



# Electric VISION

IVECO and Nikola of the USA are aiming to persuade UK and European hauliers to go zero-emission for long-haul work with the launch of a hydrogen fuel cell truck with a claimed range of up to 500 miles, reports Steve Banner

**T**he Nikola Tre is based around IVECO's S-Way tractor unit, with Phoenix, Arizona-based Nikola providing the fuel cell technology. Around 40kg to 80kg of hydrogen is held in high-pressure carbon-fibre tanks mounted between the truck's chassis rails which can be refilled in around 15 minutes, say the manufacturers. Maximum power output is 300kW (402bhp).

Trials of the newcomer are scheduled to start in 2021, with the launch scheduled for 2022 and the first deliveries in 2023.

Before that, a fully electric version of the same truck will arrive with a claimed range of 250 miles between recharges. Trials will start in mid-2020; it will make its public debut at the IAA Commercial Vehicle Show in Hanover, Germany in the autumn, and the first ones should be in customers' hands in 2021.

Nine 800V lithium-ion battery packs with a total capacity of 720kWh are fitted and can be fully recharged in no more than two hours, say the two companies. Sourced from South Korea, they come with cylindrical cells and are partly replenished by regenerative braking. Top power output is 480kW (643bhp) with 1,800Nm of torque on tap. Both vehicles use the same drive-axle-mounted electric motor - hub-mounted motors are under consideration - and the fuel cell model will be equipped with one of the aforementioned battery packs. Both vehicles will be roughly 900kg heavier than the equivalent diesel S-Way.

In December, the two companies unveiled a maquette - a detailed full-scale model - of the battery-electric version in Turin, IVECO's home town, just three months after the announcement of their partnership. "We've pulled off something that most truck manufacturers would take three years to achieve," says larger-than-life Nikola chief executive officer, Trevor Milton.

Under a 50/50 joint-venture agreement, IVECO will market the newcomers through its dealer network, but they will retain the Nikola badge. The trucks will be assembled at an IVECO plant in Europe, but an announcement has yet to be made as to which one it will be.



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Trevor Milton

First to arrive will be 4x2 models, followed by 6x2s and possibly a 6x4. Tre will also be sold as a two- and three-axle rigid, grossing at 18 and 26 tonnes respectively. Italdesign has been involved in integrating what Nikola has to offer into the S-Way, with the work carried out at its headquarters in Moncalieri, Turin.

Expected sales volumes and prices have yet to be revealed. However, IVECO and Nikola hope to be able to match or beat the equivalent diesel models in total cost of ownership terms, with the fuel cell version said to be potentially 10% to 20% cheaper to acquire and operate than a diesel.

A key reason for IVECO's embrace of batteries and fuel cells is the need for truck manufacturers to reduce the CO<sub>2</sub> emissions of their products by 15% by 2025 under European legislation. The new vehicles will help IVECO to achieve this target, despite the fact that they will be badged Nikola.

IVECO is owned by CNH Industrial, and CNH chief executive officer Hubertus Muhlhauser is endlessly enthusiastic about the new venture. "It's going to be a step change for the truck industry globally," he insists. "What we've got is the coolest, most exciting, hippest truck on the planet. What we've created with Nikola is a unique partnership - it's a marriage that makes a lot of sense - and Nikola is a true disrupter."

He is convinced that fuel cells are set to have a massive impact on transport and on the economy in general. "A fuel cell and hydrogen represent the only way to transport and store an abundance of energy," he argues.

None of this should be taken as suggesting that IVECO is abandoning the continued development of engines that will run on diesel, compressed natural gas, or liquefied natural gas, stress the company's executives. "LNG is in fact proving to be a useful bridge to the acceptance of electric and fuel cell

trucks," says Gerrit Marx, CNH president, commercial and specialty vehicles.

#### **HIGH-TECH**

IVECO and Nikola are stressing the truck's connectivity as well as its environmental benefits with a new infotainment package. As well as satellite navigation, which takes obstacles such as low bridges into account, it features controls for many of the vehicle's functions. They include climate control, suspension height adjustment and the 360° camera system. The truck is fitted with cameras rather than bulky exterior rear-view mirrors - which should cut fuel consumption by around 1%, says IVECO - with the images they see shown on monitors inside the cab.

Bluetooth low-energy technology can be used to create a link between the driver's smartphone and the truck, creating a keyless entry system that unlocks the cab as the driver approaches. The arrangement is as secure as it can be, say IVECO and Nikola, just so long as drivers don't allow their phones to fall into the wrong hands. They should of course take equal care of conventional keys, for the same reason.

Not just an electronics designer, Nikola designs and manufactures hydrogen-electric vehicles, electric vehicle drivetrains, vehicle components, energy storage systems and hydrogen stations. Milton is not one to undersell his company, its products, its partnership with IVECO, or himself. "I don't care what other truck manufacturers say," he states.



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#### **SOURCES OF HYDROGEN**

So where will all the hydrogen required come from? Nikola aims to set up a network of 70 hydrogen production and refuelling sites along key transport routes around Europe, but the first ones will not appear in the UK until 2026. They will be preceded by locations in France, Germany and Italy, with Poland and other East European countries likely to follow from 2030 onwards. Covering around three to four hectares (7.5 to 10 acres), the sites will be substantial, producing up to eight tonnes of hydrogen daily, consuming 75,000 litres of water and requiring a substantial 17.8MW of power. They could cost the equivalent of US\$15m (£11.5m) apiece to set up but would meet the needs of over 160 trucks a day. The electricity will have to be generated by environmentally friendly sources - solar, wind, tidal, etc - to make the project credible. Zero-carbon nuclear would be an acceptable source, too, but not fossil fuels. **TE**

## **STATESIDE ROLLOUT**

Nikola has already developed day- and sleeper-cab tractor units for sale in North America under the Nikola One and Nikola Two banners. They are offered under a seven-year/700,000-mile leasing agreement, which includes maintenance and fuel, as well as the vehicle. Brewing group Anheuser-Busch has already ordered 800 fuel cell models for use in its North American distribution operation. The first one recently went into service in St Louis, Missouri, delivering a consignment of beer from the brewery to Lohr Distribution. It is possible that Nikola trucks could be supplied under a similar arrangement on this side of the Atlantic, alongside other agreements.