacturing, storage, office space, etc.). Consequently, purchasing zero-emission equipment may not always be

[61] SCAQMD, Rule 2305, Warehouse Indirect Source Rule – Warehouse Actions and Investments to Reduce Emissions (WAIRE) Program, May 7, 2021, p. 2305 – 17, https://www.aqmd.gov/docs/default-source/rule-book/reg-xxiii/r2305.pdf?sfvrsn=99b5af61_21

feasible, especially if charging infrastructure cannot be installed onsite, or is not readily available for public use.

The inability for a smaller facility to implement at least some of the compliance menu options could result in any potential warehouse ISR being considered as a de-facto purchase mandate and raise federal preemption concerns. There are also concerns that land-use changes (such as new sensitive receptors moving into a neighborhood) interacting with such requirements could present a dynamic regulatory environment, which consequently could result in previously exempt warehouses becoming subject to a potential ISR even if their operations have never changed. This scenario could create additional legal uncertainty.

11. *While the Framework Supplement acknowledges California's withdrawal of a waiver request to the Environmental Protection Agency for its Advanced Clean Fleets (ACF) regulation, it does not fully lay out the emissions or air quality impacts of this decision or the vacuum of regulatory uncertainty that the loss of this regulation creates.*

By letter dated January 13, 2025, CARB withdrew their request for a waiver from the EPA. Consequently, the anticipated emission benefits that would have been achieved through implementation of the ACF regulation, including those from the turnover of truck fleets servicing warehousing operations, were not included in estimates presented in the Supplement.[62] The emission scaling factors were subsequently adjusted to effectively remove from the District's initial estimates the emission reductions that the ACF regulation was anticipated to achieve.[63]

The District acknowledges that there continues to be uncertainty on the status of other regulations at the State and federal level. However, it is unclear what and how much impact these actions will ultimately have on emissions overall as many of the actions are now in litigation with uncertain outcomes. Additionally, there are recommendations happening at the State level that seek to mitigate some of these federal actions, one of which includes CARB potentially pursuing a statewide ISR (Sections 4.4.3 and 4.4.4). The District is also mindful of uncertainty with seeking federal approval for new local rules that could deviate from already approved rules in the SIP.

[62] Supplement, Section 2.7.2, p. 45
[63] Ibid., Section 2.4.1, p. 30

12. While the scale and pace of this transition demonstrates that the requisite technology is available, voluntary or incentive-based programs do not always work.

While voluntary incentive programs are not "required", their existence has consistently shown that they are an integral component in the transition to cleaner technologies. CARB has noted in a recent report that incentive programs "crosscut the need to address both the affordability of vehicles and infrastructure and to support market expansion."[64] While the commentor notes that zero-emission technology is now available, the price of such technology (without incentive funding) still far exceeds the cost of traditional combustion equipment. For example, the approximate cost of a ZEV Class 8 truck with day cab is $436k, while the cost of a similar diesel Class 8 truck is $156k, which is a 179% difference.[65] Without the existence of incentive programs, procuring zero-emission technology would likely continue to be too expensive for many small businesses or independent owner/operators for the foreseeable future. Additionally, with State incentive funding levels being reduced for FY25-26 for various programs like the Clean Truck and Bus Voucher Incentive Project (HVIP) and AB 617, it is uncertain whether available grant funding can sufficiently meet local demand for zero-emission equipment in the foreseeable future.

As has been demonstrated by the EPA's approval of SCAQMD Rule 2305, and the rule withstanding litigation, an ISR must offer a menu of compliance options, and is at this time the only legal pathway currently available for a potential warehouse ISR. Thus, a potential ISR, if adopted, would have the same level of uncertainty as to the level of implementation and adoption of cleaner technologies as an incentive program. For an ISR, facilities must select from a menu of options to comply; some of these available options would achieve little to no creditable emission reductions, nor would these options address the dynamic of diesel trucks operating within under-resourced communities. General economic principles suggest that it is highly likely that many of the subject facilities for a warehouse ISR, would select the least expensive option to comply with a potential ISR, which has been exhibited within reporting for SCAQMD Rule 2305. Additionally, adoption of a potential ISR would restrict these subject facilities from being eligible for incentive funding to comply with the rule, making ZEV or Low-NOx menu options potentially even less viable to the warehouse operator.

[64] https://ww2.arb.ca.gov/sites/default/files/2025-08/August%202025%20Report%20to%20the%20Governor%20in%20Response%20to%20Executive%20Order%20on%20ZEV%20Deployment%20FINAL_0.pdf

[65] CARB, Zero-Emission Class 8 Truck Pricing Comparisons – EU & US, October 2024, p.3, https://ww2.arb.ca.gov/sites/default/files/2024-12/Zero%20Emission%20Class%208%20Tractor%20Pricing%20Comparisons_ADA.pdf

13. *In Section 2.6 of the [Supplement], the District explains that up to six additional full-time staff positions would be necessary to regulate warehouses over 50,000 sq ft, under such a rule, and that staffing increases would result in up to $900,000 in additional ongoing costs for personnel salary and benefits. While we are sensitive to the financial realities of the District, a more in-depth analysis of warehouse activity and truck counts throughout the County is required to determine whether this figure overestimates administrative costs.*

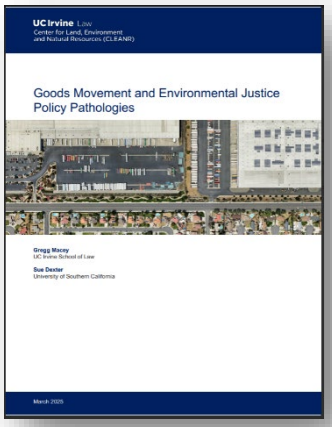
The estimated ongoing costs included in the Supplement of $300,000 to $900,000 that the District may accrue were based on the number of additional full-time staff positions that may be needed to implement an ISR (assuming regulation of facilities over 50,000 sq. ft.) and were not based on warehouse activity and truck counts.[66] These estimated salary costs also comprised of the "all-in" costs for hiring of such positions, which include salary and benefits. The District acknowledges that such ongoing costs could decrease as the number of subject facilities are likely to be less than the warehouse inventory estimated in the Supplement due to the number of facilities that are most likely not conducting warehousing activities. Nonetheless, the District would likely need to plan accordingly with appropriate staffing levels to cover the anticipated large increase in workload and additional outreach and enforcement activities associated with a potential warehouse ISR.

Staff believes the staffing needs in San Diego County presented in the Supplement are consistent with other air districts also evaluating existing and potential warehouse ISRs. In a recent presentation the Bay Area AQMD (which is also evaluating a potential warehouse ISR) estimated that three full-time equivalent staff would be needed solely for the rule development process alone.[67] SCAQMD also estimated five full-time equivalent positions for rule and program implementation for Rule 2305.

[66] Supplement, Section 2.6, p. 41

[67] BAAQMD, Presentation to Stationary Source Committee, March 12, 2025, slide 13, https://www.baaqmd.gov/~/media/files/board-of-directors/2025/ssc_presentations_031225_op-pdf.pdf?rev=ca3e15891cee4cf987e33ce7ec16f579&sc_lang=en

14. *The potential public health benefits of a Warehouse ISR are substantial. For example, the UC Irvine School of Law study estimated the dollar value of health benefits of a Rule 2305-style Warehouse ISR in the Bay Area. Its authors determine that such a program would achieve health benefits from PM and NOx/ozone reductions of up to $18.1 million per year for a Rule 2305-type program in the Bay Area alone.*[68]



The District acknowledges that public health benefits may be achieved in any region through the implementation of a warehouse ISR (see Section 3.2). However, the level of benefits will vary between regions due to differences in warehouse inventory and actions implemented for compliance. For example, regions that have little/no warehousing activity, would be expected to experience little/no health benefit from a potential ISR. Thus, an ISR's effectiveness will depend significantly on the inventory of goods movement-related warehouses in a particular region.

The UC Irvine School of Law study referenced in the comment, which analyzed ISR impacts in the Bay Area air basin, considered approximately 1,000 warehouses and distribution/transloading centers greater than or equal to 100,000 square feet. [69] This amount is four times greater than the 243 large warehouse buildings estimated for San Diego County of similar size, and thus it would be expected that regions with a greater warehouse inventory would experience more emission reduction benefits from a potential ISR. However, it is also likely that not all of the 1,000 facilities in the inventory identified for the Bay Area region are conducting warehousing activities, which could reduce the study's emissions reduction estimate and corresponding potential health benefits noted (Section 3.5). The District utilized the same tool (EPA COBRA) as the study referenced above to estimate potential health benefits for San Diego County regionwide, as well as in under-resourced communities (see Section 3.2), in the Supplement and within this White Paper. Due to fewer facilities that would be subject to a potential ISR, and using San Diego County-specific truck trip rate estimates for trucks visiting warehouses throughout the county, this expectedly produces a much smaller health benefit than those anticipated in the Bay Area and South Coast regions.

[68] Gregg Macey & Sue Dexter, Goods Movement and Environmental Justice Policy Pathologies, UC Irvine Law CLEANR, March 2025, Table 5, p.47, https://cleanr.law.uci.edu/files/2025/03/Goods-Movement-and-Environmental-Justice-Policy-Pathologies-March-18-2025.pdf
[69] Ibid., p. 43

Also, the projected air quality in the study is based in part on the retirement of existing internal combustion engine trucks and purchase of new vehicles from 2025 through 2045. A WAIRE-based ISR must include multiple compliance options, some of which do not result in direct emission reductions at the facility, e.g., installation of solar panels, charging infrastructure, and air filters in the surrounding communities. Thus, warehouse operators/owners may elect not to replace their trucks with lower emission vehicles as a compliance option. For this reason, and as discussed above, the emission reductions and associated public health benefits are likely to be less in practice than the estimates presented in the study.

15. *Barrio Logan has 220 warehouses across roughly 5 square miles. West National City has 201 warehouses within its borders. Roughly ¾ of these warehouses are smaller than 20,000 square feet; they should appear in any consideration of the utility and cost-effectiveness of an ISR.*

Based upon the results of a case study conducted by the District within the ISR Supplement,[70] staff believes there is a strong likelihood that a small percentage of the warehouse buildings noted by the commenter (and seemingly identified by CoStar) in these neighborhoods are conducting goods movement activity. The case study, which evaluated 70 warehouse locations (all sizes) around a sensitive receptor in the Barrio Logan neighborhood, determined 14% (10 out of 70) of the CoStar warehouse inventory in the area assessed were likely to be conducting prototypical warehouse operations that might be conducive to trucking activity. Other locations identified as a "warehouse", had other activities occurring that are not likely to generate significant truck activity and/or emissions, including a billiards hall, educational facility, church, youth and community center, art gallery, and event space rental. Staff believes that, particularly in areas where land use zoning is mixed between industrial and residential uses (like Barrio Logan and National City), that many of the locations identified as a warehouse by CoStar may not actually be a warehouse that would be subject to a potential ISR (if developed), or are small businesses operating a warehouse that could potentially be impacted financially if they were to be subject to an ISR.

As noted above, regulating warehouses smaller than 100,000 sq ft of floor space poses significant logistical and legal challenges that may not be adequately

[70] Supplement, Section 2.7.4, pp. 46-49

addressed within already federally approved ISRs.[71] See Comment No. 10, Section 4.2.1.

16. Sensitive land uses face even greater impacts of warehousing and goods movement; Barrio Senior Villas, for example, is home to residents over the age of 75 and located within 1000 feet of over 35 warehouses.

The number of warehouses located within 1,000 feet of the Barrio Senior Villas referenced in the comment may be an overestimation of facilities that are actively engaged in goods-movement activities, considering staff's case study of the warehouses located in that same area. According to the preliminary findings in the study, of the 70 sample warehouse buildings researched, an estimated 64% (45 out of 70) of those facilities do not appear to be involved in goods-movement activities at all (e.g., educational facility, residential housing, and a church). See Section 3.5.

17. Prior to development of Rule 2305, SCAQMD attempted a voluntary incentive program for over a year but achieved little success.

Potential options for reducing emissions from warehouses were discussed in the SCAQMD Warehouse ISR Working Group such as facility caps, local government measures, clean fleets crediting/banking program, voluntary fleet certification program, best management practices, and mitigation fees. Of these options, only the best management practices (now the WAIRE Menu and Custom WAIRE Plan option) and the mitigation fee options were included in Rule 2305.[72]

Like SDAPCD, SCAQMD has also exhibited significant success in implementing voluntary incentive programs. In 2020 alone, one year before Rule 2305 was adopted, SCAQMD awarded over $139 million for clean air projects, of which $40 million was awarded to goods-movement operators who purchased 399 cleaner heavy-duty vehicles, electric charging infrastructure, and hydrogen fueling units.[73]

18. According to updated ISR emission reduction estimates presented to the public by SDAPCD in April 2025, an ISR for facilities over 50,000 square feet is expected to

[71] Supplement, Section 2.1.5, pp. 16-17
[72] SCAQMD, Rule 2305, Staff Report, p. 11
[73] SCAQMD, 2020 Annual Report, https://www.aqmd.gov/docs/default-source/annual-reports/2020-annual-report.pdf

reduce regional NOx emissions by as much as 36.1 tons per year, and PM2.5 emissions by as much as 0.26 tons per year.

Estimated emission reductions from warehouses in San Diego County subject to a potential ISR are between 13 - 27 tons per year of nitrogen oxide (NOx), and 0.1 - 0.3 tons per year of particulate matter (PM2.5), depending on the applicability threshold used. See Section 3.1. These figures are best-case scenario, and for the reasons described in the Supplement and this White Paper, the District anticipates lower emission reductions than calculated to date.

19. *But the South Coast's Rule 2305 is not the first indirect source rule in California. In fact, local air districts in California have utilized indirect source regulations for decades. The table below [in comment letter] provides a brief description of indirect source rules adopted by various air districts in California.*

While there are six ISRs referenced in the table in the comment letter, five of those rules are for residential, commercial, and/or industrial development projects, which are different source types than warehouses.[74] In general, these rules require on-site mitigation or payment of off-site mitigation fees, and all involve emissions only from new and redevelopment sources (i.e. not existing). Additionally, all five of the referenced rules were adopted prior to the eventual passage of Proposition 26, which was passed by California voters in November 2010. The imposition of Proposition 26 significantly limited local government authority to adopt fees, such that a similar rule adopted today would not be likely to survive legal challenge.

The sixth rule referenced in the comment letter is SCAQMD Rule 2305, which currently is the only ISR adopted in California that specifically applies to warehouses sized 100,000 sq ft and larger located in the South Coast region. Accordingly, Rule 2305 has been referenced and discussed in the ISR Framework, the Supplement, and this White Paper, and thus is more appropriate to be the model for a potential warehouse ISR for San Diego County.

20. *APCD has a legal obligation under state law to adopt indirect source controls. Under state law, air districts that have moderate air pollution such as San Diego County must comply with additional requirements in developing plans to achieve and maintain state ambient air quality standards. More specifically, California law directs each district with moderate air pollution to include specific measures in its*

[74] The six ISRs referenced in the table of the comment letter are: Colusa County, Rule 510; Mendocino County, Regulation 1; San Joaquin Valley, Rule 9510; Imperial County, Rule 310; Tehama County, Rule 2:11D; and South Coast, Rule 2305.

attainment plan, including "provisions to develop areawide source and indirect source control programs."

