Inductive Charging

Brief description of organization and role in the project

Bombardier’s PRIMOVE portfolio began with the development of the innovative PRIMOVE charging system for trams, allowing them to run continuously without overhead lines. The Flanders’ DRIVE research project on inductive charging allowed Bombardier to test its inductive charging technology on road-based vehicles as well.

In the research project, Bombardier delivered the inductive charging technology, assisted with the test concept and plan, especially with regard to electromagnetic field emissions, installed the wayside charging infrastructure and supported the onboard integration.

In a first phase, a Van Hool bus fitted with PRIMOVE charging equipment for maximum energy transfer of 160kW proved the technical feasibility of high-power inductive energy transfer for electric buses while being parked (static charging) and while moving (dynamic charging).

During the second phase, we performed elaborate tests on an electric Volvo C30 car equipped with PRIMOVE fast charging technology. The easy integration of the 22kW system did not require any changes to the car system. Car positioning proved to be very flexible both laterally and longitudinally.

Importance of the project for the organization

The PRIMOVE portfolio now provides a contactless power source for all electric vehicles, from light rail and bus networks to commercial vehicles and cars.

Project results for the organization

The research project provided Bombardier with valuable results which helped optimizing the PRIMOVE charging system for road-based vehicles for commercial projects.

Next steps

Bombardier is currently implementing its 200kW system for electric buses in the cities of Bruges (Belgium), as well as Braunschweig, Mannheim and Berlin (Germany). On the automotive side, the PRIMOVE team has worked on the further development of the technology and is now able to offer its automatic and convenient solution at three levels of charging power: 3.6kW, 7.2kW and 22kW.

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The project is supported financially by the Flemish government.
Inductive Charging

Brief description of organization and role in the project

The Belgian Road Research Centre (BRRC) is a public utility research institute at the forefront of technological developments in the field of roads, providing services to the entire industry. Sustainable development through innovation and through constant care for and improvement of the technical quality of roads and the environment for road users – whether motorists, cyclists or pedestrians – and people living nearby is the vital lead behind all activities of the Centre.

The role of BRRC in the project is to provide the necessary knowledge to incorporate the devices needed for creating an inductive field in the road. BRRC dealt with the challenges to integrate separate parts in both a concrete pavement and asphalt pavement. It was also responsible for evaluating the behavior of the road under the load of traffic to determine the impact of the inductive charging system on pavement durability.

Importance of the project for the organization

This project is important for BRRC in the sense that it represents a step forward towards the ‘Forever open road concept’. The integration of new sustainable techniques generates new possibilities for road users and allows more continuous and sustainable driving.

Project results for the organization

The implementation of the inductive charging system showed that it is feasible to introduce components in the road that are foreign to the conventional pavement. This opens possibilities for other functions for the road. Also the interdisciplinary aspect of the project leads to new insights in the behavior of the pavement.

Next steps

Following steps concern the implementation of this technique in real conditions. BRRC will cooperate with the project partners to help road operators to integrate this technique in the road network.

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Inductive Charging

Brief description of organization and role in the project

INFRAX is a Flemish DSO that manages and operates electricity grids, natural gas networks, cable TV and sewerage and invests in the maintenance, improvement and expansion of these networks. Over 2 million clients are connected.

INFRAX develops information and awareness raising programs in order to achieve a more sustainable way of life through energy savings and the optimum use of renewable energy sources. On the other hand, INFRAX also investigates possibilities to increase the hosting capacity of renewables in the grid without requiring reinforcements.

Importance of the project for the organization

The project investigated elements of smart metering and billing, as well as the impact of the inductive charging technology on the electric grid. These topics are the core business of the DSO, which is responsible for providing validated metering data to the market and for ensuring security of supply and quality of service.

Project results for the organization

The project illustrated that the impact of conductive and inductive charging on the grid is comparable.

Other interesting results concerned the behavior of the Flemish fleet, the need for charging infrastructure and the conditions in which electric charging may cause grid constraints. Slow charging seems to be very interesting as for the loading of the grid and the life expectancy of the battery. When there are sufficient charging possibilities, people can do the majority of their trips fully electrically. The need for fast chargers is rather limited.

Next steps

INFRAX will install, operate and maintain the charging infrastructure for its municipalities. Based on the project results, INFRAX will investigate in greater detail the most interesting locations and the most suitable charging infrastructure that is needed in the public domain and develop potential concepts for controlling electric charging in congested areas with high concentrations of PV.

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Inductive Charging

*Brief description of organization and role in the project*

Inverto NV, spin off of Ghent University, is a technology provider and production partner for power electronics and large-screen displays. Focusing on inductive power transfer for 10 years, Inverto took the opportunity to participate in the CED project on wireless charging for automotive and bus applications.

*Importance of the project for the organization*

The CED project expanded the Inverto knowledge on wireless power transfer to automotive wireless charging application. This creates new market opportunities.

*Project results for the organization*

To be able to build a wireless power charging system fitting in the FEV Volvo C30 used for the CED project, the automotive requirements were listed and the ongoing standardization was examined.

