



Innovative collaboration for a cleaner and smarter city

In Gothenburg, Sweden, 14 partners from industry, academia and society are working together to develop, test and demonstrate new solutions for the future of public transport. The collaboration goes by the name *ElectriCity*, and here, [Stefan Eglinger](#), Director General at the Urban Transport Administration in the City of Gothenburg, explains how it is making the city greener.



“ It is very positive that we can use the ElectriCity demo arena to test the solutions in real life and regular traffic with different partners. We also encourage the ElectriCity partners to use the arena for different types of research projects. In this way, we get common benefits for all partners in our collaboration. ”

Peter Nordin, Volvo Buses

GOTHENBURG is taking a leap in city development: by 2035, the city will have grown by a third, and by 2050, according to Gothenburg's climate strategy, CO₂ emissions from road transport will have decreased by at least 80 per cent. The growth is primarily made by densification in areas where people already dwell or travel. In this development, electrification plays a crucial role.

The challenge we face is tricky. How can we build an attractive city sustainably? The answer: we cannot – at least, not by ourselves. We need collaboration with industry, different organisations and research. It is only by meeting challenges together that we will succeed in developing robust, solid and sustainable solutions.

Demo arenas for new products and services

The idea of ElectriCity is to create a platform for the development and testing of services and products

that can contribute to a more attractive public transport system. The partners work on an idea together, taking it all the way to implementation through different demo arenas where tests are made in real city environments. The testing and evaluation of electric bus operations is a central part of ElectriCity.

The most noticeable result so far is on bus route 55, where 10 all-electric or partially-electrified buses have been operating since 2015. The demo buses run on renewable electricity, are energy-efficient, quiet and emission-free.

According to the original plan, the demos were scheduled to end in 2018, but the results have been so successful that the trial has incorporated additional vehicles and the test period extended until 2020. Since June 2018, there have been two electrically-powered, high-capacity articulated prototype buses operating on route 16. ▶

↑ **ABOVE:** ElectriCity aims to create a platform for the development and testing of services and products that can contribute to a more attractive public transport system



STEFAN EGLINGER is the Director General at the Urban Transport Administration in the City of Gothenburg and has previously had several leading roles in both municipal and governmental activities. He frequently works with business and organisational development projects that are linked to infrastructure and urban development. Eglinger has extensive experience of collaboration between public and private actors.

Buses as demo arenas

On route 55, several tests are being compiled in which the route and the bus itself serve as a demo arena; for tests optimising vehicles in traffic in relation to charging requirements and testing diverse ways to display travel information. Onboard the buses there is geofencing technology, which reduces the speed of the bus in certain zones in the city.

There are also several tests concerning bus stops, for example indoor bus stops, stops that incorporate free Wi-Fi and USB chargers, sedum roofs and solar cells on the stops, and a project where bus batteries get a second life by being used to store electricity from solar cells. They will have a storage capacity of 200kWh and be used to supply electricity to 130 new apartments that will be built sustainably.

Several different research projects have focused on the drivers of the electric buses and all confirmed that the working environment is noticeably better compared with the driving environment of diesel buses.

Environmental measurements on electric buses

There is a great interest in measuring air quality and noise levels in Gothenburg. The noise of society is increasing and quickly becoming a major environmental problem. Noise is also the environmental factor that affects most people in Sweden.

In 2016, the city conducted a case study – *Calculations of benefits of reduced noise from electric bus traffic in Gothenburg*.

Together, the RISE-Institute, the Urban Transport Administration and the Environmental Department in the City of Gothenburg measured and compared noise from electric, gas and diesel buses. The results were then used to calculate health effects in terms of healthy living years lost due to noise.

The results of the study demonstrated that electric buses cause significant positive health effects when vehicles are kept to low speeds. However, they also revealed that the models for noise calculation, socioeconomic evaluation and health effects need to be developed further to clearly portray the effects of electric buses. More studies on the health effects of low-frequency traffic noise are needed.

According to the World Health Organization's (WHO) calculations, around 1,200 healthy years of life are lost every year due to noise in Gothenburg. To build an attractive and environmentally-friendly city it is essential for us to consider the noise from traffic in our planning. On route 55 buses, we have a unique opportunity to measure the air quality and noise levels in the city. This collected data we can use in many ways across our city, including traffic planning.

Onboard IT architecture collaboration

Over time, public transport vehicles have become increasingly complex as the amount of on-board IT systems increase. The vehicle manufacturer, the public transport authority and the public transport operator all have different systems, and there is a need to harmonise the overall system's IT architecture and associated interfaces.

BELOW: Electric buses have the potential to dramatically reduce Gothenburg's noise pollution levels





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Gunnar Ohlin, Lindholmen Science Park

ITxPT is an emerging, international initiative for such harmonisation and aims to cooperate on the implementation of standards for plug-and-play IT systems.

Among the newly-launched projects within the *ElectriCity* collaboration, the RIVISILON project aims to carry out the first large-scale evaluation of existing ITxPT specifications. The main work is done in 10 pilots that are evaluating, developing and demonstrating new functionality for plug-and-play and the virtualisation of components, new business models for procurements, and cloud services, as well as cyber-security.

“This project has different stakeholders that benefit from a shared demo arena. Here we have a unique opportunity to test the ITxPT specifications within the *ElectriCity* collaboration,” says Gunnar Ohlin, one of two *ElectriCity* coordinators and Project Leader at Lindholmen Science Park.

ITxPT in regular traffic operations

ElectriCity is one of the first real-life operations based on the new ITxPT specification for delivering ITS services. The two new fully-electric articulated prototype buses on route 16 will serve as demo arenas for the ITxPT collaboration.

The buses have an IT platform with Ethernet backbone, switches, multifunctional antenna and main compartments. There are two dynamic passenger information services running on this platform and the plan is to put more functions based on the ITxPT specification into day-to-day operation on the two buses. There will be 10 pilots carried out during a period starting in the autumn of 2018. The features will first be tested inside the lab and then tested onboard the buses.

“It is very positive that we can use the *ElectriCity* demo arena to test the solutions in real life and regular traffic with different partners. We also encourage the *ElectriCity* partners to use the arena for different types of research projects. In this way, we get common benefits for all partners in our collaboration,” says Peter Nordin, City Mobility Director at Volvo Buses.

After two successful years with electric buses, the partners in the *ElectriCity* collaboration decided to expand the demo arena with heavy vehicles for quiet and emission-free urban traffic, and these plans are now underway within the collaboration. 📶

↑ ABOVE: Gothenburg is conducting bus stop tests, including experimenting with indoor bus stops as seen in this concept artwork

FACTS ABOUT ELECTRICITY

ElectriCity is a joint partnership bringing together the research fraternity, industry and society, allowing new solutions for tomorrow’s sustainable city transport to be developed, demonstrated and evaluated.

The partners involved are Volvo Group, The Västra Götaland Region, Västtrafik, The City of Gothenburg, Chalmers University of Technology, The Swedish Energy Agency, Johanneberg Science Park, Lindholmen Science Park, Göteborg Energi, Keolis, Älvstranden Utveckling, Akademiska Hus, Chalmersfastigheter and Ericsson.



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