The District is not legally obligated under state law to adopt ISRs but rather has the discretion to consider ISRs as options for inclusion in the region's State ozone attainment plan. The California H&SC requires that "each district with moderate air pollution shall, *to the extent necessary to meet the requirements of the plan developed pursuant to Section 40913 [emphasis added]*," include certain measures in its attainment plan, with one of the possible measures being "provisions to develop areawide source and indirect source control programs."[75]

Plans developed pursuant to Section 40913 "shall be based a determination by the district board that the plan is a cost-effective strategy to achieve attainment of the state standards by the earliest practicable date."[76] Section 40922 further states that such plans "shall include an assessment of the cost effectiveness of available and proposed control measures and shall contain a list which ranks the control measures from the least cost-effective to the most cost-effective…" and, in addition to considering the relative cost effectiveness, the district shall also consider factors "…including, but not limited to, technological feasibility, total emission reduction potential, the rate of reduction, public acceptability, and enforceability."[77]

Through modeling completed for San Diego County's 2020 federal ozone Attainment Plan, the District determined that attainment of the most stringent federal ozone standard (i.e., 2015 standard, or 70 ppb), was anticipated by the federal deadline of 2032, without the need to adopt an ISR or any additional local measures.[78] Consequently, the District is not required by either State or federal law to include provisions to develop areawide source and indirect source control programs, but rather has the option to do so if considered necessary to meet the requirements of the plan.

In addition, per H&SC 40716(a), "…with respect to the attainment of state ambient air quality standards, a district *may [emphasis added]* adopt and implement regulations…" to "…reduce or mitigate emissions from indirect and areawide

[75] California Health and Safety Code (H&SC), § 40918(a) and § 40918 (a)(4), https://codes.findlaw.com/ca/health-and-safety-code/hsc-sect-40918/. This requirement likewise applies to serious, severe, and extreme air pollution (see H&SC, § 40919, 40920, and 40920.5).
[76] H&SC § 40913(b), https://codes.findlaw.com/ca/health-and-safety-code/hsc-sect-40913/
[77] H&SC § 40922, https://codes.findlaw.com/ca/health-and-safety-code/hsc-sect-40922/
[78] SDAPCD, 2020 Plan for Attaining the National Ambient Air Quality Standards for Ozone in San Diego County, October 2020, p. 84, https://www.sdapcd.org/content/dam/sdapcd/documents/grants/planning/Att%20A%20(Attainment%20Plan)_ws.pdf

sources of air pollution."[79] Also, per H&SC 40100.6.5(a)(6), the District shall "*consider [emphasis added]* adopting an indirect source rule to address pollution from mobile sources that is associated with stationary sources, such as ports, warehouses, and distribution centers."[80] Accordingly per the H&SC, the District may adopt or shall consider adopting an ISR, which are not the same as requiring the District to adopt such rules. This is further supported by a statement made by the SCAQMD within a May 2018 Staff Report to their Governing Board on ISRs noting that "*SCAQMD is not required to adopt an ISR simply because another air district found it feasible*."[81]

21. While the 2009, 2016, and 2022 Regional Air Quality Strategy make note of potential indirect source measures, the District has yet to take action to develop any indirect source regulation.

As discussed in the 2022 Regional Air Quality Strategy (RAQS), a possible ISR measure was included in the District's list of scheduled measures for possible adoption.[82] This was not a commitment in the RAQS to adopt a warehouse ISR within a certain timeframe but to consider it for possible adoption. Staff's preparation of the ISR Framework, convening the WWG meetings, and preparation of the Supplement and this White Paper were done to fulfill the requirement set forth by AB 423 to consider an ISR for warehouses and distribution centers in San Diego County, and also fulfill the commitment for consideration made in the 2022 RAQS.

The District did not mention possible ISR regulations within the 2009 or 2016 RAQS. However, the District's existing indirect source program that was adopted by the Board in 1997 primarily consists of outreach to local governments, land developers, and neighborhood groups, to reduce vehicle trips and associated emissions through voluntary land use and street design improvements. No ISR rulemakings were under consideration in this program until the 2022 RAQS was developed and adopted.

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[79] https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?sectionNum=40716.&lawCode=HSC

[80] https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?sectionNum=40100.6.5.&lawCode=HSC

[81] SCAQMD, Staff Update and Recommendations, Facility-Based Mobile Source Measures, March 2018, p. 3-2, https://www.aqmd.gov/docs/default-source/agendas/governing-board/2018/2018-may4-032.pdf?sfvrsn=70fcf961_2

[82] SDAPCD, 2022 Regional Air Quality Strategy (RAQS), p. 55, https://www.sdapcd.org/content/dam/sdapcd/documents/grants/planning/Att.%20A%20-%202022%20RAQS.pdf

4.2.2 Additional Comments

Since the public release of the Supplement in April 2025, staff continued to engage with various industry and environmental stakeholders, including the County of San Diego Environmental Justice Working Group, to elicit feedback on the District's consideration of a local warehouse ISR. Some key comments received (*in italics*) are summarized below along with District feedback.

1. *Waiting for CARB to adopt a statewide ISR is not a viable option as it will likely face legal challenges and take at least 5 years to develop and adopt.*

   If CARB were to develop statewide emission reduction strategies for indirect sources (Sections 4.4.3 and 4.4.4) there is the potential that a statewide warehouse ISR could be challenged in court on the argument, among other things, of federal preemption of mobile sources such as trucks. A potential warehouse ISR for San Diego County could also be legally challenged on the same grounds and would likely take multiple years to develop and adopt.

2. *Incorporate equity to protect smaller businesses from any costs.*

   A local warehouse ISR could potentially apply to small businesses depending on the applicability threshold of the rule. Any warehouse subject to a local ISR, including potential small businesses, would incur costs to comply with the requirements of the rule, such as District fees, reporting fees, as well as implementation costs such as installing charging infrastructure, purchasing ZEV or Low-NOx trucks, or mitigation fees.

3. *Prioritize protections for nearby EJ communities and ensure strategies don't shift pollution elsewhere.*

   A local warehouse ISR cannot prevent emissions attributed to warehousing activities from being displaced to other areas. It is currently unknown whether warehouse operations would be relocated outside of San Diego County, such as to other regions in California, out of state, or out of the United States, as a result of the estimated costs that would be incurred to comply with the requirements of a local ISR (Section 4.5.4). If developed and adopted by CARB, a statewide warehouse ISR may help to minimize the displacement of emissions at least within California through uniform requirements for all subject air districts throughout the state.

4.3 Supplement Clarifications

The following are additional discussions of certain sections of the Supplement provided for clarification.

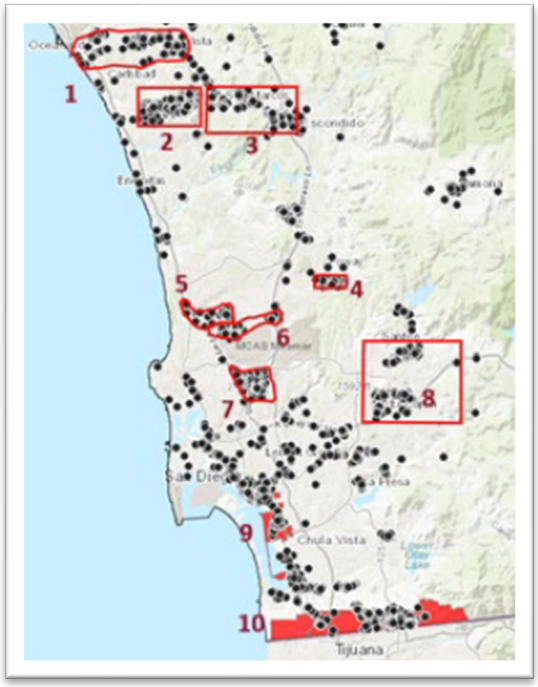
4.3.1 Warehouse Clusters

Correlation Coefficients

The Warehouse Clusters analysis was included in the Supplement to present the correlation between warehouse floor area and total truck trip volume. The warehouse clusters were grouped into ten areas of San Diego County where general warehouse clusters are located (Figure 5).[83] Except for the Portside and International Border communities, the other eight clusters were designated using approximate boundaries to group warehouses located within the same city or area and not with census tracts or any specific geographic parameters.

[83] 1) Oceanside and Vista, (2) Carlsbad and Vista, (3) San Marcos and Escondido, (4) Poway, (5) Sorrento Valley, (6) Miramar, (7) Kearny Mesa, (8) Santee and El Cajon, (9) Portside Community (AB 617), and (10) International Border Community (AB 617)

Figure 5 – Map of Warehouse Clusters in San Diego County



The following are the estimated number of warehouse buildings sized 100,000 sq ft and greater that are located in each of the ten warehouse clusters analyzed: Oceanside and Vista (8), Carlsbad and Vista (15), San Marcos and Escondido (0), Poway (6), Sorrento Valley (0), Miramar (0), Kearny Mesa (3), Santee and El Cajon (0), the Portside Community (6), and the International Border Community (36).[84]

The overall trend of the analysis showed that warehouse floor area (square footage) and total truck volume have a strong positive correlation. This means that as warehouse square footage increases, the truck volume also proportionately increases. Due to this strong correlation between warehouse size and truck volume, staff determined that the methodology presented in the Supplement to estimate truck trip rates specific to the San Diego region was appropriate.[85]

Emissions Impact

The Supplement does not conclude that the ten warehouse clusters assessed are located in communities that are disproportionately impacted by air pollution specifically from warehouse operations. Additional analysis was needed to determine if these specific communities are disproportionately impacted by warehousing activities. The District attempts to answer this question in the sections below by evaluating warehouse locations

[84] Supplement, Appendix A, Table A1, pp. A-1 and A-2
[85] Ibid., Sections 2.3.3 and 2.3.4, pp. 20-22

that exist in relation to impacted areas found in CalEnviroscreen and looking at communities that were identified by the District's Office of Environmental Justice as being disproportionately impacted through other metrics and tools.

At present time, only two emission inventories have been developed for state-designated disadvantaged communities within the county, which are the Portside and International Border Communities. With those existing inventories, staff was able to estimate the impact a potential warehouse ISR may have on those communities. However, staff could not determine the emissions impact in other under-resourced communities in the county, e.g., Vista, Escondido, and El Cajon. If formal rulemaking is pursued in the future, staff could potentially estimate the emission reduction impacts of a potential ISR in areas where the total emissions of a community can be determined. It is only then that the percentages of emissions from warehousing operations in relation to total emissions from all other sources can be estimated in those areas.

CalEnviroScreen

Though additional analysis will be needed to quantify the percentage of the emissions impact within the warehouse clusters analyzed, staff used CalEnviroScreen 4.0 to determine the degree of health burden in these clusters. CalEnviroScreen 4.0 is an online tool that evaluates communities throughout California using environmental, public health, and socioeconomic indicators to determine their health burdens.[86] Communities are given a percentile score (out of 100%) to show how they compare to the rest of the state. Communities receiving the highest scores statewide are indicated in the map as shaded in light orange (>70% - 80%), orange (>80% - 90%), or red (>90% - 100%), with higher scores indicating increasing health burdens. Figures 6 through 14 below show warehouses sized 50,000 sq ft and larger shown as dots located in each of the ten warehouse clusters analyzed overlayed with the CalEnviroScreen 4.0 maps.[87]

[86] https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-40

[87] Warehouses legend: Industrial warehouses 100k sq ft and greater (yellow); industrial warehouses 50k to less than 100k sq ft (orange); flex warehouses 100k sq ft and greater (olive); and flex warehouses 50k to less than 100k sq ft (maroon).

Figure 6 – Warehouse Cluster 1 (Oceanside and Vista)

Figure 7 – Warehouse Cluster 2 (Carlsbad and Vista)

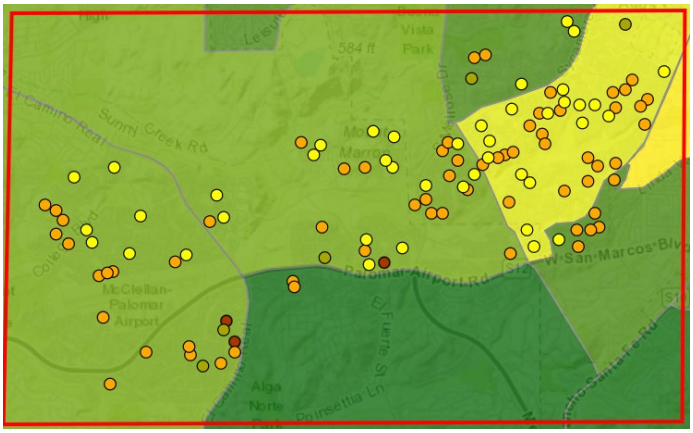


Figure 8 – Warehouse Cluster 3 (San Marcos and Escondido)

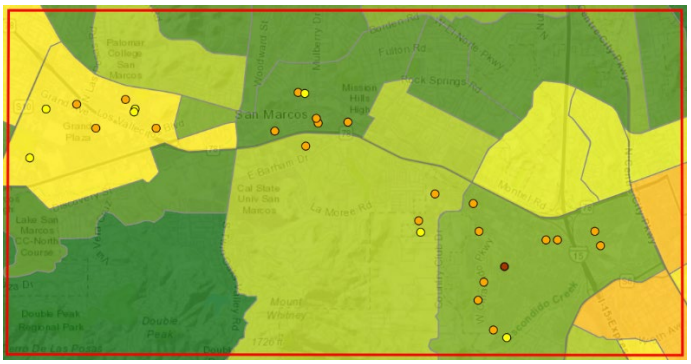


Figure 9 – Warehouse Cluster 4 - Poway

Figure 10 – Warehouse Clusters 5 and 6 (Sorrento Valley, Miramar)

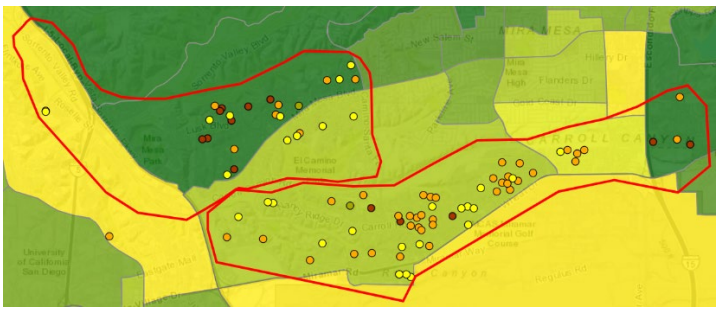


Figure 11 – Warehouse Cluster 7 (Kearny Mesa)

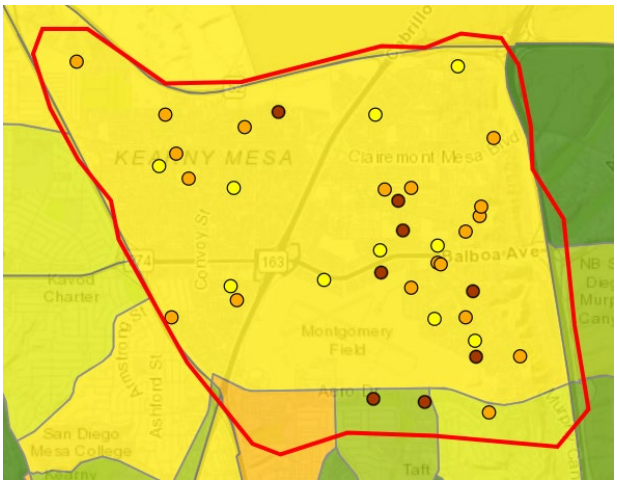


Figure 12 – Warehouse Cluster 8 (Santee and El Cajon)

