What's the Future for HVO??

(…or "RD" in the US)

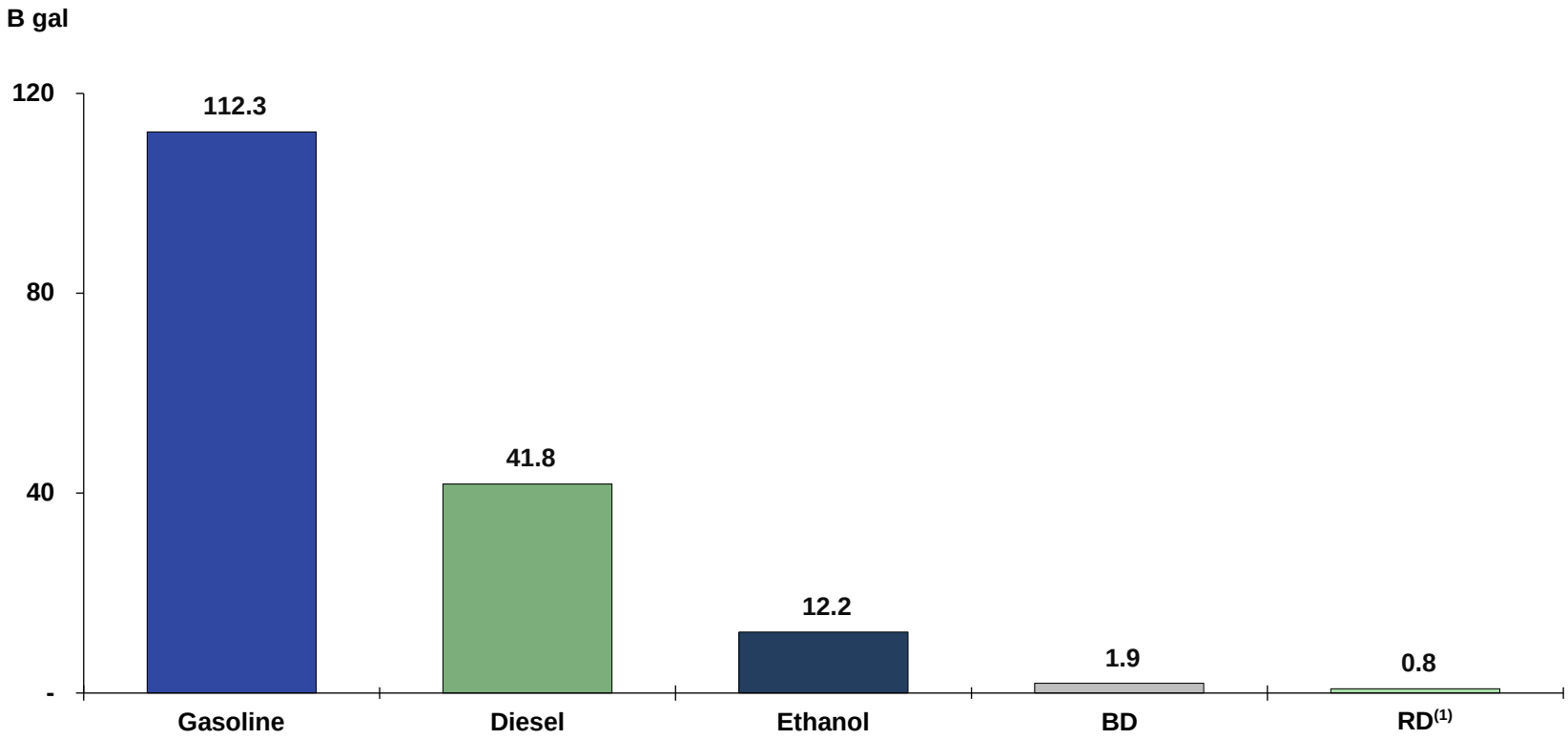
Overview of US Renewable Diesel (RD)

- **Construction boom**
- **Economics**
- **Policies**
- **Feedstocks**
- **Consequences**

RD in Perspective

Renewable fuels are still a small part of the fuel market.

