

OPIS

A DOW JONES COMPANY

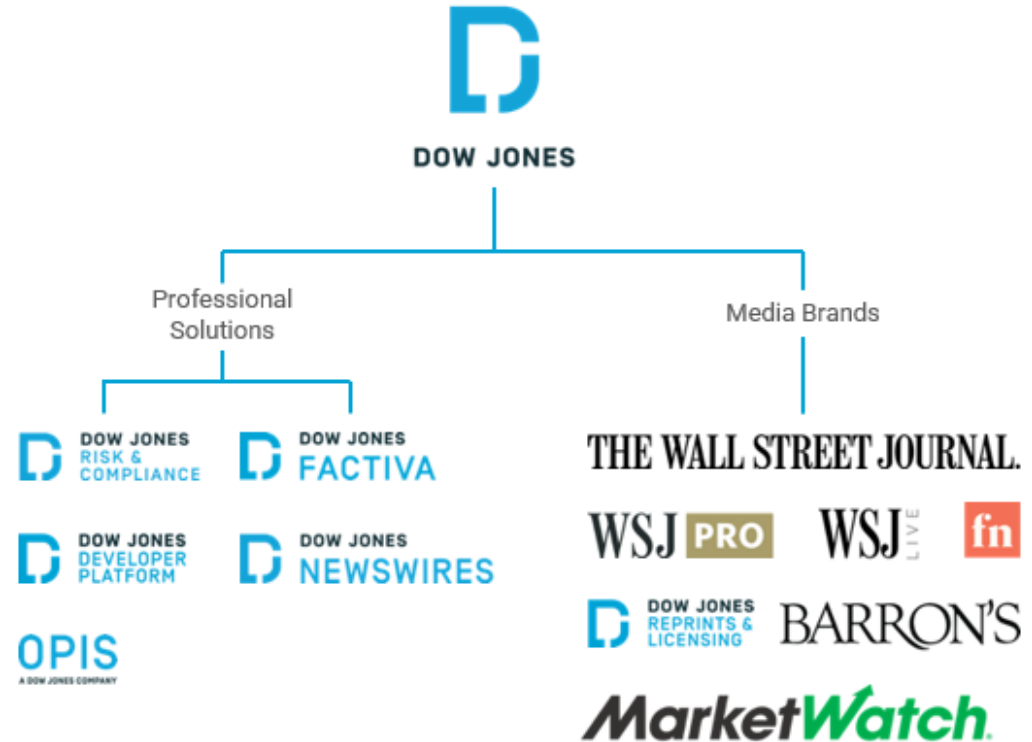
 | DOW JONES

Renewable Diesel & Sustainable Aviation Fuel: Bringing Price Transparency to Growing Markets

Jordan Godwin, OPIS Renewables Director

Who We Are

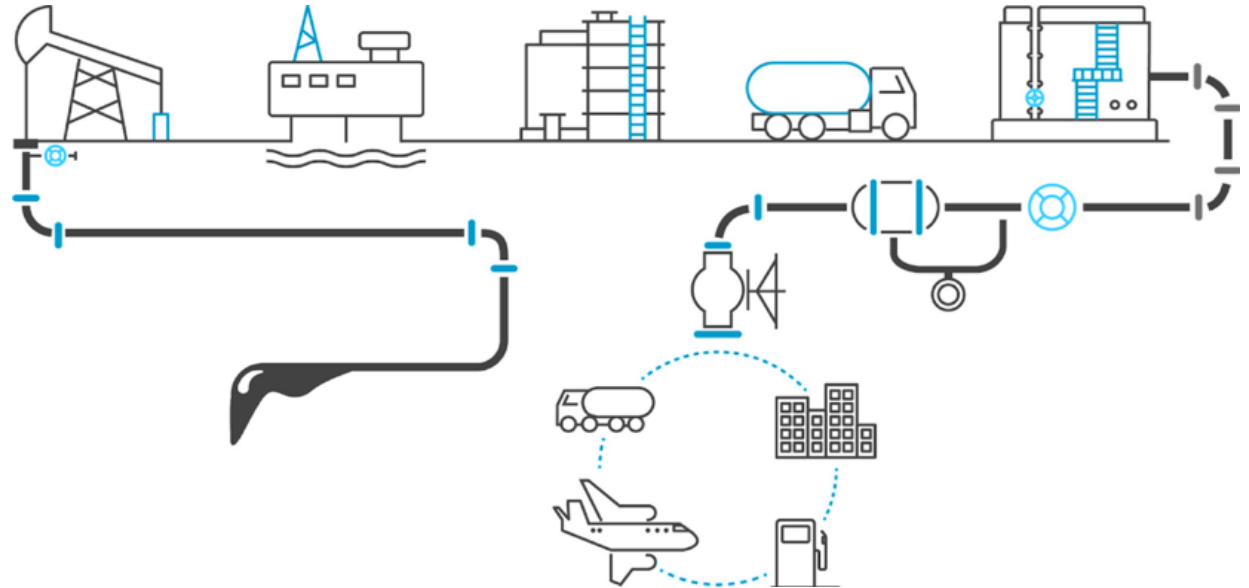
- OPIS is a Dow Jones company. Dow Jones is a foremost provider of proprietary news, data and analysis to decision makers around the globe on multiple platforms.
- Dow Jones is a division of News Corp (Nasdaq: NWS, NWSA; ASX: NWS, NWSLV).
- Our OPIS Renewables team:
 - Spencer Kelly
 - Michael Schneider
 - Patrick Newkumet
 - Aaron Alford
 - MK Bower



Who We Help

OPIS provides solutions for all players in the downstream energy market, including:

- Refiners & Suppliers
- Wholesalers & Jobbers
- Retailers
- Fleets & Airlines
- Traders
- NGL & Petchem Companies
- Pipelines & Terminals
- Municipalities
- Financial Institutions
- Biofuels Producers
- Feedstock Providers
- Manufacturers
- Chemical Producers



	2019	2020	2021	2022	2023
“Renewable Diesel”	202	278	392	358	403
“Sustainable Aviation Fuel”	46	88	213	288	321

Renewable Fuel Standard (RFS)

- **EPA:** Environmental Protection Agency
- **RIN:** Renewable Identification Number credits
- **RVO:** Renewable Volume Obligation
- **BBD:** Biomass-based diesel
- **BOHO:** Bean oil heating oil for BBD blending
- **SAF:** Sustainable Aviation Fuel
- **UCO:** Used cooking oil
- **IATA:** International Air Transport Association

Low Carbon Fuel Standard (LCFS)

- **LCFS:** Low Carbon Fuel Standard
- **CARB:** California Air Resources Board
- **CFP:** Oregon Clean Fuels Program
- **DEQ:** Oregon Department of Environmental Quality
- **CFR:** Canada's Clean Fuel Regulations
- **CI:** Carbon Intensity
- **GHG:** Greenhouse Gas
- **GREET:** Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation

Renewable Fuel Standard (RFS)

- Federal program established in 2005 and overseen by U.S. Environmental Protection Agency (EPA)
- Volume-based targets with individual Renewable Volume Obligation (RVO) percentages
- Biofuels generate Renewable Identification Number (RIN) credits that refiners and importers of gasoline/diesel need to purchase to be compliant
- EPA finalized a major “set” rule in 2023
 - > Included targets for 2023, 2024 & 2025
 - > eRINs from EV fleet, soon maybe?

