Appendix 2. Analysis from Lipow Oil Associates on Projected Renewable Fuel Capacity, 2023-2025.

Company	Location	Feedstock	Dec 2019 Capacity	Dec 2020 Capacity	2021	2022	2023	2024	2025	Other	Cost	Comments
			MMG/YR	MMG/YR	MMG/YR	MMG/YR	MMG/YR	MMG/YR	MMG/YR	Proposed	\$/gallon	
Alabama												
Vertex	Saraland	soybean oil, corn oil, tallow, yellow wax, grease and UCO					215	215	215		0.55	Announced May 27, 2021 an \$85 MM hydrocracker conversion to 10 MBD by 4Q 2022 and 14 MBD by mid 2023. As of November 8, 2022, mechanical completion is 1Q 2023, start up is 2Q 2023 Cost now \$90-\$100MM. Idemitsu to take all of the RD product for 5 years. Pretreatment unit planned for Myrtle Grove LA
California												
Aemetis	Riverbank						45	45	90			Received CA Tax exmption Jan 2019 for cellulosic ethanol plant. Now RD and SAF. Plans to construct 90 MMG/yr plant in two phases: first phase in early 2023, second phase in 2025
Chevron	El Segundo				30	30	153	153	153			Announced March 3, 2020 plans to co-process bio-feed in the FCC later in 2020. Sept 26, 2022 Letter From EPA states 10%, not to exceed 20% which is about 7.5/15.0 MBD. As of August 2, 2021,plan to co process 10 MBD by end of 2021. As of Feb 28, 2022 presentation, plan to convert diesel hydrotreater by end 2022
												https://chevroncorp.gcs-web.com/static-files/20c2a7dc- e42f-4ada-991e-b36a5e224556
Global Clean Energy Holdings	Bakersfield	Veg Oil					150	220	220		2.70	Purchased the Delek refinery for \$40MM in May 2020 expected Jan 2022 start up. Retooling Cost of \$365 MM Offtake to multi national of 85 + 20 at buyers option. Backed by Orion Energy Partners, GCM Grosvener, Voya Investment Management. Delek has option to buy 33%. Exxon to take 5000 MB/yr for 5 years announced April 22, 2021. In April 2021 XOM said it will take 5000 MB per year. Capacity per website is 15 MBD. As of Novmber 14, 2022 SEC Filing, start up now delayed to 1H 2023 and may be limited to 12 MBD by hydrogen availability

Company	Location	Feedstock	Dec 2019 Capacity	Dec 2020 Capacity	2021	2022	2023	2024	2025	Other	Cost	Comments
Indaba Renewable Fuels California	Imperial	Veg Oil, greases, animal fat						100	100			Announced Jan 15, 2022. Predevelopment Jan 2022, Lance Capital Funding Jan 2022, Construction to begin Feb 2022, expected on line April-June 2024. Haldor Topsoe technology
Kern Oil Refining	Bakersfield		6	6	6	6	6	6	6			Co-processing tallow since 2014
Marathon/Neste	Martinez						735	735	735		2.72	Announced July 31, 2020 indefinite idling of refinery. On August 3, 2020 announced conversion to 48 MBD Renewable diesel. As of Feb 2021, expect 17 MBD end 2022 and the balance by end 2023. Total Capital Cost \$2 B. As of Nov 2022 expect Phase mechanically complete end 2022. Start up 1Q 2023. Phase 2 start up end 2023
PBF	Martinez									???		February 2020 Evaluating project to use idled equipment
Phillips66	Rodeo	UCO, fats, tallow, soybean oil			120	138	138	800	800		1.00	Announced in Nov 6, 2019 Investor Day presentation. Announced July 31, 2020 conversion of a hydrotreater to produce 9,000 B/D of RD by mid 2021. Announced Aug 12, 2020 shutting refinery , FID by 1Q 2022 at a cost of \$750-800 MM and will produce an additional 680 MMG by 1Q 2024. Began production Apr 2021 will ramp up to 9 MBD rates by 3Q 2021.
Vallery Green Fuels	Kern County									230		Company organized December 30, 2019. Plan was to be on stream 1H 2023
World Energy (Alt Air)	Paramount	Tallow/small amts of veg oil and animal fat	45	45	45	45	45	45	45	261	1.34	Announced Oct 24, 2018 plans to spend \$350 MM to expand to 306 MMG of which 150 MMG will be SAF. Permits out for public comment Sep 2021. Construction is expected to take about 2 years. Secured permits April 2022.
Illinois												

