Marathon Petroleum Company LP

539 South Main Street
Findlay, OH 45840
Tel: 419.422.2121
Fax: 419.425.7040

March 9, 2026

Lauren Sanchez
Chair California Air Resources Board
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Submitted Electronically via CARB

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

Dear Chair Sanchez:

Marathon Petroleum Company LP (Marathon) appreciates the opportunity to provide comments on the California Air Resources Board's (CARB or Board) proposed amendments (Proposed Amendments) to the Regulation for the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms Regulation (Cap-and-Invest Program, C&I).[1]

We write to express serious concerns with CARB's proposal to materially reduce the number of industrial assistance allowances provided to refineries and biorefineries and to remove a total of one billion allowances between 2027 and 2045. If finalized, the Proposed Amendments would impose significant financial burdens on California petroleum refineries and biorefineries. CARB's proposal undermines the intent of AB 1207 (Irwin, 2025) by threatening to exacerbate the already elevated fuel production costs faced by in-state refineries and drive more refining production out of the state, resulting in adverse impacts on California's economy and environmental objective due to a greater reliance on imports of fuel from out-of-state and international refineries.

Marathon's recommendations to avoid these outcomes are below, with further supportive discussion and data in the following pages:

- Increase the Cap Adjustment Factor (CAF) in Table 9-2 to 0.85 for the petroleum refining sector including the Hydrogen and Cogeneration facilities supporting petroleum refining, beginning with compliance year 2026 and maintain the CAF at 0.85 through 2045; and

[1] CARB Proposed Regulation Order

- Increase the CAF to 1.0 in Table 9-2 for the biorefining sector, including the Hydrogen and Cogeneration facilities supporting biorefining, beginning with compliance year 2026 and maintain the CAF at 1.0 through 2045.

Executive Summary

California's petroleum refineries are already among the highest-cost fuel producers globally. Independent benchmarking by HSB Solomon Associates LLC (Solomon), covering more than 300 refineries representing about 85% of global capacity, shows that California refineries face production costs approximately **8% above the global average, 3% above Asia-Pacific imports (including freight), and 14% above the average U.S. refinery outside of California.** If CARB finalizes the Proposed Amendments, the cost gap between California, and the rest of the world will widen further.

Marathon's recommendations aim to ensure the C&I Program reduces greenhouse gas (GHG) emissions without undermining California's economy. Contrary to AB 1207 (Irwin, 2025) CARB's Proposed Amendments would sharply increase in-state refineries' cost to produce transportation fuel, increasing the risk of leakage. Without targeted adjustments, the amendments would deepen California refineries' competitive disadvantage to those that do not face comparable stationary source compliance costs, shifting fuel production—and emissions—out of the state. Simply maintaining a status-quo approach through 2031 is not a viable option given the significant changes to California's refining outlook since the passage of AB 398 (Garcia, 2017) and subsequent 2018 Cap and Trade amendments. The need to address the status quo was recognized in the passage of AB 1207, which removed the AB 398 requirement that industrial allocations align with the overall cap. Near-term targeted adjustments are necessary because of the increased leakage risk associated with California's refining sector.

Marathon has invested to modernize operations, improve efficiency, and transition to lower-carbon fuels and feedstocks. These actions reflect the practical limits of feasible, cost-effective emission reductions at complex refineries. While CARB has identified carbon capture, utilization, and sequestration (CCUS) as a potential decarbonization pathway, CCUS is not a viable near- or medium-term option for complex refineries due to cost, technical, logistical, and infrastructure barriers.

Marathon has also invested in renewable transportation fuels, which are a critical and complementary component of California's climate strategy. These fuels deliver near-term lifecycle GHG reductions from the existing vehicle fleet and are especially important in sectors where alternatives to liquid transportation fuels remain limited. Adding costs to in-state renewable fuel facilities may undermine this strategy.

Petroleum refineries and biorefineries are essential to California's economy and emissions-reduction goals. Marathon's recommendations aim to preserve in-state fuel production, protect emission reduction investments, and keep the C&I Program focused on reducing - not shifting - global emissions, maintaining a competitive, resilient, and environmentally responsible transportation fuels sector in California.

Without increased allocations to industrial facilities, CARB's Proposed Amendments would sharply raise the cost to produce transportation fuels in California. These cost pressures could ultimately result in job losses, lower tax revenue, weaker supply chains, greater import dependence, and higher global GHG emissions.

Comments and Supporting Data

CARB's C&I Program is built with statutory obligations in AB 32, AB 398, and AB 1207, which mandate that CARB consider "cost-effectiveness," "affordability," and "leakage" impacts of these regulations.[2] CARB issues an allocation of allowances to industrial entities as the mechanism to ensure both cost-containment and leakage-prevention for emissions-intensive, trade-exposed (EITE) sectors such as refining.[3] CARB's proposal to tighten the cap while simultaneously *reducing the number of allowances allocated to industrial entities* would substantially increase compliance costs by requiring regulated entities to purchase a greater share of their required allowances on the market.

Third-party data shows that the projected outcome of the Proposed Amendments will, in fact, accelerate the rate of leakage as the Proposed Amendments are likely to result in the following:

- Drive more refining production capacity out of the state and increase reliance on imports, which in turn will negatively impact California's economy (economic leakage); and
- Shift refining capacity to out-of-state and international refineries in jurisdictions that have not adopted any, or as stringent, GHG emission regulations (environmental leakage).

Marathon recommends that CARB revise its Proposed Amendments to be consistent with the Legislature's directive to implement a C&I Program that is cost-effective, affordable and minimizes leakage. Such changes will provide stability and encourage further investments in California refineries.

The projected costs to comply with CARB's Proposed Amendments will place California refineries at a pronounced competitive disadvantage, lead to curtailed operations, and drive refining production capacity out of the state.

