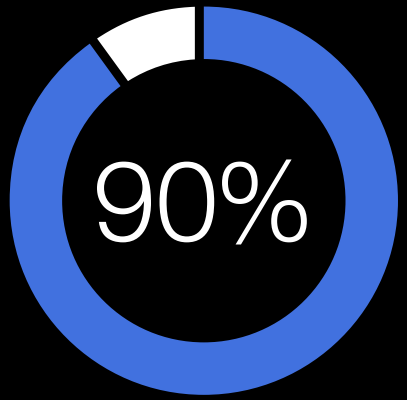
KOHLER®

Renewable fuels - the *reliable* and *risk-free* source of *sustainable* mission-critical power

Mission-critical power systems need to be reliable and resilient to support a range of vital infrastructures such as hospitals, smart grids, and utility plants.

But technologies such as diesel generators also need to be cleaner and more sustainable as part of the broader fight against climate change. Next-generation renewable fuels such as Hydrotreated Vegetable Oil (HVO), made from waste vegetable oils and other feedstocks, provide a high-quality slot-in alternative to fossil diesel that can reduce carbon emissions by up to 90%.

Renewable fuels represent a flexible and dependable option for generator users looking to decarbonize their operations as they embark on a longer-term journey to zero emissions.



NEXT-GENERATION RENEWABLE FUELS SUCH AS HYDROTREATED VEGETABLE OIL (HVO) CAN REDUCE CARBON EMISSIONS BY UP TO 90%.

Introducing next-generation renewable fuels

Imagine a fossil-free renewable energy source that reduces net carbon dioxide emissions by as much as 90%. It is a liquid fuel that can be used in existing infrastructure, such as mission-critical generators, without any modifications. And it has complete blending compatibility with fossil diesel, providing end-users with total flexibility in their operations.

Such a compelling set of performance characteristics might seem too good to be true. But this renewable fuel is already available today – and its widespread adoption is set to accelerate the pace of decarbonization rapidly, supporting organizations embarking on a longer-term journey to zero emissions.

The fuel in question is hydrotreated vegetable oil (HVO), which is made from waste products and residues such as vegetable oils, animal fats, and used cooking oils. The refining process means that HVO is a superior, cleaner-burning fuel than traditional first-generation biodiesel, and that feeds through into fewer emissions across its lifecycle.

These credentials make HVO a renewable alternative to fossil diesel – providing new environmentally-friendly options for the users of equipment such as diesel generators.

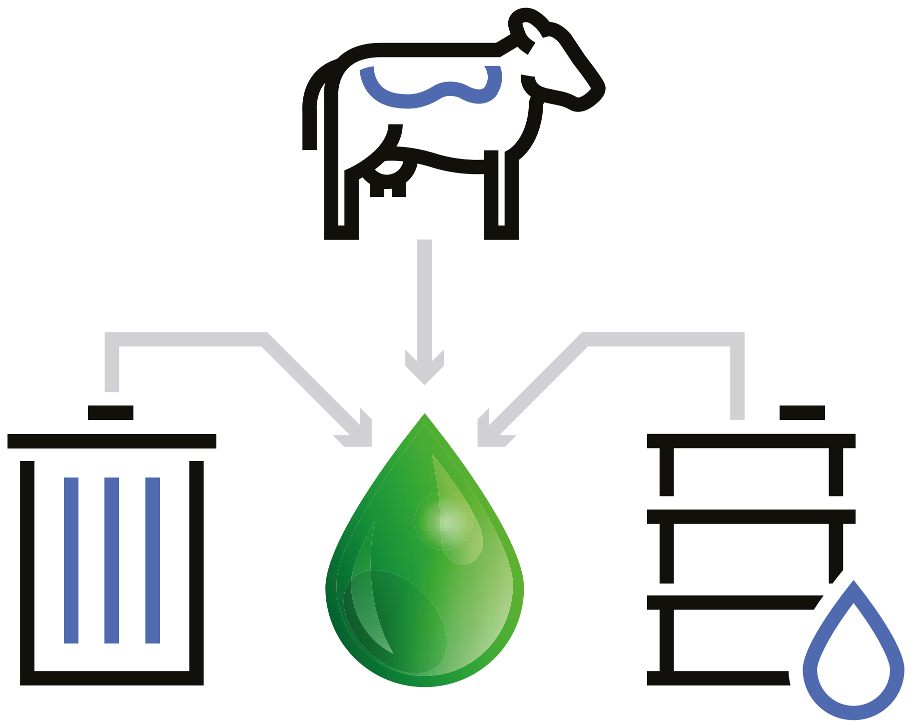
But what impact will these initiatives have on the diesel generator, which has long been the mainstay in the provision of essential backup power?

