April 8, 2025

Biomass Based Diesel Volume Estimate for RVO 2026

This report provides background information and analysis to estimate Biomass Based Diesel Volume for the RFS RVO in 2026 and 2027. This industry has demonstrated that it can operate at an 80% utilization rate, and at our estimated end 2025 production capacity of 7.2 billion gallons (BG) translates into 5.75 BG per year of biodiesel and renewable diesel production to satisfy the Conventional, Advanced and Biomass Based Diesel categories. After allocating Biomass Based Diesel Renewable Identification Numbers to any Conventional and Advanced Biofuel category shortfalls, the Biomass Based Diesel volume for the RFS RVO 2026 can be increased from 3.35 BG in 2025 to 5.04 BG in 2026.

Increasing the utilization rate in either 2026 or 2027 to 85% producing 6.12 BG of Biomass Based Diesel annually leads to a 5.40 BG RVO. Increasing the capacity utilization to 90%, which may be achievable under the right conditions, could result in 6.48 BG of annual Biomass Based Diesel production which results in a 5.76 BG RVO.

The volume estimate relies on domestically produced biodiesel and renewable diesel. It does not account for imports or exports. The analysis sets aside the impacts of 45Z and focuses on domestic supply.

The volume estimate does not rely on any increase or decrease in the number of RINs available in the RIN bank at the end of 2025. The volume estimate accounts for the re-allocation of Biomass Based Diesel RINs to other biofuel categories to make up for any shortfall in those categories.

EIA Biodiesel Plant Capacity

The EIA publishes U.S. Biodiesel Capacity annually. The yearly August release provides capacity data as of January 1 of that year.
https://www.eia.gov/biofuels/biodiesel/capacity/

Table 1
EIA Biodiesel Production Capacity
Millions of Gallons

MMG	Jan 1, 2021	Jan 1, 2022	Jan 1, 2023	Jan 1, 2024
Biodiesel Capacity	2409	2255	2086	2090

The EIA has published monthly production capacity figures since January 2011.
https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=M_EPOORDB_8BDPC_NUS_MMGL&f=M

EIA Biodiesel Production

Annual Biodiesel production data from the EIA is shown in Table 2. Actual data is for 2021-2023, the February 2025 Short Term Energy Outlook (STEO) Forecast is used for 2024 and 2025. EPA EMTS data is shown for comparison.

EIA and EPA volumes may not exactly agree as some producers that are exporting products may not have generated RINs against those exports.

Table 2
EIA Annual Biodiesel Production

	2021	2022	2023	2024	2025
Production MBD	111	106	111	108	103
Production MMG	1700	1625	1700	1660	1580
EPA EMTS MMG	1697	1615	1660	1660	

Biodiesel Production Capacity Utilization

Using the EIA actual biodiesel production and the EIA monthly biodiesel production capacity to calculate the average capacity during the year, one can determine the capacity utilization. See Table 3.

Table 3
Biodiesel Production Capacity Utilization
Based on EIA Data

MMG	2021	2022	2023	2024
Production MMG	1700	1625	1700	1660
Capacity MMG	2408	2171	2081	2006
Utilization %	70	75	82	83

The closure of biodiesel plants since 2021 has resulted in less available capacity, but a higher utilization for those remaining in operation.

Renewable Diesel Plant Capacity

Since September 2021, the EIA has published an annual table of Renewable Diesel and Other Biofuel Plant Production Capacity. This includes production of Renewable diesel, renewable heating oil, renewable jet fuel, renewable naphtha, renewable gasoline, other biofuels, and bio intermediates. The EIA capacity figures are higher than the actual

Renewable Diesel production capacity figures cited by some companies, leading to some confusion when comparing figures from different sources.
https://www.eia.gov/biofuels/renewable/capacity/

For example, Darling Ingredients 2023 SEC 10-K states that its annual Renewable Diesel production capacity is approximately 1.2 BG. The EIA shows the Diamond Green Diesel (Darling-Valero Joint Venture) plant capacity as follows: Norco 982 MMG, Port Arthur 537 MMG for a total of 1.519 BG. https://d18rn0p25nwr6d.cloudfront.net/CIK-0000916540/a65cefc5-ccdd-4b24-960e-9277ce179233.pdf

