

Talking in Tonnes, Negotiating in Dollars: The Politics of Carbon Markets in California

Danny Cullenward JD, PHD | University of Pennsylvania | 22 October 2025



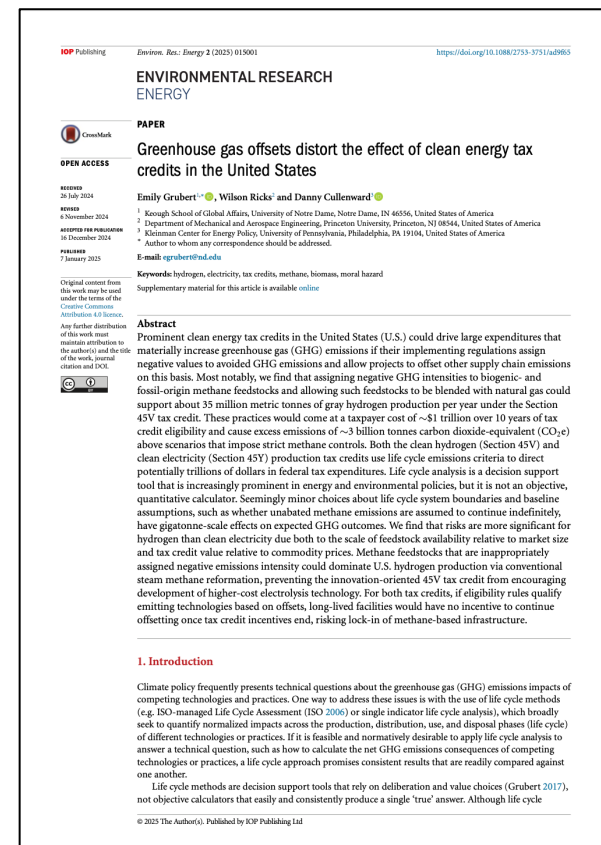
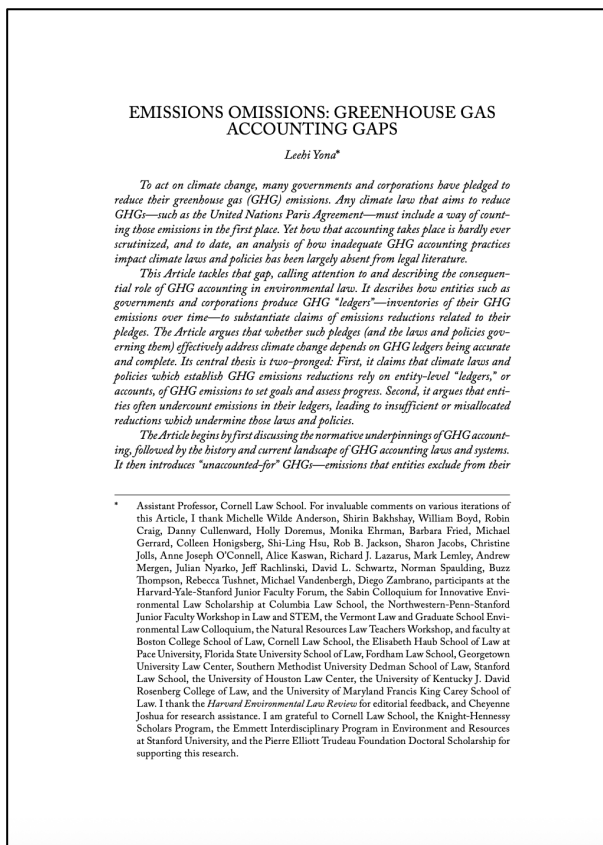
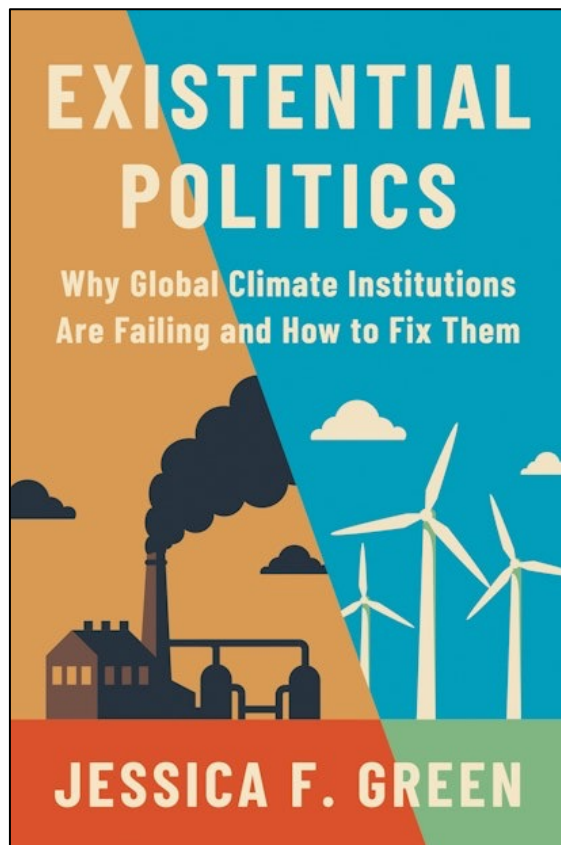
Disclaimer

- I am the Vice Chair of California's Independent Emissions Market Advisory Committee, but do not speak for the Committee here. This presentation reflects my personal views only.

Climate policy serenity statement

- Some climate policy is better than nothing
- We need more and better climate policy
- We won't get it without critical reflection
- Understanding what works and what doesn't is important

Count dollars, not tonnes



A tale of two markets

	Cap-and-invest	Low carbon fuel standard (LCFS)
Emissions limits	Quantity-based (tCO ₂ e)	Intensity-based (gCO ₂ e/MJ)
Accounting	State inventory method	Life cycle methods
Authority	Explicit	Implicit (under AB 32)
Coverage	Transportation Utilities Industry	Transportation only

Case study #1:

The Low Carbon Fuel Standard

Cutting transportation emissions

Vehicle miles
travelled (VMT)
(miles)

?

(Housing)

Tailpipe emissions
standards (ZEVs)
(gCO₂e/mi)

?

(Electricity prices)

Low Carbon
Fuel Standard
(gCO₂e/MJ)

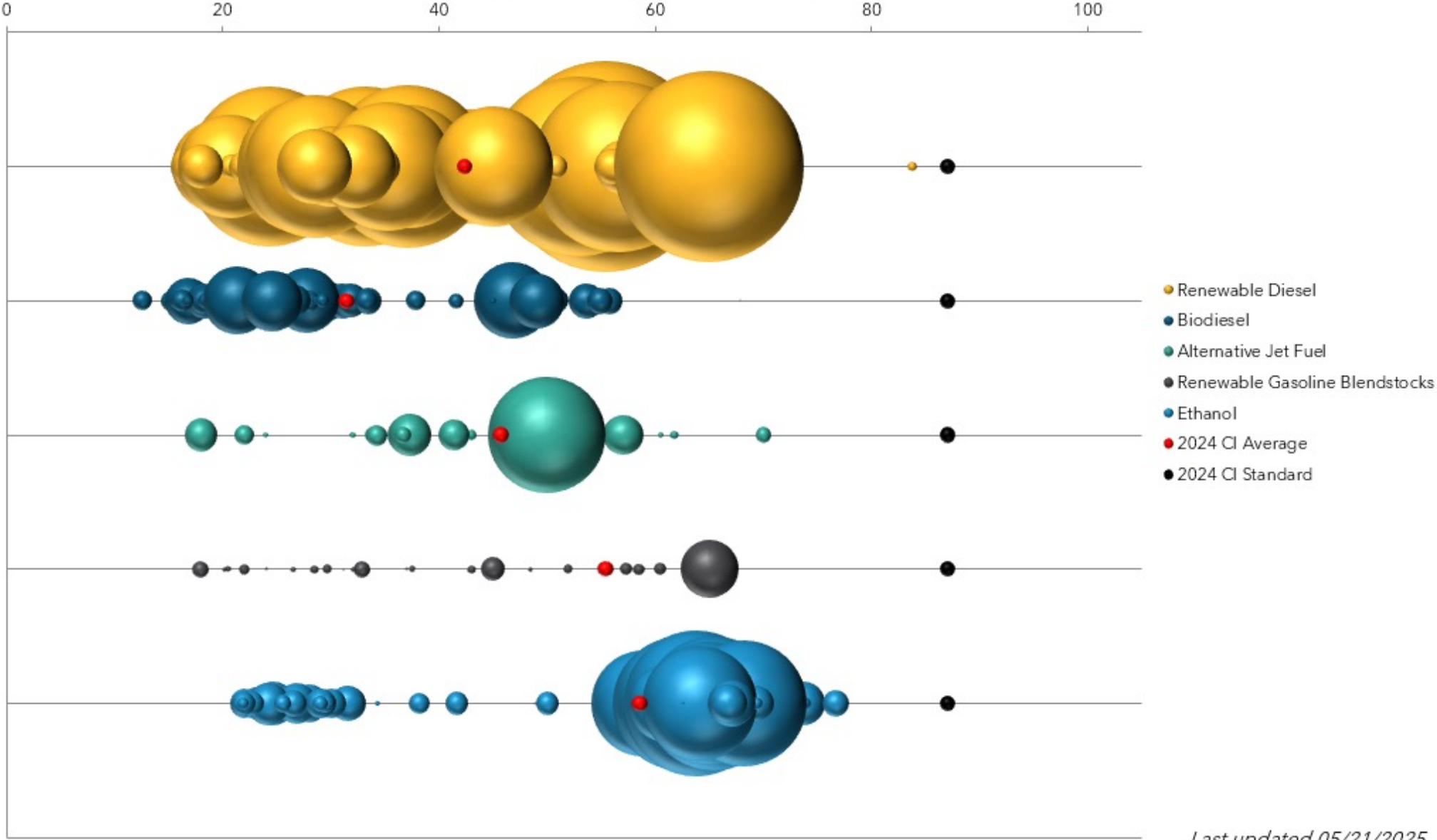


The LCFS in a nutshell

- Every fuel is assigned a carbon intensity (CI) score (gCO₂e/MJ)
- Each year the program regulations specify a target CI
- Fuels with CI scores higher than the target incur deficits
- Fuels with CI scores lower than the target earn tradeable credits
- Fuel sellers must cover any deficits with credits
- In practice, most fuels claim custom CI scores (mostly proprietary)