APPROVED FOR
HVO
RENEWABLE FUEL

Production of hydrotreated vegetable oil

So, where exactly does HVO come from, and how is it produced? The feedstocks are primarily waste products that don't impact agricultural land use. These include waste vegetable oil, used cooking oil, and waste animal fats, but also fish fat from processing waste and inedible technical corn oil generated in the production of ethanol from corn. HVO could also be made from photosynthetic organisms such as algae in the near-to-medium term.

In terms of the production process, impurities are firstly removed from the raw waste feedstocks. Then the HVO is produced by hydrogenation and hydrocracking of the raw materials using hydrogen at high temperature and pressure. The end-products are straight-chained hydrocarbons (paraffins) of consistent quality, which is very similar to the chemical properties of fossil-based diesel. According to the European Technology and Innovation Platform Bioenergy, the process is sufficiently flexible to convert a wide range of low-quality waste and residue materials to hydrocarbon-based drop-in fuels, making it a flexible diesel substitute for a broad range of diesel engine applications.



PRODUCTION PROCESS:

1. IMPURITIES ARE REMOVED FROM THE RAW WASTE FEEDSTOCKS
2. HVO IS PRODUCED BY HYDROGENATION AND HYDROCRACKING OF THE RAW MATERIALS
3. THE END-PRODUCTS ARE STRAIGHT-CHAINED HYDROCARBONS (PARAFFINS) OF CONSISTENT QUALITY

Significant advance on existing biofuels

The HVO production process is different from that used to create first-generation biodiesels, which is based on feedstocks being reacted with short-chain alcohols such as methanol via a method of transesterification. Consequently, renewable HVO fuel has different properties to first-generation biodiesels that, in turn, deliver significant environmental and operational advantages.

Firstly, the production process of HVO is such that the final product is similar in grade and quality to fossil diesel, so it can be used as a ‘drop-in’ for existing infrastructure, without modification. It is entirely compatible with the standard mix of petroleum-derived fossil diesel fuels. Therefore, it can also be blended with fossil diesel – boosting flexibility for the end-user.

Renewable diesel is a high cetane fuel, with a cetane number of 70-90 compared to first-generation biodiesel’s 50-65 and fossil diesel’s 40-55. High cetane has advantages such as better combustion, better cold start, and reduced emissions levels. Cetane number is often seen as a measure of the quality or performance of diesel fuel: the higher the number, the better the fuel burns within the engine of mission-critical equipment such as generators.

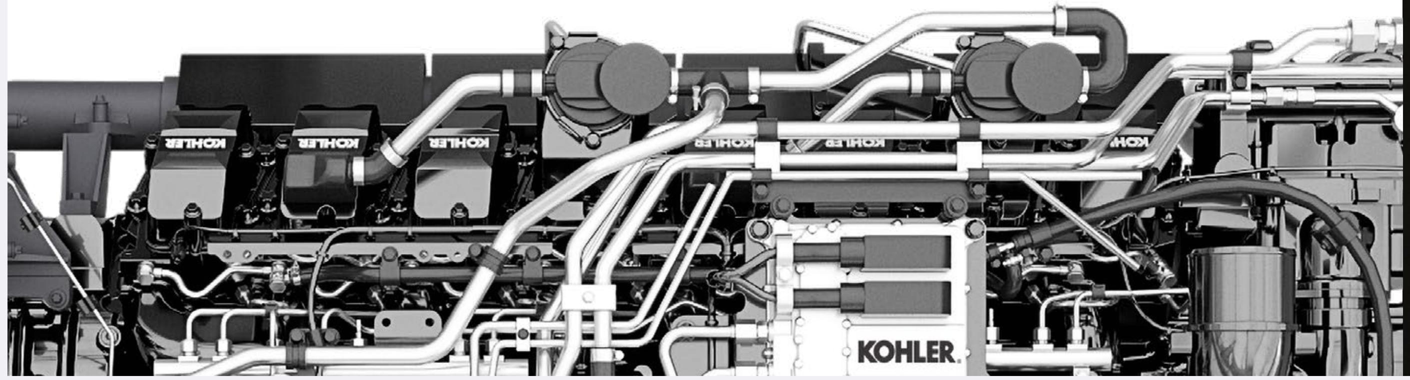
HVO is also very stable, with no bacterial growth, making it easier to handle and store than other fuels. It can be kept for up to ten years without any notable degradation. It is not prone to oxidation or water absorption, and it can perform in harsh conditions down to -32 degrees C. With a minimum flashpoint of 61 degrees C – it is safe to use in warmer climates.