Irrespective of the differences in reporting, the EIA data in Table 4 shows an increase in annual Renewable Diesel and Other Biofuel Plant Capacity.
https://www.eia.gov/biofuels/update/table1.pdf

Table 4
EIA Renewable Diesel and Other Biofuels Production Capacity
Millions of Gallons

MMG	Jan 1, 2021	Jan 1, 2022	Jan 1, 2023	Jan 1, 2024
RD+ Other Capacity	791	1750	3000	4328

Monthly U.S. Renewable Diesel and Other Biofuels Production Capacity is also available beginning with data from January 2021. Capacity had risen to 4580 MMG in September 2024 and remained there through the end of the year.
https://www.eia.gov/dnav/pet/pet_pnp_capbio_dcu_nus_m.htm

Note: According to the EPA EMTS system, Renewable Jet Fuel is reported as a Biomass Based Diesel D4 RIN, Renewable Heating Oil has both D4 and advanced D5 designations, and Renewable Naphtha and LPG are reported as advanced D5 RINs. In 2023 and 2024, Advanced Biofuel D5 RIN generation was 200 MM of which approximately half was due to Renewable Diesel production from co-processing. The other half is made up of renewable naphtha, renewable heating oil and some other smaller volumes of biofuels. This volume of RINS equates to approximately 160 MM physical gallons of advanced biofuel.

In its November 6, 2024, Edition, Farmdoc Daily (University of Illinois) estimated Renewable Diesel Production Capacity. For 2023, Farmdoc cites EIA data. The forecast for 2024-2026 cites several sources including Render and Biodiesel magazine, Argus, and other industry sources. Farmdoc estimates 2024 capacity at 5.120 BG, for 2025. Capacity is estimated at 5.2 BG in 2026.
https://farmdocdaily.illinois.edu/2024/11/updated-estimates-of-the-production-capacity-of-u-s-renewable-diesel-plants-through-2026.html

The following examples illustrate the difficulty in comparing data. Survey timings may be different and data sources used are not specifically identified. For example, Farmdoc

includes the Chevron Geismar expansion in 2024. According to Chevron Fourth Quarter Earnings call held January 31, 2025, the unit was still in the final commissioning stages.

Another example of data inconsistency: Farmdoc cites the capacity of the three HF Sinclair facilities as Wyoming Renewables Sinclair 117 MMG, Cheyenne 92 MMG and Artesia 141 MMG for a total of 350 MMG, yet HF Sinclair for a total of 350 MMG, yet the HF Sinclair website cites a renewable diesel capacity of 380 MMG. https://www.hfsinclair.com/sustainability/renewable-energy/

Lipow Oil Associates maintains a database similar to that of the EIA and Farmdoc, but different in that the capacity is based on Renewable Diesel production capacity (including those RD plants that have SAF capability). This database does not include renewable naphtha, heating oil or LPG production. The focus is on production that generates D4 Biomass Based Diesel RINs.

Comparison of Renewable Diesel Production Capacity Figures

In Table 5, the Lipow Oil Associates figures for Renewable Diesel production capacity along with an add on of 160 MMG for other advanced biofuels capacity are compared to the EIA and Farmdoc data.

Table 5
Comparison of Annual Production Capacity
Millions of Gallons

	End 2021	End 2022	End 2023	End 2024	End 2025
EIA	1751*	3000	4329	4580	
Farmdoc	1751**	3000	4329	5120	5200
Lipow #	1406	2629	4048	4892	5242
Lipow + 160 MM of D5 Capacity ##			4208	5052	5402

*The EIA data for end 2021 is the data reported for a survey as of January 1, 2022, etc.
** The Farmdoc data for End 2021-End 2023 is the EIA data
# The Lipow data is for RD only
An adjustment for other advanced biofuels is made to compare with EIA and Farmdoc

The figures are remarkably close. Once the EIA and Farmdoc update their data, greater convergence on 2024 production capacity between the sources is expected.

EIA Renewable Diesel and Other Biofuels Production

Annual Renewable Diesel and Other Biofuels production per the EIA data is in Table 6. The actual data is used for 2021-2023, the February 2025 Short Term Energy Outlook

Forecast is used for 2024 and 2025. EPA EMTS Renewable Diesel data, both D4 and D5 generation, is shown for comparison.