California refineries are vital to California's economy

California's refining industry plays a critical role in the state's economy, supplying essential transportation fuels and chemical feedstock that underpin nearly every sector of economic activity. Beyond fuel production, refineries support thousands of high-quality jobs, generate substantial state and local tax revenues, and anchor complex supply chains that serve manufacturing, agriculture, logistics, and consumer markets throughout California.[4] Marathon proudly employs over 2,000 workers in California, including those with roles in engineering and union process operator and construction roles, and contracted approximately 5,300 full-time equivalent contractors in 2024 and 2025. Additionally, Marathon and its employees support[5] their local communities by donating their time, money and expertise. Policies that undermine the viability of in-state refining carry consequences well beyond the facilities themselves.

---

[2] California Health & Safety Code HSC § 38562(b)(5), (b)(7), and b(9) as amended by AB 1207
[3] CARB's Workshop Presentation October 2025
[4] Los Angeles Economic Development Corporation Oil and Gas in California 2025. Exhibit 2-11
[5] Marathon Los Angeles Refinery Sustainability brochure 2024 Los Angeles Sustainability Highlights Brochure; Martinez Renewables Sustainability brochure 2024 Martinez Renewables Facility Sustainability Highlights Brochure; Marathon Los Angeles Refinery Summer Youth Program

According to the California Energy Commission's (CEC) Transportation Fuels Assessment, California refineries are a source of transportation fuel for in-state users, and a source of transportation fuels for California's neighboring states of Arizona and Nevada.[6] California refineries also fulfill the majority of the state's jet fuel demand, including the jet fuel for military operations along the West Coast. While the CEC noted potential policy options to replace gasoline supply should California refineries close, the CEC acknowledged, "Jet fuel imports would need to increase substantially even with moderate penetration of reasonable substitute aviation services (e.g., sustainable aviation fuel, hydrogen, or electric aviation)."[7] Specifically, jet fuel will need to be supplied by marine imports, most likely from Asia, with limited volumes available from Washington state refineries. Because reliable jet fuel supply is essential to military operations and California's aviation-dependent economy, disruptions would have direct national security implications and economic consequences for the state.

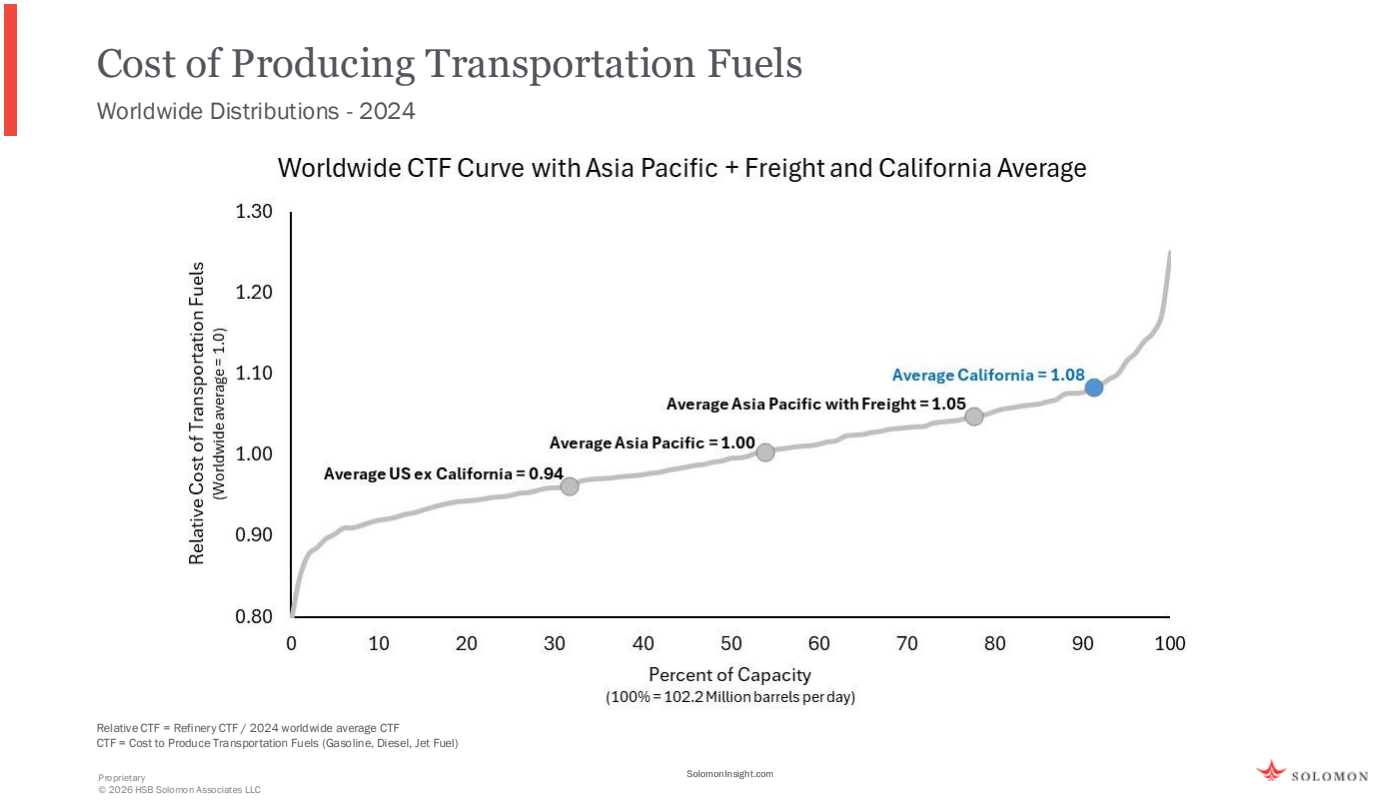
The costs to produce transportation fuel are greater in California than in other states and countries

Today, California refineries incur greater costs to produce transportation fuel than out-of-state and international refineries. Solomon benchmarking confirms that California refineries already sit well to the right of the global cost curve, leaving them disproportionately exposed to incremental policy-driven costs. This point was underscored when two in-state refineries announced closures based, in part, on California market dynamics: Phillips 66's Los Angeles refinery ceased operations in 2025[8], and Valero's intent to cease operations at its Benecia refinery in 2026[9].

