Going electric, safely

The expected transition to widespread use of electric vehicles (EVs) depends to a large extent on the availability of safe, easy-to-use charging points. In the Netherlands, electricity company Eneco has a program for rolling out a network of charging points called NRGSPOTs. KEMA was asked to provide certification of this network, ensuring that the equipment is safe to use. "This area of technology is developing so fast that existing European norms do not cover all aspects of the new equipment," says Dirk Jan Schreurs, Electronics Engineer at KEMA. "That's where our experience comes in."

Text **Mike Gould** Photography **Eneco** and **Fotostudio Alain Baars**

Dirk Jan Schreurs: "Eneco has developed a new generation of charging points for small vehicles such as scooters and electric bicycles as well as large vehicles such as cars and buses, at home, at commercial premises and in public spaces, each with two connectors. We've been asked to test all of these types."

Monique Blokpoel, Senior Innovation Officer at Eneco, explains: "The first type has standard power sockets protected by a flap, but the others have unique connectors. All have sophisticated communication software, which allows designated owners to charge their vehicles. Basically what you do is hold up an electronic card in front of the card reader. Once you've been identified, you're able to plug in your vehicle and charging commences. For large vehicles, the starter mechanism is disabled during this process, making it impossible for the owner to inadvertently drive away while charging. For small vehicles, in such an unlikely situation, the flap would come away from the charge point and power would immediately be switched off."

"At KEMA we like to keep a finger on the pulse of the energy transition" – Dirk Jan Schreurs

Quick scan

Dirk Jan Schreurs continues: "We were asked to carry out a quick scan of the equipment, leading to a certification process after which Eneco can apply for a CE mark. There are several standards relating to charging points and individual components, but a combination of approved components does not necessarily guarantee user safety. Nevertheless, we can go a long way toward doing so. Together with Eneco, we are making an inventory of potentially hazardous user situations and single fault conditions such as short-circuits, which we will test to make sure that both the user is safe and the equipment is safe to use from an electrical point of view. Once the scan has been successfully completed, we will look at other aspects such as potential electromagnetic interference. For example, you wouldn't want the radiation from a mobile phone to interrupt charging."

Fundamental drivers for e-mobility

Monique Blokpoel explains the background to the project: "The expected increase in e-mobility will be determined by five key drivers: increasing public demand for environmental protection, political support from the EU and national authorities, customer acceptance through lower total cost of ownership and a wider action radius, improvements in technology (especially in batteries), and a range of market players getting involved, from vehicle manufacturers to utilities like us and technology providers. Naturally, our charging points will be available 24 hours a day and they will deliver green electricity."

"There are four potential locations for charging points: at home, at work, at businesses such as restaurants and hotels, and in public spaces. In July, together with electrical bicycle manufacturers Sparta, we installed two pilot small-scale NRGSPOTs in Rotterdam. By the end of 2010, we will have installed 800 of these charging points, each equipped with two plugs; an earthed two-pin plug and an earthed three-polar plug. These will be suitable for charging all kinds of electrical bikes, scooters and wheelchairs. We also plan to install an NRGSPOT at the KEMA Business Park in the near future."

Simple to use

"We decided to adopt a single, simple method of identification: the new public transport chip card. In the first instance, users will present their card for identification purposes only and payment will be made by the organization they work for, but we are researching ways of offering integrated payment using this card."

"The key drivers are environmental protection, political support, customer acceptance, improvements in technology, and the involvement of market players" – Monique Blokpoel

Phased introduction

"I believe strongly in introducing this technology in places where there already are EVs and phasing it in carefully, first for commercial fleets and later for the general public. In phase one we will install charging points for 500 electric cars in our own fleet. These will be located at employees' homes and at our offices. At the same time, we will install charging points for municipalities, the National Railways, parking garages, and large companies throughout the Netherlands. Finally, large-scale public infrastructure will be rolled out in most parts of the country. At that stage we expect to be able to offer electricity and access to a widespread charging infrastructure network to EV users at an attractive, easily charged price."

Wider issues

Dirk Jan Schreurs concludes: "Electric vehicles have significant potential to reduce toxic emissions such as NO_x, noise and CO_2 emissions. However, once sufficient numbers of people drive them, emissions will be transferred from energy consumers (vehicles) to power plants. EVs have the potential to be entirely carbon-neutral if CO_2-emission-free energy sources are used. This also raises interesting issues such as the need for intelligent grids to balance the supply and demand of electricity and the role of wind energy – areas in which KEMA is closely involved. However, these issues will only come into play when much larger numbers of electric vehicles are in use. At KEMA we like to keep a finger on the pulse of the energy transition and I expect we will come back to this topic in the not-too-distant future." **<<**

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Industrial designers Studio Mango specialize in the design of innovative products that also look good in the urban landscape. Partner Frank Hansen: "Our role was to translate Eneco's functional requirements into a smart-looking product that would be safe, efficient, and cost-effective. We carried out a study of similar developments worldwide and came to the conclusion that there was room for new product design in this fast-growing industrial area. The result was the NRGSPOT."

"Electric vehicles have significant potential to reduce toxic emissions such as NO_x, noise and CO_2 emissions" – Dirk Jan Schreurs