EIA and EPA volumes may not exactly agree as some producers that are exporting products may not have generated RINs against those exports.

Table 6
EIA Renewable Diesel and Other Biofuel Production

	2021	2022	2023	2024	2025
RD MBD	56	98	170	209	233
Other Biofuel MBD	5	13	19	22	41
Total MBD	61	111	189	231	274
RD MMG	858	1500	2610	3210	3572
Other Biofuel MMG	77	200	291	338	628
Total MMG	935	1700	2901	3548	4200
RD MMG EPA D4	782	1376	2351	3062	
RD MMG EPA D5	62	77	71	46	
RD MMG EPA Total	844	1453	2422	3108	

Renewable Diesel Production Capacity Utilization

Using the EIA actual Renewable Diesel and other advanced biofuel production and the EIA monthly biofuel production capacity to calculate the average capacity for the year, one can determine the capacity utilization in Table 7.

Table 7
Renewable Diesel Production Capacity Utilization
Based on EIA Data

MMG	2021	2022	2023	2024
Renewable Diesel	858	1500	2610	3210
Other Advanced	77	200	291	338
Total	935	1700	2901	3548
Capacity	986	2132	3544	4391*
Utilization %	95	80	82	81

Company Data

Several publicly traded companies have published their capacity figures as well as actual production figures from which one may determine capacity utilization. Larger facilities tend to operate at higher utilization. Lower utilization at smaller facilities may be due to poorer unit economics, i.e., they don't have economies of scale, scheduled maintenance or equipment limitations may prevent the facility from reaching full nameplate capacity.

As the industry becomes more familiar with the operating process, one would expect utilization to improve, assuming profitable economics.

Diamond Green Diesel

RD Production Capacity per 2023 SEC 10-K Page 9: 1.2 billion gallons per year
https://d18rn0p25nwr6d.cloudfront.net/CIK-0000916540/a65cefc5-ccdd-4b24-960e-9277ce179233.pdf

Actual RD Production is from the Interactive Analyst Center: 2023: 1246 MMG. 2024: 1253 MMG
https://vbench.virtuaresearch.com/IR/IAC/?Ticker=DAR&Exchange=NYSE#

Capacity Utilization: Approximately 104%

Phillips66

RD+SAF Production Capacity per News Release: Approx 50 MBD (800 MMG)
https://investor.phillips66.com/financial-information/news-releases/news-release-details/2024/Phillips-66-Achieves-Full-Production-Rates-of-Renewable-Fuel/default.aspx

Renewable Fuels Produced: 3Q 2024: 44 MBD, 4Q 2024 42 MBD.
https://s22.q4cdn.com/128149789/files/doc_financials/2024/q4/Phillips-66-4Q24-Earnings-RELEASE-FINAL-2.pdf

Capacity Utilization: Phillips66 was starting up its Rodeo expansion during the first half of 2024. Based on the last half of 2024 production figures, Phillips66 operated Rodeo at 86% utilization.

HF Sinclair

RD Production Capacity per website: 380 MMG
https://www.hfsinclair.com/sustainability/renewable-energy/

Sales Volumes per Quarterly Earnings Release: 2023: 214 MMG, 9 months 2024: 194 MMG https://s29.q4cdn.com/382181944/files/doc_news/HF-Sinclair-Corporation-Reports-2024-Third-Quarter-Results-and-Announces-Regular-Cash-Dividend-2024.pdf

Based on the reported sales volumes, HF Sinclair operated at 56% utilization in 2023 and at an annualized 68% in 2024.

Montana Renewables

RD Production Capacity per website 15 MBD (230 MMG)
https://montanarenewables.com/products/renewable-diesel/

Renewable Fuels Produced per Quarterly Earnings: 2023: 97 MMG, 9 months 2024 121 MMG.
https://www.prnewswire.com/news-releases/calumet-reports-third-quarter-2024-results-302299889.html

While the website indicates an annual nameplate production capacity of 230 MMG, statements at their earnings calls and their investor presentations indicate they will operate at an annual rate of 12 MBD or 183 MMG. The pretreater did not come on stream until April 2023, limiting production rates. Based on nameplate capacity, utilization in 2023 was 42%, rising to 70% for the first 9 months of 2024.