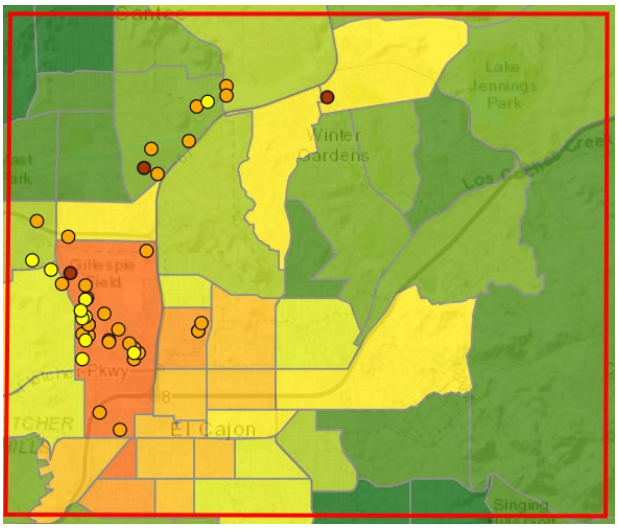


Figure 13 – Warehouse Cluster 9 (Portside Community)

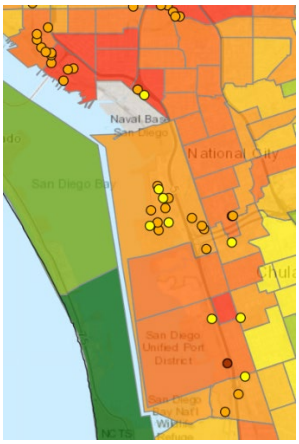


Figure 14 – Warehouse Cluster 10 (International Border Community)

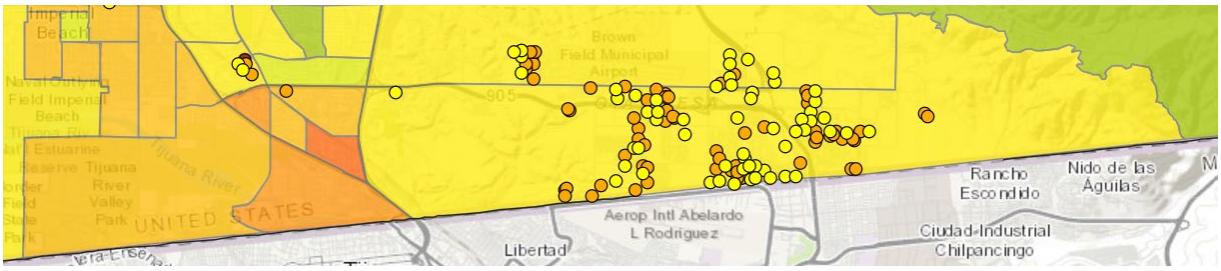
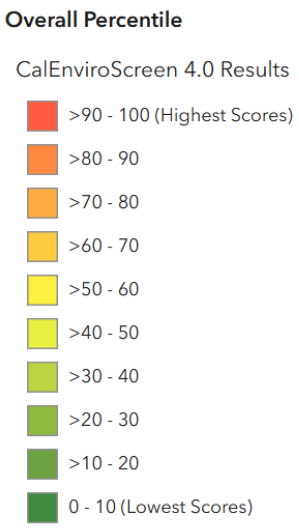


Figure 15 – CalEnviroScreen Legend



With the exception of warehouse building locations in Cluster 8 – Santee and El Cajon (Figure 12) and Cluster 9 – Portside Community (Figure 13), the graphics visually indicate that warehouse buildings located within the other eight clusters are located primarily in areas with CalEnviroScreen scores of 60% (yellow) or less (green). This indicates that most of the warehouse building locations sized 50,000 sq ft and greater located within these clusters may actually be located in areas within the county that have not been identified in CalEnviroscreen 4.0 as having as a high health burden compared to those in the other communities. Additional information on warehouses located in under-resourced communities can be found in the next section.

4.3.2 Under-Resourced Communities

An analysis of warehouse buildings located in under-resourced communities compared to the rest of the county demonstrated that a majority of potential warehousing locations (over 70%) are located outside of identified under-resourced communities.

Staff also assessed the locations of warehouses in specific designated environmental justice communities throughout the County to determine if the same dynamic found in Section 4.3.1 applied in other under-resourced communities that may not have been assessed in the clusters discussed above. With the use of a map developed by the District's Office of Environmental Justice, staff identified the warehouse buildings located in various under-resourced communities throughout San Diego County.

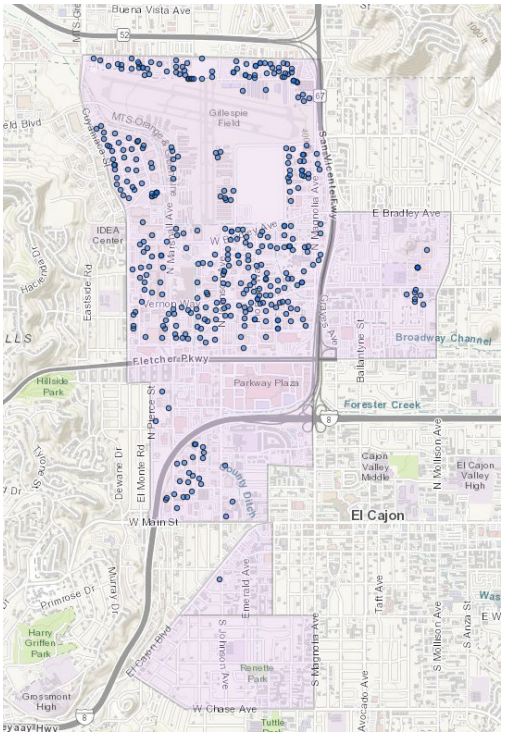
These under-resourced communities were evaluated independently of each other because they are designated with different criteria as determined by the state, the County of San Diego, or the collaborative effort between the District's Office of Environmental Justice and other partner organizations. Note that the warehouse buildings located in the

AB 617 Portside and International Border Communities were already accounted for in the Supplement. For more information on how these under-resourced communities were designated see Appendix C – Background on Under-Resourced Communities.

Senate Bill 535

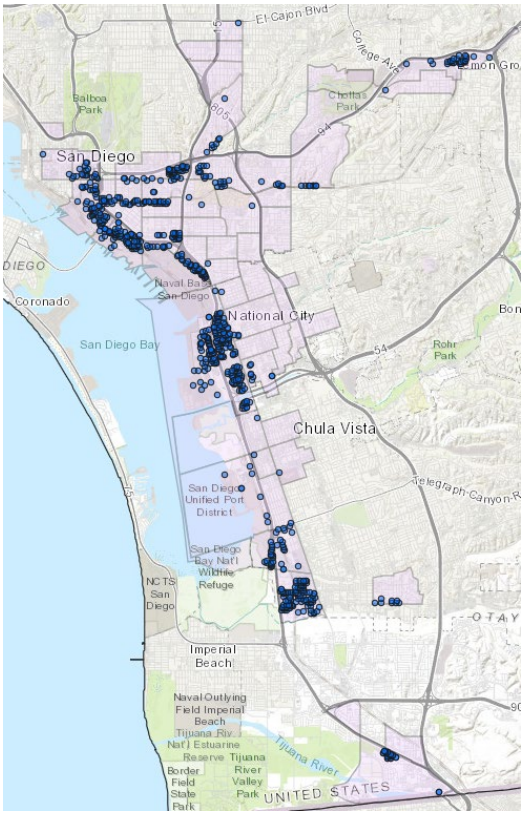
The District determined that a total of 1,163 warehouse buildings of any size were identified as being located in disadvantaged communities (DAC) as defined by Senate Bill (SB) 535 (Figures 16 and 17). This equates to 17.3% of all warehouse buildings in San Diego County identified using the CoStar data being located within DACs as defined by SB 535.[88] For warehouse buildings sized 50,000 sq ft and larger (which is the applicability threshold for a potential ISR considered in the Supplement), there are 81 such warehouse buildings located in these DACs, which is 12.3% of warehouse buildings in the county in this size category.[89] The warehouse buildings in DACs sized 50,000 sq ft and larger are located in areas that rank on average in between the 83rd and 84th percentile according to CalEnviroScreen 4.0.

Figure 16 – Warehouses in SB535 DACs (El Cajon)



[88] (1,163/ 6,737) = 17.3%
[89] ISR Framework, Table 1, p. 5; (81/ 657) = 12.3%

Figure 17 – Warehouses in SB535 DACs (South San Diego)

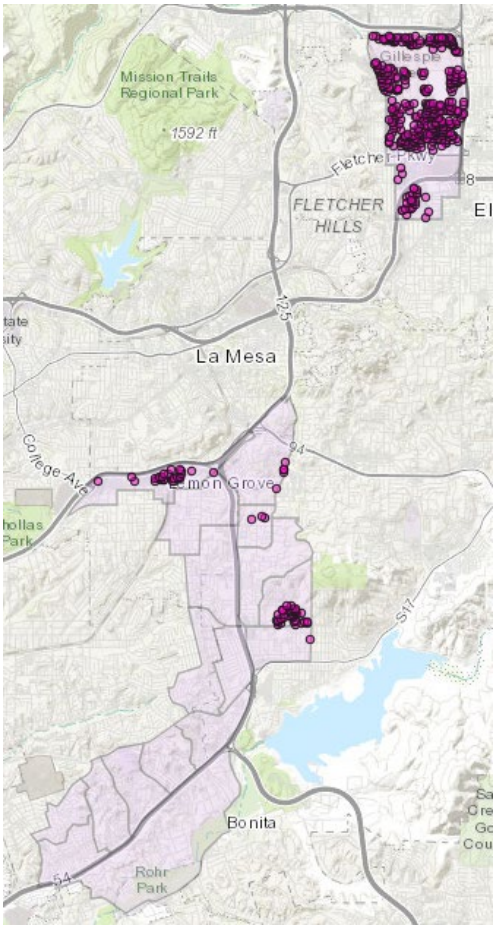


Environmental Justice Communities

A total of 446 warehouse buildings of any size were identified as being located in County of San Diego-defined Environmental Justice (EJ) Communities (Figure 18). This equates to 6.6% of all warehouse buildings in San Diego County located in these communities.[90] For warehouse buildings sized 50,000 sq ft and larger, there are 27 such warehouses located in these communities, which is 4.1% of warehouse buildings in the county in this size category.[91] The warehouse buildings in EJ Communities sized 50,000 sq ft and larger are located in areas that rank on average in the 86th percentile according to CalEnviroScreen 4.0.

[90] (446/ 6,737) = 6.6%
[91] (27/ 657) = 4.1%

Figure 18 – Warehouses in County EJ Communities



Environmental Justice Partnership Communities

A total of 1,083 warehouse buildings of any size were identified as being located in Environmental Justice Partnership (EJP) Communities (Figures 19 and 20). This equates to 16.1% of all warehouse buildings in San Diego County located in these communities.[92] For warehouse buildings sized 50,000 sq ft and larger, there are 62 such warehouse buildings located in these communities, which is 9.4% of warehouse buildings in the county in this size category.[93] The warehouse buildings in EJP Communities sized 50,000 sq ft and larger are located in areas that rank on average in between the 81st and 83rd percentile according to CalEnviroScreen 4.0.

[92] (1,083/ 6,737) = 16.1%
[93] (62/ 657) = 9.4%

Figure 19 – Warehouses in Local EJP Communities (North County)

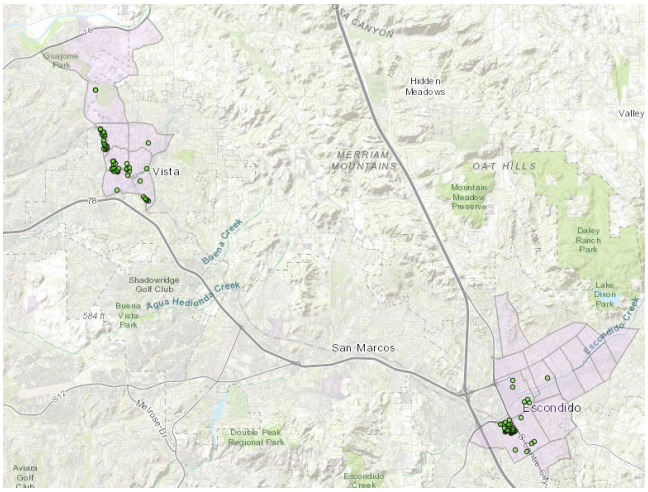
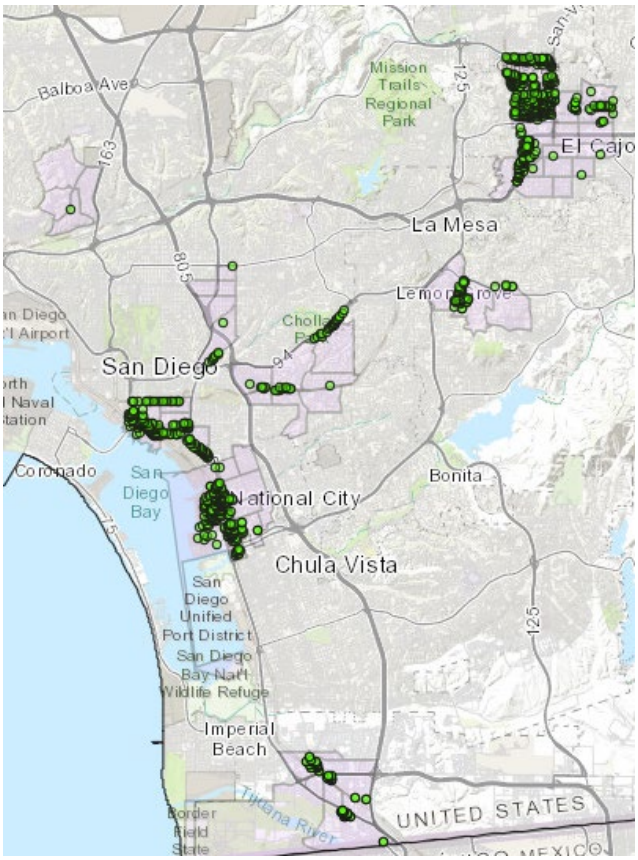


