

WE'RE DIALED IN ON BIOFUELS

REDUCE YOUR LIFECYCLE CARBON INTENSITY TODAY WITH ZERO ENGINE MODIFICATIONS

FUELING THE FUTURE

Biodiesel (FAME) and Renewable Diesel (HVO) are popular among customers seeking to reduce the environmental impact of their marine operations right now, on their existing Cat® engines. Using biofuels instead of petroleum diesel reduces lifecycle greenhouse gas (GHG) emissions in the fuel value chain.



WHAT ARE BIOFUELS?

Biofuels can be produced from renewable feedstocks. Biofuels from secondary feedstocks, also referred to as waste feedstocks, are considered a cost-effective, easy-to-implement alternative to traditional fuels.



BIODIESEL

- Also known as Fatty Acid Methyl Ester (FAME)
- Shorter shelf life than traditional fuels
- Expressed as the % of biodiesel blended with petroleum diesel, e.g., B20, B70, B100
- Increases nitrogen oxides (NOx)*
- May reduce available power up to 10% on B100***



RENEWABLE DIESEL

- Also known as Hydrotreated Vegetable Oil (HVO)
- Similar shelf life to traditional fuels
- Measured in its pure form, i.e., R100
- Reduces NOx**
- May reduce available power up to 5% on R100***

* NOx increase with biodiesel approximated from Environmental Protection Agency (EPA), Comprehensive Analysis of Biodiesel Impacts on Exhaust Emissions Draft Technical Report, 2002.

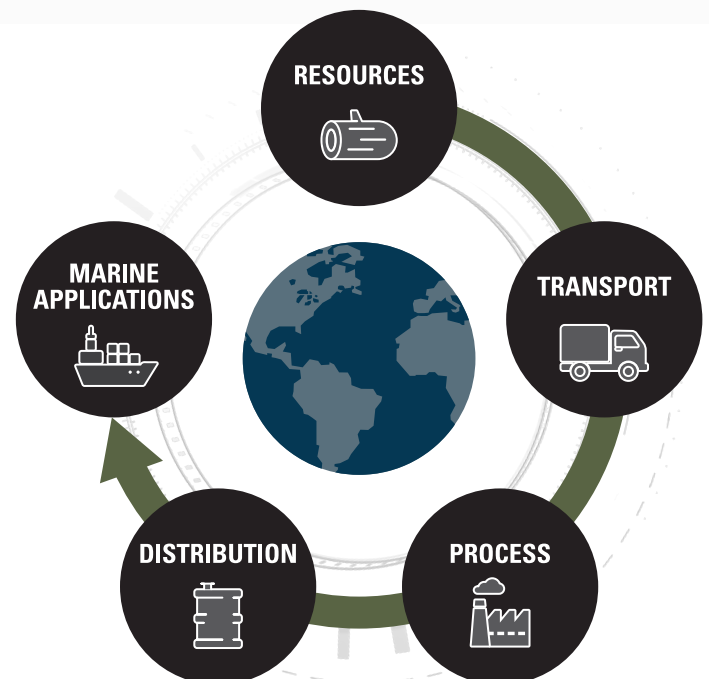
**NOx reduction with renewable diesel varies depending on operating conditions. Up to 10% reduction may be expected based on the work cycle.

***Power reduction with biodiesel and renewable diesel is based on fuel energy content at 100% concentration (neat biodiesel or HVO).

BIG-PICTURE VIEW OF BIOFUELS

From a well-to-wake perspective, biofuels can reduce overall carbon dioxide equivalent (CO₂e) lifecycle GHG emissions. It's important to also consider their carbon footprint through the whole value chain, i.e., energy consumed in growing the crops (cultivation, irrigation, harvesting), plus transportation, manufacturing and distribution of the biofuels.