Solomon conducts an analysis of refinery performance worldwide every two years, comparing more than 300 refineries (approximately 85% of global refining capacity) across various parameters, including operational expenses, reliability and maintenance, energy efficiency, and emissions performance. A key benchmarking metric for all study participants is the cost to produce transportation fuels.[10] As shown in Figure 1, costs to produce transportation fuels in California are already among the highest in the world, leaving California refineries comparatively less resilient to any incremental cost increases associated with the C&I Program. On average, the cost to produce transportation fuels at California refineries is approximately 8% higher than the global average, 3% higher than Asian imports including freight, and 14% higher than the average U.S. refinery, excluding California.

[6] CEC Commissioner's Report - Transportation Fuels Assessment, August 2024, p. 12
[7] Id. at p. 27.
[8] Phillips 66 provides update on Los Angeles Refinery operations. October 1, 2025
[9] Valero Announces Notice to the California Energy Commission Regarding its Benecia, California, Refinery. April 16, 2025
[10] CTF is the cost to produce the average barrel of transportation fuel in USD/bbl. Transportation fuel includes gasoline, diesel and jet fuel. The CTF includes raw material costs, operating costs and the cost to purchase biofuels.

Figure 1: Cost to produce transportation fuels[11], Solomon 2024 Fuels Study



CARB's Proposed Amendments will exacerbate in-state refineries' costs

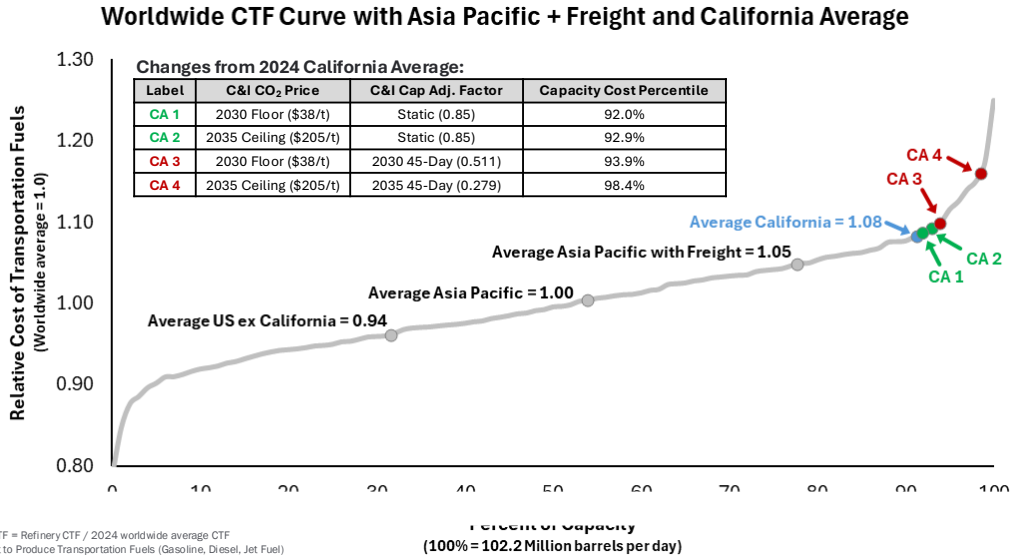
To illustrate the potential impacts of CARB's Proposed Amendments to California refineries' competitiveness, Solomon developed Figure 2 showing the impact to the cost of transportation fuel in year 2030 and year 2035 using the following assumptions: California refineries will need to purchase more allowances as the industrial allowance allocation decreases; and using the floor price of $38/MT for year 2030 and the price ceiling of $205/MT for year 2035.[12] In addition, Solomon shows the impact to the cost of transportation fuel for these two years at the same floor price ($38/MT in 2030 and price ceiling ($205/MT in 2035) if Marathon's proposed 0.85 CAF is adopted. As shown in Solomon's figure, if California's actual GHG emissions exceed the number of budgeted allowances causing price-ceiling conditions, California refineries move into the top 1-2% of refineries with the highest production costs.

[11] Freight cost of $5/bbl from South Korea to Los Angeles, As Reliance on Imported Gasoline Rises, California Adapts to a 'New World' - OPIS, A Dow Jones Company (November 4, 2025)
[12] CPI of 3% plus 5% annual increase. Considers CARB's Proposed Amendments and reduced allocation of allowances to refineries in 2030 and 2035.

Figure 2: California Scenarios: Cost to produce transportation fuels, Solomon 2024 Fuels Study

Cost of Producing Transportation Fuels

Worldwide Distributions – 2024



Relative CTF = Refinery CTF / 2024 worldwide average CTF
CTF = Cost to Produce Transportation Fuels (Gasoline, Diesel, Jet Fuel)

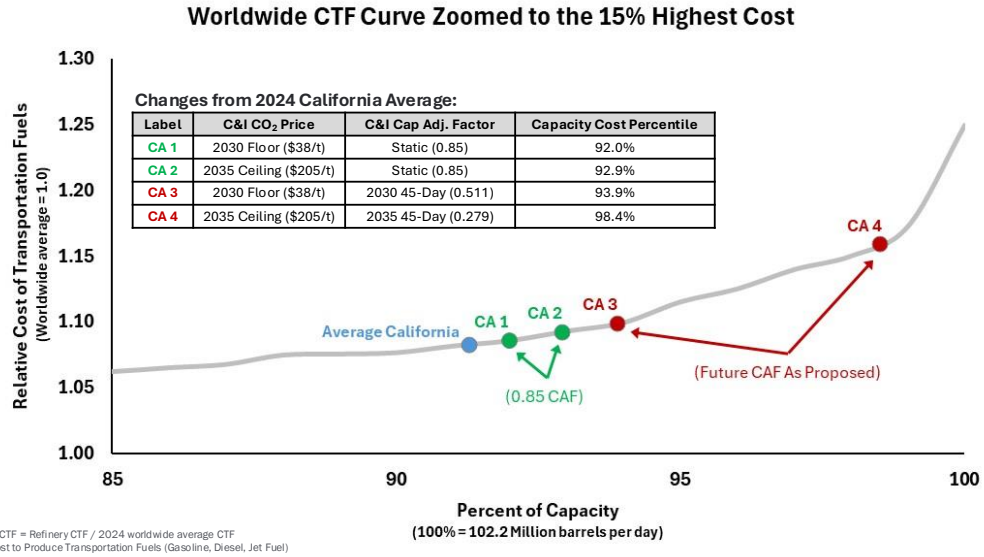
SolomonInsight.com

SOLOMON | 4

Figure 3: Zoomed-In California Scenarios: Cost to produce transportation fuels, Solomon 2024 Fuels Study

