

How KOHLER is *reducing emissions* by optimizing diesel generators

The climate crisis means that all organisations are under significant pressure to comply with environmental regulations and to achieve corporate sustainability goals. Anything that uses fossil fuels will be subject to increased scrutiny. The diesel generator is in this category, as it emits carbon dioxide (CO₂) and other gases.

Diesel generators are the backbone of a resilient energy solution to support critical applications. They are a proven technology with unmatched performance, that delivers reliable emergency backup power. A generator starts up quickly, in 10 seconds or less, and has a well-established fuel supply infrastructure.

However, generators are not always thought of as sustainable. How can we ensure that we minimize their emissions, and hence their impact on the environment?

HVO: A RENEWABLE FUEL

One of the biggest opportunities to reduce generator emissions is by switching from diesel to renewable fuel. In particular, hydrotreated vegetable oil (HVO) can provide an effective, low greenhouse gas (GHG) emissions balance alternative to petroleum-derived diesel.

HVO is made by the hydrogenation of vegetable oil, adding hydrogen to molecules, or by hydrocracking, using hydrogen to break big molecules into smaller ones. Also known as green diesel or renewable diesel, using HVO instead of conventional diesel reduces net CO₂ emissions by up to 90%.

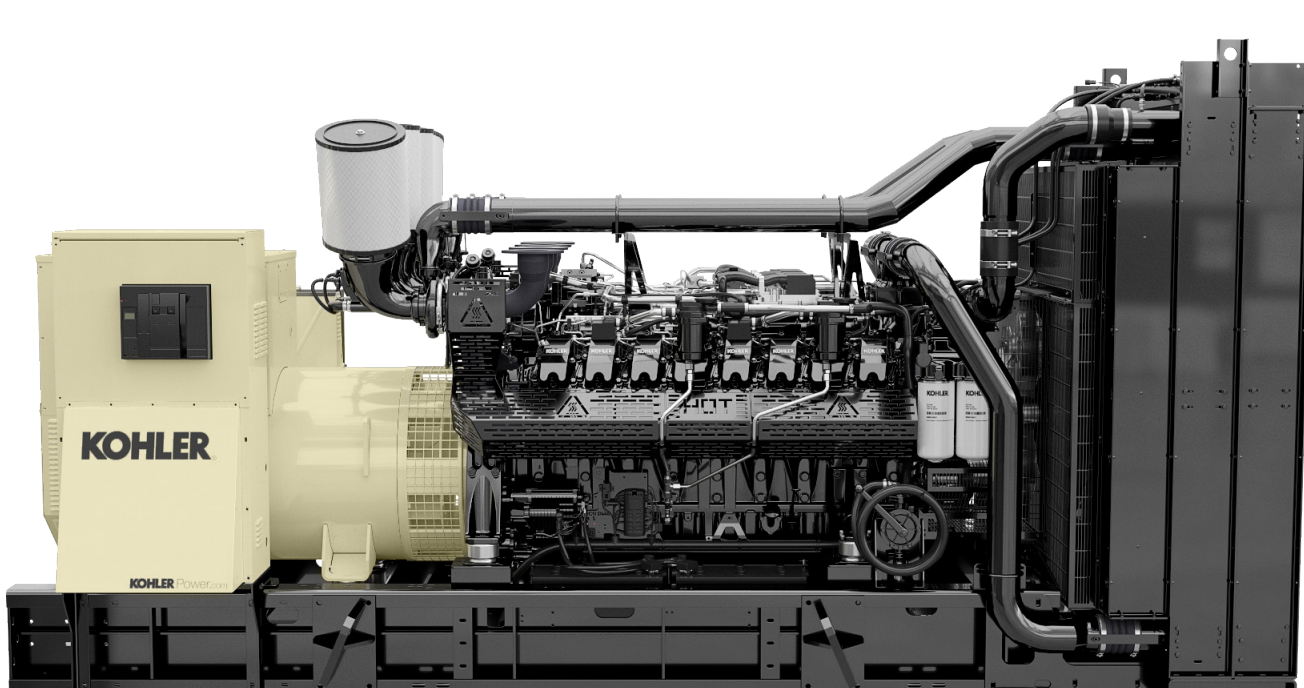


Since HVO is similar in grade and quality to conventional diesel, it can be used without modification or replacement of an engine or fuel system infrastructure. KOHLER's KD engines have been proven to operate with HVO.

