Renewable Diesel

Renewable diesel (RD) is not a biodiesel because it is chemically different and relies on a different production process. RD uses hydrogen combined with a low carbon feedstock while biodiesel is a blended fuel combined with fossil fuels such as diesel or gasoline.

What is it?

What is RD? RD is a colorless, odorless fuel that has a similar chemical composition to petroleum diesel. It is a "drop-in" fuel meaning it can replace conventional diesel in existing engines without the need for blending. This means that it is not subject to the blending wall that most biodiesels are subject to, via local regulations. RD can be used a direct replacement fuel.

What is the production process?

A typical production chain for RD involves reacting renewable feedstock such as soybean oil, waste products, animal fats with hydrogen to remove oxygen in a hydrotreating unit. The result is a high-quality, low-sulphur diesel fuel that is stable, can be shipped in existing refined products pipelines and stored at cold temperature. Initially, most RD was produced from palm oil but production processes and pre-treatment technologies have since improved, with plant operators now able to use wastes and residues as a raw material, resulting in a lower carbon intensity (CI) fuel.

What is the carbon impact of RD?

What are the carbon credentials of RD? The extent of carbon reduction depends upon the feedstock used, with those biofuels produced from vegetable oils typically having a higher CI than those from waste or other renewable feedstocks. Typically, RD produced from waste drives a 70-80% reduction in CO2 emissions, while for those from vegetable oil the reduction is nearer 40%. The table below shows the range of CI scores as well as the implied emission reduction in the table below.

CARBON INTENSITY BY FEEDSTOCK

RAW	CI, GCO2/MJ	NET CO2 REDUCTION
SOYBEAN OIL	56.3	44%
ANIMAL FATS	33.2	67%
SOUTH EAST	33.1	73%
USED COOKING OIL	21.5	79%

Source: California CARB

Advantages of RD over biodiesel

RD is not a biodiesel – it is chemically different and relies on an entirely different production process. RD can lead to major improvements in air quality due to the production processes involved. There is a reduction in nitrogen oxides, carbon monoxide, and much lower numbers of particulate emissions.

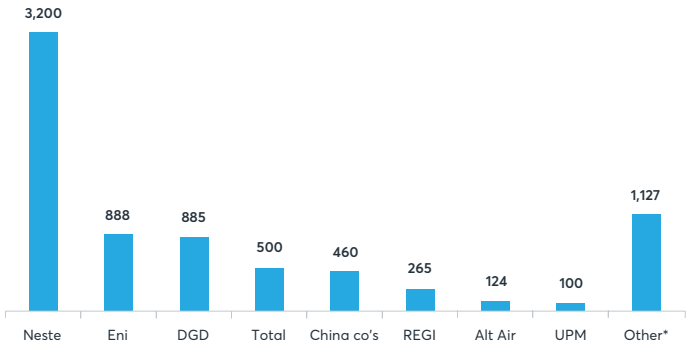
1. Lower emissions, cleaner, and more efficiently burning than traditional biodiesel.
2. Traditional biodiesel is an esther, and for this reason, the blend is limited to 7% in Europe and up to 20% in other parts of the world.
3. Chemically different to petroleum diesel.
4. Only RD can be used in high concentrations.
5. RD tends to be well suited to much colder climates due to the cold properties of the fuel.

Source: Neste – what is the difference between renewable diesel and traditional biodiesel

Who are the main producers of RD?

Total capacity is around eight million tons per year but is expected to rise to around 30 million tons per year by 2030. The U.S. is a major source of the new additional supply. Neste is the world's largest supplier of renewable diesel.

RD capacity by company in 2020, kton/a



Source: Barclays

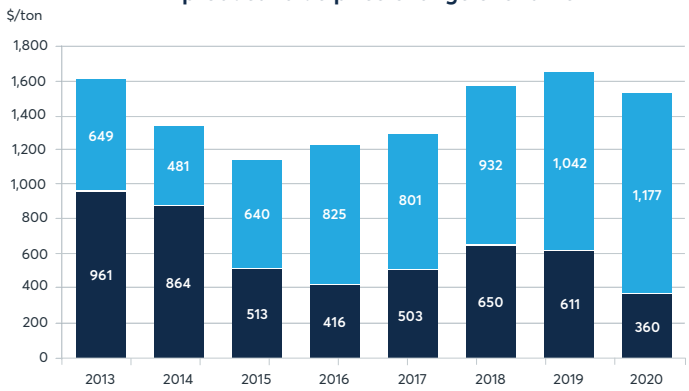
How is RD priced?

Barclays estimate that the production cost for RD is over $1,000 per metric ton, about three times the cost of petroleum diesel. There is a significant CI that is seen with RD compared to petroleum diesel and this largely accounts for the difference in the price. The price of carbon, as defined under schemes like the U.S. Low Carbon Fuel Standard (LCFS), contributes to the overall cost of the final product. Suppliers of products like RD typically receive a value of a carbon credit from the purchaser of the fuel, which goes to offset the higher production cost associated with the higher feedstock costs.

Petroleum diesel, being a replacement fuel alternative product, tends to be one of the major cost inputs in the RD price. Barclays research estimates that in 2013, the price of diesel made up about 60% of the total product value for RD. Given the increase in the RD prices, the diesel price made up as little as 25% of the total price (Source: Barclays research).

The chart below shows a producers product value since 2013 and shows the changing cost of the CO2 reduction value between 2013 and 2020. Over this time period, the CO2 reduction value nearly doubled in price.

RD product value price change over time



Source: Barclays

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