March 9, 2026

California Air Resources Board
1001 I Street
Sacramento, CA 95814

Submitted online via the comment submittal portal

RE: Comments on Proposed Amendments to the California Cap on Greenhouse Gas Emissions and Market- Based Compliance Mechanisms Regulation

Dear Mark Sippola and Cap-and-Invest Program Staff,

Industrious Labs and The 2035 Initiative at UC Santa Barbara appreciate the opportunity to submit these follow-up comments on the California Air Resources Board (CARB)'s proposed 2026 Amendments to the Cap-and-Invest Regulation released January 20, 2026. In our November 2025 comments on CARB's October 29 workshop, we recommended:

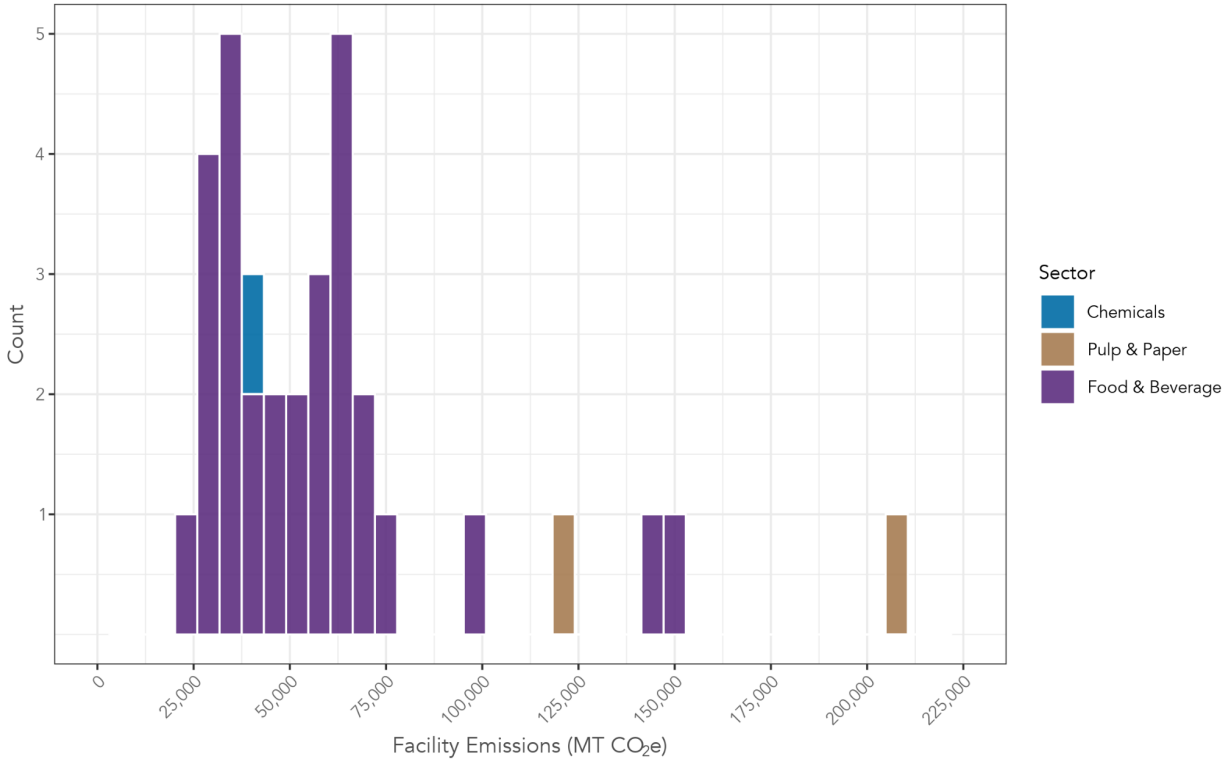
1. Making direct capital investments in industrial decarbonization, prioritizing facilities best suited for electrification, excluding petroleum refining;
2. Investing in geothermal for industrial heat;
3. Prioritizing co-pollutant reductions and benefits;
4. Prioritizing investments in and near CalEnviroScreen Communities;
5. Coordinating with the CPUC to improve electricity affordability for industrial customers; and
6. Phasing out free industrial allocation allowances.