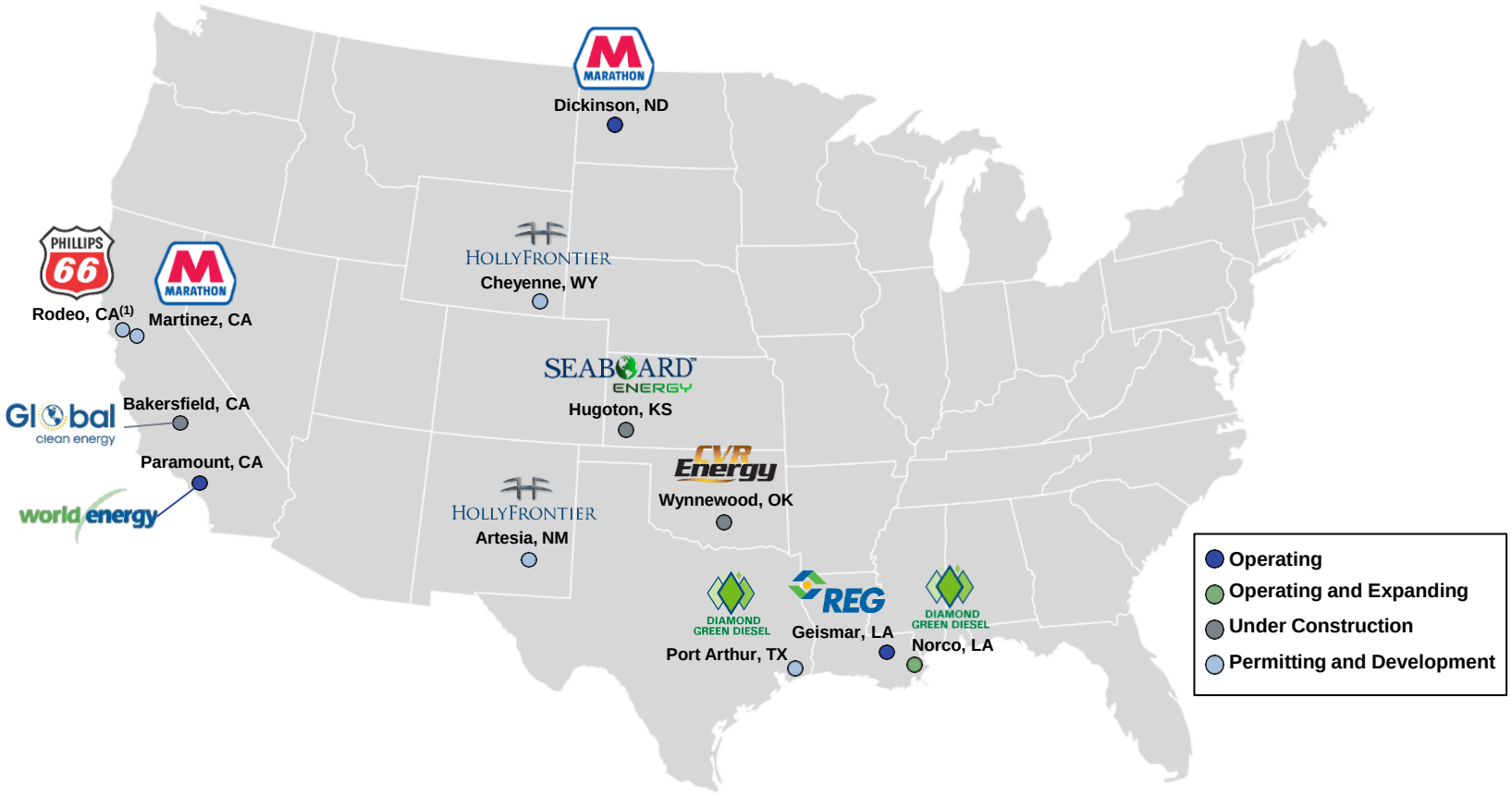
2020 US Transportation Fuel Consumption



Source: EIA, EPA.
Note: Transportation sector includes all road vehicles, airplanes, trains and ships. RD consumption data is based on RFS RIN data from EPA and imports data from EIA which was used as a proxy for consumption.
(1) RD imports are sourced exclusively from Singapore (Neste) and comprised 34% of total RD consumption.

RD Plants

Twelve plants are operating or making rapid progress.



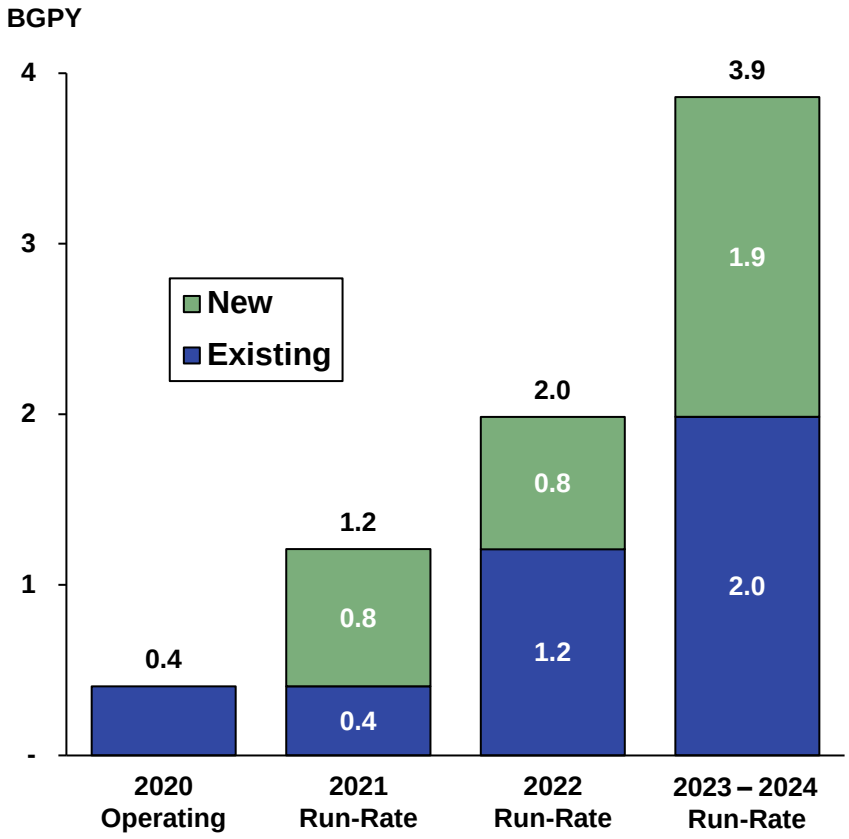
By 2024, these 12 plants will have 3.9 BGPY of production capacity.

(1) First phase is operational. Second phase for 680 MGPY pending County EIR.

Construction Boom

Capacity will quintuple from 400 MGPY to 2 BGPY by 2022 – another 2 BGPY by 2024.

RD Plants: 2020 – 2024



Source: Company filings and press releases, OP research and analysis.
Note: Does not include co-processing by any other refineries.

More Than Announcements

- The 2021-2022 projects have a high probability of completion – either under construction or in final stages. All are funded from balance sheets.
- In 2023-2024, DGD III is almost certain. REG is fully funded. P66 and Marathon projects are subject to permitting.

Magnitude of Change

- In roughly 18 months, the market should expect:
  - 1.6B incremental gallons of RD
  - 2.7B D4 RINs
  - 12B+ lbs of additional feedstock required for full capacity
  - Seismic shifts in related markets

Other Potential Projects

Numerous announced projects, totaling 3+ BGPY. The status of these projects is unclear from public information.

CVR Energy
Coffeyville, KS[(1)]

