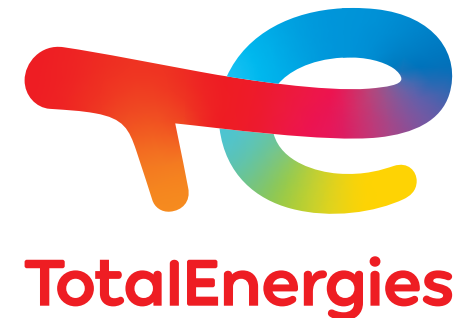




**What are the renewable alternatives to standard fuel for Diesel vehicles?**



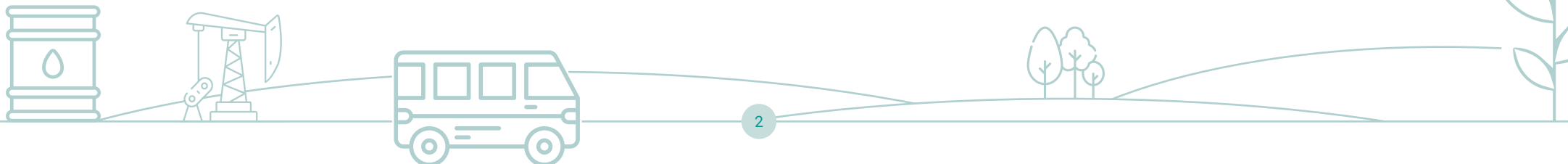
# Tackling environmental challenges

Biofuels represent an immediate alternative to conventional diesel fuel for cutting carbon emissions in the transport sector. What is biofuel? Biofuels are made from renewable and mainly bio-based feedstock. There are two types of biofuels for diesel vehicles: oxygenated compounds called Fatty Acid Methyl Esters (FAME), and non-oxygenated compounds called Hydrotreated Vegetable Oil (HVO).

 <b>CONVENTIONAL DIESEL FUEL</b>	 <b>RENEWABLE ALTERNATIVE DIESEL FUEL</b>	
<b>B7</b> EN 590-compliant	<b>B100</b> EN 14214-compliant	<b>HVO100</b> EN 15940-compliant
<ul style="list-style-type: none"> <li>✓ The diesel fuel of choice in Europe</li> <li>✓ Produced primarily from crude oil refining</li> <li>✓ Compatible with and approved for all diesel vehicles in Europe</li> </ul>	<ul style="list-style-type: none"> <li>✓ Marketed exclusively for captive fleets in France</li> <li>✓ This fuel is made primarily of FAMEs produced from 100% renewable feedstock</li> <li>✓ Approved use for certain Euro VI heavy-duty vehicles only (this varies significantly depending on the manufacturer)</li> </ul>	<ul style="list-style-type: none"> <li>✓ Marketed exclusively for captive fleets in France</li> <li>✓ This fuel is made primarily of paraffins produced from 100% renewable feedstock</li> <li>✓ It is approved for all Euro VI heavy-duty vehicles. With some exceptions, it is compatible with the majority of previous-generation diesel engines</li> <li>✓ Already used in heavy-duty vehicles in Scandinavia for several years, it is now also available at service stations in Belgium and Luxembourg</li> </ul>

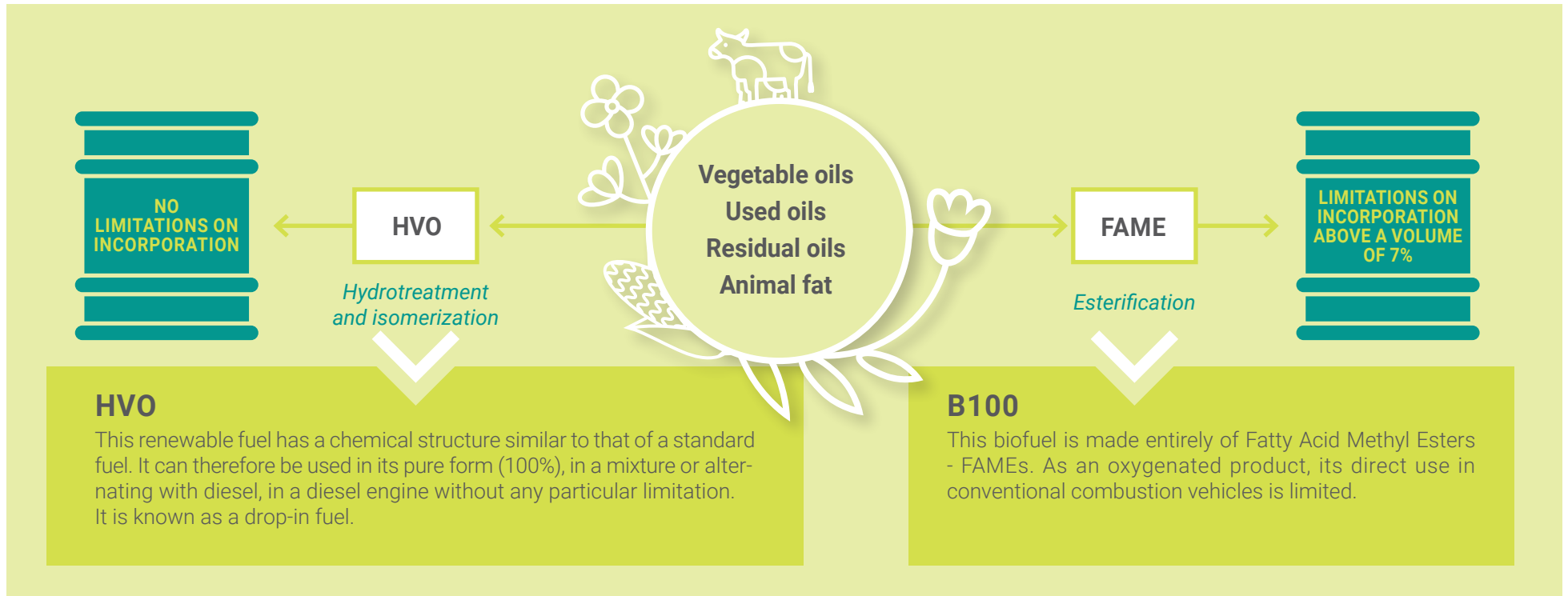
## Biofuels, a Key Component of TotalEnergies' Strategy