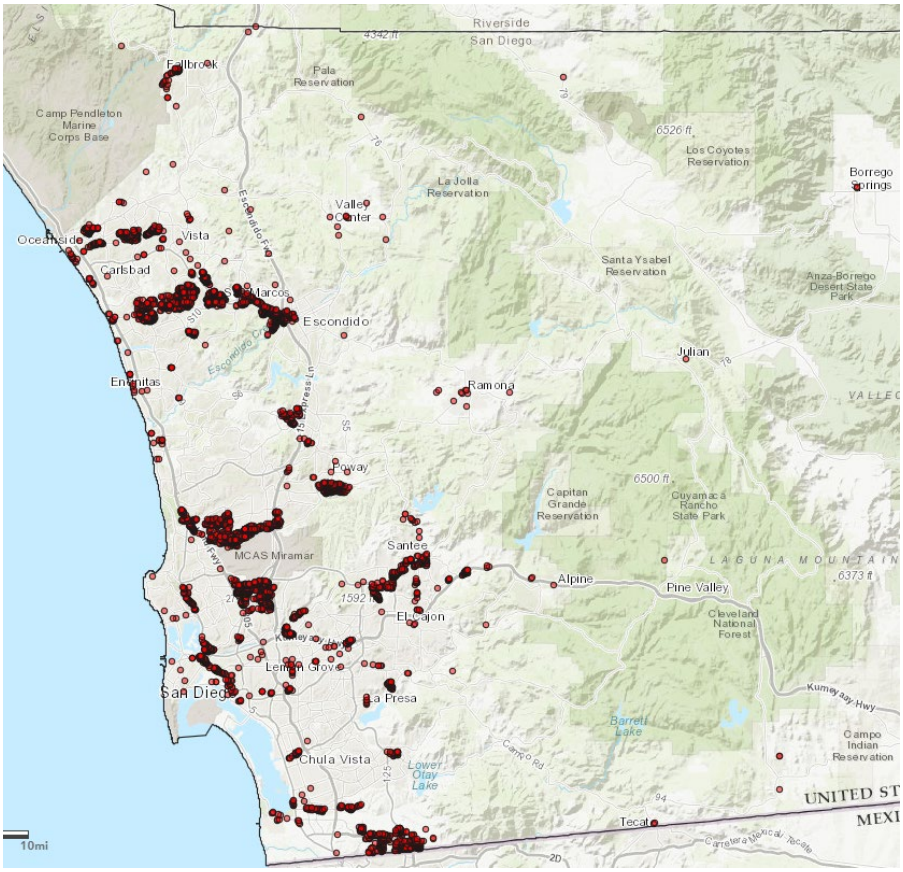
Figure 20 – Warehouses in Local EJP Communities (South and East County)



Outside of Under-Resourced Communities

Staff also identified warehouse building locations that are located outside of the communities discussed above: DACs designated under SB 535, County of San Diego EJ Communities and EJP Communities, the AB 617 Portside and International Border Communities, and tribal land. A total of 4,988 warehouse buildings of any size were identified as being located outside of these designated under-resourced communities (Figure 21). This equates to 74.0% of all warehouse buildings in San Diego County located in other areas of the county.[94] For warehouse buildings sized 50,000 sq ft and larger, there are 467 such warehouses located in other areas, which is 71.1% of warehouse buildings in the county in this size category.[95] These warehouse buildings are located in areas with lower average health burdens (34th percentile) according to CalEnviroScreen 4.0.

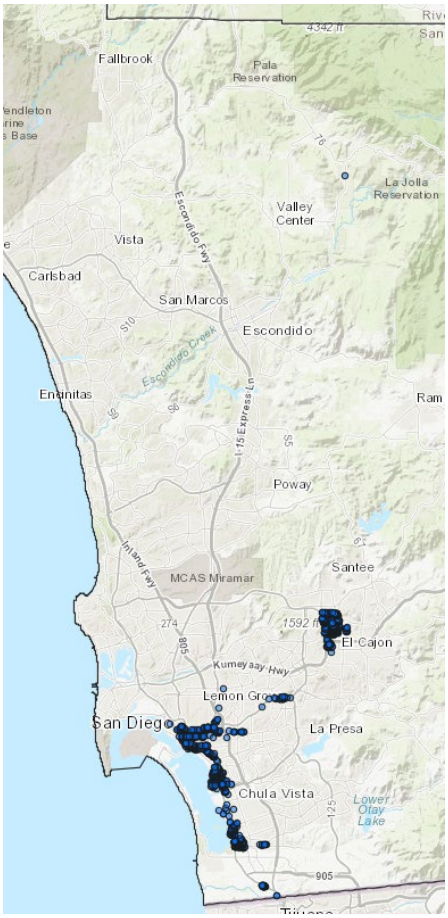
Figure 21 – Warehouses Outside of Under-Resourced Communities



[94] (4,988/ 6,737) = 74.0%
[95] (467/ 657) = 71.1%

In comparison, there are a total of 1,749 warehouse buildings of any size in the under-resourced communities of SB 535, County of San Diego EJ Communities and EJP Communities, the AB 617 Portside and International Border Communities, and tribal land (Figure 22).[96] This equates to 26.0% of all warehouse buildings in San Diego County.[97] For warehouse buildings sized 50,000 sq ft and larger, there are 190 such warehouse buildings located in under-resourced communities, which is 28.9% of warehouse buildings in the county in this size category.[98]

Figure 22 – Warehouses Within Under-Resourced Communities



[96] (6,737 – 4,988) = 1,749. The sum of the number of warehouses in each under-resourced community is greater than the total of 1,749 because the various communities have areas of overlap between them. For example, a warehouse located in an area designated as a DAC (SB 535) may also be in an area designated as an EJ Community (County of San Diego) and/or EJP Community (local).
[97] (1,749/ 6,737) = 26.0%
[98] (657 - 467) = 190; (190/ 657) = 28.9%

In addition, an analysis of communities in the SCAQMD region showed that those living within 0.5 miles of a warehouse subject to that district's Rule 2305 (100,000 sq ft and larger) rank in the 85th percentile according to CalEnviroScreen.[99] This analysis suggests that most warehouses in the SCAQMD region subject to Rule 2305 are located in close proximity to communities with high health burdens. In comparison, 28.9% of warehouse buildings sized 50,000 sq ft and larger in San Diego County are located in under-resourced communities with health burdens ranging between the 81st and 86th percentile.

Conclusion

The findings show that the majority (71.1%) of warehouse buildings sized 50,000 sq ft and larger in the county are located outside of identified under-resourced communities, and are located in areas with lower average health burdens (34th percentile) in CalEnviroScreen. These findings suggest that the majority of emissions attributed to warehousing activities may be generated outside of under-resourced communities in the county. Due to the difference in the location of warehouses relative to under-resourced communities in the county compared to subject warehouses in the SCAQMD region, a potential warehouse ISR for San Diego County may not be the most efficient strategy to achieve similar localized health benefit impacts as those anticipated from SCAQMD Rule 2305.

4.3.3 CARB Scaling Factors

Due to the recent revocation of State waivers of preemption for several state mobile source regulations, the future legal status of CARB regulations is uncertain (Section 4.4.1). Nonetheless, staff used the best data available at the time when the Supplement was being prepared.[100] If the District receives official confirmation from CARB that certain regulations have been withdrawn and/or repealed in their entirety (as was the case with the ACF regulation), and if the District begins the formal rulemaking process for a warehouse ISR, staff would coordinate with CARB to use the appropriate scaling factors and update the estimated baseline emissions and potential emission reductions.

It should be noted that while the revocation of state waivers could impact CARB mobile source regulations, the adoption of Assembly Bill 98 requirements for new and expanded warehouses (Section 4.4.2), as well as the potential for CARB to develop a statewide ISR (Sections 4.4.3 and 4.4.4), could also result in potential changes to the estimates presented in the Supplement. For example, in September 2025, CARB proposed to amend the ACF regulation to remove some fleets from the regulation, but still require

[99] SCAQMD, Rule 2305, Staff Report, p. 16
[100] Supplement, Section 2.4.1, p. 30

emission reduction targets for others within their regulatory authority that may not require EPA waivers.[101] This uncertainty on the status of state mobile source regulations, which all need to be accounted for in the consideration of any potential warehouse ISR, is another component that contributes to the complexity of estimating the emission benefits of a warehouse ISR for San Diego County.

4.3.4 Public Health Benefits

The Supplement included estimates that implementation of a potential warehouse ISR could result in avoiding between 25 and 68 health-related incidences per year as a best-case scenario. This includes reductions in certain health incidences, which are the number of events that would be avoided per year because of the emission reductions. Health related incidences include the following: total mortality; nonfatal heart attacks; infant mortality; total hospital admits, all respiratory; total emergency room visits, respiratory; total asthma onset; total asthma symptoms; emergency room visits, asthma; lung cancer; hospital admits (cardio-cerebro/peripheral vascular disease, Alzheimer's disease, Parkinson's disease); stroke; total hay fever/rhinitis; cardiac arrest, out of hospital; and emergency room visits, all cardiac (Appendix A – EPA COBRA Output Tables).[102]

This White Paper includes additional public health estimates specifically for the Portside and International Border communities (Section 3.2.2). For the Portside community, the estimated health benefits result in reductions in negative health-related incidences that total less than five overall incidents per year for the community. For the International Border community, the estimated health benefits result in reductions in negative health-related incidences that total less than 19 overall incidents per year for the community.

4.3.5 Costs and Necessity for Conducting CEQA and SIA Analyses

The Supplement concluded that an Environmental Impact Report (EIR) would be necessary to comply with CEQA if the District were to pursue formal development of a warehouse ISR. This aligns with the SCAQMD, which also determined their warehouse Rule 2305 required an Environmental Assessment (equivalent to an EIR) because the rule had the potential to generate significant adverse environmental impacts for the topics of: 1) aesthetics; 2) agriculture and forestry resources; 3) air quality and greenhouse gas emissions; 4) biological resources; 5) cultural resources; 6) energy; 7) geology and soils; 8) hazardous materials and solid and hazardous waste; 9) hydrology and water quality; 10) mineral resources; 11) noise; 12) transportation; and 13) utilities and service

[101] CARB, Board Item Summary, September 2025, https://ww2.arb.ca.gov/sites/default/files/barcu/board/books/2025/092525/25-6-8bis.pdf
[102] Supplement, Section 2.4.4, pp. 37-38

systems.[103] In comparison, an incentive-based program or potentially other non-regulatory alternative approaches would likely not require a CEQA analysis at this level or would be categorically exempt.

The Supplement also concluded that a Socioeconomic Impact Analysis (SIA) would be required to comply with State law if the District were to pursue formal development of a warehouse ISR. The California H&SC requires air districts to conduct such an analysis whenever rules are being modified or adopted, and emissions are consequently reduced or increased. The District does not currently have the appropriate resources to prepare an SIA of this complexity in-house. This is a primary reason why staff contracted with a third-party consultant to potentially prepare an SIA for the District as needed. A streamlined or inadequate SIA could be grounds for litigation from stakeholders who may oppose a potential ISR. In comparison, an incentive-based or other non-regulatory alternative program does not require an SIA.

For stationary source rule adoptions or amendments over the past few years, the required level of CEQA/SIA analysis has varied. Past District rulemakings were not as controversial and did not have the same risk of federal preemption or potential litigation as an ISR. Similarly, robust SIA analyses were not previously determined to be required. However, given the controversial nature of a potential warehouse ISR, comprehensive CEQA/SIA analyses would be needed in support of such rulemaking. While no recent rulemaking has required an EIR, staff anticipates that future zero-emission water heater and furnace rules may likely require an EIR-level CEQA document and comprehensive SIA analyses.

4.4 Other Federal and State Activities

Other state activities, such as Assembly Bill 98 and a possible statewide ISR if adopted in the future, would likely achieve and support mobile source emission reductions from warehousing operations.

Other federal and state actions related to the goods movement industry or mobile sources have been or are being taken since the release of the Supplement. These actions are important considerations when contemplating potential strategies to reduce emissions from warehousing activities. A few key actions are discussed below.

[103] SCAQMD, Rule 2305, Board Letter, May 27, 2021, p. 6, http://www.aqmd.gov/docs/default-source/Agendas/Governing-Board/2021/2021-May7-027.pdf?sfvrsn=10

4.4.1 U.S. EPA Approvability

On September 11, 2024, the U.S. Environmental Protection Agency (EPA) approved SCAQMD Rule 2305 as a SIP strengthening measure rather than granting a full approval. Though the EPA made it clear that the rule was nonetheless still federally enforceable, full approval of the rule was not granted due to specific deficiencies identified by the EPA. These deficiencies included: two ambiguous definitions that cite California Code of Regulations that have not been approved in the State Implementation Plan (SIP); the rule's inclusion of a sunset clause, meaning if the rule were to sunset in the future, it had the potential to interfere with reasonable further progress or attainment of the National Ambient Air Quality Standards, and represented a potential inconsistency with the Clean Air Act; and, two instances in the rule of a concept known as "unbounded director's discretion," which potentially allows an air district to undermine enforceability of a SIP regulation.

Due to these deficiencies, the EPA could not assign credit in the SIP for the emission reductions anticipated from Rule 2305 up and until the deficiencies are resolved. Staff are not aware if and when the SCAQMD plans to rectify these deficiencies in an upcoming rule amendment. Re-opening the rule for amendments could bring additional scrutiny to the already-approved rule. While Rule 2305 withstood a legal challenge in federal court, the court's decision does not preclude other lawsuits from potentially being filed to challenge the EPA's approval of Rule 2305 into the SIP. As of January 2026, no further appeals or litigation have been filed.[104]

After the Supplement's release, the U.S. Senate voted on May 22, 2025, to revoke three waivers of preemption issued by the U.S. EPA for CARB: the Advanced Clean Cars II (ACC II) regulation, the Advanced Clean Trucks (ACT) rule, and the Heavy-Duty Low NOx Omnibus Regulation. However, CARB rejected the Senate vote as illegal. In a statement by then CARB Chair Liane Randolph, "California will pursue every available remedy to challenge these actions and defend our right to protect the public from dangerous air pollution."[105] Considering that the U.S. Congress revoked waivers for state regulations that were adopted to reduce emissions from mobile sources, it is uncertain whether the EPA will approve a warehouse ISR into the SIP for any region for the foreseeable future. However, the District acknowledges that EPA approval may not be critically necessary to proceed with developing a warehouse ISR for San Diego County.

4.4.2 Assembly Bill 98

Assembly Bill 98 (AB 98) was passed by the California state legislature in late August 2024 and signed by Governor Newsom on September 29, 2024. AB 98 will apply to new

[104] Supplement, Section 2.7.1, p. 43
[105] https://dieselnet.com/news/2025/05us2.php

and expanded warehouses that are proposed for any floor size, though more requirements apply to proposed facilities over 250,000 sq ft in size.

In summary, AB 98 will: (1) prescribe statewide warehouse standards for new or expanded logistics use developments to minimize impacts on certain "sensitive receptors," as specified; (2) prohibit cities and counties from approving new or expanded logistics use developments unless they meet specified standards; (3) require cities and counties to update their circulation elements by January 1, 2028 to include specified truck routes, except that certain local agencies in the Inland Empire must comply with this requirement by January 1, 2026; and (4) provide for enforcement of circulation update requirements by the Attorney General.

AB 98 will primarily affect new and expanded warehouse operations throughout the state. Existing warehouse operations may not be as impacted unless they are proposing to expand operations.[106] However, AB 98 coupled with other regulations that may apply to new buildings and sources of emissions (e.g., CEQA and New Source Review), could significantly slow the rate of development of new or expanded large warehouses throughout California and San Diego County. It is uncertain how AB 98 will impact emissions from warehousing operations overall.

4.4.3 Possible Statewide ISR

In March 2025, Assemblymember Robert Garcia introduced Assembly Bill 914 (AB 914). The legislation proposed to affirm CARB's authority to regulate indirect sources that attract activity from vehicles and other mobile equipment. Currently, local air districts have explicit authority under state law to adopt indirect source rules to reduce emissions in their respective regions.[107] In June 2025, the bill was ordered to the inactive file. As of January 15, 2026, the bill's status had not changed.

