World premiere: First network with 14 hydrogen trains starts operation with passengers in Lower Saxony

Hanover/Bremervörde, 24.08.2022. The German state of Lower Saxony is making railway history: In Bremervörde (Rotenburg district), the world's first network with hydrogen trains in passenger service has been launched today. The 14 vehicles with fuel cell propulsion belong to the Landesnahverkehrsgesellschaft Niedersachsen mbH, a subsidiary of the state. In 2012, the LNVG had already set out to find alternatives to diesel trains, thus providing an impetus for the development of these trains in Germany. Further project partners are rail vehicle manufacturer Alstom, Eisenbahnen und Verkehrsbetriebe Elbe-Weser (evb), and the gas and engineering company Linde.

The project has a volume of more than 93 million euros. Lower Saxony's State Premier, Ministerpräsident Stephan Weil, emphasised in Bremervörde: "This project is a worldwide role model. It is an excellent example of a successful transformation Made in Lower Saxony. As a state of renewable energies, we are setting a milestone on the path to climate neutrality in the transport sector." And Weil adds: "My special thanks go to vehicle manufacturer Alstom for its courage to innovate, as well as to the company Linde, the Landesnahverkehrsgesellschaft and the Eisenbahnen- und Verkehrsbetriebe Elbe-Weser. With great commitment, they have all made it possible that, just under four years after the start of pilot operation, the world's first fuel cell trains can now run regularly on this route."

Dr Bernd Althusmann, Lower Saxony's Minister of Economics, Labour, Transport and Digitalisation, says: "The innovation state of Lower Saxony impressively demonstrates that alternative technologies on rail can offer the level of performance we have come to expect – without any emissions. We are doing truly groundbreaking work here. I am very proud that the Lower Saxony Ministry of Transport has funded the costs for the procurement of 14 trains to the amount of more than 85 million euros and that it has made this pioneering project possible together with the Landesnahverkehrsgesellschaft. The fact that the federal government is contributing an additional 8.4 million euros ensures that the project will have an impact beyond our state borders and beyond Germany.

Stefan Wenzel, Parliamentary State Secretary to the Federal Minister for Economic Affairs and Climate Protection, explains: " CO2-free drive technologies are a basic prerequisite for climate-neutral mobility, and this also applies to rail transport. By promoting the world's first fleet of hydrogen trains, which is starting regular service here today, the Federal Government is emphasising its claim to make Germany a pioneer in the application of climate-neutral technologies in passenger transport."

On the rail line between Cuxhaven, Bremerhaven, Bremervörde and Buxtehude, 14 hydrogen-powered Alstom regional trains are being used by evb as commissioned by LNVG, replacing 15 diesel trains. They will be fuelled daily and around the clock at the hydrogen filling station. Thanks to a range of 1,000 kilometres, the Alstom Coradia iLint trains, which are emission-free in operation, can run an entire day on the evb rail network with a single tank filling. This means that 1.6 million litres of diesel per ear are no longer consumed, which in turn results in 4,400 tonnes of CO 2 that are no longer produced. Five of the new trains are currently running, and

the others will be added by the end of the year. Starting in September 2018, there was a trial run of almost two years with two pre-series trains, which went without a hitch.

Statement LNVG:

LNVG had already started looking for alternatives to diesel trains in 2012. "This way we gave an impulse for the development of hydrogen trains in Germany," says Carmen Schwabl, spokeswoman for the management of LNVG. She explains the background to the project: "We own 126 diesel multiple units that we use on various railways in Lower Saxony. We will not buy any more diesel vehicles in order to contribute even more to climate protection. We are also convinced that diesel trains will no longer be economically viable to operate in the future. We are pleased to have now reached another milestone with our partners Linde and Alstom as well as evb." Depending on the circumstances on non-electrified rail networks, LNVG will decide whether to use hydrogen or battery-powered trains there.

Statement Alstom:

"Emission-free mobility is one of the most important goals for a sustainable future, and Alstom has a clear ambition to become the world leader in alternative propulsion systems for rail. The world's first hydrogen train, Coradia iLint, is testimony to a clear commitment to green mobility combined with cutting-edge technology. We are very proud to bring this technology into series operation as part of a world premiere together with our strong partners," says Henri Poupart-Lafarge, Chairman and CEO of Alstom.

Statement evb:

"We are proud to be the world's first operator of hydrogen trains in scheduled passenger transport and, as the operator of these trains, we are happy to contribute to the further development of this environmentally friendly and innovative new technology in daily operations," says Christoph Grimm, Managing Director of evb.

