



Renewable Diesel Market Report

Prepared for the Washington Alternative Fuel & Vehicle
Technical Assistance Group (AFV-TAG)

March 21, 2024



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Fueling the future of transportation energy with trusted industry experience

1. Stillwater Associates leverage decades of experience to help clients navigate transportation fuels market challenges. **We see things others miss.**
2. Our clients: government agencies, oil and renewable fuels companies, trade associations, technology developers, private equity firms, and law firms.
3. Leading experts on renewable fuels markets and the regulations that drive them.
4. Stillwater's **LCFS and C&T Newsletters** offers producers, importers, traders, and investors the right information to make smart credit market decisions.
5. **Questions about renewable fuels markets?** Our team of experts is available to provide specific analysis and tailored strategy for your needs.

Agenda

1. Regulations and incentives driving the renewable diesel market
2. The renewable diesel incentive stack
3. Renewable diesel production capacity

CO₂ reduction regulations

Driving forces behind renewable fuel supply & demand

LCFS RFS
CFP CFS BTC 45Z
C&I C&T
CPP

LCFS

- Administered by CARB
- Reduces the CI (gCO₂e/MJ or g/MJ) of the transportation fuel pool by setting an annual carbon reduction standard
- Current reduction target is 20% by 2030.
*That will probably change.
- Fuels with a CI above the standard (currently gasoline & diesel) generate deficits. Fuels with a CI below the standard (renewable fuels, electricity) generate credits.
- Deficit generators must purchase or generate credits to be in annual compliance with the standard
- Compliance mechanism = LCFS credit

CFP CFS

- Administered by DEQ
- Modeled after the CALCFPS program with slight adjustments
- Current reduction target is 37% by 2035
- Compliance mechanism = CFP credit
- Administered by Ecology
- Modeled after the CA & OR LCFS and CFP programs with some slight differences
- Current reduction target is 20% by 2034
- Compliance mechanism = CFS credit

**State low carbon fuel standards are referred to collectively as LCF programs.*

RFS

- Administered by the U.S. EPA
- Mandates specific volumes of renewable fuel, identified by separate categories, be blended into petroleum fuel
- Compliance mechanism = RIN
- *Can be political

45Z

BTC

- Administered by the IRS
- Provides \$1 per gallon tax credit for RD/BD blended with petroleum fuel
- Expires at the end of 2024 (replaced by 45Z)
- *easy peasy

- Part of the IRA and also known as the Clean Fuel Production Credit (CFPC)
- Starts in 2025
- Available to any transportation fuel produced in the U.S. (not just RD/BD/SAF)
- Per-gallon credit is calculated from the emissions rate of the fuel. IRS will publish an annual table of emission rates for each applicable fuel.
- Base rate for non-aviation fuels is \$1 per gallon for fuels with an emissions rate less than 50 kgCO₂e/mmBTU.
- Value of CFPC will probably be lower than the BTC for most producers.
- *will be more complicated than the BTC

