

EVs Unplugged

Within a decade, advancement in power electronics could get us to a state where wireless charging comes as default in public spaces, Richard Gould, head of Business Development, INTIS Integrated Infrastructure Solutions tells IHS Hybrid-EV in an email interview

> **Inductive or wireless** charging has the potential to become one of the most sought after technologies considering the convenience factor associated with it. "Charge on the go" feature will be particularly helpful for commercial EV users and for fleet services running multi-shift operations. Germany-based INTIS, an engineering service provider for many industries including mobility, feels that improvement in power electronics could bring in cost benefits, in turn raising chances of commercial viability of the wireless charging technology by 2025. However, harmony and interoperability would be key for making it a reality. INTIS has invested

three years in R&D and has connected with a number of EV manufacturers to facilitate wireless charging. Richard Gould, head of business development at INTIS, shared his views with *IHS Hybrid-EV* about the technology, prospects and concerns that are yet to be addressed. Edited excerpt:

What is the business objective behind investment in inductive charging technology?

We don't see how wireless charging systems can be one-size-fits-all products. The magnetic fields used to transfer power interact with each type of vehicle differently depending on the



INTIS testing wireless charging on Volkswagen T5 Transporter inside its facility. Source: INTIS Integrated Infrastructure Solutions

shape and material of components and the vehicle underfloor.

We are aiming to become a dominant engineering service provider of development and optimisation for wireless charging systems.

How do you see the prospect of wireless charging?

The current electric mobility market does not yet reflect the potential of the [wireless charging] technology. But there exists sizeable opportunity as the EV market also includes industrial vehicles, such as fork lifts.

There will always be scenarios where wired charging is the more suitable technology, but given the advantages of wireless charging, such as convenience, robustness and the ability to charge on the move, we expect there to be a large uptake of these systems, especially in commercial applications where charging on the move is a prerequisite for the use of EVs.

We also see huge potential with fleet services.

To run a fully electric fleet, operators are usually required to maintain multiple vehicles to run multi-shift operations. Inductive opportunity charging can allow a reduction in the number of vehicles required for multi-shift operation by up to 60%.

Does INTIS rely on government or private funding?

The research and development project undertaken by INTIS for the last three years was subsidised by 50% by the German government. The remaining 50% was financed privately. We are currently in talks with one government agency within the European Union, who are very interested in dynamic charging for motorway/highway applications.

When do you expect to achieve return on your investments?

In the next two-three years, by concentrating on industrial and commercial transportation applications and demonstration projects to start off with. We fully expect private electric cars to use the technology as well, but they won't be the market drivers for the next few years.

INTIS has already launched 30kW system for wireless charging. When do you plan to roll out the product?

The system referred to was developed for dynamic charging but is also perfectly suited to stationary applications. We expect to roll out the product within the next 18 months.

What are the installation costs of this product?

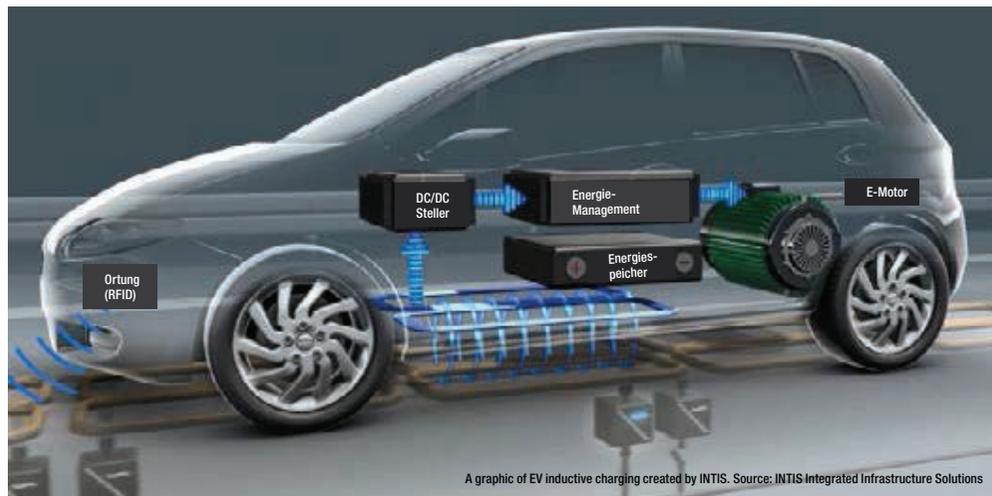
Installation costs will depend on each application (stationary or dynamic charging, embedded in the road or not). As an example, a wireless charging system for stationary applications with the road side charging coils installed above the road surface will prospectively have similar installation costs per kW to a wired system.

The greatest benefit we expect to see with dynamic solutions is that total lifecycle costs will be lower than equivalent catenary systems, especially considering maintenance and spatial impact.

There is no material wear and tear and we expect far fewer planning ramifications. A public transport provider we have been talking to reckoned on a seven- to nine-year planning and consultation process to approve an in-town catenary system, due to public resistance. This comes with associated costs.

Can you provide us with a ballpark cost figures for a wired system as you mentioned?

What we have seen at the moment for wired systems is between EUR400-800 (USD433-867) per kW, although this is



A graphic of EV inductive charging created by INTIS. Source: INTIS Integrated Infrastructure Solutions

hardly likely to be the final price, given the market is nowhere near mature. Prices will change greatly with volume.

How long does it take to install a typical 30kW system for stationary charging?

Maybe a maximum of two weeks. The most time costly activity is construction work in the road, which is not something we are likely to have control over.

And complexity will be similar to that of installing a wired system of equal charging capacity.

Are you working with any automakers to facilitate wireless charging?

“The basics of wireless energy transfer are not complex, but implementing it is... Harmonisation & inter-operability are also some of the main hurdles,” says Richard Gould, head of Business Development, INTIS Integrated Infrastructure Solutions

What are the challenges that you foresee in this market?

The basics of wireless energy transfer are not complex, but implementing it is. As an example of technical issues, for a high-powered system that is economically viable you need semi-conductors which can cope with high switching speeds and high voltage.

These are only just being developed. Harmonisation and inter-operability are also some of the main hurdles. If the technology is to succeed as an infrastructure, it needs to be fairly open to allow the largest number of applications possible to use it. But this requires the cooperation of vehicle OEMs,

We are in discussions with a number of EV OEMs.

We expect to begin working together with some of these OEMs to facilitate wireless charging in 2015.

What is your target market (geographically)?

We intend to focus on the EU for the near future and obviously we will go where the markets are. Given the global nature of the EV market, we don't expect to stay limited to Europe for very long.

What is INTIS planning next in the alternate powertrain spectrum?

We consider charging technology to be an integral part of the EV powertrain. The interaction between the charging system and powertrain is one of our focuses. We will be concentrating on higher powered and dynamic inductive charging systems next.

infrastructure providers, roadbuilders, (local) governments and safety executives, to name just a few.

We have worked with road construction experts from the start to ensure our technology is as cost-effective as possible to install into the road, but this is only the start. For a dynamic system, on a motorway say, the technology needs to work for decades with millions of vehicles passing over it.

How do you cope with wear and tear on the road and resurfacing? What about grid stability and energy provision requirements in areas away from industry? Who is going to be the operator of such infrastructure?

How do you foresee wireless charging market for EVs in 2025?

With developments in power electronics and subsequent cost benefits, we expect wireless charging to be well on the way to being the default charging solution for EVs in public spaces by 2025. ■