GRÖN FUELS, LLC
(920 MGPY)
Baton Rouge, LA

NEXT Renewable Fuels, Inc.
(600 MGPY)
Clatskanie, OR

GREEN TECH
(336 MGPY)
Baton Rouge, LA

PBF Energy
(307 MGPY)
Chalmette, LA

world energy
(260 MGPY)
Paramount, CA

CALUMET SPECIALTY PRODUCTS PARTNERS, L.P.
(153 MGPY)
Great Falls, MT

Ryze RENEWABLES
(100 MGPY)
Las Vegas, NV

St. Joseph renewable fuels
(90 MGPY)
Newton, IL

Love's Cargill
(80 MGPY)
Hastings, NE

ReadiFuels
(34 MGPY)
Hull, IA

Louisiana Green Fuels LLC
(32 MGPY)
Columbia, LA

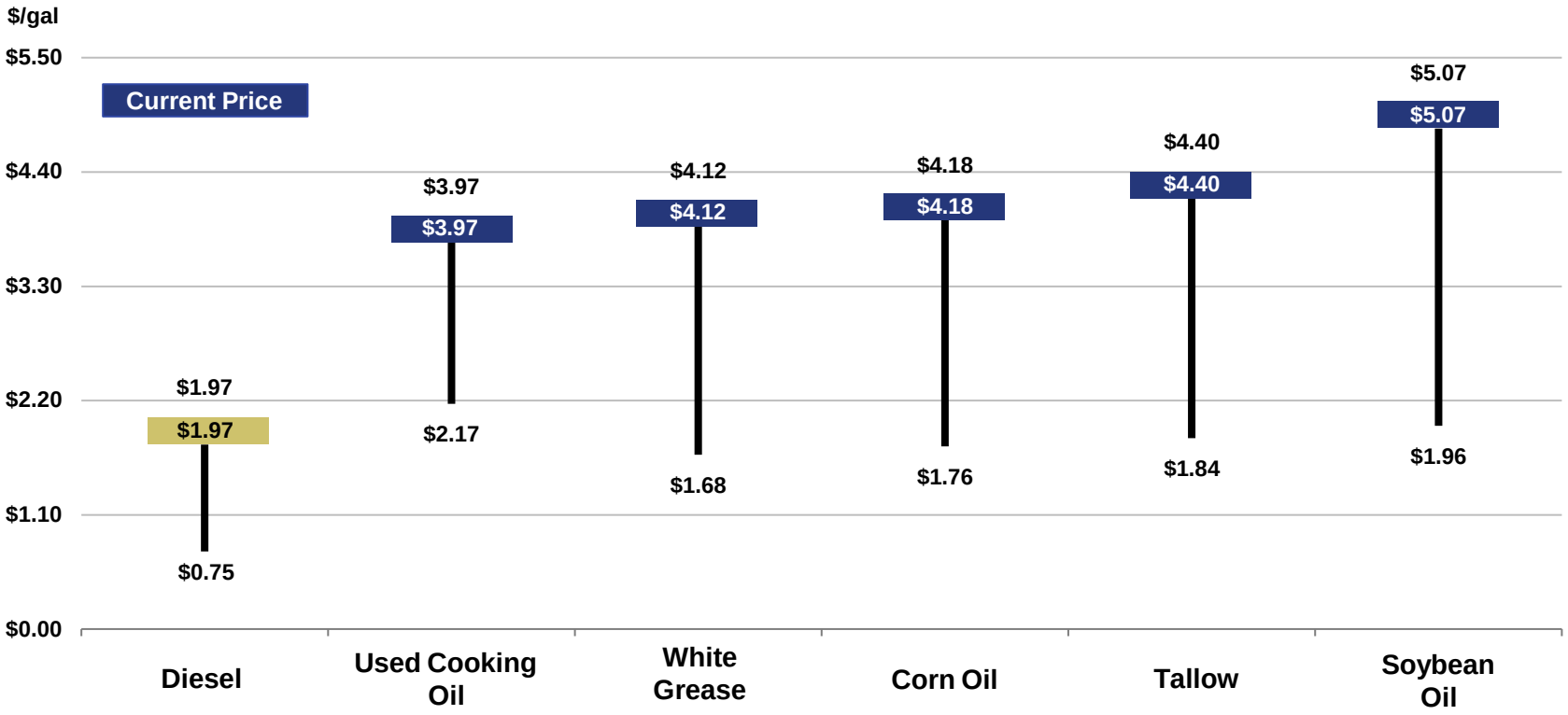
To the extent any of these projects are successfully completed, it will only amplify the market forces that the initial wave of RD plants initiate.

Source: Company filings and press releases, OP research and analysis.
(1) Potential capacity has not been disclosed.

Economics – Feedstock Costs

Feedstocks are expensive – costing 2x – 2.5x as much as diesel.

Feedstock Costs vs. Diesel Prices – Per Gallon



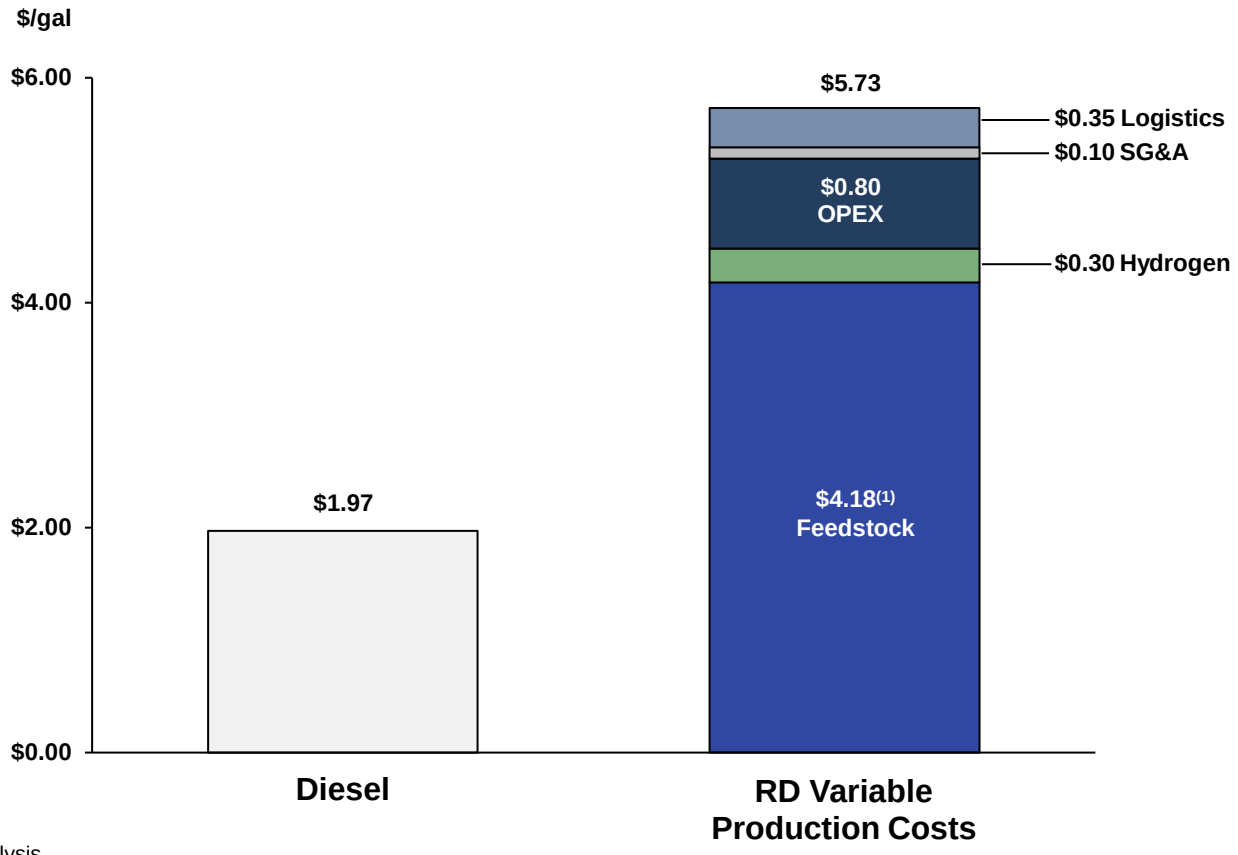
Finished Product	Feedstock Costs for RD				
$/lbs	$0.47	$0.52	$0.51	$0.55	$0.68

Source: Jacobsen, EIA, USDA, OP research and analysis.
Note: Current prices as of May 14, 2021. Based on conversion of 8.5 lbs/gal for UCO, 7.5 lbs/gal for SBO, 8.0 lbs/gal for White Grease/Tallow and 8.2 lbs/gal for Corn Oil.