We are encouraged that CARB's proposed Manufacturing Decarbonization Incentive Allocation reflects our recommendation to encourage capital investments in industrial decarbonization. However, our facility-level modeling of 35 large California manufacturing facilities across the chemicals, pulp & paper, and food & beverage sectors finds that the proposed allocation structure is unlikely to drive the fuel switching it is designed to incentivize. The primary reason is the significant differential between industrial retail electricity rates and gas rates. Without industrial electricity rate reform, most electrification projects remain economically infeasible and avoided allowance costs and/or the Incentive Allocation under the proposed program design are insufficient to close that gap. Our modeling suggests that an allowance price approaching $500 would be necessary to meaningfully close the gap for the average food and beverage facility, far above the proposed amendment price of $68. Furthermore, the proposal to keep current levels of free industrial allowances until 2035 further disincentivizes industrial electrification.

I. Overview of Modeled Facilities and Emissions Profiles

To assess how the proposed Incentive Allocation would function in practice, we analyzed 35 California manufacturing facilities reporting to EPA's Greenhouse Gas Reporting Program (GHGRP) in subsectors with significant low- and medium-temperature process heat demand, which are the best near-term candidates for electrification with commercially available technologies, including industrial heat pumps, thermal batteries, and electric boilers.[i] These 35 facilities are also covered entities under the Cap-and-Invest Program.[ii] As shown in Figure 1, the majority of facilities fall below 100,000 $MTCO_2e$ annually, with a substantial share clustered near the 25,000 $MTCO_2e$ program inclusion threshold.[iii]

Figure 1: Histogram of CA Manufacturing facilities in project scope, by sector and annual emissions (MT CO_2e)[iv]



II. Industrial Electrification Capital and Operating Costs

We binned the 35 facilities into six emissions profile ranges to avoid disclosing facility-specific estimates. Our California-specific modeling assumptions are intended to represent typical facility conditions and assume an industrial electricity rate of 19¢/kWh and a natural gas price of $12.24/MMBTu.[v]

For the lowest-emitting facilities (0–33k $MTCO_2e$), electrification scenarios yield average incremental capital costs ranging from approximately $570,000 (when assuming electrification with an electrode boiler and energy efficiency measures) to $23 million (assuming electrification with a high-temperature heat pump and energy efficiency measures), with incremental post-electrification operating cost of $8-15.5 million annually. These cost estimates increase as the original emissions profile of a facility increases. Tables 1 and 2 below present the full breakdown by emissions range and sector.

Table 1. Estimated capital and operating costs associated with electrification, by electrification technology scenario and facility emission range

Facility emissions range	**Number of Facilities**	**Electrification technology scenario**	**Average Δ CAPEX** ***(Electric Equipment costs - NG Boiler costs)***	**Average Δ OPEX** ***(Electricity Costs - NG Fuel Costs)***	**Number of facilities likely below 25k MT CO_2e after electrification**
0 - 33k $MTCO_2e$	8	Electrode Boiler *("E-Boiler")* + Energy Efficiency Measures ("EE")	+$568,821	+$15,696,418	8
		Air-Source High-Temp Heat Pump ("*HTHP*") + Energy Efficiency Measures ("EE")	+$23,015,349	+$8,019,624	
33k - 47k $MTCO_2e$	7	E-Boiler + EE	+$704,014	+$21,734,191	7
		HTHP + EE	+$27,118,421	+$8,873,385	
47k - 62k $MTCO_2e$	8	E-Boiler + EE	+$3,850,773	+$29,672,420	7
		HTHP + EE	+$35,035,422	+$11,628,715	
62k - 100k	7	E-Boiler + EE	+$1,408,176	+$42,993,522	7

$MTCO_2e$		HTHP + EE	+$42,882,520	+$17,919,934	
100k - 175k $MTCO_2e$	3	E-Boiler + EE	- $525,528	+$62,535,443	2
		HTHP + EE	+$48,007,835	+$26,414,058	
175k+ $MTCO_2e$	2	E-Boiler + EE	+$1,833,936	+$60,924,001	0
		HTHP + EE	+$51,106,153	+$23,195,581	