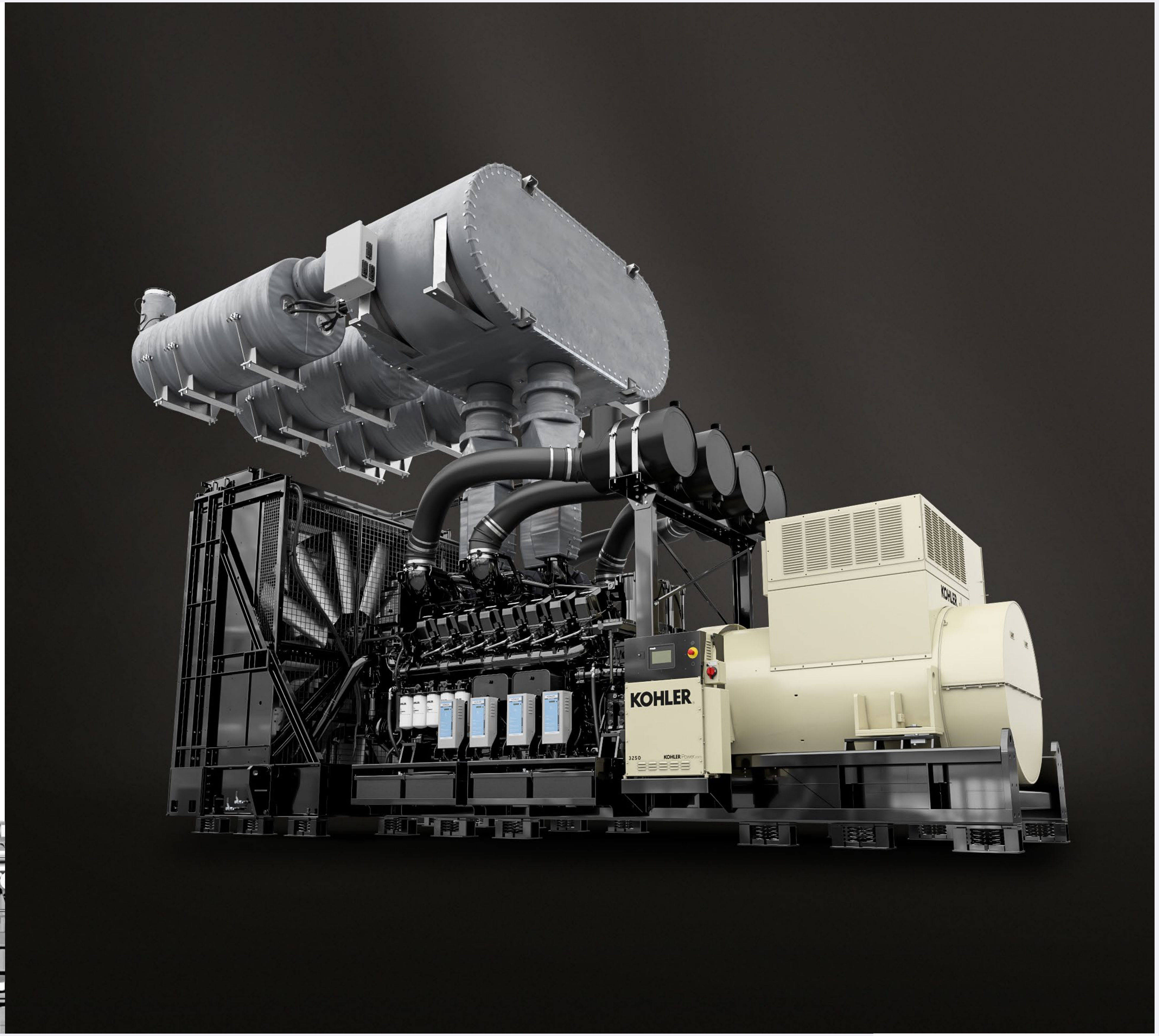
The only performance downside to HVO is a slight reduction in power output due to lower volumetric mass. For mission-critical generator users, this does not result in less power electrical output, rather the fuel consumption will rise 3-5% to compensate for the difference in volumetric mass. Generator transient response time with use of HVO is similar to performance with fossil diesel in operation.