Economics – Production Costs

After adding production costs, RD costs almost 3x diesel.

Diesel Price and RD Production Costs

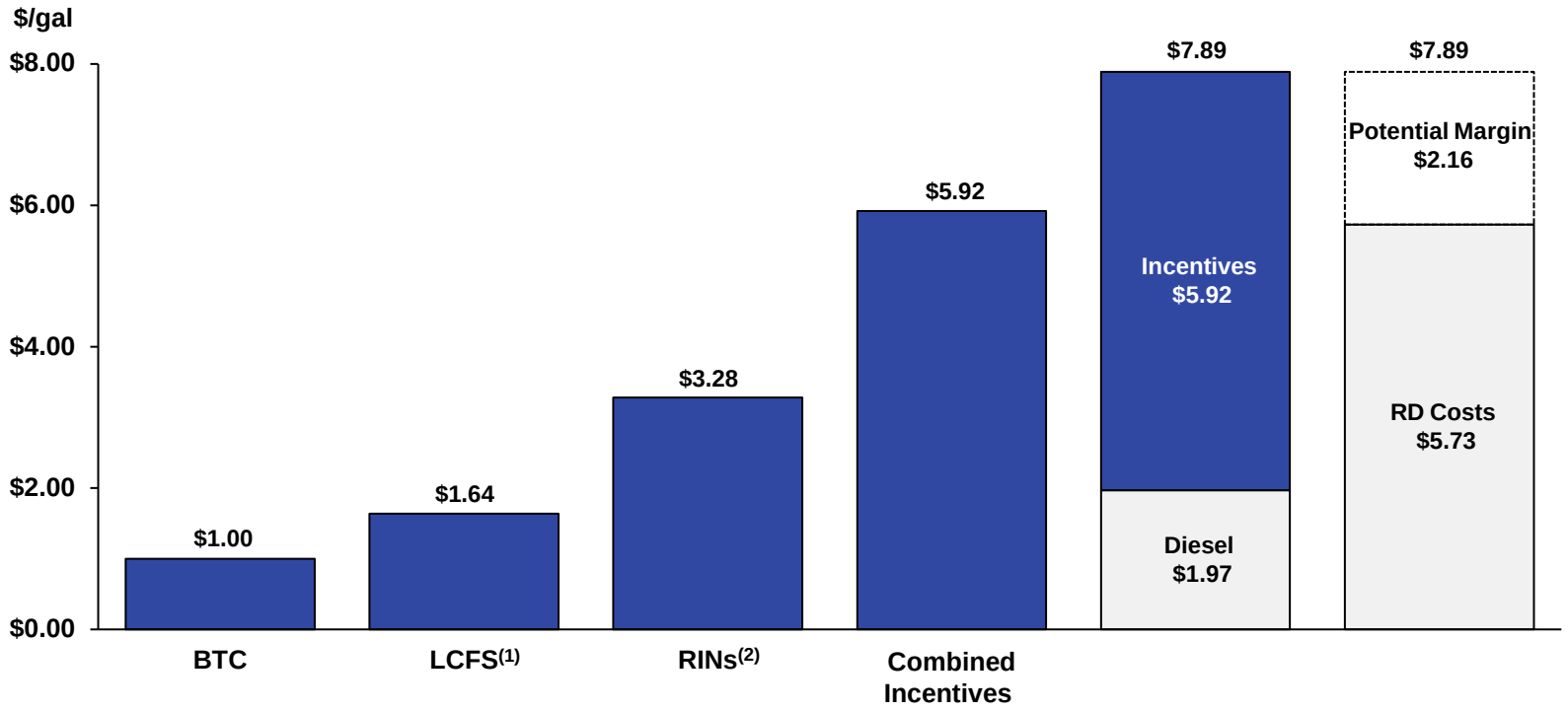


Source: OP research and analysis.
Note: Prices as of May 14, 2021. **Analysis does not account for capital costs.**
(1) Based on 8.2 lbs. of feedstock at an average waste feedstock cost of $0.51/lb.

Economics – Policy Incentives Bridge the Gap

No one would make RD if not for the policy incentives.

Value of Policy Incentives – May 2021



How long will the market pay this premium? Why sell RD anywhere other than California?

Source: S&P Platts, CARB, and OP research and estimates. Prices as of May 14, 2021.
(1) Based on credit price of $187/MT and average CI Score of 26.3. RD conversion CI scores range from 20 to 32.
(2) Based on D4 RINs value of $3.28/gal for RD ($1.93 x 1.7 factor).

RD Policies – the RFS

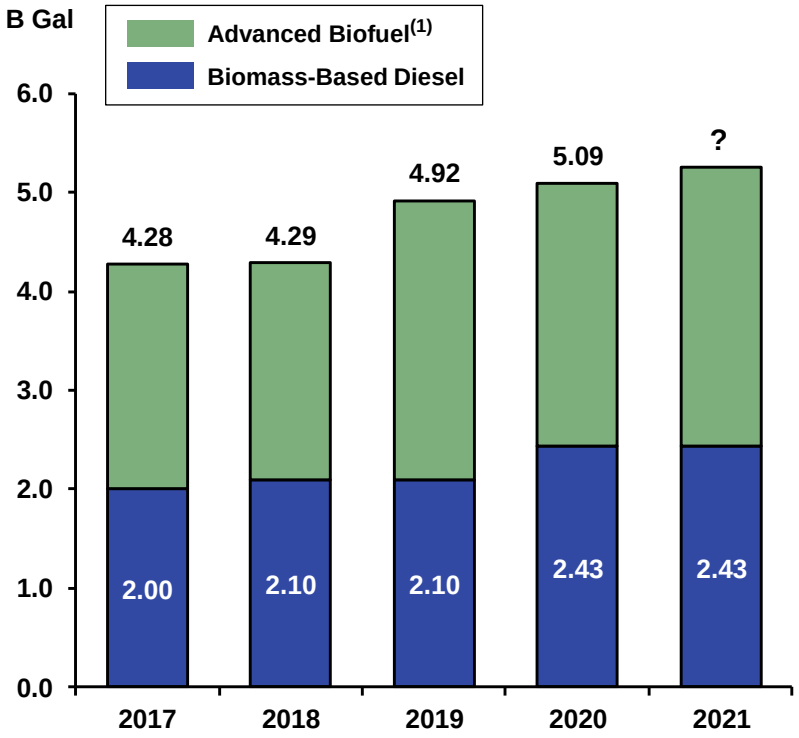
The RVO caps demand for RD and BD. Unless the future RVOs match the growth in RD capacity, BD and RD will compete for the same RIN credits and feedstocks.