Company	Location	Feedstock	Dec 2019 Capacity	Dec 2020 Capacity	2021	2022	2023	2024	2025	Other	Cost	Comments
St Joseph Renewable Fuels	Newton									0	1.00	Proposed as early as Sept 2018 Announced May 12, 2020 plans to build \$400 MM plant. Backed by Lance Capital
lowa												
HOBO Renewable Diesel LLC (Multifuels 50%)	Waterloo								120			Website indicates 9.3 MBD Midwest project by 2Q 2025. HOBO has filing with Iowa Sec of State with Waterloo Registered Agent. Stonepeak (Evolve Transiition Infrastructure) investing \$600 MM in HOBO in Nov 2021 subject to tolling agreement
Readi-Fuels (Applied Research Associates/C&N Biofuels)	Hull	UCO/Corn Oil								34	1.71	Announced Feb 21, 2019 to construct new \$58 MM plant also producing renewable naphtha. Originally expected to begin construction in 2019 and be on stream 2021. Technology contract awarded to Chevron Lummus and ARA June 2021. Seeking \$80 MM fund raise as of Aug 2022
Kansas												
CVR	Coffeyville									125		Announced Nov 3, 2020 that it could convert a high pressure hydrotreater, pending succesful RD production at Wynnewood. RD 125, SAF 25. As of Jan 2022 Board approved completing process design
East Kansas Agri Energy	Garnett		3	3	3	3	3	3	3			Came on line in 2017
WB Services/Green Energy Products	Sedgwick											Operated a 3 MMG plant until they declared bankruptcy in 2016.
Seaboard Energy (High Plains Bioenergy)	Hugoton	animal fats, veg oils				85	85	85	85		4.12	Announced end April 2021 plans to convert idled cellulosic ethanol site by end 2021 to produce 85 RD and 8.5 naphtha. Equipment shipped to site in July 2021.  Cost \$350 MM per englobal.com websiter Dec 2021 video. On stream Feb 2022