Introducing HVO-ready generators

For applications such as mission-critical generators, HVO provides a cleaner and more sustainable alternative to conventional diesel and biofuels, where its use is deemed applicable by the end-user. This option is becoming increasingly important as companies look to decarbonize their operations as part of a transition towards zero carbon in the fight against climate change. In some parts of the world, such as California in the US and many European cities, legislators are actively encouraging and incentivising the uptake of renewable fuels to reduce harmful pollutants into the atmosphere.

For Kohler, the response has been to make segments of its diesel generator line-up fully approved for HVO, providing a simple and efficient renewable alternative to fossil diesel that can be implemented straight away. These products include the advanced KD Series, which are built with the latest advancements in engine technology and are used globally as a means of mission-critical back-up power for data centers, hospitals, utility plants and other industrial settings. Customers can now use HVO, fossil diesel - or both – with no adverse impact on performance and no requirement for additional maintenance. This means that Kohler generator operators can reduce their carbon footprint by as much as 90 per cent, almost overnight.





Ensuring a resilient supply chain

The technical and performance characteristics of HVO mean it is becoming increasingly popular as a renewable fuel solution across a broad base of industries. Consequently, multi-million-dollar investments are being made in the global supply chain, and HVO is becoming more readily available. New production facilities are regularly coming online, with the use of waste feedstocks encouraging shorter supply chains than first-generation biodiesels, which often rely on raw materials being shipped around the world. More local supply of HVO – closer to the end-user – means reductions in carbon emissions usually associated with transportation.

The growth in the HVO supply base is taking place in all key markets. In the US, for example, Chevron, Phillips 66, Diamond Green Diesel, and Global Clean Energy have all made announcements to increase the capacity of HVO – with the US combined output expected to reach six billion gallons by 2024.

Neste Corporation also recently established a $1 billion 50/50 joint venture with Marathon Petroleum to produce HVO at a refinery in Martinez, California. The facility will come online in the second half of 2022 and will produce 730 million US gallons by the end of the following year.

In Europe, meanwhile, big names such as Shell are also making moves into lower carbon fuels. In Rotterdam in the Netherlands, a new plant will produce HVO from sustainable feedstocks such as vegetable oils. Shell reckons that the 820 ktons/year renewable fuels plant will help avoid 2.8 million tonnes of carbon dioxide emissions a year.

Finally, state-owned energy provider Beijing Sanju Environmental Protection & New Materials launched a 400 ktons/year capacity HVO plant in Rizhao, Shandong province in China. In this case, the biorefinery utilizes used cooking oil and palm oil mill effluent as feedstocks. Beijing Sanju plans other sites in China, including a 1 M/tonnes a year facility in the southern Guangxi region.

These investments help ensure a resilient supply chain for HVO, ensuring availability across markets. HVO can be produced in dedicated facilities that manufacture only HVO, or it can be co-processed with fossil oil in refineries. Increased supply will help reduce the price of the fuel – which is around twice that of fossil fuels currently.