If a similar bill is introduced in the future and ultimately passes, CARB may proceed to adopt and enforce rules and regulations applicable to indirect sources, such as warehouses and distribution centers if necessary to achieve National Ambient Air Quality Standards (NAAQS). In this scenario, CARB would become the lead agency in developing an ISR for the state.

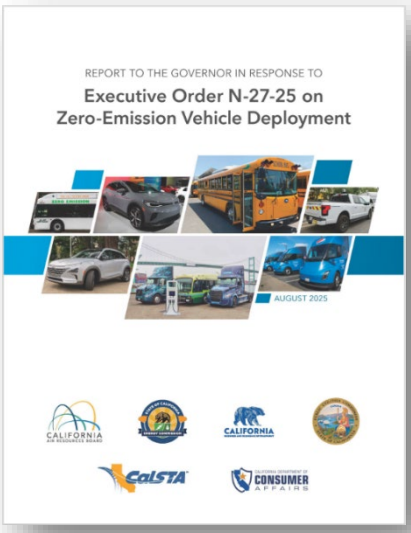
Due to the revocation of three waivers of preemption issued by the U.S. EPA for CARB, and CARB's withdrawal of their request for a waiver from the EPA for the Advanced Clean Fleets (ACF) Regulation, it is necessary for CARB to develop alternative strategies that can achieve emission reduction benefits now forgone from the revocation and withdrawal

[106] Supplement, Section 2.7.3, p. 46

[107] https://earthjustice.org/press/2025/new-legislation-from-assemblymember-robert-garcia-tackles-californias-growing-pollution-hotspots

of those waivers.[108] If statewide ISR legislation is passed in the future, it would be a pathway for CARB to develop such emission reduction strategies for indirect sources statewide and potentially provide consistent requirements for warehouses across the various air districts in California.

4.4.4 California Report on ZEV Deployment



Signed on June 12, 2025, Executive Order N-27-25 directed CARB, the California Energy Commission, Governor's Office of Business and Economic Development, California State Transportation Agency, and Department of Consumer Affairs to recommend strategies that make clean transportation more affordable, reliable, and accessible.[109] On August 19, 2025, California state agencies published a report in response to Governor Gavin Newsom's executive order on zero-emission vehicle (ZEV) deployment.[110] The report, developed with input from the public, charts a path to expand clean and ZEV adoption across all vehicle types, protect public health, and maintain the state's momentum in the face of federal rollbacks.

The report detailed actions being needed in six areas: private investment, incentives, infrastructure, fuel pricing, regulations, and procurement. Under the section on regulations, the report recommended only two actions, one of which was for CARB to collaborate with local air districts to develop and implement a statewide ISR. As proposed, the report recommends CARB pursue a statewide ISR that would reduce emissions from mobile sources that frequent indirect sources such as large warehouses, ports, airports, and railyards.[111] The report's recommendation for CARB to develop a statewide ISR also aligns with the objectives of AB 914 discussed in the previous section (Section 4.4.3).

[108] Supplement, Section 2.7.2, p. 45
[109] Executive Order N-27-25, June 12, 2025, https://www.gov.ca.gov/wp-content/uploads/2025/06/CRA-Response-EO-N-27-25_-bl-formatted-GGN-Signed-6-11-954pmFinal.pdf
[110] Report to the Governor in Response to Executive Order N-27-25 on Zero-Emission Vehicle Deployment, August 2025, https://ww2.arb.ca.gov/sites/default/files/2025-08/August%202025%20Report%20to%20the%20Governor%20in%20Response%20to%20Executive%20Order%20on%20ZEV%20Deployment%20FINAL_0.pdf
[111] Report to the Governor, p. 6

4.5 Ramboll Study

A third-party study that analyzed SCAQMD's WAIRE Program (Rule 2305) to date, which noted inconsistencies in reported data and the benefits that can be directly attributed to Rule 2305, and other findings.

Consulting firm Ramboll released a study in June 2025 that analyzed the implementation of SCAQMD's WAIRE program, which enforces that air district's warehouse Rule 2305.[112] The Ramboll Study is a third-party review of the SCAQMD WAIRE Program to date that was prepared independently of the SCAQMD and SDAPCD, and sponsored by the Supply Chain Federation. Note that the SDAPCD does not affirm or deny the study's findings. SCAQMD may address the findings of the Ramboll Study in the future. Some key findings of the study (*in italics*) are summarized below along with SDAPCD feedback.

4.5.1 Near Zero Emission Truck Visits

Rule 2305 specifies that qualifying Near-Zero Emission (NZE) trucks must be equipped with engines certified to meet the lowest optional NOx standard applicable at the time of manufacture as defined in the California Code of Regulations Title 13, Section 1956.8.[113] Beginning in 2022 when the WAIRE Program went into effect, the lowest optional NOx standard dropped to 0.01 grams per horsepower hour (g/hp-hr). However, to date, no engines have been certified to meet this 0.01 g/hp-hr standard. As a result, warehouse operators are unable to purchase new NZE trucks (with Model Year 2022 or newer engines) even if they are incentivized to do so under the WAIRE Program. All NZE trucks currently in operation are equipped with Model Year 2021 or older engines certified to the 0.02 g/hp-hr optional Low-NOx standard that predates the WAIRE Program's initial implementation date. Hence, according to the study, any NOx emission reductions from NZE truck trips that SCAQMD staff included in their 2nd Annual Report for the WAIRE Program cannot be attributed to the WAIRE Program.[114]

[112] Ramboll, Review of the South Coast Air Quality Management District Indirect Source Rule (ISR) on Warehouses, June 23, 2025, https://supplychainfederation.com/wp-content/uploads/2025/08/ISR-Ramboll-Study_6-23-25_Updated.pdf. A summary of the Ramboll Study can also be found here, https://supplychainfederation.com/wp-content/uploads/2025/08/WarehouseISR_Summary_6-23-25_Updated.pdf.

[113] https://www.law.cornell.edu/regulations/california/13-CCR-1956.8

[114] Ramboll Study, pp. 1-2

It is inherently difficult to attribute emission reductions to a specific program. Facilities can procure cleaner equipment for a variety of reasons that could go beyond the scope (or be complementary) of an ISR and Rule 2305 (i.e., incentive funding availability, corporate strategy, etc.). If emission reductions from Low-NOx truck trips are not solely attributable to the WAIRE Program as suggested in the study, which were reported to account for 40% of the total earned WAIRE Points in SCAQMD for Phase 2 facilities (150k to <250k sq ft), compliance year 2023, the District notes that it is possible that the emission reduction estimates included in the Supplement are likely to have been overestimated.[115]

4.5.2 Zero Emission Yard Hostlers

In SCAQMD's Final Staff Report for the Warehouse ISR, the baseline NOx emissions from all yard hostlers associated with warehouses that would be subject to the WAIRE Program was estimated to be 0.09 tons per day (tpd) for 2023, and 0.08 tpd for 2031.[116] The 2nd Annual Report for the WAIRE Program reported that the WAIRE Program had reduced emissions from yard hostlers by approximately 0.4 to 0.5 tpd in 2023, which is four to five times higher than the baseline emissions reported for these equipment.[117]

This emission benefit estimate for yard hostlers is a result of SCAQMD's assumption that all zero-emission (ZE) hostler usage reported under the WAIRE Program represent replacements of equivalent diesel yard hostler usage. However, there is no requirement in the WAIRE Program to retire or replace diesel yard hostlers with ZE yard hostlers. Instead, the WAIRE Program allows users of ZE yard hostlers to earn WAIRE points that can be used to meet their compliance requirements without assuring that existing diesel yard hostlers are retired or replaced.[118]

To its credit, Rule 2305 allowed for a greater understanding of the existing yard hostler inventory within the SCAQMD region, which is a category that was previously not well documented. That being said, if existing diesel yard hostlers are not being retired or replaced in the SCAQMD region as suggested in the study, it is possible that Rule 2305 may not be achieving emission reductions at a subject facility from the use of ZE yard

[115] Supplement, Section 2.4.3, p. 33
[116] SCAQMD, Rule 2305, Staff Report, Table 13, p. 52
[117] SCAQMD, 2nd Annual Report for the Warehouse Actions and Investments to Reduce Emissions (WAIRE) Program, October 2024, Figure 18, p. 24, https://www.aqmd.gov/docs/default-source/planning/fbmsm-docs/annual_report_waire_program_102024.pdf?sfvrsn=c6288561_9
[118] Ramboll Study, pp. 3-4

hostlers. The emission reductions noted from ZE yard hostlers also being exceedingly higher than the estimated baseline emissions from yard hostlers subject to Rule 2305, does also call into question the validity of the numbers, and whether those reductions were truly the result of Rule 2305 being in place or not.

4.5.3 Cost of Class 8 ZE Trucks

The study's findings indicate that the compliance cost for Scenario 1 (compliance using mitigation fee-only) is approximately $0.81/sq ft/yr, which is similar to SCAQMD's assessment. However, the costs associated with the acquisition and use of Class 8 ZE trucks to meet the compliance obligation (Scenarios 2 and 3) range from $0.46 to $1.32/sq. ft./yr, depending on the type of warehouse and methods of ZE truck acquisition. These costs are 3.3 to 9.4 times the $0.14/sq ft/yr value that SCAQMD staff estimated for the only Class 8 ZE truck visit scenario that was analyzed in the Socioeconomic Impact Assessment for Rule 2305.[119] The primary reasons for this discrepancy are SCAQMD staff's assumption that the Class 8 ZE truck fleet visiting the warehouse would be a third party truck that is not owned by the warehouse operator and staff's projected decrease in the purchase cost of Class 8 ZE trucks from $292,544 in 2022 to $201,351 in 2024 and $170,748 in 2031.[120] However, as noted in a more recent 2024 report from CARB, the purchase price of a Class 8 ZE trucks have actually increased from $332,757 in 2021 to $436,839 in 2024.[121] Overall, the study's findings indicate that the lease and use of Class 8 ZE trucks ($1.06 to $1.32/sq ft per year) for rule compliance is more costly than paying mitigation fees ($0.79 to $0.83/sq ft per year). While purchase and use of ZE Class 8 truck ($0.46 to $0.57/sq ft per year) could be more cost effective than the mitigation fee payment ($0.79 to $0.83/sq ft per year), this requires a sizeable upfront capital investment, posing additional financial risks on business operations.[122]

Due to inflation and other factors, it is likely that the costs for ZEV equipment have increased since the time of SCAQMD's analysis. While this is expected within the rule development process, if this is the case, then the compliance costs and cost-effectiveness estimates included in the Supplement are likely to have been underestimated.[123]

4.5.4 Net Emissions Increases

Emissions leakage can occur when an area implements stricter emission reduction measures, causing a relocation to areas with more relaxed regulations. Proposed

[119] SCAQMD, Rule 2305, SIA, p. ES-6
[120] Ibid., Table 10, p. 14
[121] CARB, Zero-Emission Class 8 Truck Pricing Comparisons – EU & US, October 2024, p. 3, , https://ww2.arb.ca.gov/sites/default/files/2024-12/Zero%20Emission%20Class%208%20Tractor%20Pricing%20Comparisons_ADA.pdf
[122] Ramboll Study, pp. 6-7
[123] Supplement, Section 2.5, pp. 38-40

Warehouse ISRs that model SCAQMD's WAIRE Program could provide warehouse operators an option to pay a mitigation fee, effectively making the ISR a tax obligation for warehouse operators who are unable to be serviced by ZE trucks at their facilities. These increased costs to warehouse operators would eventually be passed down to consumers through increased cost of goods and could cause small warehouse operators who are unable to absorb these additional costs to go out of business. Alternatively, warehouses may choose to relocate outside of ISR's jurisdiction to avoid paying these fees. This relocation could result in increased trip lengths and result in a net increase in regional NOx emissions.[124]

Notably, in relation to Rule 2305, SCAQMD completed a study during their rule development process in relation to this comment and found that it did not hold merit. SCAQMD has continued to see growth in the warehousing industry in their region since Rule 2305 adoption with no indication that relation is occurring. However, at the same time, increased compliance costs can result in increased consumer prices and/or warehousing operations potentially closing or relocating outside the jurisdiction of Rule 2305. This dynamic was similarly elevated in a comment the District received to the Supplement. In addition, if warehousing operations are relocating outside of the SCAQMD region, air quality could potentially be negatively impacted in other regions of San Diego County, or in the International Border community (if such relocations occur to the industrial areas of Tijuana). A statewide ISR that provides equivalent requirements for each region, if developed by CARB in the future, could potentially address this concern and limit the potential for relocation of businesses.

4.5.5 Implementation Costs

SCAQMD has allocated approximately half a million dollars to AgreeYa Solutions, Inc. for the development and maintenance of their WAIRE POP web portal.[125,126] *Although SCAQMD staff have proactively addressed some of the bugs with the tool's functionality, WAIRE POP still suffers from foundational data integrity issues. Warehouse operators frequently need to contact staff during the report amendment process, requiring backend approval, which significantly slows the process. Overall, the WAIRE Program imposes substantial administrative costs that are not adequately covered by current reporting fees.*[127]

[124] Ramboll Study, p. 8
[125] SCAQMD, Governing Board Package, August 6, 2021, Agenda No. 7, https://www.aqmd.gov/docs/default-source/agendas/governing-board/2021/brdpkg-2021-aug6.pdf?sfvrsn=5681d661_15
[126] SCAQMD, Governing Board Package, March 1, 2024, Agenda No. 6, https://www.aqmd.gov/docs/default-source/Agendas/Governing-Board/2024/2024-mar1-006.pdf?sfvrsn=2
[127] Ramboll Study, p. 9

Given the funds that the SCAQMD allocated to develop and maintain their web portal discussed in the study (updated to a total of approximately $900,000 per SCAQMD), and recent costs for developing other SDAPCD programs from the ground up (e.g., CC4A and AIRE), estimates included in the Supplement of $200k for a new District web portal and $25k estimate to maintain the web portal on an annual basis, may have been underestimated.[128]

[128] Supplement, Section 2.6, p. 41

5.0 POTENTIAL ISR ALTERNATIVES

Other potential non-regulatory alternatives for consideration, such as a focused Transport Refrigeration Unit (TRU) incentive program, may provide comparable emission reductions at lower costs and/or resources than anticipated with an ISR.

This section includes additional information on potential alternatives to a local warehouse ISR. Since the public release of the Supplement, the District has further evaluated alternative ISR concepts proposed within the WWG and Supplement, in addition to other new concepts. Notably, the District envisions being able to proceed with at least one potential alternative program given current staff resources and availability.

5.1 GMERP TRU Incentive Program

5.1.1 Background

An incentive funding concept that may likely reduce diesel emissions in disadvantaged communities from warehouses, grocery stores, and other indirect sources of emissions that move refrigerated cargo by truck is the replacement of diesel Transport Refrigeration Units (TRUs) with zero-emission TRUs. TRUs are refrigeration systems powered by diesel internal combustion engines designed to refrigerate or heat perishable products that are transported in various containers, including truck vans, semi-truck trailers (pictured below), shipping containers, and railcars.[129]

The Proposition 1B Goods Movement Emission Reduction Program (GMERP) is a partnership between CARB and local agencies to reduce diesel emissions and health risk from freight movement along California trade corridors. Projects funded under this program must achieve early or extra emission reductions not otherwise required by law or regulation. The District administers the program for the San Diego region. The District currently has approximately $2.8 million remaining in the program and can request an additional $665k if needed for additional projects, totaling $3.4 million.[130] Any remaining unused funds must be returned to CARB to be reallocated to other air districts in California. The District has administered this program since 2008 on

[129] https://ww2.arb.ca.gov/our-work/programs/transport-refrigeration-unit/about

[130] Estimates reflect funding available as of October 2025. Additional funding could become available for TRUs if existing GMERP projects already under contract get cancelled or do not proceed.

behalf of CARB, but in recent years has been unable to allocate funds for additional projects due to limited applicant eligibility and more stringent program requirements.