Company	Location	Feedstock	Dec 2019 Capacity	Dec 2020 Capacity	2021	2022	2023	2024	2025	Other	Cost	Comments
Louisiana												
Diamond Green Diesel(Valero/Darling	Norco	Tallow, UCO, Corn Oil	275	290	690	690	690	690	690		2.75	began construction Oct 2011. Project cost \$330MM with a \$241MM DOE Loan Guarantee. Makes Renewable
International)												Diesel thru a UOP process. 125 MMG, \$190 MM.Expansion on stream Aug 2018. Approved 400 MMG RD plus 30 MMG renew naphtha expansion Nov 5, 2018 at a cost of \$1100M. began start up Oct 2021.
Emerald Biofuels	Plaquemine									85		Announced May 2012 to construct RD plant at Dow Chemical Plaquemine location. UOP Process
Greentech Materials, LLC	Baton Rouge	Soybean/Palm Oil								336-378	1.32- 1.49	Announced January 17, 2020 for possible \$500 MM plant on 164 acres in the Port of BR located west of the Genesis Energy terminal.
Gron Fuels/Fidelis New Energy	Baton Rouge	Soybean, Corn oil, Tallow								920	1.36	Announced Nov 10, 2020 to spend up to \$9.2 billion. First phase of 60 MBD for \$1.25 B on stream in 2025. FID expected in 2021. Received Air Permit April 2021. On Oct 25, 2021 was going to spend \$2.1 B to produce 46 MBD SAF, 14MBD RD. FID expected 1H 2022.
Louisiana Green Fuels/Strategic Biofuels	Port of Colombia, Caldwell Parish									32	87.50	Announced April 2021 to spend \$700 MM. Moving into engineering phase August 2021. FID planned for late 2022 would come on stream in 2025. Receivd LA approval Sept 2022 to issue \$1.1 B bonds. Total cost now \$2.8 B
PBF	Chalmette	Soybean oil, corn oil, fats					307	307	307		1.80	Announced Feb 11, 2021 potential project to convert idled hydrocracker and produce 15-20 MBD. On June 24, 2021 said it would cost \$550 MM. Selected Honeywell UOP Ecofining process. On April 28, 2022 said they had completed engineering and permitting, securced some long lead time equipment, expect 1H 23 start up
cl project	6 :		7-	00	00			2.12	2.12		2.22	D 1 10 12000 C
Chevron REGI Geismar	Geismar	High and Low Fatty acid feedstocks	75	90	90	90	90	340	340		3.30	Broke ground Oct 2008. Came on stream November 2010. In May 2018 REG said considerring spending \$660 MM to expand. On Oct 6, 2020 announced they would proceed with 250 MMG expansion with mechanical

Company	Location	Feedstock	Dec 2019 Capacity	Dec 2020 Capacity	2021	2022	2023	2024	2025	Other	Cost	Comments
												completion end 2023 and on line in 2024 at a cost of \$825 MM. Broke ground Oct 2021.
Shell	Convent	Veg Oil, Animal Fat							584		2.53	Per OPIS Story October 15, 2021, Shell considerring repurposing refinery. Confirmed by Shell Feb 24, 2022 in The Advocate. Filed Title V Air Permit modification August 31, 2022. Will produce RD, SAF and naphtha. Will process up to 6,000 tons per day= 584 MMG/yr. Cost \$1.48 B
Mississippi												
55 5 P.P												
JaxOn Energy	Jackson	Corn Oil		38	38	38	38	38	38			Constructed 2500 B/D plant in 2019
Missouri												
IVIISSOUTI												
Indaba Renewable Fuels California		Veg Oil, greases, animal fat								100		Announced Jan 15, 2022 in planning stages
Montana												
IVIOIILATIA												
Calumet	Great Falls	tallow, soybean oil				77	185	276	276		0.93	Announced February 16, 2021 potential project to convert hydrocracker to process 10 to 12 MBD feedstock. Began production Nov 5, 2022.Adding pretreater in 1Q 2023. Capacity is 15 MBD, will operate at 12 MBD. (9 RD, 2 SAF, 1 Naphtha). Can expand to 20 MBD capacity, 18 MBD (12 RD, 4 SAF, 1.5 RN) run rate in July 2024 increasing hydraulic capacity. Cost \$200MM Opex including transportation is 62 cpg from March 2021 presentation. Oaktree investing \$300 MM. Rail to PNW and CA is 8-12 cpg. Started up Sep 2022
Naharada												
Nebraska												
1												