TotalEnergies is integrating the climate into its strategy and has set itself the ambition of becoming a major player in the energy transition. To achieve this, the Company is continuing to expand in renewable energies and is building low-carbon businesses into a significant proportion of its portfolio. Biofuels are central to this strategy. TotalEnergies is actively participating in various programs to develop solutions to convert all available types of biomasses. The Company work in its own laboratories and via R&D partnerships with manufacturers, start-ups, universities, and private laboratories.



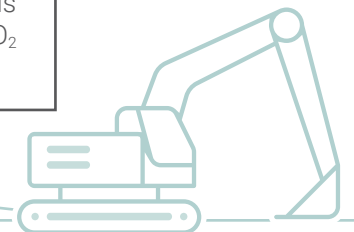
## Same feedstock, but different processes

These two types of biofuels – HVO and FAME – are produced using the same feedstock (vegetable oils, used oils, residues, and animal fat). However, their production processes differ: hydrotreatment and isomerization for HVOs, and esterification for FAMES.



### GTL

Gas-To-Liquid (GTL) is a synthetic paraffin fuel made from natural gas derived exclusively from fossil fuels, as opposed to biofuels which are made from renewable sources. It does not, therefore, offer the same carbon-cutting performance as biofuels in terms of CO<sub>2</sub> emissions. In addition, significant amounts of CO<sub>2</sub> are also produced during the manufacturing process.



# A closer look at its properties

## HVO100

In addition to their renewable feedstock, biofuels have certain characteristics. Their main properties are briefly presented below.



### ENGINE COMPATIBILITY

Compatible with all vehicles. Heavy-duty manufacturers have homologated their entire Euro VI range for this fuel.



### MAINTENANCE

No operating changes. There is nothing specific to adapt or maintain, when compared to a conventional fuel.



### CONSUMPTION

The use of HVO100 results in a slight increase in volume consumption (below 4%) due to its lower density, when compared to a standard diesel fuel.



### COMBUSTION

The use of HVO100 cuts vehicle CO<sub>2</sub> tailpipe emissions by around 4% to 5%.



### STORAGE

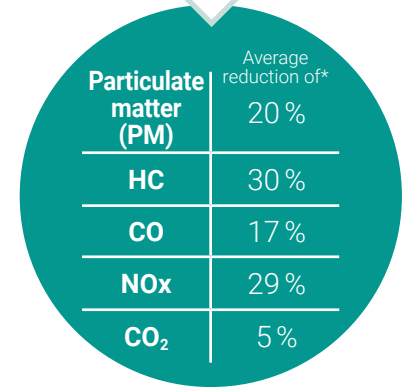
It is very stable over time and not very susceptible to oxidative degradation.



### COLD FLOW PROPERTIES

Its cold flow properties are at least on a par with those of a standard diesel fuel.

### REGULATED POLLUTANT AND CO<sub>2</sub> EMISSIONS



#### Values measured before the after-treatment system

\*Tests performed with an EN 15940-compliant HVO100 fuel in 2018 and 2019 on different types of vehicles, compared to a standard EN 590 diesel fuel.

