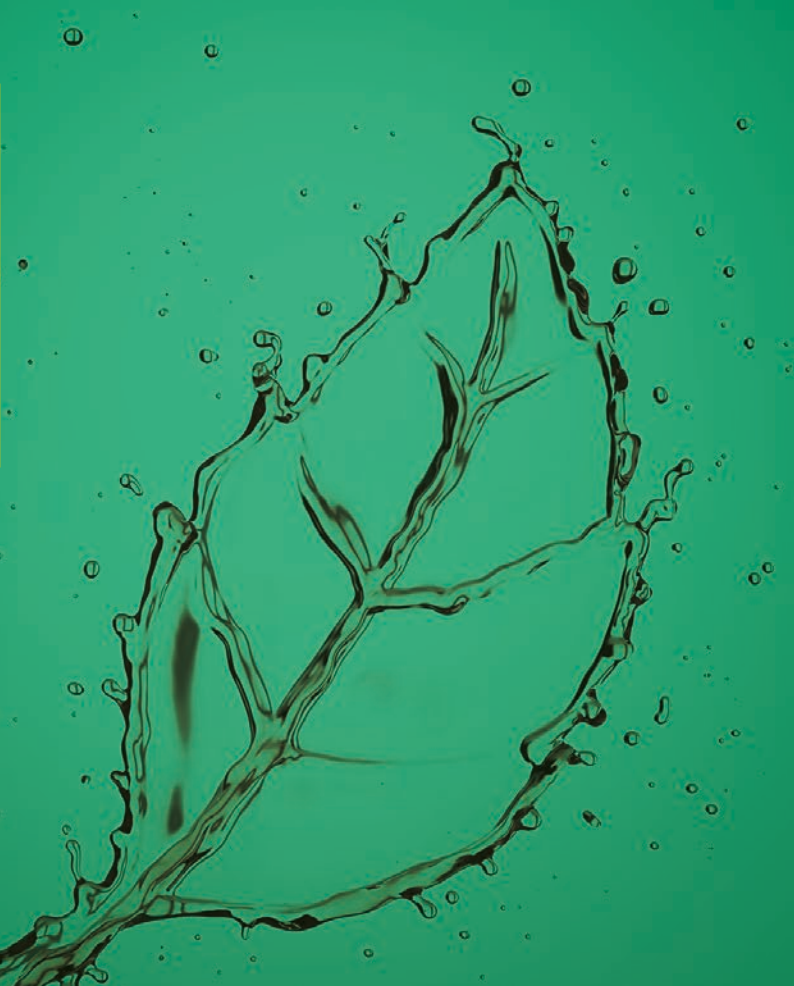

HVO fuel

Fuel from hydrogenated vegetable oils
for zero emissions crane operation

LIEBHERR

Mobile and crawler cranes



What is HVO?

Raw materials	Vegetable and animal oils & fats from the food industry (ideally waste such as used cooking oil and fat residues) At Ehingen: from waste (excluding palm oil)
Difference to diesel	Lower density & lower exhaust emissions
Addition	In pure form (100 % HVO) or in any ratio with diesel
Standard	EN 15940 (synthetic fuel)

HVO fuels which comply with standard EN 15940 with a base of hydrogenated vegetable oils can make a valuable contribution to reducing global emissions of greenhouse gases.

HVO vs. Biodiesel¹

	HVO	Biodiesel
Raw materials	Primarily vegetable and animal oils & fats (ideally waste)	Primarily rapeseed oil, vegetable oils, animal fats
Production process	Hydrogenation	Esterification
Chemical composition	Chemically pure fuel	Ester-based
Target	Both fuels are made from organic/renewable biomass. Target – replace fossil fuels	

Engine approvals

All the diesel engines we install have been tested in detail by the manufacturers. Furthermore, our cranes have undergone extensive testing and trials with customers in the field and at our test department using pure HVO (100%).

Liebherr engines	Approval for all Liebherr engines²
Cummins engines	Approval for QSB6.7 & B6.7
MTU engines	Approval for Stage 4 & Stage 5

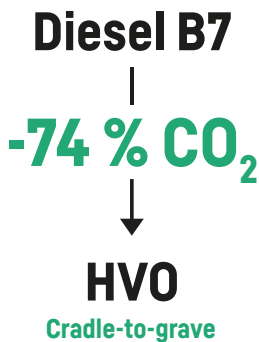
→ Cranes before interface emission stage 4: No approval, but we do not expect any technical problems or consequential damages when HVO is used

→ All our new cranes are HVO-ready

The benefits

Highlight

The **reduction** in **CO₂ emissions** from a 5-axle mobile crane which permanently uses pure HVO is **74 %³** compared to diesel fuel, if we take the full life of the crane including its production into account – cradle to grave, in other words.



- No modifications are required
- Good compatibility with all engine components
- HVO can be mixed with fossil diesel in any ratio for use in conventional internal combustion engines
- That means that even older Liebherr machines in global fleets can be operated on an essentially climate-neutral basis using HVO
- Very good low temperature resistance (down to at least -20 °C)
- Reduced use of Adblue (around -10 %)
- Lower emissions of nitrogen oxides (around -11 %)
- Lower soot particle emissions, especially in cranes without diesel particulate filters

¹ Comparison only serves to differentiate between HVO & biodiesel. Biodiesel is **not** approved for current Liebherr engines.

² Subject to alterations.

³ To achieve the maximum possible CO₂ reductions, the crane must be powered permanently using pure HVO. The CO₂ reductions fall if only low quantities of HVO are added to the fuel mix.

HVO at Liebherr

Since September 2021, all new mobile and crawler cranes in EHINGEN have been fuelled exclusively with pure HVO fuel (their very first tank of fuel and for test drives and on the test areas).



Up to 90 % lower CO₂ emissions during operation

HVO ready

Customer Service

**Personal.
Competent.
Reliable.**



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