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ICT for Electric Mobility III

*Integration of commercial electric
vehicles into logistics, energy and
mobility infrastructures*



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ICT for Electric Mobility III

Integration of commercial electric vehicles into logistics, energy and mobility infrastructures

Modern information and communication technology (ICT) plays a major part in electric mobility. It controls all the important functionality in electric vehicles and forms the foundation for integrating them into future intelligent energy and traffic systems. A functioning electric mobility system as a whole is built on ICT.

With the technology programme „ICT for electric mobility III: integration of commercial electric vehicles into logistics, energy and mobility infrastructures“ the Federal Ministry for Economic Affairs and Energy (BMWi) supports research projects that focus on the use of electric mobility in commercial contexts. From 2016 to 2020, at least 21 projects are developing exemplary system solutions for the commercial sector while integrating technologies, services and business models.

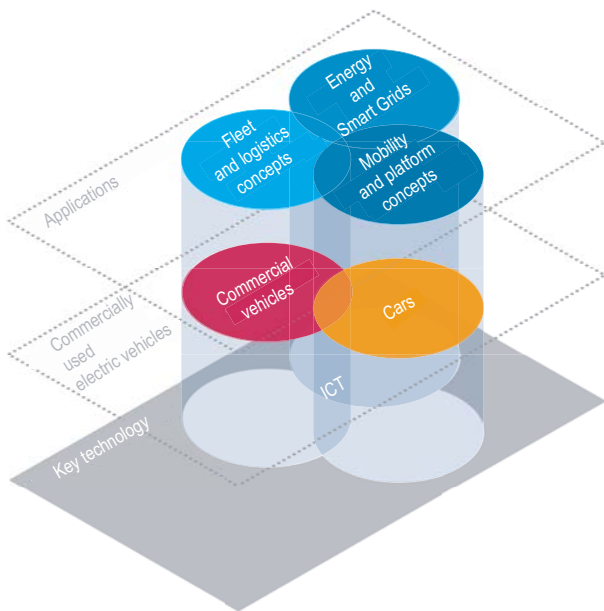
As a primary objective the funding programme identifies commercially viable applications of electric mobility for commercial vehicles and helps them achieve break-throughs. As in the predecessor programmes, it is not the development of electric vehicles and drivetrains that is at the centre of attention but rather their integration into ICT-based holistic logistics, energy management and mobility approaches. The projects develop suitable technologies and test them in real-life settings.

The funded projects focus on three topic areas:

- **Logistics:** Electric trucks and cars used commercially
- **Energy:** Integration of commercial electric mobility into energy distribution networks and smart grids
- **Mobility:** Intelligent integration into holistic mobility, platform and logistics approaches in combination with novel vehicle technology

In order to adequately cover the entire electric mobility system, the funding programme “ICT for electric mobility III” does not consider these three focus areas in isolation. Instead, following a systemic approach, these focus areas are addressed in a cross-cutting manner. This approach is already evident even within many individual projects themselves. Moreover, the supporting research activity of

Illustration: Thematic priorities of the funding programme.





the funding programme ensures a synoptic view and analysis of the focus areas.

Around 100 enterprises and scientific institutions are involved in the projects. The overall volume of funding for the high priority funding programme “ICT for electric mobility III” currently stands at 60 million euros. When the funding provided by the partners is also taken into consideration, the total amount represents an investment of about 110 million euros. “ICT for electric mobility III” is embedded into the German Government Programme for Electric Mobility which forms the basis for the accelerated market launch of electric vehicles in Germany.

3connect

With a total of 18 partners in three locations, 3connect investigates key aspects of electric mobility in commercial fleets, in public transport and in agriculture. The emphasis is on algorithms, interfaces and standards for the interoperability of vehicle technology, commercial mobility and electrical grid that have been lacking so far. The Aachen team focuses on the integration of electric logistics fleets into energy management, the Allgäu team on the integration of electric hybrid tractors into the energy management of agricultural enterprises, and the Osnabrück team on a multimodal e-mobility platform with electric buses for public transport.