TANK-TO-WAKE EMISSIONS FOR BIOFUELS ARE ESSENTIALLY THE SAME AS TRADITIONAL FUELS. SOME BIOFUELS MAY OFFER SOME ADVANTAGES, SUCH AS REDUCTION IN PARTICULATE MATTER.

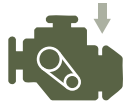


Note: GHG emissions at the tailpipe are essentially the same as with traditional fuels.

BENEFITS OF BIOFUELS



Offer an easy-to switch-to, drop-in alternative to traditional diesel fuel.



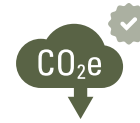
Deliver similarly rated power output, transient response, start-up time and NOx emissions.



Follow established international standards to ensure consistent fuel specifications.*



Do not impact standard equipment warranty or emissions certifications.**



Provide CO2e intensity reduction.***



Significantly lower visible exhaust smoke (with HVO), helping reduce environmental impact.

* Only purchase biofuels from reputable suppliers selling commercial-grade fuels that meet industry specifications. For more information on approved specifications, consult Cat Commercial Diesel Engine Fluids Recommendations (SEBU6251) or contact your Cat dealer.

**When using biofuels that meet recommended specifications.

***CO2e reduction varies depending on feedstock and blend level. Tailpipe emissions are essentially the same as traditional fuels.

(Source: California Air Resource Board, May 2021).

MARINE ENGINES BIOFUEL RECOMMENDATIONS

ENGINE MODEL	BIODIESEL RECOMMENDATION	RENEWABLE DIESEL RECOMMENDATION
C1.5-C4.4 Mechanical	Up to B7*	All Cat Marine Engines are Capable of Up to R100
C4.4-C7.1 Electronic	Up to B20**	
All Other Cat Engines with Aftertreatment	Up to B20	
All Other Cat Engines without Aftertreatment	Up to B100	

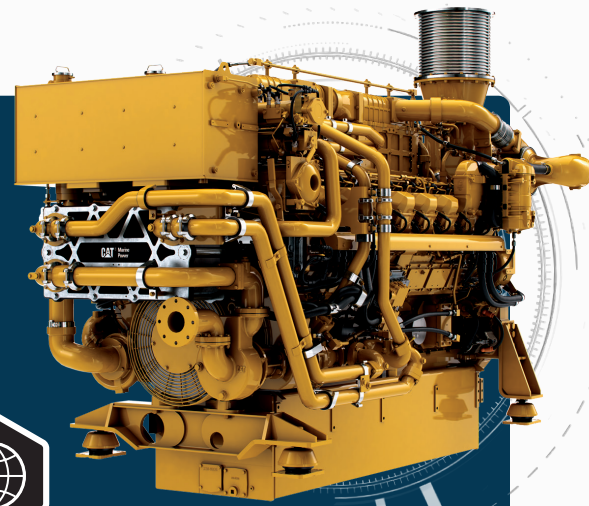
* BX: Indicates the blend of biodiesel + fossil fuel. The number following the "B" represents the percentage of biodiesel. For example: B7 = 7% biodiesel + 93% fossil fuel.

**Where mandated, higher blends (up to B30) can be used in these engines.

WE GO THE EXTRA (NAUTICAL) MILE

Whether your goal is to increase fuel flexibility, lower greenhouse gas emissions, improve safety, operate more efficiently—or all of the above—count on Cat Marine products and services to help navigate the energy transition. Our engines and generators have been running on biofuels (as an option to traditional fuels) for over a decade. Successfully, efficiently and economically.

We're dialed in on biofuels. Are you?



CONTACT YOUR CAT® DEALER TO ONBOARD BIOFUELS TODAY

This alternative to fossil fuels is available now. Your local Cat dealer can provide guidance and model-specific recommendations for switching to (or augmenting with) biofuels that will efficiently fuel your fleet's gensets and engines with less environmental impact.



To find your nearest Cat dealer, scan the QR code or visit: https://www.cat.com/en_US/support/dealer-locator