Low Carbon Fuel Standard (LCFS)

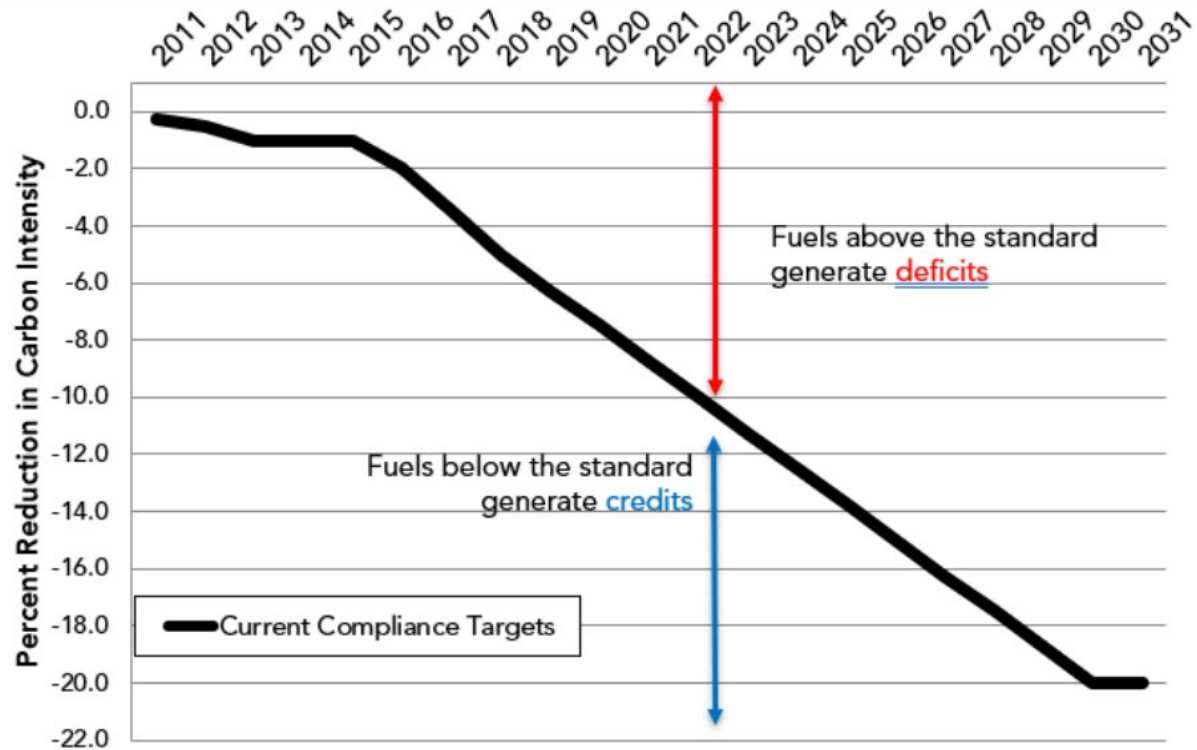
- California program created in 2011 and overseen by California Air Resources Board (CARB)
- Assigns Carbon Intensity (CI) scores to each fuel and targets increasingly stringent greenhouse gas (GHG) target reductions in California’s transportation fuel pool
- Fuels above the target generate deficits, fuels below generate credits, and refiners need credits to be compliant
- Currently in the rulemaking process to increase the near-term stringency of the targets and establish longer-term targets out to 2040

LCFS Programs Have Been A Driving Force

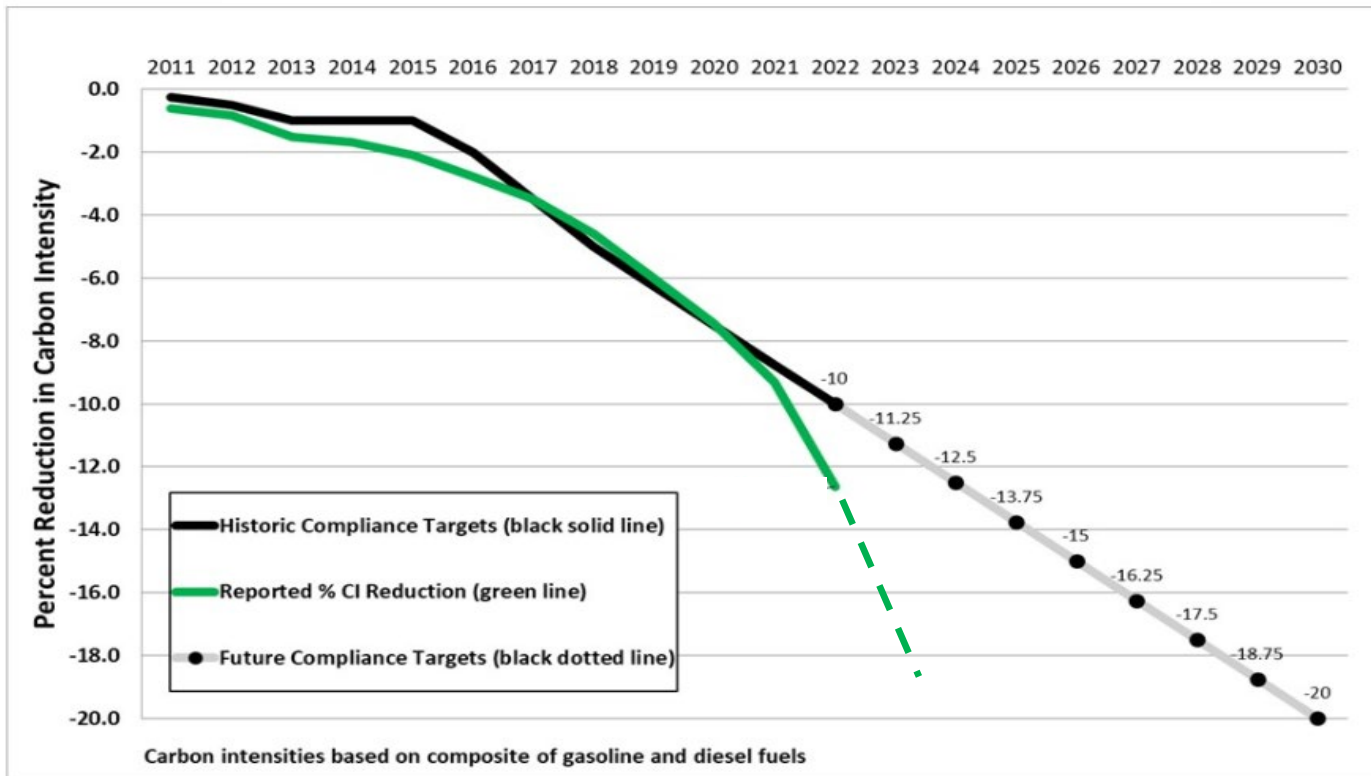


- California launched the first Low Carbon Fuel Standard program, targeting reduced GHG emissions in transportation fuels.
- British Columbia started its BC-LCFS in 2013.
- Oregon Clean Fuels Program began in 2016.
- Washington's Clean Fuel Standard and Canada's Clean Fuel Regulations launched in 2023.
- New Mexico, New York, New Jersey, Michigan, Hawaii, Minnesota and other states are also weighing LCFS programs.

