

SOLAR FLARE

Diesel has long been the go-to fuel for fleet operators, but a growing interest and utilisation of electric propulsion systems with battery energy storage could point to a more sustainable future.

Another battery-boosting option on the table is solar panels. Over the last few years, a number of suppliers have begun to offer fitment of these to the roof of commercial vehicles.

Adam Buckley-Mayes, principal engineer at Trilar, says attaching a 10–20W solar panel to a commercial vehicle can trickle-charge diesel engine starter batteries, while those that generate 160–200W can utilise solar as a battery charger.

"This offers a host of benefits to make sure the battery is charged, which in turn has a knock-on effect on vehicle components, including the starter motor and the solenoids on the door locks," he says.

Trilar's system helps reduce parasitic loads during driving. "Power for the daytime running lights, camera systems and heater fans pull from the alternator, which drags on the engine and uses more fuel and [produces more] CO₂, but solar lets you introduce 400–500W of energy to counteract the alternator output."

Using this solution to reduce the alternator load has other operational benefits. Assuming a vehicle runs during a five-day working week, Buckley-Mayes claims that rigid vehicles could save up to 500 litres of fuel per annum, while vans could save around 300 litres. Powering tail-lift and double-deck lifting trailers from solar panels rather than the tractor unit via the Anderson lead could potentially save

Solar panels come with a range of benefits for commercial vehicles and trailers, but only if you have the right amount of roof space. Ben Spencer reports

upwards of 200 to 250 litres of fuel.

The panels generate electricity. Buckley-Mayes explains that Trilar utilises MPPT [maximum power point tracking] technology within its charge controller to convert the solar energy into 12/24V output. "On rigid trucks, we go straight into the vehicle battery to drive down the use of the alternator, therefore saving fuel and reducing CO₂. On trailers, we include a battery pack to make the trailers self-sufficient, meaning the tail-lift and deck-lifts can run without the need for external power."

A rigid kit in total weighs about 18kg including the panels, while a trailer kit including batteries weighs about 150kg.

Another system, which comprises solar panels, batteries and power electronics, is the Titan system from

SEASONS IN THE SUN

While solar panels can provide a boost to the batteries, the UK is renowned for having mild winters with little sunlight. Buckley-Mayes, therefore, emphasises the importance of modelling the solar array correctly to cover the winter months. "If you wanted to cover the winter months completely with solar, you would need quite a large array. For instance, in December and January, you would generate 10% of the output you would get in June or July, so you have to be able to spec big enough to see you through."



CV service organisation Marshall Fleet Solutions. It operates independently from the trailer's 24V electric circuit, says head of future products Lionel Curtis.

Making a return on investment (ROI) is crucial for operators thinking about investing in this technology. Buckley-Mayes says: "It comes down to finding the correct solution to guarantee an ROI, because there would be no point in saving £500 worth of fuel, [because] the technology is costing you what would be the equivalent of 2,000 litres of fuel. Therefore, each scenario is product specific."

For example, a double-decker trailer might normally do a deck lift in the morning followed by another once it has unloaded during the night. He adds: "You would look at how much energy that operation has taken from the battery, which would typically be eight amps, four per deck lift. Therefore, you would be looking at the solar replenishing that during the day."

Buckley-Mayes confirms that a 330W or a 500W panel installed on the roof of a van can provide an average of 5% range extension, depending on the size of the batteries in the vehicle.

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Lionel Curtis



This technology is also expected to extend the radius for operators, especially those offering last mile deliveries. “Typically we would see around 5-10%, especially during summer, so a 60-mile range would be around 66-70 miles with our system. When introducing our battery solution for electric fridges, we can then provide around 10kWh instead of the drive battery, which gives the 30-40 mile extra range.”

The system also saves fuel on a vehicle with a combustion engine, providing more miles per gallon.

OTHER APPLICATIONS

In applications such as refrigerated transport, every bit of power adds up. Curtis says: “Even the super-efficient fridges run at 1.5 litres per hour, so you are saving £2 an hour. If you drive 2,000 hours in a year with your fridge, you are saving £4,000.”

Curtis explains that the power electronics of the Titan system transfers the energy received from the solar panels to charge lithium batteries. It powers the fridge by three-phase DC power at 400V; it can also charge the batteries by accepting 430V three-phase mains input. The weight of the system will depend on the battery capacity, but a Titan system for a trailer is likely to weigh in the 350-500kg range.

“We can operate at three-phase, which means the motor turns faster,

runs the fridge faster, which then gets you up to the power of high-speed diesel,” Curtis adds. “On a typical truck-mounted fridge, the electrical standby won’t be as powerful as diesel on high-speed, but we get closer to it, and we get closer by using an inverter that operates at 60Hz.”

In a more recent move, Titan has been fitted to an Ocado Logistics 4.98m high double-deck trailer, combined with an Advancer A400 refrigeration unit (pictured above).

THROUGH THE ROOF

The size of the roof will limit the amount of energy obtained, which depends on the size of the panels installed. Curtis states that panels placed on the roof of a 13.5m trailer provide nearly 5kW of power, while those fitted to 8.5m fridge trailer produce between 2.5-3kW.

Buckley-Mayes adds that companies looking to trickle charge the vehicle’s battery need solar panels covering at least a 0.5 square metre area of the roof to provide 80W of power, while operators that want to introduce battery charging would need a one square metre area to produce between 160-200W.

Trailer also offers a bespoke controller that enables the use of solar as the primary source of energy to reduce the alternator load on internal combustion engine vehicles, and the high-voltage battery on EVs.

“With 3.5-tonne vans you only have a certain section of the roof available, which is especially the case for maintenance vans that have antennas and fan vents that reduce that space,” he explains.

Once a solar array has been placed on a roof, Curtis does not recommend reusing them on another trailer, because they degrade over time, with a rate of decline that is similar to lithium-ion batteries – a 20% drop over eight to 10 years. He does, however, note that a company could reuse the power electronics on another vehicle, at a lower cost than buying new.

“You’ve got to look at the whole bigger picture because for far too long we have been caught up on transitioning from diesel to electric, but we haven’t focused on how we are going to get the energy into the vehicle, and that’s wrong,” Curtis continues. “The power electronics could serve two, maybe three trailers, whereas the solar panels for the batteries would serve one vehicle.”

Buckley-Mayes agrees with Curtis, adding that Trailer’s solar panels (pictured above) come with an adhesive backing that is permanently applied. “Typically, we would not want to move the solar panel off the roof of the vehicle. With our fuel-saving technology, we get our ROI to around two years, so that it pays for itself and will continue paying for the five to ten years of the vehicle trailer.” **TE**