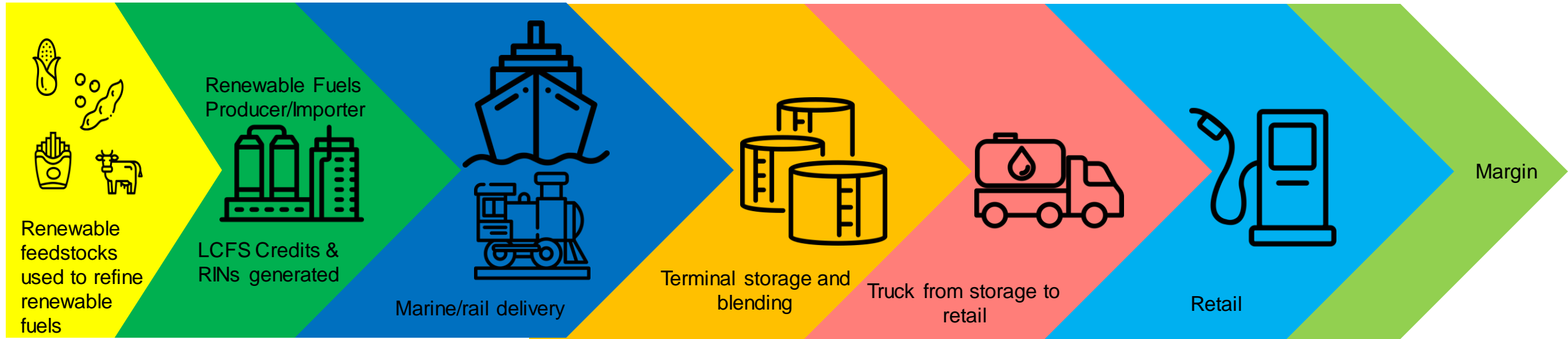
C&I CPP

C&T

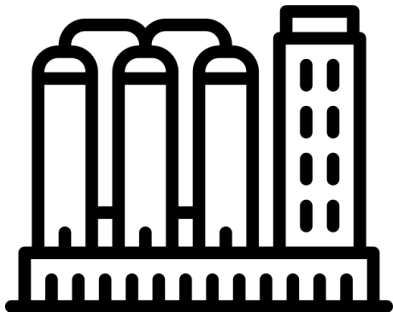
- West Coast state carbon Cap & Trade Programs
- Administered by CARB, Ecology, and DEQ
- Places a declining cap on major sources of emissions
- CA & WA programs establish an auction for carbon allowances which covered entities may purchase to offset emissions. Proceeds from auctions are used for in-state climate investment.
- CA & WA programs result in Cap-at-the-Rack fee for petroleum fuels at the wholesale level.
- CA & WA compliance mechanisms = allowances & offsets

- **Currently on hold.** OR CPP provides compliance instruments to covered entities for free. They are not sold by the state but can be traded between entities. Covered entities may also purchase Community Climate Investment (CCI) credits to offset emissions.

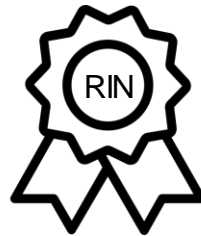
The renewable fuels value chain relies on environmental credits and tax incentives.



LCFS Credits sold to petroleum refiners and importers



RINs are separated and sold to refiners and importers



If RD/BD producers sell R99/B99, they can separate the RINs and collect the BTC value (replaced by 45Z starting in 2025).



In CA and WA, C&T/C&I Cap-at-the-Rack fee is levied on CARBOB/ULSD position holder at the terminal.

Credits & incentives offset the high cost of renewable fuel production with the goal of bringing the consumer cost of renewable fuels to parity with petroleum fuels.

The Incentive Stack

The full value of RD carbon credits & tax incentives

Cap-at-the-Rack
LCF Credits

D4 RINs

BTC (until 2025)

45Z (2025-2027)

Renewable fuel producers and blenders benefit from stacking the value of credits and incentives.

Stacked Incentive Value of 40 CI RD California, Oregon, and Washington (\$/gallon)

	CA	OR	WA
Cap-at-the-Rack	0.39	--	0.29
LCF Credit Value*	0.37	0.40	0.47
RINs Value \$0.54/gal	0.92	0.92	0.92
BTC	1.00	1.00	1.00
Total RD Incentive Value	2.68	2.32	2.68

*OPIS mean credit values on 3/18/24. CA LCFS= \$66.25/MT, OR CFP = \$68/MT, WA CFS = \$41.50/MT
Based on 2024 LCFS, CFP, and CFS benchmark values for diesel fuel and market prices reported on 3/18/24
Sources: OPIS, CARB, DEQ, Ecology

Recent ULSD and R99 Spot Prices (\$/gallon)