Table 2. Estimated capital and operating costs associated with electrification (with an high-temperature heat pump + energy efficiency measures), by manufacturing sector

Sector	**N**	**Electrification Technology Scenario**	**Average Δ CAPEX *(Electric Equipment costs - NG Boiler costs)***	**Average Δ OPEX *(Electricity Costs - NG Fuel Costs)***	**N facilities likely below 25,000 $MTCO_2e$ after electrification**
Food & Beverage	31	Air-Source High-Temp Heat Pump ("*HTHP*") + Energy Efficiency Measures (EE)	$34,283,631	$13,411,684	30
Pulp & Paper	3		$36,333,949	$15,833,578	0

**Note: The Chemicals sector is excluded here to avoid single-facility estimates.*

III. How the Incentive Allocation Interacts with Near-Threshold Facilities

In our sample of 35 facilities, 31 are likely to drop below the 25,000 MT CO_2e threshold after electrification of their low- and medium-temperature process heat. In theory, these facilities could eliminate their allowance compliance costs entirely by electrifying.

However, for the incentive allocation to drive electrification decisions, the avoided allowance costs must exceed the marginal increase in operating costs that electrification entails. Our modeling shows this condition is not met under current or proposed allowance prices. Air-source high-temperature industrial heat pumps offer better operating cost outcomes than electrode boilers due to higher efficiency, but even under this more favorable scenario, electrification is only economical for the average food & beverage facility if it currently pays more than approximately $13.4 million annually in allowance costs.

One dynamic worth flagging for CARB's consideration is the 25,000 $MTCO_2e$ program threshold may inadvertently create a policy cliff. A facility emitting just above 25,000 $MTCO_2e$ could have a rational incentive to remain in the program and continue collecting free allowances rather than electrify and exit. It's worth examining whether this dynamic might unintentionally favor incremental efficiency improvements over investment in zero-emission solutions.

This dynamic plays out differently depending on a facility's emissions profile. For facilities near the threshold, there may be a rational incentive to avoid electrification altogether and remain in the program. For higher-emitting facilities like pulp and paper, exiting the program through electrification may not be feasible, leaving them to absorb both ongoing compliance costs as well as significantly higher operating costs estimated at approximately $15.8 million per year.

Table 3 below estimates current allowance obligations before the Incentive Allocation is applied. We find that avoided allowance costs do not exceed marginal post-electrification operating costs at the current allowance price of $27.94, nor at the proposed amendment price of $68. Our modeling suggests that an allowance price approaching $500 would likely be necessary to meaningfully close the gap for food and beverage facilities with average estimated incremental operating costs of approximately $13.4 million per year. In short, the carbon price signal under the proposed amendment is not sufficient to drive electrification without complementary electricity rate reform.

Table 3. Estimated average compliance obligations by industrial sector, using CARB's Summary of Vintage 2026 Allowance Allocation to eligible entities [vi]

Sector (Vintage 2026)	**Total Allocation /C&I facilities (sample facilities)**	**C&I average allow-ances per facility/ year**	**Average covered emissions (MT CO_2e/ year)**	**Allow-ances to Buy** *(covered emissions - free allowances)*	**Com-pliance cost @ $27.94**[vii]	**Com-pliance cost @ $68**[viii] *(Proposed Amend-ment modeled) price)*	**Com-pliance cost @ $500**
Fruit and Vegetable Canning	497,004 /12(13*)	41,417	67,262	25,845	$722,109	$1.76M	$12.9 M
Other Food Manu-facturing	455,448 /15(10)	30,363	37,216	6,853	$191,472	$466,004	$3.4M

Dairy Product Manu-facturing	258,532 /8(8)	32,317	53,743	21,426	$598,642	$1.46M	$10.7M
Misc. Industrial Facilities and Legacy Contract Generators (covers Pulp & Paper facilities)	1,411,232 /15(3)	94,082	294,253	200,171	$5.6M	$13.6M	$100M

**One additional canning facility reports to GHGRP and is in our project scope, but is not included in the CARB Summary of Allowance Allocations for that industry sector. Again, the Chemicals sector is excluded here to avoid single-facility estimates.*

Even under optimistic projections that include a tightening cap and rising allowance prices that apply upward pressure on natural gas costs, the spark spread would need to close dramatically to make electrification cost competitive. Electricity currently costs more than four times as much as natural gas on an equivalent energy basis, and marginal post-electrification operating costs for the average food and beverage facility would need to fall from approximately $13.4 million to approximately $1 million per year. That gap cannot close through carbon pricing alone; it requires complementary electricity rate reform.