CARB recently revised programmatic requirements associated with TRUs as well as other emission source categories. These changes have seemingly renewed interest in facilities applying for TRU funding to replace aging diesel TRUs with zero-emission TRUs. This interest was exhibited in a recent GMERP grant solicitation in the Bay Area Air Quality Management District, which received over $37 million in application requests for zero-emission TRUs from major transportation and grocery fleets.[131] Similarly, the SCAQMD also requested approval from their respective Board to open a solicitation for zero-emission TRU projects funded through GMERP.[132] The San Joaquin Valley Air Pollution Control District also opened a solicitation for zero-emission TRU projects on December 15, 2025.[133]

5.1.2 Tentative Timeline and Budget

To implement a GMERP TRU program, the District would first need to coordinate with CARB staff to modify GMERP Grant Agreements accordingly to transfer remaining GMERP funds for TRUs. Staff has preliminarily discussed this with CARB, and CARB has informed the District that a project solicitation could be opened immediately upon making requested administrative changes within the GMERP tracking database ("GMOD") for the purposes of project and solicitation tracking. These changes are expected to take less than one month to complete. Concurrently, District staff and CARB could then coordinate (in parallel to opening a project solicitation) to complete a required Grant Agreement amendment to formally transfer the remaining GMERP funds to TRU projects. The amendment would need to be completed prior to making any payments with executed contracts.

Tentatively, the District envisions being able to open a GMERP TRU solicitation and start evaluating potential projects by the end of 2026, and executing contracts by the end of 2027. The Grant Agreement amendment would stipulate the actual timeframe for having new equipment operational, but the District anticipates that all new zero-emission TRU equipment would need to be fully operational within the 2028-2029 timeframe. Staff would (ideally) time the opening of a GMERP TRU solicitation concurrently to the District's existing Clean Air for All annual grant solicitation. Doing so would leverage marketing and outreach efforts/funding that is available through other APCD incentive programs, and

[131] https://www.baaqmd.gov/~/media/files/strategic-incentives/goods-movement-docs/other-equipment/ranklist-g16gmbr1-pdf.pdf?rev=ef92e1f38d704744b1c6863768e9e1d9&sc_lang=en
[132] https://www.aqmd.gov/docs/default-source/agendas/governing-board/2025/2025-oct3-003.pdf?sfvrsn=df4c6d7e_2
[133] https://www.valleyair.org/grants/proposition-1b-goods-movement/

allow the District to conduct targeted outreach to potential applicants in and around disadvantaged communities.

The District estimates implementing the entire TRU program with one full-time equivalent (FTE) position at the District for a period of approximately two years. This position already exists at the District working within the APCD Incentives division on other incentive programs and would be redirected to implement a TRU program, saving valuable time and money and forgoing a protracted hiring effort to staff a new program.[134] Staff costs to implement such a program are estimated to comprise of both CARB administrative funding (approximately $33k) and approximately $389k in other District funds over a two-year implementation period ($211k per year), and is not anticipated to require ongoing staff to administer beyond the two-year implementation period. With approximately $184k included in the FY 25-26 for possible warehouse ISR CEQA and SIA work that could potentially be redirected to GMERP implementation in future budgets, the District believes it would have sufficient available funds to fully cover the approximate cost to implement a successful program. In comparison to the estimated one-time costs to implement a warehouse ISR (i.e., $835k) and the ongoing costs associated with a warehouse ISR (i.e. up to $1 million), the GMERP TRU program's implementation costs are significantly lower, and could result in faster emission reductions if successful.

5.1.3 Estimated Emission Reductions

Staff estimates that if all remaining GMERP funds within San Diego County (approximately $3.4 million) were used to replace 34 diesel TRUs with new zero-emission units, it would likely achieve comparable PM2.5 emission reductions as a potential ISR in San Diego County, and would achieve approximately half of the anticipated low-end NOx reductions as a warehouse ISR (Table 7).[135]

[134] Past GMERP solicitations have been implemented with only 1 or 2 staff members and 300-400 applications. In comparison, a TRU program would be expected to receive fewer applications.

[135] The NOx emission reductions may be similar in practice to those anticipated from a warehouse ISR given that the estimated warehouse ISR emission reductions calculated are a best-case scenario and are likely to be less in practice.

Table 7 – Emission Reductions from TRU Replacements

PM	NOx	Description
51.08459	1729.545	Average lifetime reductions per TRU in BAAQMD GMERP over 5-year project life (lbs)
10.21692	345.9089	Average per year reductions per TRU in BAAQMD GMERP (lbs)
0.005108	0.172954	Average per year reductions per TRU (tons)
34		Potential number of TRUs that the program may replace with $3.4 million in Prop 1B funding (assuming $100k per TRU project)
0.173672	**5.880436**	Potential emission reductions that the program may achieve (tons/year) with $3.4 million in funding (assuming $100k per TRU)[136]
0.1 to 0.3	**13 to 27**	Potential emission reductions anticipated from a local warehouse ISR[137]

5.1.4 Conclusion

Based on recent information provided by CARB, there are almost 1,600 TRU units based in San Diego County, most of which are diesel-powered. CARB estimates that these TRU units emit approximately 227 tons of NOx per year.[138] Diesel TRU replacements with zero-emission technology are especially advantageous because they would likely produce real, enforceable, permanent, and quantifiable emission reductions in under-resourced communities and areas where the public congregates, in much closer proximity than most warehousing clusters. For example, refrigerated cargo is typically delivered to and from grocery stores, restaurants, and other establishments located near the general public (e.g., residences, schools, child-care centers, and health clinics). Reducing TRU emissions through this incentive funding program would likely achieve both regionwide and localized emission benefits, and provide comparable emission reductions to a potential warehouse ISR. The District could also explore prioritizing incentive funding to companies that operate within disadvantaged communities, and/or near sensitive receptors. The District could also explore building on momentum that could result from a successful GMERP TRU program to seek even more emission reductions by opening up additional funding and prioritization pathways that could then utilize Carl Moyer and AB

[136] GMERP tabulates total PM emissions, whereas the ISR Framework Supplement included estimates for PM2.5 emissions, which is a subset of PM. This may be the reason there are more PM reductions estimated with GMERP.
[137] Supplement, Section 2.4.3, p. 33
[138] CEPAM v1.04, https://ww2.arb.ca.gov/cepam

617 incentive funding for additional zero-emission TRU projects, if GMERP funds are exhausted.

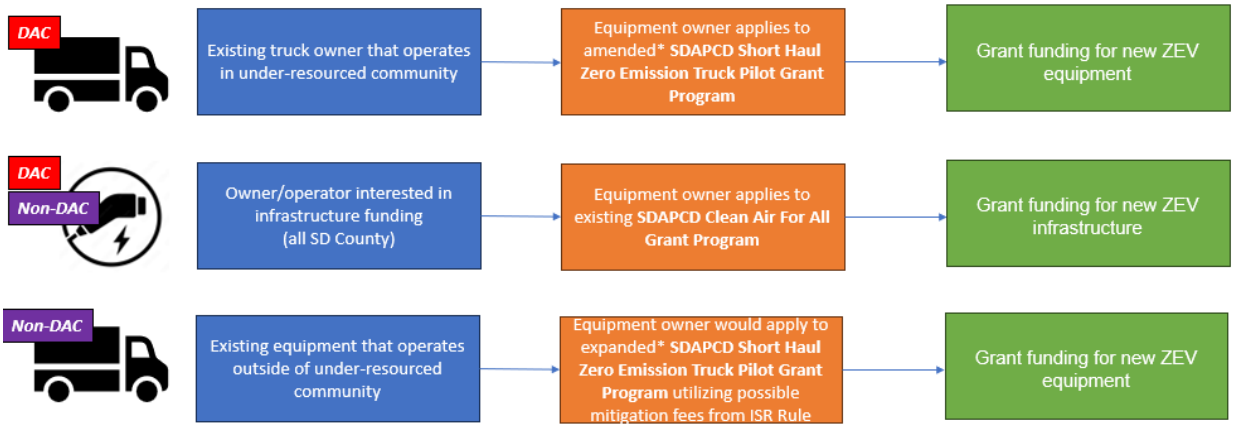
The District considers this as a viable alternative strategy that could achieve similar health benefits in lieu of a potential warehouse ISR for the following reasons: the high level of interest in TRU funding exhibited in the Bay Area region; comparable emission reductions to a potential warehouse ISR; no CEQA and/or SIA analyses would be needed; real, enforceable, permanent, and quantifiable emission reductions; minimal risk for legal challenges because it would be a voluntary program; and implementation with current staff resources.

5.2 Heavy-Duty Truck Incentive Program

5.2.1 Background

On March 4, 2024, staff presented to the WWG a preliminary three-tiered incentive concept as the primary non-regulatory strategy to incentivize emission reductions from warehouses and distribution centers in a timely manner (Figure 23).

Figure 23 – Preliminary Incentive Strategy[139]



The first tier would incentivize new zero-emission vehicle (ZEV) truck purchases in under-resourced communities by expanding and modifying the existing Portside Short Haul Zero-Emission Truck Pilot program to areas outside of the Portside Community and to encourage more applications. The second tier, which already exists today through the Clean Air for All Grant program, would continue to incentivize infrastructure purchases for new ZEV charging opportunities for warehouse and trucking companies. Lastly, the third tier would be considered by the District if a warehouse ISR were to be developed, and mitigation fees were collected as a method of compliance. The third tier would expand

[139] Supplement, Figure 2, p. 9

the District's existing Zero Emission Truck Pilot Program to ensure warehouse entities and trucking companies operating outside of under-resourced communities would be eligible to apply for new ZEV trucks.[140]

5.2.2 Tentative Timeline

To implement the aforementioned Heavy-Duty Truck incentive program, the District envisions it would be able to complete each tier in subsequent phases.

Tier 1

The first tier, which would expand and modify the existing Portside Short Haul Zero-Emission Truck Pilot program, would first need AB 617 Portside Community Steering Committee (CSC) approval (as well as potentially the AB 617 International Border CSC), and CARB approval to proceed with any modified program requirements. Potential programmatic revisions would be expected to include opening up funding eligibility beyond the Portside neighborhoods to other disadvantaged and low-income communities, and potentially prioritize applications submitted from warehousing entities located within 1,000 feet of a sensitive receptor, which was an idea requested by the WWG. Additional adjustments submitted could also seek to enhance participation in the program, such as building stronger relationships with ZEV truck dealerships, which have historically proven to be a successful model for reaching potential applicants.

Based on past submissions to CARB for community-identified projects, it is expected that CSC discussions, the preparation of a submittal to CARB, and subsequent approval by CARB, could take approximately one year to complete before being able to proceed, with the potential that CSC members may not ultimately want to support such a proposal. Consequently, a tentative timeline of opening a modified program in 2027 would be anticipated if pursued and supported by the CSC. Like GMERP, formal Grant Agreements with CARB may stipulate the actual contracting and operational deadlines for new zero-emission trucks, but a tentative timeline for being operational between 2028-2029 is anticipated if successful. The program would remain open until funds are exhausted or State deadlines for liquidation expire. Existing staff that currently implement the District's Clean Air for All grant program would likely be utilized to administer the program; therefore most (if not all) funding would be covered by CARB from existing Grant Agreements. Funding would likely emanate from the District's AB 617 fund, which due to recent legislation being passed is now expected to receive annual allocations to the District for the foreseeable future.

[140] Ibid., Section 2.1.2, pp. 8-9

Tier 2

The second tier of the Heavy-Duty Truck Incentive program, which would incentivize electrification infrastructure for trucks serving or located at warehouses, currently exists today and could be further modified to enhance participation from warehousing entities before a future Clean Air for All Grant solicitation. Infrastructure projects to serve trucks, no matter where they are located or serve, is already an allowable funding category, but may not be as well-known as other incentive programs. To enhance participation from warehousing and/or trucking companies that serve them, the District could explore including provisions within a future solicitation to prioritize such projects that could demonstrate potential emission reduction benefits around sensitive receptors, or potentially offering a higher funding cap for applicable projects.

As mentioned, formal Grant Agreements with CARB may stipulate the actual contracting and operational deadlines for new zero-emission infrastructure, but a tentative timeline for equipment being operational between 2028-2029 is anticipated if successful. The immediate availability of such a program would also work well in relation to ZEV truck purchases, as most companies require infrastructure prior to making investments in the ZEV trucks. The program would be anticipated to open annually as part of the District's existing Clean Air for All grant program; therefore, most (if not all) funding would be covered by CARB from existing Grant Agreements. Funding would likely emanate from the District's AB 617 fund which, due to recent legislation being passed, is now expected to receive annual allocations to the District for the foreseeable future. Pursuant to AB 617 funding requirements, the District would still be required to demonstrate how the funding relates (and benefits) disadvantaged and low-income communities. Existing funding from the Carl Moyer program could also be utilized if available.

Tier 3

The third tier of the Heavy-Duty Truck Incentive program, which would incentivize the purchase of ZEV trucks not located in disadvantaged communities through an additional modification to the District's Zero-Emission Truck Pilot program, would require more time and evaluation to prepare relevant timelines and budgets. If a warehouse ISR is not pursued, the District would not collect mitigation fees associated with its implementation. Consequently, the District would need to seek an additional funding source (beyond AB 617) to fund such truck projects. Existing Carl Moyer program funding could be utilized to a limited extent, but such funding is in high demand from other source categories and would also require scrappage of existing equipment which some companies have recently been reluctant to do.

Should a funding source be identified and received for such a program, the District would commit to working with community members and stakeholders in the development of such a program to further encourage projects in and around warehouses, including making any

necessary revisions to the Zero-Emission Truck Pilot project at the appropriate time and coordinating with any CSC and/or CARB as applicable. While some aspects are unknown, the District anticipates that existing staff that already implement the District's Clean Air for All grant program could be utilized to administer this potential future program.

Summary

The District anticipates Tiers 1 and 2 of the aforementioned program could potentially be available by 2027. Staff would (ideally) time the opening of such elements with the District's existing Clean Air For All annual grant solicitation. Doing so would leverage marketing and outreach efforts/funding that is available through other APCD incentive programs, and allow the District to conduct targeted outreach to potential applicants in and around disadvantaged communities.

5.2.3 Tentative Budget and Estimated Emission Reductions

The District estimates being able to implement Tiers 1 and 2 of the program with existing positions currently implementing other grant programs at APCD and would be redirected to implement a Heavy-Duty truck program, saving valuable time and money and forgoing a protracted hiring effort to staff a new program. Staff costs to implement are estimated to be approximately $211,000 per year, most (if not all) of which would be covered by CARB administrative funding associated with the incentive grants received from the state. The District would attempt to seek a funding source for Tier 3 of the aforementioned program that would similarly allow for full reimbursement of staff time spent on implementing a potential future program. In comparison to the estimated one-time costs to implement a warehouse ISR (i.e., $835k) and the ongoing costs associated with a warehouse ISR (i.e., up to $1 million), the Heavy-Duty Truck Incentive Program's implementation costs are expected to be lower and could result in faster emission reductions if successful.