Cost of Producing Transportation Fuels

Worldwide Distributions – 2024 (zoomed view)



Relative CTF = Refinery CTF / 2024 worldwide average CTF
CTF = Cost to Produce Transportation Fuels (Gasoline, Diesel, Jet Fuel)

SolomonInsight.com

SOLOMON | 5

CARB characterizes the Proposed Amendments as preserving cost containment by maintaining the Program's existing price ceiling and allowance price containment reserves prices, but as shown in Figure 3, the current cost-containment mechanism does little to mitigate compliance costs for refineries if allowances allocated to refineries are simultaneously reduced. The price ceiling is intended to limit the maximum price of allowances each year, but refineries will need to buy more as the allowance allocation decreases when no feasible and economical technology exists to further reduce GHG emissions. CARB acknowledges the C&I Program has the lowest "Ratio of Industrial Allocation to Industrial Covered Emissions"[13] amongst the listed peers. Any further reduction of allowances allocated to industrial entities in the C&I Program will only increase the absolute cost of the program, widening the competitive gap between California refineries and facilities outside of the state.

By increasing the CAF to 0.85 for petroleum refineries including the Hydrogen and Cogeneration facilities supporting petroleum refining, starting in 2026 and maintaining the 0.85 through 2045, CARB will minimize the risk of economic leakage associated with the C&I program.

CARB's Proposed Amendments will result in increased environmental leakage as California's transportation fuel supply shifts to out-of-state and international refineries.

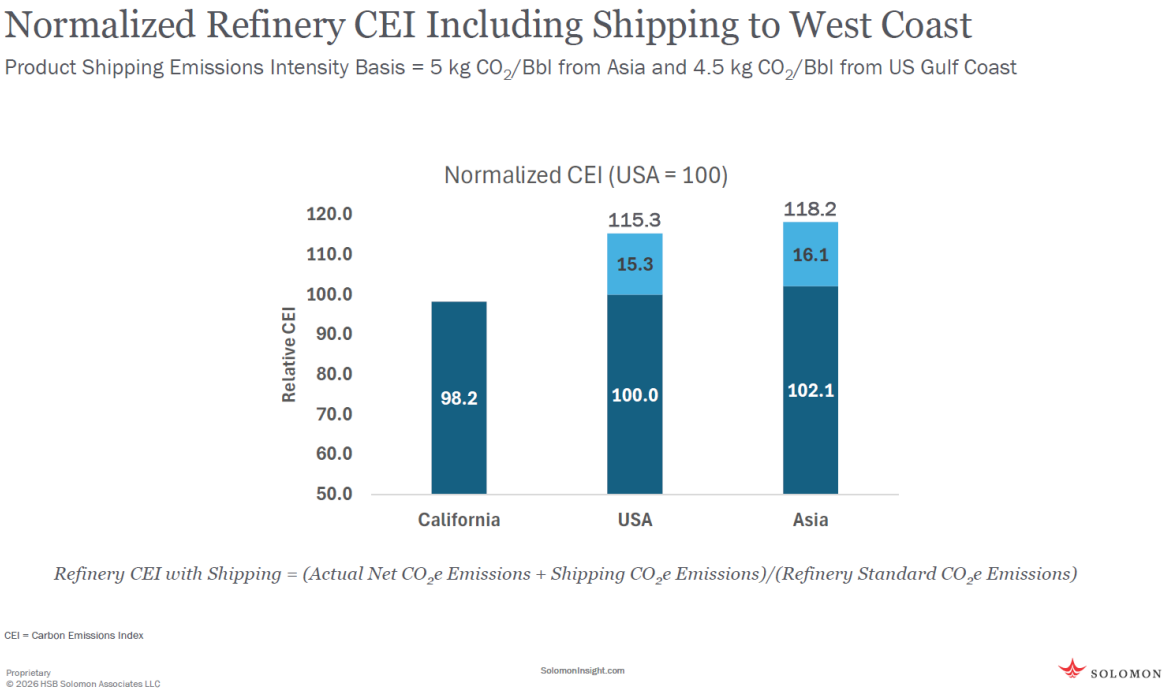
AB 1207 re-affirmed CARB's obligation to minimize environmental leakage, but CARB's Proposed Amendments risk doing the opposite. Demand for gasoline within California is already outpacing in-state production capacity.[14] Imposing such drastic reductions in industrial assistance allowances will not reduce demand for transportation fuels – it will simply increase the costs to produce transportation fuel in-state, creating a heightened risk of further refinery operations curtailment and of emissions leakage as fuel production shifts to refineries in other states or countries with less stringent regulations and lower regulatory costs. The net effect of decreased transportation fuel production in California will be an increase in global GHG emissions. Such an outcome would undermine California's environmental objectives while increasing costs and supply risks for consumers.

A benchmark Solomon uses to demonstrate refinery performance is the Carbon Emissions Index (CEI).[15] This is a complexity-based metric that measures a facility's Scope 1 and Scope 2 carbon emissions considering the manufacturing complexity of the facility. Much like the Complexity Weighted Barrel (CWB), the CEI considers the more carbon-intensive process units in a refinery (e.g., cokers, hydrocrackers, fluid catalytic crackers) to measure the differences in refining performance. As shown in Figure 3, California refiners have a lower CEI relative to peers in the U.S. and Asia, and when shipping emissions are included, the difference becomes even more significant.

