

Press release

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World's first narrow-gauge hydrogen train unveiled

Stadler and the transport company Trasporti Regionali della Sardegna (ARST) unveiled the world's first hydrogen-powered train designed for narrow-gauge lines in Erlen. Compared to diesel trains, the new vehicles will save over 2,100 tonnes of CO₂ per year. In addition to Sardinia, Sicily and Calabria are also participating in the green transition thanks to Stadler's hydrogen trains.

Stadler and ARST unveiled today the world's first narrow-gauge hydrogen train at the commissioning centre in Erlen (Switzerland). The new trains will enter passenger service from 2028 on the narrow-gauge lines operated by ARST, specifically connecting Alghero Airport – Mamuntanas, Sassari – Alghero and Sassari – Sorso.

“With the commissioning of the first hydrogen-powered train designed for narrow-gauge railways, Sardinia is proving itself a pioneer of technological innovation in the transport sector. This is the first train of its kind, specifically designed for contexts similar to ours with the aim of turning a limitation into a great opportunity. The hydrogen trains, which will be deployed on ARST lines, are a shining example for the environment, the local economy and the development of key skills in our region,” said Barbara Manca, Regional Minister for Transport of the Autonomous Region of Sardinia.

“The unveiling of this train demonstrates ARST's ability to position itself as a cutting-edge company on the international stage. We are deeply proud to bring the world's first narrow-gauge hydrogen train to our lines. It is a historic technological leap forward for our fleet, a milestone made possible by the full alignment of objectives and the crucial support of the Region of Sardinia. We are radically transforming the way we provide public transport, making ARST a model of innovation and reliability,” explains Giovanni Mocci, Sole Director of ARST.

“This is a world first in the global rail sector, combining innovative technological development with sustainability. The train we are presenting today sets new standards in Italian regional rail transport and demonstrates the commitment of Stadler and the Autonomous Region of Sardinia to more environmentally responsible rail transport,” says Maurizio Oberti, Stadler’s Sales & Marketing Director for the Italian market. “We would like to thank ARST for the trust they have placed in us and for the excellent collaboration established during the project.”

A saving of over 2,100 tonnes of CO₂

With the launch of the new hydrogen train, Stadler and ARST are opening a new chapter in sustainable regional rail transport in Sardinia. Compared to the use of diesel trains, the ten hydrogen trains ordered by ARST will save over 2,100 tonnes of CO₂ per year, equivalent to around 450 trips around the globe by car.

“Stadler is the only train manufacturer in the world that designs and builds hydrogen trains for narrow-gauge lines. Together with ARST, we have developed a solution that makes a tangible contribution to the decarbonisation of rail transport,” explains Dr Ansgar Brockmeyer, Head of Marketing & Sales and Deputy CEO of the Stadler Group.

Hydrogen produced entirely from renewable energy

The innovative feature of these trains is their propulsion system, which is based on fuel cells and hydrogen tanks. This system is housed in the central carriage (the Power Pack), which acts as a battery charger, converting hydrogen into electrical energy that powers and recharges the traction batteries. Thanks to this system, the trains can operate efficiently on non-electrified lines, addressing the challenges of the green transition while ensuring operational reliability.

The hydrogen production is particularly innovative: the energy required for it is obtained 100 percent from solar power. As a result, the trains are fueled with sustainable hydrogen. This project represents the creation of a zero-emission system for narrow-gauge railway lines, from energy production right through to train propulsion.

“These vehicles, developed in collaboration with Stadler, are a central element of the decarbonisation strategy for the narrow-gauge network. It is the first step in ARST’s evolution from a transport operator to an energy company capable of powering its own network of services. As already demonstrated by the active construction sites in Mandas, Alghero and Macomer, we are integrating technological innovation in vehicles with the autonomous production of clean energy. Working in full synergy with regional institutions, ARST is bringing to fruition a model of sustainable and fully self-sufficient public transport,” explains Carlo Poledrini, Central Director of ARST.

Designed for narrow-gauge lines

Due to the specific characteristics of the infrastructure, narrow-gauge railways in Italy only allow trains with a particularly low axle load to run. In response to this requirement, the new vehicles

have been designed with a special profile and built using lightweight materials to fully meet the requirements of the various lines.

Passengers will enjoy comfortable, air-conditioned, practical and bright interiors, enhanced by large panoramic windows. The low-floor access allows for easy boarding, even for people with reduced mobility. Compared to diesel trains, hydrogen trains are quieter and produce less vibration, contributing to an even more pleasant travel experience. Crew members will also benefit from dedicated facilities, such as a private access door and an independent air-conditioning system.

Before entering service, the new trains will undergo a series of rigorous tests to comply with the guidelines set out by Italy's National Agency for the Safety of Railways and Road and Motorway Infrastructure (ANSFISA).

Italian regions moving towards sustainable rail transport

The Framework Agreement, signed between ARST and Stadler in 2023, provides for the supply of a total of ten vehicles for regional and local transport in Sardinia.

The project is part of an initiative promoted by the Italian government and the Ministry of Infrastructure and Transport, aimed at decarbonising rail transport in Italy. The objective is to apply hydrogen technology to narrow-gauge lines, thereby paving the way for a new generation of modern, innovative and sustainable trains.

In addition to ARST, two other rail operators are implementing more sustainable solutions through the use of hydrogen technology developed by Stadler: nine trains are currently being built for Ferrovie della Calabria (FdC) and a further two units for Ferrovia Circumetnea (FCE) in Sicily. All vehicles will be manufactured at Stadler's headquarters in Bussnang, Switzerland.

Information about Stadler

Stadler has been building trains for over 80 years. The provider of mobility solutions in the fields of rail vehicle construction, maintenance and signalling technology is based in Bussnang, in eastern Switzerland. Over 17,000 employees work across 8 production sites and 6 engineering centres, as well as in over 95 service centres, with around 6,000 of them based in Switzerland. Stadler is the world's leading manufacturer of alternative-fuel vehicles (hydrogen and battery) and rack-and-pinion rail vehicles. The company is mindful of its social responsibility towards sustainable mobility and therefore stands out for its innovative, sustainable and durable quality products.

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