Data center backup energy

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The data center industry is rethinking its approach to backup power, prompted by pledges from hyperscale operators to end the use of diesel fuel in their emergency generators. This trend is prompting new approaches to one of the most critical points in the digital infrastructure power chain, and will be carefully considered as mission-critical operators seek to strike the right balance between reliability and sustainability.

The shift won"t happen overnight. With generators deployed at virtually every data center around the globe, transitioning off diesel fuel is a big task. The data center industry was created to ensure that mission-critical applications never go offline, and that goal has typically been achieved through layers of redundant electrical infrastructure, including uninterruptible power supply (UPS) systems as well as emergency backup generators.

But early movers are implementing new approaches to backup power. Here"s a look at several approaches being implemented for power resiliency, including alternative fuels, large-scale batteries, fuel cells and geothermal.

Switching to less carbon-intensive fuels is a logical first step, as it protects the massive investment in generators by data center operators and service providers. Microsoft and Kao Data each have initiatives with alternative fuels at data centers in Europe.

This month UK data center provider Kao Data transitioned all the backup generators at its Harlow, England campus to HVO (hydrotreated vegetable oil) fuel, which Kao says will eliminate up to 90% of net CO2 from their backup generators while reducing emissions of nitrogen oxide, carbon monoxide and particulate matter.

"HVO fuel is dramatically better for the environment compared to traditional, mineral diesels," said Simon Lawford, Technical Sales Manager at Crown Oil, the fuel supplier for Kao. "It is 100% renewable, biodegradable, sustainable and non-toxic. We"re proud to have worked with Kao Data to initiate a first-of-its kind project, which will be transformative for the data center industry, and help point the way forward for significant reductions in industrial greenhouse gas emissions."

HVO is synthesized from vegetable oils, requires no modification to existing infrastructure and can be used as a direct replacement for diesel. It eliminates microbial growth, which generates sludge that can contaminate fuel lines and potentially lead to engine shut down. Kao Data will replace an initial 45,000 liters of diesel and switch to an HVO provision of more than 750,000 liters when the campus is fully developed.

"This move effectively eliminates fossil fuels from our data center operations, and helps us reduce Scope 3 emissions in our customers" supply chain, while delivering no degradation to the service they receive," said G?rard Thibault, Chief Technology Officer at Kao Data. "Most importantly, it shows how our industry can take a simple and highly beneficial step forward for the good of the environment, ahead of COP26 (the UN

Climate Change conference being held in Glasgow, Scotland in November)."

Microsoft will use low-carbon renewable fuel to provide emergency power for its cloud region in Sweden, the company said today. The backup generators at a new Microsoft data center in Sweden will run on Evolution Diesel Plus, a fuel that incorporates tall oil, a renewable byproduct of forestry and paper production. The "Eco-labelled" diesel is made by Swedish energy company Preem, which has worked with Caterpillar to ensure it will work in the generators at the Microsoft Azure cloud data center, which is scheduled to begin operating later this year.

The announcement advances Microsoft"s goal of ending its reliance on diesel fuel by the year 2030 as part of its goal to be carbon negative. The eco-diesel contains more than 50 percent renewables, and thus will have half the carbon impact of using petroleum-based diesel.

For more on "Drop in" substitution of alternatives to diesel, see fuel usage guidance from generator manufacturers Caterpillar and Cummins.

Utility-scale energy storage has long been the missing link in the data center industry"s effort to power the cloud with renewable energy. Energy storage could be a key enabler, addressing the intermittent generation patterns of leading renewable sources (solar panels only generate power when the sun is shining, and wind turbines are idle in calm weather). Large batteries could also lead to innovation in load-sharing with utilities and grid management.