Press Release

Charging electric buses quickly and efficiently: bus stops fitted with modular components make “Charge & Go” simple to implement

“Charge & Go” for electric buses – for electric buses equipped with wireless automatic charging technology, charging becomes a minor issue. Brief stops at suitably adapted bus stops are all it takes to get the necessary energy boost.

Electric buses that make use of opportunity charging not only offer greater convenience, but are also more economical than buses that can only be charged overnight: they get by with smaller batteries and yet also offer longer operating times. In order to make the integration of the inductive charging stations just as simple and convenient as the charging itself, Conductix-Wampfler has developed a system of charging modules that works on the principle of a construction kit: depending on the size of the bus, a charge of 60, 120 or 180 kW can nowadays be delivered wirelessly – charges that can also be achieved on 400V networks. The charging modules are delivered ready for service, meaning that once the preparations have been made below ground, they only have to be lowered into the shaft. It takes very little time before the inductive charging point is ready to go – “plug & play”, as it were.

IPT® charging technology

Inductive Power Transfer – or IPT – is an energy transfer system for electric vehicles that works by magnetic resonance coupling. The system comprises two main components: a primary coil, which is connected to the electricity grid via an infeed converter, and a pickup coil with a rectifier, which is integrated in the floor of the bus. This technology permits automatic and efficient non-contact electricity transmission.

In charging mode, the electricity collector on the bus is lowered to about 40 mm from the ground. This closeness to the charging plate allows the magnetic field to be focussed in such a way that stray magnetic fields remain almost entirely restricted to the immediate vicinity of the coil. In and next to the vehicle, the field values are significantly below the thresholds prescribed by ICNIRP recommendations. Due to the fact that the bus driver is not required at any point to leave the bus to perform the recharge or handle the charging accessories, safety is guaranteed at all times. Neither is there any need for personnel trained in electrical engineering (as called for by local regulations in some countries when dealing with a connected load of over 30 kW). Efficiencies of over 90 percent (grid connection to battery) likewise speak unequivocally in favour of the technology and are superior to many plug-in battery chargers. Because the use of opportunity charging makes smaller battery sizes possible, less weight has to be driven around, which also boosts the vehicle efficiency.

Structure and advantages of charging module "construction kit" system

The basic component of the construction kit charging system for electric buses is a 60kW module. The number of charging modules and charging points can be individually matched to the size and the operating situation of the bus fleet: the more buses there are in service and the more charging points, the more flexible and, with the right configuration, the shorter the required charging episodes. This has a rapid and very beneficial impact on overall operating costs (TCO). But even a scenario comprising a smaller number of vehicles and just one or two charging points can start paying for itself very quickly.

The charging modules are mounted in an underground concrete shaft, where they are connected to the power grid. Once a module

has been lowered beneath the ground, all that can be seen is the concrete-and-steel charging plate, flush with the road surface and able to withstand a wheel load of up to 6 tonnes. This allows it to be installed in virtually any kind of road setting and driven over by all kinds of traffic. All cables and charging components, as well as the power electronics, are located underground and are therefore completely protected from both weather and vandalism. Naturally it is vital for this kind of installation to need minimum maintenance only. Nevertheless, should a fault ever occur, the system can be got running again by simply and quickly replacing the module, and the actual maintenance work can be performed at a suitable location. The charging system is controlled and monitored via an Ethernet interface in the charging module. Electricity only flows when a bus is positioned above the charging point and triggers the charging process. The supply of power is always requested by the bus; the inductive power transfer system only transfers the specific power level requested, which in turn contributes positively to the high overall efficiency of the charging system.

Summary and outlook

Wireless charging of electric buses has already proved itself in Genoa and Turin for over ten years. In 2012 the second generation of the modular, wireless charging system was used for the first time in a 12-metre bus in s'Hertogenbosch in the Netherlands. Although operating times were in excess of 18 hours, it was nevertheless possible to reduce the battery capacity of the electric bus from 240 kWh to 120 kWh. A 12-metre electric bus that has the same number of sitting and standing spaces as its diesel equivalent and covers 290 km in a single day is often considered utopian, but here it is already in service. In summer 2013, eight buses equipped with the same IPT charging technology will go into regular service in another project in Milton Keynes in the UK.