LCFS Overview

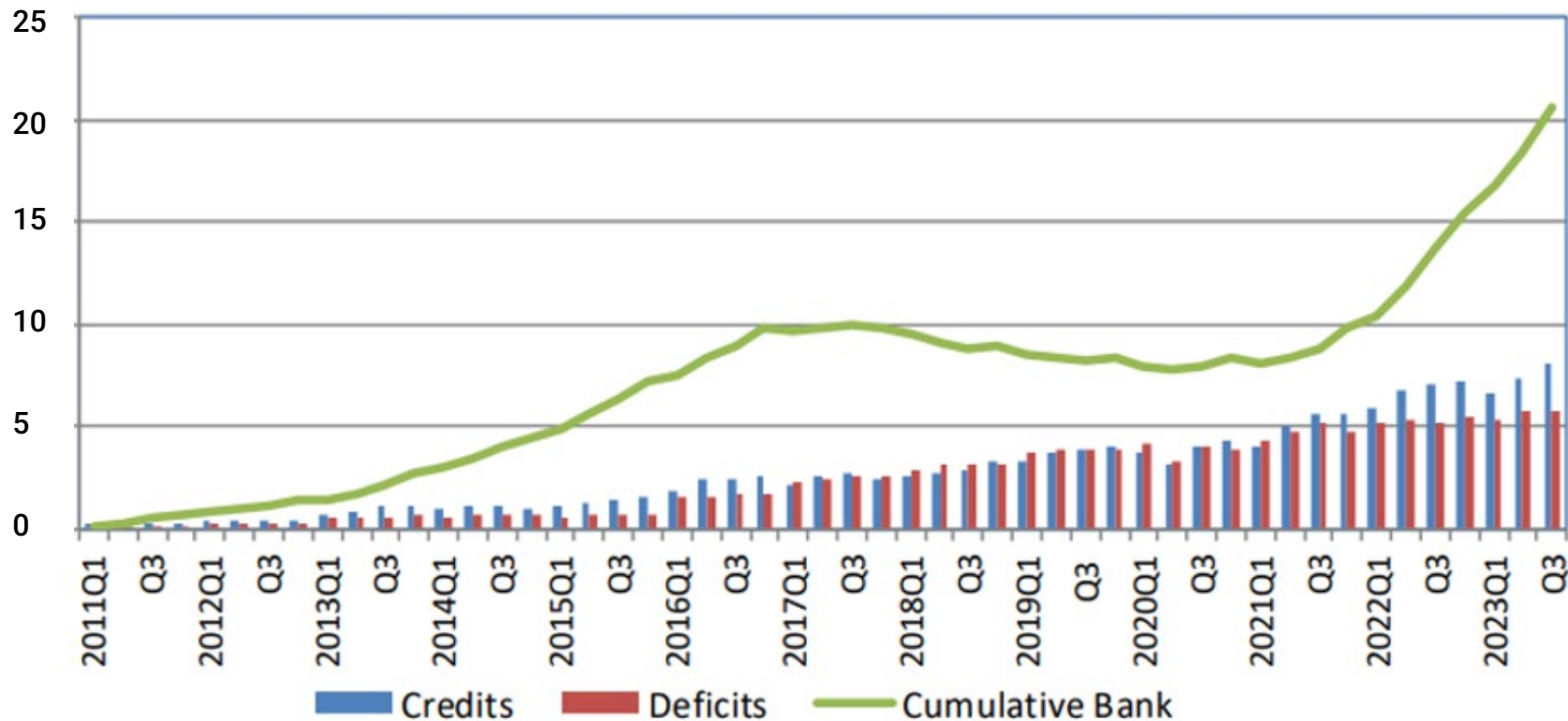


2011-2022 Performance of the California LCFS

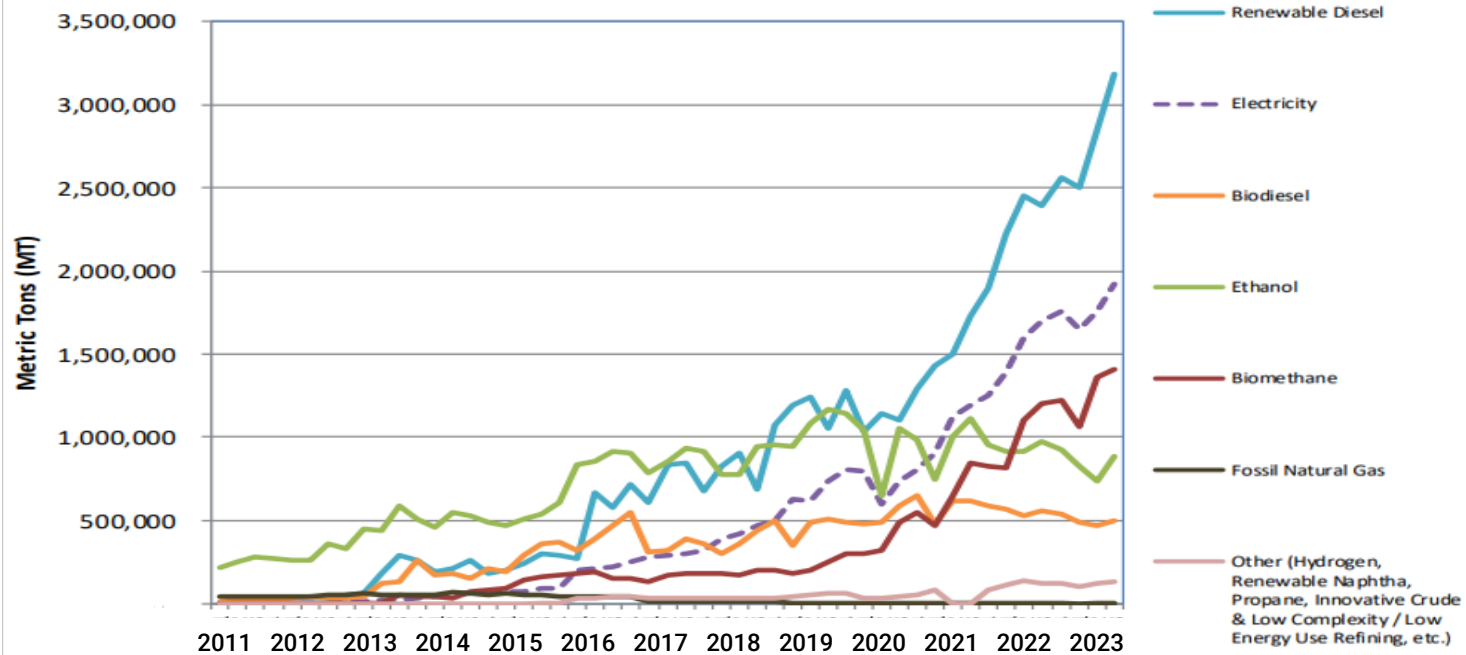


Total Credits & Deficits

(million credits, through Q3 2023)



