Press release

Premiere ride: Siemens and Deutsche Bahn test hydrogen train and mobile fueling station for first time

Next milestone in the "H2goesRail" project • Siemens CEO Roland Busch, DB CEO Richard Lutz and State Secretary Hartmut Höppner take first test ride in the Mireo Plus H and test the refueling process • Innovative complete hydrogen system will be used in regular passenger service as of 2024 and replace diesel trainset • Hydrogen train and mobile fueling station can be viewed at the InnoTrans2022

(Wegberg-Wildenrath, September 9, 2022) Premiere ride in the new hydrogen train: Dr. Roland Busch, CEO of Siemens AG, Dr. Richard Lutz, CEO of Deutsche Bahn, and Hartmut Höppner, State Secretary in the Federal Ministry for Digital and Transport (BMDV), are taking their first ride in the Mireo Plus H hydrogen train today and will then demonstrate the train's refueling procedure using the mobile hydrogen fueling station. The event will be held at the Siemens Test and Validation Center in Wegberg-Wildenrath, North Rhine-Westphalia. It is planned to have hydrogen technology replace diesel-powered trainsets in regional transport in the future and make a significant contribution to phasing out diesel fuel. Hydrogen trains are a particularly climate-friendly drive technology since they operate emission-free with green hydrogen and emit only water vapor.

Siemens Mobility and Deutsche Bahn presented the H2goesRail project to the public in November 2020. In addition to the refueling and commissioning tests conducted over recent months, DB employees have been trained to operate the system when it enters service.

"We are taking a decisive step with our partners today toward the future of climate-neutral transport. The new Mireo Plus H train emits nothing but water. It has a range of around 1,000 kilometers, can reach speeds of up to 160 kilometers per hour, and can be refueled quickly. Over its service life of 30 years, a single train will save up to 45,000 tons of CO_2 emissions compared to travel by car," said Roland Busch, CEO of Siemens AG.

"Hydrogen belongs to the future of mobility. That's why I am especially pleased that we have reached the next important milestone in the H2goesRail project today," said Dr. Richard Lutz, CEO of Deutsche Bahn. "Our goal is clear: We plan for Deutsche Bahn to be climate-neutral by 2040. And one key lever here is bidding farewell to diesel fuel.

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With our development of a mobile hydrogen fueling station and its associated maintenance infrastructure, we at Deutsche Bahn are once again showcasing outstanding and innovative drive technologies and demonstrating how climate-neutral mobility of tomorrow will work."

"Hydrogen technology has the potential to make sectors of mobility CO_2-neutral. This is a milestone for climate protection. The H2goesRail project demonstrates the innovative power that is being driven by the funding programs of the Federal Ministry for Digital and Transport in the field of alternative drives. We support the transfer from research and development to marketable products that is helping accelerate technological progress and creating the prerequisites for tomorrow's climate-friendly mobility. Our goal is to develop and promote modern, quiet and climate-friendly mobility," commented Hartmut Höppner, State Secretary in the Federal Ministry for Digital and Transport.

The project is being funded with €13.74 million by the Federal Ministry for Digital and Transport as part of the National Innovation Program for Hydrogen and Fuel Cell Technology.

The Mireo Plus H developed for the H2goesRail project has a range of up to 800 kilometers, is as powerful as its electric multiple-unit counterpart, has 1.7 MW of traction power providing up to 1.1 m/s^2 acceleration, and a top speed of 160 kilometers per hour.

One key factor needed to make hydrogen technology competitive with diesel fuel in daily operation is a fast refueling process. To provide this, DB has developed a new method that, for the first time, enables a hydrogen train to be refueled as fast as a diesel-powered train. This is especially important considering the closely timed scheduling of DB's regional passenger service. Hydrogen for the trains will be produced in Tübingen by DB Energy with green electricity taken directly from the overhead power line.

On the route between Tübingen and Pforzheim, for example, switching from diesel to the H2goesRail project train will save around 330 tons of CO_2 emissions a year. In general, and depending on the route, the Mireo Plus H can save 520 tons of emissions per year (calculated on a total mileage of 200,000 kilometers). The Mireo Plus H will begin test runs in Baden-Württemberg in 2023. As of 2024, it will be underway in

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regular passenger service for the H2goesRail project, operating between Tübingen, Horb and Pforzheim and replacing a diesel railcar currently in use on that route.

