NESTE MY
Renewable Diesel

Renewable Diesel: The Sustainable High-Performance Fuel

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Managing and reducing costs is a balancing act for fleet managers. They don't want to risk performance but haven't always had a choice when trying to meet California's sustainability requirements. Now the choice is easy.

Renewable diesel makes reducing a fleet's environmental footprint simple; it lowers greenhouse gas emissions by up to 80% compared to petroleum diesel, and fleet managers don't have to sacrifice a thing when it comes to operations or convenience.

The fuel made from 100% renewable & sustainable raw materials

Renewable diesel is one of the only fuels made from 100% renewable and sustainable raw materials. It is not a fossil fuel; instead, it is made of non-petroleum renewable resources and is classified as a hydrotreated vegetable oil (HVO). Neste's unique technology converts cooking and vegetable oil residues, along with waste animal fats from the food processing industry, into premium-quality fuel.

In the manufacturing process, impurities are removed from the raw materials before treatment with hydrogen at high temperature and pressure. This makes it possible to manufacture hydrocarbons with chemical properties substantially similar to those of regular diesel. The high quality of the final product is always consistent, regardless of the raw materials used.

While every molecule in Neste MY Renewable Diesel is in petroleum diesel – meaning the two fuels can be used interchangeably – it has superior qualities that help reduce a vehicle's carbon footprint. As a pure hydrocarbon, it is a non-polar molecule. It doesn't attract impurities or water. And with a higher cetane number than diesel – 75 to 85 versus approximately 40 to 52 – fleets experience improved startup and combustion since the fuel burns more efficiently.

"We have been using renewable diesel for some time now, and we are thrilled with it. The best news is that there is no difference between traditional diesel and renewable diesel. From a performance standpoint, it's amazing."

DEBORAH RAPHAEL, DIRECTOR, SAN FRANCISCO DEPARTMENT OF THE ENVIRONMENT

Improve operations while also reducing your environmental impact

Reducing a fleet's carbon footprint used to require compromising for greater sustainability. With renewable diesel, there is no trade-off; it's an alternative fuel that's better for vehicle performance, fleet managers' bottom lines and the environment.

Superior Performance

The power and miles per gallon of renewable diesel are comparable to, and can be better than, those of petroleum diesel. Renewable diesel does not contain any sulfur or aromatics, so it is odorless, colorless and generates very few impurities when burning inside a motor. Its efficient and clean combustion means that engines run quieter, smoother and with fewer harmful emissions.

Renewable diesel is a drop-in fuel that can be easily switched for petroleum diesel in existing diesel infrastructures and distributed exactly like diesel. This enables fleets to switch to cleaner fuel overnight without any conversion costs to vehicles or logistics systems.

Renewable diesel provides:

- More complete combustion
- Improved cold starts
- Less engine noise and knocking
- Reduced smoke and warm-up time
- Fewer misfires
- Lower exhaust emissions: nitrogen oxide, hydrocarbon, carbon monoxide and particulate matter

Lower Vehicle Maintenance Costs

Maintenance costs may be lower with Neste MY Renewable Diesel. This environmentally friendly fuel contains fewer contaminants to damage fuel systems and burns more cleanly, producing less soot for after-treatment systems. Since it reduces a vehicle's particulate, hydrocarbon and nitrogen oxide emissions and generates practically no ash, renewable diesel saves fleet managers money by extending the service life of particulate filters.

In fact, fleet managers who have already switched have seen reductions in how often they must change or regenerate filters on their vehicles. The result is that trucks stay in service longer with less downtime.

Before Atlas Disposal, a sanitation company in Sacramento, began using renewable diesel, they were conducting maintenance on their four trucks every two days. They spent $35,000 on a machine for in-house servicing, and their maintenance costs increased by an additional $1,200 a week. When Atlas Disposal made the switch from petroleum diesel to renewable diesel, service intervals to change out the DPF filters were reduced from two days to 40 days.

Reduced Environmental Impact

Using renewable diesel can achieve up to 80% reduction in greenhouse gas emissions over its life cycle compared to conventional diesel. In addition, it reduces levels of local emissions that have a negative impact on air quality.