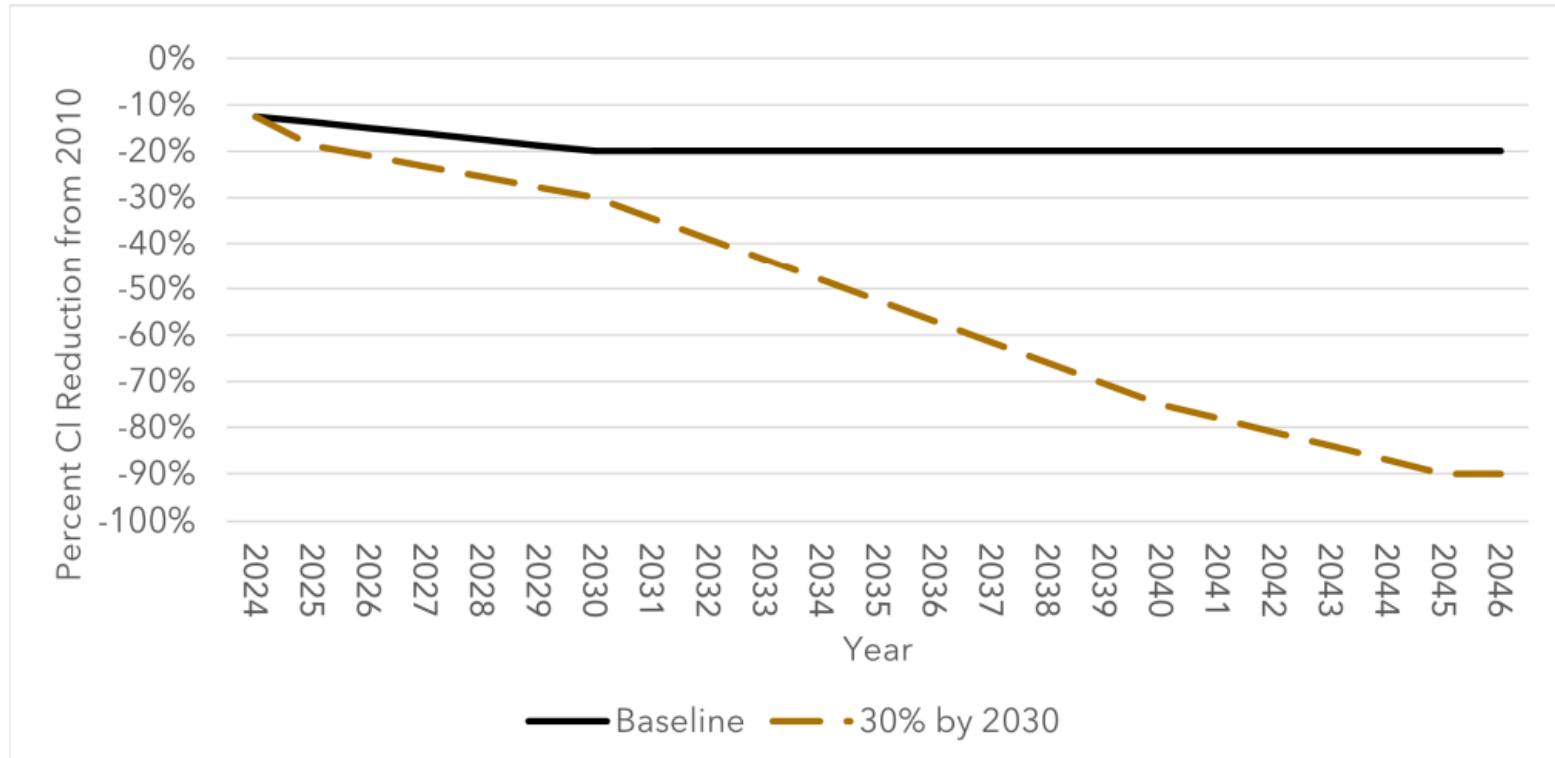
Quarterly Credits by Fuel Type



OPIS LCFS Daily Price Assessments



Current & Proposed Annual Carbon Intensity Benchmarks

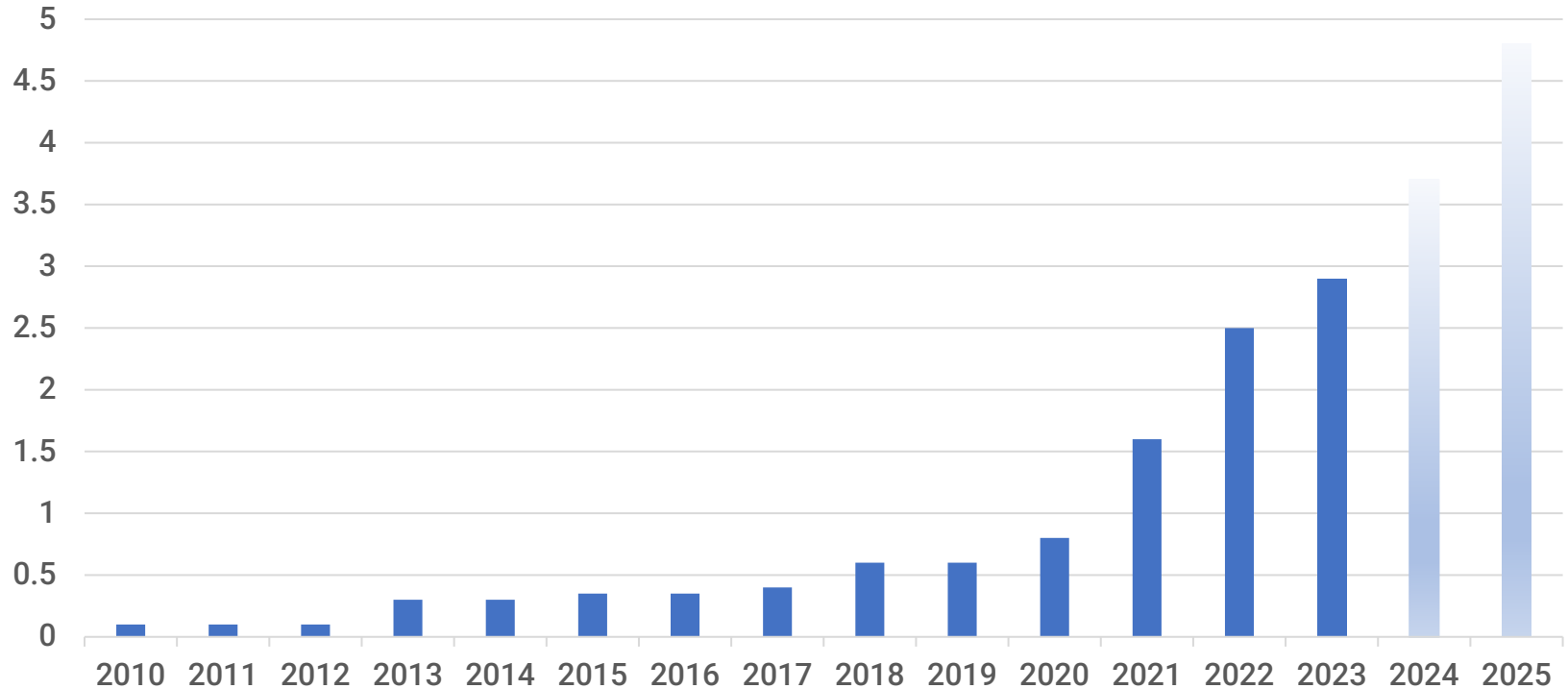


Renewable Diesel

- Renewable diesel is a broad class of fuels derived from biomass feedstocks, including crop-based edible oils, waste oils or animal fats.
- **Chemically similar to petroleum diesel** and **nearly identical** in its performance characteristics.