A successful 3.6KW ‘grid-to-battery’ system was built and tested in the Volvo C30.

The demonstrator achieves a 90% grid-to-battery efficiency while providing a safe energy transfer. This is considered state-of-the-art.

*Next steps*

The increased knowledge of automotive wireless charging applications combined with Inverto’s existing know-how on wireless power paves the way for a genuine valorization trajectory and many opportunities for future automotive and industrial applications.

Inverto now has a partnership with one of the main global players to provide solutions for the wireless charging of electric buses, PHEV and FEV.

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Inductive Charging

Brief description of organization and role in the project

Mobistar is the second largest mobile Telecom operator in Belgium and a publicly traded company since 1996. The company is member of the Orange Group, which covers France Telecom’s main mobile activities, and has been involved in M2M since 2002. When Mobistar established its dedicated M2M Business Unit, it was among the first operators in Europe to do so.

Importance of the project for the organization

M2M allows devices to communicate in order to optimize cost efficiency, create new business and promote environmentally friendly solutions.

Mobistar focuses on a number of fields of what is generally known as Smart Cities:
- Automotive: Connected Cars, e-Call, In-Car Entertainment, Electric Vehicles, ...
- Mobility: Road Charging, Public Transportation, Dynamic Traffic Control, ...
- Utilities: Smart Home, Smart Buildings, Smart Grids, Smart Metering, ...
- Healthcare: remote monitoring of patients

Project results for the organization

The Continuous Electric Drive project enabled us to get a better understanding of the specific commercial, technical and operational challenges of this new type of business.

Next steps

We see machine-to-machine much more as a service than as a product. Our offer goes far beyond simple connectivity and will enable you to get economy of scale, cost control and faster deployment.

The International M2M Center of Competence (IMC) was created by Orange Business Services (30,000 employees, turnover of 8 billion €, focus on Fortune 500) to provide wireless M2M GSM connectivity to Original Equipment Manufacturers (OEMs) and international clients.

In the International M2M Center, we’ve brought together the M2M expertise of the entire France Telecom Group and we leverage our knowledge of the M2M ecosystem to bring the most innovative solutions.

Here at Mobistar, we share the passion to ecosystem the industry and we are excited to help shaping the M2M future together with our clients and partners.

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The project is supported financially by the Flemish government.
Inductive Charging

Brief description of organization and role in the project

Van Hool is a Belgian independent manufacturer of buses, coaches and commercial vehicles. The company, founded in 1947, is located in Koningshooikt (Belgium). The main part of our production is for Europe and the US. Van Hool has more than 4,000 employees worldwide, most of whom work in the branch establishments in Koningshooikt and Bree. www.vanhool.be.

In the CED project, Van Hool equipped two buses for urban public transport (one A330 and one A360) with prototypes of the necessary equipment to transfer electric power to the vehicle during movement. The subsequent research confirmed the feasibility of this type of power transfer to an electric powertrain and identified outstanding technological issues.

Importance of the project for the organization

To be able to realize zero-emission public transport in the future, the introduction of electric powertrains will be mandatory. To energize these powertrains, there are several options, all having their own maximum performance range. The application of inductive power transfer to the vehicle, let it be dynamic (during driving) or static (when the bus stops), in combination with one-board energy storage, is one of these options.

As a pioneer in sustainable urban public transport, Van Hool aims to have access to each of these electric power options. From this perspective, our participation in the CED project was a first step in the application of inductive power for the further development of sustainable zero-emission vehicles.

Project results for the organization

It has been proven that electric power can be transferred to a moving bus using the concept of inductive power transfer. The constraints under which this transfer can be realized are now documented.

Next steps

Many outstanding issues and technological hurdles still need to be tackled. In the near future, Van Hool will, together with its partners, continue to integrate this technology for in-the-field demonstration in order to come to a commercial solution. The first application will be static rather than dynamic, which reduces the complexity of the concept.

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The project is supported financially by the Flemish government.
Inductive Charging

Brief description of organization and role in the project

Volvo Car Corporation (Sweden) is conducting research into pure electric drives and developed the C30 Electric, a fully fledged four-seater with a power output of 89 kW or 120 bhp. Volvo Cars supplied the car for the Inductive Charging project.

Importance of the project for the organization

Inductive regular and fast charging is an appealing technology because it has the potential to improve the owner’s comfort and convenience by enabling to charge the vehicle without requiring a power lead, which – in turn - will no doubt have a positive effect on the customer’s acceptance of electric vehicles.

Project results for the organization

The project has shown that the inductive fast charging technology can be applied on cars. The Primove charging technology of project partner Bombardier Transportation achieved good efficiency and performance results. Testing was done on an add-on pick-up unit and on the interfaces between this unit and the car. Electromagnetic fields have shown low impact on the environment or car users.

We also conducted research into slow or regular charging together with Inverto.

Next steps

The Inductive Charging project enables Volvo to continue its research in this type of charging and to evaluate the feasibility of this technology in future prototypes.

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The project is supported financially by the Flemish government.