[13] CARB C&I Workshop, October 2025. Slide 38 [California 60% in 2023, Washington ~ 100% in 2023, Quebec 99% in 2023, European Union 84% in 2023, United Kingdom 72% in 2023]

[14] CEC Refineries and the Petroleum Fuels Transition July 31, 2025 slide 4
[15] Report on CWT-CWB for California Regulatory Support May 17, 2013. P 2-1

Figure 4: Solomon Carbon Emissions Index including Shipping



California is already experiencing an increase in imported[16] transportation fuels due to the cessation of operations at Phillips 66's Los Angeles-area refinery and Valero's planned idling of its Benecia refinery. Solomon's data demonstrates that global emissions will increase as more transportation fuel imports are needed to meet California's demand.

California refineries are among the lowest emitting refineries. Other decarbonization tools, such as CCUS, are not viable options in the near or medium term.

Opportunities to reduce GHG emissions from refineries while maintaining reliable production of transportation fuels have largely been exhausted. Refiners must operate efficiently to remain cost-competitive, making the minimization of natural gas and internally produced fuel use for process heat a key focus. Marathon's Los Angeles Refinery has implemented several notable energy-efficiency projects to reduce emissions, including shutting down one of two fluid catalytic crackers, shutting down its coke calciner, installing electric motors on multiple large pieces of machinery and replacing aging boilers with modern, more efficient units. At this time, Marathon does not see additional opportunities to further reduce GHG emissions at the Los Angeles Refinery.

Most of the Los Angeles Refinery's GHG emissions originate from combustion sources, for which there are few scalable alternatives to reduce the amount of heat required for fuel production. To address this, for refining

[16] Bloomberg. February 15, 2026. Gasoline-starved California is turning to fuel from the Bahamas

operations, CARB identified CCUS as a strategy that could be deployed as soon as 2027.[17] However, while CCUS has been demonstrated in limited narrowly defined applications, implementation at a large, complex facility such as the Los Angeles Refinery is infeasible.

CCUS is most effective where carbon dioxide (CO_2) emissions originate from a single, high-concentration, high-pressure point source. Refineries present precisely opposite conditions. Refinery CO_2 emissions are distributed across dozens of units, including heaters, boilers, hydrogen plants, and utility systems. Marathon's Los Angelese Refinery average 2020 through 2024 Mandatory Reporting Regulation covered emissions was 5,967,476 metric tonnes of GHG, primarily consisting of low-concentration flue gas (approximately 3–8% CO_2) at near-atmospheric pressure. Capturing these emissions would require either individual capture systems for each unit or an extensive ducting network to aggregate exhaust streams, making CCUS deployment far more complex and costly than at facilities with high-purity CO_2 streams such as ethanol or ammonia plants. In addition, CCUS operations require material inputs of steam for solvent regeneration, electricity for compression, and additional fuel to offset energy losses. For refineries, this translates into higher operating costs, increased fuel consumption, and elevated emissions of non-CO_2 pollutants such as nitrogen oxides (NO_x) and particulate matter - impacts that are particularly acute for California refineries already facing escalating regulatory costs. These are only the technical feasibility issues with capturing the CO_2. Once captured, the CO_2 must be liquefied, transported and disposed of through underground injection well systems into geologic formations deep underground. To date, only one such site has been permitted in California and has yet to begin operation.[18] Further, the well site is only being designed to sequester up to 1.5 million metric tons of CO_2 per year, less than 1% of California's total GHG emissions inventory[19].

The Legislature intended the C&I Program to function as a market-based mechanism to reduce GHG emissions, not as a punitive regime targeting individual sources. California refineries are among the most highly regulated and tightly controlled industrial facilities in the nation, leaving few remaining, technically feasible control measures capable of delivering additional emissions reductions. Refinery operators have invested for decades in emissions controls and efficiency improvements and have consistently contributed to California's environmental objectives.[20] Companies such as Marathon have pursued emissions reductions through electrification, transitions to alternative fuels and the installation of more modern, efficient equipment. Under CARB's current proposal, however, the remaining practical options for refineries to materially reduce GHG emissions are to curtail operations - thereby reducing fuel production - or to shift refining activity out of state. Either outcome would undermine the C&I Program's objectives by increasing costs, threatening fuel supply reliability, and heightening the risk of emissions leakage and an overall increase in GHGs.

---

[17] *Supra (7)*. 2022 Scoping Plan, p88

[18] EPA issues first ever underground injection permits for carbon sequestration in California | US EPA

[19] California Air Resources Board (2025, November), Annual Summary of GHG Mandatory Reporting Non-Confidential Data for Calendar Year 2024

[20] *See* additional state measures aimed at reducing emissions from both stationary sources and mobile sources: CARB 2022 State Implementation Plan - designed to achieve the 70 ppb ozone standard by 2037; CARB 2022 Scoping Plan - identifies several significant state-led measures intended to achieve the state-wide GHG reduction target of 85 percent below 1990 levels by 2045; CARB At Berth Regulation - designed to reduce NOx and VOC emissions from shipping vessels while docked within the state; and SCAQMD Rule 1178 - designed to reduce VOC emissions from storage tanks.

Petroleum refineries and biorefineries need C&I regulations that are cost-effective, provide long-term stability, and encourage continued investment.

Refining crude oil and renewable feedstocks into products such as gasoline, jet fuel, petroleum diesel, renewable diesel, chemical feedstocks, and other products require large, continuous, multi-year capital investments to keep assets operating safely, reliably and competitively. Marathon's investments in California demonstrate a commitment to improving air emissions and reducing greenhouse gas emissions; however, they also underscore the importance of stable, predictable, and cost-effective regulatory policy.

Marathon's recent investments have reduced stationary-source GHG emissions in California by approximately 1.7 million metric tons of CO_2e and have contributed to considerable transportation sector emission reductions[21] with a combined capital cost of nearly $2 billion. These investments include Marathon's Los Angeles Refinery's project to reduce nitrogen oxides (NOx) emissions in accordance with the South Coast Air Quality Management District Rule 1109.1 - completed three years ahead of compliance deadlines - and Marathon's conversion of its Martinez petroleum refinery to a biorefinery.

