



What are biofuels?

These are fuels obtained through physical or chemical treatment of organic matter derived from agricultural products such as starch-rich corn and cassava; oleaginous plants such as oil palm, soybean, sunflower; woods such as pine and eucalyptus; animal fats; and waste household oils and fats. Conventional technologies like fermentation are used for processing sugars and starches, while trans-esterification (or alcoholysis) is used for oils and fats, and anaerobic digestion for organic waste.



What is biodiesel?

Biodiesel is a biofuel that results from the chemical reaction between a plant or animal oil or fat plus alcohol, methanol being the most widely used. Two products result from this reaction: biodiesel and raw glycerin.

Which are the sources?

In tropical countries like Malaysia, Indonesia and Colombia, biodiesel is obtained from palm oil. In Europe it is derived from rapeseed and sunflower, and in the United States from soybean oil and tallow.

How is it used?

Biodiesel may be used pure and, in that case, it is called B100, or in a blend with fossil diesel fuel, in which case, a 15% biodiesel blend with fossil diesel, for example is called B15. The current blend used in Bogotá and eastern Colombia is B8, whereas it is B10 in the rest of the country, and that is how it is delivered to consumers in all service stations in Colombia.

What are the advantages of using biodiesel?

Environmental benefits

- ♦ Reduction of GreenHouse Gases (GHG) emissions mainly from mass transportation systems in the cities. Besides improving the environment, it benefits human health^(*).

- ♦ Job creation in the rural areas: formal labor in the rural areas has increased, mainly in conflict zones where oil palm, the raw material for Colombian biodiesel, is grown. The benefit in terms of formal rural employment is estimated at around USD7.64 billion between 2007 and 2025^(*).
- ♦ Energy independence: the development of the biodiesel industry has contributed to the diversification of the energy base in the country, creating a more stable domestic supply of fuels for the future.

Performance in engines

Biodiesel performance in engines is comparable to that of fossil diesel fuel. Although it is true that biodiesel has a lower caloric content than diesel, it is a high performance fuel because of its structural characteristics, including the following:

- ♦ High cetane number: because of oxygen being part of the molecule, pure biodiesel has better combustion properties and, with the blends used in this country, it provides for smooth and regular engine operation. This characteristic is similar to the octane number in gasoline⁽¹⁾.
- ♦ High lubricant capacity: it avoids the use of lubricant additives for diesel fuel and prolongs engine lifecycle. It is estimated that cost savings related to lubricant additives with the use of biodiesel blends in cargo trucks and urban mass transportation may amount to almost USD 80 million between 2007 and 2025^(*).
- ♦ Sulfur-free: in a blend with diesel fuel, biodiesel helps reduce sulfur content. This results in less deleterious environmental effects, considering that sulfur promotes acid rain and particulate material emissions.
- ♦ Free of aromatic compounds: biodiesel does not contain aromatic compounds and, in the blend, it prevents pollutant emissions that cause respiratory diseases. It is estimated that reductions in healthcare costs in Colombia between 2008 and 2025 may amount to USD 885 million from the addition of 10% biodiesel to diesel fuel with 50 ppm of sulfur^(*).
- ♦ Stability: it remains stable during prolonged storage periods (more than six months).
- ♦ Decomposition: biodiesel degrades 4-5 times faster than fossil diesel fuel and it may even be used as solvent to clean diesel spills.
- ♦ Transportation: it is safer to transport because its flash point (150°C) is 100°C higher than that of fossil diesel.

⁽¹⁾ Good engine performance when either biodiesel or diesel fuel are used depends, among other characteristics, on engine design, maintenance and use. Impurities such as water residues, muds, methanol, triglycerides and other contaminants may affect engine integrity and performance.



Why do GreenHouse Gases (GHG) emissions diminish?

Studies conducted in several countries with different types of biodiesel have confirmed that palm oil biodiesel lowers GHG emissions compared to diesel fuel. In Colombia, a study done in 2011 by the CUE Consortium under the auspices of the Inter-American Development Bank and the Ministries of Mines and Energy, Agriculture and Environment, demonstrated that GHG reduction is 83% compared to diesel fuel emission. In practice, this effect is evidenced mainly in lower emissions of particulate material, carbon monoxide and total hydrocarbons. In biodiesel-fossil diesel blends, small increases in nitrogen oxide (NOx) emissions have been found, associated only with the type of fuel but also with engine technology, operating temperature and maintenance.

What is the raw material for biodiesel in Colombia?

Colombia has sufficient quantities of the right-quality palm oil for biodiesel production as well as for meeting the local demand from the food industry and other uses. Substantial amounts of palm oil are exported at present, mainly to Europe and Mexico.

Palm oil production in Colombia has grown over the past few years, with the increase in planted areas. At present, there are 516.960 hectares planted in oil palm, 430.884 in production and 86.077 in development^(**).

How is the use of biodiesel regulated?

The national government authorized the use of the biodiesel-fossil diesel blend as of January 1st, 2008. In order to foster the development of the nascent sector, the government passed the necessary legal and technical standards, including Law 939/04 on incentives for the production of biofuels; Conpes 3510 of 2008 to establish the use of biofuels in the country; the Colombian Technical Standard (NTC 5444) on the specifications of biodiesel for use in diesel engines; and a series of resolutions to define biodiesel pricing, quality, distribution and use.



^(**)Source: Fedepalma, 2018.

How much biodiesel is produced?

In 2017, total production amounted to 139 million gallons, equal to 460.121 tons of biodiesel, in twelve production plants with a total installed capacity of 986.000 tons^(*).

What is the size of the investment in the biodiesel sector in Colombia?

Investment in processing plants amount to more than COP\$ 1 trillion, while investments in close to 200.000 hectares planted in oil palm to support the growth of the biodiesel sector over the past four years amount to nearly COP\$ 3 trillion.

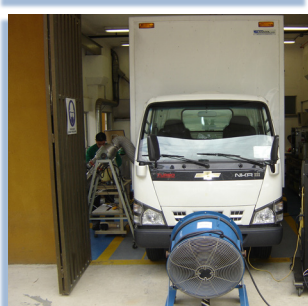
How many direct jobs are created by the biodiesel sector?

In 2017, this sector has created 31.777 direct employment and 63.554 indirect employment that mainly benefit communities in rural areas^(*).

How is biodiesel performance tested in vehicles?

Studies conducted between 2008 and 2010 by the Ministry of Mines and Energy, together with Cenipalma, Ecopetrol, Fedepalma, GM Colmotores and SI 99, demonstrated that palm biodiesel blended with up to 50% diesel fuel, performs well as fuel for vehicles. The first study was conducted with buses of the Transmilenio system in Bogotá, using B5-B50 diesel-biodiesel blend. The second was conducted with a fleet of cargo trucks at a national level, using diesel-biodiesel blends ranging between B10 and B30. Both tests showed that the quality of pure and blended fuels met the standards established by the Colombian legislation. Vehicle performance in terms of yield, wear, lubricant quality, among others, was satisfactory and was not affected by the use of biodiesel. Additionally, using emissions in general were reduced or at least remained the same.

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^(*) Source: Fedebiocombustibles.



National Oil Palm Growers Federation - Fedepalma
Carrera 10A No. 69A-44
www.fedepalma.org
Bogotá, D.C. - Colombia

The ABC of Palm Biodiesel