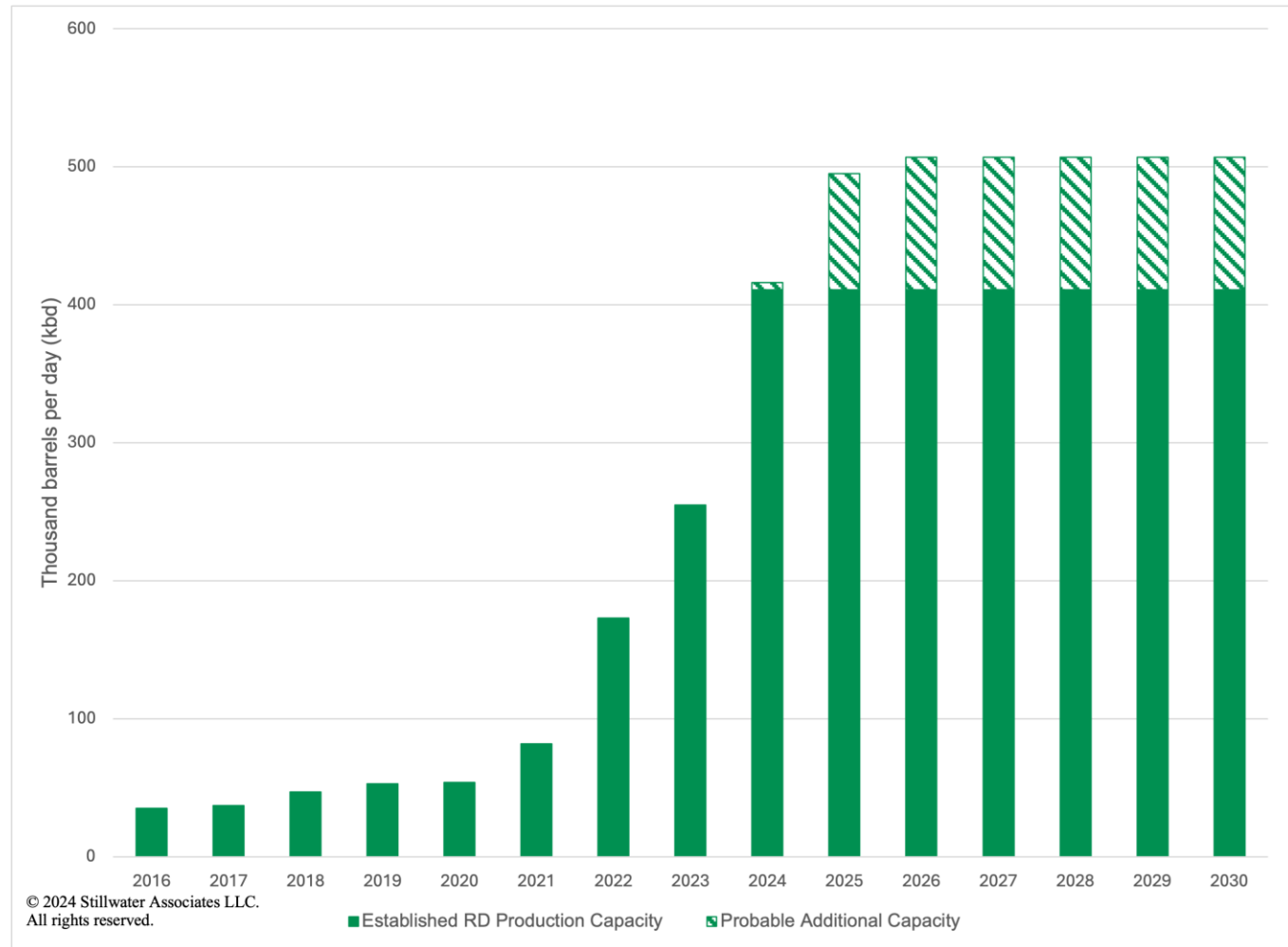
	LA	SF	PNW
ULSD Spot Price	2.79	2.84	2.43
R99 Spot Price	2.96	3.05	2.98

Collection of spot prices 3/11/24 (PNW) and 3/18/2024 (LA & SF)
Sources: Argus, OPIS, StarOil Co.

The BTC will be replaced with 45Z in 2025, which will have a lower value based on the CI of the fuel. Cap-at-the-Rack, LCF credit, and RINs prices will move with the markets, changing the incentive stack value.

RD Production Capacity is growing by leaps and bounds

Established and Probable RD Production Capacity Aimed at the North American Market 2016-2030



Stillwater tracks new RD project announcements and assesses each project for viability to create a probability weighted analysis of upcoming production capacity. Based on current announcements and our analysis, Stillwater's outlook shows RD production capacity growth, aimed at the North American market, peaks in 2026 at 7.7 bgy (507 kbd).