Scientific studies and field trials have shown that switching to renewable diesel reduces major pollutants significantly:

- 33% lower levels of fine particulates
- 30% lower hydrocarbons
- 24% lower carbon monoxide
- 9% lower nitrogen oxides
- Reduced polyaromatic hydrocarbons

Using a gallon of petroleum diesel fuel emits more than 30 pounds of greenhouse gases into the air. Using a gallon of renewable diesel emits fewer than 10.[1]

When it comes to carbon intensity, or the amount of carbon used or generated from the fuel manufacture to the fuel consumption, a truck running on renewable diesel is more environmentally friendly than an energy-efficient car.

Superior Cold-Weather Performance

Neste MY Renewable Diesel's cold-weather performance is equal to or better than that of petroleum diesel. Its cloud point, an indicator of cold flow and storage properties, is guaranteed at -4˚F/-20˚C and can be customized to lower specs. To put it into context, petroleum diesel's cloud point is 16˚F/-9˚C. No matter which raw materials are used, renewable diesel exceeds domestic climate requirements to allow for travel in cold temperatures.

[1] "Renewable Diesel Reduces Ore. Utility's Maintenance Costs," *Trucking Info,* **http://www.truckinginfo.com/channel/fuel-smarts/news/story/2016/01/renewable-diesel-reduces-ore-utility-fleet-maintenance.aspx**

Excellent Storage Properties

Renewable diesel can be stored for long periods of time without any change to its properties. This includes no deterioration in quality or water accumulation, which can pose a challenge when using other fuels.

Neste MY Renewable Diesel can be stored in the same tanks as petroleum diesel and under the same conditions. Prolonged storage of any fuel at temperatures below the cloud point can cause precipitation.

Purity That Only Comes From 100% Raw Materials

While petroleum diesel consists of thousands of different molecules, renewable diesel is extremely consistent, no matter the starting feed stock. It's so clean and clear that it could be mistaken for water. Since it doesn't contain any sulfur or aromatics, it generates very few impurities when burning inside a motor.

The fuel also significantly reduces a vehicle's particulate, hydrocarbon and nitrogen oxide emissions. As a result of its complete combustion within the cylinder, less unburnt fuel leaves the engine. Its predictable consistency helps to prevent variations in performance and issues with engines like clogged fuel filters.

Several government fleets in California, where the use of renewable diesel has rapidly grown due to the state's Low Carbon Fuels Standard, have reported less frequent clogging of diesel particulate exhaust filters.[2]

[2] "4 Things You Should Know About Renewable Diesel," Western WA Clean Cities, **http://www.pscleanair.org/Blog.aspx?IID=8**

Renewable diesel continues to gain momentum in California

Since California outlined more stringent regulations in 2006 to combat climate change, renewable diesel has made it easier and faster for fleets to comply with the regulations of California Assembly Bill 32 (2006) and Senate Bill 32 (2016), as well as the 2010 DPF filter mandate. It also allows municipal fleets in California to meet the state's 2015 mandate that all state agencies purchase renewable diesel for their fleets of diesel-powered vehicles and equipment.[3]

Neste MY Renewable Diesel™ is a premium-quality renewable diesel that meets all California state requirements for conventional diesel and can be sold throughout the United States as Ultra Low Diesel Fuel when blended from 1-100%. It fully meets ASTM D975, which sets the standard for diesel fuel oils suitable for various types of diesel engines. It is a reliable, consistent, high-performance fuel that allows fleet managers to improve the performance of their vehicles, lower maintenance costs and significantly reduce their fleets' greenhouse gas emissions in the process.

The Advantages of Renewable Diesel

- Manufactured from more than 10 different raw materials
- 100% renewable and sustainable
- Superior quality that outperforms petroleum diesel
- Fully compatible with all diesel engines and fuel infrastructures
- More fuel-efficient than conventional diesel
- Cleaner combustion
- Can be stored as low as -4°F/-20°C
- Can be stored over long periods of time with no deterioration in quality
- Odorless, containing no sulfur or aromatics
- Extends the life of particulate filters

[3] "Calif. Mandates Renewable Diesel Purchases for State Agencies," *Government Fleet*, **http://www.government-fleet.com/channel/clean-diesel/news/story/2015/12/calif-mandates-renewable-diesel-purchases-for-state-agencies.aspx**