SIEMENS

Mobility Division

Background Information

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UITP 2015, June 8 to 10, 2015 in Milan

Hybrid trams in Doha: For a cleaner ride without overhead lines

All over the world, the tram is once again attracting the attention of urban planners and transportation companies as a powerful, ecological and highly economical means of transport. Existing lines are being expanded and completely new tram networks planned, more often than not through lively city districts. Low-floor concepts with sidewalk-level boarding, step-free car floors and appropriate comfort levels are especially in demand. Doha, the capital of Qatar, will soon see 19 trams operating without overhead contact lines on a route which is 11.5 kilometers long and has 24 stations. They will be equipped with an energy storage system which can re-use up to 30 percent of the supplied energy for vehicle operation by recovering braking energy.

In 2012 the Siemens Tram Consortium won an order for the turnkey construction of a light rail system for the Education City in Doha, Qatar's capital. The project has been launched to support the transformation of Qatar into a knowledge and education-based society. The scope of supply includes the vehicles, as well as signaling and communication systems, railway electrification and equipment for one depot.

Avenio – the most modern tram in the world

The vehicles ordered are based on the Avenio platform, the most modern tram system in the world. A light-weight steel car body structure, a new welding technology and fewer parts than in previous models – all this reduces not only the weight but also the production costs of each vehicle. Lateral stability elements

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reduce the track forces during movement through curves and thus increase passenger comfort.

The low-floor technology and ergonomic design provide a high level of comfort for the passengers. In addition, the energy storage system for optimized energy consumption and the catenary-free operation make the Avenio a role model for sustainable, rail-based mass transit. Siemens will supply 19 three-car trams, with each tram capable of accommodating up to 239 passengers.

The first Avenio for Doha is being tested at the Wegberg-Wildenrath test and validation center, and delivery to Doha is expected for June 2015. The remaining 18 vehicles will be completed at the Siemens plant in Vienna by the end of 2015, before being delivered to Doha.

The Sitras HES energy storage system saves up to 80 metric tons of CO_2 per year and allows trams to operate without overhead lines

The Sitras HES hybrid energy storage system comprises two energy-storing components: the mobile Sitras MES energy storage (double-layer capacitor, DLC) and a lithium ion battery. Sitras MES enables power-saving operation. The Sitras HES hybrid concept combines the benefits of the DLC with the properties of a traction battery. This way, the routes to be traveled without overhead contact lines can be extended to a maximum of 2,500 meters – depending on the operating and route parameters. The systems are mounted on the roofs of the tram and electrically linked to the feeder point of the vehicle via a DC chopper (DC/DC transformer). With this new, independent circuit concept the energy storage system can be either directly integrated into new rail vehicles or installed into existing vehicles. The energy storage units are charged when the trams brake during operation. Using the stored energy, the tram can operate over extended distances without current having to be supplied via overhead contact lines. The energy storage units can also be charged on the routes with overhead lines or via stationary charging stations (for example at the stations). The high energy content of the traction battery permits operation even during failures and maintenance work on the overhead contact lines and the charging stations as well as unforeseeable faults on catenary-free routes.

Thanks to the recovery of the braking energy, it will soon be possible to reduce the energy demand of a vehicle equipped with Sitras HES or Sitras MES by up to 30 percent per year under optimum operating conditions. One vehicle with a lower energy demand produces up to 80 metric tons less of CO_2 emissions every year. The operators of catenary-free routes also save on electrification costs. Catenary-free operation is particularly suitable for difficult structural conditions which restrict the installation of overhead contact lines and/or where the architecture does not permit the installation of overhead lines (for example under bridges, at system switchovers or large intersections with several traffic systems).

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All information about the Siemens presentation at the UITP 2015 can be found at http://www.siemens.com/press/uitp2015

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