- **Meets ASTM specifications** for petroleum diesel and may be used in existing petroleum pipelines, storage tanks and diesel engines.
- Renewable diesel is produced through various thermochemical processes such as **hydrotreating**, gasification and pyrolysis.

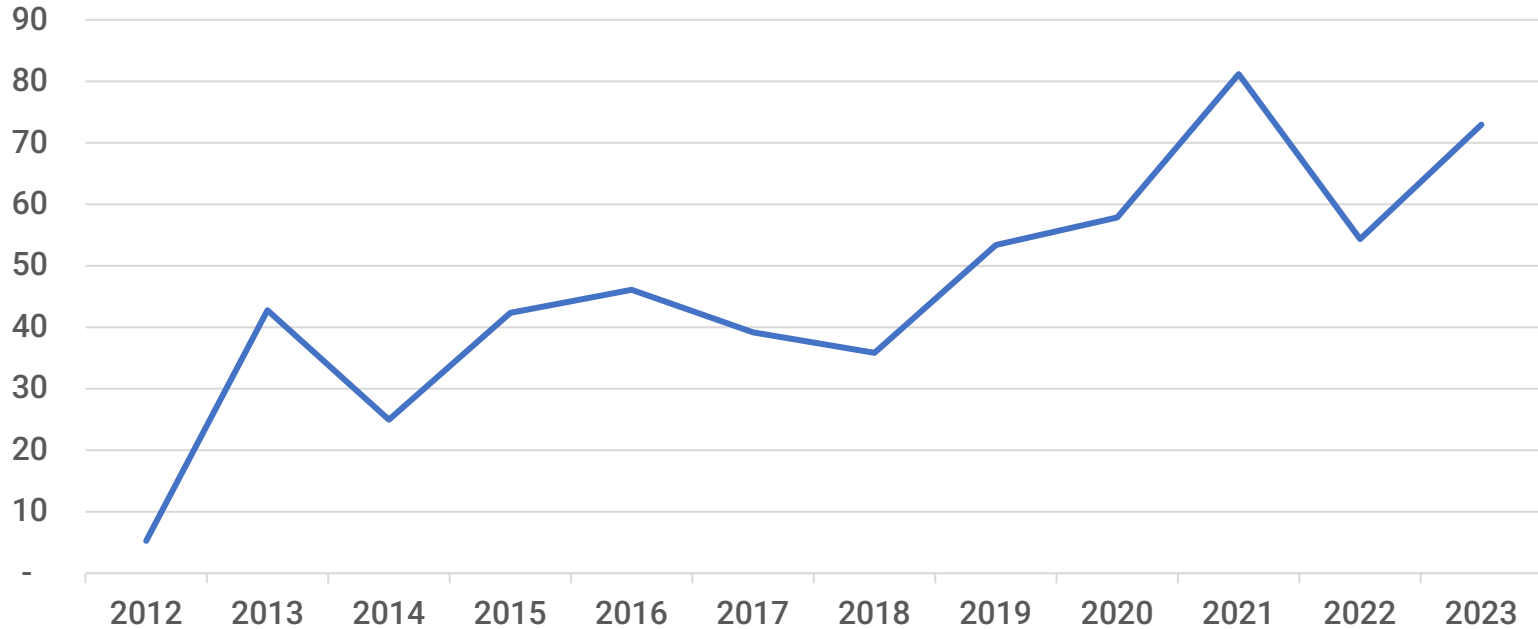


U.S. Renewable Diesel Production Capacity (billion gallons/year)