2024 Volume-weighted Average Carbon Intensity by Fuel Type for Liquid Fuels

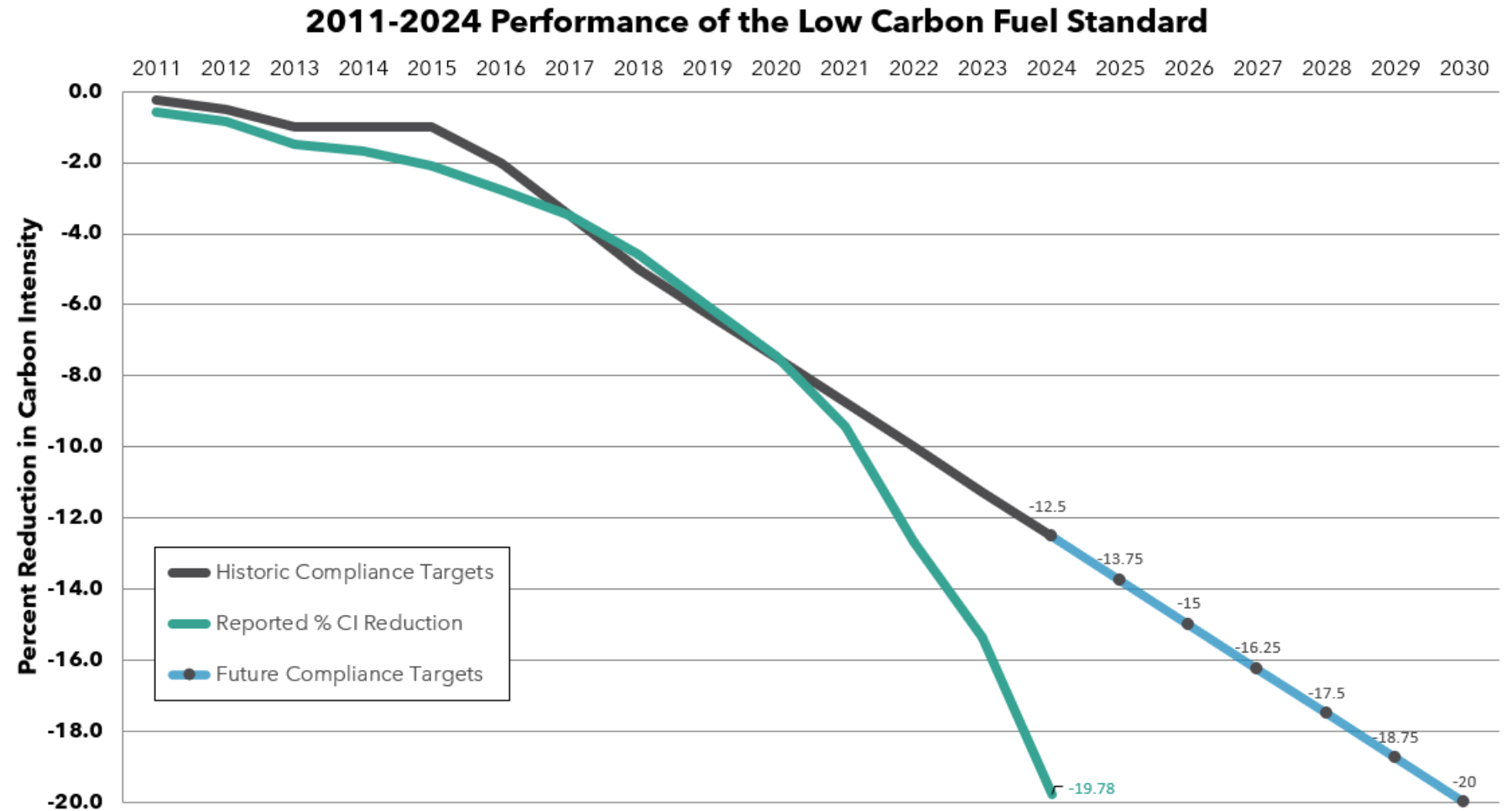
EER Adjusted CI (gCO₂e/MJ)



A very brief history

- Established in 2010 as an “early action” measure under AB 32, pursuant to a 2007 Executive Order from Governor Schwarzenegger
- CARB sued in court; some delays resulted, but program ultimately upheld
- Initial 10% cut in CI by 2020; 20% cut in CI by 2030
- 2024 rulemaking → 23% cut in 2025, 30% in 2030 ~90% by 2045
- Political drama re: costs; vote delayed until aftermath of US election
- More lawsuits follow re: environmental impacts (ongoing)

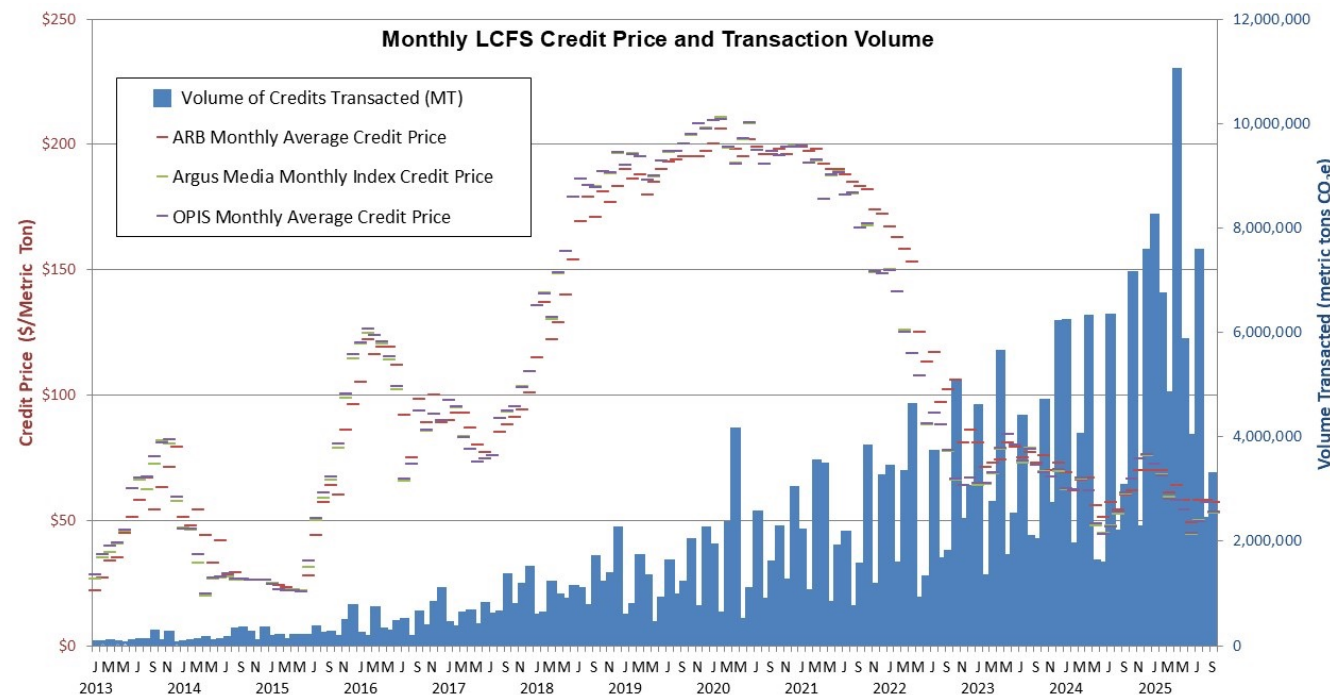
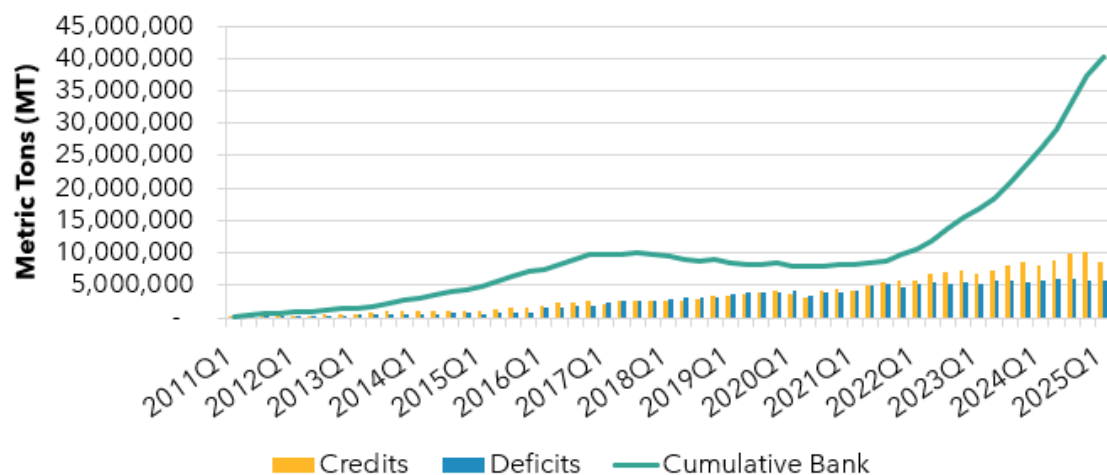
Compliance exceeds expectations ...



Last updated 05/21/2025

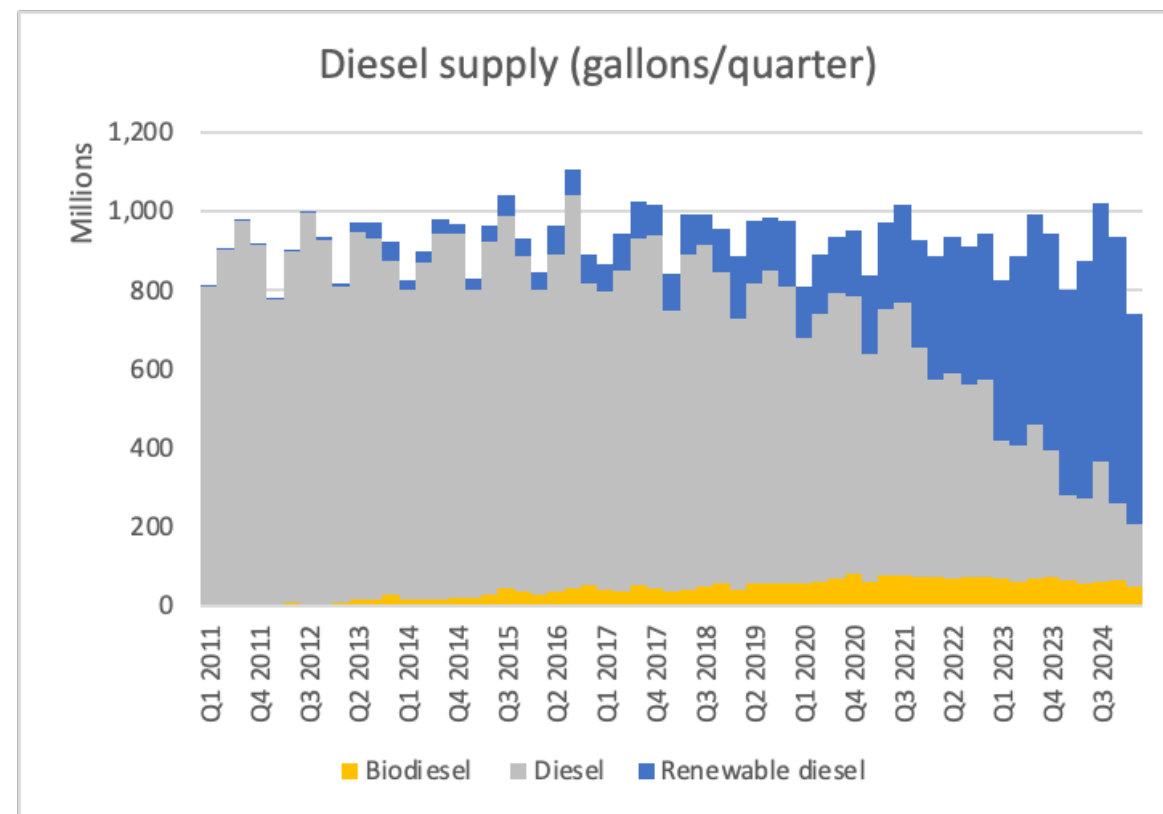
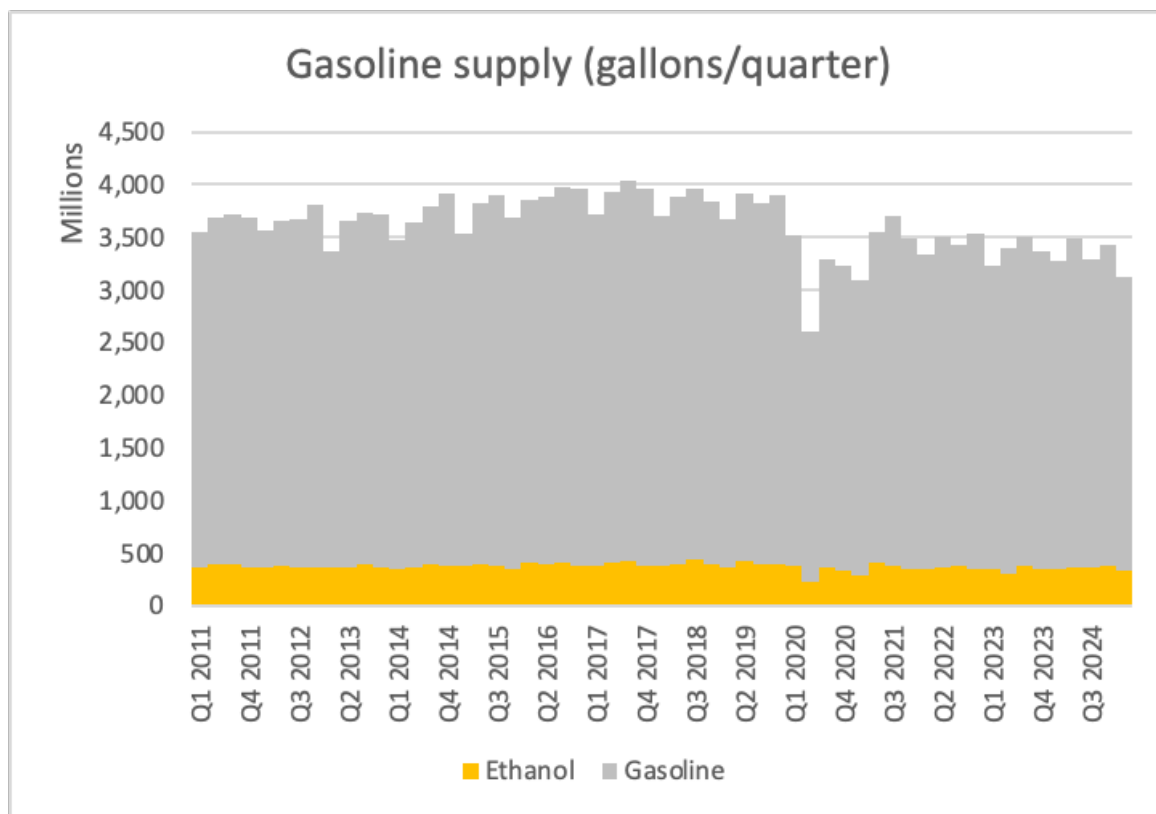
... but the glut of credits leads to low prices ...