Even if the high initial investment in electric propulsion is currently still painful for fleet operators, the switch to hybrid or natural gas buses does not represent a genuine medium-term alternative for urban-only buses. In other areas, inductive charging systems could well be a solution to facilitate a high proportion of all-electric driving, for example where electrically driven vehicles only are permitted on specific roads or in urban “green zones”. And anyway it is only a matter of time before there are more incisive price hikes in the price of crude oil, to which the cost of natural gas is pegged. Even now the extra cost of purchasing an electric bus, though still higher due to the lower production volumes, can be recouped through the lower operating costs made possible by lower energy overheads. Based on the assumption that the price of the vehicles and batteries will continue to fall, the TCO models will come out in favour of electric buses with opportunistic charging much sooner than one might expect. And once the increasing emissions-offset costs of diesel and hybrid buses are included in the equation, the result of any comparison will be very conclusive.
Another reason why zero-emission buses cannot be ignored in the long term becomes clear with a glance at international legislation: in California it is already mandatory for 15% of all urban transportation to be zero-emission, and a number of megacities in Asia have now imposed restrictions on diesel-vehicles.

Brief profile of Conductix-Wampfler

Conductix-Wampfler is the world’s leading manufacturer of systems for energy and data transmission to moving machinery. With its own companies and numerous partnerships with other companies, this Delachaux Group company is represented in nearly every major industrialised country. The core competence of Conductix-Wampfler is in the development, production, consultancy and installation of solutions that give tailor-made

answers to all questions of energy and data transfer for mobile consumers.

Beside its sector expertise, the company also stands out for its application expertise: it unites all the usual current technologies of energy and data transmission in the industry under one roof, such as cable festoon systems, conductor lines, power supply chains, spring cable reels, motor-driven cable reels, slip-ring assemblies through to inductive transfer solutions. For the customer this means product-neutral advice and the optimum technical implementation for each specific application from a single source.

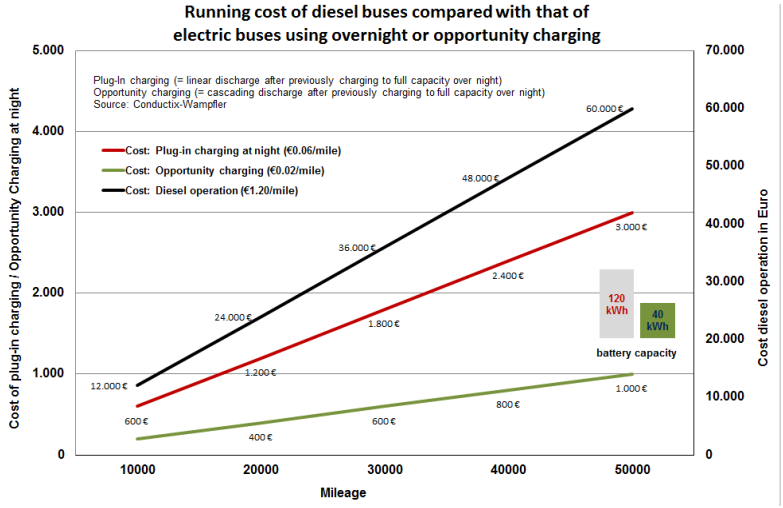
Pictures

Caption: Convenient and safe charging from the driver's seat (Conductix-Wampfler)

Caption: IPT permits a 12-metre electric bus three times the length of service (Conductix-Wampfler)

Caption: Once the hole has been prepared, the concrete shaft is installed at the stop, the charging module is connected up to the power grid and after installation only the charging plate is visible and the road is barrier-free

Caption: Installing a 60 kW charging module at a bus station with 120 kW charging capacity (Conductix-Wampfler)



Caption: Cost comparison of diesel bus, electric bus and electric bus with IPT charging (Conductix-Wampfler)

Date	13.05.2013
Images	PICT 12-12-19 Den Bosch_Inside Bus_IPT-Charge; PICT 12-12-19 Den Bosch_IPT-Charge; PICT 12-04-26 IPT-Charge_Urban Solution; PICT 12-07-10 Den Bosch_Construction; PICT 12-05-30 IPT-Charge_Cost comparison plug-in - opportunity charging - diesel operation

For further information:

Conductix-Wampfler GmbH
Mathias Wechlin
Product Manager Inductive Power Transfer IPT
Rheinstr. 27 + 33
79576 Weil am Rhein

Phone +49(0) 7621 / 662-287
Fax +49(0) 7621 / 662-7287
mathias.wechlin@conductix.com

Conductix-Wampfler GmbH
Marketing Communications
Michael Kusch
Rheinstraße 27 + 33
79576 Weil am Rhein

Phone +49(0) 7621 / 662-492
Fax +49(0) 7621 / 662-297
michael.kusch@conductix.com