Siemens Mobility and Deutsche Bahn will also be showcasing the H2goesRail project and the Mireo Plus H at InnoTrans 2022, the world's largest trade fair for railway technology, held in Berlin. The Mireo Plus H can be visited at stand T06/40, and the mobile hydrogen fueling station at stand O/630 in the outdoor exhibition area of InnoTrans.

Project details:

The joint funding project is officially called "H2goesRail". The Federal Ministry for Digital and Transport (BMDV) is funding the project with over €13 million through the National Innovation Program for Hydrogen and Fuel Cell Technology (NIP 2). NIP 2 is coordinated by NOW (National Organization for Hydrogen and Fuel Cell Technology) GmbH and is being implemented by project lead Jülich.

Hydrogen propulsion

In hydrogen drive systems using fuel-cell technology, the reaction of hydrogen and oxygen produces electricity and the "waste product" water. These trains can be used by DB as a way to become climate-neutral by replacing its diesel-powered trains with alternative drive systems. To ensure the solution is truly ecofriendly, green electricity is used to produce the environmentally friendly green hydrogen. DB Energy will supply the hydrogen.

Mireo Plus H

For the project's one-year trial operation, Siemens has developed a two-car regional train using a next-generation hydrogen drive system. The train operates with two propulsion systems, each consisting of a fuel cell and a lithium-ion battery. The Mireo Plus H is as powerful as an electric multiple-unit train and has a range of up to 800 kilometers – depending on operating conditions such as season or route. A three-car variant has a range of up to 1,000 kilometers. Thanks to its reduced maintenance and repair costs, the train has low lifecycle costs. The Mireo Plus H has a top speed of 160 kilometers an hour.

Fueling station

DB has developed, tested and optimized the related hydrogen infrastructure. Hydrogen is produced by electrolysis at the DB maintenance depot in Tübingen using green electricity taken directly from the overhead power line. In the electrolyzer,

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water is split into hydrogen and oxygen using electricity. After being compressed, the hydrogen is kept in a mobile storage unit. Prior to the refueling procedure, the green fuel is processed and cooled. The mobile system will enable DB to conduct further test projects on non-electrified rail routes.

Rapid refueling

The train is refueled with hydrogen in an innovative procedure that, for the first time, takes no longer than tanking a diesel train. This is an especially important factor considering that DB's commuter and regional trains operate on closely timed schedules. Thanks to this fast refueling process, hydrogen technology will be economically competitive with the diesel fuel currently in use.

Maintenance

The DB maintenance depot in Ulm will be converted to handle the servicing of the hydrogen trains. Extensively trained DB Region staff, supported by Siemens Mobility employees, will service and maintain the trains.

Passenger operations

After completing a test phase, the train will enter passenger service in 2024 and operate between Tübingen, Horb and Pforzheim. Approximately 120,000 kilometers of scheduled rail service are planned. The route is particularly suitable for the tests, with its typical regional service frequency and topography. By replacing a diesel-powered train used on this route, the Mireo Plus H from Siemens Mobility will save around 330 tons of CO_2 yearly. Drivers will be specially trained on the hydrogen train and operate it in passenger service.

A press photo is available at: https://sie.ag/3B8fHhq

Further information on H2goesRail, footage of the train and photos of the event (from 16.30 onwards) can be found at:

https://press.siemens.com/global/en/feature/deutsche-bahn-and-siemens-enter-hydrogen-age

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Siemens Mobility is a separately managed company of Siemens AG. As a leader in transport solutions for more than 160 years, Siemens Mobility is constantly innovating its portfolio in its core areas of rolling stock, rail automation and electrification, turnkey systems, intelligent traffic systems as well as related services. With digitalization, Siemens Mobility is enabling mobility operators worldwide to make infrastructure intelligent, increase value sustainably over the entire lifecycle, enhance passenger experience and guarantee availability. In fiscal year 2021, which ended on September 30, 2021, Siemens Mobility posted revenue of €9.2 billion and had around 39,500 employees worldwide. Further information is available at: www.siemens.com/mobility.

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