Statement Linde:

"At Linde, we have been working on hydrogen-based mobility solutions for over 30 years. We have built the most hydrogen filling stations for cars in the world. We are all the more pleased to see the world's first filling station for trains in operation here, thus opening up a new mobility sector," says Dr Mathias Kranz, Head of Onsite and Bulk Business in Germany. "Linde is strongly committed to the further spread of sustainable hydrogen technology."

Download link for photo and video material: www.evb-wasserstoffzug.de

The trains:

The Coradia iLint is the world's first passenger train powered by a hydrogen fuel cell that generates electrical energy for propulsion. This completely emission-free train is quiet and emits only water vapour and condensation. The Coradia iLint features several innovations: clean energy conversion, flexible energy storage in batteries, and intelligent management of motive power and available energy. Specifically developed for use on non-electrified lines, it enables clean, sustainable train operation while maintaining high performance. On the evb network, the train travels at 80 to 120 km/h, with a maximum speed of 140 km/h.

The filling station:

The Linde facility in Bremervörde contains sixty-four 500-bar high-pressure storage tanks with a total capacity of 1,800 kilograms, six hydrogen compressors and two fuel pumps. The use of hydrogen as a fuel for trains noticeably reduces the burden on the environment, as one kilogram of hydrogen replaces approximately 4.5 litres of diesel fuel. A later hydrogen production on site by means of electrolysis and regeneratively generated electricity is planned; corresponding expansion areas are available.

The project is funded by the Federal Ministry of Digital Affairs and Transport as part of the National Hydrogen and Fuel Cell Technology Innovation Programme. The federal government will contribute 8.4 million euros to the costs of the vehicles and 4.3 million euros to the costs of the filling station. The funding directive is coordinated by NOW GmbH and implemented by Project Management Jülich (PtJ).

About Alstom

Alstom develops and markets mobility solutions to move towards a low-carbon future together with its customers. Its products and solutions provide a sustainable foundation for the future of the global transport market. From high-speed trains, metros, monorails and trams to turnkey systems, services, infrastructure, signalling and digital mobility solutions, Alstom offers its customers a product portfolio that is unique in the industry. 150,000 vehicles in service worldwide demonstrate the company's expertise in project management, innovation, design and technology. In 2021, the company was included in the Dow Jones Sustainability World and Europe indices for the eleventh consecutive year. Headquartered in France, Alstom is present in 70 countries and employs more than 74,000 people. The Group achieved revenues of €15.5 billion for the financial year ended 31 March 2022.

For more information, please visit www.alstom.com

About the Eisenbahnen- und Verkehrsbetriebe Elbe-Weser (evb) –
Elbe-Weser Railways and Transport Company

The evb group is a public company owned by the state of Lower Saxony and nine other districts and municipalities. It is one of the leading groups of companies in passenger and freight transport in northern Germany. With around 600 dedicated employees, evb transports 6 million passengers a year by bus and train in the Elbe-Weser triangle to their destinations – safely and climate-friendly. evb has its own 235 km long rail network as well as repair facilities for trains and buses. The evb group operates freight transport throughout Germany and is represented with locations in Hamburg, Bremen, Bremerhaven, Wilhelmshaven and Regensburg. As a shareholder, evb holds shares in metronom, the bus company KVG and various transport associations.

You can find further information at www.evb-elbe-weser.de

About the Landesnahverkehrsgesellschaft Niedersachsen mbH

Landesnahverkehrsgesellschaft Niedersachsen mbH organises regional rail passenger transport (SPNV) between the North Sea and the Harz Mountains and makes annual compensation payments of around 300 million euros to the railway companies to this end. With its commitment to fuel cell technology, LNVG has assumed a pioneering role in Germany. LNVG's fleet of vehicles includes over 300 wagons, locomotives and multiple units which are leased to railway companies.

You can find more information at www.lnvg.de

About Linde

Linde is a leading global industrial gases and engineering company with 2021 sales of USD 31 bn (EUR 26 bn). We live our mission to make our world more productive every day by delivering high-quality solutions, technologies and services that make our customers more successful and help preserve and protect our planet.

The company serves a wide range of end markets, including the chemical, food, beverage, electronics, metals, mining, power generation, healthcare and manufacturing industries. Linde gases are used in countless applications, from life-saving oxygen for hospitals to high-purity and specialty gases for electronics manufacturing, hydrogen for clean fuels and more. Linde also provides its customers with state-of-the-art gas processing solutions to support growth, efficiency improvements and emissions reductions.

For more information, visit www.linde.com

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