EPA Final Rulemaking

B Gal

Category	2017	2018	2019	2020	2021
Cellulosic Biofuel	0.31	0.29	0.42	0.59	N/A
Biomass-Based Diesel	2.00	2.10	2.10	2.43	2.43
Advanced Biofuel	4.28	4.29	4.92	5.09	N/A
Total	19.28	19.29	19.92	20.09	N/A
Implied Conventional (Ethanol)	15.00	15.00	15.00	15.00	N/A

RVOs for Biomass-Based Diesel and Advanced Biofuel



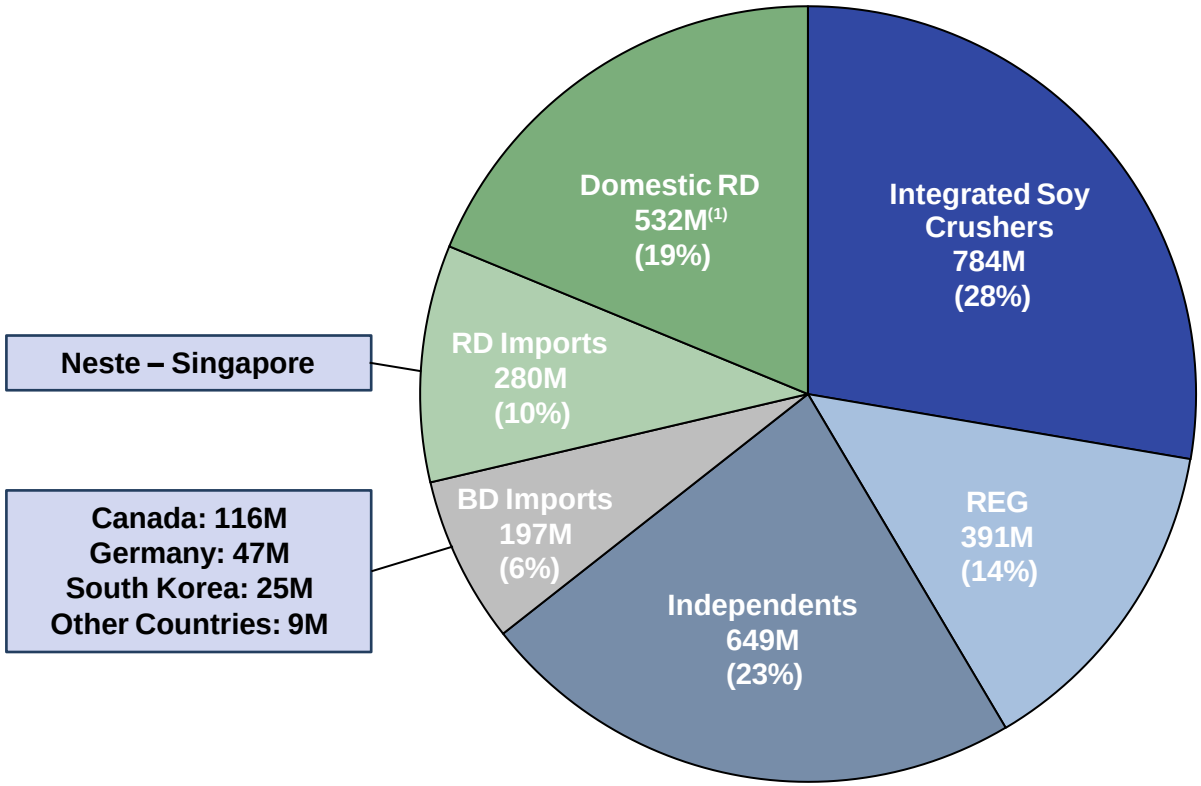
Source: EPA.

(1) All volumes are ethanol-equivalent, except biomass-based diesel which is in gallons of biodiesel.

Policies – Sources of BBD and Advanced Biofuels RINs

Currently, many sources fulfill the Advanced Biofuel RVO. Domestic BD production accounts for 65%. RD imports and domestic production accounted for 29% last year.

