

Ensuring energy *resilience*

How tried and trusted equipment such as generators will combine with other technologies to offer reliable and sustainable mission-critical power.

We hear a lot about the global energy crisis. There are threats of power cuts, alongside unbearably high energy bills, and many countries struggle to guarantee sufficient energy supplies.

So, what are the underlying factors at play? Let us focus on two key points: supply and demand. Put simply, demand is far outpacing supply, and supply has restrictions placed upon it that hinder growth.

Demand is increasing rapidly due to electrification, as we need to power smart devices such as cellphones and IoT controls, the data centers behind them, and more electric vehicles. Utility providers are struggling to keep up, with an aging infrastructure that requires maintenance and expansion.

The other side of the equation is supply. Multiple sources are needed to power the grid, like coal, gas and crude oil, renewables including wind and solar, as well as biomass and nuclear.

But conflicts can disrupt fuel supplies and force countries to find alternatives, which may be pricier, with lower availability.

On top of the supply and demand challenge, there are regulatory restrictions, typically focused on emissions. These may increase costs due to the mandatory addition of equipment (such as catalyts).

Finally, the climate crisis is creating weather extremes that cause further damage to the grid infrastructure and increase demand, both for heating and cooling.



ALTERNATIVES

These issues mean that governments and businesses need resilient systems to cope with energy outages and ensure a 100% reliable power supply.

There are some promising new technologies and energy sources. Firstly, countries can increase the overall capacity of their power grid, to reduce the impact of demand peaks. Solar and wind are boosting capacity, without increasing emissions, but both are inherently variable – when there's no wind or sun, there's no power.

So, we need ways to cope with inevitable short-term fluctuations in power supply. This means we need stored energy that can be called upon quickly.

Batteries are appealing, but still at a relatively early stage, with high costs. To provide the large amounts of power needed for grids, batteries are too expensive – although costs will fall in the years ahead.

Another promising energy storage technology is hydrogen. It's been around for years, but is still in the early phases of adoption, for two main reasons: you need a low-carbon way to make hydrogen based on renewables, as well as power generation products to consume the hydrogen, either adapting internal combustion engines, or using fuel cells.



DEALING WITH OUTAGES

New technologies like hydrogen and batteries have great potential, and renewables have a part to play. But today, when you need a resilient energy solution, a backup generator is the go-to option.

Generators have traditionally used diesel, but it's a fossil fuel the production of which generates high emissions. How can generator technology help in the move towards net zero?

The most frequent solution today is to use **HVO** (hydrotreated vegetable oil) in place of diesel. HVO has net carbon emissions up to 90% lower than diesel. It removes the dependence on fossil fuels and on specific countries to control our fuel sources.



INNOVATION IN PRACTICE

Kohler prioritizes resilience, so we explore new technologies while always improving our proven products.

How do we approach innovation in practice?

Firstly, we continuously improve proven solutions like our **KD series** generators that have evolved over years.

For customers wanting new technologies, we combine proven solutions with newer innovations. For example, pairing solar and batteries with a generator – so if the sun doesn't shine and the batteries are depleted, you still have resilient power.

We also look at adjacent industries for de-risking new technologies. For instance, as batteries are adopted in vehicles and mobility, their safety and performance improve and cost decreases, making them more viable.

We place a great deal of emphasis on advanced development and field testing. For example, in 2016 Kohler launched a new diesel generator range built on our KD engines. This meets the most stringent emissions standards, including ultra-low NOx and particulate matter levels, within a product sample. We proved our new designs internally, then deployed them into prototypes and finally into product samples that were field tested. Once we knew we had a reliable product that could back up a mission critical application, we launched.

We didn't stop there: we continuously expanded and improved the product, for example, we added HVO as an approved fuel.

A COMBINATION OF TECHNOLOGIES

Ultimately, the global energy crisis will demand ever-more innovative ways of guaranteeing reliable and sustainable mission-critical power. We believe that generators will continue to play a central role in support of emerging solutions such as renewables and batteries.

Indeed, Kohler takes a pragmatic and honest approach to the challenges of energy supply and is well-placed to offer transparent and informed advice on the best package of technologies to deliver the optimal solution.