**Total Credits and Deficits (MT)
for All Fuels Reported Q1 2021 - Q1 2025**



Last Updated 10/15/2025

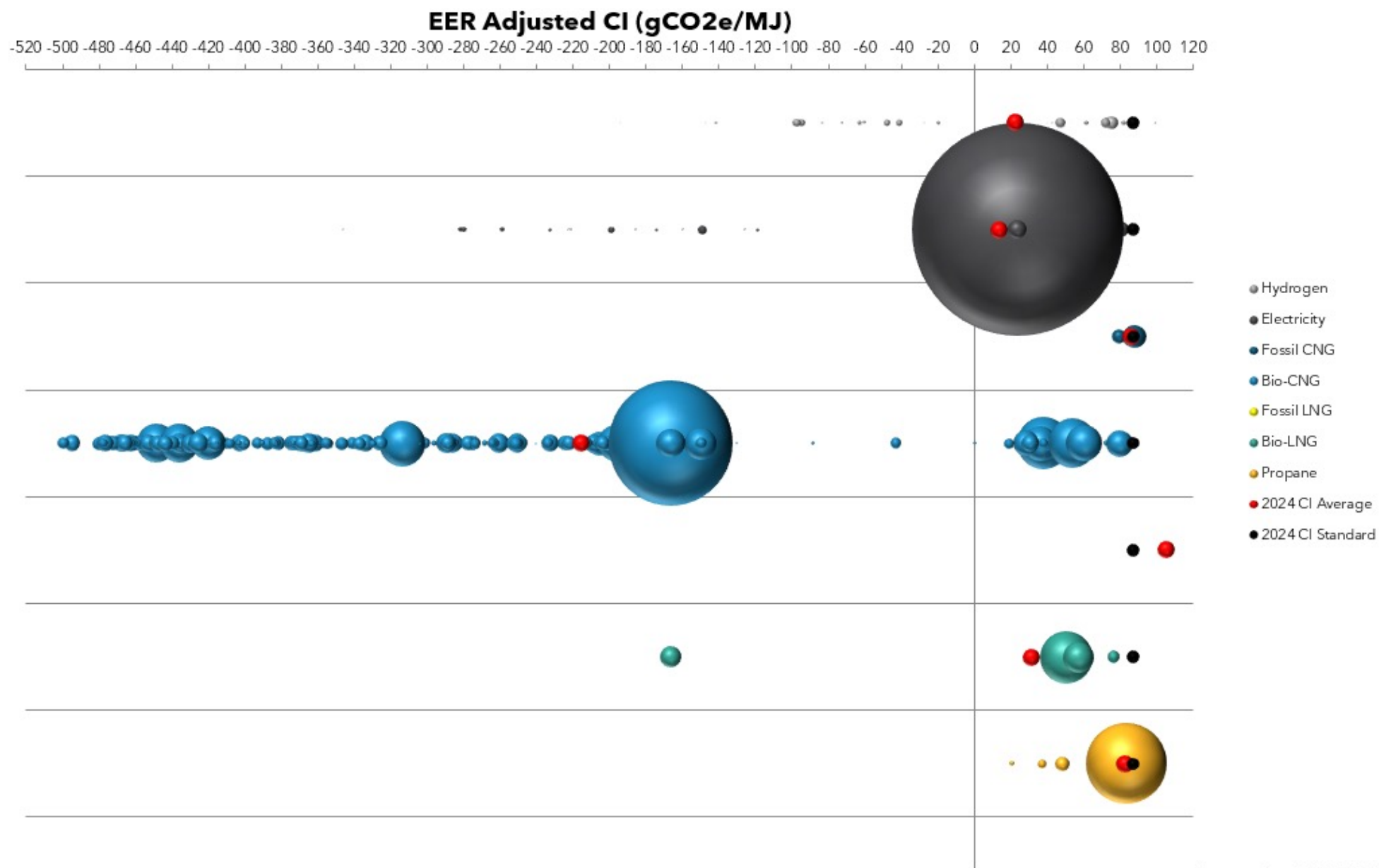
... largely due to the quiet demise of diesel



The trouble with biofuels

- Would they be produced anyway under the federal RFS mandate?
- Regulations include modest “land use change” emissions ([Breetz 2015](#); [Breetz 2017](#)), but critics argue the magnitude is too small ([Berry et al. 2024](#))
- Massively inefficient: vs ethanol, solar + EVs supports >> 100X more mi/acre
- Burning biofuels still contributes to serious local air quality problems
- Disappears emissions from state accounting ([Yona 2025](#))
- Exacerbating hunger: lower emissions based on modeling that assumes poor people around the world eat less ([Searchinger et al. 2015](#))

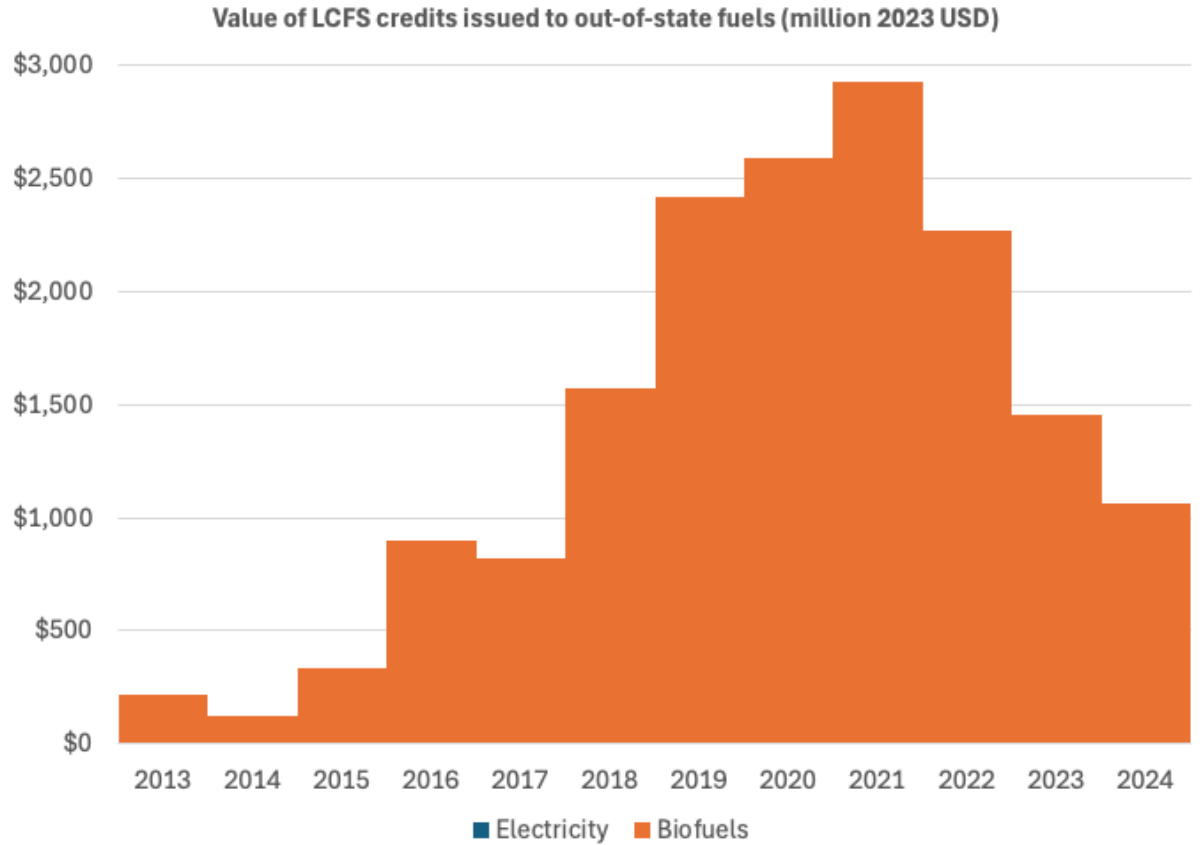
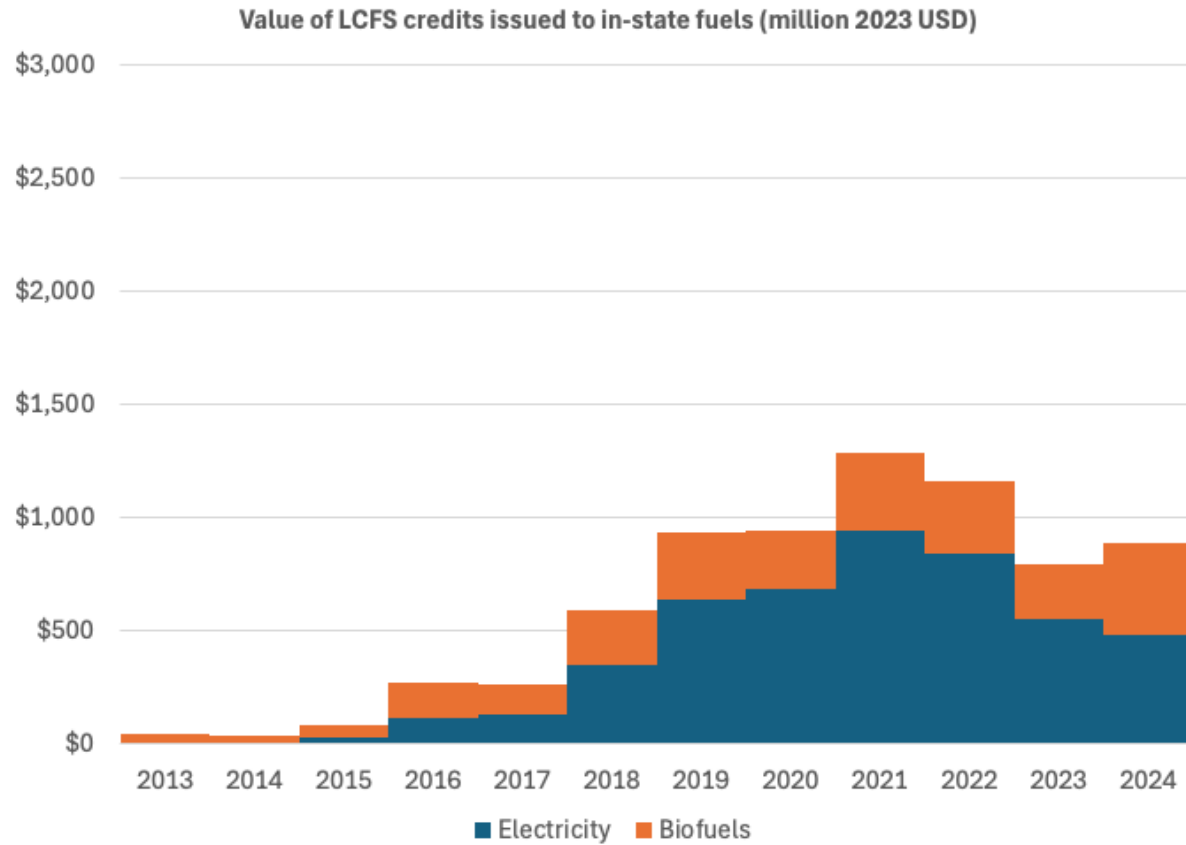
2024 Volume-weighted Average Carbon Intensity by Fuel Type for Non-Liquid Fuels



