



## Frequently Asked Questions

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#### What is biodiesel?

Biodiesel is a renewable, oxygenated fuel made from agricultural resources such as soybeans or rapeseeds. It contains no petroleum but can be blended at any level with petroleum diesel to create a biodiesel blend. Biodiesel refers to the pure alternative fuel before blending with petroleum-based diesel fuel. Biodiesel blends are denoted as "BXX," with "XX" representing the percentage of biodiesel contained in the blend. For example, B20 fuel is a blend of 20 percent biodiesel with 80 percent conventional diesel. B100 is pure biodiesel. In Europe, biodiesel is typically produced from rapeseed oil and in the U.S., from soybean oil. It also can be made from other new and recycled oilseed crops, animal fats and grease.

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#### What is the John Deere position on biodiesel use in its engines?

While 5 percent blends (B5) are preferred, biodiesel concentrations up to a 20 percent blend (B20) in petroleum diesel fuel can be used in engines manufactured by John Deere Power Systems. Biodiesel blends up to B20 can be used ONLY if the biodiesel (100 percent biodiesel or B100) meets ASTM D6751 (U.S.), EN 14214 (EU) or equivalent specification.

John Deere engines can also operate on biodiesel blends above B20 (up to 100 percent biodiesel) only if the biodiesel meets the EN 14214 specification (primarily available in Europe). Engines operating on biodiesel blends above B20 may not fully comply with all applicable emissions regulations.

John Deere-approved fuel conditioners containing detergent/dispersant additives are recommended when using lower biodiesel blends, but are required when using blends of B20 or greater.

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### What is the difference between ASTM D6751 and EN 14214?

ASTM International is a standards group consisting of technical experts from producers, users, consumers, government and academia. ASTM standards are commonly recognized in the U.S. and Canada. ASTM D6751 identifies specifications B100 must meet before being blended with petroleum diesel typically in blends up to B20.

The European Union EN 14214 specification is similar to ASTM D6751 but is somewhat more stringent in some elements of the specification. The other difference is EN 14214 was developed with B100 in mind and ASTM D6751 was developed with blends up to B20 in mind.

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### Which John Deere engines can be used with biodiesel?

Engines manufactured by John Deere can be used with biodiesel meeting the standards previously outlined.

It should be noted however, that some John Deere equipment is powered by engines not manufactured by John Deere, so please refer to those manufacturers' owners manuals (if provided) for their position on biofuels. Information currently available for Deere equipment powered by engines not manufactured by John Deere follows:

Deere crawler dozers and crawler loaders that do not have Deere manufactured engines can use blends up to B20.

Deere excavators that do not use Deere-manufactured engines can use blends up to B5. Deere articulated dump trucks that do not have Deere-manufactured engines can use blends up to B5.

In all cases, the biodiesel component must meet ASTM D6751 (U.S.), EN 14214 (EU) or equivalent specification.

Deere is working with engine suppliers to gather information and test data regarding the use of higher blends for engines from those suppliers. This FAQ will be updated when we have additional information.

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### What are the advantages of biodiesel?

Biodiesel is biodegradable and nontoxic, and it results in improved lubricity, zero aromatics and minimal sulfur. In addition, biodiesel is a renewable energy alternative, reduces dependence on petroleum, has a high cetane content, produces less visible smoke and lowers engine particulate matter, hydrocarbons, carbon monoxide and life-cycle carbon dioxide emissions. Biodiesel also has a very favorable energy balance of 3.2 to 1 (energy balance is the difference between the energy produced by 1 kg of fuel and the energy necessary to produce it).

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### Why does John Deere support the use of biofuels?

John Deere supports the use of biodiesel because it recognizes the importance of biofuels to its customers and to the environment. The use of biofuels in John Deere diesel engines is the right thing to do from a long-term economic standpoint, as well as environmental, energy-security and rural-development standpoints.

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### Is there any special protocol for equipment using biodiesel?

Observing best practices is especially important when biodiesel is being used. The following maintenance procedures should be observed with equipment that uses biodiesel:

- Drain and clean fuel storage tank before and after using biodiesel
- Install tank caps and covers properly to prevent water from entering
- Clean any spills on painted surfaces immediately if using B20 or higher blends
- Replace fuel filter more often initially
- Check engine oil sump level daily prior to starting the equipment
- Switch to regular diesel fuel for standby generators, occasional/seasonal applications and extended periods of storage or idle of the vehicle
- John Deere-approved fuel conditioners containing detergent/dispersant additives are required when using blends of B20 or greater and are recommended when using lower biodiesel blends

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### **Do I need to modify any service intervals when switching from petrodiesel to biodiesel?**

Due to the solvent nature of biodiesel and the potential for "cleaning" of the vehicle fuel tank and lines, new fuel filters should be installed when biodiesel is introduced to older or used engines. For the first two changes, the fuel filter life will be half the standard.

When using biodiesel fuel, the engine oil level must be checked daily. If oil becomes diluted with fuel, shorten oil change intervals.