Leader of the consortium

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Adaptive City Mobility 2



Adaptive City Mobility 2 builds on the success of its predecessor project in which a concept for a lightweight electric taxi with battery exchange system specifically for inner cities was developed. In a field test, the project explores the technical realisation of the deployment of multiple vehicles of this kind on public roads. This tests the intelligent networking of vehicles and battery exchange stations in a complete electric mobility system. The aim is to demonstrate that an urban electric taxi fleet can be operated in a profitable and resource-conserving way and is embraced by users.

Leader of the consortium

BMZ Batterien-Montage-Zentrum GmbH

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ALEC



Transport on airport aprons has become unthinkable without electric vehicles. However, it needs an excess of those vehicles in order to be able to serve demand at peak times. This has made a further expansion of electric mobility on aprons uneconomical until now. ALEC counteracts this with a multi-purpose approach that has been tried and tested in municipal fleets. The project will develop and test three electric universal equipment carrier vehicles and five different working attachments. The equipment changing system is to be tested for luggage transport as well as for water, petrol and electricity supply of aircrafts at the Erfurt-Weimar Airport.

Leader of the consortium

Hako GmbH

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charge4C



charge4C aims to create an innovative sharing platform that enables dynamic pricing of parking and charging, and also organises community and related services around charging stations. As a result, citizens will become increasingly involved in the installation of charging infrastructure while optimizing network utilisation and avoiding peak loads. Each charging column is equipped with sensors so that the digital control platform not only determines the price but also records the specific charging profile. This serves to identify further suitable and desirable charging locations in the project regions around Saarlouis and Cologne.

Leader of the consortium

ampido GmbH

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DiTour-EE

Electric mobility represents both a key opportunity and challenge for the tourism industry's future. DiTour-EE addresses this trend and develops an ICT platform that combines and optimizes the mobility demand of both the guests' as well as the hotel's own vehicles with the building's energy management. The platform optimizes the hotel's energy consumption, and also controls the charging processes of electric vehicles in such an intelligent manner that no additional loads are created. This enables the tourism industry to utilise electric mobility in an economically viable manner. The entire system is tested in 12 hotels in Thuringia, each with three charging stations and 5 equipped rooms.

Leader of the consortium

Betterspace GmbH

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eJIT

The objective of eJIT is to combine electric mobility and autonomous driving in the just-in-time logistics of two automotive factories. As part of the project two electrically driven truck prototypes will be built and tested in three shift operation: a tractor with integrated driver assistance systems for use on transport routes of up to 30 km around and inside the VW factory in Zwickau, and a highly autonomous tractor for the three kilometre route between the logistics hub and the Porsche factory in Leipzig. Actionable business models are to be developed that enable the economic use of such concepts.

Leader of the consortium

RKW Sachsen Rationalisierungs- und Innovationszentrum e.V.

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eMobility-Scout

How can commercial electric vehicle fleets be operated in an economically efficient way? Which logistics plans and loading strategies are best? This is being tested in pilot applications at Berliner Verkehrsbetriebe (BVG) and Stuttgart Airport. Initially, BVG will electrify 30 out of its 400 vehicles and use the lessons learnt for the conversion of the whole fleet. At Stuttgart Airport, electric busses are to be deployed and to be integrated into an intelligent energy management system. As a key for solving these problems the project aims to implement the “eMobility-Scout”, a cloud-based ICT platform for holistic electric mobility systems.

Leader of the consortium

Carano Software Solutions GmbH

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GridCON

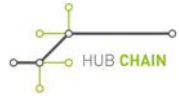
GridCon2

In the previous project, the concept of a cable-guided electric tractor was developed and the feasibility of power supply for high-performance agricultural machines via an cable demonstrated. GridCon2 now wants to electrify other differently configurable agricultural machines. A semi-stationary, movable storage unit on the edge of the field feeds the machines via cable with energy from renewable sources in addition to electricity supplied by the local grid and can serve as energy storage if required. IT communication and cloud connection are to be integrated into the cable in order to ensure exact laying of the cable and a high-precision and coordinated management of several machines.