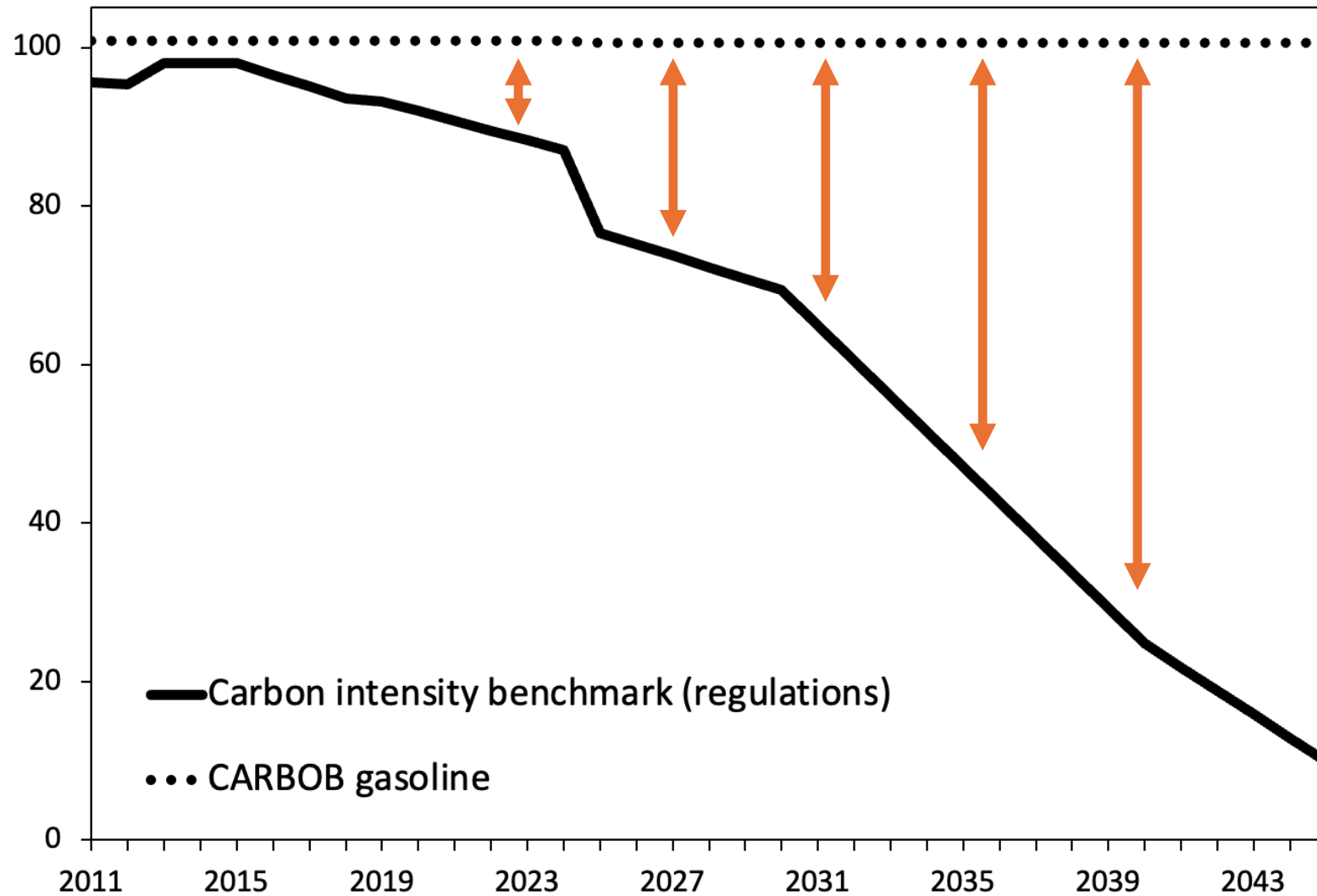
Source: [CARB](#); for more drama, see [Grubert et al. \(2025\)](#)

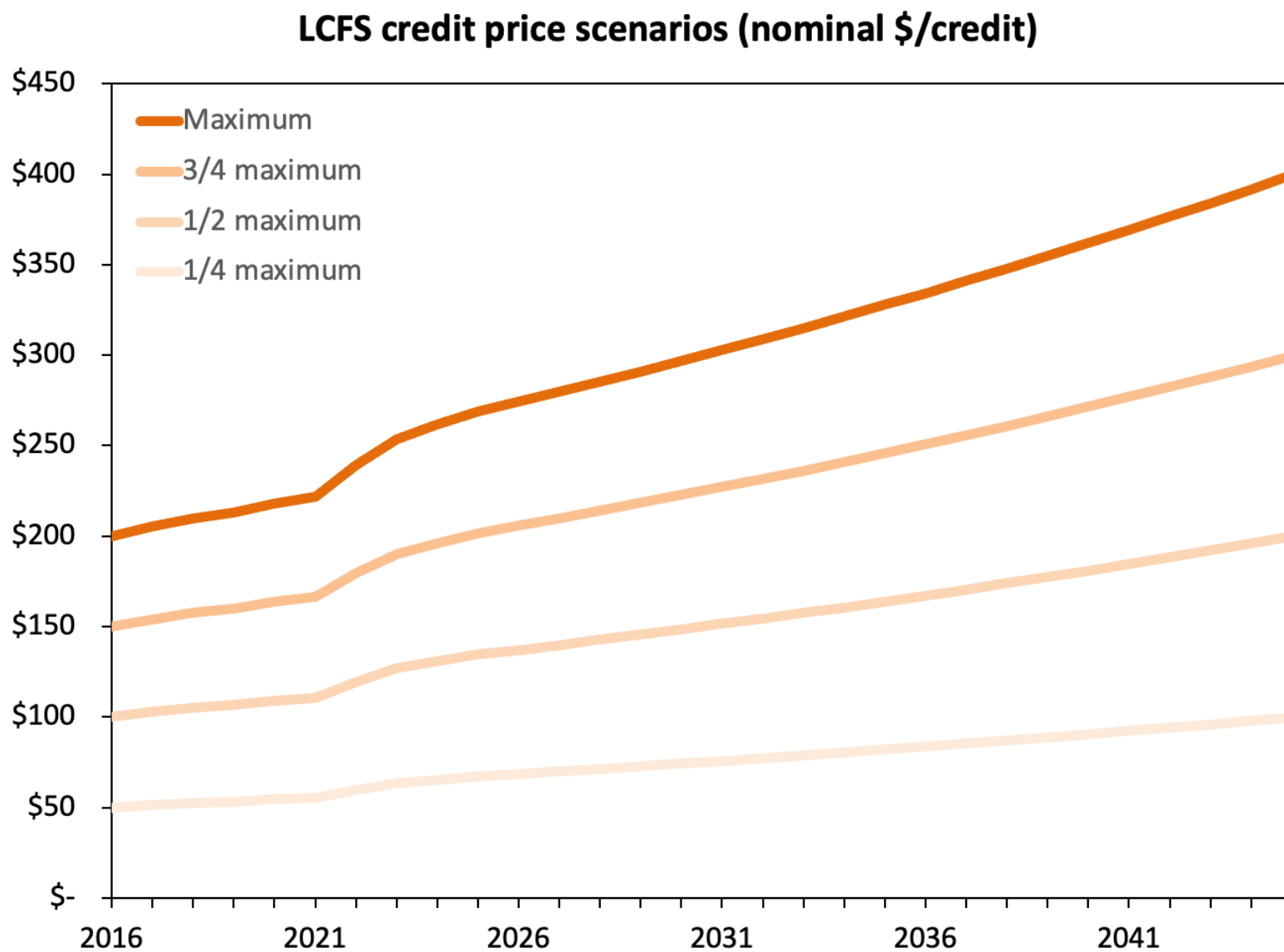
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Where does the money go?

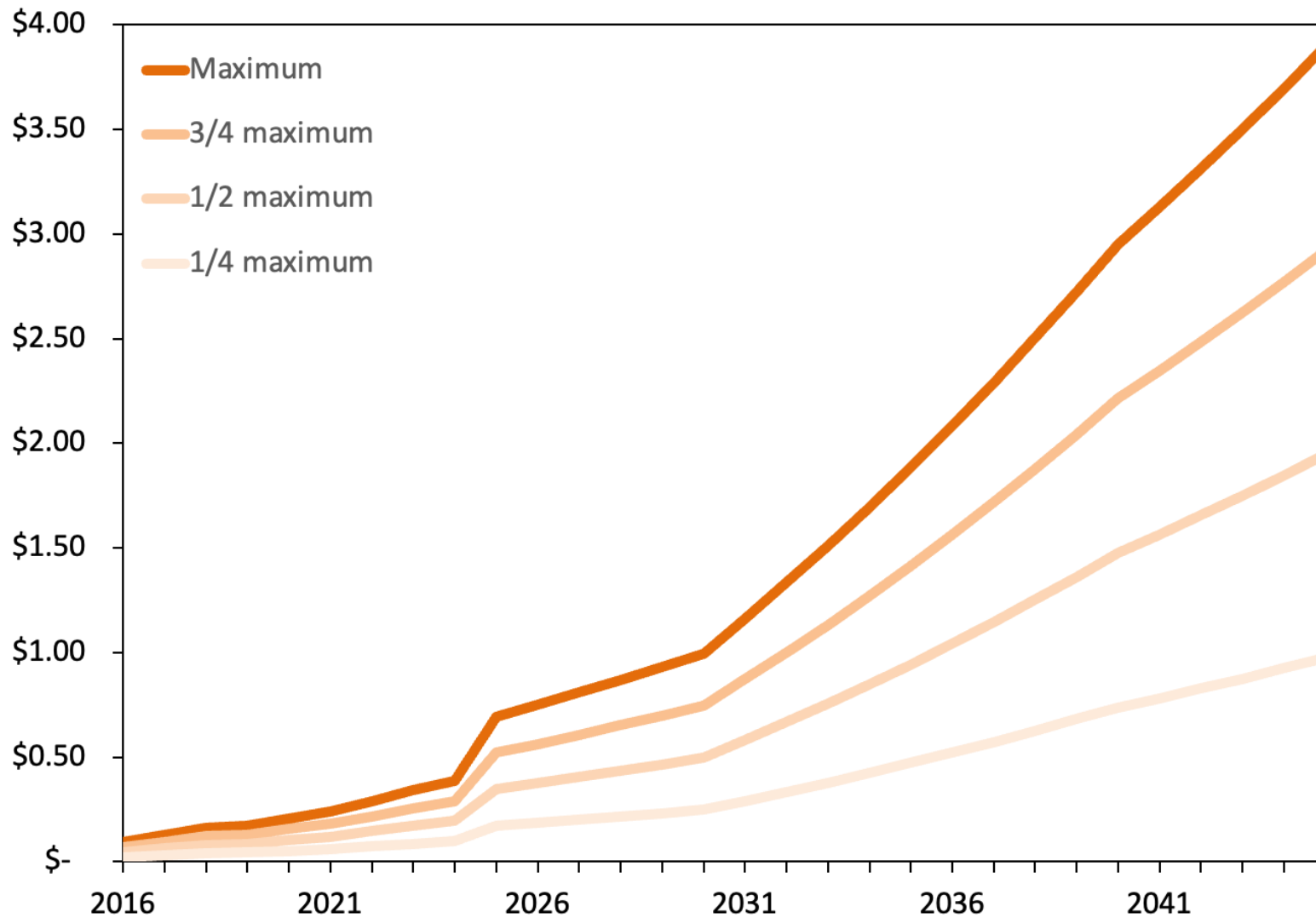


Carbon intensity benchmark (gCO₂e/MJ fuel)