Analyzing the 2024 and 2025 RIN Bank Balances

Before estimating the Biomass Based Diesel volume for 2026, it is instructive to analyze the Renewable Fuel Standard and the RIN bank for 2024 and 2025.

Reported Fuel Obligation Volumes

Since 2020, the Actual Reported by Obligated Parties volumes have exceeded the Projected Gasoline plus Diesel Use estimated by the EPA in determining the RVO percentages. Table 8 contains data from EPA EMTS Renewable Volume Obligations Table 1, Estimated Versus Actual Gasoline and Diesel Volume Reported by Obligated Parties.

Based on this bias and using the EIA Short Term Energy Outlook of February 11, 2025, Lipow Oil Associates has estimated the volume of fuel that obligated parties will report in 2024 and 2025.

Table 8
Projected versus Actual Fuel Volumes
Based on STEO of February 11, 2025

Year	Projected Gasoline & Diesel Use BG	Actual Reported by Obligated Parties BG
2025	170.03	180.25 est.
2024	172.34	178.17 est.
2023	175.10	180.88
2022	178.00	179.70
2021	168.38	177.00
2020	158.27	167.40
2019	180.40	187.32

The RINs required for compliance in 2024 will be nearly 3.38% higher and the RINs required for compliance in 2025 will be 6.0% higher than the volumes published in the EPA Final Rule.

The RFS and RIN Bank 2024

The RINs required for compliance in 2024 are 22.27 BG compared to the 21.54 BG in the Final Rule. Using the data from the EMTS, one can then calculate the change in the RIN bank balance in 2024 due to the reported fuels volume. The overall balance is presented in Table 9.

Table 9
RIN Bank Balance 2024
Billions of RINs

Billions of RINs	Conventional Biofuels D6	Advanced Biofuels D3+D4+D5
RIN Generation	+14.894	+10.326
RINs Required for Reported Fuels	-15.50	-6.76
RINs Retired for Exports	-0.506	-1.018
RINs Retired for Other	-0.017	-0.021
Build or Draw for Reported Fuel Obligation	-1.173	+2.518

The D6 RIN bank drew as the industry did not blend sufficient quantities of corn based ethanol to meet the requirement. The surplus D4 RINs generated from the production of Biomass Based Biesel will be used to meet D6 compliance.

Analyzing the specifics of the Advanced Biofuel category is a bit more difficult due to the nested nature of the Biomass Based Diesel and Cellulosic Biofuel categories. The following calculation in Table 10 determines how much of the undifferentiated Advanced Biofuel requirement was met with Biomass Based Diesel RIN generation, i.e., using D4 RINs for D5 compliance.

Note: On December 12, 2024, the EPA issued a Proposed Rule for the Partial Waiver of the Cellulosic Biofuel Volume Requirement reducing the volume from 1.09 BG to 0.88 BG. That reduction, albeit still proposed, is reflected in the table.

Table 10
Advanced RIN Bank Balance 2024
Original RVO versus Required for Compliance

Billions of RINs	Original RVO	RINs Required
Advanced RINs	6.54	6.77
BBD 3.04 x 1.6	4.86	5.02
Cellulosic 1.09 minus 0.21	0.88	0.91
Undifferentiated	0.80	0.84
Net D5 RIN Generation		0.20
BBD D4 RINS used for D5		0.64
BBD Physical gallons at 1.6		0.40

In 2024, approximately 400 MMG physical gallons of BBD will be used to meet the undifferentiated advanced biofuel requirement.

The RFS and RIN Bank 2025

The RIN bank balance for 2025 is shown in Table 11. The RINs required for compliance in 2025 are 23.32 BG compared to the 22.33 BG in the Final Rule.as the estimated reported volumes are 6.0% higher than the EPA forecast used in the Final Rule.

The basis for determining the RIN bank balance for 2025 is the Short Term Energy Outlook of February 11, 2025.