2024 RD Production Capacity Exceeds 6.2 billion gallons

1. In 2024 there are 27 RD production facilities in the U.S., Canada, and Singapore.
2. Stillwater includes the Neste Singapore refining complex in these production volumes as most of that production is aimed at the North American market.

Company	Location	Status	2024 Nameplate Production Capacity	
			kbd	mgy
BP (co-processing)	Cherry Point, WA	Operating	7.1	109
Braya Renewable Fuels	Come by Chance, NL, Canada	Expected start-up 2024	18.0	276
Calumet-Montana Renewables	Great Falls, MT	Operating	18.0	276
Chevron (co-processing)	El Segundo, CA	Operating	10.0	153
CVR	Wynnewood, OK	Operating	1.6	25
Diamond Green	Norco, LA	Operating	19.6	300
Diamond Green	Port Arthur, TX	Operating	30.7	470
Diamond Green Expansion	Norco, LA	Operating	27.4	420
East Kansas Agri-Energy	Garnett, KS	Operating	0.5	3
ENI - PBF	Chalmette, LA	Operating	20.0	306
Fulcrum	Reno, NV	Operating	1.0	11
Global Clean Energy	Bakersfield, CA	Expected start-up 2024	13.7	210
HF Sinclair	Artesia, NM	Operating	9.2	141
HF Sinclair	Sinclair, WY	Operating	10.0	153
HF Sinclair	Cheyenne, WY	Operating	6.0	90
Kern (co-processing)	Bakersfield, CA	Operating	1.0	15
LanzaJet*	Soperton, GA	Operating	0.7	11
Marathon	Dickinson, ND	Operating	12.0	184
Marathon Phase I	Martinez, CA	Operating	17.0	260
Marathon Phase II	Martinez, CA	Operating	30.7	470
Neste	Singapore	Operating	28.7	440
Neste Expansion	Singapore	Operating	28.7	440
Phillips 66 Phase I	Rodeo, CA	Operating	8.0	120
Phillips 66 Phase II	Rodeo, CA	Expected start-up 2024	42.0	680
Chevron-REG	Geismar, LA	Operating	6.6	101
Chevron-REG Expansion	Geismar, LA	Operating	16.3	250
Seaboard Energy	Hugoton, KS	Operating	6.5	85
Tidewater	Prince George, BC, Canada	Operating	3.0	46
Vertex	Mobile, AL	Operating	14.0	215
World Energy	Paramount, CA	Operating	2.7	42
Total			410.7	6,194

*LanzaJet will produce 1 mgy of RD. The remaining 10 mgy is dedicated to SAF production.
Source: based on publicly available information

Not all production capacity is aimed at the USWC



*Neste Singapore refinery not shown, but those volumes are considered USWC-advantaged.