Retail gasoline price impact (nominal \$/gallon)

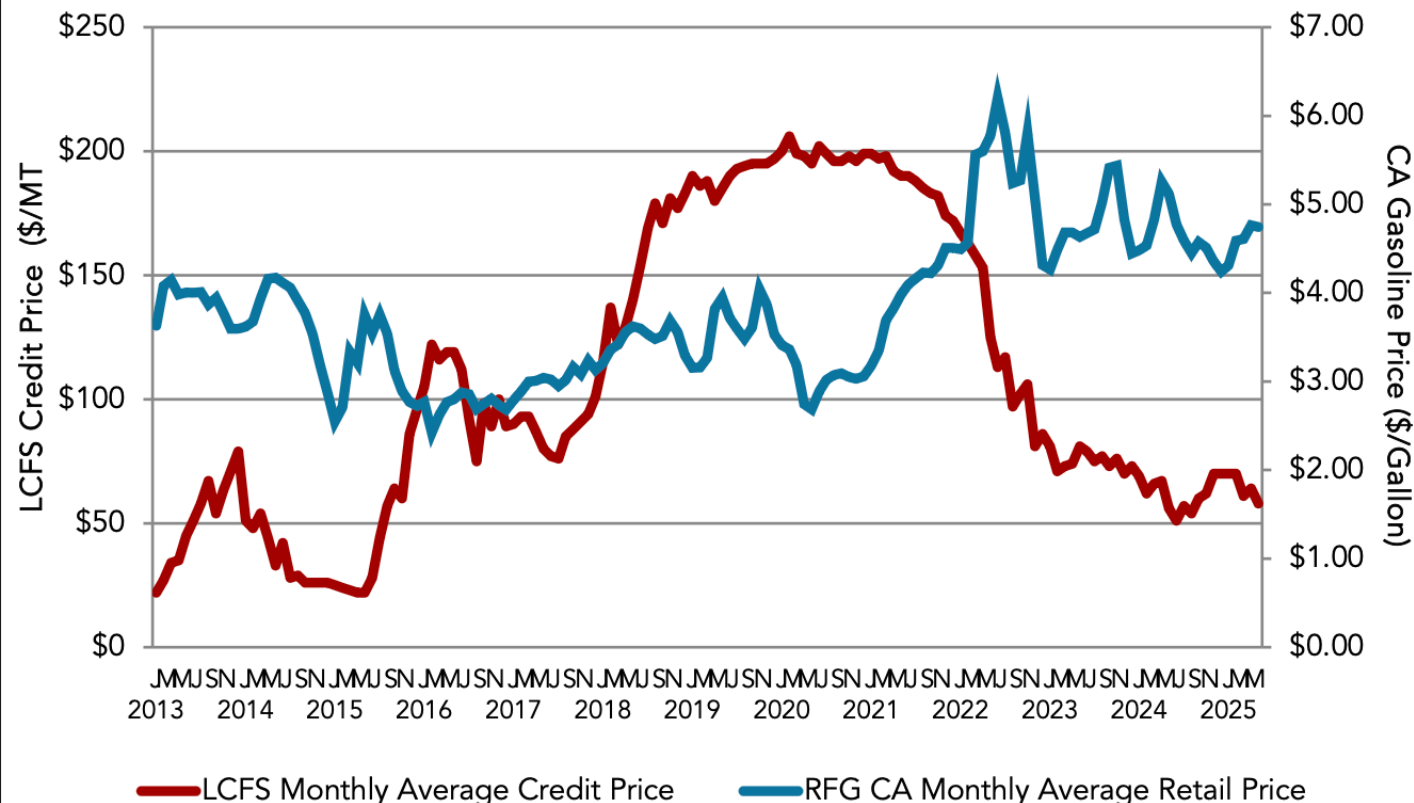




Rajinder Sahota

Deputy Executive Officer for Climate Change and Research, CA Air Resources Board
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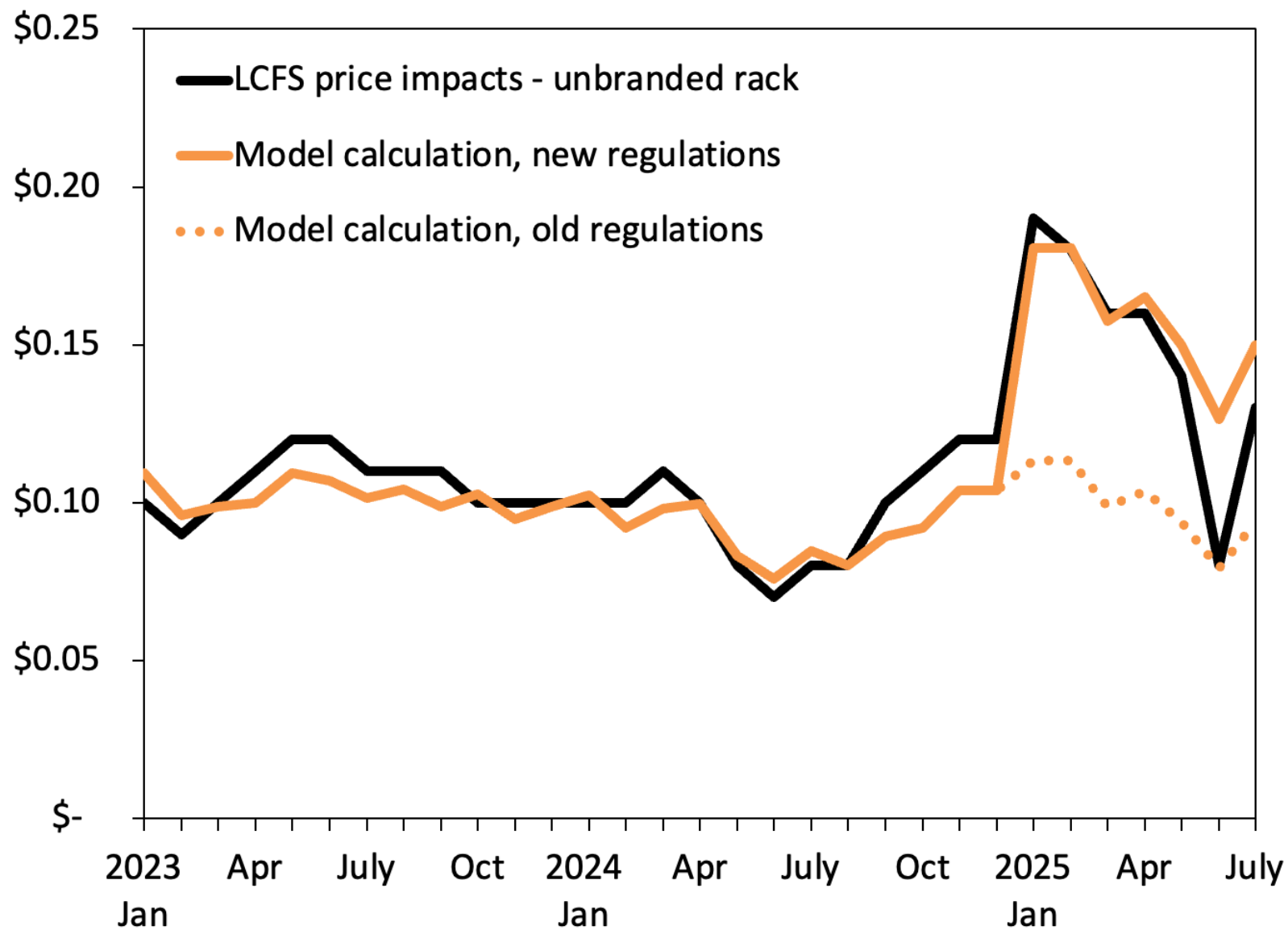
For those of you following the amendments to the Low Carbon Fuel Standard in California:
No, there isn't a correlation between Low Carbon Fuel Prices and retail gas prices. Real world data makes the point better than any model. See graph below.



NB: Ms. Sahota is referring to my 2024 Kleinman Center report, which used CARB's official formula for estimating retail gasoline price impacts.

What do the data say?

- CARB's 2024 regulations took legal effect in July 2025
- Refiners appear to have been passing along the higher costs of the new rules beginning in January 2025, as indicated by CARB in May 2025
- A natural experiment, in three acts:
 - January through May: assume refiners apply new rules (higher costs)
 - June: assume refiners apply old rules (lower costs)
 - July and after: assume refiners apply new rules (higher costs)



So what is going on?

- Carrots, not sticks for agriculture → dairy digesters as key
- Agency interest in supporting action in “red states” (but who pays?)
- Revolving door from agency → biofuels industry, lobbyists
- In-state refinery renewable diesel conversions → jobs, local investment
- In-state refinery renewable diesel conversions → loss of gasoline capacity
- EV stakeholders get ~25% and don’t have a replacement for funds
- Is E15 on the horizon? (slightly lower CI scores → minor gas savings?)

The unsteady status quo

- Billions of dollars a year, mostly for out-of-state biofuels
- Overstated climate benefits; some biofuels are worse than fossil fuels
- Essential but limited investments in electrification
- Ongoing lawsuits from environmental justice organizations
- Retail price impacts are going up, sooner if LCFS credit prices follow agency expectations and later if they continue to flounder
- Is the state doubling down on ethanol? (E10 → E15)

Case study #2:

**The carbon market formerly known as
cap-and-trade (now cap-and-invest)**

(Re-)authorizations, past and present



AB 32 (2006)
Simple majority
Authority through 2020



AB 398 (2017)
2/3 supermajority
Authority through 2030



AB 1207 & SB 840 (2025)
2/3 supermajority
Authority through 2045

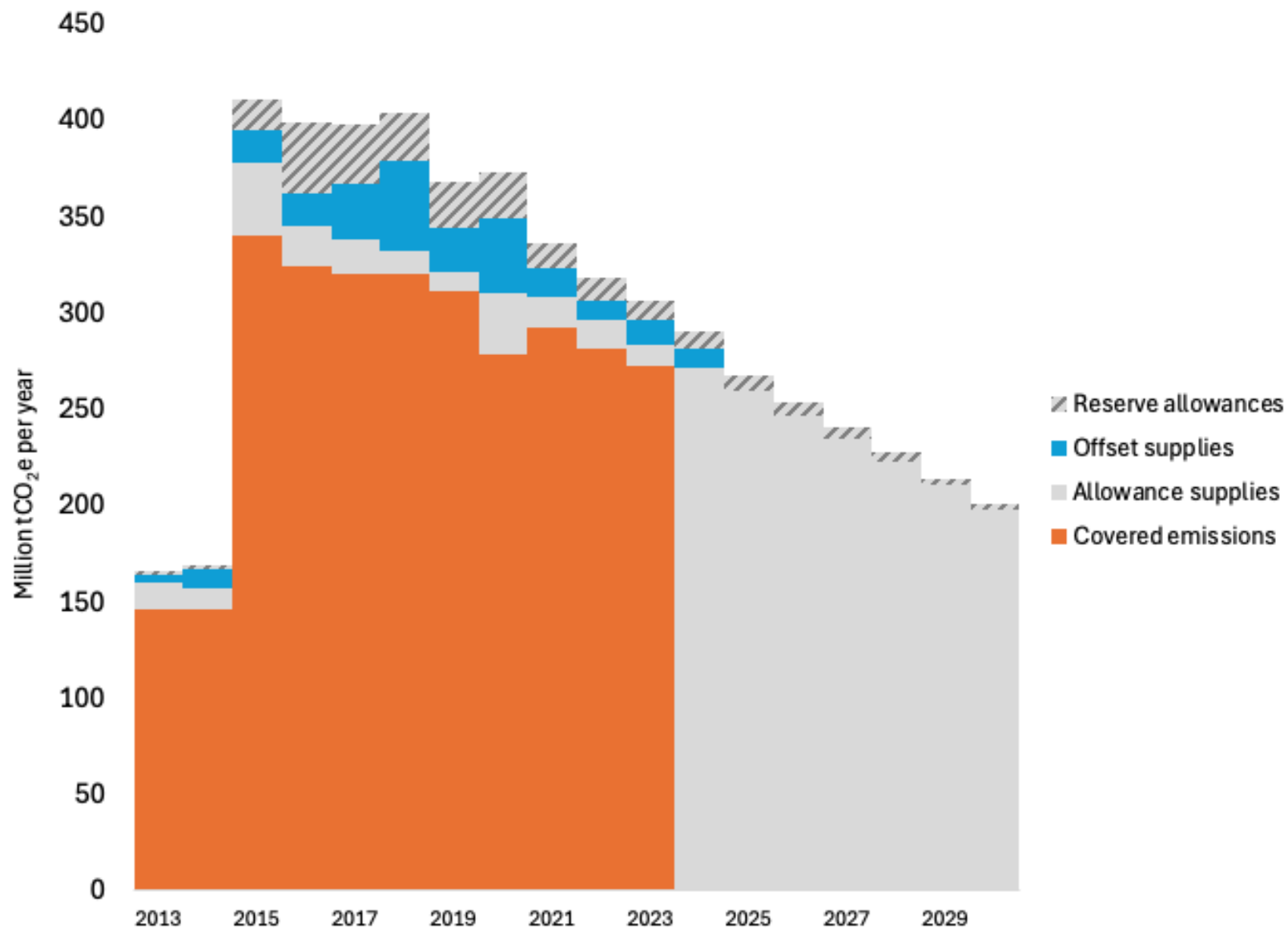
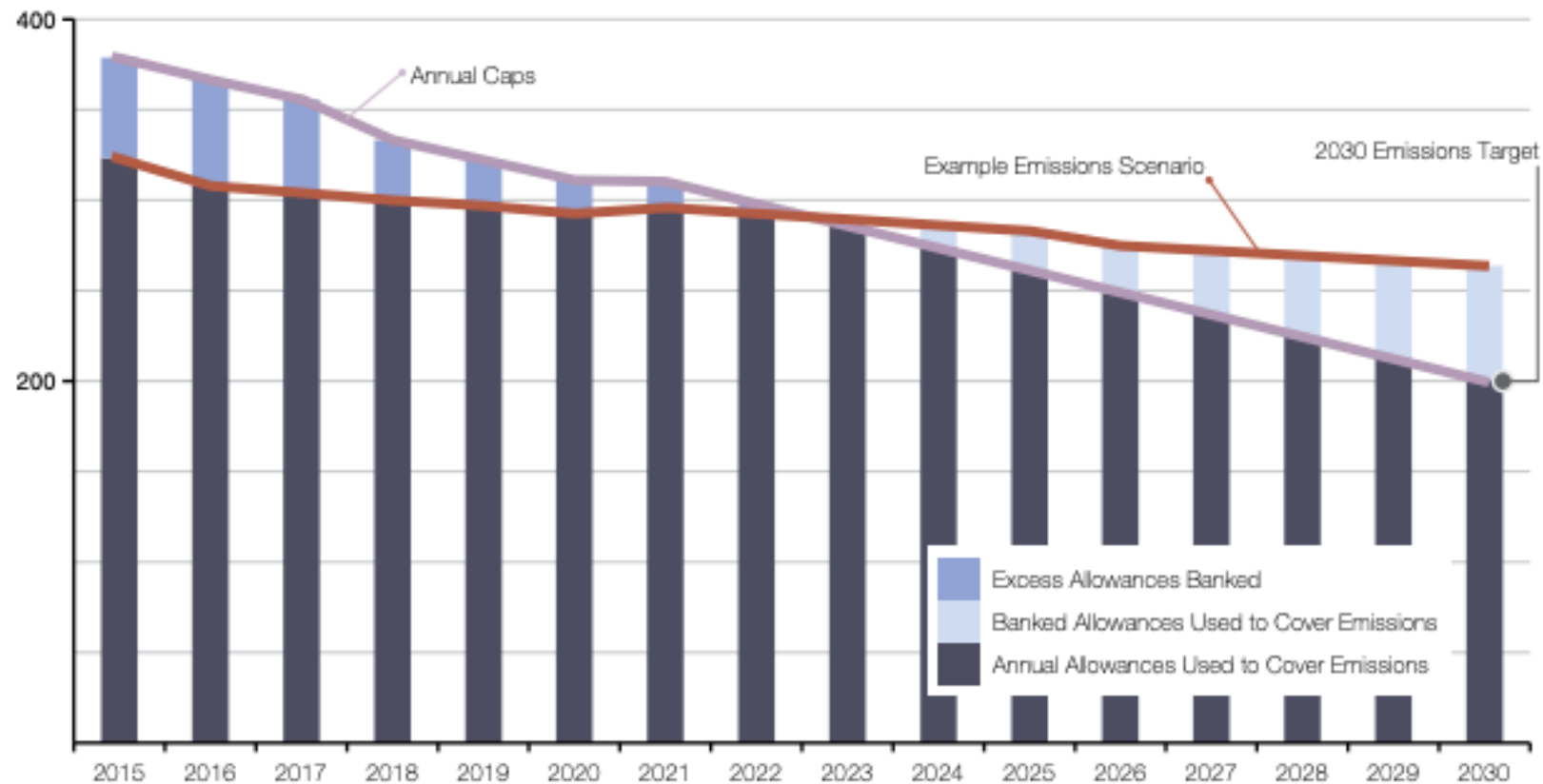


Figure 3

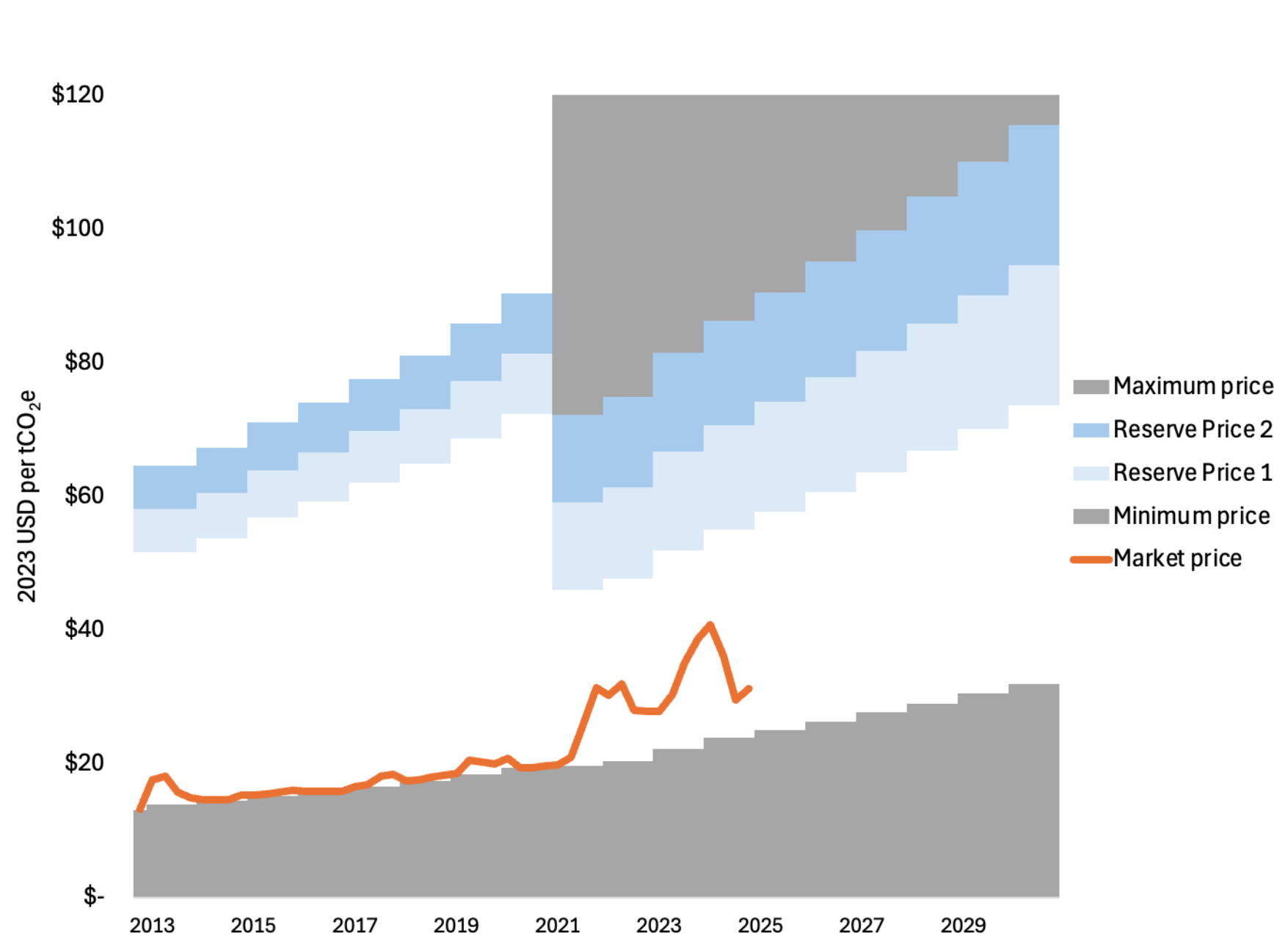
Large Number of Banked Allowances Increases Risk of Exceeding GHG Target