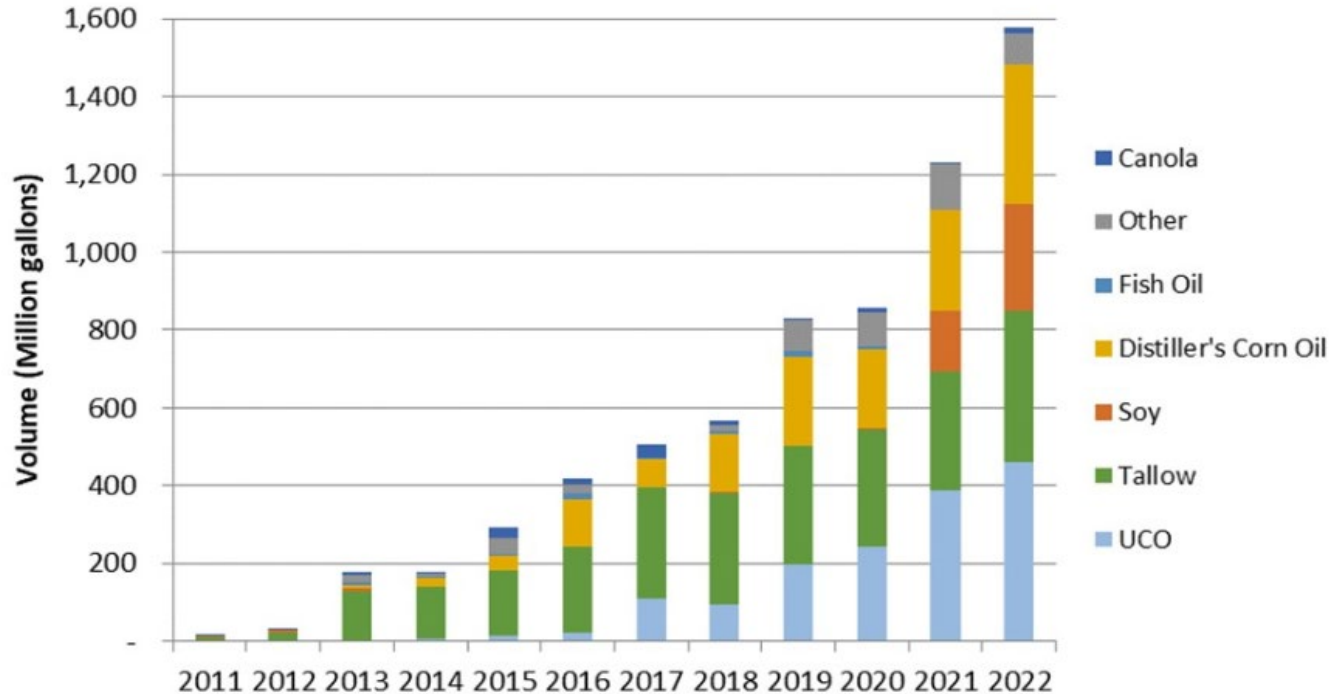


U.S. Renewable Diesel Imports

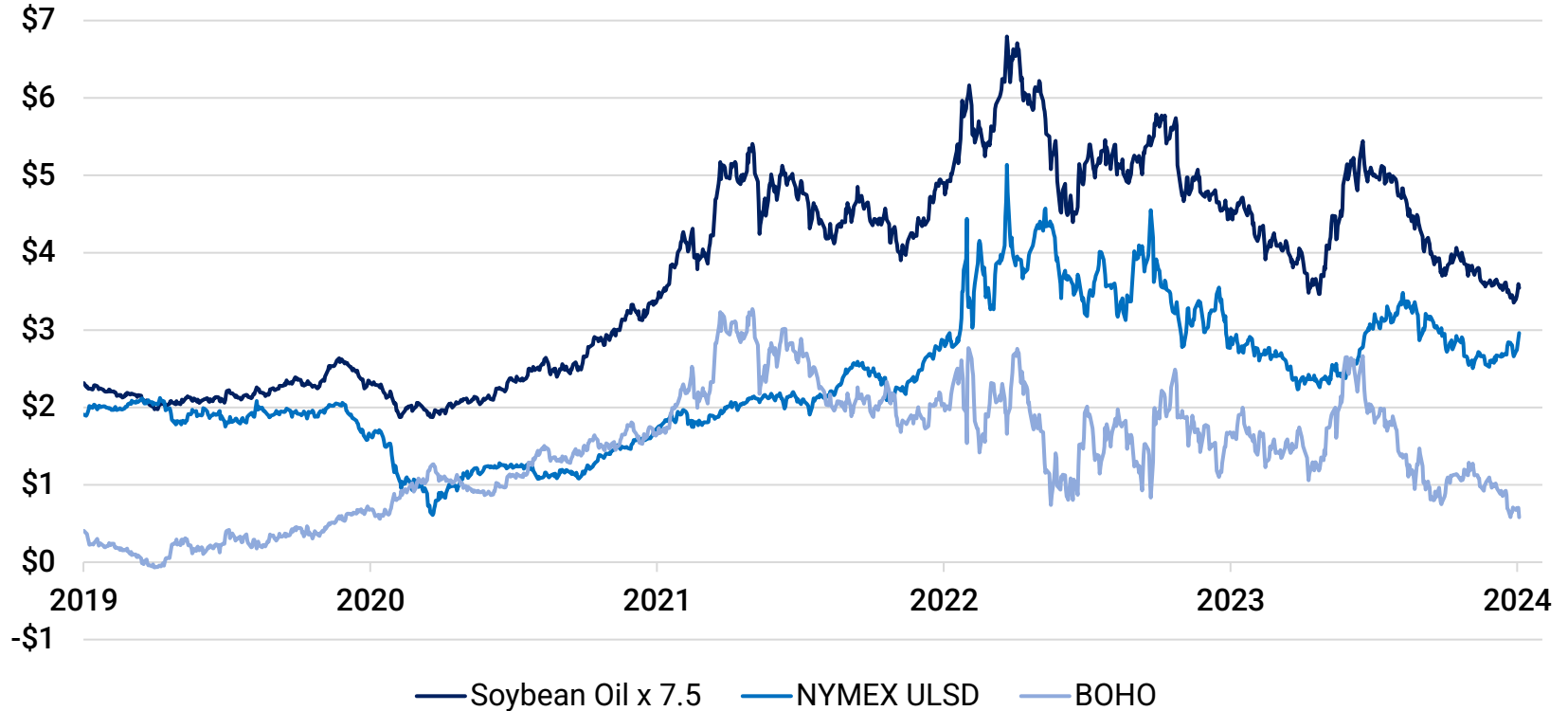
Renewable Diesel Imports
(million gallons)