2020 BD and RD Total = 2.8B gallons (4.4B RINs)

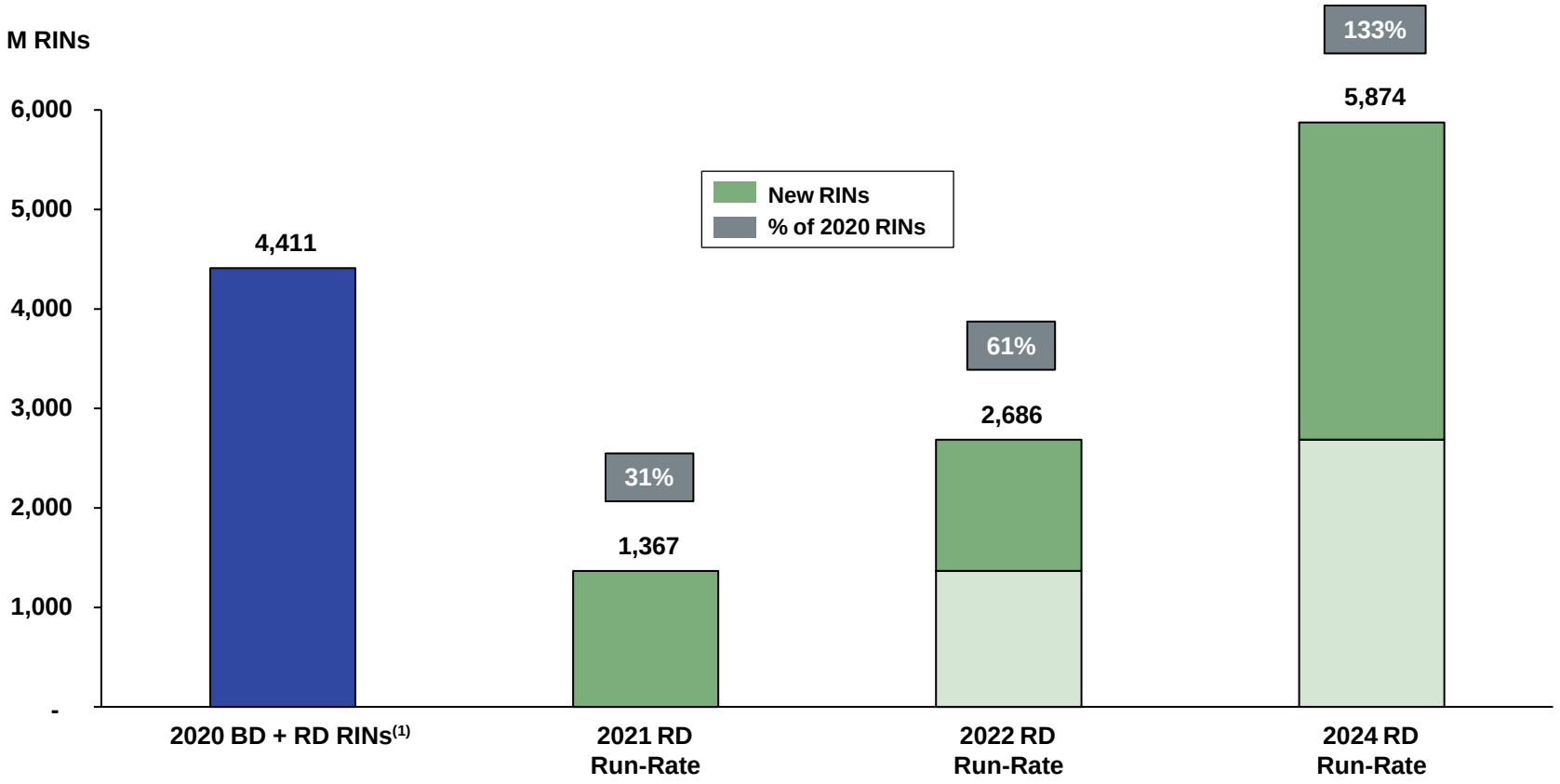


Source: EIA, EPA, company filings / websites, OP research and analysis.
Note: Exports not included in analysis.
(1) Includes co-processing.

Policies – A Wave of New RINs

The RD wave will potentially generate an enormous amount of D4 RINs.

2020 – 2024 Potential New RD RINs

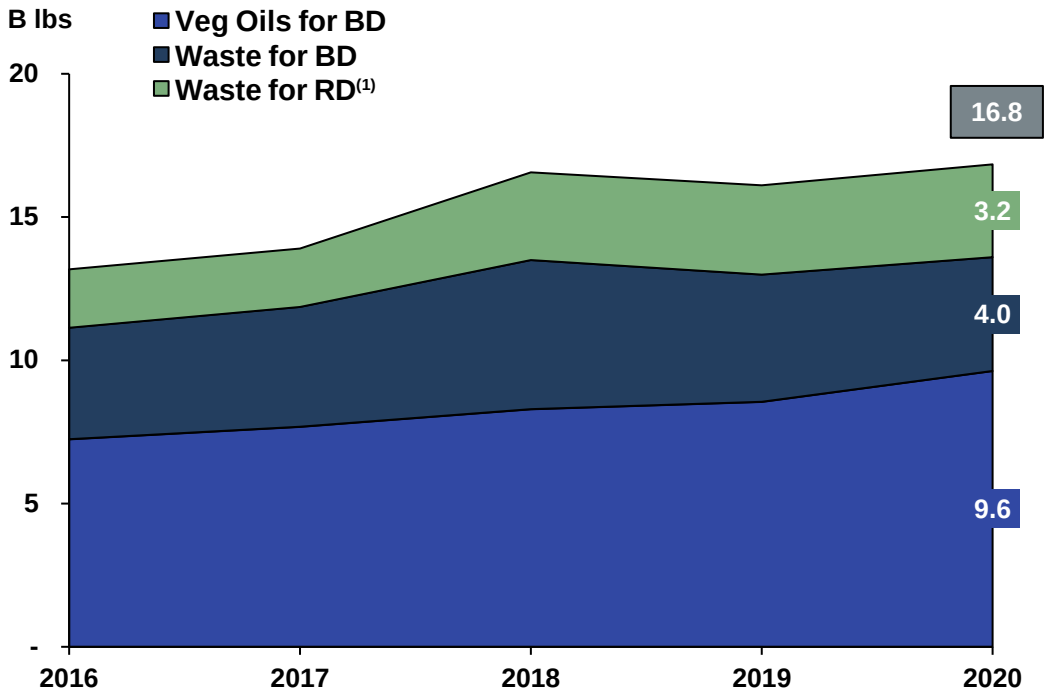


Source: EPA, OP research and analysis.
(1) Based on 1,824M gallons of domestic BD production and 197M gallons of BD imports at a 1.5 RINs factor, plus 532M gallons of domestic RD production (includes co-processing) and 280M gallons of RD imports at a 1.7 RINs factor.

Feedstocks – Current Mix

Historically, BD and RD growth relied on veg oil and waste feedstocks. However, usage will shift.