"HVO is compatible with the standard mix of petroleum-derived diesel fuels, so it can also be blended with diesel. It is easy to store and handle, and can be kept for years without major degradation," said Pierre-Adrien Bel, product manager large diesel generators EMEA at Kohler. "The generator transient response time when using HVO is similar to the performance achieved with conventional diesel, meaning the genset can respond quickly when called upon."

Let's look at an example of how HVO can reduce CO₂ emissions. With a typical 1000-kilowatt generator that is running 100 hours each year on fossil diesel, that's the equivalent of the average usage of about 16 cars per year. If we do the same calculation for HVO, it's equivalent to less than two cars per year¹.

Looking beyond HVO, Kohler is continuing to work on solutions with other new clean fuels.



¹ For this calculation, we've used figures of the generator's CO₂ kg/kWh output = 0.75 (Fossil Diesel); 0.08 (HVO).

OTHER TECHNOLOGIES

"In our new product development phases of each of our gensets, we look carefully at the trade-offs involved in emission reductions, and ensure that we're doing everything to optimize emissions specifically for each application," said Justin Loritz, product manager large diesel generators North America at Kohler.

This typically starts with the easiest options, which for engines means in-cylinder technologies such as EGR (exhaust gas recirculation) and combustion optimization to ensure that we're getting the most efficient use of the engine.

For KOHLER's KD Series™ engines, we can reduce NOx emissions by calibration of the engines without any additional after treatment. This is a big advantage for us because it's very minimal technology - there's no additional add-ons, and it doesn't drive additional cost.

When we consider more stringent emissions requirements, that's where we need additional equipment. And this is where we start talking about technologies such as Selective Catalytic Reduction (SCR) and Diesel Exhaust Fluid (DEF), which can reduce NOx emissions to negligible levels.



OPTIMIZING MAINTENANCE SCHEDULES

Generators for emergency standby power spend most of their life sitting idle waiting for there to be an outage. To ensure that they're constantly ready they need maintenance, which includes being run regularly to check everything is working. Traditionally, this check is run with load to reduce 'wet stacking' - which is when unburned fuel builds up in the engine's exhaust system, leading to excessive wear and damage.

To continue to improve both the cost of ownership to our end customer, and the emissions perspective, Kohler is working to reduce the number of hours running needed each year for maintenance, as well as reducing the loads needed. A sustainable maintenance program, **Conscious Care™**, is now available on KD Series generators.

With a KD Series generator, the monthly maintenance runs can operate with no load present and with an extended exercise interval, reducing annual generator emissions by up to 69% (compared to the emissions when running the maintenance at 30% load). The advanced engine technology in the KD Series generators allows for this no load option without an increase in 'wet stacking'.



CONCLUSIONS

Reducing emissions is no longer optional for anyone designing or using diesel generators. Around the world, environmental legislation is setting strict requirements on the improvements needed.

By optimizing their performance, reducing maintenance requirements, and switching to renewable fuel such as HVO, we can minimize the environmental impact of diesel gensets.

"More than a decade ago, our company committed to delivering net zero greenhouse gas emissions across our operations by 2035, including investment in renewable energy solutions and improving diesel genset efficiency," said Nicole Dierksheide, director at Kohler. "We are also working to reduce the carbon footprint of making our products, with, for example, the mass reduction of parts, material changes or design optimization."

When we look at the emissions-reducing technologies discussed in this article, what's exciting is that we see minimal impacts on performance. We're not seeing derating on the engine, or worse transient performance.

If we want to focus on just one change: by simply switching to HVO, Kohler customers can reduce their generators' emissions by up to 90 per cent, right now. That's an excellent start, and further reductions can easily be achieved by implementing Kohler's sustainable maintenance program, Conscious Care.