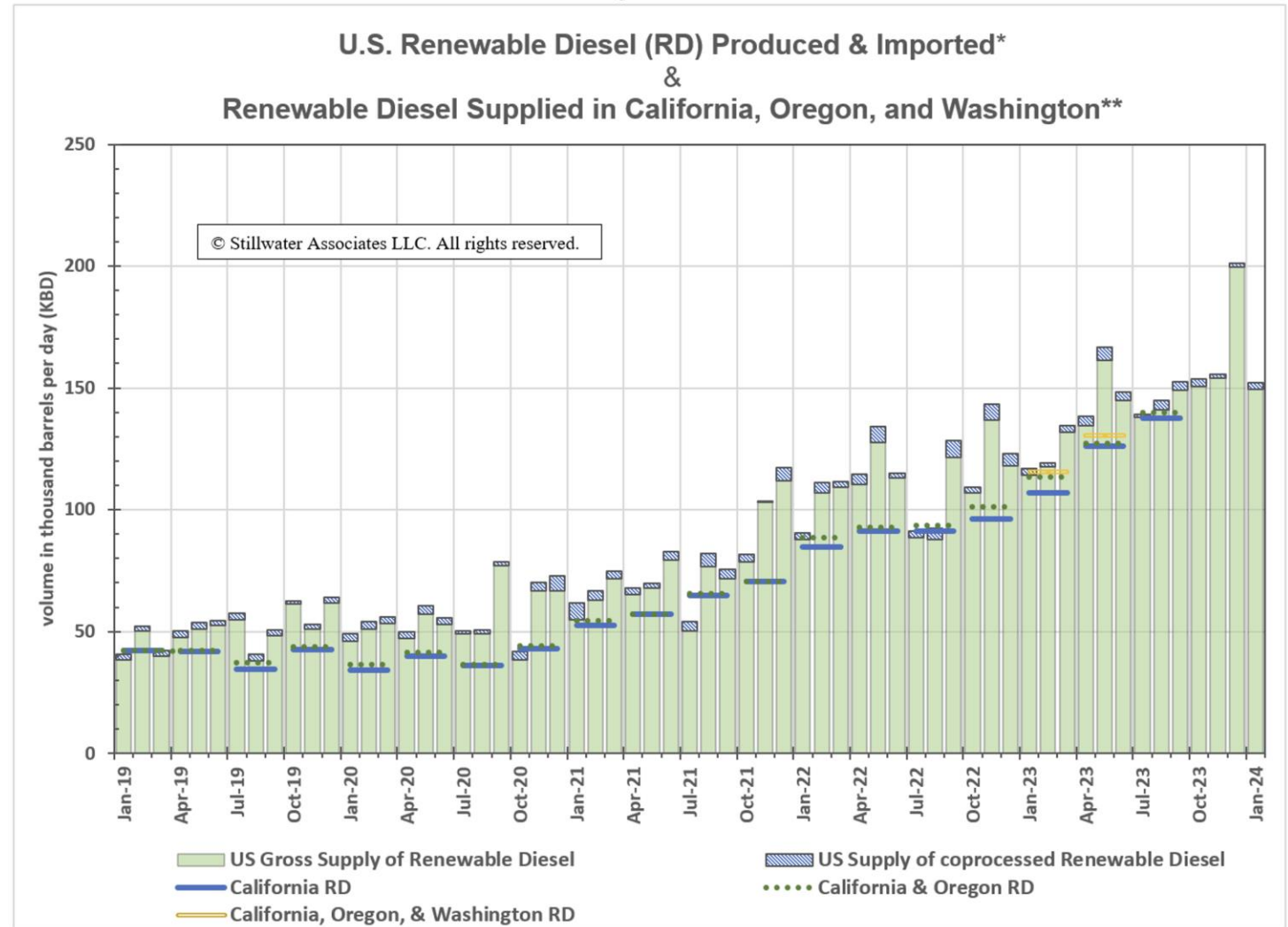
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About 3.6 billion gallons in production volume is California- or USWC-advantaged.



California's large established RD market draws the most volume.

1. In 3Q 2023, RD supplied to CA was 532 million gallons (138 kbd).
2. 3Q 2023 RD supplied to OR was 40 million gallons (10 kbd).
3. 2Q 2023 (latest data available), RD supplied to WA was 11 million gallons (2.8 kbd).



* per EMTS (includes volumes that are subsequently exported)

** per LCFS, CFP, and CFS data

Note: The reported units in this figure are in thousand barrels per day (KBD). EPA reports gallons per month via EMTS while CARB, DEQ, and Ecology report gallons per quarter for the LCFS, CFP, and CFS (respectively). California and Oregon data are available through 3Q2023, Washington data are available through 2Q2023, and EMTS data are available through January 2024.

A note about Food vs. Fuel

1. Carbon reduction programs like 45Z and state LCF programs use scientific life cycle analysis models to assess the carbon intensity (CI) of fuels. Included in LCA models are assessments of indirect land use change (ILUC).
2. ILUC can occur when agricultural land previously destined for food and feed markets is diverted to biofuel production. Fuels derived from virgin crops generally have a high ILUC score, and therefore a high CI. As such, they are disadvantaged in carbon-regulated markets.
3. Renewable fuel derived from waste feedstocks that don't compete with food sources, like used cooking oil and tallow, have a lower CI and are advantaged in carbon-regulated markets.
4. The U.S. Department of Energy recently released their [2023 Billion-Ton Report](#) which finds that *“The U.S. can triple production of biomass, producing an estimated 60 billion gallons of low greenhouse gas liquid fuels, while still meeting the projected demand for food, feed, fiber, conventional forest products, and exports.”*

Regulators and life cycle scientists are working hard to ensure that the biofuel economy does not have a detrimental impact on the availability and price of food.



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Thank you.
Questions?