

# Fridge power packs

For decades, there have been systems that draw cooling power from the prime mover engine, through various means, and supply it to the refrigerator compressor. These systems have continued to develop to the present day, reports Will Dalrymple

On 1 April, the government is ending the tax rebate on red diesel. That means that fuel for diesel-engined fridges will increase in price by 48p per litre. If the estimates of supplier Hultsteins are accurate, a typical 18- or 26-tonne rigid diesel burns about two litres per hour, or 3,000 litres per year, so the taxation change might add an extra £1,500 in cost per average vehicle of that size.

But cold needn't come from a standalone diesel; many different systems route power from the truck engine. In addition, those trucks needn't necessarily even be powered by diesel. For example, Scott Dargan, managing director UK and northern Europe, Carrier Transicold, says: "As long as there is an engine PTO output available, the Eco-Drive will operate just as it would on a diesel-powered truck. The design of the units mean they are ideally configured to work with LNG and CNG engines." (On a practical note, he adds that because of the larger gas tanks usually fitted on such tractors, it typically fits the Eco-Drive T model that is

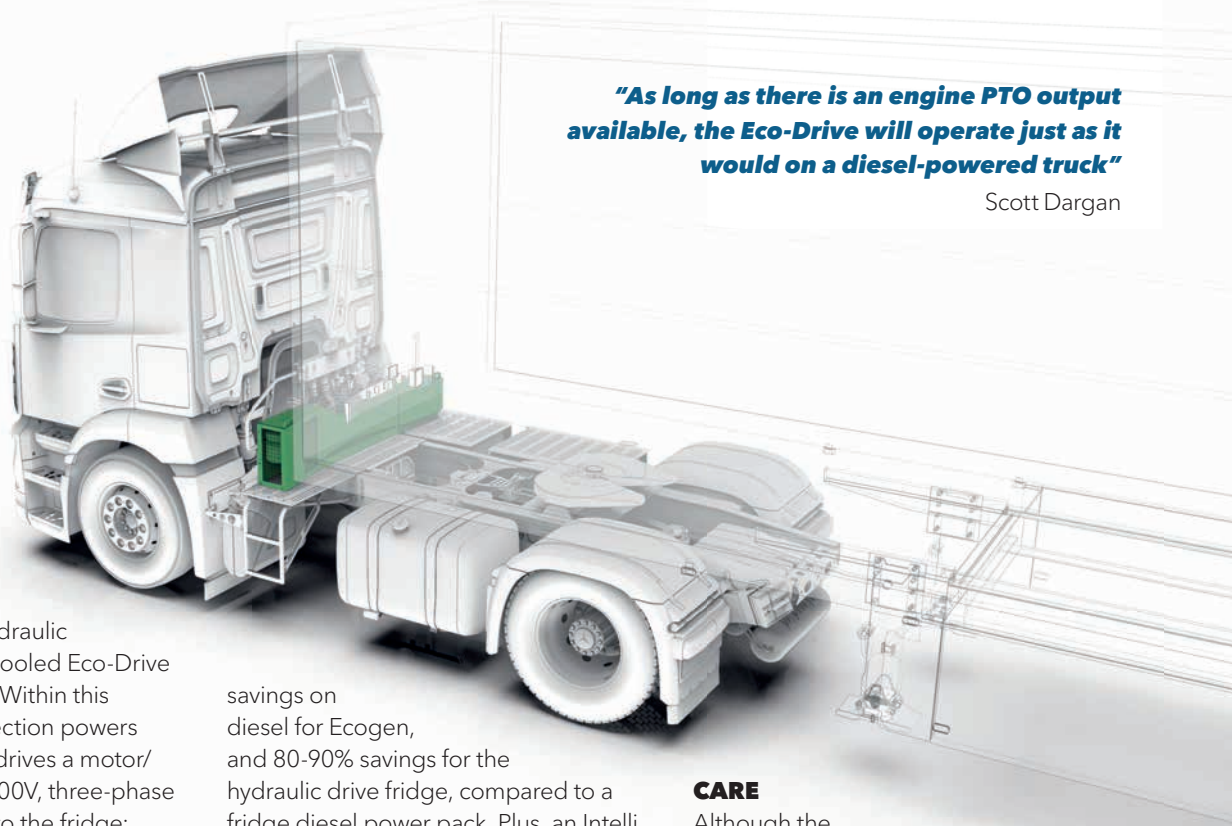


mounted behind the cab.) To start a round-up of PTO-connected power modules, Frigoblock's classic G-series alternator is fixed to the engine by a PTO crank and pulley. They are driven by a belt that runs an alternator that produces voltage and current (pictured below). Power output of these air-cooled alternators is 17 and 24kVA, although operations are



tending to specify the larger size, states regional sales manager Dale Cornes. This unit functions like a simple dynamo: increasing revs increases power output. She adds that this means that the unit increases the truck's idle speed to provide power.