US Feedstock Usage 2016 – 2020



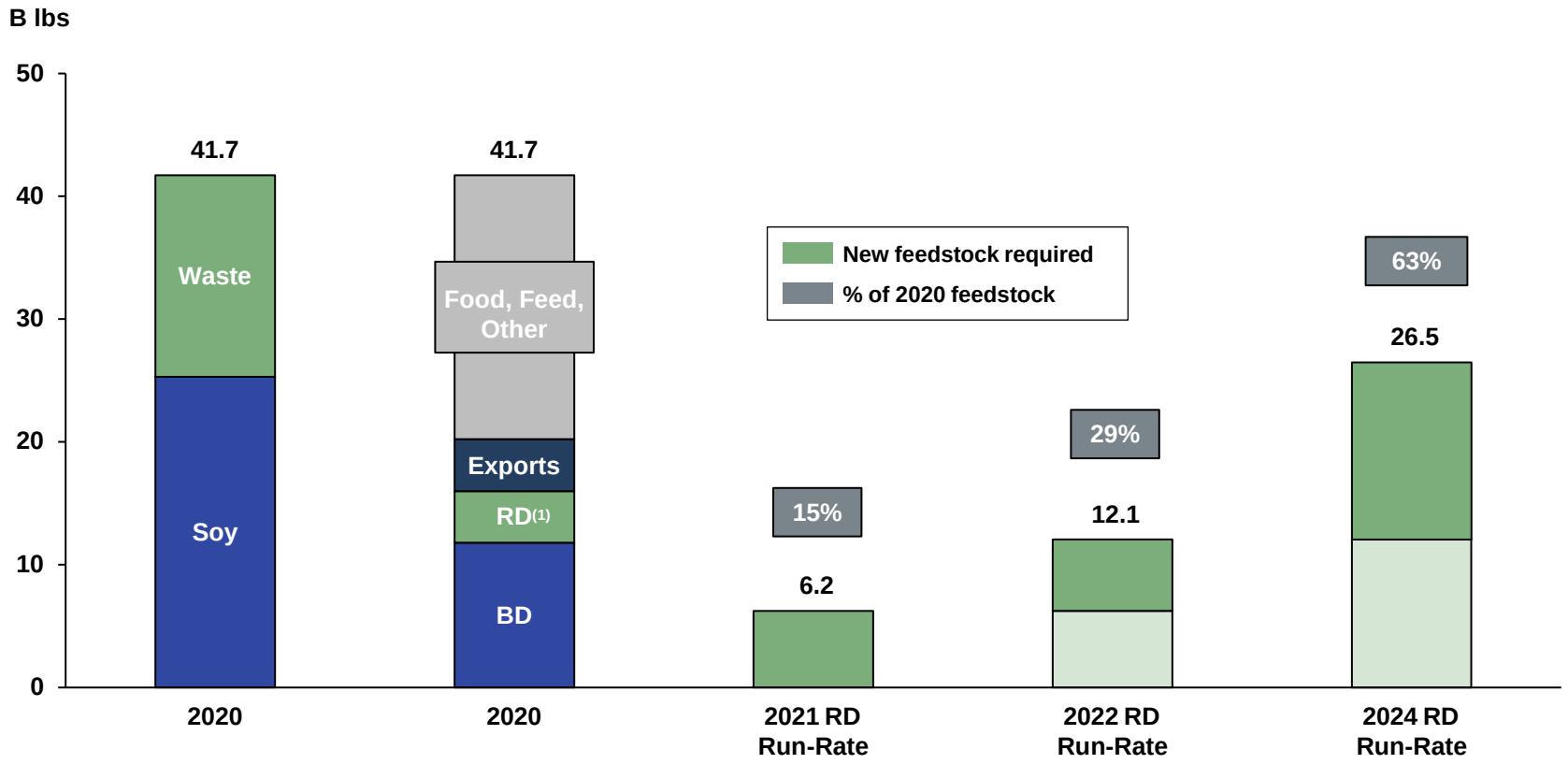
Increased RD production will significantly affect prices, usage and substitutions across veg oil and waste feedstock markets.

Source: EIA Monthly Biodiesel Production Report, Table 3.
Note: Vegetable oils include canola oil and soybean oil. Waste feedstocks include animal fats, recycled feeds and corn oil.
(1) Based on RD production from DGD, REG and World Energy. Assumes all RD production is from waste feedstocks at an average 8.0 lbs/gal conversion factor.

Feedstocks – New RD Demand

Feedstocks will be increasingly constrained as RD grows.

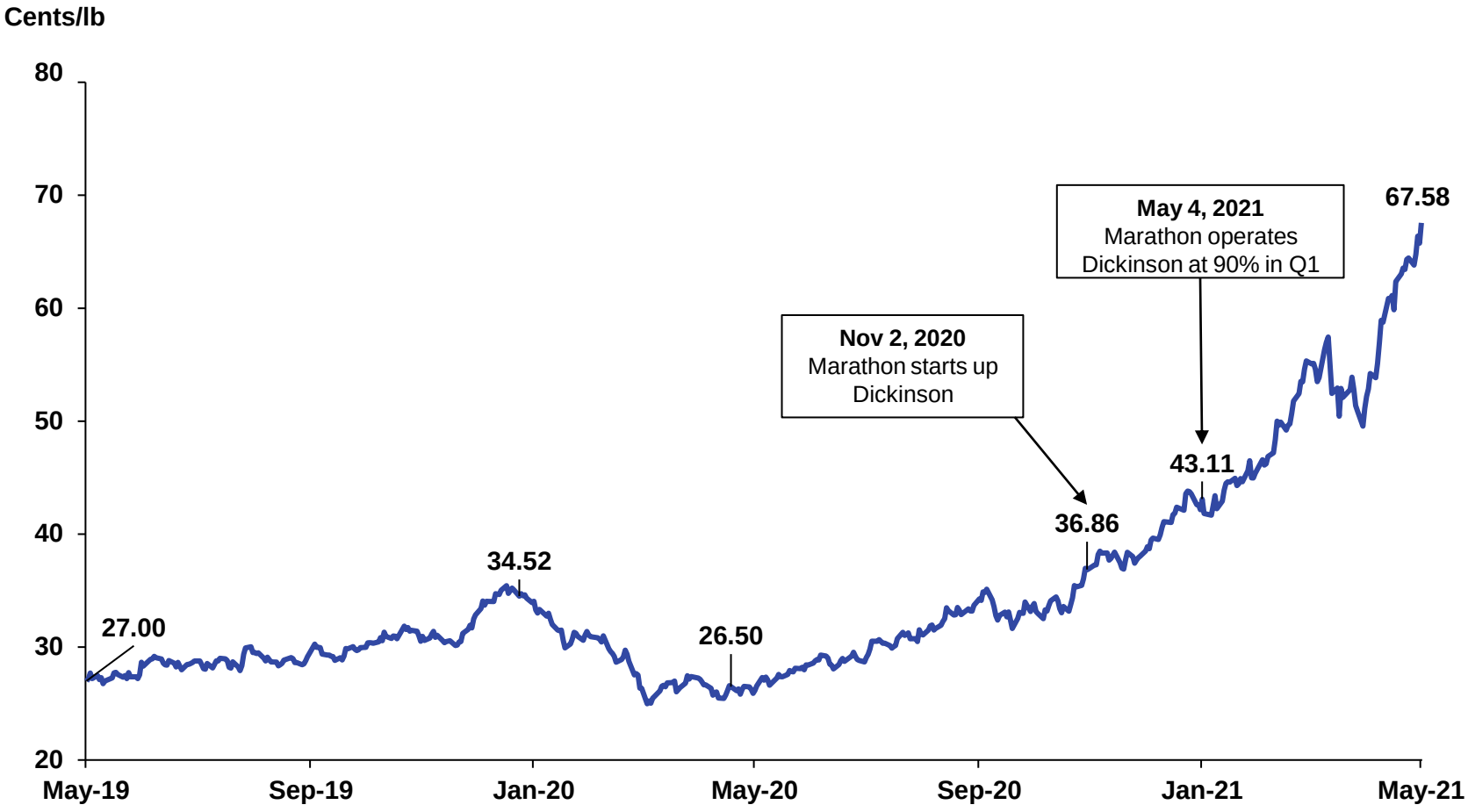
2020 – 2024 Potential RD Feedstock Usage



Source: Render Magazine, USDA, EIA, National Agricultural Statistics Service (NASS), OP research and analysis.
(1) Based on 532M gallons of domestic RD production which includes co-processing.