Staff analyzed the amount of incentive funding, potential administration funding to implement, and number of heavy-duty truck replacements that would be needed from such a program to achieve emission reductions equivalent to the reductions expected through a potential warehouse ISR. The following assumptions were used in the analysis:

- Using EMFAC2025, a NOx emission factor for an "average" heavy-duty truck in San Diego County was developed.[141] The average heavy-duty truck operational

[141] https://arb.ca.gov/emfac/emissions-inventory

on San Diego County roadways emits approximately 0.066 tons per year of NOx, and 0.002 tons per year of PM2.5.[142]

- The Supplement noted that an ISR could achieve emission reductions between 13 to 27 tons per year of NOx and between 0.1 and 0.3 tons per year of PM2.5 in San Diego County, in a best-case scenario.[143]

- Using the above emission estimates, an incentive program replacing diesel heavy-duty trucks with zero-emission equipment would need to replace between 194 and 405 trucks to achieve equivalent NOx reductions to a potential warehouse ISR. For PM2.5, a similar incentive program would need to replace between 65 and 130 trucks with zero-emission equipment to achieve similar results as a potential warehouse ISR.

- Using the District's ZEV Pilot Project grant amounts as a proxy for a possible grant amount ($250k per truck replacement), an estimated $16 to $101 million would be needed for zero-emission truck replacements for such an incentive program to achieve equivalent ISR emission reductions. For context, the District has received over $20 million annually since 2022 from AB 617 and Carl Moyer grant awards.[144]

- Typical for most grant programs the District administers for CARB, the administration of such a program would likely require that approximately 10% of the incentive funding cover District costs to administer the program. This equates to between $2 million to $10 million.

5.3 Coordination with Warehousing Industry

Another potential concept for further consideration would be for staff to coordinate with warehouse owners/operators and/or industry organizations with the goal of procuring voluntary commitments from industry to: (1) support installation of charging infrastructure for zero-emission vehicles and equipment; (2) further the transition to zero-emission cargo handling equipment where applicable; (3) continue and enhance the District's zero-

[142] The White Paper as released on January 16, 2026, included incorrect truck emission factors showing higher baseline emissions from heavy-duty diesel trucks, which have now been corrected. The corrected truck emission factors now reflect EMFAC2025 v2.0.0, San Diego County, 2025 calendar year, summer season, Class 6-8 Diesel Trucks categories. As a result, the estimates for truck replacements and funding required have also been updated.

[143] Supplement, Table 8, p. 34

[144] Given the disparity between anticipated annual funding levels the District receives and the scale of implementing such a program, the District acknowledges that sole implementation of this truck replacement incentive funding approach would be unlikely to generate comparable emission reductions equivalent to a warehouse ISR in San Diego County. However, if combined with a successful TRU incentive program, the District believes these alternative strategies can result in comparable emission reductions to a potential warehouse ISR.

emission truck pilot program; and (4) prioritize access to incentives and grants. This coordination with industry could also be paired with the potential GMERP TRU or the Heavy-Duty Truck incentive programs discussed in the preceding two sections to achieve additional NOx and PM2.5 emission reductions.

6.0 SUMMARY OF FINDINGS AND CONSIDERATIONS

The following is a summary of the findings and considerations that informed the conclusions of this White Paper. See the referenced sections for more detailed discussions on each item.

- The estimated emission reductions from a potential warehouse ISR in San Diego County are projected to be significantly less than the reductions anticipated from other rulemakings (Section 3.1).
- The estimated public health benefits, both regionwide and in under-resourced communities, of a potential warehouse ISR are less than the benefits anticipated from recent and potential future rulemakings (Section 3.2).
- The estimated compliance costs of a potential warehouse ISR are greater than the costs anticipated from other rulemakings (Section 3.3).
- The estimated cost-effectiveness values of a potential warehouse ISR significantly exceed those for other District rulemakings, as well as cost-effectiveness thresholds used in other air districts (Section 3.4).
- A substantial percentage of the facilities identified as “warehouses” in the District’s inventory may not be conducting warehousing activities. This will likely reduce the number of facilities that would potentially be subject to a potential warehouse ISR (Section 3.5).
- The estimated one-time and on-going District costs for rule development and administration are substantial in light of current fiscal uncertainty (Section 3.6).
- A warehouse ISR in San Diego County modeled after the South Coast Air Quality Management District (SCAQMD) Rule 2305, which is the only warehouse ISR that has withstood litigation to date, is anticipated to require significant District staff effort for program implementation, outreach, and compliance/enforcement activities (Section 3.7).
- SCAQMD Rule 2305 was developed with the goal of reducing regional emissions to attain the federal and state Ozone and PM2.5 ambient air quality standards while achieving localized emission reductions as a co-benefit (Section 4.1).
- The District considered applicable comments received (Section 4.2).
- An analysis of warehouse buildings located in under-resourced communities compared to the rest of the county demonstrated that a majority of potential warehousing locations (over 70%) are located outside of identified under-resourced communities (Section 4.3.2).
- Other state activities, such as Assembly Bill 98 and a possible statewide ISR if adopted in the future, would likely achieve and support mobile source emission reductions from warehousing operations (Section 4.4).

- A third-party study that analyzed SCAQMD's WAIRE Program (Rule 2305) to date, which noted inconsistencies in reported data and the benefits that can be directly attributed to Rule 2305, and other findings (Section 4.5).
- Other potential non-regulatory alternatives for consideration, such as a focused Transport Refrigeration Unit (TRU) incentive program, may provide comparable emission reductions at lower costs and/or resources than anticipated with an ISR (Section 5.0).

7.0 CONCLUSION

The District believes the analysis outlined in this White Paper supports prioritizing the alternative strategies detailed in Section 5.0. These strategies are expected to reduce emissions, help meet state and federal air quality goals, and improve air quality in communities most impacted by pollution. Given the relatively high estimated cost of implementing a local rule, and the potential for a future statewide Indirect Source Rule (ISR), the District believes focusing on these alternatives represents the most efficient use of resources at this time.

As part of future planning, the District will designate a potential warehouse ISR as a "Further Study Measure" in the upcoming Regional Air Quality Strategy (RAQS). This ensures the measure remains under active review, with status updates provided to stakeholders as part of the regular RAQS development process. If future analysis demonstrates that the measure is both feasible and cost-effective, it may be considered for adoption.

Should the selected alternative strategies experience delays or fail to achieve intended outcomes, the District can reassess the appropriateness of a local warehouse ISR, taking into account any statewide ISR developments and implementation progress.

APPENDIX A – EPA COBRA Output Tables

Table A1 – Further Study Measure FS-7, Zero-Emission Water Heaters

Total Health Benefits		
	$4,466,535	$5,323,737
	Low Value	High Value

	Change in Incidence	Monetary Value
Total Mortality	**0.260 / 0.319**	**$3,796,502 / $4,653,704**
Mortality, All Cause (PM)	0.051 / 0.110	$747,520 / $1,604,722
Mortality, O3 Short-term Exposure (O3)	0.009	$130,955
Mortality, O3 Long-term Exposure (O3)	0.200	$2,918,028
Nonfatal Heart Attacks (PM)	**0.034**	**$2,861**
Infant Mortality (PM)	**0.000**	**$5,936**
Total Hospital Admits, All Respiratory	**0.033**	**$645**
Hospital Admits, All Respiratory (PM)	0.005	$151
Hospital Admits, All Respiratory (O3)	0.028	$495
Total Emergency Room Visits, Respiratory	**0.528**	**$858**
Emergency Room Visits, Respiratory (PM)	0.030	$48
Emergency Room Visits, Respiratory (O3)	0.499	$810
Total Asthma Onset	**2.290**	**$174,706**
Asthma Onset (PM)	0.169	$12,866
Asthma Onset (O3)	2.122	$161,840
Total Asthma Symptoms	**348.483**	**$122,622**
Asthma Symptoms, Albuterol Use (PM)	30.688	$20
Asthma Symptoms, Chest Tightness (O3)	87.554	$33,777
Asthma Symptoms, Cough (O3)	103.280	$39,845
Asthma Symptoms, Shortness of Breath (O3)	44.186	$17,047
Asthma Symptoms, Wheeze (O3)	82.775	$31,934
Emergency Room Visits, Asthma (O3)	**0.003**	**$2**
Lung Cancer (PM)	**0.004**	**$189**
Hospital Admits, Cardio-Cerebro/Peripheral Vascular Disease (PM)	**0.008**	**$244**
Hospital Admits, Alzheimers Disease (PM)	**0.028**	**$618**
Hospital Admits, Parkinsons Disease (PM)	**0.003**	**$72**
Stroke (PM)	**0.004**	**$225**
Total Hay Fever/Rhinitis	**14.518**	**$16,176**
Hay Fever/Rhinitis (PM)	1.062	$1,183
Hay Fever/Rhinitis (O3)	13.456	$14,993
Cardiac Arrest, Out of Hospital (PM)	**0.001**	**$55**
Emergency Room Visits, All Cardiac (PM)	**0.015**	**$33**
Minor Restricted Activity Days (PM)	**52.447**	**$6,594**
School Loss Days (O3)	**197.469**	**$335,364**
Work Loss Days (PM)	**8.953**	**$2,832**
Total PM Health Effects	**93.503 / 93.561**	**$781,446 / $1,638,648**
Total O3 Health Effects	**531.580**	**$3,685,089**

Table A2 – Further Study Measure FS-10, Zero-Emission Central Furnaces

Total Health Benefits		
	$3,357,429	$4,001,769
	Low Value	High Value

	Change in Incidence	Monetary Value
Total Mortality	**0.196 / 0.240**	**$2,853,773 / $3,498,112**
Mortality, All Cause (PM)	0.038 / 0.083	$561,895 / $1,206,234
Mortality, O3 Short-term Exposure (O3)	0.007	$98,436
Mortality, O3 Long-term Exposure (O3)	0.150	$2,193,442
Nonfatal Heart Attacks (PM)	**0.026**	**$2,151**
Infant Mortality (PM)	**0.000**	**$4,462**
Total Hospital Admits, All Respiratory	**0.025**	**$485**
Hospital Admits, All Respiratory (PM)	0.004	$113
Hospital Admits, All Respiratory (O3)	0.021	$372
Total Emergency Room Visits, Respiratory	**0.397**	**$645**
Emergency Room Visits, Respiratory (PM)	0.022	$36
Emergency Room Visits, Respiratory (O3)	0.375	$609
Total Asthma Onset	**1.722**	**$131,326**
Asthma Onset (PM)	0.127	$9,671
Asthma Onset (O3)	1.595	$121,655
Total Asthma Symptoms	**261.949**	**$92,173**
Asthma Symptoms, Albuterol Use (PM)	23.068	$15
Asthma Symptoms, Chest Tightness (O3)	65.813	$25,390
Asthma Symptoms, Cough (O3)	77.634	$29,950
Asthma Symptoms, Shortness of Breath (O3)	33.214	$12,814
Asthma Symptoms, Wheeze (O3)	62.221	$24,004
Emergency Room Visits, Asthma (O3)	**0.002**	**$2**
Lung Cancer (PM)	**0.003**	**$142**
Hospital Admits, Cardio-Cerebro/Peripheral Vascular Disease (PM)	**0.006**	**$184**
Hospital Admits, Alzheimers Disease (PM)	**0.021**	**$464**
Hospital Admits, Parkinsons Disease (PM)	**0.002**	**$54**
Stroke (PM)	**0.003**	**$169**
Total Hay Fever/Rhinitis	**10.913**	**$12,160**
Hay Fever/Rhinitis (PM)	0.798	$889
Hay Fever/Rhinitis (O3)	10.115	$11,270
Cardiac Arrest, Out of Hospital (PM)	**0.001**	**$41**
Emergency Room Visits, All Cardiac (PM)	**0.011**	**$25**
Minor Restricted Activity Days (PM)	**39.424**	**$4,956**
School Loss Days (O3)	**148.435**	**$252,089**
Work Loss Days (PM)	**6.730**	**$2,129**
Total PM Health Effects	**70.284 / 70.328**	**$587,396 / $1,231,736**
Total O3 Health Effects	**399.580**	**$2,770,033**

Table A3 – 2028, Scenario 3, 50k sq ft Threshold, Portside Community

Total Health Benefits		
	$32,075	$40,129
	Low Value	High Value
	Change in Incidence	Monetary Value
Total Mortality	**0.002 / 0.002**	**$27,487 / $35,541**
Mortality, All Cause (PM)	0.000 / 0.001	$7,023 / $15,077
Mortality, O3 Short-term Exposure (O3)	0.000	$879
Mortality, O3 Long-term Exposure (O3)	0.001	$19,585
Nonfatal Heart Attacks (PM)	**0.000**	**$27**
Infant Mortality (PM)	**0.000**	**$56**
Total Hospital Admits, All Respiratory	**0.000**	**$5**
Hospital Admits, All Respiratory (PM)	0.000	$1
Hospital Admits, All Respiratory (O3)	0.000	$3
Total Emergency Room Visits, Respiratory	**0.004**	**$6**
Emergency Room Visits, Respiratory (PM)	0.000	$0
Emergency Room Visits, Respiratory (O3)	0.003	$5
Total Asthma Onset	**0.016**	**$1,207**
Asthma Onset (PM)	0.002	$121
Asthma Onset (O3)	0.014	$1,086
Total Asthma Symptoms	**2.421**	**$823**
Asthma Symptoms, Albuterol Use (PM)	0.288	$0
Asthma Symptoms, Chest Tightness (O3)	0.588	$227
Asthma Symptoms, Cough (O3)	0.693	$267
Asthma Symptoms, Shortness of Breath (O3)	0.297	$114
Asthma Symptoms, Wheeze (O3)	0.556	$214
Emergency Room Visits, Asthma (O3)	**0.000**	**$0**
Lung Cancer (PM)	**0.000**	**$2**
Hospital Admits, Cardio-Cerebro/Peripheral Vascular Disease (	**0.000**	**$2**
Hospital Admits, Alzheimers Disease (PM)	**0.000**	**$6**
Hospital Admits, Parkinsons Disease (PM)	**0.000**	**$1**
Stroke (PM)	**0.000**	**$2**
Total Hay Fever/Rhinitis	**0.100**	**$112**
Hay Fever/Rhinitis (PM)	0.010	$11
Hay Fever/Rhinitis (O3)	0.090	$101
Cardiac Arrest, Out of Hospital (PM)	**0.000**	**$1**
Emergency Room Visits, All Cardiac (PM)	**0.000**	**$0**
Minor Restricted Activity Days (PM)	**0.493**	**$62**
School Loss Days (O3)	**1.325**	**$2,251**
Work Loss Days (PM)	**0.084**	**$27**
Total PM Health Effects	**0.879 / 0.879**	**$7,342 / $15,396**
Total O3 Health Effects	**3.568**	**$24,733**