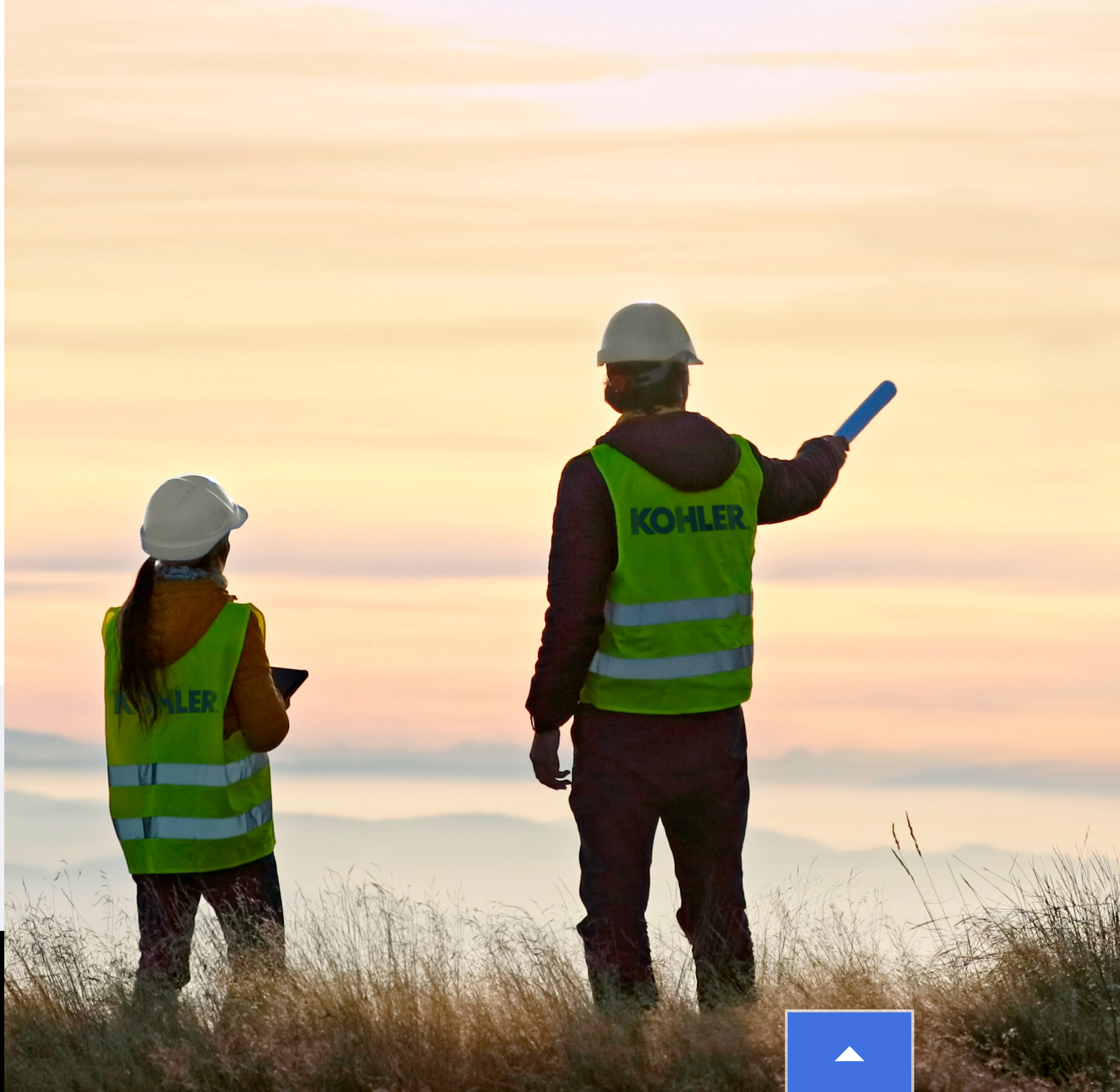
Traceability is also going to become an increasingly important consideration. Organizations such as International Sustainability and Carbon Certification confirm authentication of feedstocks on a global scale, providing details of where fuel was made, its exact composition, and the amount of greenhouse gas emitted during its production and transportation. This level of traceability provides end-users with guarantees around environmental and ethical sustainability, ensuring that production of the fuel has not resulted in damaging activities such as deforestation or land-intensive feedstocks.

Flexible options for Kohler customers

Flexible options for Kohler customers Mission-critical power plays a significant role in our everyday lives. It underpins the resilient operation of many infrastructures such as data centers, smart grids, hospitals, utilities, and airports.

HVO holds significant potential as a next-generation renewable fuel, allowing this power to be supplied in a cleaner and more sustainable manner. Its compatibility with existing diesel engines for generators provides end-users with genuine operational flexibility without losing performance. It represents a simple and efficient solution that is available right now.

Kohler believes in supporting customers with more sustainable solutions – providing today's generators for tomorrow's generation. Kohler will be a partner on this journey through innovation and collaboration - providing today's generators for tomorrow's generation.



Contact us

Kohler Power Systems EMEA
270 Rue de Kerervern,
29490 Guipavas, France
Website

Kohler Power Systems North America
444 Highland Drive
Kohler, WI 53044
Website

Kohler Power Systems Asia Pacific
7 Jurong Pier Road
Singapore 619159
Website

CLICK HERE TO CONTACT US,
OR VISIT HVO.KOHLERPOWER.COM.