A more sophisticated Frigoblock system, Envirodrive, launched in 2014, taps into the engine's water cooling system, and is said to be more efficient than the air-cooled version. The Envirodrive comprises an alternator and an inverter (pictured above left) coupled to a DC-DC transformer. Power output capacity is either 22.5kW or 30kW. That system features a massive capacitor to produce a stable output at 380V. For that reason, it is asynchronous, which means that it does not always take energy from the engine. That also provides an opportunity for electronic control of fridge demand for soft-start functionality. Frigoblock claims this system is 90% efficient. A recent trial comparing a group of five trucks of



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similar size fitted with Envirodrive and five without, found only a 1% penalty in fuel consumption for those equipped with Envirodrive.

Instead of using water cooling, Carrier Transicold adds in a hydraulic oil circuit within its air-cooled Eco-Drive units (pictured above). Within this system, the PTO connection powers a hydraulic pump that drives a motor/generator, supplying 400V, three-phase 50Hz electrical power to the fridge; capacities range from 25-45kVA. The company says that all of its units, managed by a smart in-cab controller, X-Flow, can rapidly return to any temperature set-point, so the engine need not always be on idle. In case the engine is off, another option is Carrier's additional Safe Start module, which automatically starts up the truck engine when refrigeration is required.

New entrant to the UK market, Hultsteins of Sweden, has recently launched a power supply of similar design to the Eco-Drive. Ecogen electric generators offer capacities of 20, 30 and 50kVA. The 30kVA behind-cab version generates 400V at 50Hz. The first three units in Scotland were installed in December 2021 on trucks in the fleet of Perth operator McLaughlan Transport.

Hultsteins also offers an older all-hydraulic design. The PTO turns a squash plate pump that feeds hydraulic oil directly to a fridge compressor. With a reported average additional hourly fuel consumption for the fridge system of 150ml, the all-hydraulic system offers better fuel savings compared to the hydraulic-electric option, because there are no losses involved with the conversions of energy (kinematic to pressure to electric), according to the company. The figures are 75-85%

savings on diesel for Ecogen, and 80-90% savings for the hydraulic drive fridge, compared to a fridge diesel power pack. Plus, an Intelli Start drive controls the engine directly to maintain a set-point. The first unit to be installed into a UK vehicle fitted with immobiliser is currently in testing.



**CARE**

Although the power supply units vary in function and components, repair and maintenance requirements are largely similar. Servicing Frigoblock's G-series involves replacing carbon brushes and potentially a slip ring and diodes, plus greasing. The water-cooled unit just involves greasing. Still, Frigoblock recommends a six-month service, which, if carried out by service agents, includes checking the condition of electric wiring. The PTO belt is to be replaced annually. It recommends using approved agents, who undergo basic training as well as specific courses on multi-temperature systems and inverters.

Carrier says that its Eco-Drive systems are serviced twice per year, and that work can be carried out by its service partner network as part of a service contract (called BluEdge). It says: "Being such high voltage systems, we take great pride in how highly trained every member of our service partner network is in terms of managing the health and safety requirements when it comes to service, repair and testing."

Hultsteins recommends an annual inspection, which includes checking the belts and the oil system. It is said to use standard belts to reduce servicing costs. Although the newest in the UK, Hultsteins has appointed a half-dozen service agents around the UK. [TE](#)

**BEV OPTIONS**

Frigoblock's product portfolio suitable for battery electric vehicles (BEV) includes the FK2, launched in November 2021. All-electric, it features Frigoblock's alternator technology. For better uptime, temperature control monitoring and cargo safety, the new FK2 unit can come with integrated telematics and connectivity thanks to the Thermo King BlueBox. Envirodrive can also be coupled to a hydraulic e-PTO, or even the vehicle's own inverter, although at an efficiency cost.