Battery powered trains

The development of the WINK train in the Netherlands

What was Arriva's challenge?

The Dutch government has an ambition for transportation to be climate neutral by 2030 and Arriva's business in the Netherlands has accelerated this target further by aiming for climate neutrality in 2025.

Electrified rail is a faster, more reliable, greener and cleaner option, but track electrification requires huge capital investment from infrastructure owners,and, in some cases, this is impractical. This is true of the Northern Lines, which have numerous bridges and viaducts, making full electrification challenging.

The Passenger Transport Authority (PTA) looked to Arriva to find a cost-effective solution to achieve emissions reduction on partially electrified tracks.

Arriva working in partnership

Together with Stadler, Arriva developed a world first: a hybrid train that could operate with diesel engines using Hydrotreated Vegetable Oil (HVO) and switch to battery power for sections of the journey.

HVO is cleaner burning and can also be used at lower temperatures than other biodiesel forms.

In 2020, Arriva renewed its Northern Lines rail concession for the provinces of Groningen and Friesland and modernised its fleet with 18 of these new WINK trains. The batteries can store the energy that is released during braking and then use the battery power on parts of the line that are not electrified. In future, when the diesel engines are finally removed, the train can run under the pantograph on sections of electrified track and store energy which will be used on parts of the track which are not electrified.

Extensive trials took place at the end of 2021 to further improve the performance of the train. In partnership with government-owned ProRail, and along with the provinces of Overijssel, Gelderland and Fryslân and the manufacturer, Stadler, Arriva deployed an adapted WINK train on tracks without overhead lines. Testing was designed to examine the range of the battery and the performance of the train and see how quickly the battery drains and recharges. Arriva also analysed the switch from the overhead lines to battery operations and vice versa.

The train charged its battery via the pantograph on electrified sections of line, and then used the battery power on non-electrified tracks, avoiding the need for fuels to be used.

ProRail

STADLER

The result

Tests successfully concluded in March 2022, proving that these trains can be operated with zero emissions even on non-electrified tracks.

This is a breakthrough for Arriva's operations in the Netherlands, providing an alternative to hydrogen fuelled trains and an alternative to hybrid fuel/ battery operations.

The future

The data gathered during Arriva's trials will be used in the further development of traction batteries for these types of trains. The results will also be used when examining the best Zero emission infrastructure in other parts of the Netherlands.

By proving that Arriva can decarbonise without full electrification of the tracks, it has created a cost-effective solution that meets our client's sustainability ambitions.

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