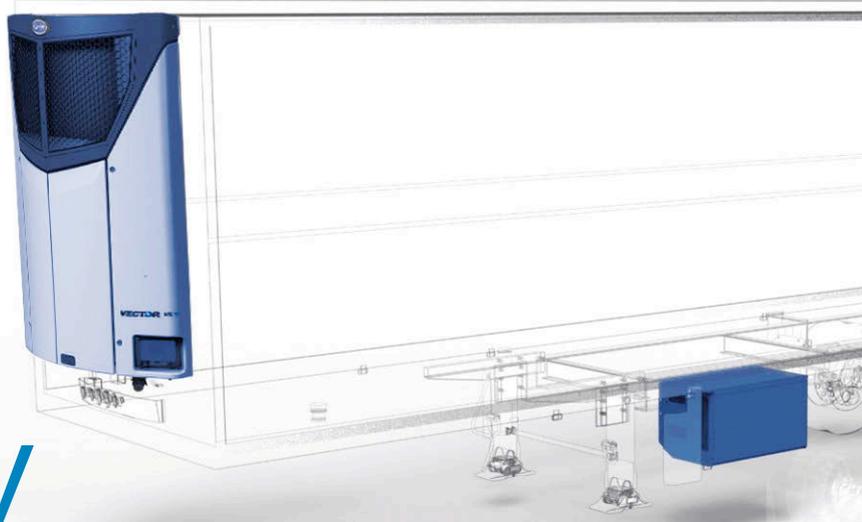


# Axles of efficiency



**A combination of mains power and kinetic energy recovered from trailer axles could power fridges in the future. Richard Simpson explains how**

As operators seek alternatives to conventional donkey-engine driven fridges ([www.is.gd/ojobux](http://www.is.gd/ojobux)), innovative manufacturers are using kinetic energy recovery system (KERS) technology initially developed to drive trucks to replace the need to use diesel to power fridge trailers either directly or indirectly.

Back in 2016, French start-up Adgero launched a trailer hybrid drive system at the UK's Commercial Vehicle Show ([www.is.gd/goyagi](http://www.is.gd/goyagi)). This had an axle-mounted electric motor-generator, which topped up graphene ultracapacitors when used as a retarder, storing energy that was then used by the motor-generator to assist the truck in acceleration. Although great things were promised, they have yet to materialise, in spite of well-publicised trials being announced in the UK with SDC, Stobart and Fraikin. Around the same time, at the 2018 IAA Show, Bosch discussed plans to use the motor from its eCargo bike in KERS for semi-trailers.

While using recovered braking energy for traction may have – for the moment at least – died a death, the idea of using it to drive fridge motors could be the next big thing in temperature-controlled road transport. The noise and exhaust pollution from

engines is eliminated, and some energy at least is reclaimed from vehicle braking. Major players working with the concept include Schmitz Cargobull, Thermo King, BPW, and Carrier Transicold.

## HOW THEY WORK

The latter is probably the closest to introduction in the UK. The Carrier Vector eCool system, pictured above, is suitable for use with engineless versions of the manufacturer's Vector HE 19 and Vector 1550 E fridge units, and combines existing E-Drive electric fridge technology with an energy recovery and storage system consisting of an axle-driven generator that tops up trailer-mounted batteries when

their charge level falls below a pre-determined point. The batteries can also be charged up from the mains electrical grid when the vehicle is parked.

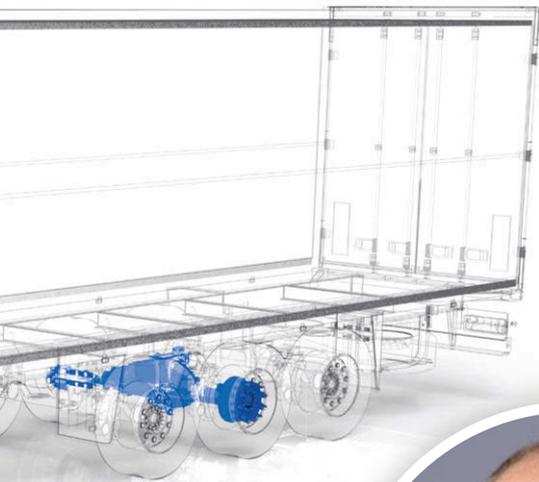
Heavy? Not so, according to Carrier Transicold's international president truck & trailer, Victor Calvo (pictured, right). He says: "If you compare the Vector eCool system, which adds key components including an axle generator and battery, versus a traditional Vector HE 19 refrigeration unit with its own diesel engine and a full fuel tank, the Vector eCool delivers a 10kg weight saving. In effect, the weight of the additional components is offset by the system not requiring a standalone engine or fuel tank."