Company	Location	Feedstock	Dec 2019 Capacity	Dec 2020 Capacity	2021	2022	2023	2024	2025	Other	Cost	Comments
Heartwell Renewables (Cargill/Musket JV)	Hastings	UCO, tallow, animal fat						80	80			Announced April 20, 2021 to come on stream Spring 2023. Let contract to Worley May 2022. Broke ground Nov 3, 2022 now expected on line summer 2024
Nevada												
ivevada												
Golden Gate Petroleum	McCarran									???		Announced Dec 17, 2018 5 MBD plant (there is a ULSD hydrotreater at this site built in 2016)
Ryze Renewables	Las Vegas	Waste streams of veg oils and animal fats		0	0	0	???	100	100		2.80	Announced Aug 27, 2018 construction Las Vegas 2020 cost is \$280 MM. 70% complete as of Oct 2020. Repurposing a biodiesel facility
New Rise Renewables Reno LLC (ex Encore D.E.C. LLC New Rise Renewables Reno)	Reno (McCarran)	Waste streams of veg oils and animal fats		0	0	0	44	44	44		6.97	Announced Aug 27, 2018 construction Reno is 2019 Cost \$150 MM. 95% complete as of Dec 2021. Pretreater is 30% complete as of Dec 2021. As of April 2022, entered ground and leaseback sale with Twain Financial Partners. Construction expected to be complete in Nov 2022 at a total cost of \$300 MM. According to Aug 10, 2022 Press release, they began opeartions
New Mexico												
Cetane Energy	Carlsbad		3	3	3	3	3	3	3			
Holly Frontier	Artesia	soybean oil and other feedstocks.				125	125	125	125		2.80	Announced May 31, 2019 adding new unit. Filed Public Notice on July 2, 2019 with NMDEQ. Proceeding with project as of Nov 2019 at a cost of \$350 MM. On stream 2Q 2022. Pre-treatment unit on stream 1Q 2022
North Dakota												

Company	Location	Feedstock	Dec 2019 Capacity	Dec 2020 Capacity	2021	2022	2023	2024	2025	Other	Cost	Comments
AIC Energy	Trenton	soybean and canola oil								100		Announced June 2021 to construct plant near Savage Trenton rail port. Filed conditional use application permit April 2021
Marathon	Dickinson	Refined Soybean oil 80%, corn oil 20%		185	185	185	185	185	185		2.53	Announced Aug 2018 Converting refinery to 12 MBD renewable diesel expected on line late 2020. Capital Cost = \$455 MM. Starting up Nov 2020. Achieved 90% of design capacity in 1Q 2021. achieved full capacity in 2Q 2021
Ohio												
SG Preston	Van Wert									120	3.33	Announced August 2014 a \$400 MM RD project to be completed 2017. As of Feb 2022, still not constructed
Oklahoma												
CVR	Wynnewood	soybean oil, corn oil				100	100	100	100		1.10	Announced May 7, 2020 looking at potential project at its refineries utilizing excess hydrogen and equipment. Project approved Dec 2020 to spend \$110MM. On stream April 20, 2022. Converting hydrocracker. As of August 8, 2022 \$60 MM pre treater to be in service 2H 2023. July 3.6 MBD, 3Q 4.65 MBD
Oregon												
Red Rock Biofuels	Lakeview	wood waste cellulosic process					16	16	16		20.00	Broke ground July 2018 with completion expected April 2021. As of June 2021 construction halted due to lack of funds and may not recommence until 2023. Produces jet and dsl. Shell will take the product and market it.Cost is \$320 MM
Next Renewable Fuels (Waterside Energy Development)	Clatskanie (Port Westward)	UCO. Tallow, seed oil, soy oil, fish oil								575 up to 750	3.33	Announced \$1100 MM project in 2016. Announced Feb 2019 will sell volumes to Shell and others. Plant to come on line in 2021. BP to supply feedstock. Raising \$1.5 Billion as of April 2020. Cost estimate rose to \$2 B in June 2021. As of Sept 2021, Oregon DEQ held a public engagement session for comments on the permit. As of Sept 28, 2022, cost is \$2.5B. Expected permitting to complete in 2023 and on stream 2025.

