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## eHighway: solution for electrified road freight transport

Transferring freight transport to rail has its limitations. Consequently the transport will need to be carried out by trucks that combine reliable service with minimum environmental impact. The eHighway system is twice as efficient as conventional internal combustion engines. The Siemens innovation supplies trucks with power from an overhead contact line. This means that not only energy consumption is cut by half but also local air pollution is reduced. The eHighway is particularly effective from an environmental and economic perspective on heavily used truck routes, e.g. between ports or industrial estates and cargo hubs, or between mines and central transshipment terminals. Siemens is demonstrating the system in pilot projects in Sweden and California on public roads.

### **Global road freight traffic to increase 200 percent by 2050**

International freight transport volume is growing continuously. The World Business Council for Sustainable Development (WBCSD) predicts a trebling of global freight transport volumes between the years 2000 and 2050. Despite considerable expansion of rail infrastructure, railroads will only be able to handle around a third of this additional freight traffic. The majority will therefore have to be transported on road. Experts expect CO<sub>2</sub> emissions from road freight traffic to more than double by 2050. Innovative ideas for passenger cars already exist – now the time has come to provide an economic alternative to fossil fuels in road freight transport too.

### **Lower CO<sub>2</sub> emissions with electrified road freight traffic**

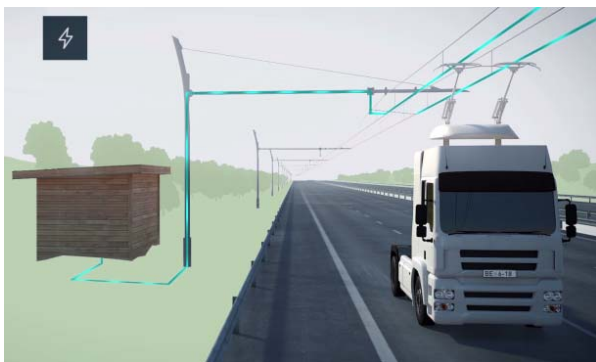
Electromobility offers a sustainable solution: The electrification of road freight transport will enable significant reductions in CO<sub>2</sub> emissions and ensure that energy for transport will be available also in the future. The key benefit: electricity can be generated in many different ways – by conventional power stations and regenerative sources.

### The principle: hybrid drive complemented by current collector

The core of the eHighway solution is an intelligent current collector combined with a hybrid drive system. The eHighway trucks are equipped with a current collector to collect power from overhead cables and produce zero local emissions. On roads without overhead lines, a hybrid drive system assures full flexibility of the truck. The intelligent current collectors enable the vehicle to connect and disconnect with the overhead contact line at speeds of up to 90 km/h.

### Overhead contact line

- Power is transmitted directly from the overhead contact lines into the vehicle, enabling an optimal efficiency level of more than 80 percent.
- Braking and accelerating trucks can exchange energy with one another via the contact line, for example on sections with a mountainous topography. The trucks are able to recover braking energy and feed it back into the grid.
- Existing overhead lines, for example in trolleybus systems, prove the safety of the technology for road applications.
- Experiences from rail and tram operations confirm its long lifespan and relatively low maintenance and servicing costs.
- The technology can easily be integrated into existing road infrastructure and does not pose an obstacle to other road users.



### Hybrid drive system

- The hybrid drive system enables the truck to remain flexible, for example when overtaking and on non-electrified routes.
- Compared to the conventional combustion engine, the hybrid drive is considerably more efficient, has a longer service life and requires less maintenance.

- The eHighway system is open for a multitude of different hybrid configurations.



### Intelligent current collector

- The intelligent current collector enables the vehicle to connect and disconnect with the contact line system at speeds of up to 90 km/h and compensates for movements of the truck within the drive lane.
- No lane guidance system is required.
- The technology represents an innovation compared to purely electrically driven trolleybuses, which can only run on fixed routes, and the hybrid trucks used in opencast mines.



### First step towards commercial use - demonstration projects

#### World's first eHighway opens in Sweden

The first eHighway system on a public road opened in June 2016. For the coming two years, a Siemens catenary system for trucks will be tested on a two-kilometer stretch of the E16 highway north of Stockholm. The trial will use two diesel hybrid

vehicles manufactured by Scania and adapted, in collaboration with Siemens, to operate under the catenary system. During the two-year trial, Sweden's Transport Administration Trafikverket and Gävleborg County want to create a knowledge base on whether the Siemens eHighway system is suitable for future commercial use and further deployment. As part of its climate protection strategy, Sweden has committed to having a fossil fuel independent transport sector by 2030.

### **Siemens demonstrates the eHighway system in California**

Siemens is currently developing another eHighway demonstration project in California. This project is being undertaken in collaboration with vehicle manufacturer Volvo and local truck converters on behalf of the South Coast Air Quality Management District (SCAQMD). Tests will be conducted throughout 2017 to see how different truck configurations interact with the eHighway infrastructure in the vicinity of the ports of Los Angeles and Long Beach.

In the framework of this project one mile of infrastructure is erected in both directions along a road in the city of Carson. This stretch represents a part of the road from the ports in Los Angeles and Long Beach to the cargo hubs near the coast, which are served by thousands of trucks every day. Southern California's environmental agency in charge of clean air policy wants to gather information along this section of road to determine whether the eHighway system is suitable for commercial use, e.g. along the nearby Interstate 710. The aim is to make freight transport emission-free in the future motivated by the heavy burden caused by local emissions in the form of particulate matter, carbon dioxide and nitrogen oxide.

Press pictures are available at <http://www.siemens.com/press/ehighway>

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