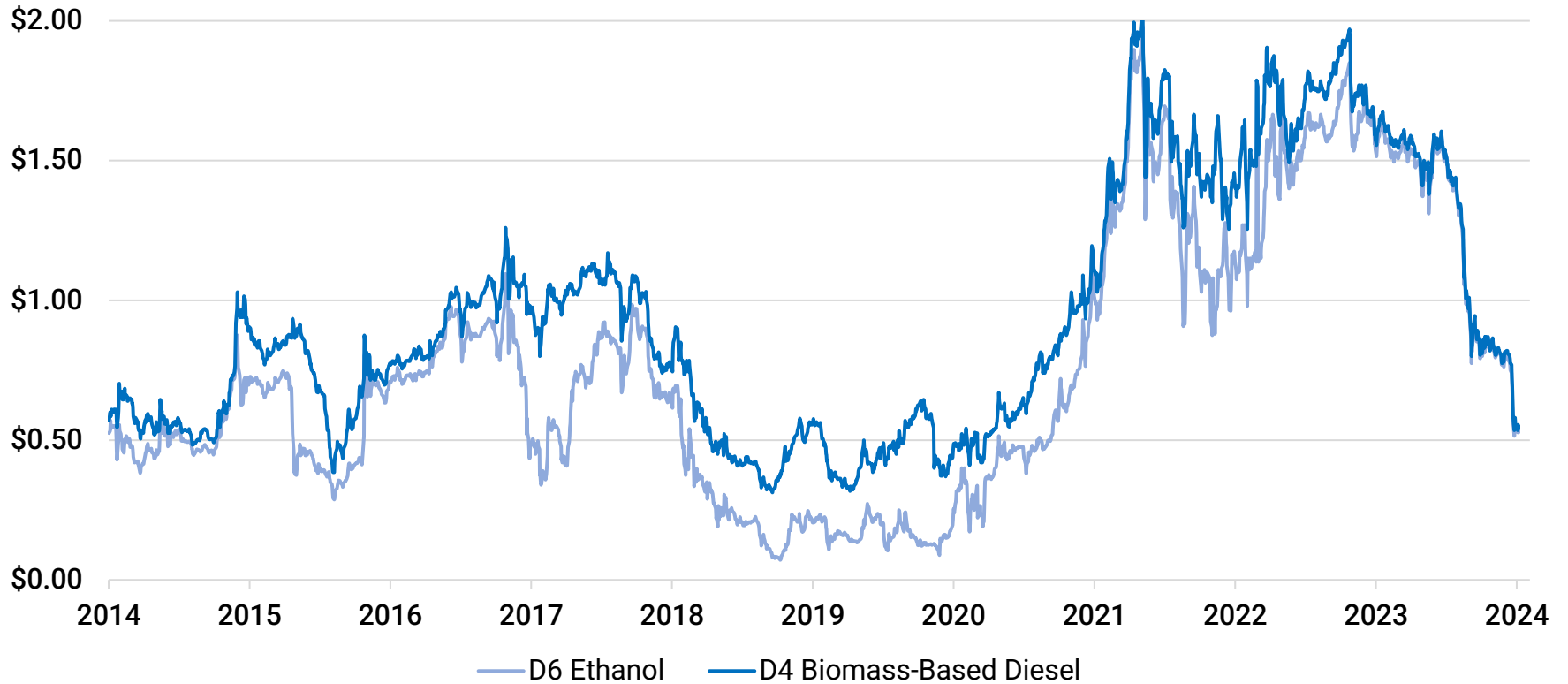
Feedstocks Used In Biomass-Based Diesel Production



Bean Oil Heating Oil (BOHO) Factor



OPIS RIN Assessments



OPIS Biofuels Deal Log Report

OPIS
A DOW JONES COMPANY

Biofuels Deal Log

Deals that Define the Market

9 February, 2024

OPIS U.S. RIN VALUES (cts/RIN)

PRODUCT	TIMING	PRICE	VOLUME (K)	NOTES
Ethanol	2023	51.00	4,000	
Ethanol	2023	51.00	500	
Ethanol	2023	50.00	500	
Ethanol	2024	52.50	500	
Ethanol	2024	52.50	500	
Ethanol	2024	52.00	500	
Ethanol	2024	53.00	500	
Ethanol	2024	53.00	500	
Ethanol	2024	52.50	500	
Ethanol	2024	52.50	500	
Ethanol	2024	53.00	500	
Ethanol	2024	52.50	500	
Ethanol	2024	53.00	500	
Ethanol	2024	52.50	500	
Ethanol	2024	53.00	500	
Ethanol	2024	53.00	500	
Ethanol	2024	53.00	500	
Ethanol	2024	53.50	500	
Ethanol	2024	53.50	500	
Ethanol	2024	53.50	500	
Ethanol	2024	52.50	500	
Ethanol	2024	52.50	500	
Ethanol	2024	53.50	500	
Ethanol	2024	53.50	500	
Ethanol	2024	53.00	1,500	
Ethanol	2024	53.00	1,000	
Ethanol	2024	53.50	500	
Ethanol	2024	53.00	1,000	
Ethanol	2024	52.50	500	
Cellulosic	2024	294.00	250	
Biodiesel	2024	53.00	500	
Biodiesel	2024	54.00	1,000	
Biodiesel	2024	54.00	500	
Biodiesel	2024	53.50	500	
Biodiesel	2024	54.00	500	
Biodiesel	2024	54.00	500	
Biodiesel	2024	53.00	500	

PRODUCT	TIMING	PRICE	VOLUME (K)
Ethanol	2023	51.00	4,000
Ethanol	2023	51.00	500
Ethanol	2023	50.00	500
Ethanol	2024	52.50	500
Ethanol	2024	53.50	500
Ethanol	2024	52.00	500
Ethanol	2024	53.00	500
Ethanol	2024	53.00	500
Ethanol	2024	52.50	500
Ethanol	2024	52.50	500
Ethanol	2024	53.00	500
Ethanol	2024	52.50	500
Ethanol	2024	53.00	500
Ethanol	2024	52.50	500
Ethanol	2024	53.00	500
Ethanol	2024	53.00	500
Ethanol	2024	53.00	500
Ethanol	2024	52.50	500
Ethanol	2024	53.00	500
Ethanol	2024	53.00	500
Ethanol	2024	53.50	500
Ethanol	2024	53.50	500
Ethanol	2024	52.50	500
Ethanol	2024	52.50	500



Biofuel Outright - D6 RINs (OPIS) Future

Contract Specifications

Description	A monthly cash settled future based on the OPIS daily assessment price for Physically Delivered D6 RINs for the Current Year.
Contract Symbol	RIN
Contract Size	50,000 RINs
Unit of Trading	Any multiple of 50,000 RINs
Currency	US Dollars and cents
Trading Price Quotation	One hundredth of one cent (\$0.0001) per RIN
Settlement Price Quotation	One hundredth of one cent (\$0.0001) per RIN
Minimum Price Fluctuation	One hundredth of one cent (\$0.0001) per RIN
Last Trading Day	Last business day of contract month

ICE FUTURES U.S.

Intercontinental Exchange (ICE) has futures instruments based on OPIS benchmark biofuels assessments:

- Current- and forward-year D6 ethanol RINs
- Current- and forward-year D4 biomass-based diesel RINs
- Current- and forward-year D3 cellulosic biofuel RINs
- Current- and forward-year D5 advanced biofuel RINs
- Renewable Volume Obligation (RVO)
- Low Carbon Fuel Standard (LCFS)

Sustainable Aviation Fuel



- SAF is a jet fuel **derived from biomass feedstocks**, including oils or animal fats.
- **Chemically similar to petroleum jet fuel** and **nearly identical** in its performance characteristics.
- **Meets ASTM specifications** for petroleum jet fuel and may be used in existing petroleum pipelines, storage tanks and engines.
- SAF is produced through various thermochemical processes such as **hydrotreating**, gasification and pyrolysis.
- It may be used in jet engines mixed/blended as a drop-in fuel.