### IMPACTS ON CARBON EMISSIONS

Unlike fossil fuels, the carbon emissions released when a biofuel is burned are partially offset by the carbon dioxide captured during the growing plant's photosynthesis. Additionally, biofuels are also made from waste and residues, providing an alternative solution to using agricultural resources as feedstock, and are part of an overall approach to a circular economy. As a result, renewable fuels help cut carbon emissions by at least 50% and up to 90%\*, when compared to a standard fuel\*\*.

\*Depending on the origin of the feedstock used during production, measured over a well-to-wheel cycle.

\*\*In compliance with EU regulations.

# B100



## ENGINE COMPATIBILITY

Requires engine modifications, which is only possible for certain heavy-duty manufacturers.



## MAINTENANCE

Increased frequency of oil changes and forced particulate filter regeneration.



## CONSUMPTION

The use of B100 raises volume consumption by around 8% compared to a standard diesel fuel.



## COMBUSTION

The use of B100 increases vehicle CO<sub>2</sub> tailpipe emissions by around 4%.



## STORAGE

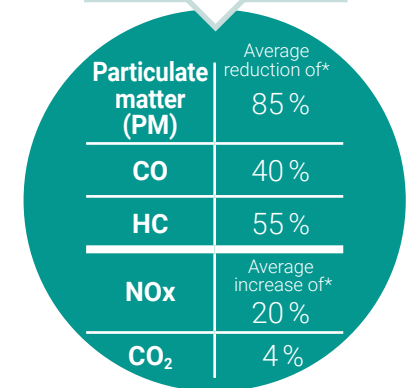
A special storage tank is required. Precautions must be taken when storing B100 to guarantee proper oxidation stability.



## COLD FLOW PROPERTIES

Its cold flow properties are at least on a par with those of a standard diesel fuel.

## REGULATED POLLUTANT AND CO<sub>2</sub> EMISSIONS



### Values measured before the after-treatment system

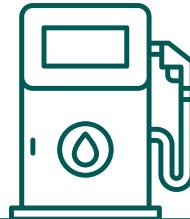
\*Tests performed with an EN 14214-compliant B100 fuel in 2018 and 2019 on different types of vehicles, compared to a standard EN 590 diesel fuel.

## DID YOU KNOW?

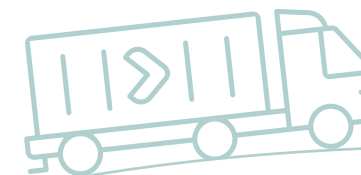
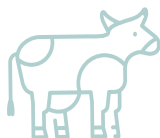
Unlike B100, HVO100 can be used, without any limitations, by blending or alternating it with a standard diesel fuel.



# Conventional diesel and biofuels: a comparison



	<b>B7</b>	<b>B100</b> EN 14214-compliant	<b>HVO100</b> EN 15940-compliant
Operability	★★★	★☆☆	★★★
Storage	★★★	★☆☆	★★★
Cold flow properties	★★★	★★★	★★★
Regulated polluting emissions before the after-treatment system	★☆☆	★★★	★★★
Tailpipe polluting emissions	★★★	★★★	★★★
Carbon emissions from well to wheel	★☆☆	★★★	★★★
Vehicle tailpipe carbon emissions	★★★	★☆☆	★★★

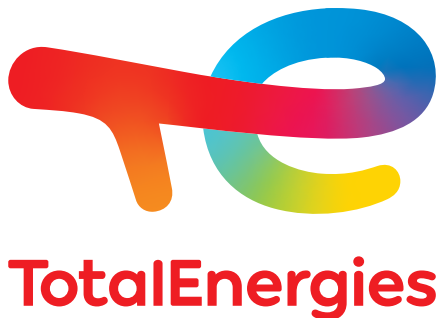


# HVO100: for on-road and off-road vehicles

HVO100 is available for on-road as well as off-road vehicles (farm machinery, construction machinery and other equipment) under the HVO100 Off Road brand name.

In France, HVO100 is only marketed for captive fleets.





TotalEnergies is a broad energy company that produces and markets energies on a global scale: oil and biofuels, natural gas and green gases, renewables and electricity. Our more than 100,000 employees are committed to energy that is ever more affordable, clean reliable and accessible to as many people as possible.

Active in more than 130 countries, TotalEnergies puts sustainable development in all its dimensions at the heart of its projects and operations to contribute to the well-being of people.

TotalEnergies' Marketing & Services business segment offers its professional and private customers a wide range of broad energy products and services—petroleum products, biofuels, charging and related services for electric vehicles, gas for road and maritime transportation—to support them in their mobility and help them reduce their carbon footprint. Every day, over 8 million customers visit our 16,000 service stations all over the world. As the world's number four in lubricants, we design and sell high-performance products for the automotive, industrial and maritime sectors.

And to provide the best response to the needs of our B2B customers, we deploy our sales forces, our international logistics network and our diverse offering. We operate in 107 countries, where our 31,000 employees stand close to all of our customers.