Consequences – Soybean Oil

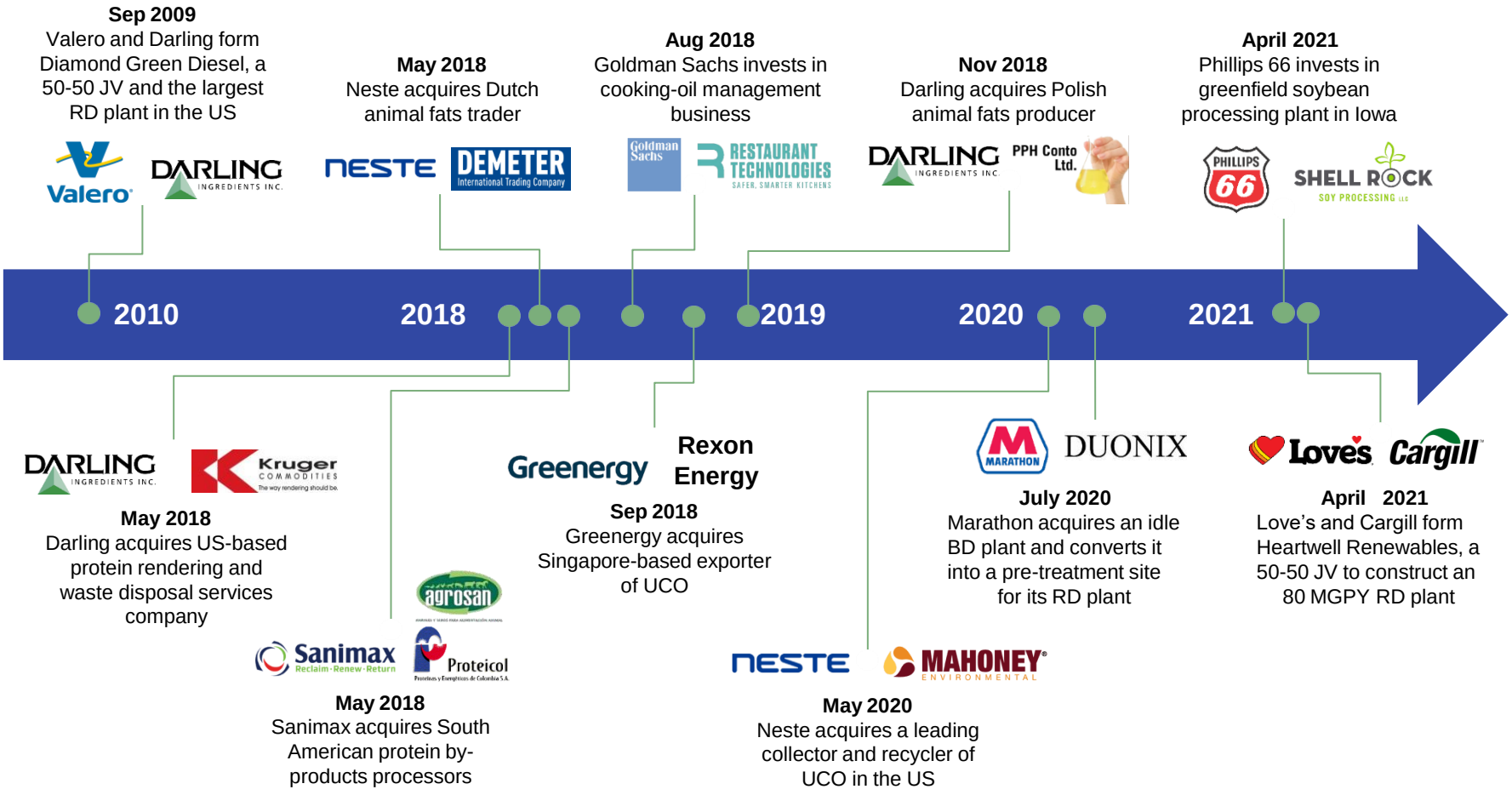
SBO prices have risen by 83% since Marathon's start up at Dickinson and 155% over the last year.



Source: Nasdaq, CME Group.

Consequences – Race for Feedstock Control Accelerates

RD producers pursue feedstock, ranging from seed capital for soy crush, acquisition of aggregators / traders and joint ventures.



Source: OP research and analysis.

Wrap-up

The future of RD (… or "HVO") will be determined by economics, policies and feedstocks.

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  - Capacity will quintuple from 400 MGPY to 2 BGPY by 2022 – another 2 BGPY by 2024.
  - Numerous announced projects, totaling 3+ BGPY. The status of these projects is unclear from public information.
- **Economics**
  - Feedstocks are expensive – costing 2x – 2.5x as much as diesel.
  - After adding production costs, RD costs almost 3x diesel.
  - No one would make RD if not for the policy incentives.
- **Policies**
  - The RVO caps US demand for RD and BD. Unless the future RVOs match the growth in RD capacity, BD and RD will compete for the same RIN credits and feedstocks.
  - Currently, many sources fulfill the Advanced Biofuel RVO. Domestic BD production accounts for 65%. RD imports and domestic production accounted for 29% last year.
  - The RD wave will potentially generate an enormous amount of D4 RINs.
- **Feedstocks**
  - Historically, BD and RD growth relied on veg oil and waste feedstocks. However, usage will shift.
  - The growth in RD will significantly affect the feedstock markets and all other end-markets (food, feed, industrial, exports, etc.).
  - Feedstocks will be increasingly constrained as RD grows.

Wrap-up (cont'd)

- **Consequences**
  - SBO prices have risen by 83% since Marathon's start up at Dickinson and 155% over the last year.
  - RD producers pursue feedstock, ranging from seed capital for soy crush, acquisition of aggregators / traders and joint ventures.