For biorefineries, policy incentives are the greatest driver to capture value in the sector. Absent sufficient, reliable, and durable incentives, capital intensive renewable projects such as the Martinez facility would not be economically feasible. To this end, Marathon agrees with CARB's proposal to designate renewable diesel production as a high leakage risk and develop an allocation benchmark. In addition, Marathon agrees with CARB's proposal to ensure consistent treatment of biogenic emissions across the C&I program by exempting biogenic process emissions and biogenic combustion emissions generated in the production of renewable transportation fuels. To ensure biorefineries remain viable, CARB must do more by increasing the CAF to 1.0 for biorefineries including the Hydrogen production facilities that support a biorefineries operations, while adding a mechanism to provide allocations for Cogeneration facilities that support biorefining, starting in 2026 and maintaining the CAF at 1.0 through 2045.

Absent a revision to CARB's Proposed Amendments to increase the number of allowances allocated to industrial entities, CARB's Proposed Amendments are likely to substantially increase compliance costs, forcing California transportation fuel producers to reassess near- and long-term operational and investment decisions. Further reductions in allocations to industrial entities will directly raise the cost of producing transportation fuels, exacerbating competitive disadvantages relative to out-of-state and international fuel producers. Over time, these cost pressures risk curtailing in-state production or driving refining activity out of California altogether, resulting in job losses, reduced tax revenues, weakened supply chains, increased fuel import dependence, and an overall increase in global GHG emissions.

Conclusion

Marathon's recommendation to freeze the CAF for petroleum refineries and biorefineries is intended to minimize economic and environmental leakage and provide a cost-effective program in accordance with the Legislature's directive. As noted, Marathon recommends that CARB revise the Proposed Amendments to:

[21] CARB GHG Inventory Trends 2000 to 2023

- Increase the CAF in Table 9-2 to 0.85 for the petroleum refining sector, including the Hydrogen and Cogeneration facilities supporting petroleum refining, beginning with compliance year 2026 and maintain the CAF at 0.85 through 2045; and
- Increase the CAF to 1.0 in Table 9-2 for the biorefining sector, including the Hydrogen and Cogeneration facilities supporting biorefining, beginning with compliance year 2026 and maintain the CAF at 1.0 through 2045.

Please note that in submitting this letter, Marathon reserves the right to supplement its comments as it deems necessary, especially if additional or different information is made available to the public during the C&I Program rulemaking process. We incorporate by reference into this letter the relevant comments submitted by Western States Petroleum Association on March 9, 2026.

We greatly appreciate the opportunity to provide the comments on CARB's Proposed Amendments. We are glad to discuss the proposals in this letter and look forward to continued dialogue.

Sincerely,

Brian McDonald
Marathon Petroleum Company LP | West Coast Regulatory Affairs Advisor

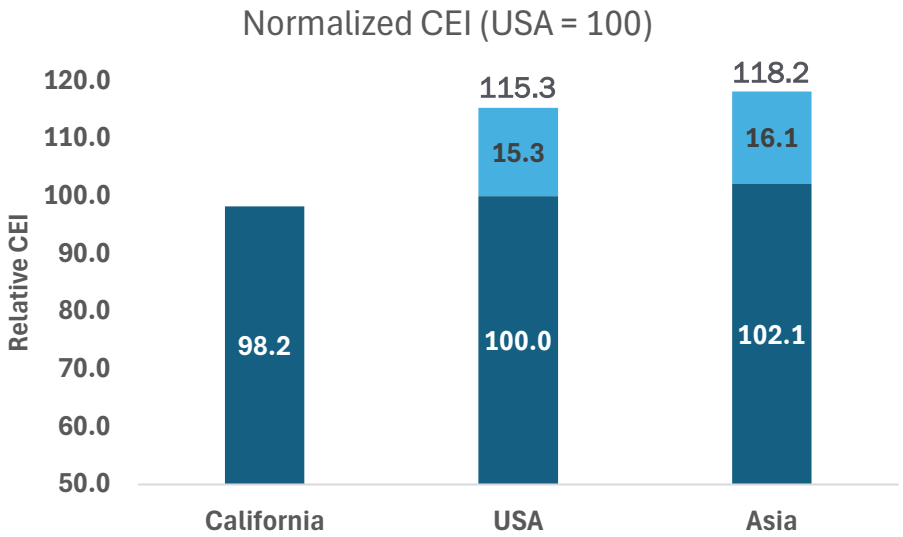
SOLOMON

Solomon CEI & CTF Sensitivities

February 2026

Normalized Refinery CEI Including Shipping to West Coast

Product Shipping Emissions Intensity Basis = 5 kg CO_2/Bbl from Asia and 4.5 kg CO_2/Bbl from US Gulf Coast