Million Metric Tons

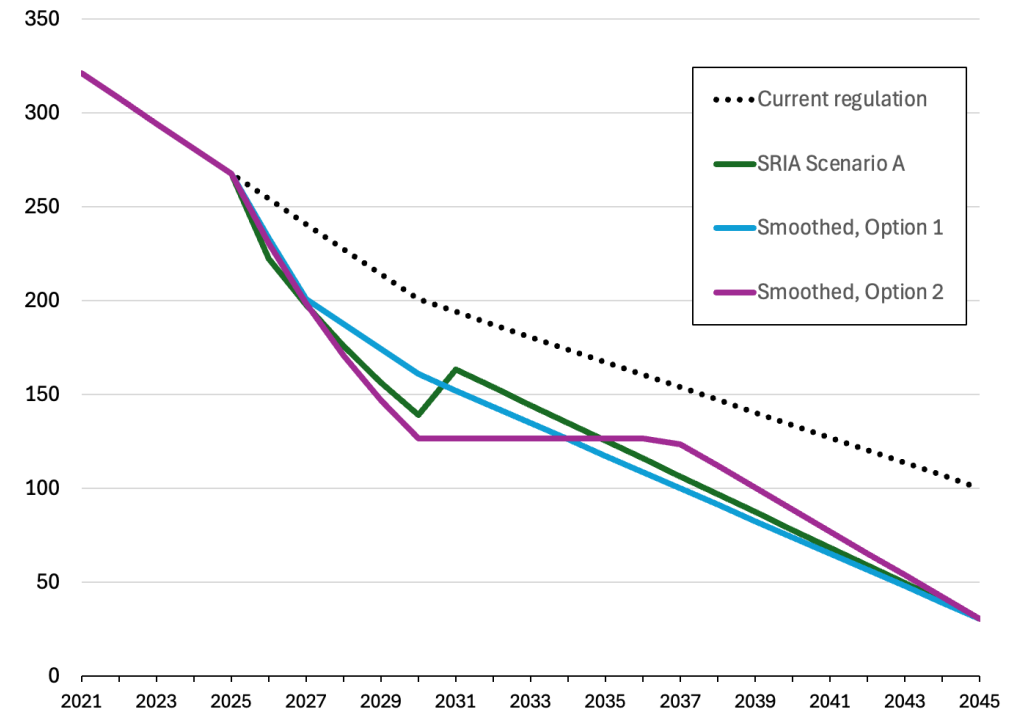
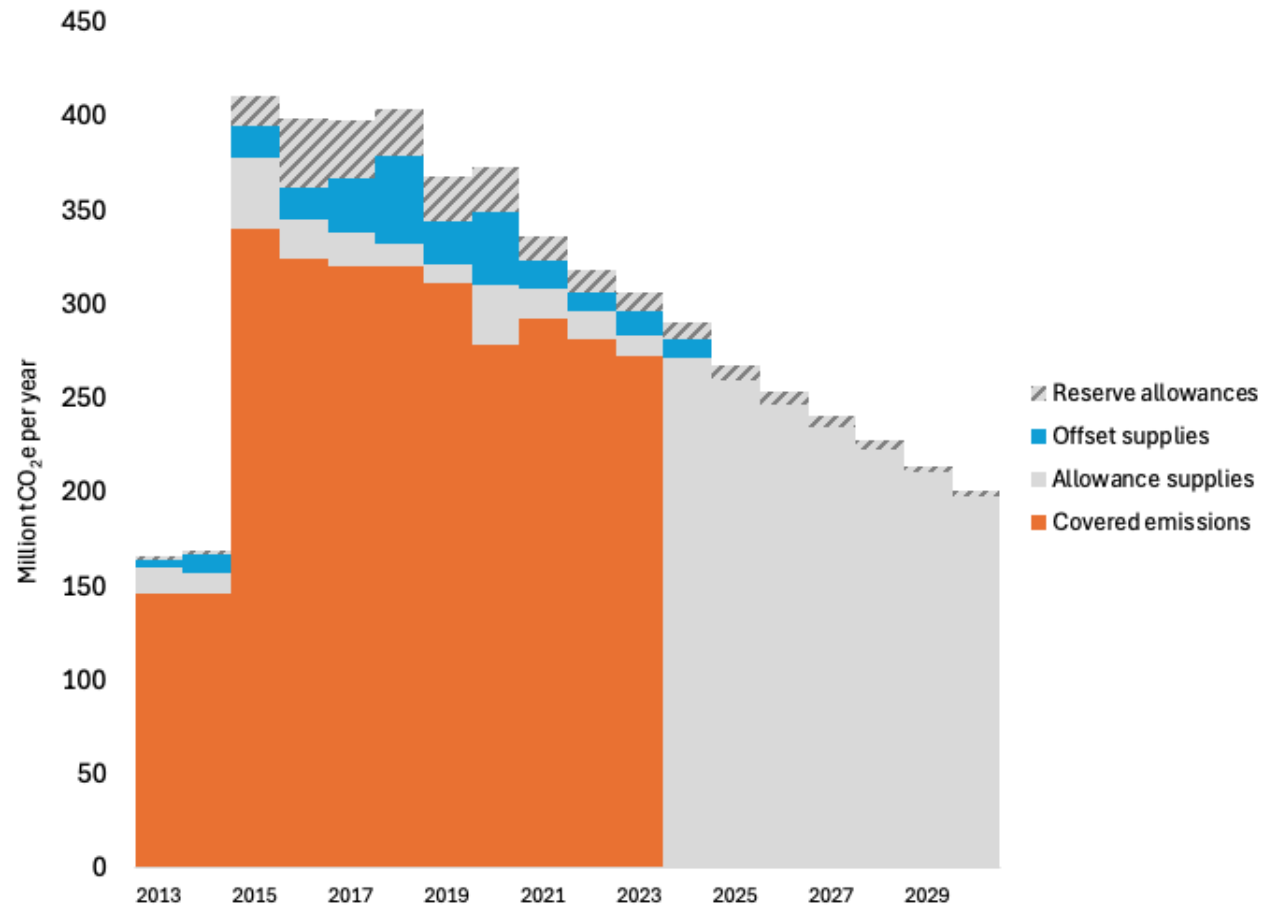


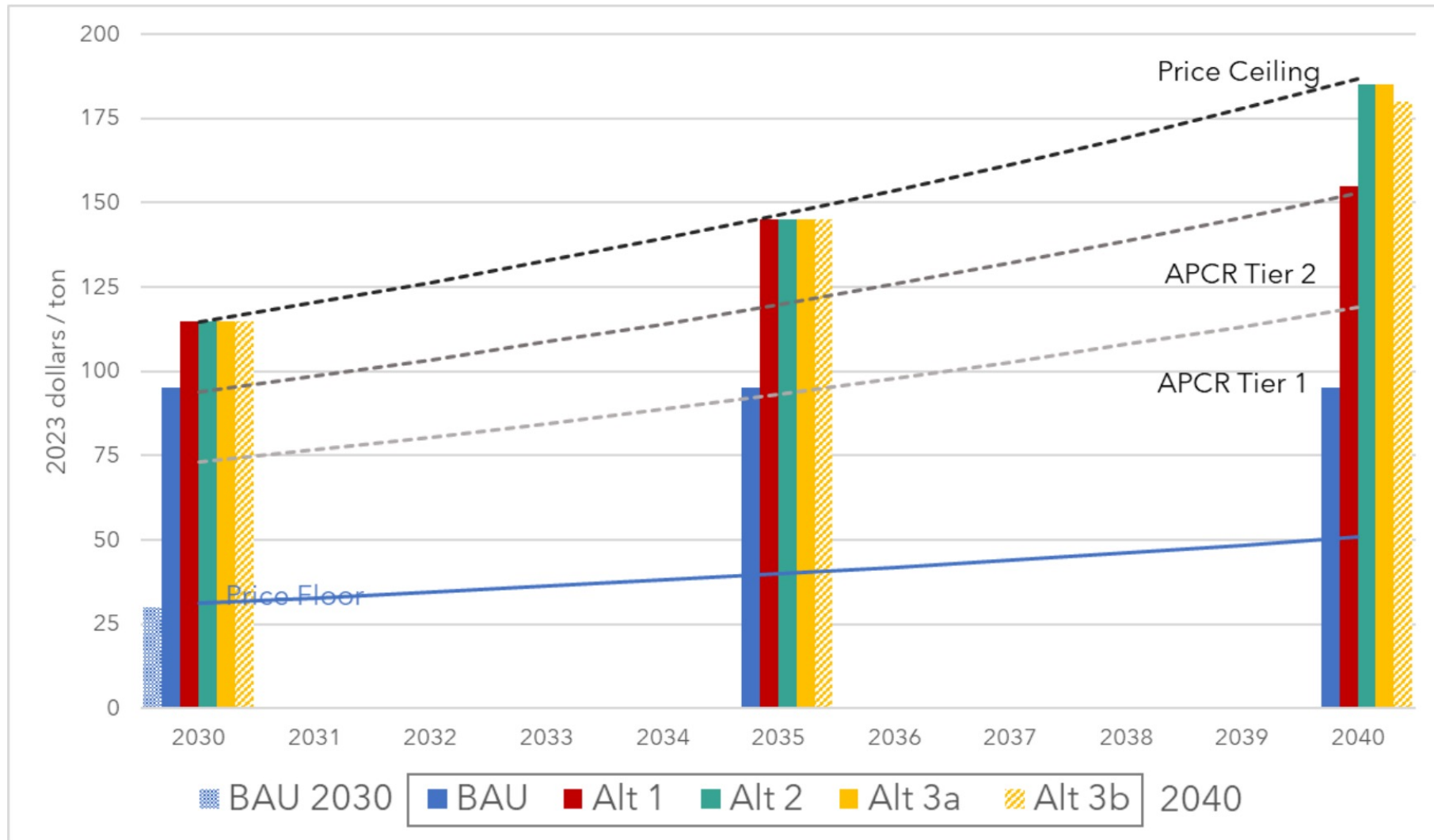
GHG = green house gas.

LAOA



From laxity to scarcity





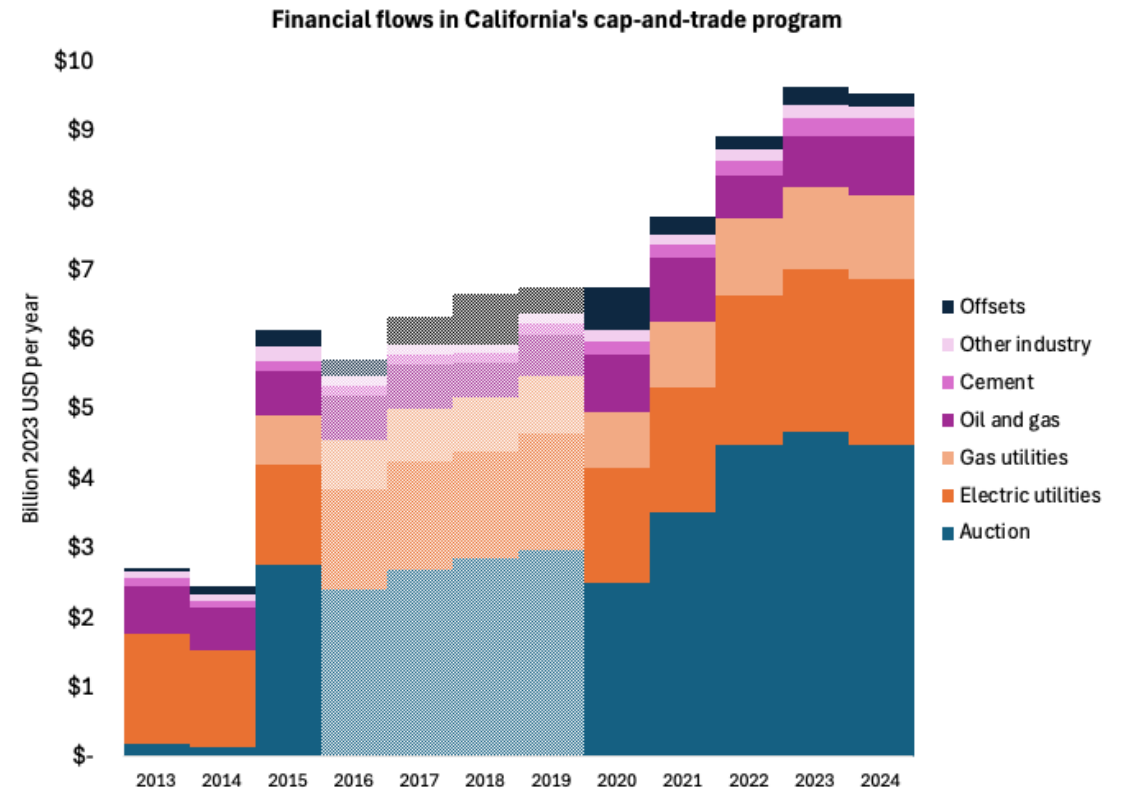
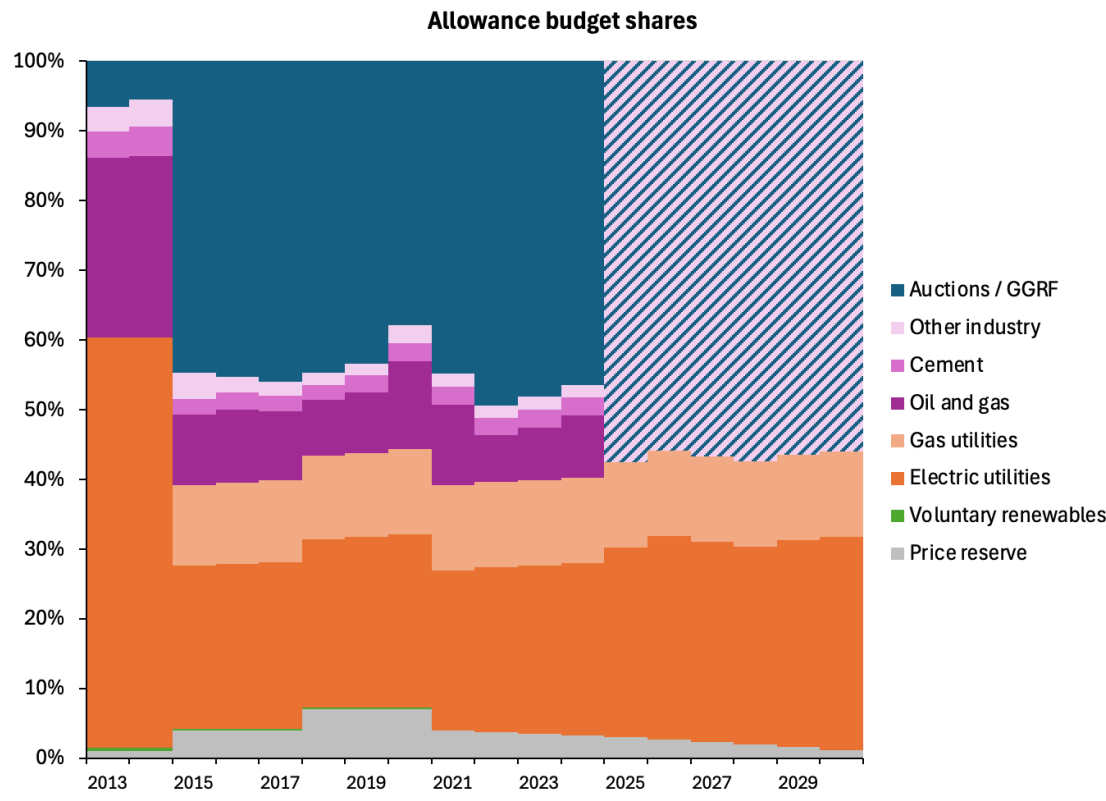
2025 re-authorization