Leader of the consortium

John Deere GmbH & Co. KG

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Hub Chain

Public transport of the future will be expanded into a cross-carrier network. Some bus and train stations will likely become hubs where passengers change to (autonomous) electric vehicles which will take them to their individual destinations as required. The Hub Chain project aims to show how such on-demand vehicles can be linked intelligently via one platform so that they are available at the right time and at the right hubs in sufficient numbers, thus reliably connecting all the hubs. Their use will be tested by running an autonomous minibus in Osnabrück as well as conventional minibuses in Mecklenburg-Vorpommern.

Leader of the consortium

Stadtwerke Osnabrück AG

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iHub

Electric trucks feature only a small range compared to diesel trucks. Therefore, logistics companies only benefit from operating them when they are controlled through centralised fleet management with the flexibility to decide whether a diesel or electric truck is most suited for a particular tour. The key parameters are the state of the battery, the load planning and the length of the distribution routes. Project iHub develops the prototype of an ICT platform for this purpose. This includes the deployment of three electric trucks with a total weight of 12 tons in a mixed fleet transporting palletized freight as general cargo. The results will then be extrapolated to larger fleets.

Leader of the consortium

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iMove

**iMOVE**

Locally emission-free mobility through the electrification of means of transport is a promising way to reduce emissions in cities. To date, this systemic potential has been underexploited. The iMove project is countering this by developing an intermodal ICT solution in Stuttgart that enables integrated processing of all relevant data from the energy supply, charging infrastructure and transport system. The main focus here is on the nationwide implementation of intelligent incentive and control options for integrated route and charging management for electric fleets with simultaneous consideration of traffic, charging and energy systems.

Leader of the consortium

Hubject GmbH

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lokSMART Jetzt! 2

**lokSMART**
Lokale smart grids

In the funding programme „ICT for Electric Mobility II“, the lokSMART Jetzt! project has demonstrated the potential benefits of coupling electric vehicles with self-sufficient local smart grids. Based on this, the successor project tests decentralised electricity supply units in a commercial context that are fed from renewable energy sources and include electric vehicles with bidirectional fast charging capability. In three field trials with a total of 12 electric delivery vehicles of a bakery, an engineering firm and an event catering supplier, the project develops solutions for the operation of small electric fleets that are mostly independent of the general grid.

Leader of the consortium

Planungsbüro Koenzen

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MENDEL



The MENDEL project aims to minimise the load put on electric grids through the charging of electric buses. This will be achieved both through lower costs for building and operating charging infrastructure and through reducing the electricity consumption of the buses. This requires optimisation of vehicle deployment and infrastructure planning as well as load management and driving strategy in day-to-day operation. The system that MENDEL develops will be tested with a pilot fleet of five buses in Braunschweig and will be integrated into real-life operation via modified traffic light schedules and a traffic computer. The project thus links the two domains of “intelligent traffic systems” and “smart grid”.

Leader of the consortium

INIT GmbH

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OVAL



At present, drivers of electric vehicles can usually only access charging points in public places if they have a contract with a charging point operator or an electricity provider. The OVAL project analyses how adhoc charging and payment (without a contract from an emobility service provider) as required by the European Union can be realised and assesses the possibilities against economic and legal criteria. The results and recommendations will be crystallised in a study and will be implemented in practice in pilot plants at locations in Hilden and Langenfeld.

Leader of the consortium

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PostBot-E

The high density of traffic and the increasing delivery traffic is a problem for many cities. To address this, PostBot-E proposes automated supply and disposal services for urban quarters with autonomous electric vehicles. This requires the installation of mechatronic parcel boxes on buildings, with some allowing inductive charging. The autonomous, electric vehicles are the size of a pallet and supposed to deliver packages and collect recyclables in a quiet and safe manner, especially at night. The goods are handled fully automatically by the technology installed in the vehicle. Depending on the situation, orders can either be controlled centrally via an IT control centre or decentrally.