Table 11
RIN Bank Balance 2025
Billions of RINs

Billions of RINs	Conventional Biofuels D6	Advanced Biofuels D3+D4+D5
RIN Generation from Ethanol 929 MBD	+14.24	
RIN Generation from Biodiesel 101 MBD		+2.32
RIN Generation from RD 250 MBD		+6.52
RIN Retirement from RD Exports of 35 MBD#		-0.91
RIN Generation from Other Biofuels*		+0.76
RIN Generation from Cellulosic Biofuels**		+1.38
RINs Required for Compliance	-15.90	-7.77
Build or Draw for Reported Fuel Obligation	-1.66	+2.30

Effective April 8, 2025, the EIA will account for RD exports in the Short Term Energy Outlook, reducing the consumption figure cited above by an estimated 35 MBD.

*Using STEO 638 MMG physical gallons and assuming 200 MMG has an equivalence factor of 1.6 for SAF and renewable heating oil gives a total RIN contribution of 760 MMG.

** Assumes Industry produces 1.38 BG of cellulosic per the Final Rule.

The 2025 RIN bank is anticipated to build 640 MMG. Similar to 2024, Biomass Based Diesel RIN generation will be needed to meet the D6 compliance. Some Biomass Based Diesel will be needed to meet the undifferentiated advanced biofuel requirement. The calculation to determine the amount of D4 RINs required for D5 compliance is in Table 12.

Table 12
Advanced RIN Bank Balance 2025
Original RVO versus Required for Compliance

Billions of RINs	Original RVO	RINs Required
Advanced RINs	7.33	7.77
BBD 3.35 x 1.6	5.36	5.68
Cellulosic 1.38	1.38	1.46
Undifferentiated	0.59	0.63
Net D5 RIN Generation		0.76
BBD D4 RINS used for D5		0
BBD Physical gallons at 1.6		0

Surprisingly, the undifferentiated volume can be completely met with the other biofuel production in Table 11, data which came from the EIA estimate of Other Biofuels in February 11, 2025, Short Term Energy Outlook. If this figure changes, so will the estimate of D4 RINs required for D5 compliance, but as it stands today, there is no shortfall of D5 RINs to meet the undifferentiated volume requirement.

Estimating the Domestic Biomass Based Diesel Volume for 2026

Based on the foregoing analysis, Lipow Oil Associates, LLC calculates a Biomass Based Diesel volume increase of 1.69 BG from 2025 levels to 5.04 BG for the Biomass Based Diesel Renewable Fuel Standard for 2026. See the bottom line of Table 13.

The volume can be further increased by 0.36 MMG in 2027 to 5.40 MMG with an improvement in Biodiesel and Renewable Diesel utilization factors from 80% to 85%.

The volume estimate relies on domestically produced biodiesel and renewable diesel. It does not account for imports or exports. The analysis sets aside the impacts of 45Z and focuses on domestic supply.

The volume estimate does not rely on any increase or decrease in the number of RINs available in the RIN bank at the end of 2025. The volume estimate accounts for the re-allocation of Biomass Based Diesel RINs to other biofuel categories to make up any shortfall.

Table 13
Biomass Based Diesel Volume Estimate for RVO 2026
Billion Gallons

Item	Billion Gallons
Renewable Diesel Production Capacity#	5.20
Biodiesel Production Capacity#	2.00
RD RIN Production at 80% Utilization##	+7.07
BD RIN Production at 80% Utilization##	+2.40
D4 RINS for D5 Compliance*	-0.40
D4 RINs for D6 Compliance**	-0.80
RINs Available for BBD Category	8.27
Physical Gallons of BBD at 1.64##	5.04
Increase versus 2025 RVO of 3.35 BG	1.69

The estimate assumes that actual volumes reported by obligated parties are equal to the EPA projection. RINs required for compliance equal the Proposed RVOs for 2026.

#The volume estimate relies on domestically produced biodiesel and renewable diesel and does not account for imports or exports.

The utilization is estimated at 80% based on recent data. Renewable Diesel Equivalence Factor is 1.7, Biodiesel Equivalence Factor is 1.5, the volumetric blend of the two based on production is 1.64.

*Assumes BBD is used to meet 400 MMG of undifferentiated advanced biofuel RINs (2024: 640 MMG, 2025: 0 MMG)

** Assumes the Conventional Biofuel Category is set to 15.00 BG as in previous years.