Company	Location	Feedstock	Dec 2019 Capacity	Dec 2020 Capacity	2021	2022	2023	2024	2025	Other	Cost	Comments
												https://www.oregon.gov/deq/Programs/Pages/NEXT- Renewable-Fuels.aspx
Riverside Renewables	Clatskanie											Project moved from Cowlitz County, Washington
Pennsylvania												
Delta	Trainer					24	24	24	24			Co-Processing in a distillate hydrotreater beginning August 2022 per June 2022 DEP letter
Texas												
Diamond Green Diesel(Valero/Darling International)	Port Arthur					470	470	470	470		3.09	Announced Sept 9, 2019 cost study for 400 MMG/yr plant coming on line in 2024. Project approved at a cost of \$1.45 B Jan 28, 2021 to come on line 1H 2023. Will produce 50 MMG renew naphtha. On stream Nov 2022
Emerald Biofuels	Port Arthur	Veg Oil, greases, animal fat								105	3.15	Filed TCEQ Permit 134821 in 2015 updated July 2021. Location is at GT Omniport 1998 highway 73. so may be the same as Steamboat. Will produce 105 RD and 20 other. Cost of \$315 MM. UOP Ecofining process. As of Jan 2022 construction start pushed back to summer 2022
Steamboat Biofuels	Port Arthur	corn oil, soyoil, grease								80		Filed TCEQ Permit 157861 Sept 2019. Location at GT Omniport 1998 Highway 73. Feedstock Capacity is 6500 B/D, assumed 80% renewable diesel Haldor Topsoe technology
Steamboat Fuels	La Porte									80		Filed TCEQ Permit April 2020 for new facility. RN 111029104 Permit 161051. Feedstock capacity = 6500 B/D assumed 80% renewable diesel
Washington												

Company	Location	Feedstock	Dec 2019 Capacity	Dec 2020 Capacity	2021	2022	2023	2024	2025	Other	Cost	Comments
ВР	Cherry Point	tallow, soybean oil	44	44	44	109	109	109	109		0.52	Production based on Whatcom County June 3, 2021 letter. Hydrotreater #3 DHDS coprocessing. Announced Oct 4, 2021 project to increase production to 109 MMg/yr sometime in 2022 at a cost of \$45. Expansion on stream November 2022.
Par Pacific	Tacoma	soybean oil					34	34	34			Announced May 5, 2022 investor presentation co- processing project to be on line early 2023. 2250 B/D soybean oil feed
Phillips66/REG	Ferndale	animal fat, UCO, veg oil, grease			xxx	XXX	XXX	xxx	xxx	xxx		Announced Nov 1, 2018 plans to build a 250 MMG plant coming on line 2021. Canceled Jan 21, 2020
Riverside Renewables	Cowlitz County									xxx	3.33	Announced May 2017 plan to invest \$500 MM to construct 150 MMG plant. Project subsequently shelved and moved to Clatskanie Oregon
)A/ :												
Wyoming												
HollyFrontier	Cheyenne					90	90	90	90		1.67	Announced June 1, 2020. Repurpose existing equipment at a cost of \$125-175 MM. Announced Nov 3, 2021 was to be mechanically complete by weekend. Was on stream as of Feb 2022. Pretreatment construction suspended to 2023
Sinclair (Wyoming Renewable Diesel)	Rawlings	Animal Fat/Soybean Oil	92	92	92	153	153	153	153			Built unit in 2018 to process 7500 B/D RBD soybean oil = 115 MMG/yr adding feed pretreatment in 2022. Per HFC acquisition, unit was recently expanded to 10 MBD
Slate Refinng/Starwood Energy Group	Douglas									100		Announced August 17, 2021 to convert exsting refinery to 100 MMG/yr renewable fuels plant