SAF Growth Potential



California SAF Volumes	Million Gallons
2019	1.8
2020	4.6
2021	8.2
2022	11.6
2023 (through Q3)	15.8

- Global SAF production was about 160 million gal in 2023, up from about 79 million gal in 2022.
- Expected to approach 500 million gal in 2024, which would equal about 0.5% of global jet fuel demand.
- 43 airlines have committed to use about 4.3 billion gal in 2030.
- To achieve net-zero emissions by 2050, SAF production capacity needs to increase to about **118 billion gal/year**.
- Biden administration has set a goal of boosting U.S. SAF production to **3 billion gal/year by 2030** and **35 billion gal/year by 2050**.

OPIS Biofuels Daily Report

Export ▾

2024-02-01

Table of Contents ▾

RENEWABLE DIESEL

Spot Renewable Diesel Assessment [\$/gal]

Commentary

Location	Product	Low	High	Average
Los Angeles	RD 99%	2.1879	2.2679	2.22790
San Francisco	RD 99%	2.1879	2.2679	2.22790
Los Angeles	RD 100%	4.4719	4.5891	4.53050
San Francisco	RD 100%	4.4719	4.5891	4.53050
California	RD Carbon Intensity	0.0073	0.0074	0.00736

- ASTM D975 100% renewable diesel, made from a variety of feedstocks.
- L.A. and S.F. renewable diesel price assessments have a Carbon Intensity (CI) specification of a 37.93 CI proxy.
- The L.A. and S.F. renewable diesel 100% assessments include the LCFS credit, the \$1/gal federal tax credit and 1.7 D4 biomass-based diesel RINs.

OPIS Sustainable Aviation Fuel Pricing

OPIS Biofuels Daily Report

Export ▼

2024-02-01

SUSTAINABLE AVIATION FUEL

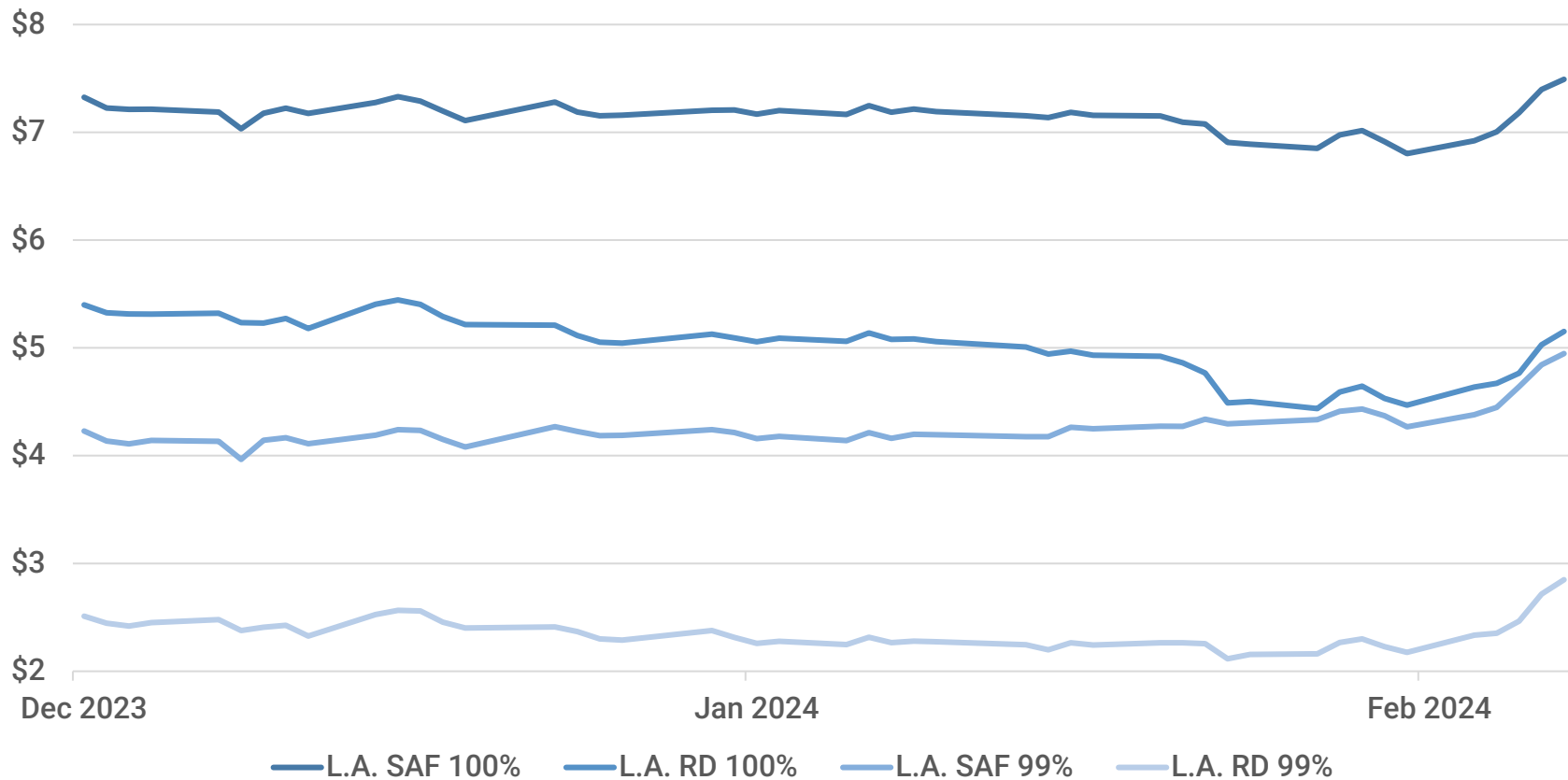
Spot Sustainable Aviation Fuel Assessment (\$/gal)

Commentary

Location	Product	Low	High	Average
Los Angeles	SAF 99%	3.7279	5.0129	4.37040
San Francisco	SAF 99%	3.7279	5.0129	4.37040
Los Angeles	SAF 100%	6.2533	7.5734	6.91335
San Francisco	SAF 100%	6.2533	7.5734	6.91335
California	SAF Carbon Intensity	0.0071	0.0072	0.00717

- ASTM D7566 100% renewable diesel, made from a variety of feedstocks.
- L.A. and S.F. SAF price assessments have a Carbon Intensity (CI) specification of a 38.68 CI proxy.
- The L.A. and S.F. SAF 100% assessments include the LCFS credit, the \$1.31/gal federal tax credit and 1.6 D4 biomass-based diesel RINs.

OPIS RD SAF Assessments



Upcoming OPIS Events



16th Annual OPIS RFS, RINs & Biofuels Forum

- September 23-25, 2024
- The Radisson Blu Aqua Hotel, Chicago, IL



13th Annual OPIS LCFS & Carbon Markets Workshop

- January 2025
- San Diego, CA

OPIS

A DOW JONES COMPANY

 | DOW JONES

Questions?

Jordan Godwin, OPIS Renewables Director

jgodwin@opisnet.com

ICE ID: jgodwin4