

Polar explorer sees the light



A historic Antarctic expedition was supported by an innovative and durable generator system that provided sustainable off-grid heat and power in the harshest conditions.

When British explorer [Robert Swan](#), OBE (Order of the British Empire), set off earlier this year to walk across the Antarctic landmass to the Geographic South Pole relying solely on renewable energy, he knew he was taking on a monumental challenge.

Even in summer, monthly [mean temperatures](#) at Antarctica's coastal research stations are between -10°C and -30°C, with the interior plateau rarely recording temperatures above -20°C. The task for Swan on his Undaunted Expedition was to complete his trek while using a power source that would minimize harm to the delicate ecosystem in the southernmost landmass.



CHAMPIONING SUSTAINABLE POWER TO COMBAT CLIMATE CHANGE

The [effects of climate change](#) are keenly felt in Antarctica, with the continent's temperatures rising [up to three times](#) faster than the global average. Research stations and expeditions have historically depended on diesel generators for mission-critical power and heating – which inevitably release some emissions of their own.

But Swan has always been at the forefront of advances in renewable energy and sustainability through his [2041 Foundation](#). As the first human to have walked to the North and South Poles, he was determined to show that near-net-zero polar expeditions were now possible. And so, the Undaunted Expedition to the South Pole was born, with the trek to be entirely powered by renewable energy sources centred around sustainable generators.

DEVELOPING A SPECIAL KIND OF GENERATOR

The first challenge was to develop a generator system that could cope with Antarctica's extreme conditions. With this crucial requirement in mind, Kohler became a partner on the Undaunted Expedition and set about developing a customized solution based on established engine and alternator technologies that had been proven for durability and reliability in industrial settings. These core systems were complemented with a rugged yet lightweight composite enclosure that would be easier to transport on the expedition.

To minimize the generator's environmental footprint, Kohler specified the use of a renewable fuel called hydrotreated vegetable oil (HVO). HVO is a high-quality alternative to fossil diesel made from waste products from the food industry, including vegetable oils and other sustainable materials.

What sets HVO apart from other biofuels is that it is produced within a circular economic model without putting added pressure on crop resources. Also, HVO reduces lifecycle greenhouse gas emissions by up to 90 per cent compared to traditional diesel.

The fuel is also cleaner than other biofuels, displaying a higher cetane number in the range of 70-90. This performance translates into better cold start, reduced emissions, more efficient combustion, and the ability to withstand extreme temperatures down to -32°C.

These features gave Swan reliable low-carbon energy generation to power the expedition.



A SCALABLE, SUSTAINABLE OFF-GRID SOLUTION

The HVO generator powering the Undaunted Expedition acted as the beating heart of a broader off-grid renewable solution, including batteries and solar panels. The integrated energy system was controlled by the [Heila EDGE](#), a modular and decentralized energy platform from Heila Technologies – part of Kohler.

Heila EDGE connected and optimized solar arrays, batteries, and other distributed energy resources, creating a resilient microgrid for Swan's Antarctic base camp. This system met the energy demand of the base camp while enabling battery charge to Swan's mobile equipment.

A SUCCESSFUL CONCLUSION TO AN INTREPID EXPEDITION

Swan embarked on his icy mission in December 2022 and successfully reached the Geographical South Pole in early 2023. The expedition showed that deploying and scaling low-carbon off-grid systems successfully, even in the harshest environments, is possible.

Swan and Kohler's partnership on the Undaunted Expedition is also testament to the considerable progress made with clean power generation solutions. Kohler's energy products show resiliency can be combined with sustainability – with no performance loss.

Indeed, developing more sustainable energy solutions continues to be Kohler's core mission. The company is constantly pushing the boundaries of energy efficiency for its generators, with optimized engines and after-treatment systems reducing emissions.

Now, with the widespread adoption of HVO generators, Kohler has taken a significant step on the journey to net zero power generation – with plans for other clean technologies to achieve fully renewable generation for future polar expeditions and beyond.