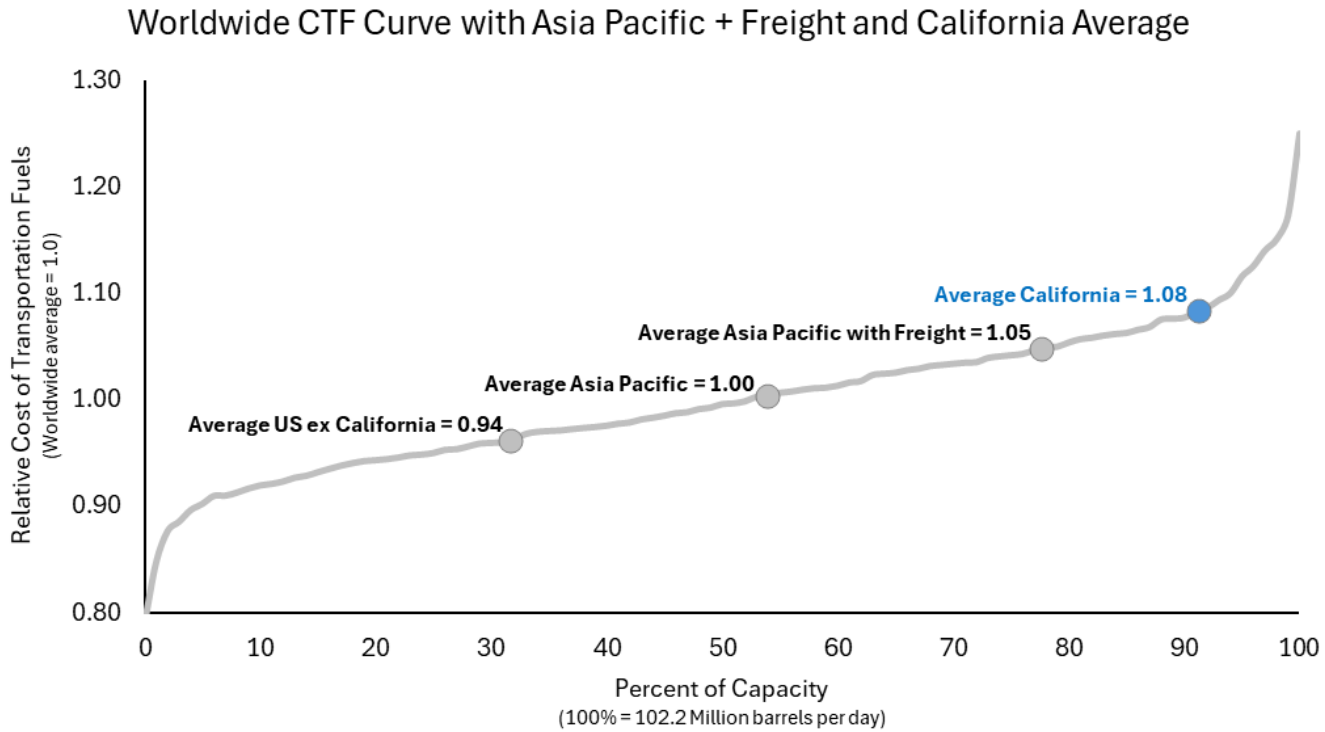


Refinery CEI with Shipping = (Actual Net CO_2e Emissions + Shipping CO_2e Emissions)/(Refinery Standard CO_2e Emissions)

CEI = Carbon Emissions Index

Cost of Producing Transportation Fuels

Worldwide Distributions - 2024



Relative CTF = Refinery CTF / 2024 worldwide average CTF
CTF = Cost to Produce Transportation Fuels (Gasoline, Diesel, Jet Fuel)

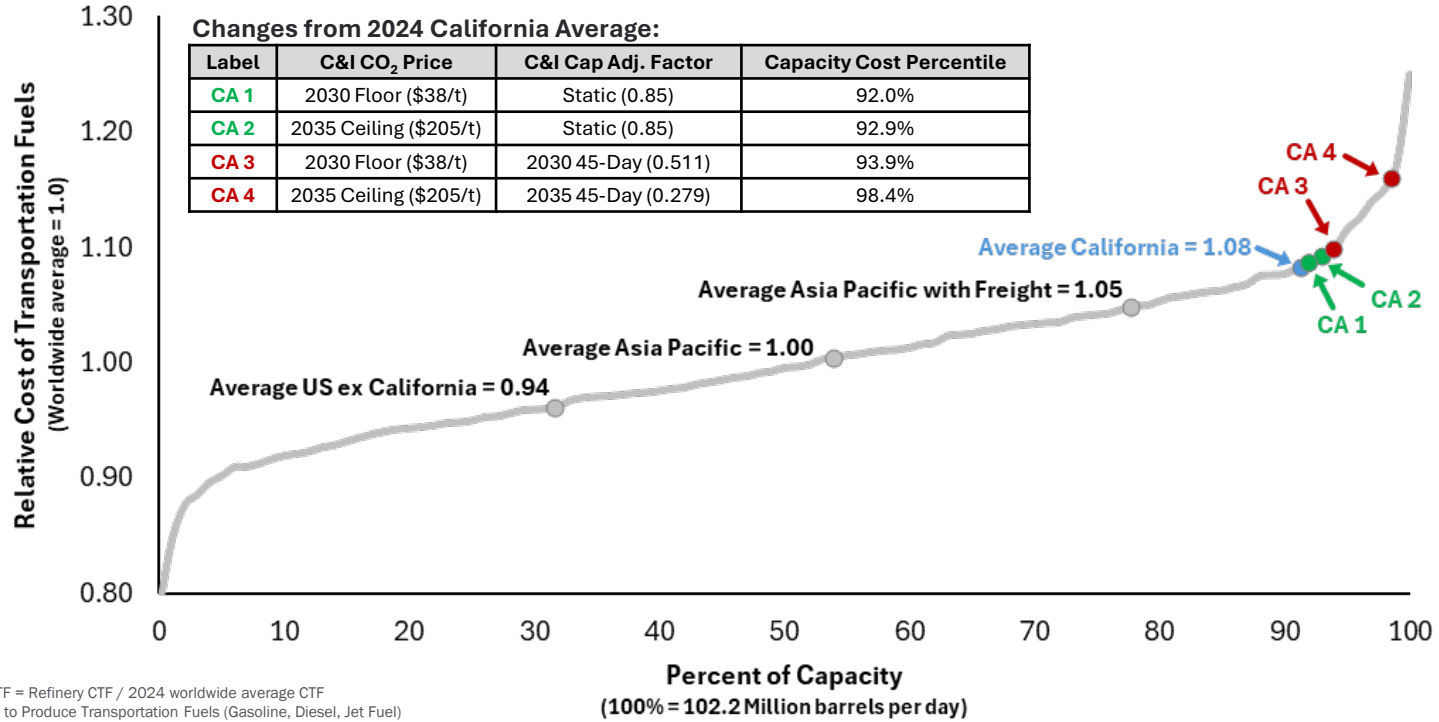
Cost of Producing Transportation Fuels

Worldwide Distributions – 2024

Worldwide CTF Curve with Asia Pacific + Freight and California Average

Changes from 2024 California Average:

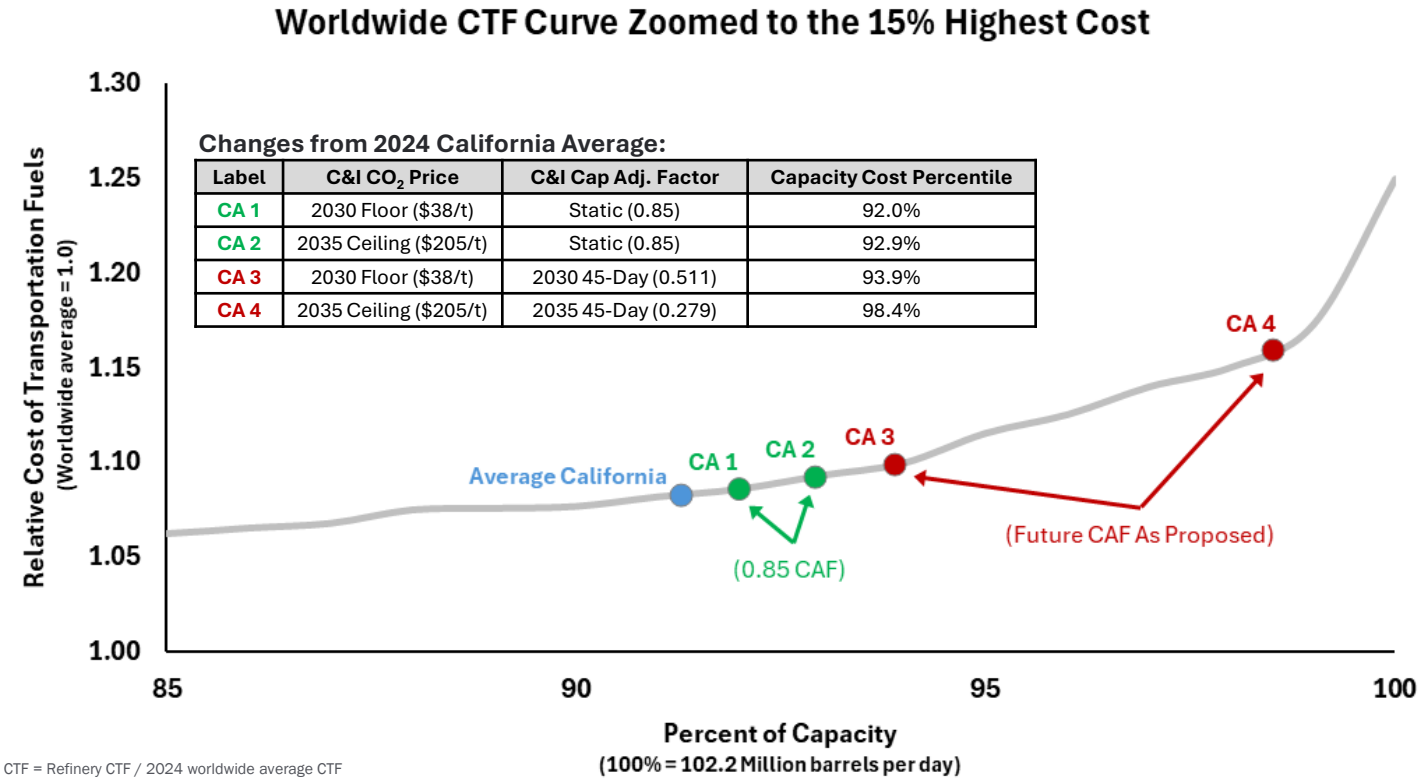
Label	C&I CO_2 Price	C&I Cap Adj. Factor	Capacity Cost Percentile
CA 1	2030 Floor ($38/t)	Static (0.85)	92.0%
CA 2	2035 Ceiling ($205/t)	Static (0.85)	92.9%
CA 3	2030 Floor ($38/t)	2030 45-Day (0.511)	93.9%
CA 4	2035 Ceiling ($205/t)	2035 45-Day (0.279)	98.4%



Relative CTF = Refinery CTF / 2024 worldwide average CTF
CTF = Cost to Produce Transportation Fuels (Gasoline, Diesel, Jet Fuel)

Cost of Producing Transportation Fuels

Worldwide Distributions – 2024 (zoomed view)



Relative CTF = Refinery CTF / 2024 worldwide average CTF
CTF = Cost to Produce Transportation Fuels (Gasoline, Diesel, Jet Fuel)

Carbon Emissions Index (CEI) Calculation

Upstream, Midstream, Refining and Chemical Process

- **CEI (Carbon Emissions Index)** - CEI is a complexity-based metric measuring a facility's carbon emissions efficiency taking into account the manufacturing complexity of the facility.
- CEI is the ratio of actual Scope 1 + Scope 2 GHG emissions relative to a standard GHG emissions calculated for the facility.
- The formula for the calculation is as follows:

$$\text{CEI} = \frac{\text{Actual Net } CO_2e \text{ Emissions}}{\text{Standard } CO_2e \text{ Emissions}} \times 100$$

Carbon Emissions Index, %

Standard CO_2e emissions are the expected CO_2e emissions from a refinery operating at an industry average performance level based on the refinery's configuration, process unit characteristics and utilized capacity.

The standard is built up from Solomon industry performance data for all refinery processing units at industry average energy efficiencies.

Cost of Transportation Fuels (CTF) Calculation

The Cost of Transportation Fuel (CTF) is defined by Solomon as:

$$CTF = \frac{\textit{Raw Material Cost + Cash Operating Expense - BYPvalue – Other Revenue}}{\textit{TFvolume}}$$

Cost of Transportation Fuels

Where

- *CTF* is the cost to produce the average barrel of transportation fuel in USD / bbl
- *BYPvalue* is the total value of refinery-produced byproducts
- *Tfvolume* is the barrels of transportation fuel produced by the refinery

Refinery-produced byproducts include all products other than transportation fuels, including refinery-produced fuels consumed as energy by the refinery.

SOLOMON

Thank you for your time.

Action from Insight®