Cost savings are harder to quantify, not least because the trailer can draw power from the mains when static, typically when at the operator's depot.



***“This system is a first for the industry; we’ve designed the Vector eCool to help customers improve fleet sustainability and better future-proof their operations”***

Victor Calvo



However, all costs must be seen against the background of the abolition of duty-rebated fuel for conventional diesel-electric fridges due in 2022-23.

Calvo adds: “While the total cost of operation for the Vector eCool depends on an individual customer’s specific application, we believe it offers great value for customers. Our own internal testing has shown the Vector eCool’s operating costs to be lower than those of a standard diesel refrigeration system.

“For temperature-controlled fleets, it means any fuel savings that can be achieved now will be worth significantly more in just a couple of years. The generator will have a similar operational



life to that of a traditional transport refrigeration unit [ $>25,000$  hours], while the cell technology in the battery pack can endure 4,000 recharging cycles, which should equate to 10 years on the road for a typical fleet.”

A similar product has been revealed in prototype form by rival Schmitz Cargobull (pictured below left). It is a vertically-integrated refrigerated trailer incorporating the company’s own refrigeration unit, axles and telematics.

The S.KOe uses the S.CUe all-electric engineless fridge unit (pictured below), which can produce up to 15.9kW of cooling or 9.1kW of heating energy, and draws power from batteries situated between the trailer’s landing legs, a location normally reserved for the diesel fuel tank on a conventional trailer. With 34 kW/hr batteries installed, the fridge unit can run for up to four and a half hours, depending upon conditions and demands. Recharging from a three-phase supply takes about 90 minutes. Larger battery packs are also available.

Recharging intervals can be extended and charging times reduced if the brand’s eAxle is specified. This uses a geared generator integrated into the existing Rotos axle design. Typically, this will be the centre axle on a tri-axle trailer.

When launched, the system will be integrated into the trailer’s telematics system, enabling factors such as battery charge levels, remaining range and (when on charge) remaining charging time to be monitored. Furthermore, an intelligent charging strategy aims to maximise on-the-road charging using the eAxle. That also provides additional

trailer braking capability, although a spokeswoman for Schmitz Cargobull said the braking torque generated by the axle is very low when compared to the effort of the standard brake, which is retained. Nevertheless, it is controlled by a smart algorithm, and the generator shuts off if the trailer EBS is activated by a wheel locking. As with the Carrier system, standard trailer tyres are used on the eAxle, and there is expected to be little impact on tyre life.

**WEIGHT PENALTY?**

All-up weight is expected to be marginally higher than for the diesel-electric version, but its advantages for specific operations are expected to compensate for this. It should be borne in mind that the Hatz diesels the manufacturer uses in its diesel-driven fridges are among the lightest in class.

Schmitz Cargobull highlights urban distribution and inter-depot trunking as being two applications particularly suitable for the S.KOe, which is expected to commence operational trials in the first quarter of 2021.

Thermo King also has a product, developed in conjunction with axle manufacturer BPW, which is promised to be revealed in greater detail in the first quarter of 2021.

Introduction of the Carrier system appears to be close. Calvo says: “Specifically, in the UK, the first demonstrator trailer is being manufactured by Gray & Adams and [were to] be on the road in January. Several major Carrier Transcold customers have already placed orders.”

Calvo concludes: “This system is a first for the industry; we’ve designed the Vector eCool to help customers improve fleet sustainability and better future-proof their operations - particularly when taking into account the tightening restrictions and regulations relating to Low Emission Zones and urban operations.” 