- Directs CARB to set caps aligned with ambitious 2030 and 2045 targets
- Delegates price ceiling choice to CARB (same as before)
- Restores CARB's ability to freely allocate allowances based on leakage risks (rather than implement a political deal from the oil industry)
- Shifts utility free allocation from gas and electric → electric only
- Establishes a new funding structure for program revenues
- Keeps offsets, removes allowances on a 1:1 basis ([Macintosh et al. 2025](#))

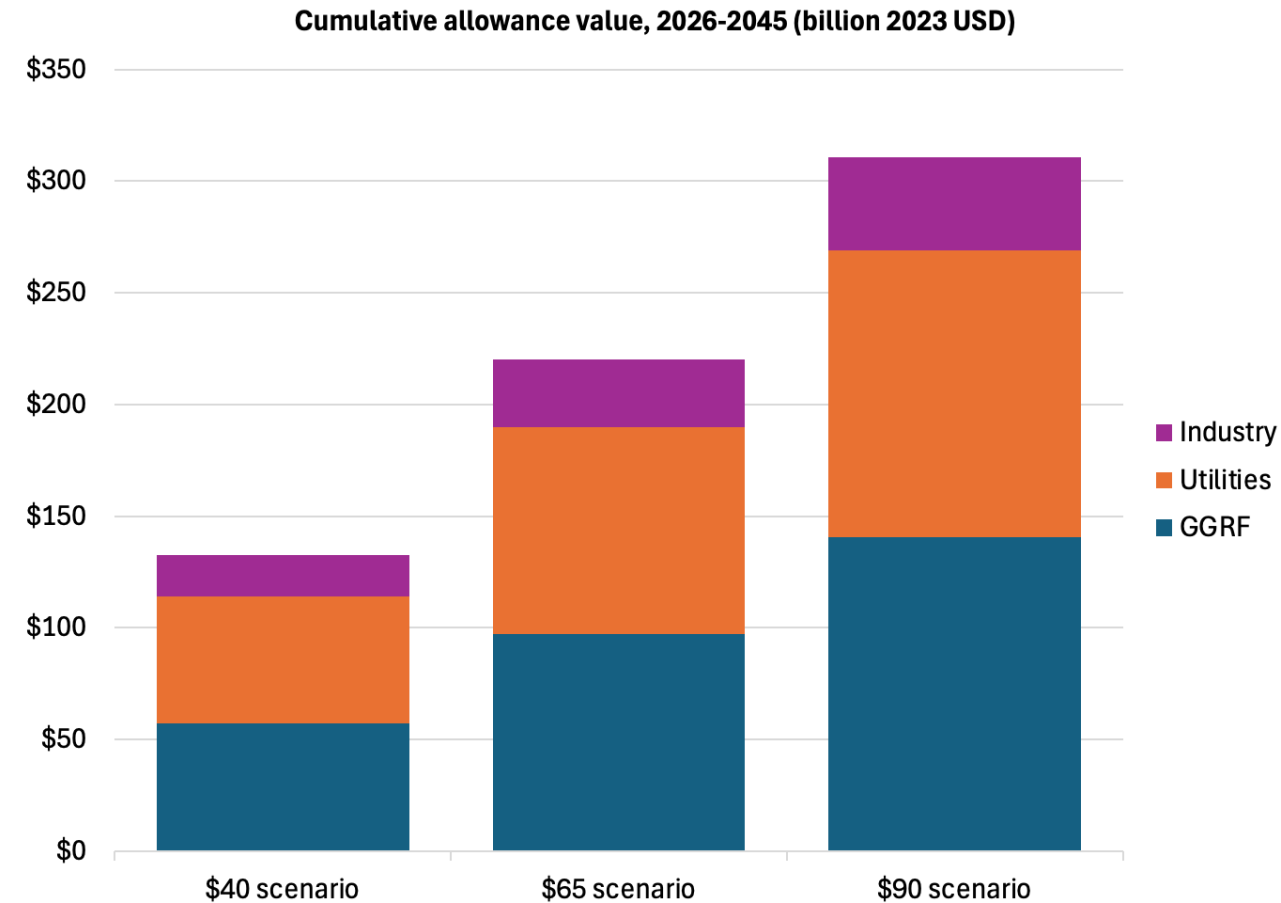
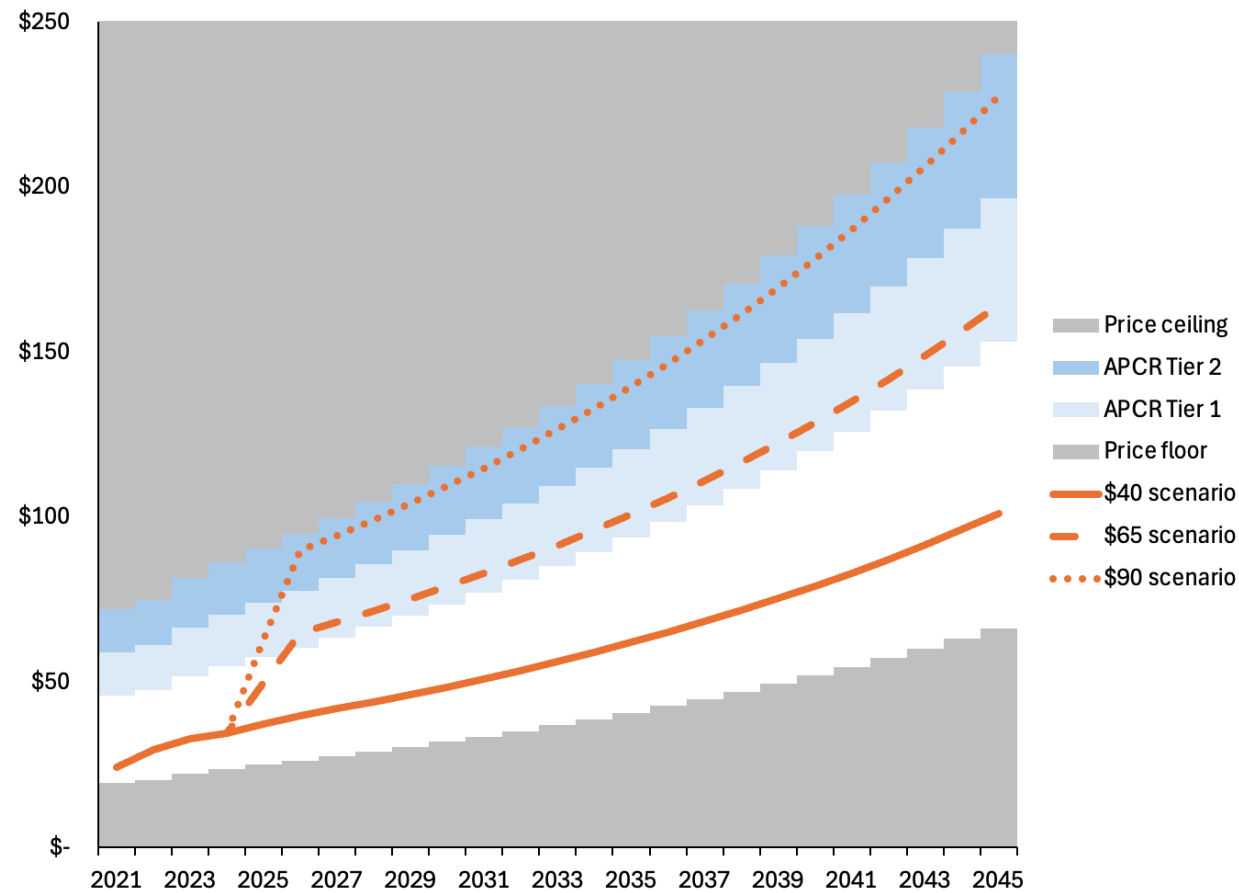
Key questions for upcoming rulemaking

- Will CARB reduce allowance supplies to address historically lax caps?
- Will CARB keep the same ambitious price ceiling?
About \$95/tCO₂e today, rising annually at 5% plus inflation
- Will CARB maintain similar allocation shares?
Very roughly: 15% free to industry, 40% to utilities, 45% to climate fund
- Will expected net benefits to electric utility ratepayers mitigate political concerns about higher fossil gas and transportation fuel prices?

Where does the money go?



Price uncertainty and fiscal outlook



Outcomes travel together

Higher carbon prices →

- More emission reductions
- More program revenue
- Higher fuel price impacts

Lower carbon prices →

- Fewer emissions reductions
- Less program revenue
- Lower fuel price impacts

Don't expect to maintain the status quo

Lax program design (including lots of low-quality offsets) kept allowance prices low and prevented the market from “doing its work”

Reauthorizing the program through 2045, requiring ambitious allowance budgets, and putting offsets under the cap will flip the equation and put significant upward pressure on market prices

But because the market hasn't had any significant historical impact price impacts, some discount the possibility that it will in the future

Carbon markets and political limits

Ultimately, carbon markets are like consumption (sales) taxes

Those impacts are regressive, absent transfers (like utility rebates)

Even with sound transfer mechanisms, politics aren't easy (see Canada)

Set ambitious caps and choose a price ceiling you can live with

Political forces limit ambition, so spend all resources wisely

Alternative funding sources are also needed; some don't have the same affordability concerns (e.g., progressive income and corporate taxes)

Listen to (or at least paraphrase) your friends

- Emissions accounting and life cycle analysis are malleable practices that are determined, in significant part, by political forces ([Yona 2025](#))
- We should count dollars, not tonnes ([Green 2025](#)); however, it's not always easier to count dollars because opacity reinforces the status quo
- Special interests seek to create loopholes leading climate programs and expand those loopholes to other jurisdictions ([Grubert et al. 2025](#))

Thanks!

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