Leader of the consortium

SEW-EURODRIVE GmbH & Co. KG

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RouteCharge

RouteCharge

By means of an intelligent battery exchange system this project aims to make distances of up to 300 km accessible for transporting goods with electric trucks. The first step is a field trial of a concept with an electric 20 ton truck with swappable battery and three battery exchange stations. These will be set up between the central store of a logistics company in Peine and its distribution centre for the Berlin area in Potsdam. The exchange stations are intended to play a second role as the providers of balancing power on the electricity market. Thus, they can be operated in a profitable way.

Leader of the consortium

MC Management GmbH

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SADA – completed 04/2018

The project SADA (Smart Adaptive Data Aggregation) starts from the observation of a discrepancy: While modern cars and trucks are equipped with more and more ICT functionality and the traffic control systems in many cities become more and more intelligent, there are hardly any efforts to link vehicle and infrastructure data. Therefore, the SADA project develops an ICT-based solution that combines vehicle data in a modular and flexible manner with sensor data collected by the city infrastructure so that new applications can rapidly be implemented. The integration is to be demonstrated with the example of the (partly) autonomous control of an inductive charging station.

Leader of the consortium

Siemens AG

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Smart Distribution Logistik

Media logistics has recently seen major changes, which include restructuring of business processes. This opens up the chance to use electric transport vehicles with the help of intelligent planning right from the start, costoptimised in distribution processes. Building on the results of its predecessor project, Smart Distribution Logistik (SDL) aims to deploy e-vehicles in media logistics economically from the first year onwards. The project develops a learning ICT system platform for planning, controlling and holistically optimising the operation of at least 40 e-vehicles in a field trial for the delivery of newspapers, advertising material and mail in three mixed fleets.

Leader of the consortium

DAKO GmbH & Co. KG

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sMobilityCOM



After an earlier project demonstrated possible solutions for optimized charging and deployment management of electric vehicles in the Erfurt area, sMobilityCOM now applies these results specifically to the fleets of mobile care services. Because of its large number of vehicles and its high public profile, this sector holds important leverage for the acceptance and wide use of electric mobility. Intelligent multi-use (e.g. in combination with private security services) and an integrated energy and operations management approach are intended to demonstrate in this examples that care services can use electric vehicles in an economically viable way.

Leader of the consortium

INNOMAN GmbH

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UrbanMove



‘PeopleMovers’ are electric autonomous minibuses for up to 15 passengers that manage the transport of people within city centers as needed. Building on this vision, the Urban-Move project will develop a service platform that processes information flows from three sources: city (transport) infrastructure data, autonomous minibus data, and data on user behaviour, including user acceptance. The platform is to be developed step by step so that the autonomous electric shuttle routes can be precisely tailored to user needs. The IT architecture builds on a platform already operated economically by a project partner. With a small fleet of PeopleMovers it will be tested in Aachen.

Leader of the consortium

e.GO Mobile AG

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WINNER



How can the housing industry play an active part in the roll-out of electric mobility? The WINNER project wants to provide a sample answer to this question, initially in an estate of eight housing blocks and 280 housing units in Chemnitz. The project partners will generate renewable energy using a photovoltaic plant on top of the blocks. The electricity is sold directly to tenants while an ICT-controlled active local load management system directs excess capacity into storage in electric vehicles of tenants as well as service providers working on the estate. The overall objective is to achieve the first demonstration of an economically self-sufficient, grid-neutral infrastructure for commercial mobility by tightly integrating the housing industry.

Leader of the consortium

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Supporting research activity

As a supporting research activity, the VDE Verband der Elektrotechnik Elektronik Informationstechnik e.V. and the Deutsches Dialog Institut have been tasked by the Federal Ministry for Economic Affairs and Energy to assist the projects with identifying and overcoming obstacles to innovation, with collaborating across and beyond projects, and with transferring results.



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