Table A4 – 2028, Scenario 3, 50k sq ft Threshold, International Border Community

Total Health Benefits		
	$134,297	$167,663
	Low Value	High Value
	Change in Incidence	Monetary Value
Total Mortality	**0.008 / 0.010**	**$115,045 / $148,411**
Mortality, All Cause (PM)	0.002 / 0.004	$29,097 / $62,463
Mortality, O3 Short-term Exposure (O3)	0.000	$3,691
Mortality, O3 Long-term Exposure (O3)	0.006	$82,257
Nonfatal Heart Attacks (PM)	**0.001**	**$111**
Infant Mortality (PM)	**0.000**	**$231**
Total Hospital Admits, All Respiratory	**0.001**	**$20**
Hospital Admits, All Respiratory (PM)	0.000	$6
Hospital Admits, All Respiratory (O3)	0.001	$14
Total Emergency Room Visits, Respiratory	**0.015**	**$25**
Emergency Room Visits, Respiratory (PM)	0.001	$2
Emergency Room Visits, Respiratory (O3)	0.014	$23
Total Asthma Onset	**0.066**	**$5,063**
Asthma Onset (PM)	0.007	$501
Asthma Onset (O3)	0.060	$4,562
Total Asthma Symptoms	**10.153**	**$3,457**
Asthma Symptoms, Albuterol Use (PM)	1.195	$1
Asthma Symptoms, Chest Tightness (O3)	2.468	$952
Asthma Symptoms, Cough (O3)	2.911	$1,123
Asthma Symptoms, Shortness of Breath (O3)	1.246	$481
Asthma Symptoms, Wheeze (O3)	2.333	$900
Emergency Room Visits, Asthma (O3)	**0.000**	**$0**
Lung Cancer (PM)	**0.000**	**$7**
Hospital Admits, Cardio-Cerebro/Peripheral Vascular Disease (	**0.000**	**$10**
Hospital Admits, Alzheimers Disease (PM)	**0.001**	**$24**
Hospital Admits, Parkinsons Disease (PM)	**0.000**	**$3**
Stroke (PM)	**0.000**	**$9**
Total Hay Fever/Rhinitis	**0.421**	**$469**
Hay Fever/Rhinitis (PM)	0.041	$46
Hay Fever/Rhinitis (O3)	0.379	$423
Cardiac Arrest, Out of Hospital (PM)	**0.000**	**$2**
Emergency Room Visits, All Cardiac (PM)	**0.001**	**$1**
Minor Restricted Activity Days (PM)	**2.041**	**$257**
School Loss Days (O3)	**5.566**	**$9,454**
Work Loss Days (PM)	**0.348**	**$110**
Total PM Health Effects	**3.640 / 3.642**	**$30,417 / $63,783**
Total O3 Health Effects	**14.985**	**$103,880**

APPENDIX B – Kerr Study Analysis

Staff analyzed the data used in the Kerr et al study by calculating two correlations:[145]

- Correlation between warehouse floor area (RBA) and on-road emissions (EONRD).
- Correlation between warehouse floor area (RBA) and annual average daily traffic (AADT).

Both correlations indicate a strong relationship between warehouse floor area and on-road emissions (0.99), and between warehouse floor area and annual average daily traffic (0.97 to 0.99). A correlation coefficient of 1 indicates a perfect positive correlation, which means that when one variable changes, the other variable changes in the same direction.[146] Therefore, as warehouse square footage increases, on-road emissions and annual average daily traffic also proportionately increases.

Table B1 – Warehouse Floor Area and Emissions

City	Count of Sub	Sum of RBA	Avg floor area	Sum of EAIRP	Sum of ENONPT	Sum of ENONRD	Sum of EONRD	Sum of ERAIL	Sum of ERWC	Sum of EALL
Campo	3	69880	23,293	0	1.434075147	5.671195149	19.0697608	156.8923721	0.200954221	183.2683678
Carlsbad	60	3112212	51,870	459.4379778	3382.968754	13936.8463	30882.8096	2007.341385	341.4656384	51010.86975
Chula Vista	53	2445984	46,151	455.5446502	3573.167782	12769.69048	35307.39723	4528.211904	127.7784657	56761.79059
El Cajon	70	2438109	34,830	365.5147762	4793.17165	15847.43439	47364.28467	1773.953855	330.8410687	70475.20129
Encinitas	1	26579	26,579	0	34.98558044	172.7808685	347.7989502	23.29445648	3.840089321	582.6998901
Escondido	54	1806468	33,453	0.390419025	1965.557726	7473.814743	28391.75934	1313.461157	235.2947221	39380.27844
Fallbrook	3	75838	25,279	1.594059169	31.32354927	205.4012299	234.5946884	127.1659813	4.534640789	604.614151
Imperial Beach	1	26011	26,011	1.98231E-05	49.45735168	202.590683	454.7655029	84.3604126	1.521110296	792.6950684
Jamul	1	38000	38,000	0	20.52851486	56.16518784	171.2213135	0	1.969271183	249.8843231
La Mesa	2	63850	31,925	10.5946312	179.5735931	557.8886108	1712.943237	86.84208679	7.526556969	2555.368774
Lakeside	11	477475	43,407	58.23070765	474.2116318	1655.262909	4027.964569	71.51924515	33.18663764	6320.375763
Lemon Grove	5	177598	35,520	0.054224865	574.8330917	1639.011597	6432.876953	299.1056137	16.76549864	8962.646729
National City	29	1884245	64,974	0.488023804	2470.050537	8334.67041	31119.54059	4833.457001	47.16618919	46805.37256
Oceanside	55	2310908	42,017	16.63449819	3183.396732	12736.52051	25725.68826	2618.264492	300.84254	44581.34607
Poway	56	3874108	69,181	0.202439494	1817.813383	5465.458931	19529.51302	183.3571808	172.5703943	27168.91678
Ramona	3	103072	34,357	10.33788747	17.80431366	40.98323631	158.1085854	0	2.41852653	229.6525421
San Diego	471	24553079	52,130	33707.29292	27576.1766	94651.25222	403950.7633	23588.84257	1034.139985	584508.4702
San Marcos	46	1779551	38,686	7.945930107	1777.756416	7171.32666	19585.80017	1668.36215	206.4132309	30417.60492
Santee	17	501994	29,529	90.05436516	980.9120522	3304.66803	9227.952362	318.280756	60.97982597	13982.8479
Spring Valley	5	137239	27,448	0.020125088	327.600708	1033.891678	3045.62677	140.174118	21.76326752	4569.076538
Valley Center	1	25394	25,394	0.104213186	3.185622931	68.0994873	32.68902588	0	0.119341269	104.1976776
Vista	58	2783158	47,985	420.827379	3002.399654	12043.24803	25318.07169	2044.223803	300.998003	43129.76892
Total	**1,005**	**48,710,752**	**48,468**	**35,605**	**56,238**	**199,373**	**693,041**	**45,867**	**3,252**	**1,033,377**
Correlation RBA vs				**0.97**	**0.99**	**0.99**	**0.99**	**0.97**	**0.93**	**0.99**

[145] Kerr et al, "Data availability" section, https://www.nature.com/articles/s41467-024-50000-0#Sec4

[146] A correlation coefficient of 1 indicates a perfect positive correlation, which means that when one variable changes, the other variable changes in the same direction, https://www.scribbr.co.uk/stats/correlation-coefficient-meaning/.

Table B2 – Warehouse Floor Area and Annual Average Daily Traffic

Row Labels	Count of City	Sum of RBA	Sum of AADT	Sum of AADT_single	Sum of AADT_combination	Sum of AADT5km	Sum of AADT5km_single	Sum of AADT5km_combination	Sum of AADT3km	Sum of AADT3km_single	Sum of AADT3km_combination	Sum of AADT1km	Sum of AADT1km_single	Sum of AADT1km_combination
Campo	3	69880	208921.0726	11039.36015	10782.50086	172387.8567	8459.761097	9118.846397	99844.12338	4362.617657	2813.572257	25098.14766	1141.580708	736.2368335
Carlsbad	60	3112212	537853870	16238236.27	12612721.7	254684997	7129754.541	5915890.283	69363511.05	1533038.83	1447336.414	8202164.98	165446.8147	166298.1066
Chula Vista	53	2445984	600594234.4	18272631.98	17315242.06	391349473.4	11961439.49	11399034.44	162164148.2	5255091.32	4487090.099	33816114.28	1264153.518	839593.9146
El Cajon	70	2438109	699348396.4	22323963.52	24788229.58	478157645.9	14883545.39	18020497.3	250133101.7	7496035.804	9606512.363	62882001.05	1630904.568	1333148.302
Encinitas	1	26579	6149678.131	226456.0628	179284.6555	4619303.733	180766.8431	134930.4808	2763628.129	110057.546	76178.77459	692728.6261	26620.30003	19005.86067
Escondido	54	1806468	486649710.9	14429403.12	16459248.37	366573257.2	10989133.5	12817607.12	215207241.6	6775533.97	7250714.119	51593255.73	1877532.492	1486060.265
Fallbrook	3	75838	4702847.793	252599.0738	78752.60117	2396286.595	17556.30485	11162.33997	1528656.767	7443.574087	5527.839077	301821.3382	135.8111541	81.52051841
Imperial Beach	1	26011	9980368.506	310646.1521	289052.0047	3541564.816	124027.2598	103089.6916	1736276.07	73509.38168	52907.37809	109420.3177	1684.123012	2557.840965
Jamul	1	38000	2442840.649	85346.8691	59409.27392	743191.4134	34599.29108	26768.93429	174583.7283	12310.72681	7357.937118	42743.53219	2835.5846	1702.057008
La Mesa	2	63850	26089280.37	742515.5844	726551.7522	17508984.92	475406.364	382701.82	8670045.492	272664.2493	235159.7657	1698789.42	35122.5623	21753.88361
Lakeside	11	477475	64155875.47	2101666.837	2673399.549	36581163.03	1385382.687	1758173.876	10585481.66	452274.0265	795681.1055	2932357.815	150936.5347	261169.6378
Lemon Grove	5	177598	98201712.26	2661509.211	2007504.15	54997134.85	1458902.54	987984.4354	13867082.49	396745.6425	237434.6038	3979843.967	107178.2963	62183.68619
National City	29	1884245	509355401.3	14687848.95	11066174.99	285124770.9	7913702.139	6482448.407	125013152.6	3434200.436	2845777.433	25907649.11	597754.4109	470784.2791
Oceanside	55	2310908	410686801	13010130.52	10261334.03	261919094.1	8262097.293	6224740.035	136424545.1	4275337.248	3094320.579	13335238.5	428975.9572	234525.2583
Poway	56	3874108	428795402.6	12692730.84	20292571.07	133678877	3202501.11	5892189.96	18306511.82	150125.6816	233499.6816	2650935.57	2722.576772	5938.536882
Ramona	3	103072	2165160.15	86087.32398	55894.98764	1635727.163	64840.53521	44626.83865	1043541.045	38955.28489	30581.46397	367192.3651	16528.38499	11846.23788
San Diego	471	24553079	6838757769	217212715.1	195713634.9	3759659918	122571850.9	108947590.9	1536639874	49905545.21	44542631.48	323022127.7	10383343.79	9328492.91
San Marcos	46	1779551	339749886.3	10639399.68	8662905.148	203132142.2	6289960.145	4610063.288	94405542.82	2774975.406	1835199.87	33194154.75	945768.5792	686209.6684
Santee	17	501994	140820815.9	4268162.681	4940759.918	84215840.34	2792089.606	3648956.9	33990548.46	1212444.686	1957214.436	7658742.203	336122.6567	740896.2274
Spring Valley	5	137239	47600295.98	1338260.867	1146741.123	26957460.82	884283.1913	801424.6299	8636067.022	315934.4177	327294.372	1117362.683	42310.62706	42705.79107
Valley Center	1	25394	96430.5321	7528.354352	8018.870358	51713.4543	3574.610427	3807.517056	6608.256031	0	0	0	0	0
Vista	58	2783158	340713896.4	8904617.928	5799038.498	203047460.7	5153143.87	3186010.956	91235789.44	2442604.184	1312539.569	12407112.19	209091.6431	126337.3452
Correlation RBA vs			**0.993**	**0.992**	**0.992**	**0.988**	**0.986**	**0.984**	**0.979**	**0.978**	**0.967**	**0.969**	**0.967**	**0.967**
minimum correlation		**0.967**												
maximum correlation		**0.993**												

APPENDIX C – Background on Under-Resourced Communities

Senate Bill 535

In 2012, Senate Bill (SB) 535 (De León, Chapter 830, Statutes of 2012) established initial requirements for minimum funding levels to "Disadvantaged Communities." The legislation also gave CalEPA the responsibility for identifying those communities, stating that CalEPA's designation of disadvantaged communities must be based on "geographic, socioeconomic, public health, and environmental hazard criteria."

In May 2022, CalEPA released its updated designation of disadvantaged communities for the purpose of SB 535.[147] In this designation, CalEPA formally designated four categories of geographic areas as disadvantaged:

- Census tracts receiving the highest 25 percent of overall scores in CalEnviroScreen 4.0.
- Census tracts lacking overall scores in CalEnviroScreen 4.0 due to data gaps, but receiving the highest 5 percent of CalEnviroScreen 4.0 cumulative pollution burden scores.
- Census tracts identified in the 2017 DAC designation as disadvantaged, regardless of their scores in CalEnviroScreen 4.0.
- Lands under the control of federally recognized Tribes.

The designation takes into account the latest and best available data and considers factors related to data unavailability. This designation went into effect on July 1, 2022, at which point programs funded through California Climate Investments will use the designation in making funding decisions.[148]

Environmental Justice Communities

As discussed in the Environmental Justice Element (EJ Element) of the County of San Diego's General Plan, the County of San Diego identified "disadvantaged communities" for the EJ Element using the state-recommended screening tool CalEnviroScreen combined with localized data available through the County's Live Well San Diego data Indicators as measurements of pollution, health, and social equity. To broaden the reach of the EJ Element and to align with current County programs directed at high-need areas, the County's methodology refers to "disadvantaged communities" as Environmental Justice Communities (EJ Communities) to differentiate them from the State's designated "disadvantaged communities."

To better target engagement efforts and tailored goals, policies, and implementation measures in the EJ Element, the County grouped the 17 identified census tracts into four (4) distinct EJ Communities:

[147] https://oehha.ca.gov/media/downloads/calenviroscreen/document/sb535dacresultsdatadictionaryf2022.zip
[148] https://oehha.ca.gov/calenviroscreen/sb535

North El Cajon, North Lemon Grove, Spring Valley, and Sweetwater. These communities span the unincorporated and incorporated (city) areas within the jurisdiction covered by the County's General Plan and share land use jurisdiction with the cities of Chula Vista, El Cajon, La Mesa, Lemon Grove, and San Diego.[149]

Environmental Justice Partnership Communities

The Environmental Justice Partnership (EJP) is a collaborative effort between SDAPCD's Office of Environmental Justice, County of San Diego's Office of Sustainability and Environmental Justice (OSEJ), California Air Resources Board (CARB), community-based organizations (CBOs), and individual community members to reduce air pollution and improve air quality in some of the San Diego communities most impacted by air pollution. EJP focus communities include the following: Barrio Logan and National City, City Heights, El Cajon, Escondido and Vista, Linda Vista, San Ysidro, Southeast San Diego, and Spring Valley.[150]

[149] San Diego County General Plan, Environmental Justice Element, pp. 9-5 and 9-6, https://www.sandiegocounty.gov/content/dam/sdc/pds/gpupdate/09-Environmental-Justice-Aug2021.pdf
[150] https://www.sdapcd.org/content/sdapcd/community/office-of-environmental-justice/ejp.html