IV. Recommendations

1. Tighten carbon allowance budgets and phase out free allowances to send stronger price signals for near-term action.

Tightening the 2027–2030 allowance budgets is essential to closing the fuel-switching cost gap. Higher allowance prices increase the value of avoided compliance costs from electrification, making the Incentive Allocation more effective. Free allowances allocated to industry should also begin to be phased out before 2035, and CARB should signal this trajectory now, giving manufacturers time to plan investments and policymakers time to develop complementary measures, including coordination with the CPUC on industrial electricity rate reform and reinvestment in capital grant programs such as CEC's INDIGO and FPIP programs.

2. Coordinate with the CPUC to pair the Incentive Allocation with industrial electricity rate reform.

Our analysis shows that electricity prices are the primary barrier to electrification for many facilities. Even accounting for the efficiency advantages of industrial heat pumps and other electric technologies, electricity is not cost-competitive with natural gas for industrial process heating under today's rates. Supporting industrial decarbonization therefore requires active coordination with the CPUC to make electrification the more cost-effective option over the long term.

V. Conclusion

The proposed Manufacturing Decarbonization Incentive Allocation represents a constructive step toward supporting California's industrial sector through the clean energy transition. However, facility-level modeling makes clear that the proposed design alone is unlikely to unlock low- and medium-temperature heat electrification, as the electricity-to-gas price gap is simply too large to be bridged by avoided allowance costs at current or near-term projected carbon prices or with the proposed Incentive Allocation.

Meaningful leakage protection depends on ensuring that operating costs are sustainable enough to support the capital investment manufacturers make to decarbonize and remain competitive in California for the long term. Every time a company makes a major capital investment to clean up its emissions, that investment deepens their commitment to operating in California, bringing with it jobs, tax base, and long-term economic stability. To realize that potential, CARB should pair the Incentive Allocation with a commitment to phase out free allowances, tighten the cap, and coordinate with the CPUC on the electricity rate reform that will make clean industrial heat economically viable.

We look forward to continued engagement as CARB finalizes this rulemaking.

Sincerely,

Teresa Cheng, California Director, **Industrious Labs**

Leah Stokes Associate Professor, **UC Santa Barbara** Policy Director, **The 2035 Initiative**

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[i] See our national results at: https://www.2035initiative.com/clean-manufacturing.
[ii] California Air Resources Board, "Compliance Instrument Tracking System Service (CITSS) Registrants Report," December 31, 2025, https://ww2.arb.ca.gov/sites/default/files/2025-12/nc-2025_q4_citssregistrantreport.pdf.
[iii] One additional facility, a pulp & paper plant with emissions >550,000 $MTCO_2e$, is excluded from the figure for visibility.
[iv] One Chemicals manufacturing facility reports to GHGRP and is included here, but is not a C&I covered entity.
[v] Further information on data sourcing is available in our national report methodology: https://www.2035initiative.com/clean-manufacturing.
[vi] California Air Resources Board, "Cap-and-Invest Program Vintage 2026 Allocation Summary," December 2025, https://ww2.arb.ca.gov/sites/default/files/2025-12/nc-v2026%20Public%20Allocation%20Summary.pdf.

[vii] California Air Resources Board, "California and Quebec Release Summary Results from 46th Joint Cap-and-Invest Allowance Auction," press release no. 26-04, February 25, 2026, https://ww2.arb.ca.gov/news/california-and-quebec-release-summary-results-46th-joint-cap-and-invest-allowance-auction.

[viii] California Air Resources Board, "Staff Report: Initial Statement of Reasons — Public Hearing to Consider the Proposed Amendments to the Regulation for the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms," January 20, 2026, https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2026/cap_invest/nc_isor.pdf.