When using biodiesel blends greater than B20, oil service intervals should be cut in half. In no instance should the fuel dilution of the oil be allowed to exceed 5 percent. OILSCAN™ can be used to verify fuel dilution levels.

Refer to Diesel Engine Oil and Filter Service Intervals for more details regarding biodiesel and engine oil change intervals.

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### **Are there any biodiesel fuel storage guidelines?**

Biodiesel blends up to B20 should be used within 90 days of the date of biodiesel manufacture. Biodiesel blends from B21 to B100 should be used within 45 days of the date of biodiesel manufacture.

The reason for these usage time periods is to help ensure a stable fuel since biodiesel is naturally biodegradable. In addition to prompt usage, storage tanks should be protected from direct sun, frost and other extremes. They should also be kept as full as possible to minimize condensation since water accelerates microbial growth. To improve storage and extend fuel life, John Deere recommends the use of a fuel stabilizer. Consult your John Deere dealer for approved biodiesel fuel stabilizers. To be effective, the stabilizer needs to be added to the fuel when it is fresh (close to the time it was produced).

Request a certificate of analysis from your fuel distributor to ensure that the fuel is compliant with the above specifications.

Testing the fuel to ensure it continues to meet specifications is recommended.

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### **How does using biodiesel affect the engine warranty?**

The John Deere warranty covers only defects in material and workmanship as manufactured and sold by John Deere. Failures caused by poor quality fuel of any type cannot be compensated under our warranty.

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### **Are there any drawbacks to using biodiesel fuel?**

The risk of problems occurring in the engine increases as the level of biodiesel blend increases.

The following must be considered when using biodiesel blends up to B20:

- Expect a 2 percent reduction in power and a 3 percent reduction in fuel economy when using B20
- Cold weather flow degradation
- Stability and storage issues (moisture absorption, oxidation, microbial growth)
- Possible filter restriction and plugging (usually a problem when first switching to biodiesel on used engines)
- Possible fuel leakage through seals and hoses
- Possible reduction of service life of engine components

In addition to those factors listed above, the following must also be considered when using biodiesel blends above B20:

- Expect up to a 12 percent reduction in power and an 18 percent reduction in fuel economy when using B100
- Possible coking and/or blocked injector nozzles, resulting in power loss and engine misfire if John Deere-approved fuel conditioners containing detergent/dispersant additives are not used
- Possible crankcase oil dilution, requiring more frequent oil changes
- Potential corrosion of fuel injection equipment
- Possible lacquering and/or seizure of internal components
- Possible formation of sludge and sediments
- Possible thermal oxidation of fuel at elevated temperatures
- Possible elastomer seal and gasket material degradation (primarily an issue with older engines)
- Possible compatibility issues with other materials (including copper, lead, zinc, tin, brass and bronze) used in fuel systems and fuel-handling equipment
- Possible reduction in water separator efficiency
- Potential high acid levels within fuel system
- Possible damage to paint if exposed to biodiesel

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#### **How does using biodiesel fuel affect emissions certification?**

John Deere engines are certified to meet emissions standards with the prescribed EPA and EU registered fuels.

Engines operating on biodiesel blends above B20 may not fully comply with all applicable emissions regulations. It is the customer's responsibility to use the fuel that these regulations require and that the engine manufacturer recommends. In addition, it is also the customer's responsibility to obtain any local, regional or national exemptions required for the use of biodiesel in any emissions-certified John Deere engine.

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#### **Is there anything to watch for when purchasing biodiesel?**

Biodiesel users in the U.S. are strongly encouraged to purchase biodiesel blends from a BQ-9000 Certified Marketer and sourced from a BQ-9000 Accredited Producer, as certified by the National Biodiesel Board. Certified Marketers and Accredited Producers can be found [www.bq-9000.org](http://www.bq-9000.org).

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#### **Where can I get the John Deere-approved biodiesel fuel conditioners?**

Consult your John Deere dealer for approved biodiesel fuel conditioners to improve storage and

performance with biodiesel fuels.

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### **Where can I find further information as it relates to the use of biodiesel in John Deere engines?**

More information about the John Deere position on biodiesel can be found at [www.JohnDeere.com/biodiesel](http://www.JohnDeere.com/biodiesel).

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### **Can raw pressed vegetable oils be used in John Deere engines?**

Recently, there has been increased industry interest in the use of raw pressed vegetable oils as fuel in diesel engines. John Deere continues to investigate many renewable fuels.

Until those studies prove differently, raw pressed vegetable oils are not acceptable for use as fuel in any concentration in John Deere engines. There is concern that use of this fuel could cause engine failure. In addition, engines operating on such fuel may not fully comply with all applicable emissions regulations. It is the customer's responsibility to use the fuel that these regulations require and that the engine manufacturer recommends. In addition, it is also the customer's responsibility to obtain any local, regional or national exemptions required for the use of fuels in any emissions-certified John Deere engine.

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