Company	Location	Feedstock	Dec 2019 Capacity	Dec 2020 Capacity	2021	2022	2023	2024	2025	Other	Cost	Comments
Total End of Year USA Capacity MMG/yr			543	796	1346	2461	4238	5591	6340	2272		
Neste	Singapore	UCO/Waste Residue	325	325	325	325	715	715	715			Announced Dec 12, 2017 expansion from 1.3 to 2.6 MMT/yr to come on line in mid 2022. Announced Aug 2020 expansion delayed to 1Q 2023. As of Dec 15, 2022 new start up date March 2023
	Rotterdam	UCO/Waste Residue	325	325	325	325	325	325	325			Announced June 27, 2022 expansion from 1.4 to 2.7 MMT/yr to come on line 1H 2026 at a cost of EUR 1.9 billion. Of the 2.7 capacity, 1.2 will be SAF
	Porvoo	UCO/Waste Residue	190	190	190	190	190	190	190			
	Debottleneck		100	100	100	200	200	200	200			Announced further de-bottlenking project expected on stream in 2022
Total End of Year Neste Capacity MMG/yr			940	940	940	1040	1430	1430	1430			
Canada												
Cielo Waste Solutions	Aldershyde, AB	Wood Waste		0.4	0.4	0.4	0.4	0.4				On Stream as of Jan 2020
Cielo Waste Solutions	Halifax, NS										4.17	Announced Jan 9, 2020 to construct approx 9 MMG/yr at a cost of \$50MM
	Grande Paririe											Announced Jan 2020 JV with Renewable U Energy
	Dunmore (Medicine Hat)									23.1	4.30	Announced Nov 2019. JV with Renewable U Medicine Hat at a cost of CAD \$50 MM to produce 8.6 MMG/yr. In Nov 2020 announced expanding to 10,000 liters per hour

Company	Location	Feedstock	Dec 2019 Capacity	Dec 2020 Capacity	2021	2022	2023	2024	2025	Other	Cost	Comments
	Lethbridge											Announced July 2019 JV with Renewable U Lethbridge Inc
	Calgary											
	Winnepeg											Announced March 2021 JV with Renewable U Energy Inc
	Kamloops											Announced March 2021 JV with Renewable U Energy Inc
	Ft Saskatchewan									26.4	4.51	Announced May 2021, three trains, total cost \$119 MM
Parkland	Burnaby, BC				23	46	46	46	46	77		Coprocessing 1500 B/D canola and animal fat in 2021 at the FCU. Coprocessing 3 MBD in 2022 with plans to double. plan to build new RD unit to come on line in 2026 adding another 5 MBD capacity. FID in 2023
Forge Hydrocarbon Corp	Sombra, Ontario	waste fats and oils				7.5	7.5	7.5	7.5		3.00	Announced Feb 27, 2020. Received an equity investment from Shell Ventures and Valent Low Carbon Technologies to build CAD \$30MM plant
Braya Renewable Fuels (Cresta Fund Management)	Come-By Chance NF						215	215	215			Cresta reported Feb 2021. Will produce 14 MBD. expected to be on line August 2022. ultmate expansion plans to 35 MBD including SAF. Total RD+SAF initially 260 MMG
Tidewater Midstream	Prince George BC	Tallow, Animal Fat, UCO, Canola, Soybean Oil					45	45	45		3.75	Announced March 11, 2021 considerring project to construct 3 MBD facility to come on line in 2023. Capital Cost C\$225 Million
Imperial Oil	Strathcona, Edmonton		Local Vegoils					307	307			Announced Aug 25, 2021 construction of new 20 MBD facility to come on stream in 2024

Company	Location	Feedstock	Dec 2019 Capacity	Dec 2020 Capacity	2021	2022	2023	2024	2025	Other	Cost	Comments
Federated Co-Op Ltd (FCL)	Regina, Saskatchewan		Canola							230		First announced March 2021 by True North who was aquired by FCL. FCL announced Jan 17, 2022 project to produced 15 MBD coming on stream in 2027. Will use Haldor Topsoe technology
Covenant Energy Ltd	Estevan Saskatchewan		Canola							80		Announced March 2021, Haldor Topsoe technology. Target on stream 2H 2023
Refuel Energy	Toronto Area		Waste Fats, oils, greases						46			Announced April 19, 2022. FID in 2023 and if approved on stream 2025. Haldor Topsoe Technology
Total End of Year Canada Capacity MMG/yr				0.4	23.4	53.9	313.9	620.9	666.5	436.5		